Newport Adhesives and Composites NCT4708 MR60H 300gsm 38% RC Unidirectional Qualification Material Property Data Report

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A	Kim-Leng Poon	8/19/2011	Yeow Ng	ILT calculations revised to average thickness of the curve section.

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1. Introduction

1.1 Scope

The test methods and results described in this document are intended to provide basic composite properties essential to most methods of analysis and are consistent with MIL-HDBK-17-1F—Composite Materials Handbook for Polymer Matrix Composites. This report contains material property data of common usefulness to wide range of projects. The lamina and laminate material property data have been generated with NCAMP oversight in accordance with NSP 100 NCAMP Standard Operating Procedures; the test panels and test specimens have been inspected by NCAMP Authorized Inspection Representatives (AIR) and the testing has been witnessed by NCAMP Authorized Engineering Representatives (AER). However, the data may not fulfill all the needs of any specific company's programs. Specific properties, environments, laminate architecture, and loading situations that individual companies may require additional testing.

The use of NCAMP material and process specifications do not guarantee material or structural performance. Material users should be actively involved in evaluating material performance and quality including, but not limited to, performing regular purchaser quality control tests, performing periodic equivalency/additional testing, participating in material change management activities, conducting statistical process control, and conducting regular supplier audits.

The applicability of NCAMP material property data, material allowables, and specifications must be evaluated on case-by-case basis by aircraft companies and certifying agencies. NCAMP assumes no liability whatsoever, expressed or implied, related to the use of the material property data, material allowables, and specifications.

This report contains material property data only. Statistical analysis of the data including the calculations of b-basis values is given in a separate report, Newport NCT4708 MR60H 300 gsm 38% RC Unitape Material Allowables Statistical Analysis Report NCP-RP-2010-074 N/C. The qualification material was procured to NCAMP Material Specification NMS 4708/1 Rev Initial Release dated January 15, 2009. The qualification test panels were cured in accordance with Newport NPS 4708 Process Specification Initial Release. The panels were fabricated at NIAR Composites Lab at WSU, 1845 N. Fairmount, Wichita, KS 67260-0093. The NCAMP Test Plan NTP 4708Q1 Rev B was used for this qualification program.

Part fabricators that wish to utilize the material property data, allowables, and specifications may be able to do so by demonstrating the capability to reproduce the original material properties; a process known as equivalency. More

information about this equivalency process including the test statistics and its limitations can be found in Section 6 of DOT/FAA/AR-03/19 and Section 8.4.1 of MIL-HDBK-17-1F. The applicability of equivalency process must be evaluated on program-by-program basis by the applicant and certifying agency. The applicant and certifying agency must agree that the equivalency test plan along with the equivalency process described in Section 6 of DOT/FAA/AR-03/19 and Section 8.4.1 of MIL-HDBK-17-1F are adequate for the given program.

Aircraft companies should not use the data published in this report without specifying NCAMP Material Specification NMS 4708/1. NMS 4708/1 may have additional requirements that are listed in its prepreg process control document (PCD), fiber specification, fiber PCD, and other raw material specifications and PCDs which impose essential quality controls on the raw materials and raw material manufacturing equipment and processes. *Aircraft companies and certifying agencies should assume that the material property data published in this report is not applicable when the material is not procured to NMS 4708/1.* NMS 4708/1 is a free, publicly available, non-proprietary aerospace industry material specification.

The data in this report is intended for general distribution to the public, either freely or at a price that does not exceed the cost of reproduction (e.g. printing) and distribution (e.g. postage).

1.2 Symbols Used

ν_{12}^{t}	major Poisson's ratio, tension
$\mu\varepsilon$	micro-strain
E_1^{c}	compressive modulus, longitudinal / warp direction
E_1^{t}	tensile modulus, longitudinal / warp direction
E_2^{c}	compressive modulus, transverse / fill direction
E_2^{t}	tensile modulus, transverse / fill direction
F_1^{cu}	ultimate compressive strength, longitudinal / warp direction
F_1^{tu}	ultimate tensile strength, longitudinal / warp direction
F_2^{cu}	ultimate compressive strength, transverse / fill direction
F_2^{tu}	ultimate tensile strength, transverse / fill direction
SBS	short beam strength
ν_{12}^{c}	major Poisson's Ratio, compression
ν_{21}^{c}	minor Poisson's Ratio, compression
$F_{12}^{s5\% \text{ strain}}$	in-plane shear strength at 5% strain

$F_{12}^{s0.2\%}$	in-plane shear strength at 0.2% offset
G_{12}^{s}	in-plane shear modulus

Superscripts

c	compression
cu	compression ultimate
s	shear
su	shear ultimate
t	tension
tu	tension ultimate

Subscripts

1 – axis; longitudinal / warp direction
(parallel to warp direction of reinforcement)
2 – axis; transverse / fill direction
(parallel to fill direction of reinforcement)
12; in-plane

Acronyms and Definitions

ASTM	American Society for Testing and Materials
B – Basis	95% lower confidence limit on the tenth population percentile
CV	Coefficient of variation
CTD	cold temperature dry
CPT	cured ply thickness
ETD	elevated temperature dry
ETW	elevated temperature wet
Gr/Ep	graphite/epoxy
norm	normalized
RTD	room temperature dry
SACMA	Suppliers of Advanced Composite Materials Association
SRM	SACMA Recommended Method
CPT	cured ply thickness

Tply	thickness divided by the number of plies provides the thickness average per specimen
wet	specimen with an “equilibrium” moisture content
T, RH	temperature, relative humidity

1.3 NIAR NCAMP – Newport Specimen Naming Format

The NIAR specimen names can be correlated to Newport specimen names using the nomenclature in Figure 1-1

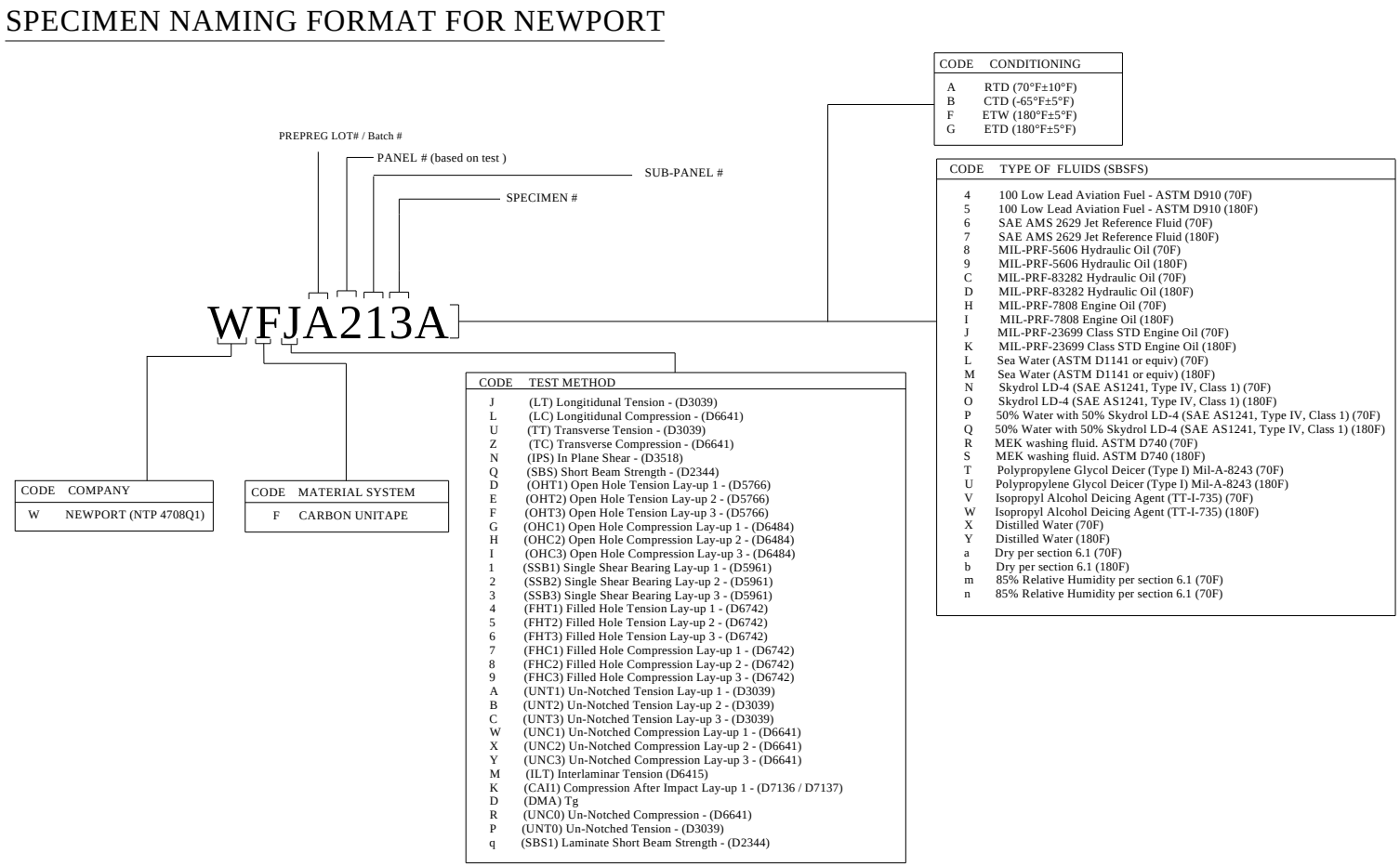


Figure 1-1: NIAR – Newport Specimen Naming Format Correlation

1.4 References

ASTM Standards

All testing was in accordance with nationally recognized standards, methods and procedures. Specific mechanical property test methods applicable to the test program in this document include:

- ASTM D2344/D2344M-00(2006) – Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
- ASTM D3039/D3039M-00(2006) – Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials
- ASTM D3518/D3518M-94(2007) – Standard Test Method for In-Plane Shear Response of Polymer Matrix Composite Materials by Tensile Test of a ± 45º Laminate In-Plane Shear Strength and Modulus
- ASTM D5766/D5766M-02a – Standard Test Method for Open Hole Tensile Strength of Polymer Matrix Composite Laminates
- ASTM D5961/D5961M-05e1 – Standard Test Method for Bearing Response of Polymer Matrix Composite Laminates
- ASTM D6415-06ae1 – Standard Test Method for Measuring the Curved Beam Strength of a Fiber-Reinforced Polymer-Matrix Composite
- ASTM D6484/D6484M-04 – Standard Test Method for Open-Hole Compressive Strength of Polymer Matrix Composite Laminates
- ASTM D6641/D6641M-01e1 – Standard Test Method for Determining the Compressive Properties of Polymer Matrix Composite Laminates Using a Combined Loading Compression (CLC) Test Fixture
- ASTM D6742/D6742M-02 – Standard Practice for Filled-Hole Tension and Compression Testing of Polymer Matrix Composite Laminates
- ASTM D7136/D7136M-05e1 – Standard Test Method for Measuring the Damage Resistance of a Fiber-Reinforced Polymer Matrix Composite to a Drop-Weight Impact Event
- ASTM D7137/D7137M-05e1 – Standard Test Method for Compressive Residual Strength Properties of Damaged Polymer Matrix Composite Plates

1.5 Methodology

1.5.1 Process Definition

For each combination of test, batch and condition, the specimens were selected from minimum two separate panels cured separately as shown in Figure 1-1 unless otherwise specified.

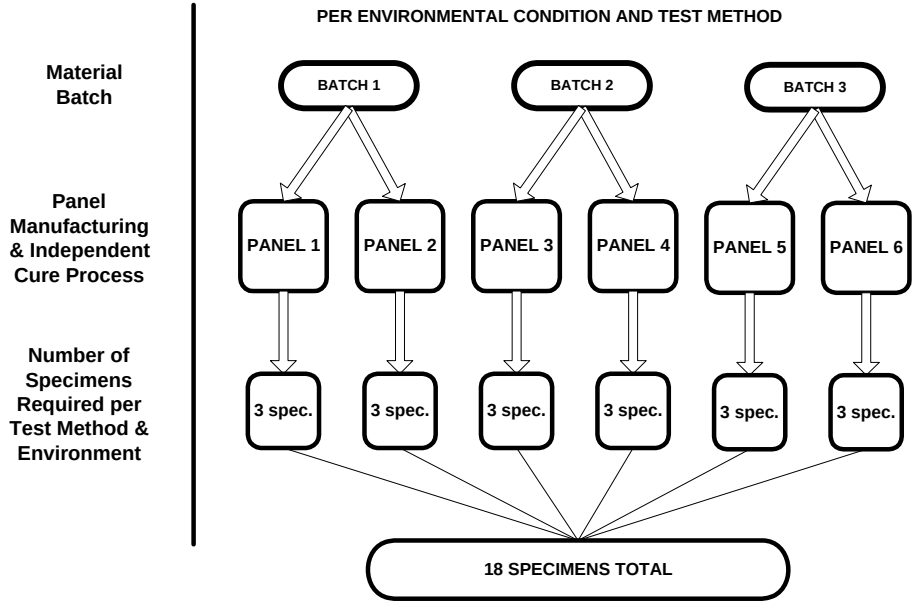


Figure 1-1: Specimen Selection Methodology

All panels were fabricated in accordance with NCAMP Process Specification NPS 4708 “C” Cure Cycle.

In order to facilitate individual specimen trace ability, individual specimen numbering and/or skewed lines were written or drawn across each sub-panel as shown in Figure 1-2.

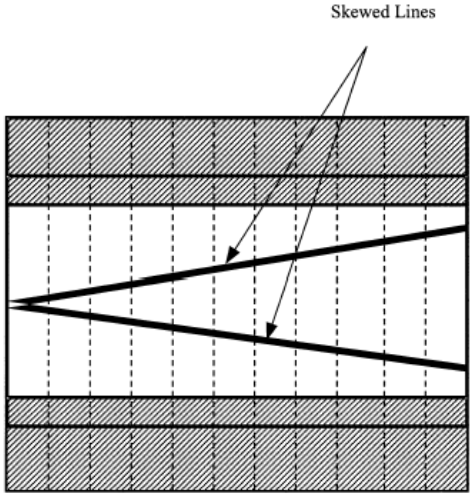


Figure 1-2: Specimen Traceability Line

For the single shear bearing tests, the ASTM D5961 was used with one of the pairs of specimens replaced by a steel fixture. The configuration is shown in Figure 1-3 below.

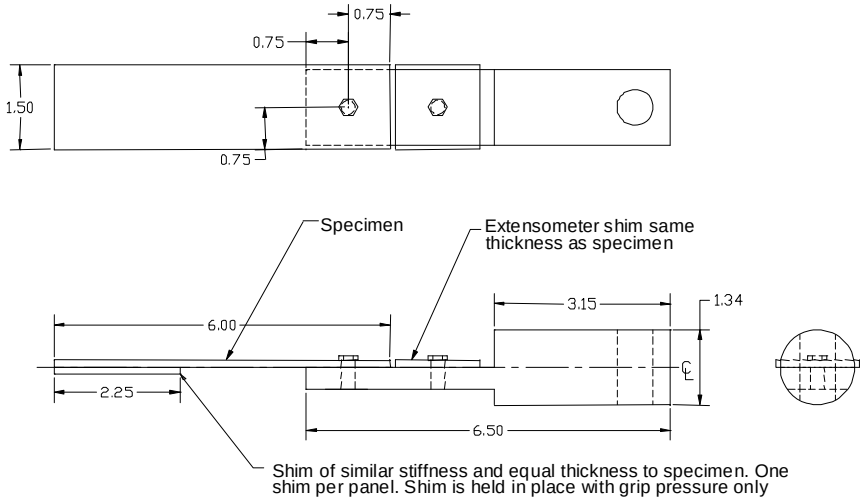


Figure 1-3: Modified ASTM D5961 (Single Shear Bearing) Specimen and Loading Arrangement

1.5.2 Specimen & Testing Details

1.5.2.1 Tabbing

Tabs were used on all Longitudinal Tension specimens.

1.5.2.2 Specimen Dimensions & Test Configuration

For filled-hole and bearing tests, the hole diameter was 0.25 in -0.000 +0.003 in. For filled-hole tension tests, the fasteners were installed to 85±5 in-lb. For filled-hole compression and bearing tests, the fasteners were installed to 30±5 in-lb. Fasteners were installed after moisture conditioning.

Unless otherwise specified, a tolerance of ±5°F applied to all temperature conditions specified in this document.

For filled-hole and bearing tests, the hole diameter was 0.25 in -0.000 +0.003 in. The following fasteners were used:

1) NASM 21297-04003 bolts with MS21084 nuts and MS21206 washers for FHT and FHC
2) NASM 21297-04013 bolts with MS 21084 nuts and MS21206 washers for SSB

1.5.3 Test Matrix

Table 1-1 summarizes the lamina level tests carried out on unidirectional materials. The lay-ups chosen have been designed to produce the appropriate thickness required for the various types of tests performed. Table 1-2 summarizes the laminate level tests carried out on unidirectional materials.

Layup	Test Type and Direction	Property	Number of Batches x No. of Panels x No. of Specimens			
			Test Temperature/Moisture Condition			
			CTD	RTD	ETD	ETW
$[0]_4$	ASTM D3039 0° Tension	Strength, Modulus and Poisson's Ratio	3x2x3	3x2x3	3x2x3	3x2x3
$[0]_{10}$	ASTM D6641 0° Compression (Note 1)	Modulus	3x2x3	3x2x3	3x2x3	3x2x3
$[90]_8$	ASTM D3039 90° Tension	Strength and Modulus	3x2x3	3x2x3		3x2x3
$[90]_{10}$	ASTM D6641 90° Compression (Note 1)	Strength and Modulus	3x2x3	3x2x3		3x2x3
$[0/90]_{2S}$	ASTM D3039 0° Tension (see Note 2)	Strength and Modulus	3x2x3	3x2x3	3x2x3	3x2x3
$[90/0/90]_3$	ASTM D6641 0° Compression (see Note 1 & 2)	Strength and Modulus	3x2x3	3x2x3	3x2x3	3x2x3
$[45/-45]_{4S}$	ASTM D3518 In-Plane Shear	Strength and Modulus	3x2x3	3x2x3	3x2x3	3x2x3
$[0]_{21}$	ASTM D2344 Short Beam	Strength	3x2x3	3x2x3	3x2x3	3x2x3

Note 1: Back-to-back strain gages are needed on the first two specimens of each environment. If no buckling is observed, the remaining modulus specimens will require a strain gage on one side of the specimens only. An appropriate extensometer may be used in place of strain gage.

Note 2: Derive the 0° lamina tensile or compressive strength $F^u_{0^\circ\ plies}$ as follows

$$F^u_{0^\circ\ plies} = BF\ \frac{P^f}{wh}$$

$$BF = \frac{E_1\left[V_0 E_2 + (1-V_0) E_1\right] - \left(\nu_{12} E_2\right)^2}{\left[V_0 E_1 + (1-V_0) E_2\right]\left[V_0 E_2 + (1-V_0) E_1\right] - \left(\nu_{12} E_2\right)^2}$$

Where BF = Back-out factor obtained using linear classical lamination theory
P^f = Peak load carried by the test specimen (usually at failure)
w = specimen gage width, mm [in.]
h = specimen gage thickness, mm [in.]
V_0 = fraction of 0° plies in the cross-ply laminate (1/2 for [0/90]ns and 1/3 for [90/0/90]n)
E_1 = axial tensile or compressive stiffness of 0° plies, from an average of all batches
E_2 = transverse tensile or compressive stiffness of 0° plies, from an average of all batches
ν_{12} = major Poisson's ratio of 0° plies, from an average of all batches

Table 1-1: Lamina Level Test Matrix

Table 1-2 below summarizes the laminate level tests carried out. The layup angles 0º, 45º, -45º, and 90º refer to the orientation of the warp/longitudinal fiber direction. The laminate stacking sequences in this program are not specific to any design. Therefore, careful consideration should be given to the validity of properties derived from this program based on the design specific laminates in a structure to be certified.

Table 1-2 also emphasizes those properties and test condition combinations believed to constitute the worst case, which in general is cold dry for tension and hot wet for compression and other matrix dominated properties.

(%0º/%±45º/%90º) Actual Test Type	Test Type and Layup (5)	Property	Number of Batches x Number of Panels x Number of Test Specimens		
			Test Temperature/Moisture Condition		
			CTD	RTD	ETW
(25/50/25 - QI) UNT1	ASTM D3039 Un-notched Tension [45/0/-45/90]S	Strength & modulus	3x2x3	3x2x3	3x2x3
(9/73/18) UNT2	ASTM D3039 Un-notched Tension [45/-45/45/-45/90/0/90/-45/45/-45/45]	Strength & modulus	3x2x3	3x2x3	3x2x3
(55/36/9) UNT3	ASTM D3039 Un-notched Tension [0/45/0/-45/0/90/0/-45/0/45/0]	Strength & modulus	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) UNC1	ASTM D6641 Un-notched Compression (4) [45/0/-45/90]S	Strength & modulus		3x2x3	3x2x3
(9/73/18) UNC2	ASTM D6641 Un-notched Compression (4) [45/-45/45/-45/90/0/90/-45/45/-45/45]	Strength & modulus		3x2x3	3x2x3
(55/36/9) UNC3	ASTM D6641 Un-notched Compression (4) [0/45/0/-45/0/90/0/-45/0/45/0]	Strength & modulus		3x2x3	3x2x3
(25/50/25 - QI) SBS1	ASTM D2344 Short Beam [45/0/-45/90]2S	Strength		3x2x3	3x2x3
(25/50/25 - QI) OHT1	ASTM D5766 Open Hole Tension (1) [45/0/-45/90]S	Strength	3x2x3	3x2x3	3x2x3
(9/73/18) OHT2	ASTM D5766 Open Hole Tension (1) [45/-45/45/-45/90/0/90/-45/45/-45/45]	Strength	3x2x3	3x2x3	3x2x3
(55/36/9) OHT3	ASTM D5766 Open Hole Tension (1) [0/45/0/-45/0/90/0/-45/0/45/0]	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) FHT1	ASTM D6742 Filled Hole Tension (2) [45/0/-45/90]S	Strength	3x2x3	3x2x3	3x2x3
(9/73/18) FHT2	ASTM D6742 Filled Hole Tension (2) [45/-45/45/-45/90/0/90/-45/45/-45/45]	Strength	3x2x3	3x2x3	3x2x3
(55/36/9) FHT3	ASTM D6742 Filled Hole Tension (2) [0/45/0/-45/0/90/0/-45/0/45/0]	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI)	ASTM D6484 Open Hole Compression (1)(4)	Strength		3x2x3	3x2x3

OHC1	[45/0/-45/90]2S				
(9/73/18) OHC2	ASTM D6484 Open Hole Compression (1)(4) [45/-45/45/-45/90/0/90/-45/45/-45/45]	Strength		3x2x3	3x2x3
(55/36/9) OHC3	ASTM D6484 Open Hole Compression (1)(4) [0/45/0/-45/0/90/0/-45/0/45/0]	Strength		3x2x3	3x2x3
(25/50/25 - QI) FHC1	ASTM D6742 Filled Hole Compression (2) [45/0/-45/90]2S	Strength		3x2x3	3x2x3
(9/73/18) FHC2	ASTM D6742 Filled Hole Compression (2) [45/-45/45/-45/90/0/90/-45/45/-45/45]	Strength		3x2x3	3x2x3
(55/36/9) FHC3	ASTM D6742 Filled Hole Compression (2) [0/45/0/-45/0/90/0/-45/0/45/0]	Strength		3x2x3	3x2x3
(25/50/25 - QI) SSB1	ASTM D5961 Single Shear Bearing (3) (6) [45/0/-45/90]S	Strength & Deformation		3x2x3	3x2x3
(9/73/18) SSB2	ASTM D5961 Single Shear Bearing (3) (6) [45/-45/45/-45/90/0/90/-45/45/-45/45]	Strength & Deformation		3x2x3	3x2x3
(55/36/9) SSB3	ASTM D5961 Single Shear Bearing (3) (6) [0/45/0/-45/0/90/0/-45/0/45/0]	Strength & Deformation		3x2x3	3x2x3
(100/0/0) ILT	ASTM D6415 Interlaminar Tension [0]15	Strength	1x1x6	1x1x6	1x1x6
(25/50/25 - QI) CAI1	ASTM D7136 & D7137 Compression After Impact (1500 in.lb/in) (4) [45/0/-45/90]2S	Strength		1x1x6	

(1) Open-hole configuration: 0.25” hole diameter, 1.5 inch width.
(2) Filled-hole test configuration: 0.25” diameter, see section 2 for fastener callout, 1.5” width.
(3) Single shear bearing test configuration: 0.25: hole diameter, 1.5” width, see section 2 for fastener callout, e/D=3
(4) Back-to-back strain gages needed on the first two specimens of each environment. If no buckling is observed, the remaining modulus specimens will require strain gage on one side of the specimens only. Appropriate extensometer may be used in place of the strain gage.
(5) Loading direction is generally along the 0-degree direction
(6) Use modified ASTM D5961 per Figure 1-3

(Note that the layup numbers 1, 2 and 3 correspond to those designated as “quasi isotropic,” “soft” and “hard” respectively. In addition, the 0°/90° cross-plied laminates used for the unidirectional materials only are designated “Layup 0”).

Table 1-2: Laminate Level Test Matrix

1.5.4 Physical Testing

The properties in Table 1-3 were determined for each panel used for test coupons with the exception of Tg by DMA which were conducted on one laminate per batch from each oven cure conducted where that batch is present. The tests were performed by the National Institute for Aviation Research (NIAR) Composites Laboratory under the supervision of NCAMP.

Property	**Condition/Method** (Note 1)	**Min Replicates per panel**
Cured Ply Thickness	ASTM D3171-06	All data from mechanical test specimens
Laminate Density	ASTM D792-00	3
Fiber Volume, % by Volume	ASTM D3171-06 (Note 2)	3
Resin Content, % by Weight	ASTM D3171-06(Note 2)	3
Ultrasonic Through Transmission, C-Scan	MIL-HDBK-787A (Note 3)	1
Glass Transition Temperature, Tg by DMA or RDA	Dry and Wet – SACMA SRM 18R-94	1 Dry, 1 Wet (Note 4)

Notes 1: Where the applicable standard allows variations in specimen form or test method, the specific parameters used were specified in the PMC Data Collection Template..
2: Method II, except for laminates of materials where actual fiber weight is not known accurately prior to impregnation, as in the case for unidirectional materials. For these materials, in order to verify Method II is accurate, a minimum of 12 samples per batch were tested by Method I, Procedure B.
3: Five MHz was used for solid laminates. Panels with anomaly were segregated. Microscopy images may have been taken from questionable areas. NCAMP was involved in the review of all the C-scans.
4: Minimum total of 24 dry and 24 wet for each material system.

Table 1-3: Physical Testing Matrix

1.5.5 Environmental Conditioning

The following tests were performed by the NIAR Composites Laboratory under the supervision of NCAMP.

Test environments are defined as:
CTD = -65±5°F, dry
RTD = 70±10°F, room temperature dry
ETD = 180±5°F, dry
ETW = 180±5°F, wet (equilibrium moisture content)

Within each test method and test environment, the failure mode was evaluated immediately after each test by an NCAMP AER. All tested specimens were digitally photographed after each test in order to pictorially document failure modes. Representative photos are included in the CD accompanying this report.

For dry testing, specimens were dried at 160°F±5°F for 120 to 130 hours. After drying, specimens were kept in a desiccator until mechanical testing. Alternatively, the specimens may have been left ambient laboratory condition for a maximum of 14 days until mechanical testing (no drying was required if specimens were tested within 14 days from the date they were cured). Ambient laboratory condition is defined as 70°F±10°F. Since moisture absorption and desorption rate for epoxy is very slow at ambient temperature, there was no requirement to maintain relative humidity levels.For wet conditioning, specimens were dried at 160°F±5°F for 120 to 130 hours before being conditioned to equilibrium at 160°F±5°F and 85% ± 5%. Effective moisture equilibrium was achieved when the average moisture content of the traveler specimen changed by less than 0.02% for two consecutive readings which are 7 ±0.5 days apart and may be expressed by:

$$\frac{W_i - W_{i-1}}{W_b} < 0.0002$$

where: W_i = weight at current time
W_{i-1} = weight at previous time
W_b = baseline weight prior to conditioning

When representative specimens could not be measured to determine the moisture content (due to size, fastener and tab effects), traveler coupons of at least 1” by 1” by specimen thickness and weighing at least 5 grams were used to establish weight gain measurements. If the specimens or traveler coupons pass the criteria for two consecutive readings which are 7 ±0.5 days apart, the specimens were kept in the environmental chamber for up to an additional 60 days. Alternatively, the specimens may have been removed from the environmental chamber and placed in a sealed plastic bag along with a moist cotton towel for a maximum of 14 days until mechanical testing. Strain-gaged specimens were removed from the controlled environment for a maximum of 2 hours for application of gages in ambient laboratory conditions.

1.5.6 Non-ambient Testing

The chamber was of adequate size so that all test fixtures and load frame grips were contained within the chamber.

For elevated temperature testing, the temperature chamber, test fixture, and grips were preheated to the specified temperature. Each specimen was heated to the required test temperature as verified by a thermocouple in direct contact with and taped to the specimen gage section. The heat-up time of the specimen did not exceed 5 minutes, unless otherwise specified in individual test summary sheets. The test was started 5^{+1}_{-0} minutes after the specimen reached the test temperature. During the test, the temperature, as measured on the specimen, was within ±5°F of the required test temperature.

For subzero temperature testing, each specimen was cooled to the required test temperature as verified by a thermocouple in direct contact with and taped to the specimen gage section. The test started 5^{+1}_{-0} minutes after the specimen reached the test temperature. During the test, the temperature, as measured on the specimen, was within ±5°F of the required test temperature.

1.5.7 Fluid Sensitivity Screening

Table 1-4 lists the requirements for fluid sensitivity screening, which requires ASTM D2344 Short Beam Strength testing on $[0°]_{21}$ lamina level specimens dried at 160°F±5°F for 120 to 130 hours before being subjected to the conditions indicated, five replicates per fluid and one cure cycle. Specimens were cleaned with a dry towel prior to the tests. In addition to short beam strength, load versus displacement curves were plotted to aid in the identification of matrix/resin softening. Since load versus displacement curves are influenced by test machine and fixture compliance, all the tests were performed with the identical machine and fixture, through a single setup. Experience suggests that for the vast majority of epoxy resins, water is the fluid with the most deleterious effect on properties. Should screening tests for fluid sensitivity indicate this to be the case, further testing of this type might be unnecessary since exposure to water moisture to equilibrium level is an inherent part of the multi batch allowables test program. However, users must evaluate the applicability of the exposure conditions and time on case-by-case basis. For example, the exposure condition for jet fuel may not fully represent the condition of integral fuel tanks.

Extended Contact:	Exposure	Test Condition	Code
100 Low Lead Aviation Fuel	90 days min. @ 70°F±10°F	70°F	FS11RT
	90 days min. @ 70°F±10°F	180°F	FS11ET
SAE AMS 2629 Jet Reference Fluid	90 days min. @ 70°F±10°F	70°F	FS12RT
	90 days min. @ 70°F±10°F	180°F	FS12ET
MIL-PRF-5606 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS13RT
	90 days min. @ 70°F±10°F	180°F	FS13ET
MIL-PRF-83282 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS14RT
	90 days min. @ 70°F±10°F	180°F	FS14ET
MIL-PRF-7808 Engine Oil	90 days min. @ 70°F±10°F	70°F	FS15RT
	90 days min. @ 70°F±10°F	180°F	FS15ET
MIL-PRF-23699, Class STD Engine Oil	90 days min. @ 70°F±10°F	70°F	FS16RT
	90 days min. @ 70°F±10°F	180°F	FS16ET
Salt Water	90 days min. @ 70°F±10°F	70°F	FS17RT
	90 days min. @ 70°F±10°F	180°F	FS17ET
Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS18RT
	90 days min. @ 70°F±10°F	180°F	FS18ET
50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS19RT
	90 days min. @ 70°F±10°F	180°F	FS19ET
Short Duration Contact:			
MEK washing fluid. ASTM D740	90 minutes min. @ 70°F±10°F	70°F	FS21RT
	90 minutes min. @ 70°F±10°F	180°F	FS21ET
Polypropylene Glycol Deicer (Type I) Mil-A-824 3	90 minutes min. @ 70°F±10°F	70°F	FS22RT
	90 minutes min. @ 70°F±10°F	180°F	FS22ET
Isopropyl Alcohol Deicing Agent (TT-I-735)	48±4 hours @70°F±10°F	70°F	FS23RT
	48±4 hours @70°F±10°F	180°F	FS23ET
Control Tests:			
Distilled Water	90 days min. at 70°F±10°F	70°F	FS31RT
	90 days min. at 70°F±10°F	180°F	FS31ET

Dry	Dry per section 6.1	70°F	FS32RT
	Dry per section 6.1	180°F	FS32ET
85% Relative Humidity	Per section 6.1	70°F	FS33RT
	Per section 6.1	180°F	FS33ET

Table 1-4: Fluid Sensitivity Matrix

1.5.8 Normalization Procedures

Most lamina level tension and compression strength and modulus properties, and all laminate level properties were normalized according to nominal cured ply thickness. Lamina level properties that were not normalized include 90º tensile strength and modulus (unidirectional only), 90º compressive strength and modulus (unidirectional only), in-plane shear strength and modulus, Poisson's ratio, SBS, and ILT. After normalizing, data scatter reduced or remained the same. If data scatter increased significantly after normalizing, the reason was investigated. Wherever properties are normalized, both measured and normalized data were reported.

Method I Average Fiber Volume (%vol) is 51.279 and Method 2 Average Fiber Volume (%vol) is 52.877. By comparing Fiber Volume values obtained from Method I and Method II, the values are deemed close enough therefore the FAW is close to the nominal of ~300 gsm. Based on the FAW data from Newport (Avg ~300 gsm) and our Method I Phys test data (Avg. void content ~ 0%) it is appropriate to use the CPT Method for normalization.

The average cured ply thickness of 0.0126 inch has been used as the nominal cured ply thickness (CPT) for normalization purpose. The following normalization formula was used:

Normalized Value = Measured Value x Measured CPT / Nominal CPT.

The cured ply thickness was predicted to be 0.012 inch. However the grand average cured ply thicknesses of all the qualification panel is 0.0126 inch. Therefore 0.0126 inch has been used for the normalization purpose.

1.5.9 Conformity

The 3-batch qualification panels have been fabricated according to the requirements of the test plan and conformed by an NCAMP AIR. The test specimens and test setup have also been conformed by an NCAMP AIR.

Testing was witnessed by NCAMP. Witnessing was delegated to an AER. Mechanical testing was carried out at the National Institute for Aviation Research, Wichita State University. The conformity documentation, with required approval signatures, is included in the CD provided with this report.

1.5.10 Material Pedigree Information

The PMC Data Collection Template includes the material pedigree information required, such as material and batch information, as well as panel fabrication record, environmental conditioning, test equipment, and test procedures. This template in Microsoft Excel file format is included on the CD provided with this report.

2. Test Results

2.1 Lamina Level Test Summary

Prepreg Material:	Newport NCT4708 MR60H 300gsm 38% RC Unitape				**Newport NCT4708 MR60H 300gsm 38% RC Unitape Lamina Properties Summary**			
Fiber	MR60H		**Resin:**	NB 4708				
Tg(dry)	297.97°F		**Tg(wet):**	238.81°F				
PROCESSING:	NPS 4708				**Tg METHOD:** DMA (SRM 18-94)			
		Lot 1	Lot 2	Lot 3				
Date of fiber manufacture		4/1/2008	3/1/2008	6/1/2008	**Date of testing**	12/2009 - 09/2010		
Date of resin manufacture		09/16/2008	09/23/2008	10/01/2008	**Date of data submittal**	01/2010 - 09/2010		
Date of prepreg manufacture		09/18/2008	09/25/2008	10/02/2008				
Date of composite manufacture		09/2009 to 11/2009						

LAMINA MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT= 0.0126 inch)

	CTD Mean		RTD Mean		ETD Mean		ETW Mean	
	Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured
F_1^{tu} (ksi)								
of LT	346.72	349.14	366.07	366.03	377.92	380.90	374.47	378.83
from UNT0*								
Eq 2.4.2.1 (d)[1]	332.65	334.74	359.82	359.92	363.91	366.09	355.46	359.62
Eq 2.4.2.1 (e)[1]	330.01	332.37	358.82	356.51			359.71	357.70
E_1^t (Msi)								
of LT	20.44	20.56	20.63	20.63	21.01	21.16	20.85	21.10
E (Msi)								
of UNT0	10.77	10.84	10.84	10.76	11.02	10.89	10.96	10.90
ν_{12}^t	--	0.316	--	0.337	--	0.345	--	0.325
F_2^{tu} (ksi)	--	5.57	--	5.75	--	--	--	2.85
E_2^t (Msi)								
of TT	--	1.28	--	1.12	--	--	--	0.82
F_1^{cu} (ksi)								
from UNC0*								
Eq 2.4.2.1 (d)[1]	214.73	221.31	191.78	196.12	175.74	182.03	129.85	131.67
Eq 2.4.2.1 (e)[1]	217.93	218.90	192.93	193.32			135.28	135.01
E_1^c (Msi)								
of LC	18.07	18.67	18.45	18.80	17.72	18.45	18.30	18.57
E (Msi)								
of UNC0	7.04	7.06	7.00	6.98	6.84	6.85	7.05	7.03
ν_{12}^c	--	0.359	--	0.355	--	0.371	--	0.367
F_2^{cu} (ksi)								
of TC	--	31.94	--	23.98	--	--	--	13.66
E_2^c (Msi)								
of TC	--	1.39	--	1.23	--	--	--	1.01
ν_{21}^c								
of TC	--	0.029	--	0.025	--	--	--	0.020
ν								
of UNC0	--	0.033	--	0.032	--	0.029	--	0.018
$F_{12}^{s5\%strain}$ (ksi)	--	8.88	--	7.80	--	6.96	--	4.74
$F_{12}^{s0.2\%}$ (ksi)	--	7.89	--	6.10	--	4.39	--	3.31
G_{12}^s (Msi)	--	0.64	--	0.55	--	0.44	--	0.36
SBS (ksi)	--	12.65	--	10.18	--	8.42	--	6.14

*** Derived from cross-ply using back-out factor**
[1] Equations from MIL-HDBK-17-1F

Table 2-1: Lamina Summary Data

2.2 Laminate Level Test Summary

Prepreg Material:	Newport NCT4708 MR60H 300gsm 38% RC Unitape			**Newport NCT4708 MR60H 300gsm 38% RC Unitape Laminate Properties Summary**
Fiber	MR60H	**Resin**	NB 4708	
Tg(dry)	297.97°F	**Tg(wet)**	238.81°F	
				Tg METHOD DMA (SRM 18-94)
PROCESSING:	NPS 4708			

	Lot 1	Lot 2	Lot 3		
Date of fiber manufacture	4/1/2008	3/1/2008	6/1/2008	**Date of testing**	12/2009 - 09/2010
Date of resin manufacture	09/16/2008	09/23/2008	10/01/2008	**Date of data submittal**	01/2010 - 09/2010
Date of prepreg manufacture	09/18/2008	09/25/2008	10/02/2008		
Date of composite manufacture	09/2009 to 11/2009				

LAMINATE MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT= 0.0126 inch)

	Layup:	25/50/25		9/73/18		55/36/9	
	Test Condition	Normalized	Measured	Normalized	Measured	Normalized	Measured
OHT	**CTD**	66.11	66.21	38.20	37.99	127.15	128.25
Strength (ksi)	**RTD**	69.15	69.03	38.35	38.13	140.07	140.08
	ETW	74.83	74.73	35.97	35.86	143.63	143.33
OHC	**RTD**	38.09	38.15	29.00	29.24	56.23	56.17
Strength (ksi)	**ETW**	29.47	29.42	19.78	19.82	43.06	42.88
UNT	**CTD**	92.62	93.01	50.32	50.38	199.95	200.71
Strength (ksi)	**RTD**	108.60	108.81	51.47	51.47	208.99	209.41
	ETW	108.83	109.14	46.61	46.40	169.03	169.01
	CTD	7.20	7.23	4.76	4.77	12.48	12.52
Modulus (msi)	**RTD**	7.44	7.45	4.53	4.52	12.55	12.57
	ETW	7.30	7.32	4.13	4.12	12.70	12.69
UNC	**RTD**	69.42	70.12	46.38	46.97	92.11	93.21
Strength (ksi)	**ETW**	40.73	41.63	32.31	32.85	69.16	70.16
Modulus (msi)	**RTD**	6.65	6.76	4.17	4.21	11.31	11.48
	ETW	6.35	6.48	3.78	3.84	10.88	11.03
νUNC	**RTD**	--	0.348	--	0.540	--	0.473
	ETW	--	0.376	--	0.630	--	0.514
FHT	**CTD**	64.74	64.82	38.91	38.84	114.18	114.36
Strength (ksi)	**RTD**	68.52	68.59	37.82	37.75	118.21	117.59
	ETW	74.08	74.24	34.63	34.67	125.46	124.59
FHC	**RTD**	52.14	51.94	41.24	41.34	80.14	80.76
Strength (ksi)	**ETW**	37.52	37.46	27.49	27.49	55.53	55.69
LSBS	**RTD**	--	6.53	--	--	--	--
Strength (ksi)	**ETW**	--	5.28	--	--	--	--
SSB							
2% offset Strength	**RTD**	93.66	95.78	99.64	99.98	94.33	95.63
Strength (ksi)	**ETW**	69.05	70.04	73.41	73.24	70.25	70.70
ILT	**CTD**	--	7.86	--	--	--	--
Strength (ksi)	**RTD**	--	5.11	--	--	--	--
	ETW	--	4.36	--	--	--	--
CAI	**RTD**	28.66	27.34	--	--	--	--
Strength (ksi)							

Table 2-2: Laminate Summary Data

2.3 Individual Test Summaries

2.3.1 Longitudinal Tension Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape			**Tension, 1-axis**	
Resin content:	45.67% vol	**Comp. density:**	1.543 [g/cc]	**Gr/ Ep**	
Fiber volume:	54.33% vol			**Newport NCT4708 MR60H 300gsm**	
Ply count:	4			**38% RC Unitape**	
				[0]4	
Test method:	ASTM D3039-00	**Modulus calculation:**	1000 to 3000 microstrain		
Normalized by:	0.0126" CPT				

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		75		180		180	
Moisture Conditioning		dry		dry		equilibrium		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		WFJXXXXB		WFJXXXXA		WFJXXXXG		WFJXXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_1^{tu} (ksi)	**Mean**	346.72	349.14	366.07	366.03	377.92	380.90	374.47	378.83
	Minimum	299.47	295.56	326.04	326.90	333.68	333.44	343.96	350.80
	Maximum	395.25	389.20	389.75	397.10	404.53	413.30	420.84	423.77
	C.V.(%)	6.68	8.06	5.77	6.29	6.14	6.87	5.84	6.07
	No. Specimens	18		18		17		18	
	No. Prepreg Lots	3		3		3		3	
E_1^t (Msi)	**Mean**	20.44	20.56	20.63	20.63	21.01	21.16	20.85	21.10
	Minimum	19.01	18.53	19.99	19.54	20.14	20.10	19.79	20.05
	Maximum	21.56	21.58	21.45	21.74	21.87	22.15	21.39	22.21
	C.V.(%)	2.80	3.88	1.91	2.92	1.98	2.88	2.14	2.43
	No. Specimens	18		18		18		18	
	No. Prepreg Lots	3		3		3		3	
ν_{12}	**Mean**	0.316		0.337		0.345		0.325	
	No. Specimens	18		18		18		18	
	No. Prepreg Lots	3		3		3		3	

2.3.2 Transverse Tension Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape			**Tension, 2-axis** **Gr/ Ep** **Newport NCT4708 MR60H 300gsm 38% RC Unitape** **[90]8**
Resin content:	47.32% vol	**Comp. density:**	1.540 [g/cc]	
Fiber volume:	52.68% vol			
Ply count:	8			
Test method:	ASTM D3039-00	**Modulus calculation:**	linear fit from 1000 to 3000 micro in/in	
Normalized by:				

		CTD		RTD		ETW	
Test Temperature [°F]		-65		75		180	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code							
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_2^{tu} (ksi)	**Mean**		5.57		5.75		2.85
	Minimum		4.84		5.03		2.35
	Maximum		6.33		6.76		3.16
	C.V.(%)		7.59		8.74		8.03
	No. Specimens		18		18		20
	No. Prepreg Lots		3		3		3
E_2^t (Msi)	**Mean**		1.28		1.12		0.82
	Minimum		1.25		1.07		0.78
	Maximum		1.34		1.15		0.88
	C.V.(%)		2.15		2.07		3.85
	No. Specimens		18		20		18
	No. Prepreg Lots		3		3		3

2.3.3 Longitudinal Compression Properties

Material: Newport NCT4708 MR60H 300gsm 38% RC Unitape

Resin content: 47.44% vol
Fiber volume: 52.56% vol
Ply count: 10

Comp. density: 1.539 [g/cc]

Compression, 1-axis
Gr/Ep
Newport NCT4708 MR60H 300gsm 38% RC Unitape
[0]10

Test method: ASTM D6641-01

Modulus calculation: linear fit from 1000 to 3000 micro in/in

Normalized by: 0.0126" CPT

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		75		180		180	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		WFLXXXXB		WFLXXXXA		WFLXXXXG		WFLXXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
E_1^c (Msi)	**Mean**	18.07	18.67	18.45	18.80	17.72	18.45	18.30	18.57
	Minimum	16.91	17.21	17.69	18.13	16.33	17.05	17.05	17.28
	Maximum	19.21	20.06	19.05	19.67	18.49	20.02	19.10	19.47
	C.V.(%)	3.81	3.94	2.26	2.27	3.56	4.02	2.97	3.01
	No. Specimens	18		18		18		19	
	No. Prepreg Lots	3		3		3		1	
ν_{12}	**Mean**	0.359		0.355		0.371		0.367	
	No. Specimens	18		18		18		19	
	No. Prepreg Lots	3		3		3		3	

2.3.4 Transverse Compression Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape		
Resin content:	46.94% vol	**Comp. density:**	1.543 [g/cc]
Fiber volume:	53.06% vol		
Ply count:	10		
Test method:	ASTM D6641-01e1	**Modulus calculation:**	linear fit from 1000 to 3000 micro in/in
Normalized by:	N/A		

Compression, 2-axis
Gr/ Ep
Newport NCT4708 MR60H 300gsm 38% RC Unitape
[90]10

		CTD		RTD		ETW			
Test Temperature [°F]		-65		75		180			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		WFZXXXXB		WFZXXXXA		WFZXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_2^{cu} (ksi)	**Mean**		31.94		23.98		13.66		
	Minimum		28.28		22.02		11.27		
	Maximum		36.73		26.09		14.96		
	C.V.(%)		5.82		4.70		7.55		
	No. Specimens	18		18		18			
	No. Prepreg Lots	3		3		3			
E_2^c (Msi)	**Mean**		1.39		1.23		1.01		
	Minimum		1.24		1.18		0.94		
	Maximum		1.50		1.32		1.07		
	C.V.(%)		4.78		2.82		3.65		
	No. Specimens	18		18		18			
	No. Prepreg Lots	3		3		3			
ν_{21}	**Mean**	0.029		0.025		0.020			
	No. Specimens	14		18		18			
	No. Prepreg Lots	3		3		3			

2.3.5 In-Plane Shear Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape				**In-Plane Shear**			
Resin content:	47.47% vol	**Comp. density:**	1.538 [g/cc]		**Gr/ Ep**			
Fiber volume:	52.23% vol				**Newport NCT4708 MR60H 300gsm**			
Ply count:	16				**38% RC Unitape**			
Test method:	ASTM D3518-94				**[+45/-45]4s**			
		Modulus calculation:	linear fit from 2000 to 6000 micro in/in					
Normalized by:	N/A							

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		70		180		180	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		WFNXXXXB		WFNXXXXA		WFNXXXXG		WFNXXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
$F_{12}^{s5\% strain}$ (ksi)	**Mean**		8.88		7.80		6.96		4.74
	Minimum		8.69		7.42		6.64		4.30
	Maximum		9.36		8.14		7.30		4.91
	C.V.(%)		2.10		2.45		3.11		2.83
	No. Specimens	15		18		19		17	
	No. Prepreg Lots	3		3		3		3	
$F_{12}^{s0.2\%}$ (ksi)	**Mean**		7.89		6.10		4.39		3.31
	Minimum		7.58		5.87		4.27		3.12
	Maximum		8.51		6.29		4.53		3.41
	C.V.(%)		2.64		1.84		1.89		2.48
	No. Specimens	18		18		19		18	
	No. Prepreg Lots	3		3		3		3	
G_{12}^{s} (Msi)	**Mean**		0.64		0.55		0.44		0.36
	Minimum		0.61		0.52		0.43		0.33
	Maximum		0.66		0.58		0.47		0.37
	C.V.(%)		2.24		2.72		2.32		2.82
	No. Specimens	18		18		19		18	
	No. Prepreg Lots	3		3		3		3	

2.3.6 Unnotched Compression 0 Properties

Material: New port NCT4708 MR60H 300gsm 38% RC Unitape

Resin content: 47.95% vol
Fiber volume: 52.05% vol
Ply count: 9

Comp. density: 1.535 [g/cc]

Test method: ASTM D6641-01E1

Modulus calculation: linear fit from 1000 to 3000 micro in/in

Normalized by: 0.0126 in. CPT

Unnotched Compression 0
Gr/ Ep
Newport NCT4708 MR60H 300gsm 38% RC Unitape
[90/0/90]3

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		70		180		180	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		WFRXXXXB		WFRXXXXA		WFRXXXXG		WFRXXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
UNC0 Strength (ksi)	**Mean**	83.64	83.66	72.80	72.79	67.86	67.64	50.03	49.86
	Minimum	71.41	73.20	59.93	58.61	57.56	57.86	44.07	44.73
	Maximum	94.24	94.74	87.27	87.25	77.72	76.69	57.02	55.61
	C.V.(%)	7.97	8.27	10.79	10.57	7.28	7.23	6.62	5.66
	No. Specimens	16		18		19		16	
	No. Prepreg Lots	3		3		3		3	
UNC0 Modulus (Msi)	**Mean**	7.04	7.06	7.00	6.98	6.84	6.85	7.05	7.03
	Minimum	6.63	6.62	6.44	6.29	6.37	6.41	6.55	6.55
	Maximum	7.79	8.04	7.65	7.65	7.48	7.45	7.63	7.51
	C.V.(%)	4.36	5.37	3.69	3.98	4.32	4.33	4.41	3.93
	No. Specimens	17		18		18		18	
	No. Prepreg Lots	3		3		3		3	
νUNC0	**Mean**	0.033		0.032		0.029		0.018	
	No. Specimens	16		18		18		17	
	No. Prepreg Lots	3		3		3		3	

2.3.7 Unnotched Tension 0 Properties

Material: New port NCT4708 MR60H 300gsm 38% RC Unitape

Resin content: 47.33% vol
Fiber volume: 52.67% vol
Ply count: 8

Comp. density: 1.538 [g/cc]

Test method: ASTM D3039-00

Modulus calculation: linear fit from 1000 to 3000 micro in/in

Normalized by: 0.0126 in. CPT

Unnotched Tension 0
Gr/ Ep
Newport NCT4708 MR60H 300gsm 38% RC Unitape
[0/90]2S

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		70		180		180	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		WFPXXXXB		WFPXXXXA		WFPXXXXG		WFPXXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
UNT0 Strength (ksi)	**Mean**	175.27	176.45	189.01	187.80	190.92	188.44	186.90	185.78
	Minimum	166.50	165.49	164.66	161.95	176.28	178.67	174.44	174.75
	Maximum	189.66	186.10	205.90	205.22	200.75	200.92	196.97	199.30
	C.V.(%)	3.72	4.01	6.32	6.27	3.85	3.36	3.28	3.59
	No. Specimens	18		16		18		20	
	No. Prepreg Lots	3		3		3		3	
UNT0 Modulus (Msi)	**Mean**	10.77	10.84	10.84	10.76	11.02	10.89	10.96	10.90
	Minimum	10.16	9.97	10.06	9.90	10.48	10.56	10.64	10.45
	Maximum	11.08	11.19	11.24	11.23	11.41	11.36	11.44	11.23
	C.V.(%)	1.98	2.63	2.74	3.62	2.40	2.19	1.81	1.79
	No. Specimens	18		18		19		20	
	No. Prepreg Lots	3		3		3		3	

2.3.8 Short Beam Strength Properties

Short Beam Strength
Gr/ Ep
Newport NCT4708 MR60H 300gsm 38% RC Unitape
[0]21

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape
Resin content:	46.73% vol
Comp. density:	1.537 [g/cc]
Fiber volume:	53.27% vol
Ply count:	21
Test method:	ASTM D2344-00^{E1}
Normalized by:	N/A

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		75		180		180	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		WFQAXXXB		WFQXXXA		WFQXXXG		WFQXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
SBS Strength (ksi)	**Mean**		12.65		10.18		8.42		6.14
	Minimum		11.79		9.54		7.94		5.77
	Maximum		13.57		10.88		8.82		6.67
	C.V.(%)		3.57		3.98		2.38		3.80
	No. Specimens	18		18		18		19	
	No. Prepreg Lots	3		3		3		3	

2.3.9 Unnotched Tension 1 Properties

Material: New port NCT4708 MR60H 300gsm 38% RC Unitape

Resin content: 47.18% vol **Comp. density:** 1.540 [g/cc]
Fiber volume: 52.82% vol
Ply count: 8

Unnotched Tension 1
Gr/ Ep
Newport NCT4708 MR60H 300gsm
38% RC Unitape
[45/0/-45/90]s

Test method: ASTM D3039-00 **Modulus calculation:** linear fit from 1000 to 3000 micro in/in

Normalized by: 0.0126 in. CPT

		CTD		RTD		ETW	
Test Temperature [°F]		-65		75		180	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		WFAXXXXB		WFAXXXXA		WFAXXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	92.62	93.01	108.60	108.81	108.83	109.14
	Minimum	83.88	83.16	97.95	101.01	102.93	102.34
	Maximum	101.45	105.99	115.96	114.43	114.71	115.06
UNT1	**C.V.(%)**	5.38	6.93	4.58	4.12	3.63	3.25
Strength (ksi)							
	No. Specimens	18		18		18	
	No. Prepreg Lots	3		3		3	
	Mean	7.20	7.23	7.44	7.45	7.30	7.32
	Minimum	6.92	6.82	6.96	6.92	7.12	7.12
	Maximum	7.48	7.62	7.65	7.77	7.46	7.51
UNT1	**C.V.(%)**	2.14	2.94	2.02	2.65	1.42	1.37
Modulus (Msi)							
	No. Specimens	18		18		18	
	No. Prepreg Lots	3		3		3	

2.3.10 Unnotched Tension 2 Properties

Material: Newport NCT4708 MR60H 300gsm 38% RC Unitape

Resin content: 47.56% vol **Comp. density:** 1.530 [g/cc]
Fiber volume: 52.44% vol
Ply count: 11

Unnotched Tension 2
Gr/ Ep
Newport NCT4708 MR60H 300gsm 38% RC Unitape
[45/-45/45/-45/90/0/90/-45/45/-45/45]

Test method: ASTM D3039-00 **Modulus calculation:** linear fit from 1000 to 3000 micro in/in

Normalized by:

		CTD		RTD		ETW	
Test Temperature [°F]		-65		75		180	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		WFBXXXXB		WFBXXXXA		WFBXXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	50.32	50.38	51.47	51.47	46.61	46.40
	Minimum	47.45	47.56	49.01	48.95	39.74	40.84
	Maximum	53.63	55.26	53.88	53.93	50.18	49.18
UNT2 Strength (ksi)	**C.V.(%)**	3.51	4.05	3.18	2.91	6.67	5.77
	No. Specimens	18		16		16	
	No. Prepreg Lots	3		3		3	
	Mean	4.76	4.77	4.53	4.52	4.13	4.12
	Minimum	4.53	4.41	4.25	4.27	4.03	3.98
	Maximum	4.97	4.95	4.71	4.82	4.29	4.27
UNT2 Modulus (Msi)	**C.V.(%)**	2.08	2.83	2.73	3.33	1.69	1.94
	No. Specimens	18		18		17	
	No. Prepreg Lots	3		3		3	

2.3.11 Unnotched Tension 3 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape					**Unnotched Tension 3** **Gr/ Ep** **Newport NCT4708 MR60H 300gsm 38% RC Unitape** **[0/45/0/-45/0/90/0/-45/0/45/0]**		
Resin content:	47.05% vol		**Comp. density:** 1.537 [g/cc]					
Fiber volume:	52.95% vol							
Ply count:	11							
Test method:	ASTM D3039-00		**Modulus calculation:** linear fit from 1000 to 3000 micro in/in					
Normalized by:	0.0126	in. CPT						
			CTD		**RTD**		**ETW**	
Test Temperature [°F]			-65		75		180	
Moisture Conditioning			dry		dry		equilibrium	
Equilibrium at T, RH							160 F,85%	
Source code			WFCXXXXB		WFCXXXXA		WFCXXXXF	
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		199.95	200.71	208.99	209.41	169.03	169.01
	Minimum		180.64	175.70	197.95	196.58	153.30	149.72
	Maximum		217.88	221.99	224.52	227.30	200.60	198.29
UNT3	**C.V.(%)**		5.71	6.46	3.31	3.72	8.20	7.94
Strength (ksi)								
	No. Specimens		18		18		17	
	No. Prepreg Lots		3		3		3	
	Mean		12.48	12.52	12.55	12.57	12.70	12.69
	Minimum		11.89	11.57	12.27	12.21	12.25	12.22
	Maximum		12.98	13.06	12.82	12.83	13.11	13.07
UNT3	**C.V.(%)**		2.65	3.23	1.24	1.52	1.84	2.06
Modulus (Msi)								
	No. Specimens		18		18		21	
	No. Prepreg Lots		3		3		3	

2.3.12 Unnotched Compression 1 Properties

Material: New port NCT4708 MR60H 300gsm 38% RC Unitape

Resin content: 47.24% vol **Comp. density:** 1.540 [g/cc]
Fiber volume: 52.76% vol
Ply count: 8

Unnotched Compression 1
Gr/ Ep
Newport NCT4708 MR60H 300gsm 38% RC Unitape
[45/0/-45/90]s

Test method: ASTM D6641-01^{E1} **Modulus calculation:** linear fit from 1000 to 3000 micro in/in

Normalized by: 0.0126 in. CPT

		RTD		ETW	
Test Temperature [°F]		70		180	
Moisture Conditioning		dry		equilibrium	
Equilibrium at T, RH				160 F,85%	
Source code		WFWXXXXA		WFWXXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**
UNC1 Strength (ksi)	**Mean**	69.42	70.12	40.73	41.63
	Minimum	62.06	62.17	36.21	37.21
	Maximum	81.76	82.12	46.48	48.76
	C.V.(%)	7.70	8.21	6.96	8.03
	No. Specimens	19		19	
	No. Prepreg Lots	3		3	
UNC1 Modulus (Msi)	**Mean**	6.65	6.76	6.35	6.48
	Minimum	6.12	6.17	5.90	5.98
	Maximum	7.44	7.47	6.77	7.10
	C.V.(%)	5.60	5.66	4.10	4.71
	No. Specimens	18		19	
	No. Prepreg Lots	3		3	
νUNC1	**Mean**	0.348		0.376	
	No. Specimens	18		19	
	No. Prepreg Lots	3		3	

2.3.13 Unnotched Compression 2 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape					**Unnotched Compression 2 Gr/ Ep Newport NCT4708 MR60H 300gsm 38% RC Unitape [45/-45/45/-45/90/0/90/-45/45/-45/45]**	
Resin content:	46.99% vol		**Comp. density:** 1.540 [g/cc]				
Fiber volume:	53.01% vol						
Ply count:	11						
Test method:	ASTM D6641-01^{E1}		**Modulus calculation:** linear fit from 1000 to 3000 micro in/in				
Normalized by:	0.0126	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			70		180		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			WFXXXXXA		WFXXXXXF		
			Normalized	**Measured**	**Normalized**	**Measured**	
UNC2 Strength (ksi)	**Mean**		46.38	46.97	32.31	32.85	
	Minimum		39.96	40.86	28.12	28.68	
	Maximum		50.34	51.10	34.81	35.17	
	C.V.(%)		5.76	6.30	5.94	5.87	
	No. Specimens		17		18		
	No. Prepreg Lots		3		3		
UNC2 Modulus (Msi)	**Mean**		4.17	4.21	3.78	3.84	
	Minimum		3.77	3.85	3.56	3.52	
	Maximum		4.41	4.59	3.97	4.15	
	C.V.(%)		4.43	4.49	3.17	4.16	
	No. Specimens		18		21		
	No. Prepreg Lots		3		3		
νUNC2	**Mean**		0.540		0.630		
	No. Specimens		18		21		
	No. Prepreg Lots		3		3		

2.3.14 Unnotched Compression 3 Properties

Material: Newport NCT4708 MR60H 300gsm 38% RC Unitape

Resin content: 46.71% vol
Fiber volume: 53.29% vol
Ply count: 11
Comp. density: 1.541 [g/cc]

Unnotched Compression 3
Gr/ Ep
Newport NCT4708 MR60H 300gsm 38% RC Unitape
[0/45/0/-45/0/90/0/-45/0/45/0]

Test method: ASTM D6641-01^{E1}
Modulus calculation: linear fit from 1000 to 3000 micro in/in

Normalized by: 0.0126 in. CPT

		RTD		ETW			
Test Temperature [°F]		70		180			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		WFYXXXXA		WFYXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**		
UNC3 Strength (ksi)	**Mean**	92.11	93.21	69.16	70.16		
	Minimum	86.17	87.52	61.54	62.39		
	Maximum	97.28	98.42	74.50	75.62		
	C.V.(%)	3.12	3.33	4.93	5.05		
	No. Specimens	18		24			
	No. Prepreg Lots	3		3			
UNC3 Modulus (Msi)	**Mean**	11.31	11.48	10.88	11.03		
	Minimum	10.70	11.08	10.37	10.45		
	Maximum	11.75	12.06	11.43	11.85		
	C.V.(%)	2.42	2.36	2.19	2.95		
	No. Specimens	18		26			
	No. Prepreg Lots	3		3			
νUNC3	**Mean**	0.473		0.514			
	No. Specimens	18		26			
	No. Prepreg Lots	3		3			

2.3.15 Laminate Short Beam Strength Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape					**Laminate Short beam Strength Gr/ Ep Newport NCT4708 MR60H 300gsm 38% RC Unitape [45/0/-45/90]2S**	
Resin content:	46.90% vol	**Comp. density:** 1.536 [g/cc]					
Fiber volume:	53.10% vol						
Ply count:	16						
Test method:	ASTM D2344-00^{E1}						
		RTD		**ETW**			
Test Temperature [°F]		75		180			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F, 85 %			
Source code		WFqXXXXA		WFqXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
LSBS (ksi)	**Mean**		6.53		5.28		
	Minimum		6.13		4.69		
	Maximum		7.33		5.55		
	C.V.(%)		4.26		5.13		
	No. Specimens	18		18			
	No. Prepreg Lots	3		3			

2.3.16 Open Hole Tension 1 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape							**Open Hole Tension 1 Gr/ Ep Newport NCT4708 MR60H 300gsm 38% RC Unitape [45,0,-45,90]S**	
Resin content:	47.00% vol		**Comp. density:** 1.538 g/cc						
Fiber volume:	53.00% vol								
Ply count:	8								
Test method:	ASTM D5766-02a								
Normalized by:	0.0126 in. CPT								
		CTD		**RTD**		**ETW**			
Test Temperature [°F]		-65		75		180			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		WFDXXXXB		WFDXXXXA		WFDXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean	66.11	66.21	69.15	69.03	74.83	74.73		
	Minimum	58.09	57.84	63.97	63.29	67.05	67.80		
	Maximum	76.64	76.45	75.88	75.48	81.02	81.97		
OHT1	**C.V.(%)**	7.19	7.66	4.79	4.87	4.43	4.54		
Strength (ksi)									
	No. Specimens	19		19		18			
	No. Prepreg Lots	3		3		3			

2.3.17 Open Hole Tension 2 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape						**Open Hole Tension 2**		
Resin content:	47.20% vol	**Comp. density:** 1.539 g/cc					**Gr/ Ep**		
Fiber volume:	52.80% vol						**Newport NCT4708 MR60H 300gsm**		
Ply count:	16						**38% RC Unitape**		
							[45,-45,45,-45,90,0,90,-45,45,-45,45]		
Test method:	ASTM D5766-02a								
Normalized by:	0.0126 in. CPT								
		CTD		**RTD**		**ETW**			
Test Temperature [°F]		-65		75		180			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		WFEXXXXB		WFEXXXXA		WFEXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	38.20	37.99	38.35	38.13	35.97	35.86		
	Minimum	35.51	34.79	34.75	35.04	33.06	33.36		
	Maximum	40.86	41.74	42.77	43.23	38.29	38.55		
OHT2	**C.V.(%)**	3.89	4.36	5.86	6.00	4.13	4.24		
Strength (ksi)									
	No. Specimens	17		18		18			
	No. Prepreg Lots	3		3		3			

2.3.18 Open Hole Tension 3 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape							**Open Hole Tension 3**	
Resin content:	47.36% vol	**Comp. density:** 1.539 g/cc						**Gr/ Ep**	
Fiber volume:	52.64% vol							**Newport NCT4708 MR60H 300gsm 38% RC Unitape**	
Ply count:	11							**[0,45,0,-45,0,90,0,-45,0,45,0]**	
Test method:	ASTM D5766-02a								
Normalized by:	0.0126 in. CPT								
		CTD		**RTD**		**ETW**			
Test Temperature [°F]		-65		75		180			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		WFFXXXXB		WFFXXXXA		WFFXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	127.15	128.25	140.07	140.08	143.63	143.33		
	Minimum	115.24	117.10	125.16	129.55	131.99	132.82		
	Maximum	139.75	141.06	157.17	161.35	148.69	150.34		
OHT3	**C.V.(%)**	5.50	5.03	6.06	6.68	2.93	3.33		
Strength (ksi)									
	No. Specimens	17		18		19			
	No. Prepreg Lots	3		3		3			

2.3.19 Filled-Hole Tension 1 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape		**Filled Hole Tension 1** **Gr/ Ep** **Newport NCT4708 MR60H 300gsm 38% RC Unitape** **[45/0/-45/90]S**
Resin content:	47.18% vol	**Comp. density:** 1.540 [g/cc]	
Fiber volume:	52.82% vol		
Ply count:	8		
Test method:	ASTM D6742M-07		
Normalized by:	0.0126 in. CPT		

		CTD		RTD		ETW	
Test Temperature [°F]		-65		75		180	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		WF4XXXXB		WF4XXXXA		WF4XXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	64.74	64.82	68.52	68.59	74.08	74.24
	Minimum	61.06	60.71	61.73	61.89	68.85	67.84
	Maximum	67.93	69.20	76.01	74.58	78.33	78.51
FHT1	**C.V.(%)**	3.45	3.81	6.15	6.15	3.87	4.01
Strength (ksi)							
	No. Specimens	18		18		18	
	No. Prepreg Lots	3		3		3	

2.3.20 Filled-Hole Tension 2 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape					**Filled Hole Tension 2 Gr/ Ep Newport NCT4708 MR60H 300gsm 38% RC Unitape [45/-45/45/-45/90/0/90/-45/45/-45/45]**	
Resin content:	47.30% vol						
Fiber volume:	52.70% vol						
Ply thickness:	0.0122-0.0130						
Ply count:	11						
		Comp. density: 1.538 [g/cc]					
Test method:	ASTM D6742M-07						
Normalized by:	0.0126" CPT						
		CTD		**RTD**		**ETW**	
Test Temperature [°F]		-65		75		180	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		WF5XXXXB		WF5XXXXA		WF5XXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	38.91	38.84	37.82	37.75	34.63	34.67
	Minimum	36.54	36.75	35.46	35.75	32.98	31.93
	Maximum	42.09	41.61	40.49	40.11	36.39	36.94
FHT2	**C.V.(%)**	3.62	3.42	3.38	2.76	2.51	3.39
Strength (ksi)							
	No. Specimens	18		18		18	
	No. Prepreg Lots	3		3		3	

2.3.21 Filled-Hole Tension 3 Properties

Material:	Newport NCT4708 MR60H 300gsm 38% RC Unitape					**Filled Hole Tension 3 Gr/ Ep Newport NCT4708 MR60H 300gsm 38% RC Unitape [0/45/0/-45/0/90/0/-45/0/45/0]**	
Resin content:	47.75% vol	**Comp. density:** 1.536 [g/cc]					
Fiber volume:	52.25% vol						
Ply count:	11						
Test method:	ASTM D6742M-07						
Normalized by:	0.0126 in. CPT						
		CTD		**RTD**		**ETW**	
Test Temperature [°F]		-65		75		180	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		WF6XXXXB		WF6XXXXA		WF6XXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	114.18	114.36	118.21	117.59	125.46	124.59
	Minimum	105.59	107.41	108.54	105.61	115.47	116.02
	Maximum	124.22	125.95	134.30	130.41	130.04	131.58
FHT2	**C.V.(%)**	4.44	4.26	6.06	6.01	3.04	3.30
Strength (ksi)							
	No. Specimens	19		17		19	
	No. Prepreg Lots	3		3		3	

2.3.22 Open Hole Compression 1 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape		**Open Hole Compression 1 Gr/ Ep Newport NCT4708 MR60H 300gsm 38% RC Unitape [45/0/-45/90]2S**
Resin content:	47.32% vol	**Comp. density:** 1.536 [g/cc]	
Fiber volume:	52.68% vol		
Ply count:	16		
Test method:	ASTM D6484-04		
Normalized by:	0.0126 in CPT		

		RTD		ETW			
Test Temperature [°F]		75		180			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		WFGXXXXA		WFGXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	38.09	38.15	29.47	29.42		
	Minimum	36.49	35.59	27.25	26.69		
	Maximum	39.62	40.30	34.65	33.51		
OHC1	**C.V.(%)**	2.62	3.00	6.07	5.55		
Strength (ksi)							
	No. Specimens	19		21			
	No. Prepreg Lots	3		3			

2.3.23 Open Hole Compression 2 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape					**Open Hole Compression 2 Gr/ Ep Newport NCT4708 MR60H 300gsm 38% RC Unitape [45/-45/45/-45/90/0/90/-45/45/-45/45]**	
Resin content:	47.37% vol	**Comp. density:** 1.536 [g/cc]					
Fiber volume:	52.63% vol						
Ply count:	11						
Test method:	ASTM D6484-04						
Normalized by:	0.0126 in CPT						
		RTD		**ETW**			
Test Temperature [°F]		75		180			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		WFHXXXXA		WFHXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	29.00	29.24	19.78	19.82		
	Minimum	26.93	27.19	18.64	18.09		
	Maximum	31.27	31.98	21.41	21.29		
OHC2	**C.V.(%)**	3.64	3.89	3.98	4.14		
Strength (ksi)							
	No. Specimens	20		19			
	No. Prepreg Lots	3		3			

2.3.24 Open Hole Compression 3 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape					**Open Hole Compression 3 Gr/ Ep Newport NCT4708 MR60H 300gsm 38% RC Unitape [0/45/0/-45/0/90/0/-45/0/45/0]**	
Resin content:	47.41% vol	**Comp. density:** 1.534 [g/cc]					
Fiber volume:	52.59% vol						
Ply count:	11						
Test method:	ASTM D6484-04						
Normalized by:	0.0126 in CPT						
		RTD		**ETW**			
Test Temperature [°F]		75		180			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		WFIXXXXA		WFIXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	56.23	56.17	43.06	42.88		
	Minimum	51.21	50.70	39.03	38.41		
	Maximum	64.99	63.53	47.33	46.51		
OHC3	**C.V.(%)**	6.16	6.38	5.04	5.12		
Strength (ksi)							
	No. Specimens	18		18			
	No. Prepreg Lots	3		3			

2.3.25 Filled- Hole Compression 1 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape			**Filled Hole Compression 1** **Gr/ Ep** **Newport NCT4708 MR60H 300gsm 38% RC Unitape** **[45/0/-45/90]2S**			
Resin content:	47.08% vol	**Comp. density:**	1.536 [g/cc]				
Fiber volume:	52.92% vol						
Ply count:	16						
Test method:	ASTM D6742-02						
Normalized by:	0.0126	in. CPT					
		RTD		**ETW**			
Test Temperature [°F]		70		180			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		RTD		ETW			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
FHC1 Strength (ksi)	**Mean**	52.14	51.94	37.52	37.46		
	Minimum	48.72	47.50	32.72	32.24		
	Maximum	59.73	60.30	43.70	44.73		
	C.V.(%)	5.34	5.96	6.81	7.63		
	No. Specimens	18		20			
	No. Prepreg Lots	3		3			

2.3.26 Filled- Hole Compression 2 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape		**Filled Hole Compression 2** **Gr/ Ep** **Newport NCT4708 MR60H 300gsm 38% RC Unitape** **[45/-45/45/-45/90/0/90/-45/45/-45/45]**
Resin content:	47.49% vol	Comp. density: 1.536 [g/cc]	
Fiber volume:	52.51% vol		
Ply count:	11		
Test method:	ASTM D6742-02		
Normalized by:	0.0126	in. CPT	

		RTD		ETW			
Test Temperature [°F]		70		180			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		WF8XXXXA		WF8XXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
FHC2 Strength (ksi)	**Mean**	41.24	41.34	27.49	27.49		
	Minimum	37.92	38.18	25.28	25.26		
	Maximum	46.16	46.85	30.10	29.98		
	C.V.(%)	6.30	6.64	5.41	5.85		
	No. Specimens	19		18			
	No. Prepreg Lots	3		3			

2.3.27 Filled-Hole Compression 3 Properties

Material:	Newport NCT4708 MR60H 300gsm 38% RC Unitape		**Filled Hole Compression 3** **Gr/ Ep** **Newport NCT4708 MR60H 300gsm 38% RC Unitape** **[0/45/0/-45/0/90/0/-45/0/45/0]**
Resin content:	47.08% vol	**Comp. density:** 1.537 [g/cc]	
Fiber volume:	52.92% vol		
Ply count:	11		
Test method:	ASTM D6742-02		
Normalized by:	0.0126	in. CPT	

		RTD		ETW			
Test Temperature [°F]		70		180			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		WF9XXXXA		WF9XXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
FHC3 Strength (ksi)	**Mean**	80.14	80.76	55.53	55.69		
	Minimum	74.56	72.95	49.31	50.53		
	Maximum	86.03	87.62	60.65	60.19		
	C.V.(%)	3.78	4.21	5.48	4.80		
	No. Specimens	18		18			
	No. Prepreg Lots	3		3			

2.3.28 Single Shear Bearing 1 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape					**Single Shear Bearing 1** **Gr/ Ep** **Newport NCT4708 MR60H 300gsm 38% RC Unitape** **[45/0/-45/90]S**	
Resin content:	46.51% vol	**Comp. density:**	1.541 [g/cc]				
Fiber volume:	53.49% vol						
Ply count:	8						
Test method:	ASTM D5961-05						
Normalized by:	0.0126 in CPT						
		RTD		**ETW**			
Test Temperature [°F]		70		180			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		RTD		ETW			
		Normalized	**Measured**	**Normalized**	**Measured**		
SSB1 Ultimate Strength (ksi)	**Mean**	106.51	108.91	83.65	84.83		
	Minimum	100.57	102.02	79.06	79.99		
	Maximum	111.34	116.38	88.94	89.37		
	C.V.(%)	2.66	3.94	2.96	3.26		
	No. Specimens	17		18			
	No. Prepreg Lots	3		3			
SSB1 2% Offset Strength (ksi)	**Mean**	93.66	95.78	69.05	70.04		
	Minimum	86.16	87.63	58.98	59.64		
	Maximum	101.10	105.68	77.69	79.06		
	C.V.(%)	4.57	5.54	6.56	7.16		
	No. Specimens	17		18			
	No. Prepreg Lots	3		3			

2.3.29 Single Shear Bearing 2 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape					**Single Shear Bearing 2** **Gr/ Ep** **Newport NCT4708 MR60H 300gsm 38% RC Unitape** **[45/-45/45/-45/90/0/90/-45/45/-45/45]**	
Resin content:	46.95% vol	**Comp. density:** 1.541 [g/cc]					
Fiber volume:	53.05% vol						
Ply count:	11						
Test method:	ASTM D5961-05						
Normalized by:	NA						
		RTD		**ETW**			
Test Temperature [°F]		70		180			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		WF2XXXXA		WFXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**		
SSB2 Ultimate Strength (ksi)	**Mean**	117.29	117.62	89.72	89.52		
	Minimum	109.28	105.23	85.06	83.15		
	Maximum	122.47	123.81	95.67	95.02		
	C.V.(%)	2.99	4.02	3.23	3.88		
	No. Specimens	18		18			
	No. Prepreg Lots	3		3			
SSB2 2% Offset Strength (ksi)	**Mean**	99.64	99.98	73.41	73.24		
	Minimum	87.04	83.81	67.46	65.54		
	Maximum	108.16	111.14	78.44	77.12		
	C.V.(%)	5.63	7.12	3.33	3.66		
	No. Specimens	18		18			
	No. Prepreg Lots	3		3			

2.3.30 Single Shear Bearing 3 Properties

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape					**Single Shear Bearing 3** **Gr/ Ep** **Newport NCT4708 MR60H 300gsm 38% RC Unitape** **[0/45/0/-45/0/90/0/-45/0/45/0]**	
Resin content:	46.73% vol	**Comp. density:** 1.539 [g/cc]					
Fiber volume:	53.27% vol						
Ply count:	11						
Test method:	ASTM D5961-05						
Normalized by:	0.0126 in CPT						
			RTD		**ETW**		
Test Temperature [°F]			70		180		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			RTD		ETW		
			Normalized	**Measured**	**Normalized**	**Measured**	
SSB3 Ultimate Strength (ksi)	**Mean**		115.39	116.95	84.45	85.01	
	Minimum		108.76	109.31	79.21	76.41	
	Maximum		121.12	123.52	88.00	90.75	
	C.V.(%)		3.08	3.52	2.31	3.61	
	No. Specimens		18		18		
	No. Prepreg Lots		3		3		
SSB3 2% Offset Strength (ksi)	**Mean**		94.33	95.63	70.25	70.70	
	Minimum		81.79	81.16	67.59	66.27	
	Maximum		101.32	103.53	73.17	73.86	
	C.V.(%)		5.59	6.35	2.61	3.30	
	No. Specimens		18		18		
	No. Prepreg Lots		3		3		

2.3.31 Compression after Impact Properties

Compression After Impact
Gr/ Ep
Newport NCT4708 MR60H 300gsm 38% RC Unitape
[45,0-45,90]2s

Material:	New port NCT4708 MR60H 300gsm 38% RC Unitape						
Resin content:	49.15% vol	**Comp. density:**	1.546 [g/cc]				
Fiber volume:	50.85% vol						
Ply count:	16						
Test method:	SACMA SRM 2R-94						
Normalized by:	0.0126 in. CPT						
		RTD					
Test Temperature [°F]		75					
Moisture Conditioning		dry					
Equilibrium at T, RH							
Source code		WFKCXXXA					
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	28.66	27.34				
	Minimum	24.91	23.77				
	Maximum	32.03	30.53				
CAI	**C.V.(%)**	9.50	9.50				
Strength (ksi)							
	No. Specimens	6					
	No. Prepreg Lots	1					

2.3.32 Interlaminar Tension Properties

Material: New port NCT4708 MR60H 300gsm 38% RC Unitape

Resin content: 42.29% vol **Comp. density:** 1.558 [g/cc]
Fiber volume: 57.71% vol
Ply count: 15

Test method: ASTM D6415-99^{E1}

Normalized by: NA

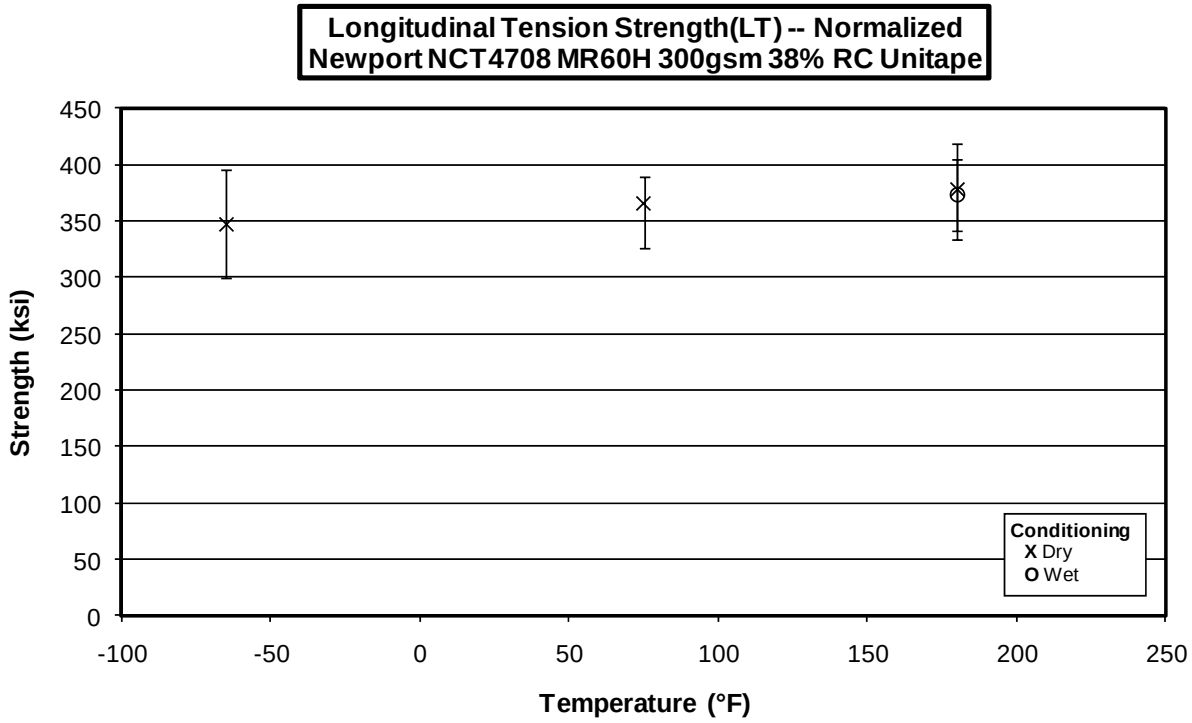
Interlaminar Tension Layup 1
Gr/ Ep
Newport NCT4708 MR60H 300gsm 38% RC Unitape
[0]15

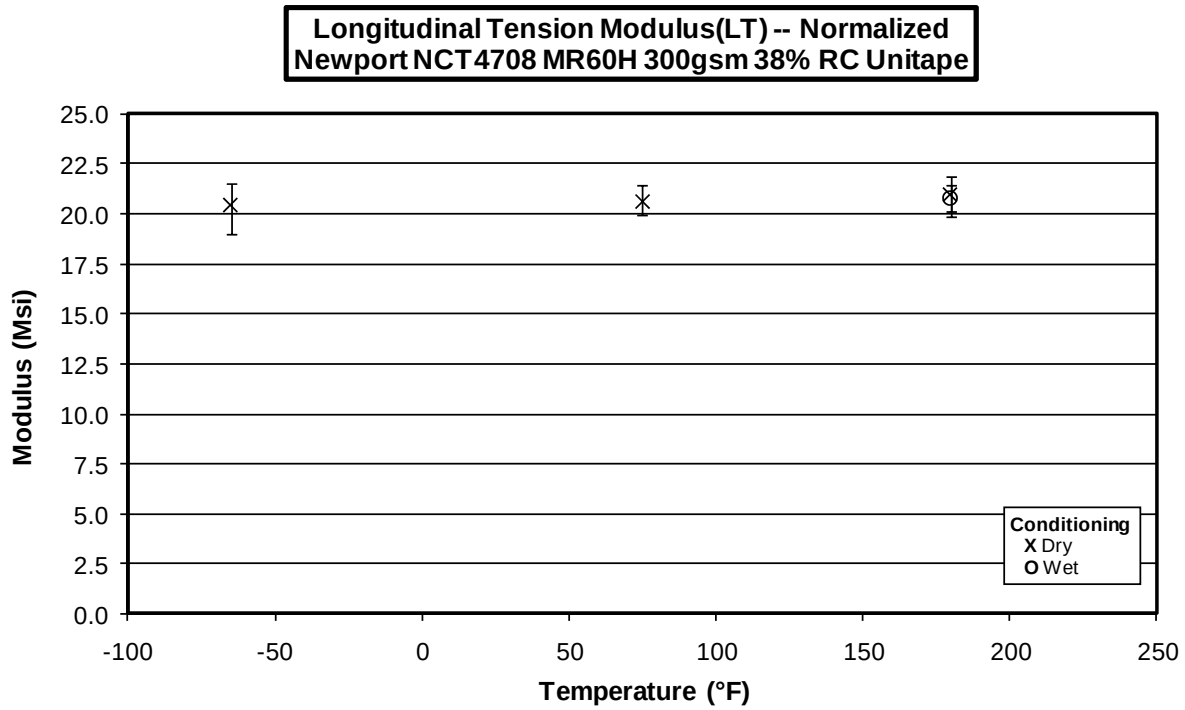
		CTD		RTD		ETW	
Test Temperature [°F]		-65		70		180	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		WFMCXXXB		WFMCXXXA		WFMCXXXF	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
ILT Strength (ksi)	**Mean**		7.86		5.11		4.36
	Minimum		4.47		4.49		3.60
	Maximum		9.93		5.88		4.96
	C.V.(%)		23.87		10.52		12.27
	No. Specimens	9		7		12	
	No. Prepreg Lots	1		1		1	

3. Individual Test Charts

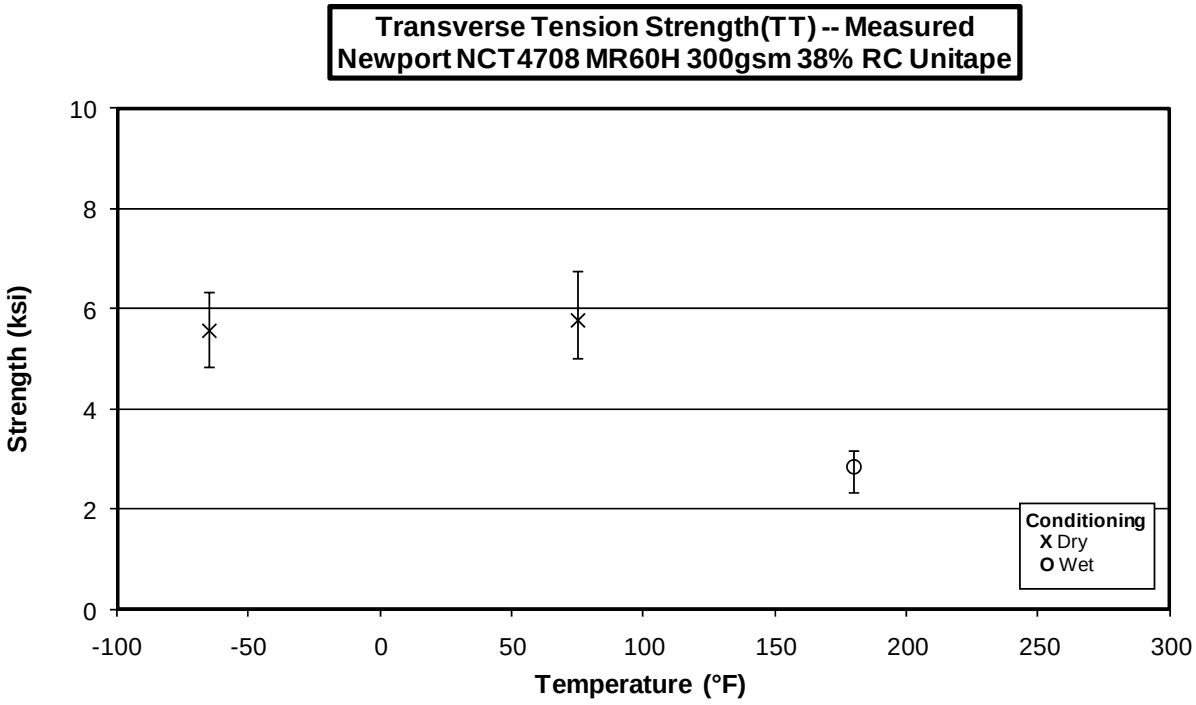
These charts combine all three batches of data and plot the minimum and maximum modulus and strength range based on the test temperature.

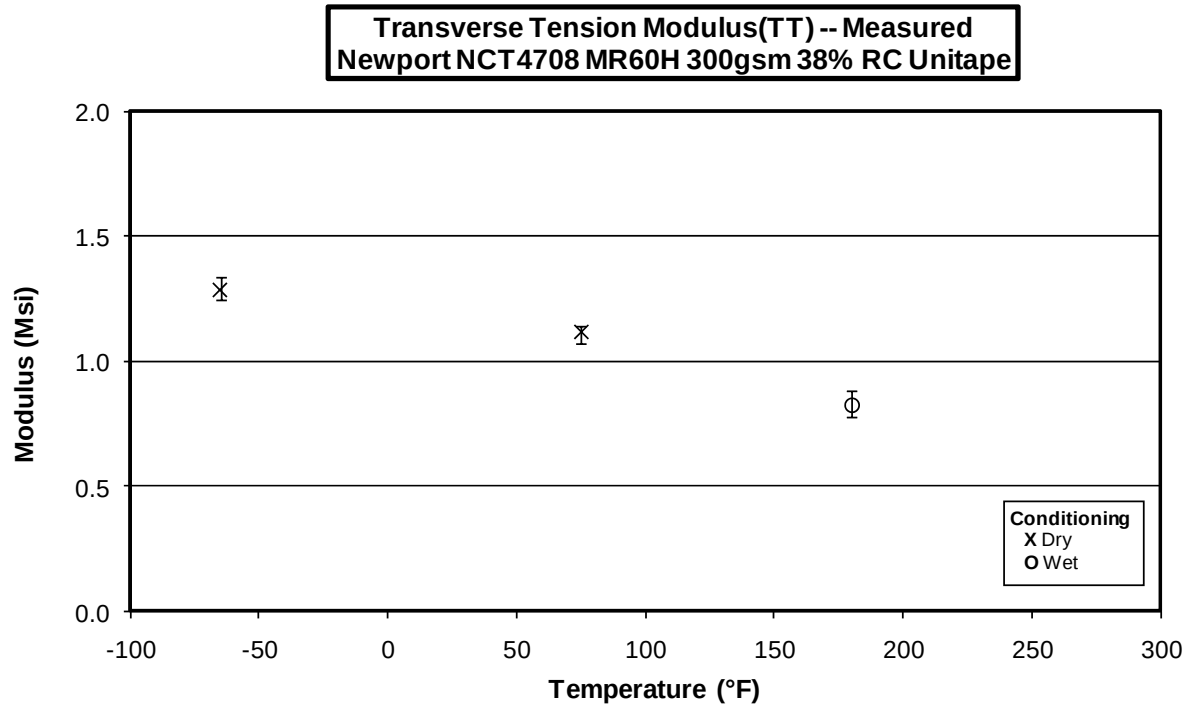
3.1 Longitudinal Tension Properties



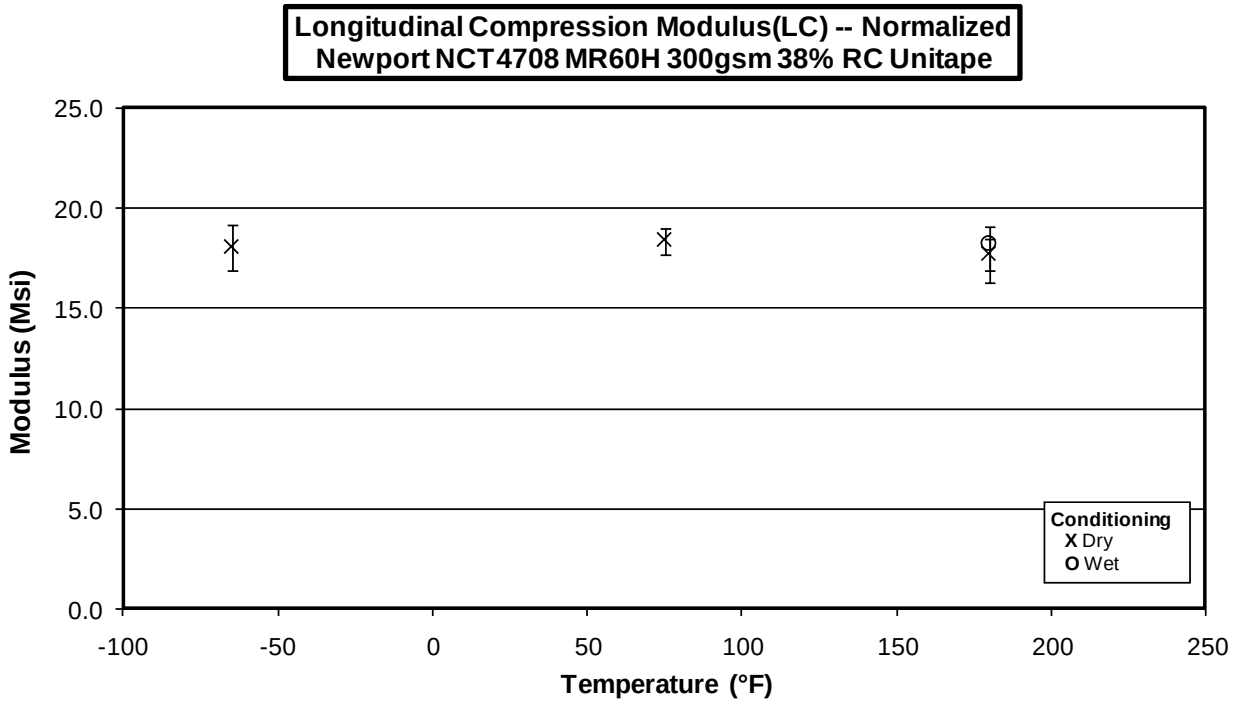


3.2 Transverse Tension Properties

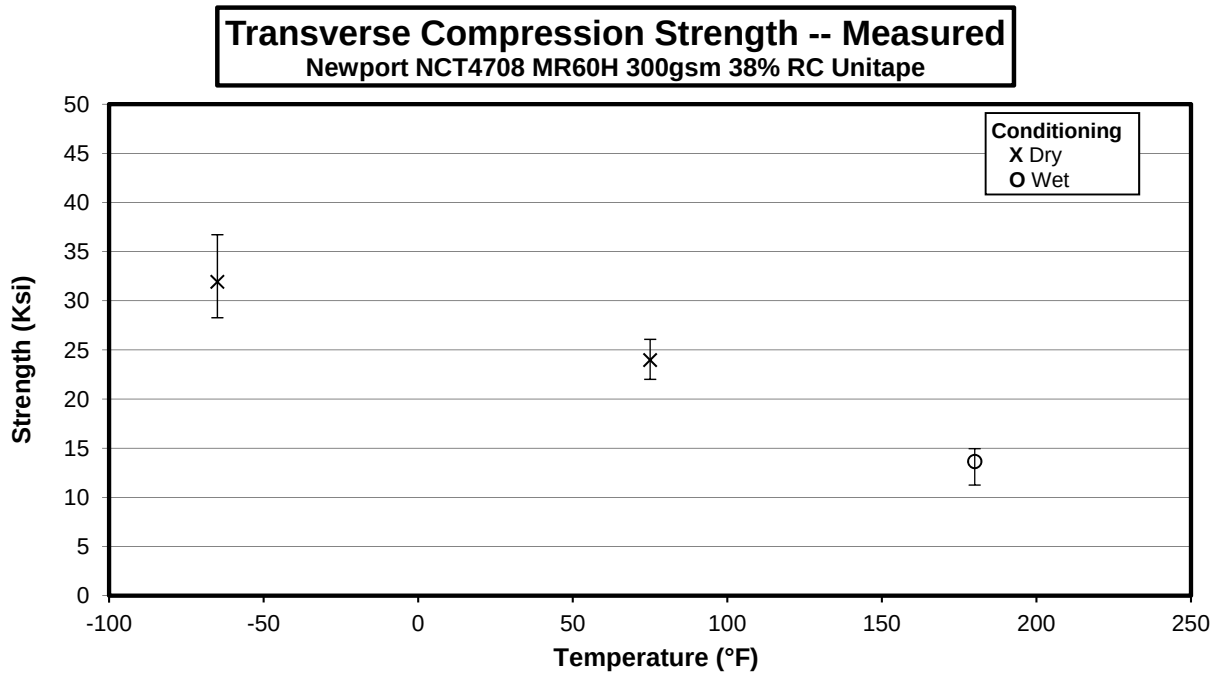


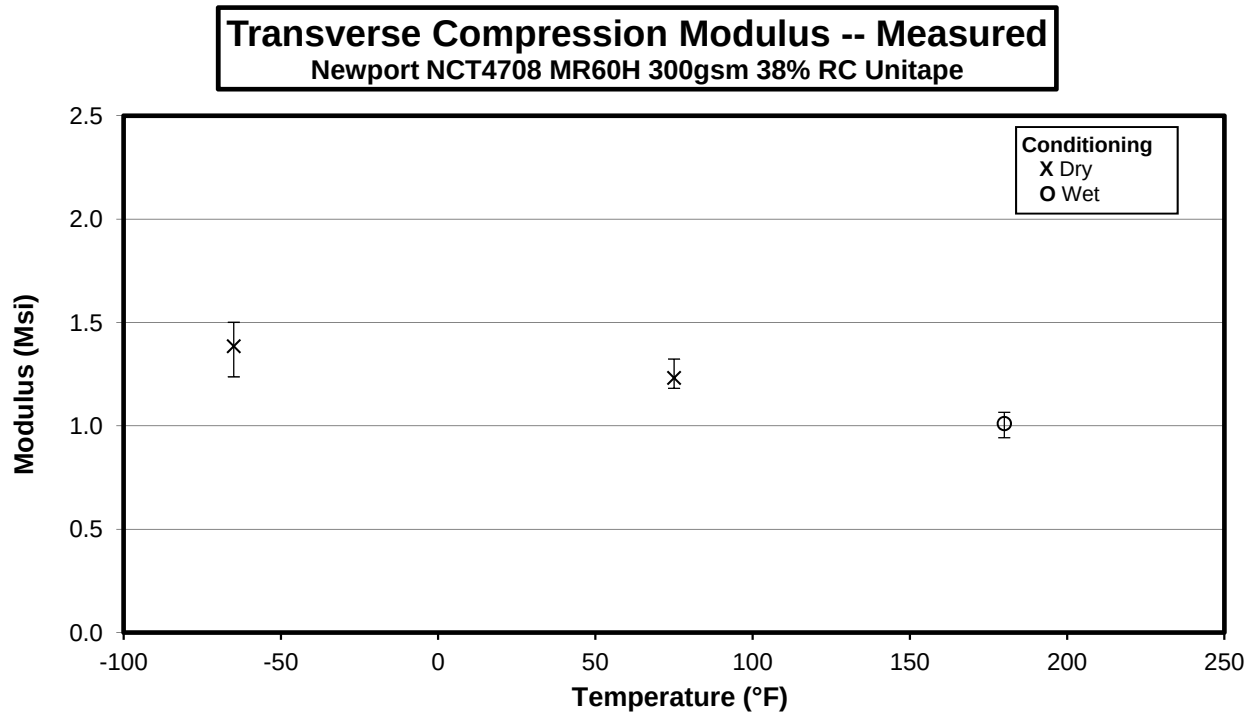


3.3 Longitudinal Compression Properties

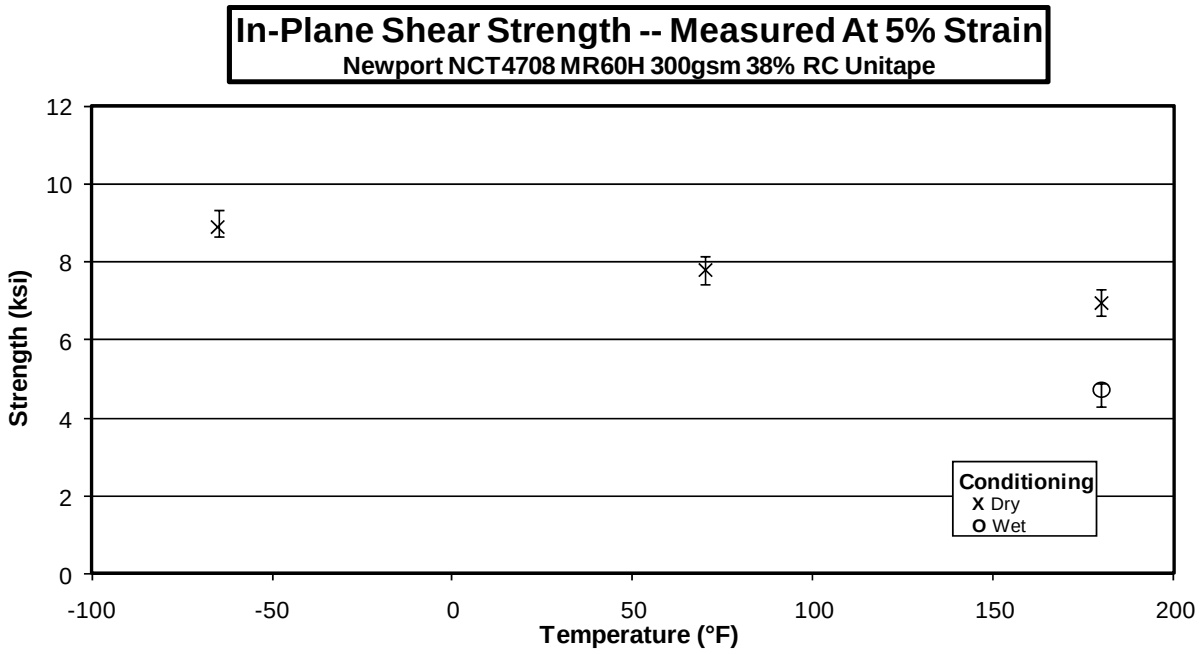


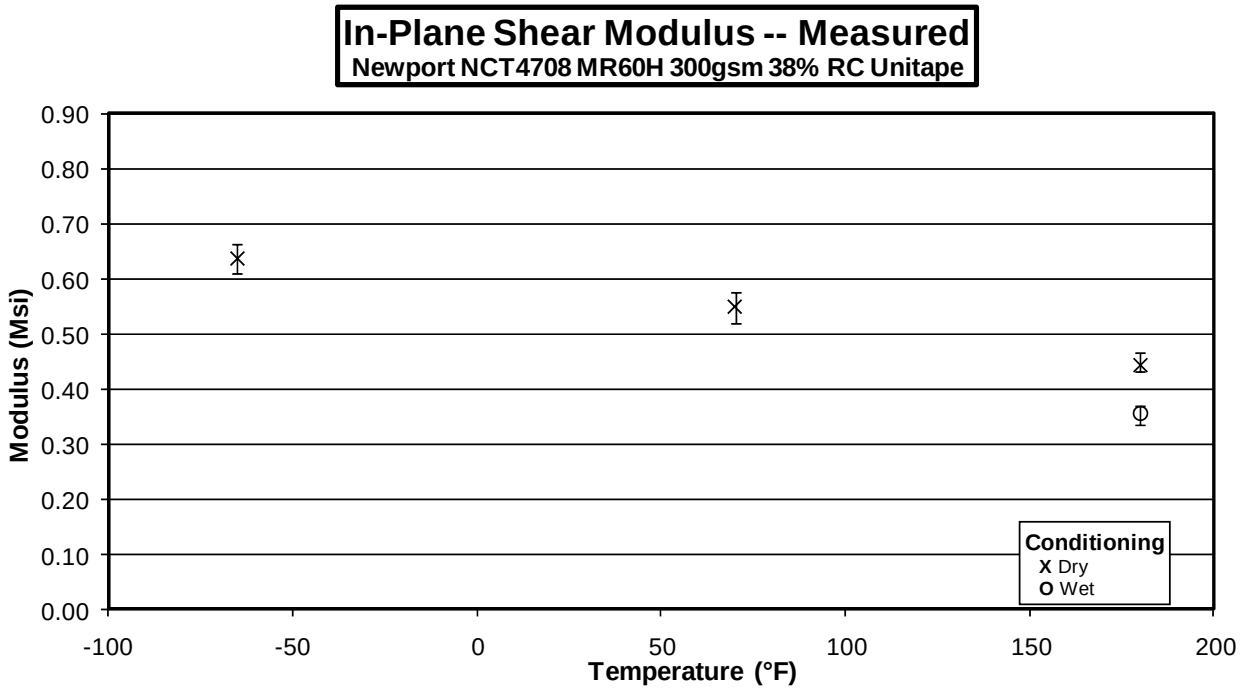
3.4 Transverse Compression Properties



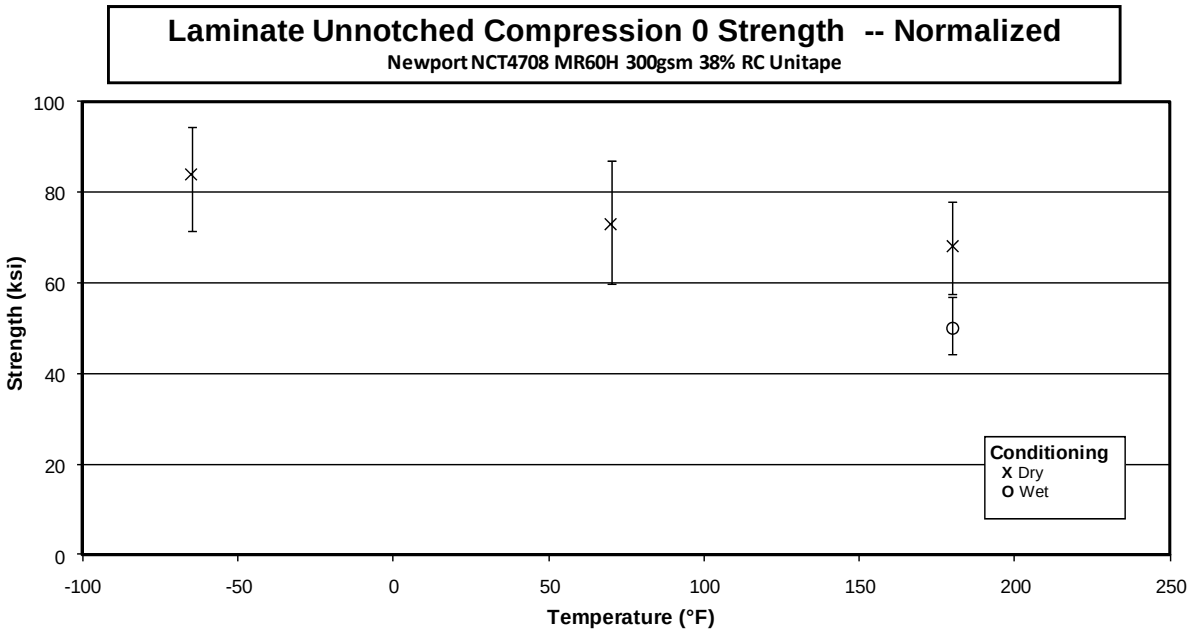


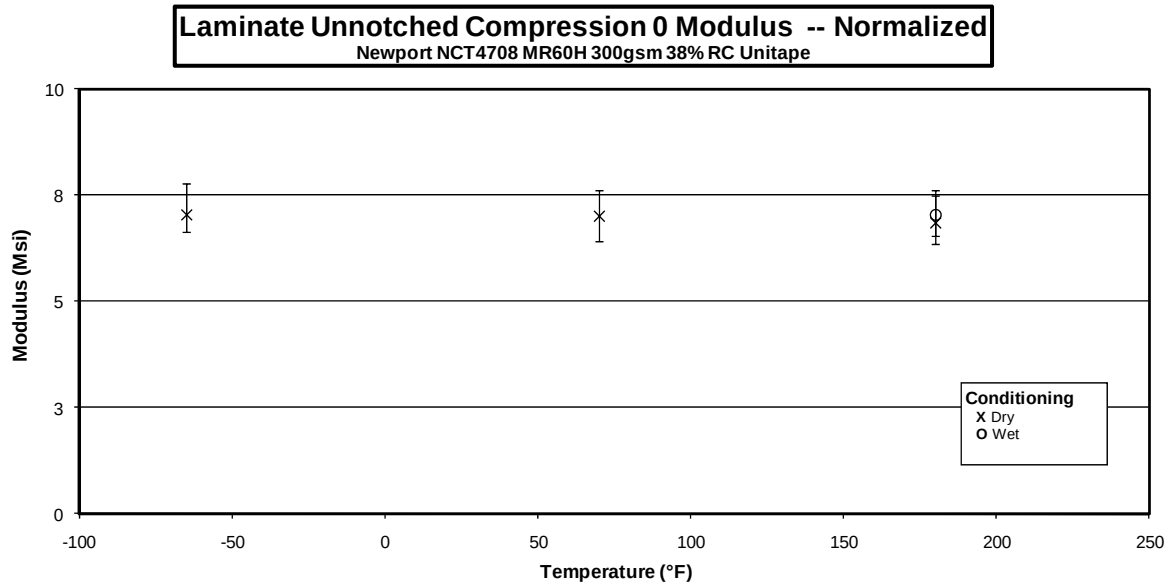
3.5 In-Plane Shear Properties



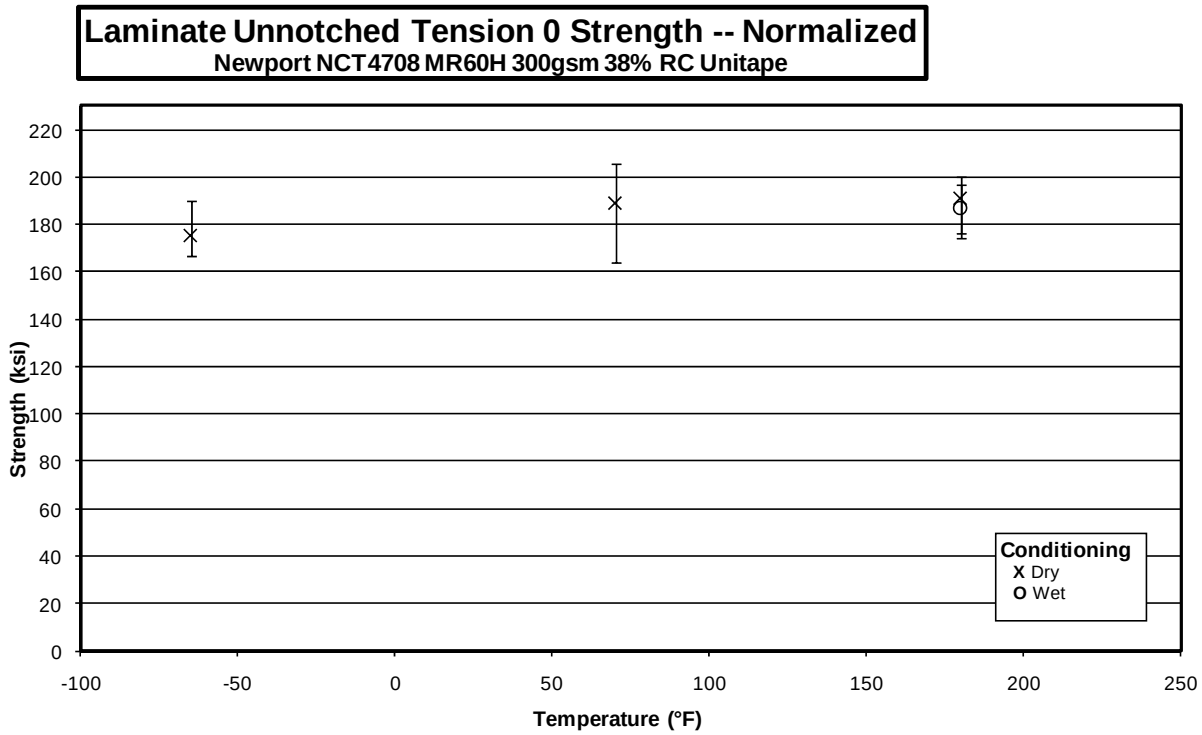


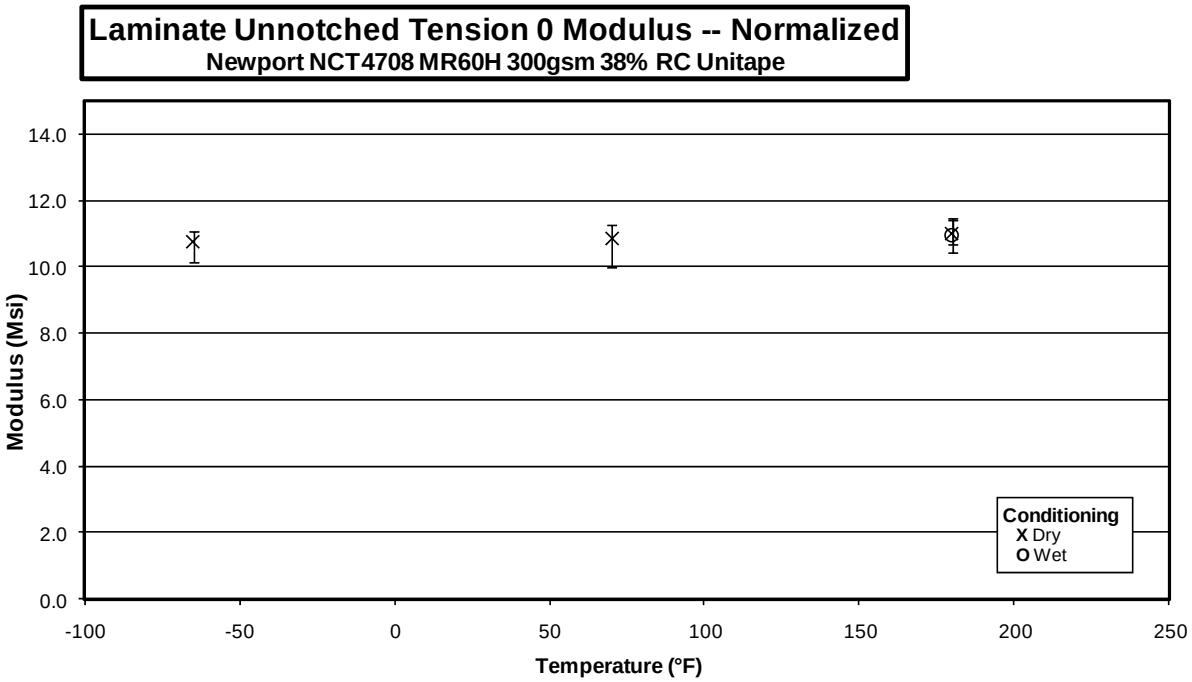
3.6 Unnotched Compression 0 Properties



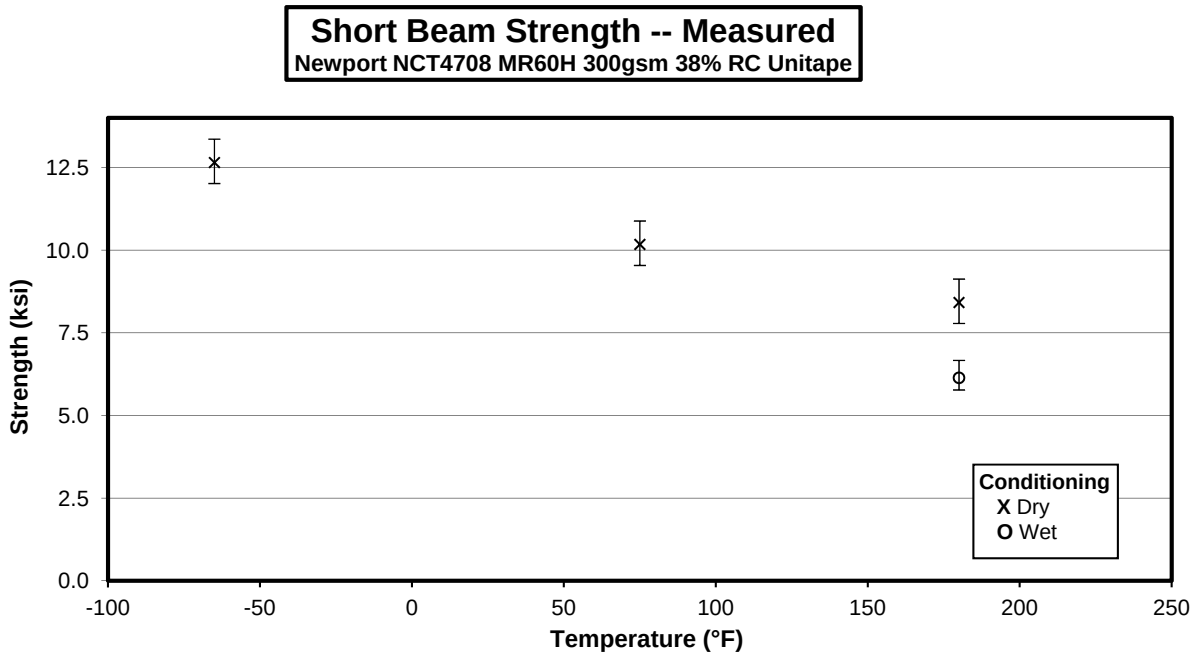


3.7 Unnotched Tension 1 Properties

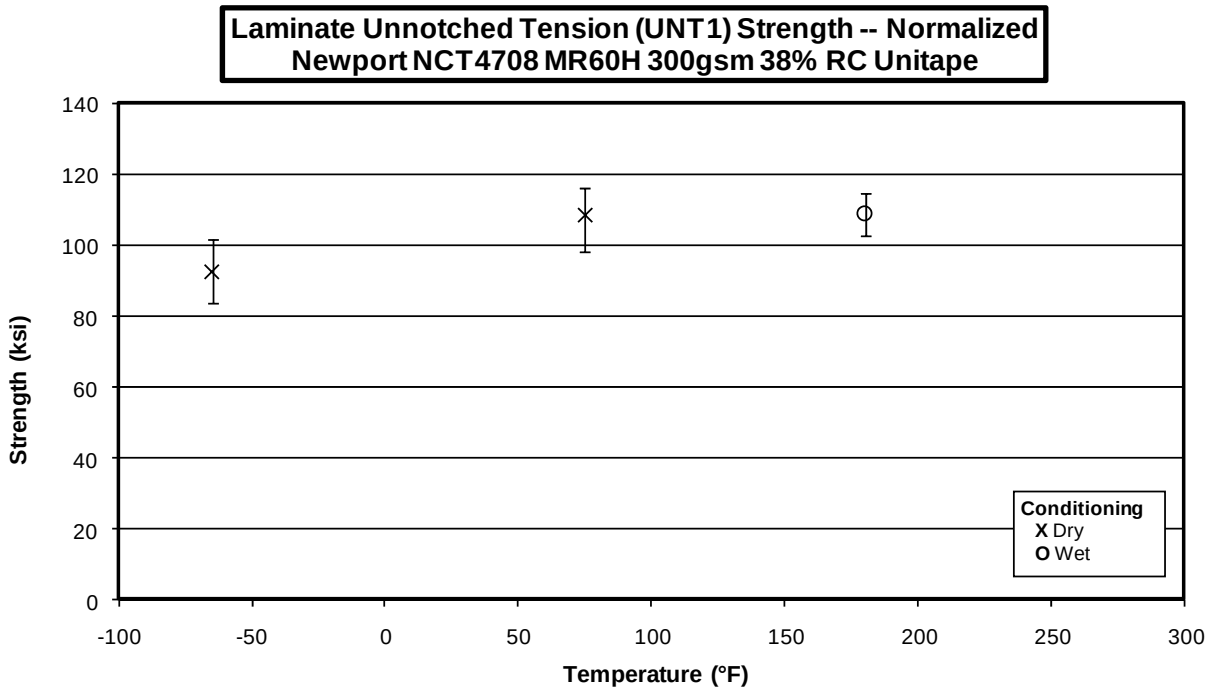


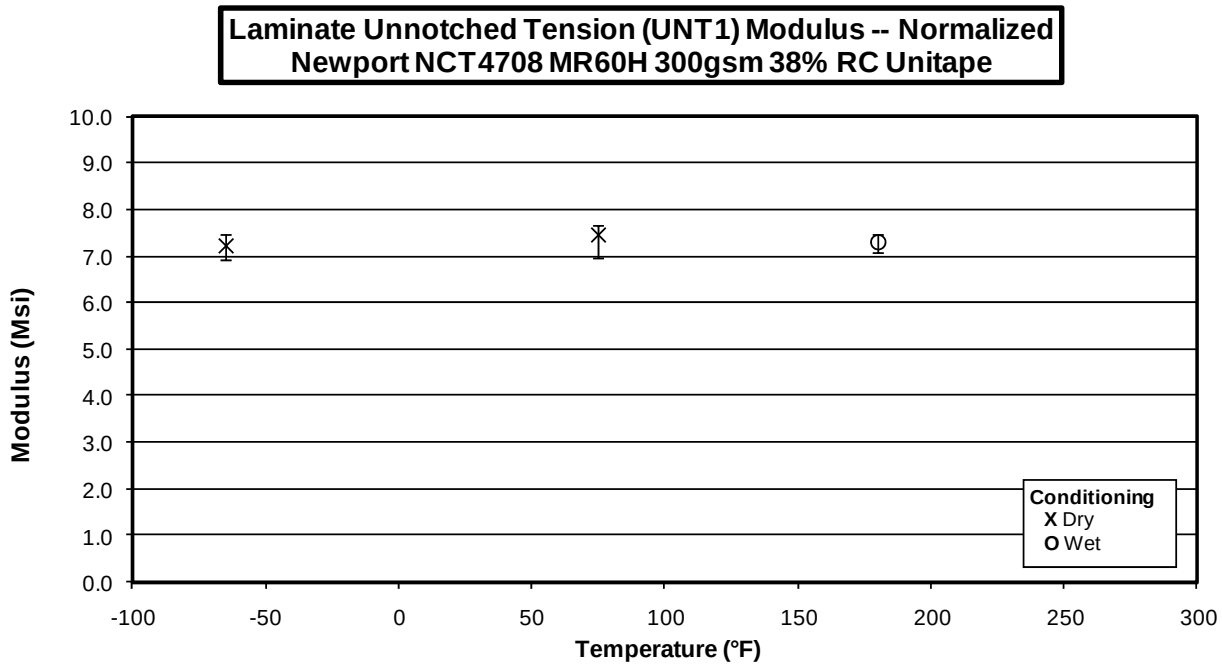


3.8 Lamina Short Beam Strength Properties

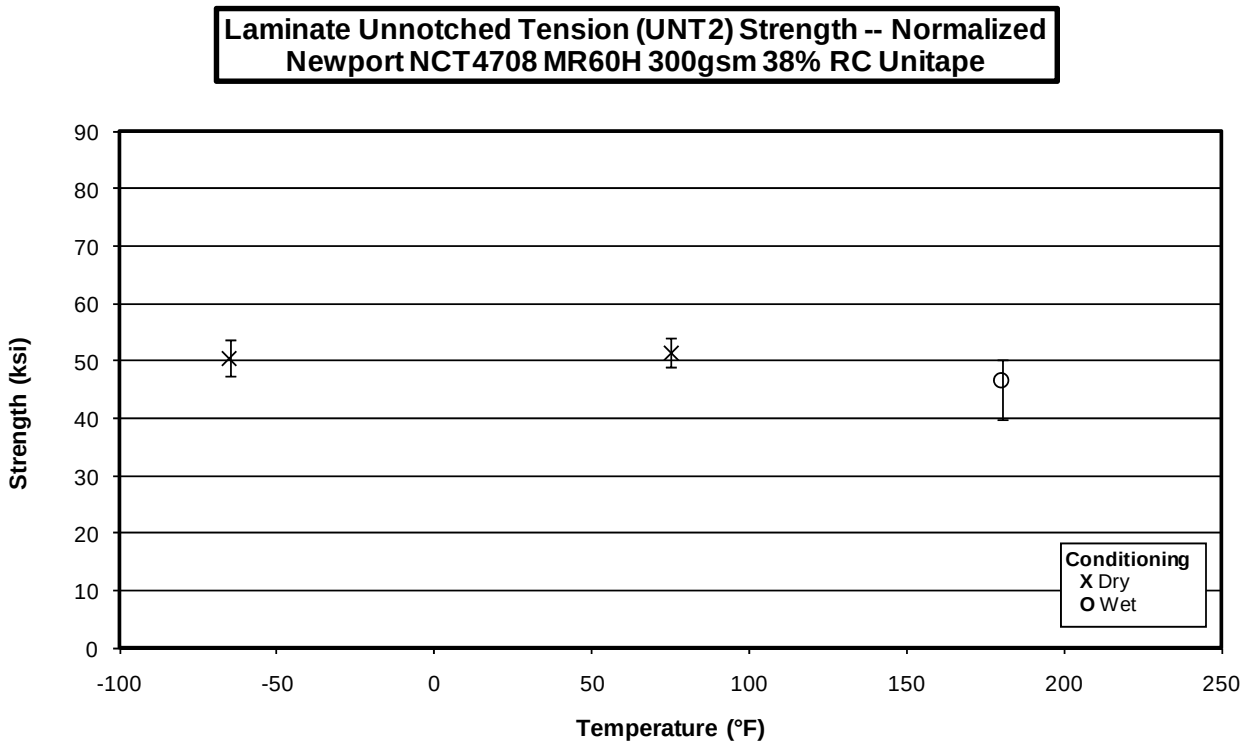


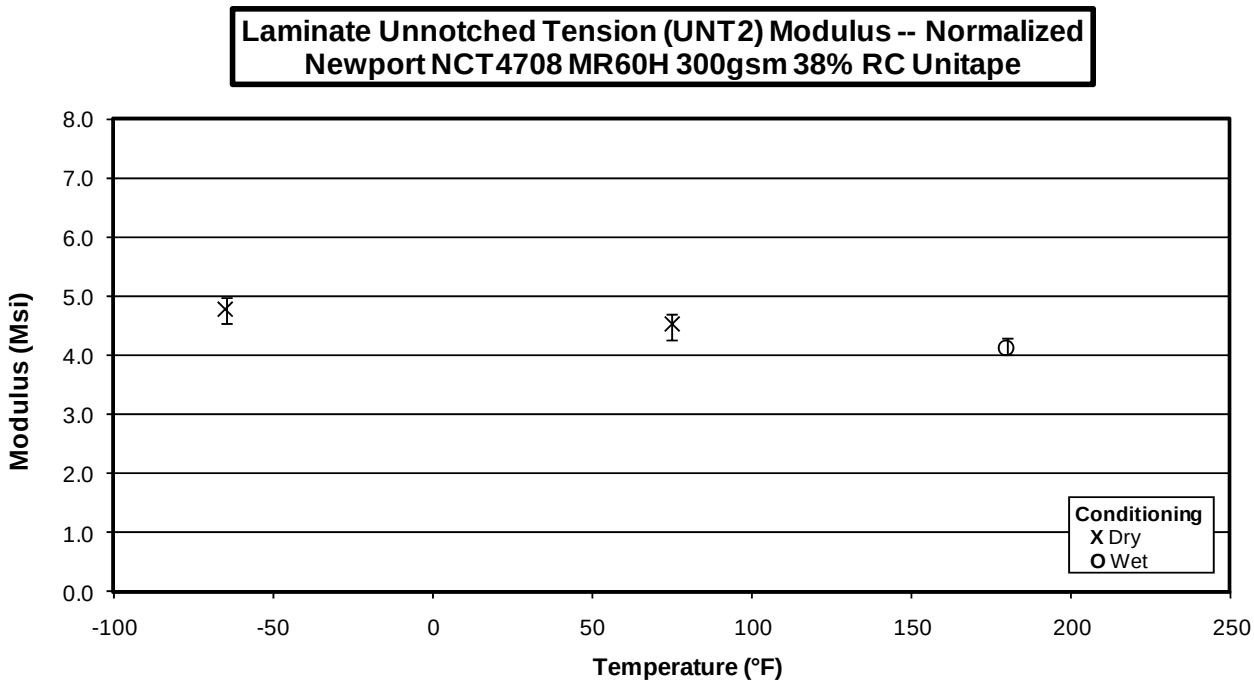
3.9 Unnotched Tension 1 Properties



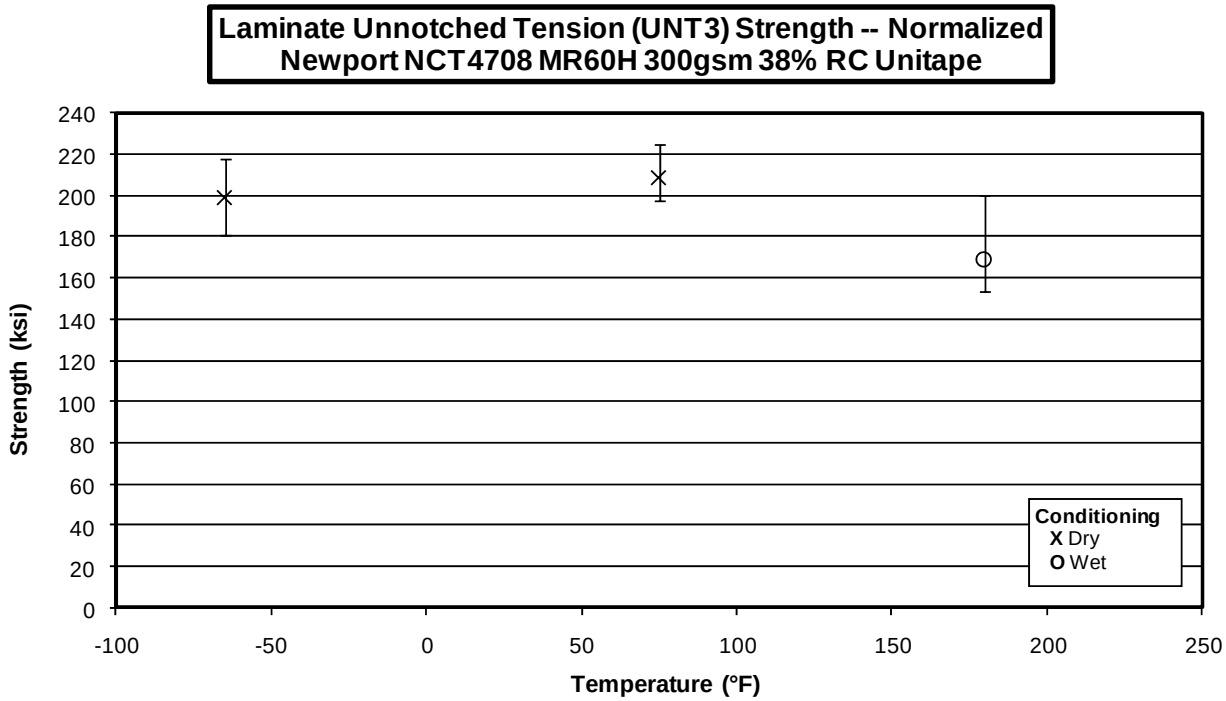


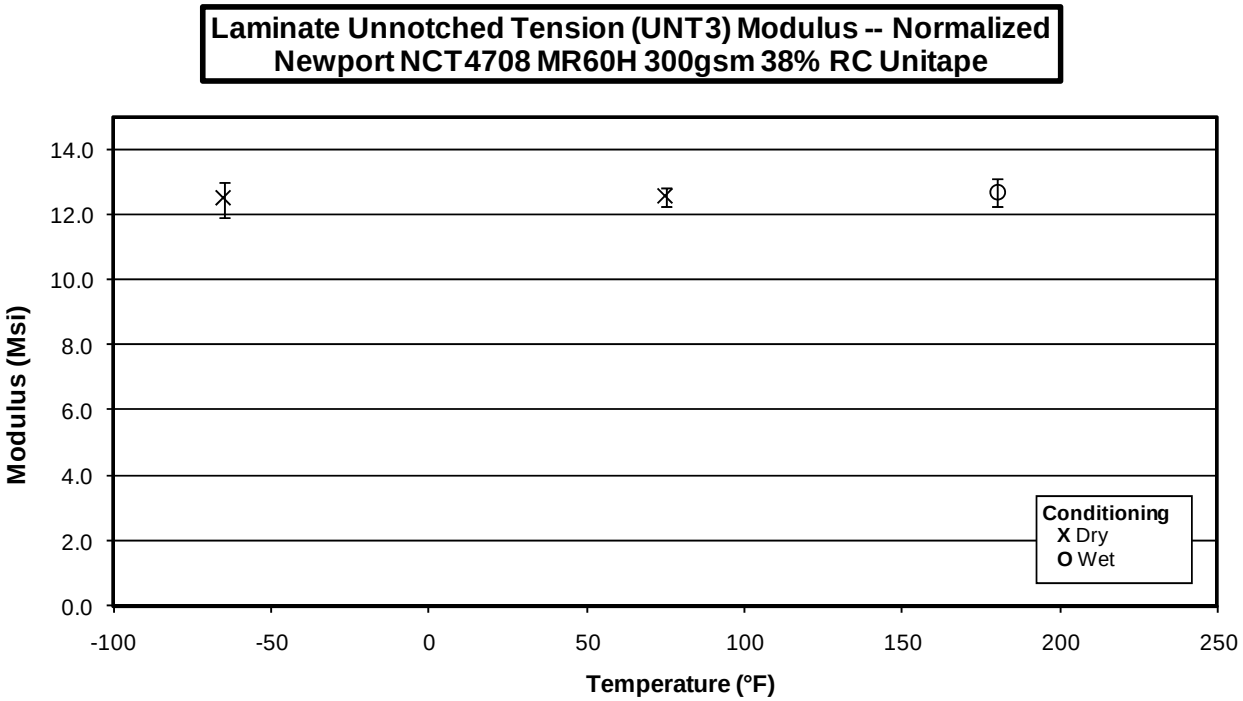
3.10 Unnotched Tension 2 Properties



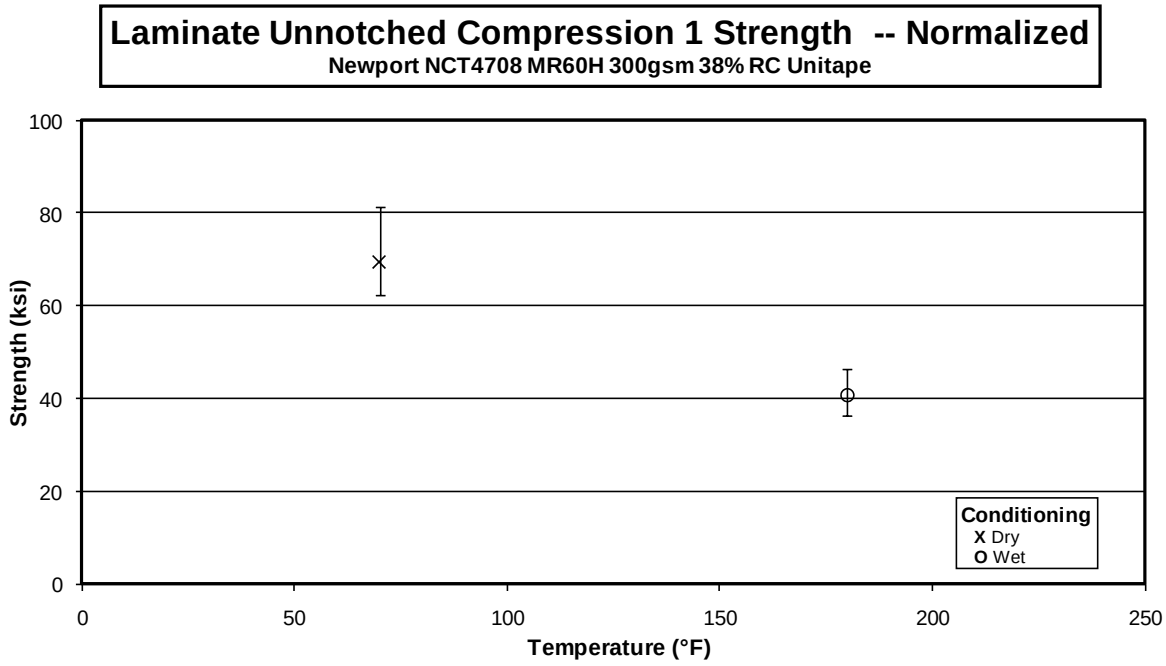


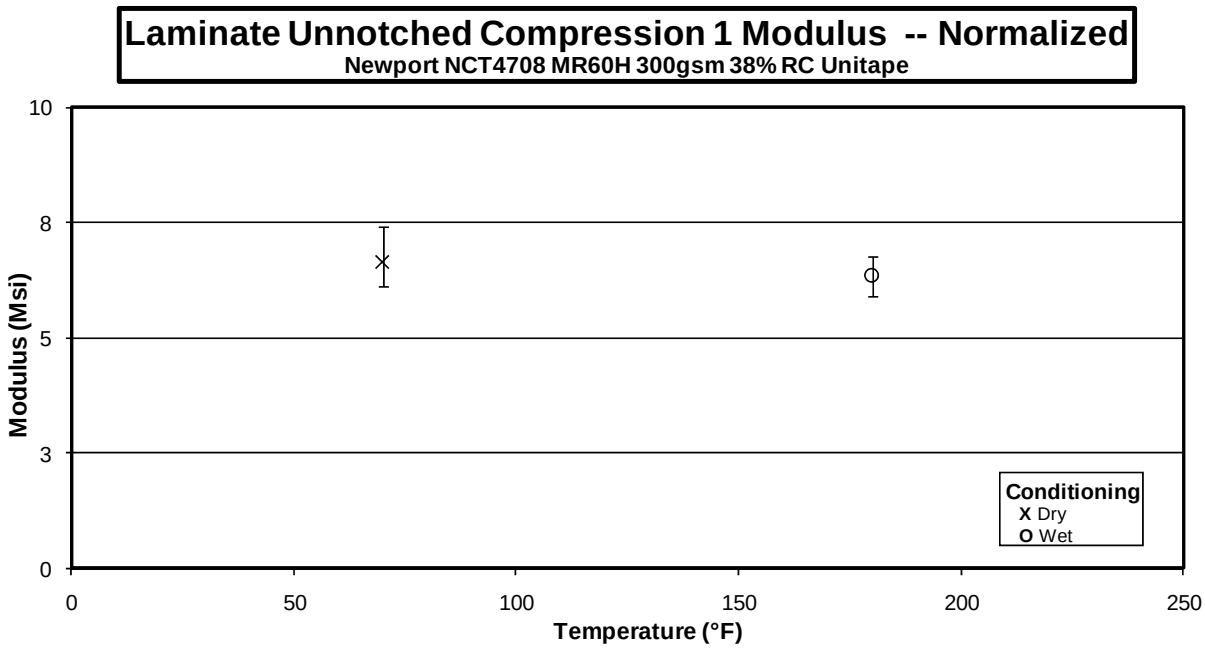
3.11 Unnotched Tension 3 Properties



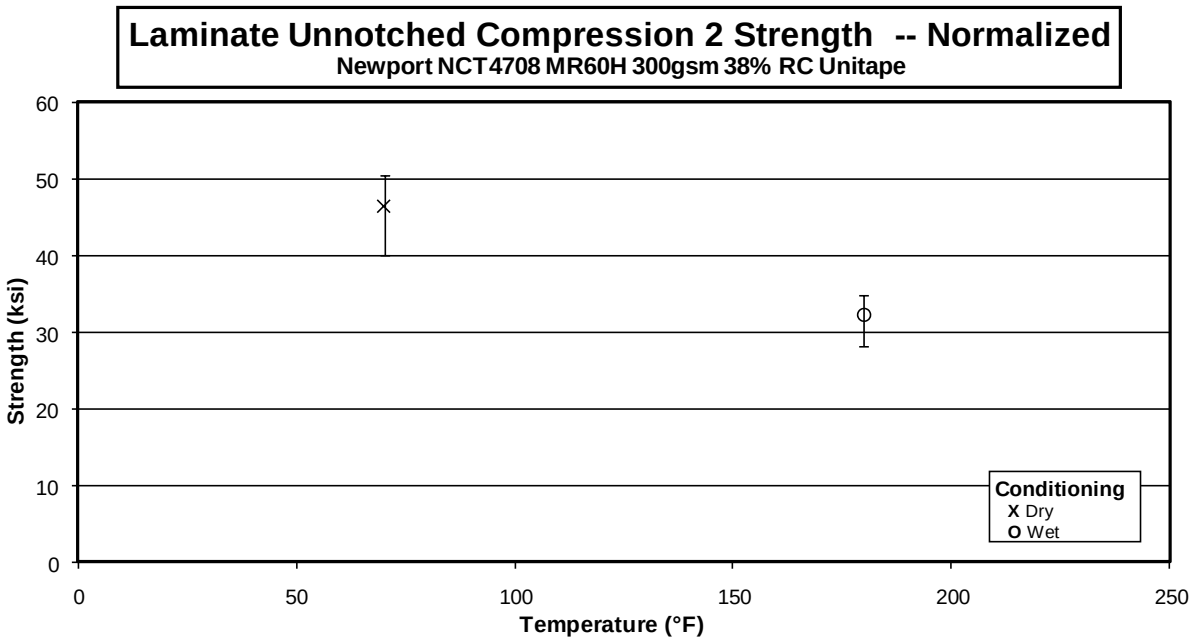


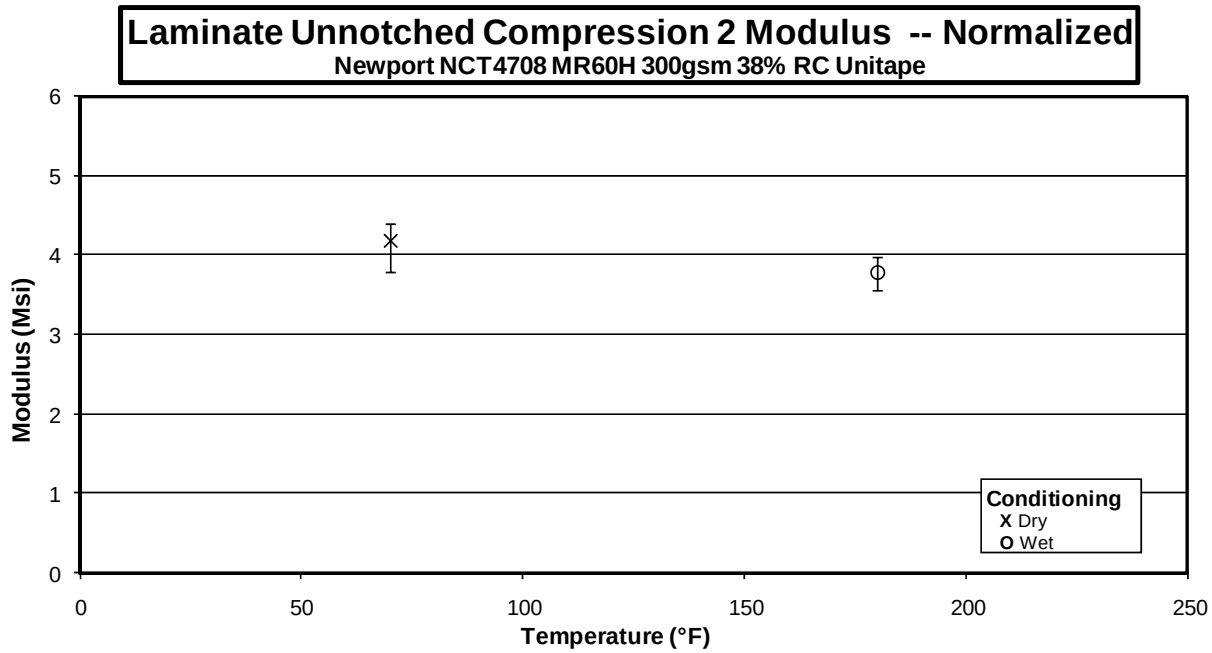
3.12 Unnotched Compression 1 Properties



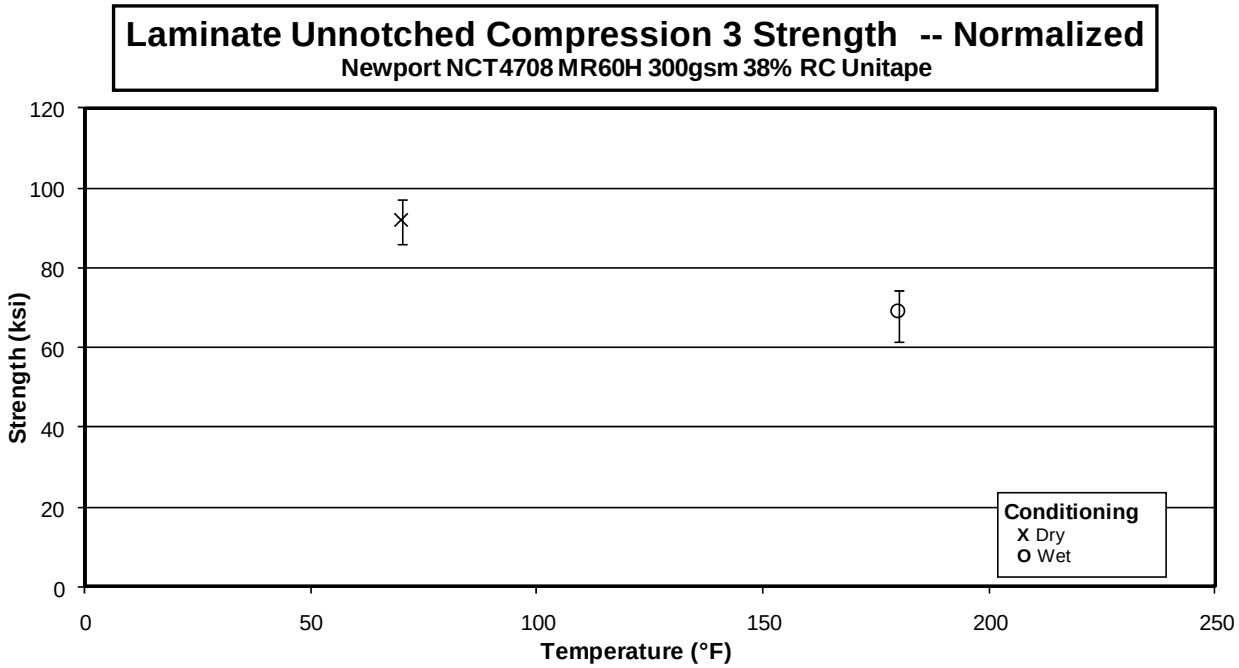


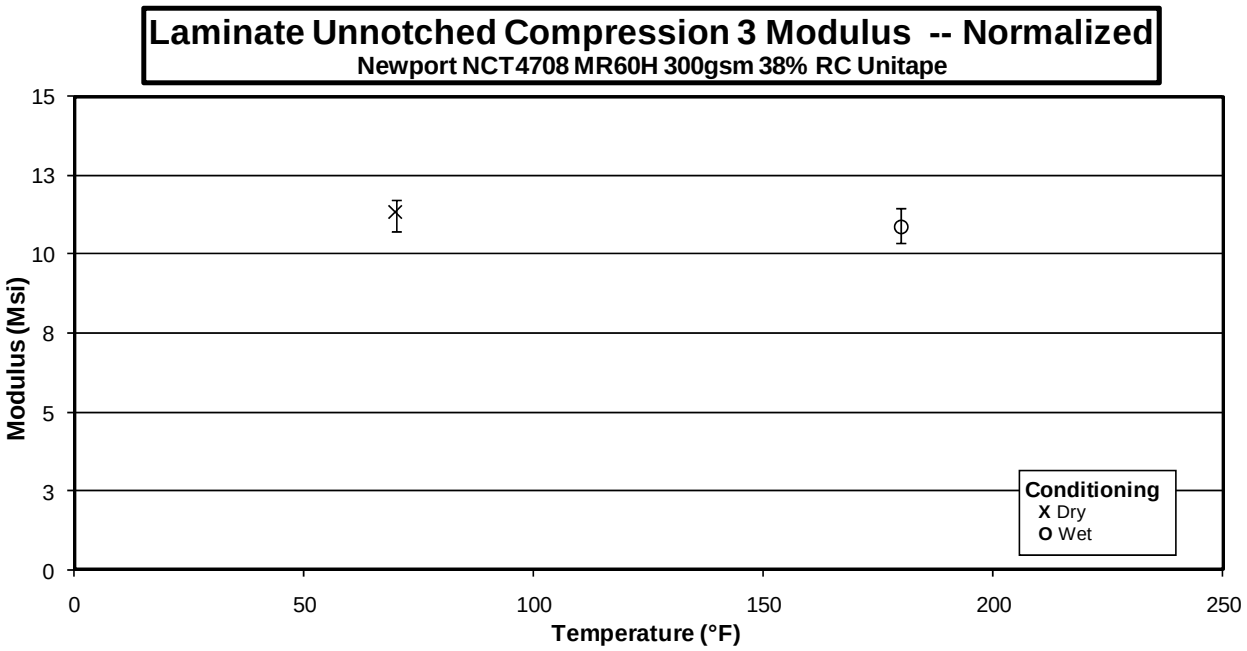
3.13 Unnotched Compression 2 Properties



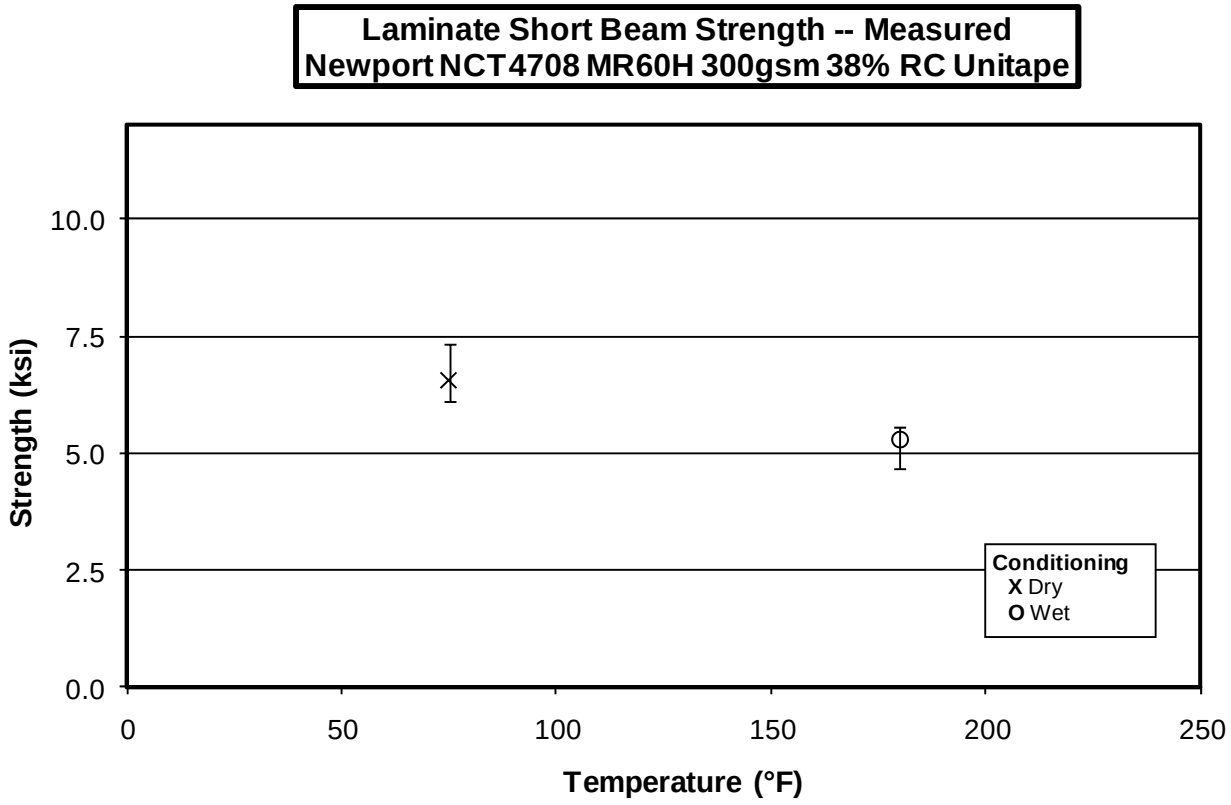


3.14 Unnotched Compression 3 Properties

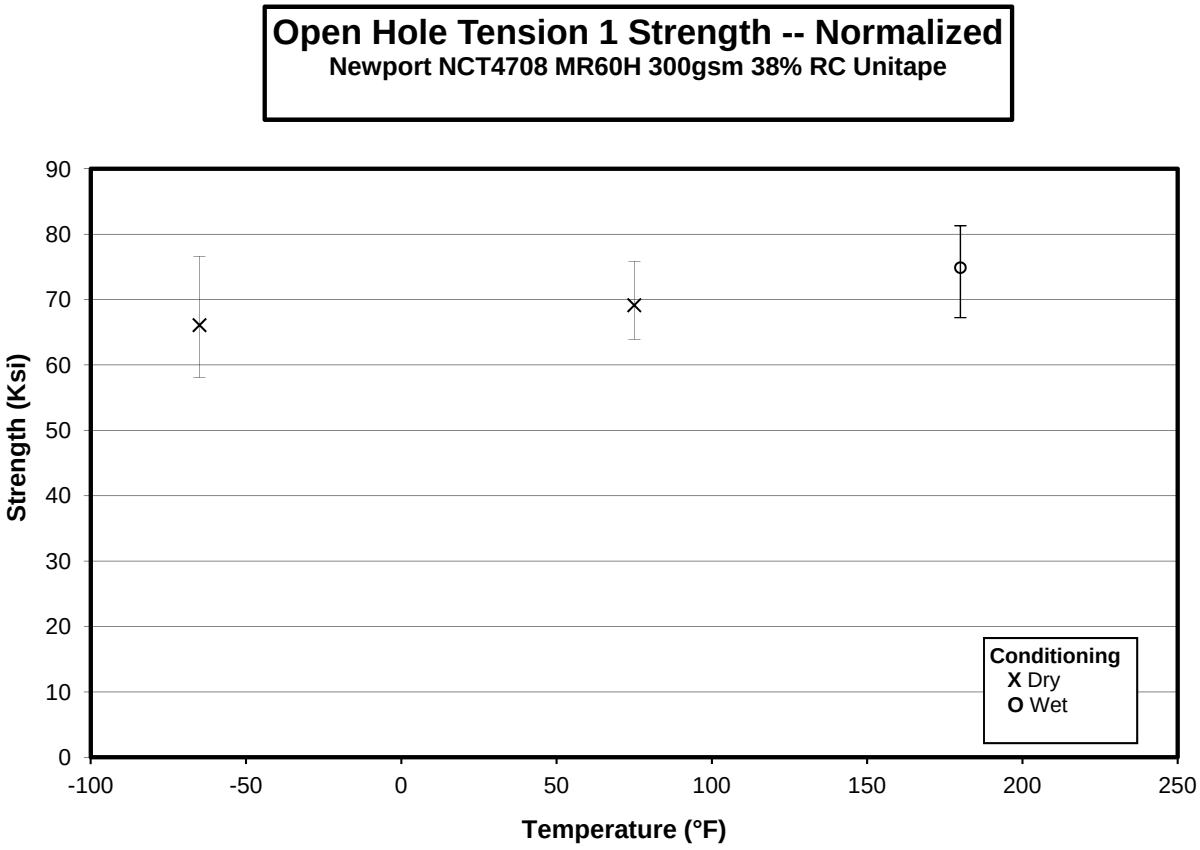




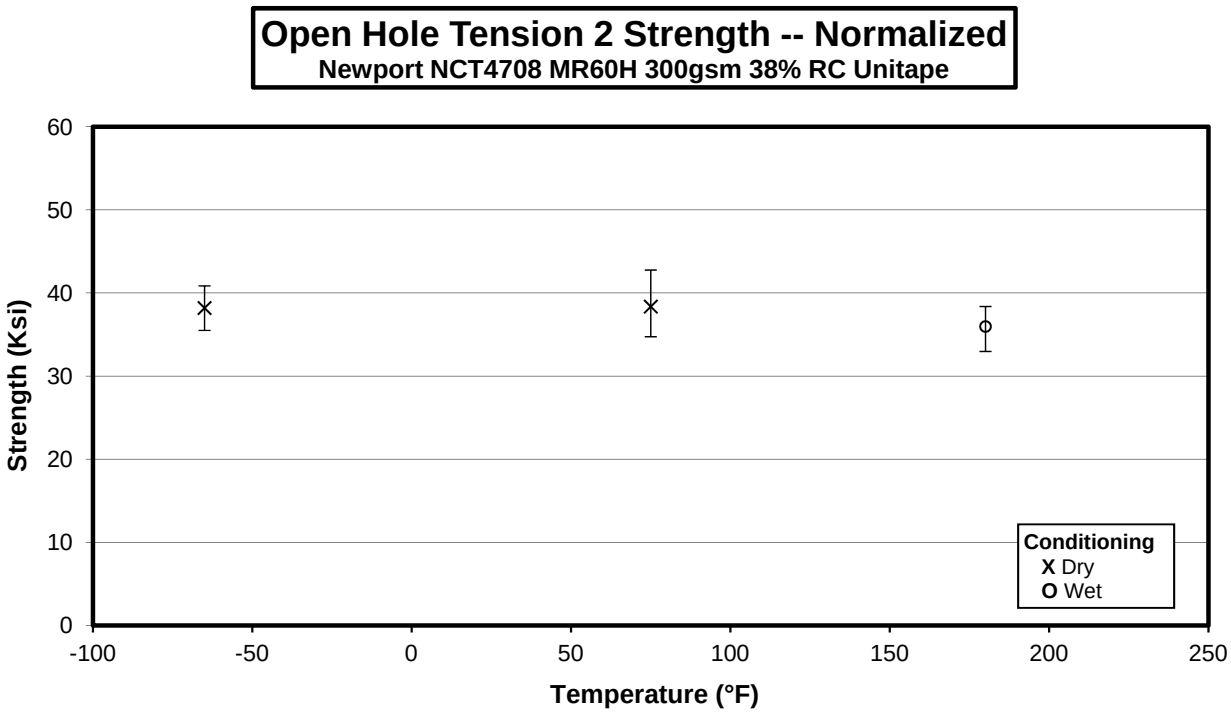
3.15 Laminate Short Beam Shear Properties



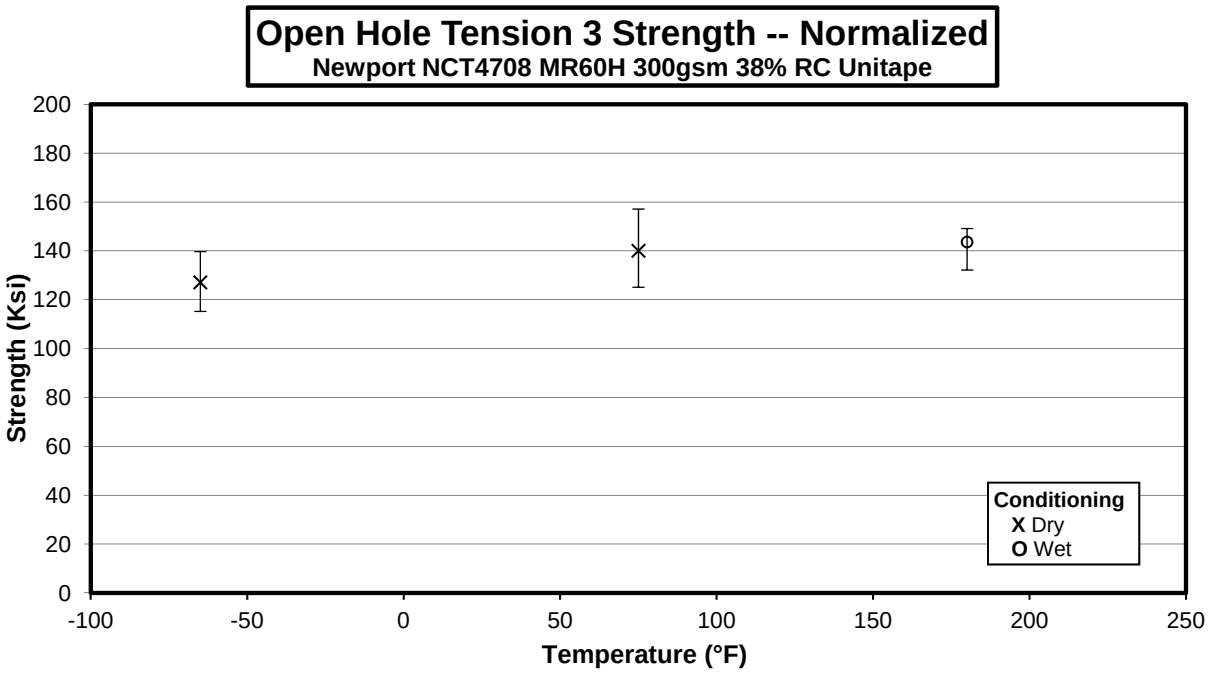
3.16 Open Hole Tension 1 Properties



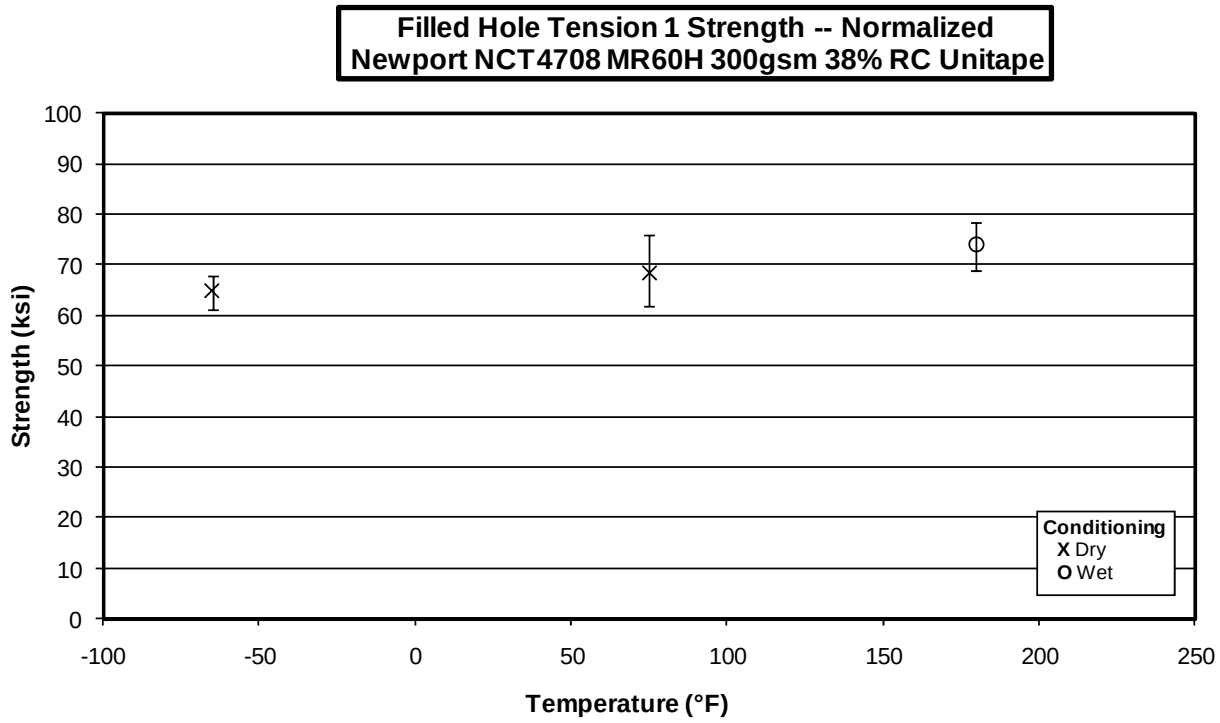
3.17 Open Hole Tension 2 Properties



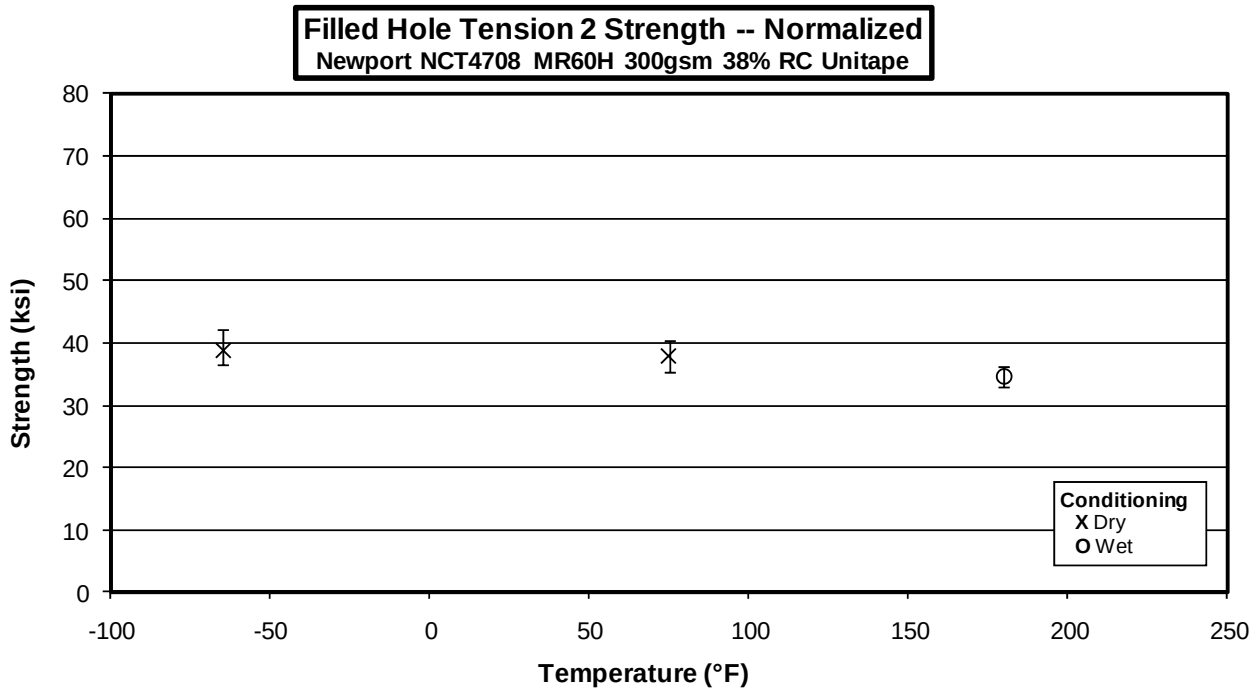
3.18 Open Hole Tension 3 Properties



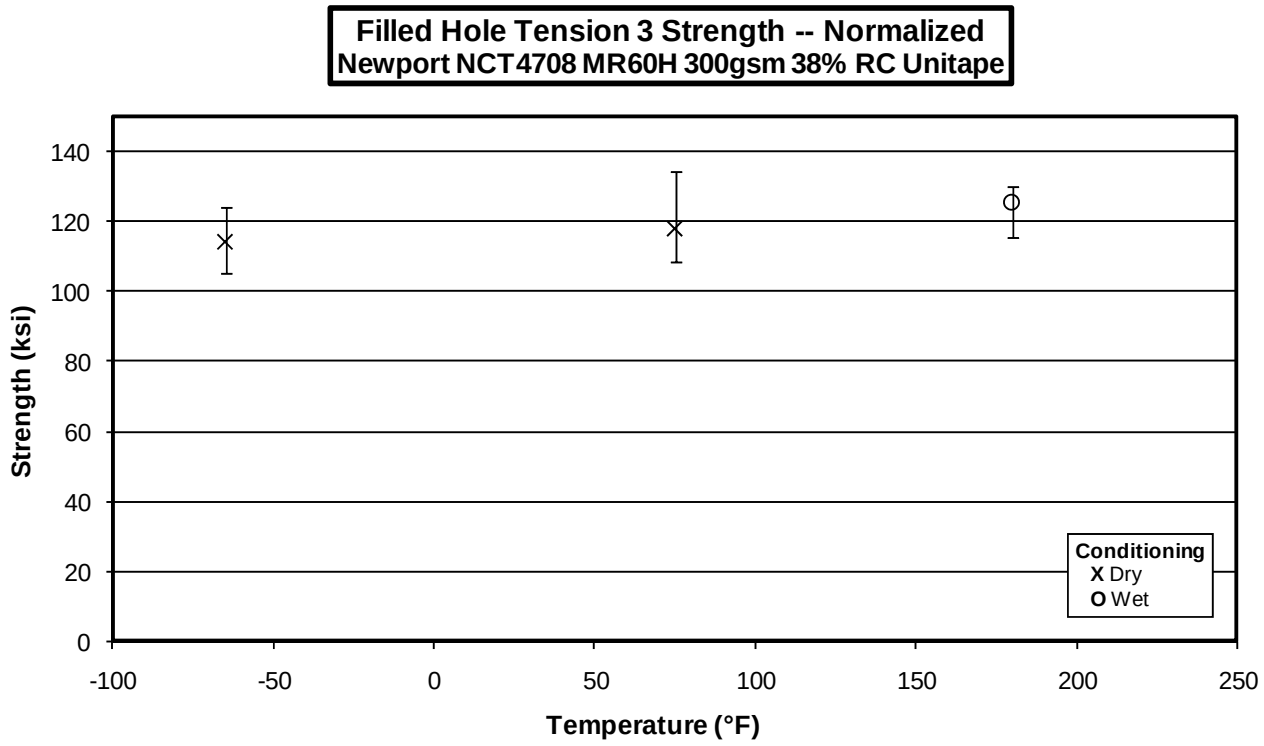
3.19 Filled-Hole Tension 1 Properties



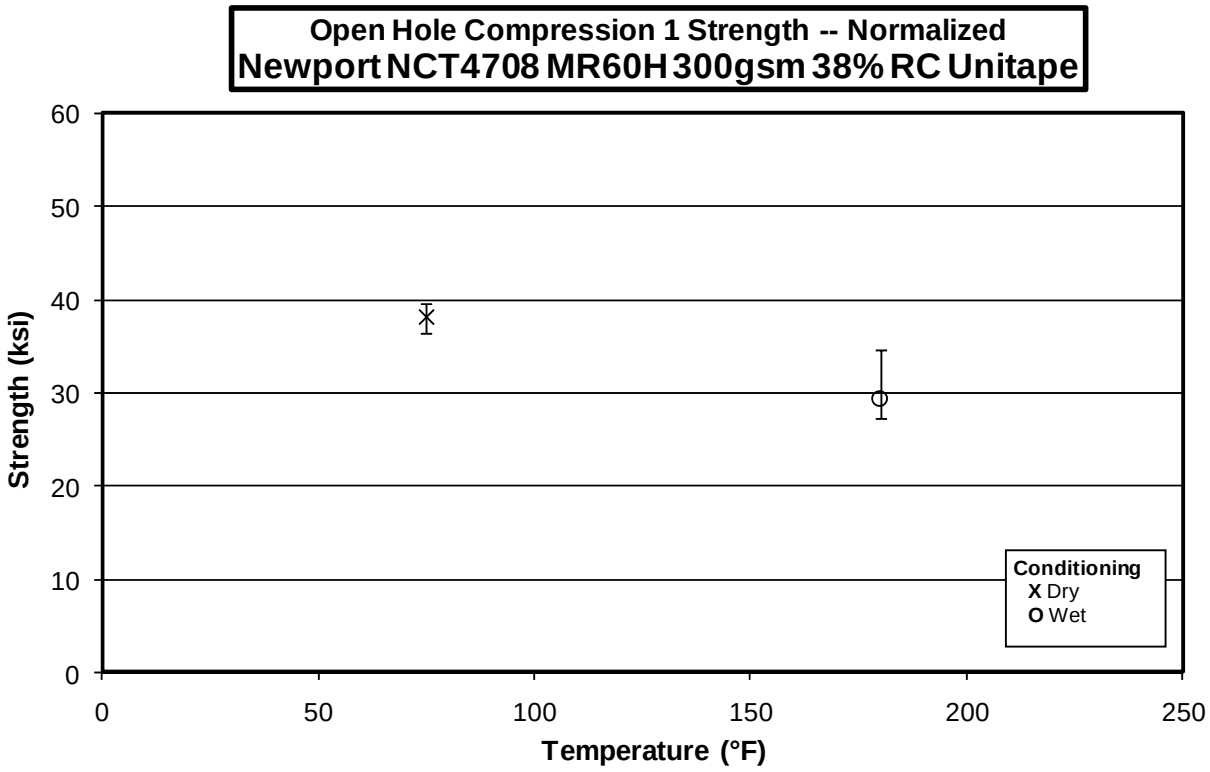
3.20 Filled-Hole Tension 2 Properties



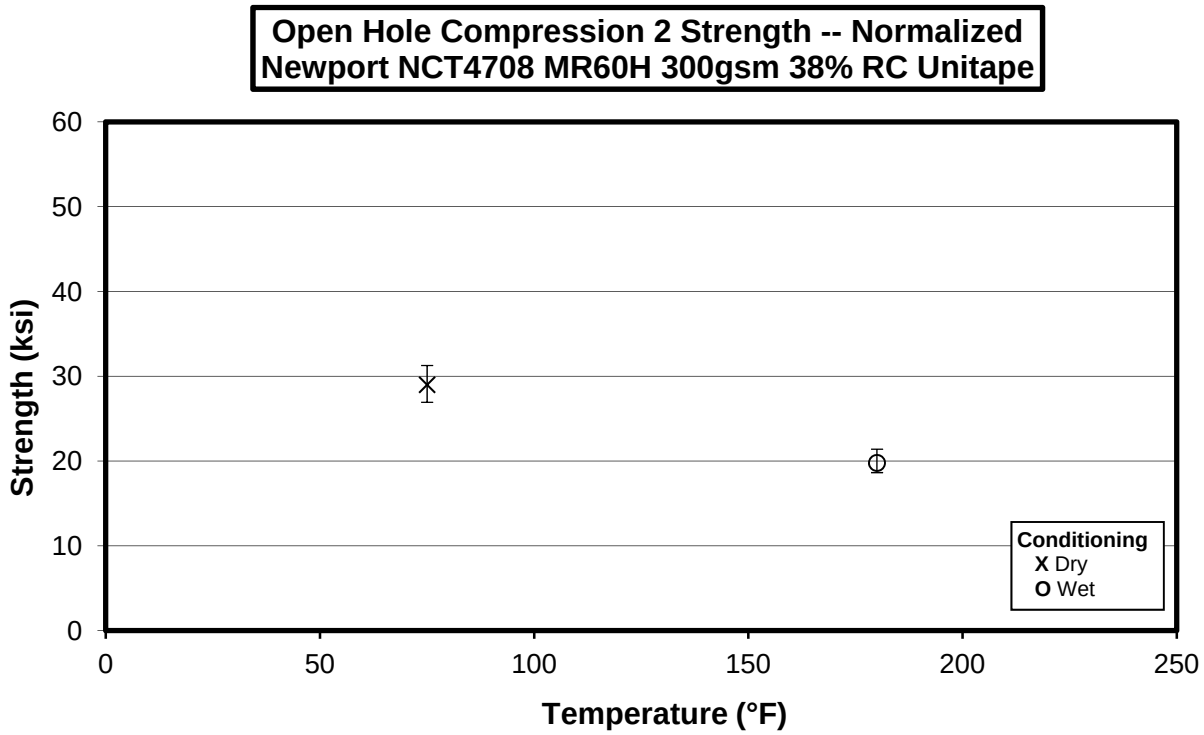
3.21 Filled-Hole Tension 3 Properties



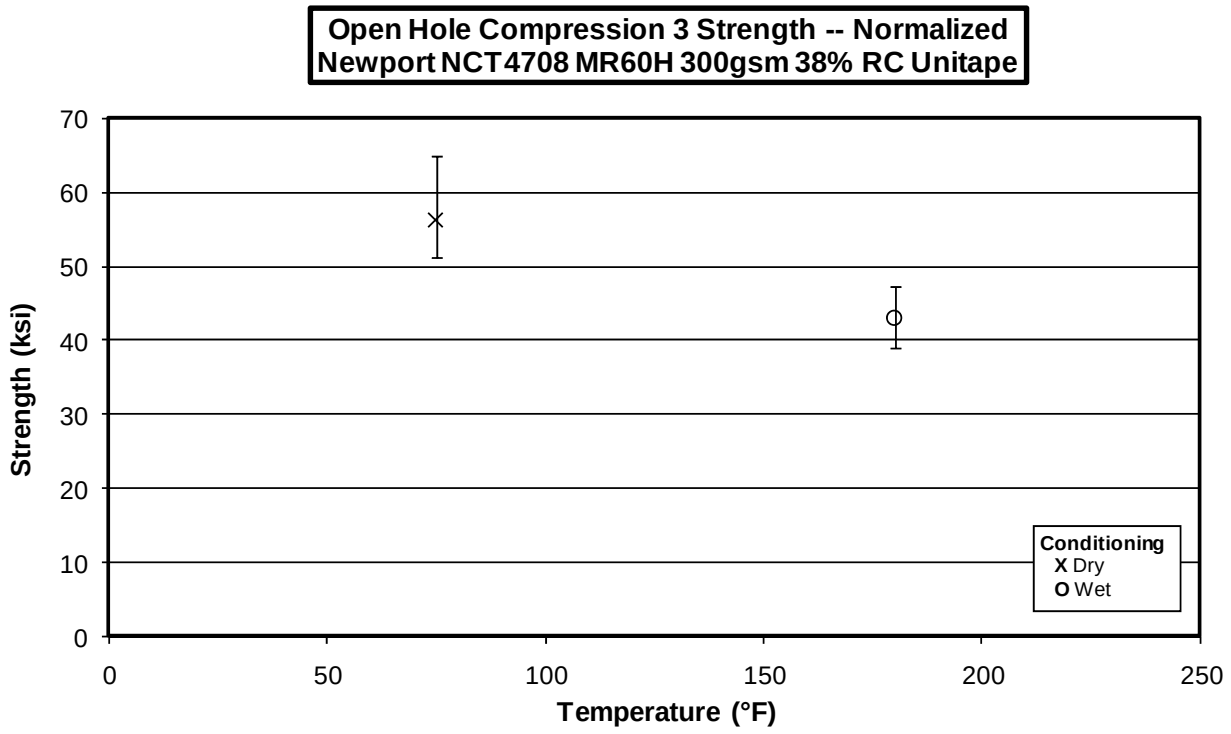
3.22 Open Hole Compression 1 Properties



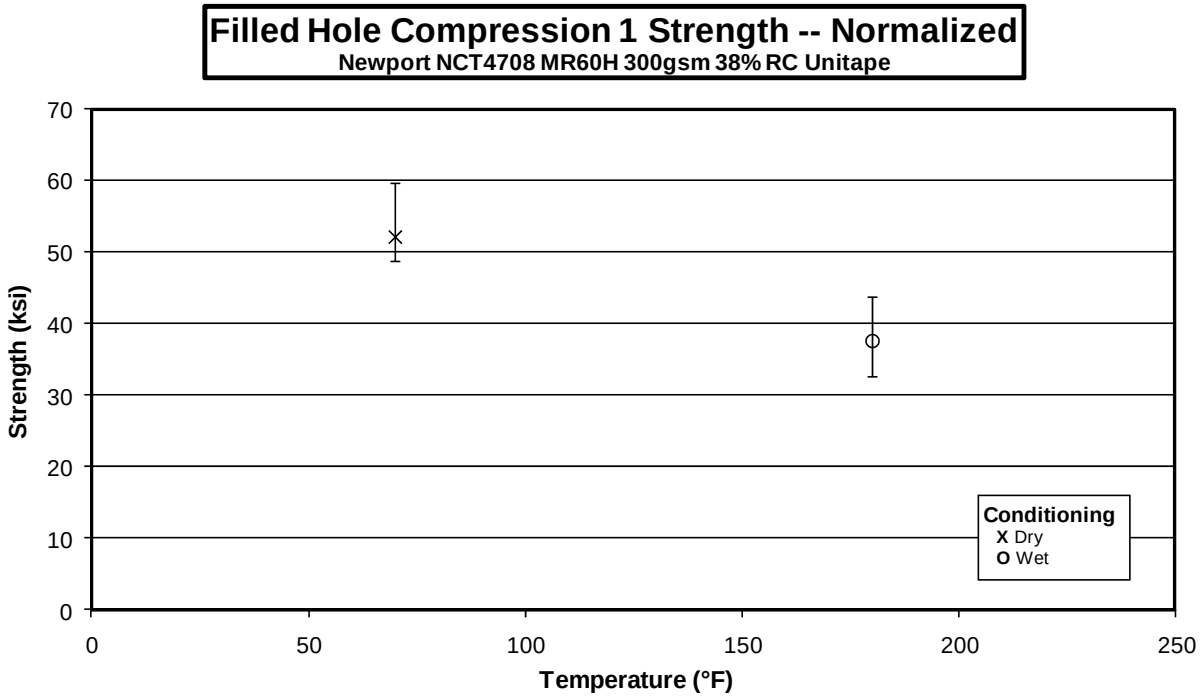
3.23 Open Hole Compression 2 Properties



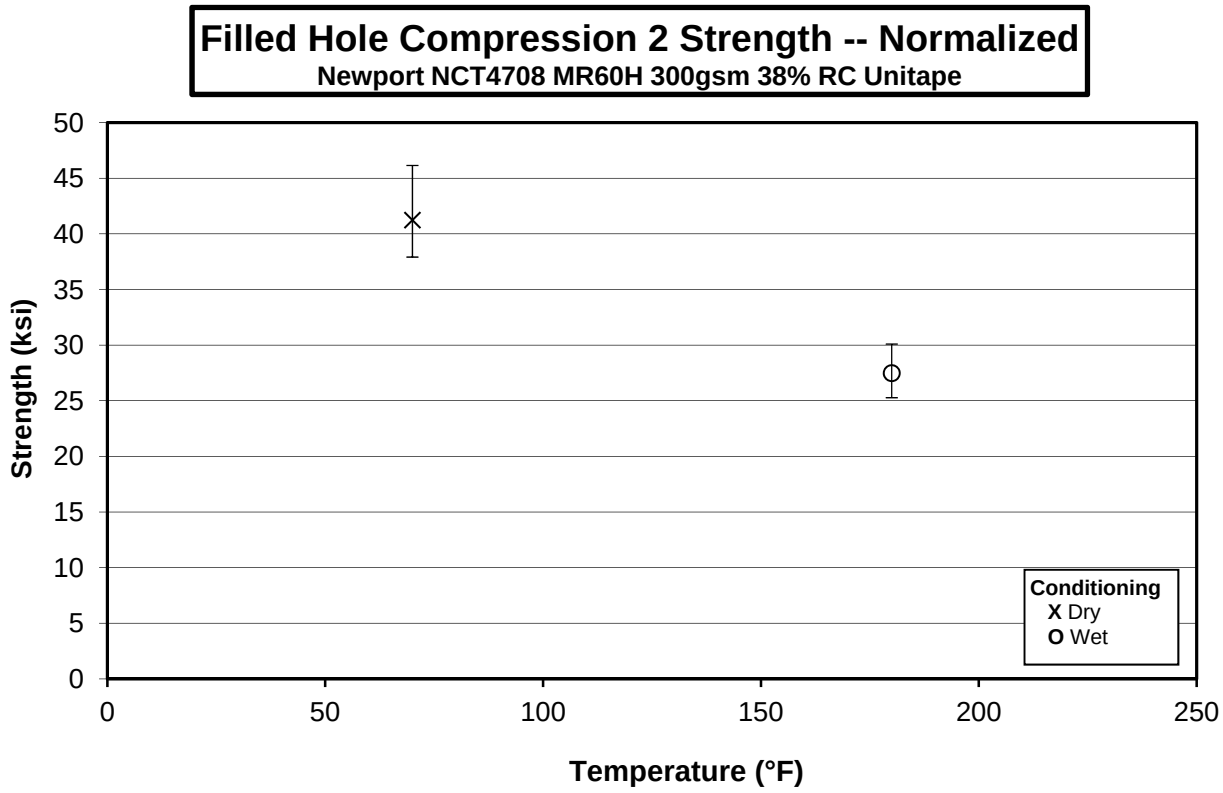
3.24 Open Hole Compression 3 Properties



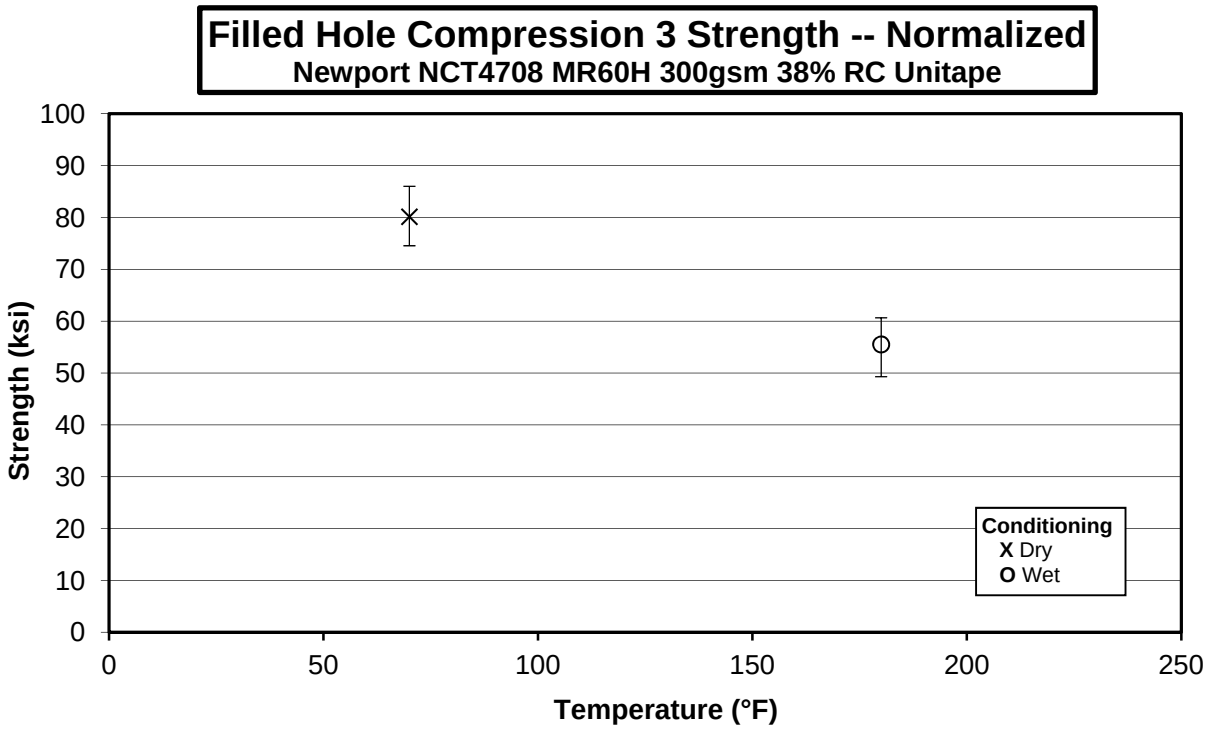
3.25 Filled-Hole Compression 1 Properties



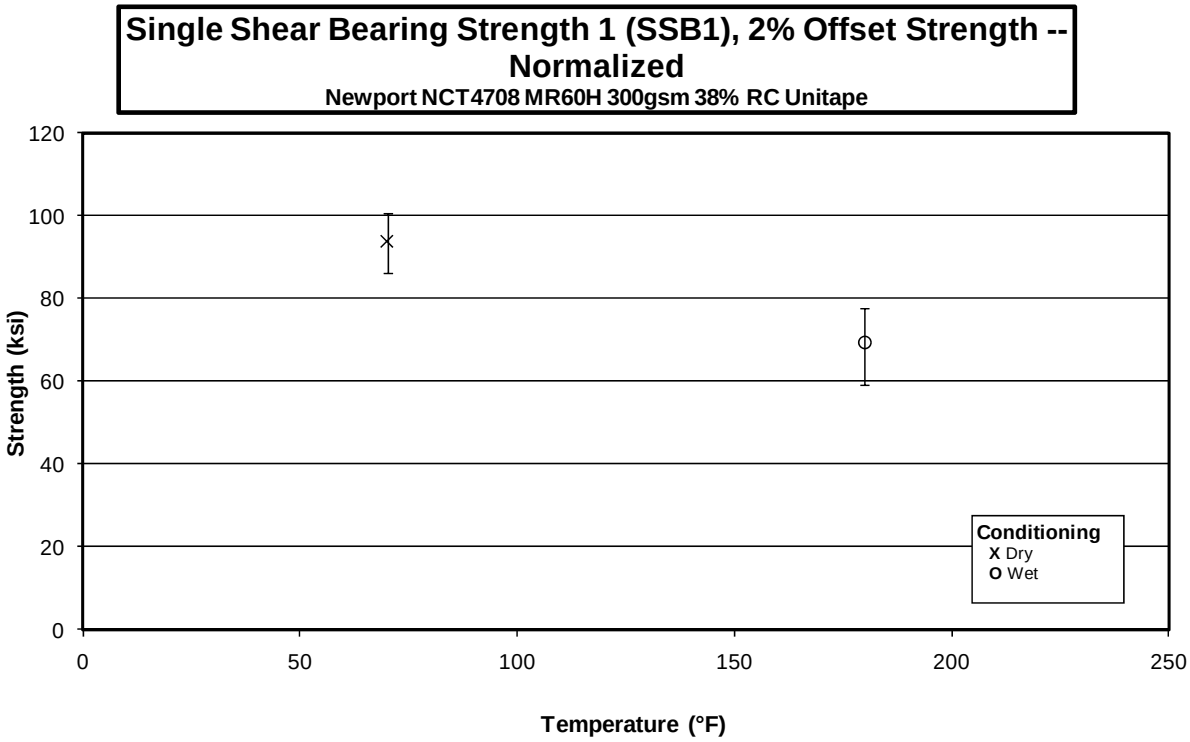
3.26 Filled-Hole Compression 2 Properties



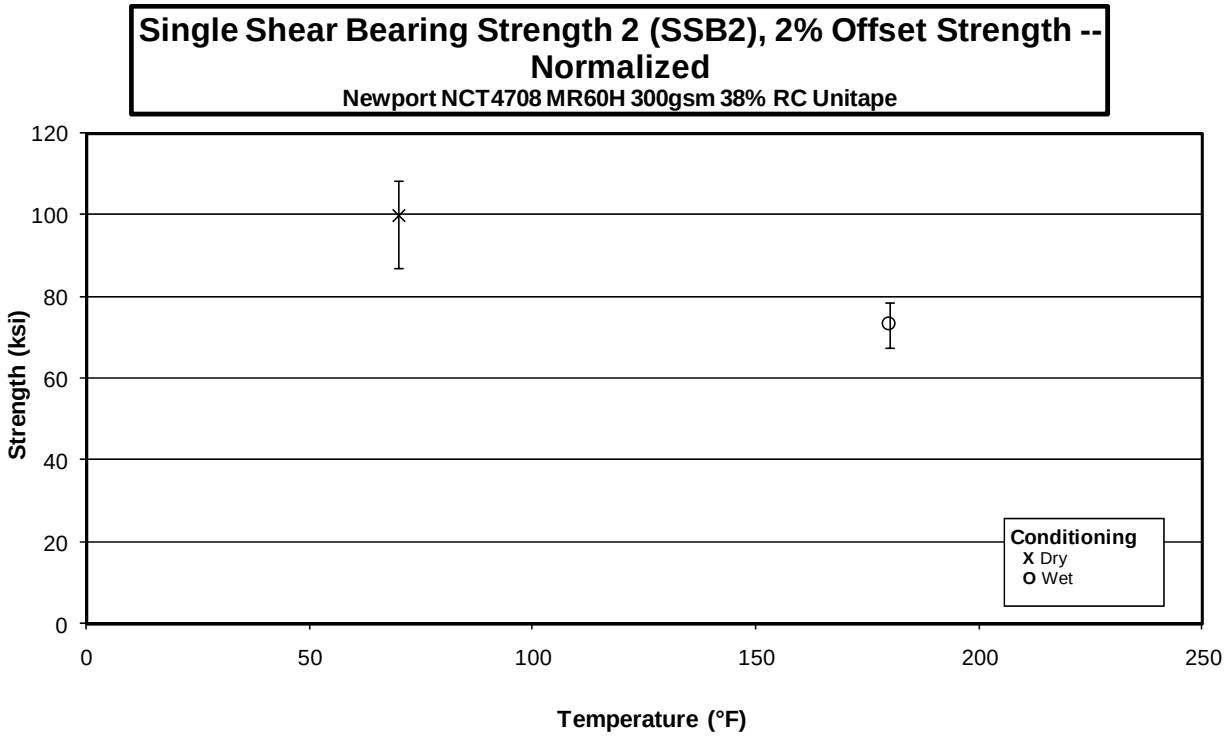
3.27 Filled-Hole Compression 3 Properties



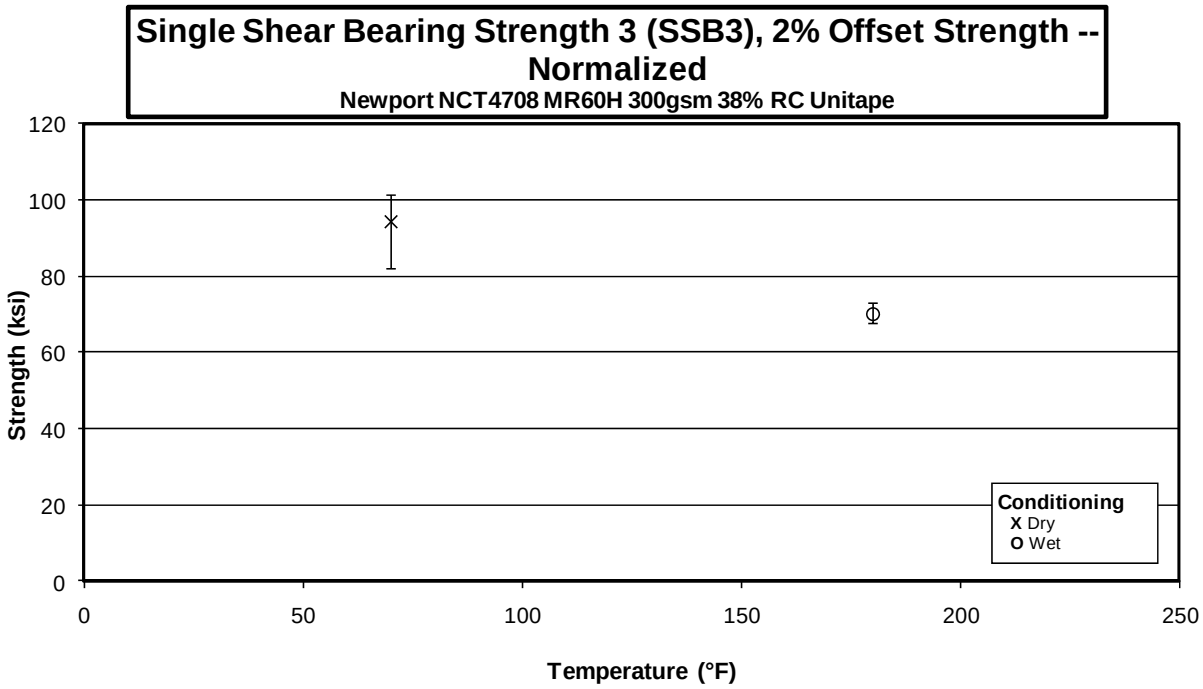
3.28 Single Shear Bearing Strength1 Properties



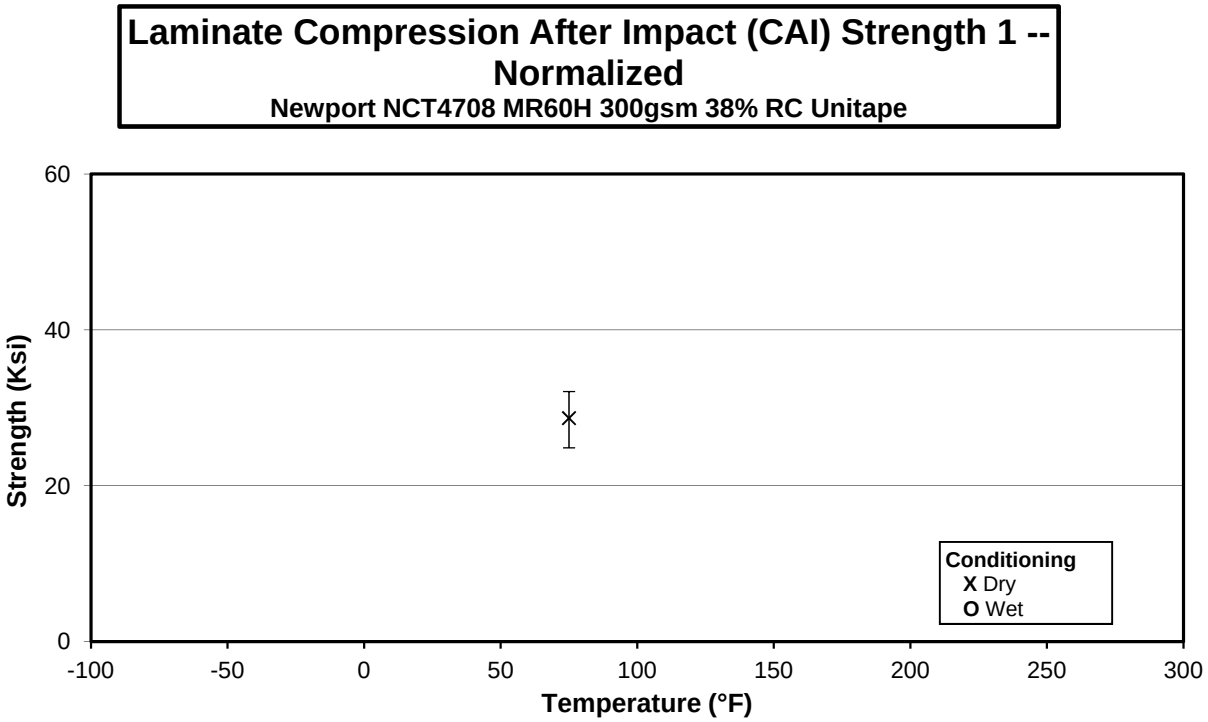
3.29 Single Shear Bearing Strength 2 Properties



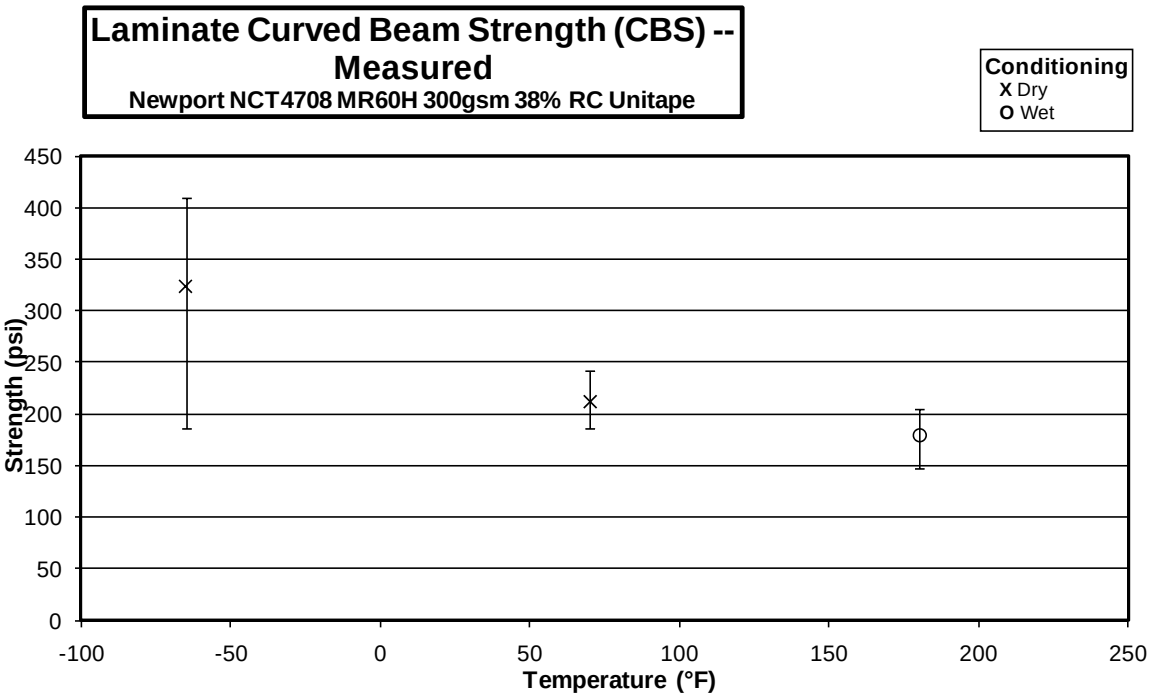
3.30 Single Shear Strength Bearing 3 Properties

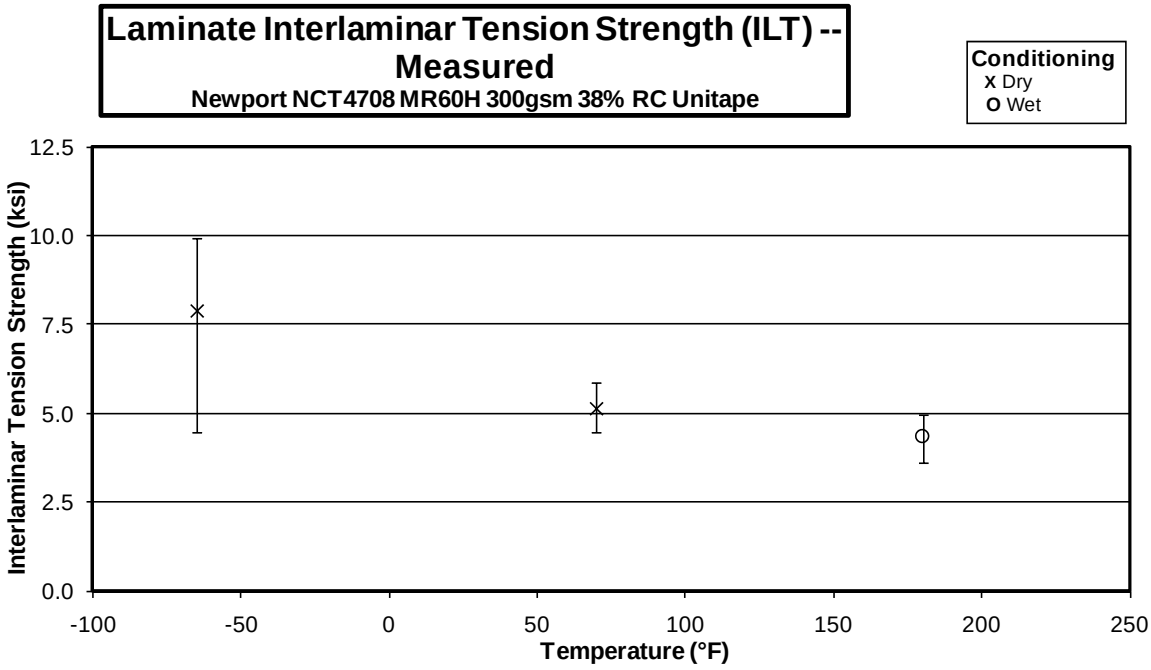


3.31 Compression Strength After Impact 1 Properties



3.32 Interlaminar Tension Properties





4. Raw Data

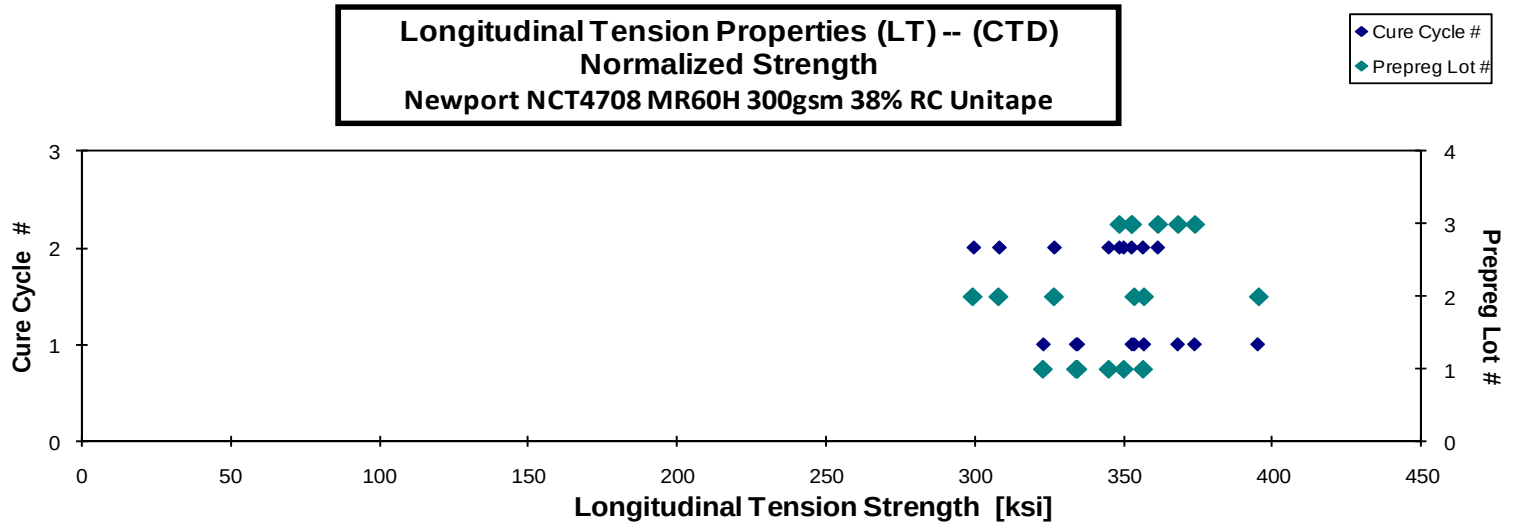
4.1 Longitudinal Tension Properties

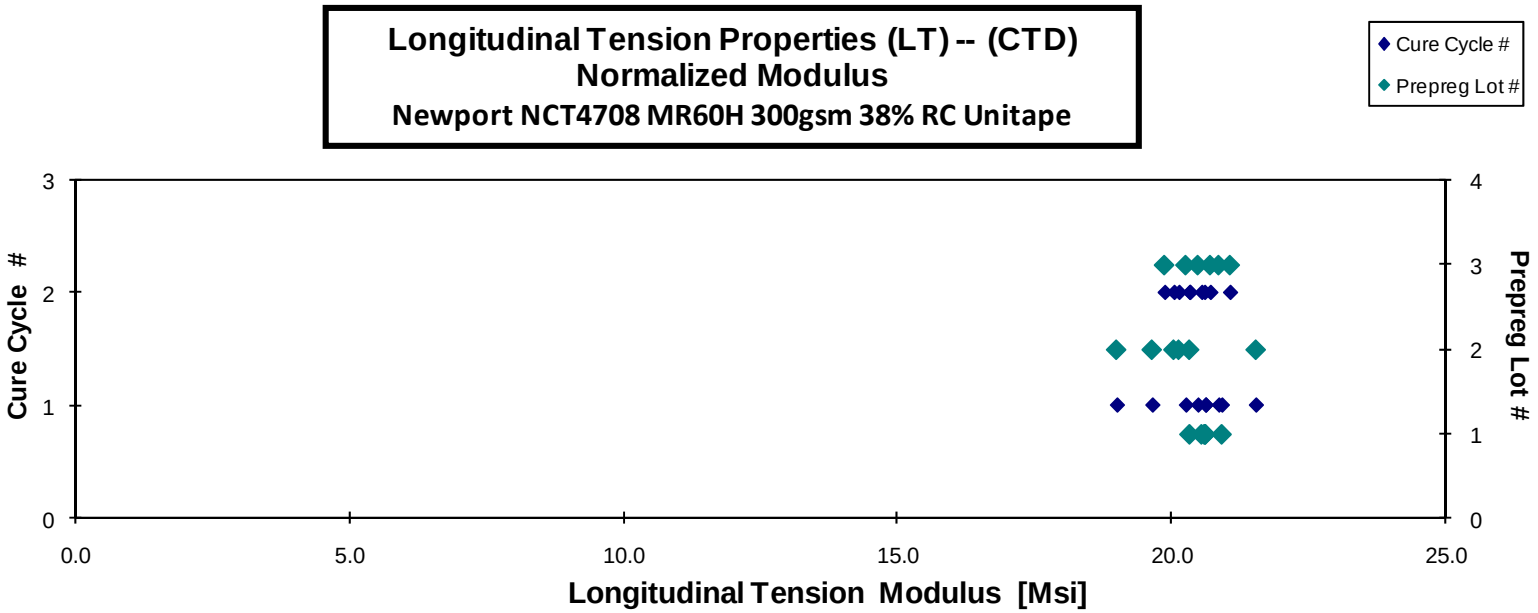
Longitudinal Tension Properties (LT) -- (CTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFJA111B	A	C1	1	1	349.412	21.584	0.280	0.048	4	XGM	0.0120	334.045	20.635
WFJA112B	A	C1	1	1	317.825	20.601	0.290	0.051	4	XGM	0.0128	322.975	20.935
WFJA113B	A	C1	1	1	326.959	20.171	0.306	0.052	4	XGM	0.0129	334.527	20.638
WFJA211B	A	C2	1	2	350.673	20.957	0.292	0.050	4	XGM	0.0124	344.991	20.618
WFJA212B	A	C2	1	2	343.125	19.944	0.328	0.051	4	XGM	0.0129	350.046	20.347
WFJA213B	A	C2	1	2	341.409	19.693	0.325	0.053	4	XGM	0.0132	356.537	20.566
WFJB111B	B	C1	2	1	383.346	20.416	0.246	0.047	4	XGM	0.0117	356.852	19.005
WFJB112B	B	C1	2	1	389.204	21.230	0.297	0.051	4	XGM	0.0128	395.253	21.560
WFJB113B	B	C1	2	1	333.299	18.529	0.339	0.053	4	XGM	0.0134	353.579	19.657
WFJB211B	B	C2	2	2	325.810	20.002	0.345	0.051	4	XGM	0.0126	326.672	20.055
WFJB212B	B	C2	2	2	302.790	19.800	0.325	0.051	4	XGM	0.0128	308.097	20.147
WFJB213B	B	C2	2	2	295.562	20.076	0.332	0.051	4	XGM	0.0128	299.471	20.342
WFJC111B	C	C1	3	1	375.298	21.564	0.348	0.047	4	XGM	0.0118	352.835	20.273
WFJC112B	C	C1	3	1	376.592	20.960	0.294	0.049	4	XGM	0.0123	368.249	20.496
WFJC113B	C	C1	3	1	378.062	21.108	0.341	0.050	4	XGM	0.0125	373.936	20.878
WFJC211B	C	C2	3	2	375.160	21.150	0.328	0.047	4	XGM	0.0118	352.705	19.884
WFJC212B	C	C2	3	2	367.995	21.092	0.316	0.050	4	XGM	0.0124	361.545	20.723
WFJC213B	C	C2	3	2	351.992	21.290	0.355	0.050	4	XGM	0.0125	348.617	21.085

Average	**349.140**	**20.565**	**0.316**	**$Average_{norm}$**	**0.0125**	**346.718**	**20.436**
Standard Dev.	**28.154**	**0.799**	**0.028**	**$Standard\ Dev._{norm}$**		**23.156**	**0.573**
Coeff. of Var. [%]	**8.064**	**3.883**	**8.953**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.679**	**2.803**
Min.	**295.562**	**18.529**	**0.246**	**Min.**	**0.0117**	**299.471**	**19.005**
Max.	**389.204**	**21.584**	**0.355**	**Max.**	**0.0134**	**395.253**	**21.560**
Number of Spec.	**18**	**18**	**18**	**Number of Spec.**		**18**	**18**


Longitudinal Tension Properties (LT) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Strength [ksi]
0
50
100
150
200
250
300
350
400
450
0
1
2
3
4


Longitudinal Tension Properties (LT) -- (CTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Modulus [Msi]
0.0
5.0
10.0
15.0
20.0
25.0
0
1
2
3
4

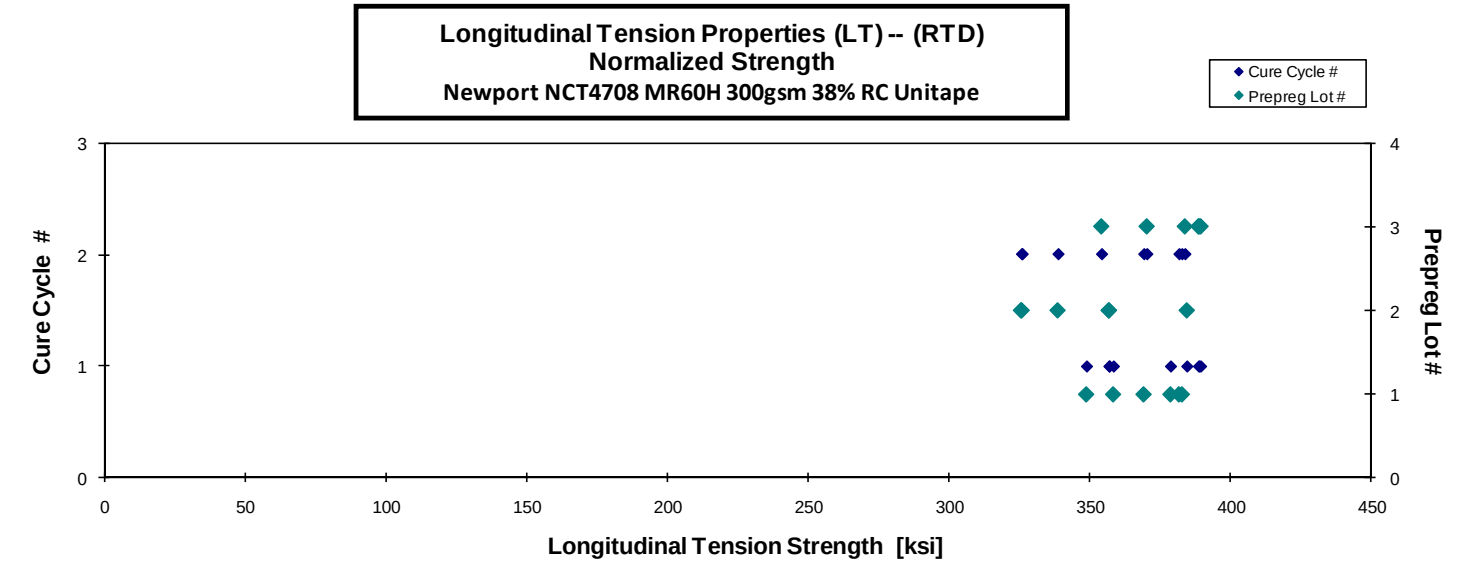
Longitudinal Tension Properties (LT) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

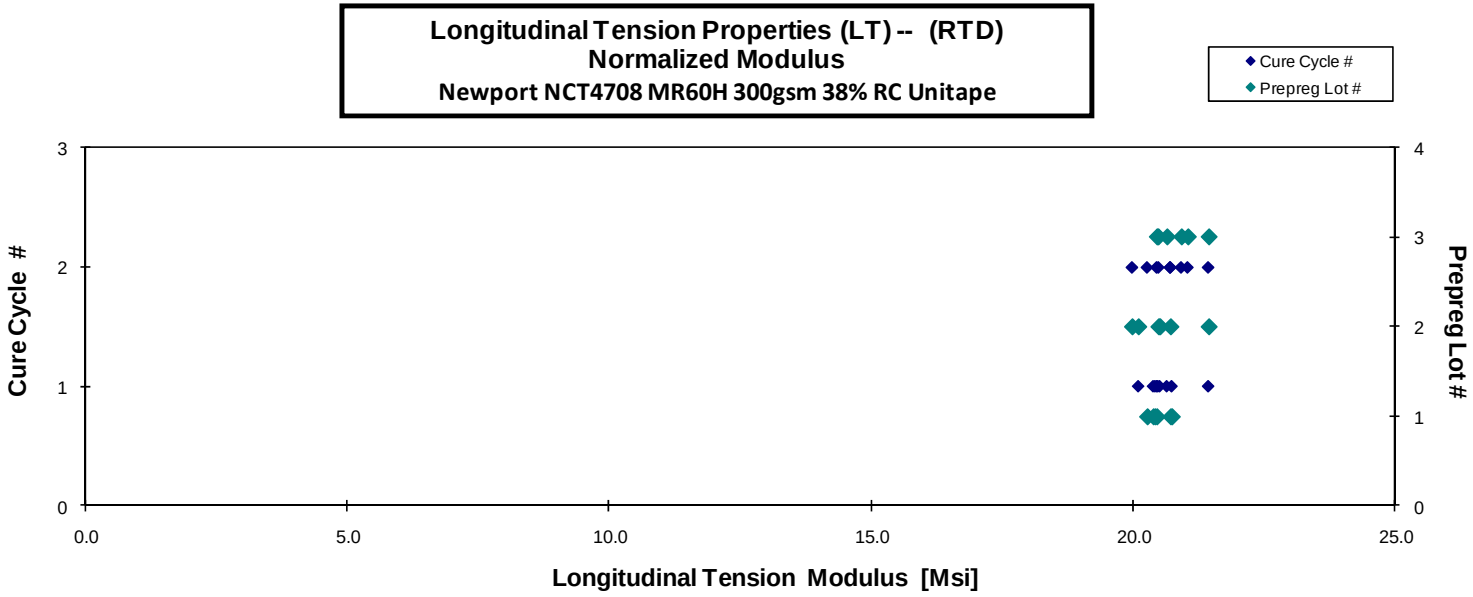
normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFJA114A	A	C1	1	1	346.630	20.248	0.339	0.051	4	XGM	0.0127	349.152	20.395
WFJA115A	A	C1	1	1	363.029	20.677	0.329	0.050	4	XGM	0.0125	358.707	20.431
WFJA116A	A	C1	1	1	381.025	20.860	0.340	0.050	4	XGM	0.0125	379.009	20.749
WFJA214A	A	C2	1	2	357.684	19.808	0.335	0.052	4	XGM	0.0130	369.512	20.463
WFJA215A	A	C2	1	2	377.590	19.988	0.343	0.051	4	XGM	0.0128	383.084	20.279
WFJA216A	A	C2	1	2	377.296	20.467	0.349	0.051	4	XGM	0.0128	382.037	20.724
WFJB114A	B	C1	2	1	345.463	20.744	0.359	0.052	4	XGM	0.0130	357.230	21.451
WFJB115A	B	C1	2	1	347.047	19.542	0.340	0.052	4	XGM	0.0130	357.146	20.110
WFJB116A	B	C1	2	1	375.645	20.030	0.317	0.052	4	XGM	0.0129	384.837	20.520
WFJB214A	B	C2	2	2	328.333	20.118	0.338	0.050	4	XGM	0.0125	326.270	19.992
WFJB215A	B	C2	2	2	340.818	20.832	0.330	0.050	4	XGM	0.0125	339.015	20.721
WFJB216A	B	C2	2	2	326.903	20.550	0.331	0.050	4	XGM	0.0126	326.038	20.496
WFJC114A	C	C1	3	1	396.566	21.059	0.342	0.049	4	XGM	0.0124	388.960	20.655
WFJC115A	C	C1	3	1	395.680	20.824	0.339	0.050	4	XGM	0.0124	389.269	20.487
WFJC116A	C	C1	3	1	397.101	20.850	0.324	0.049	4	XGM	0.0124	389.747	20.464
WFJC214A	C	C2	3	2	375.695	21.745	0.336	0.050	4	XGM	0.0124	370.601	21.450
WFJC215A	C	C2	3	2	363.145	21.567	0.332	0.049	4	XGM	0.0123	354.498	21.054
WFJC216A	C	C2	3	2	392.962	21.412	0.351	0.049	4	XGM	0.0123	384.126	20.930

Average	**366.034**	**20.629**	**0.337**
Standard Dev.	**23.019**	**0.603**	**0.010**
Coeff. of Var. [%]	**6.289**	**2.924**	**2.914**
Min.	**326.903**	**19.542**	**0.317**
Max.	**397.101**	**21.745**	**0.359**
Number of Spec.	**18**	**18**	**18**

$Average_{norm}$	**0.0126**	**366.069**	**20.632**
Standard $Dev._{norm}$		**21.138**	**0.395**
Coeff. of Var. $[\%]_{norm}$		**5.774**	**1.913**
Min.	**0.0123**	**326.038**	**19.992**
Max.	**0.0130**	**389.747**	**21.451**
Number of Spec.		**18**	**18**


Longitudinal Tension Properties (LT) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Strength [ksi]
0
50
100
150
200
250
300
350
400
450


Longitudinal Tension Properties (LT) -- (RTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Modulus [Msi]
0.0
5.0
10.0
15.0
20.0
25.0

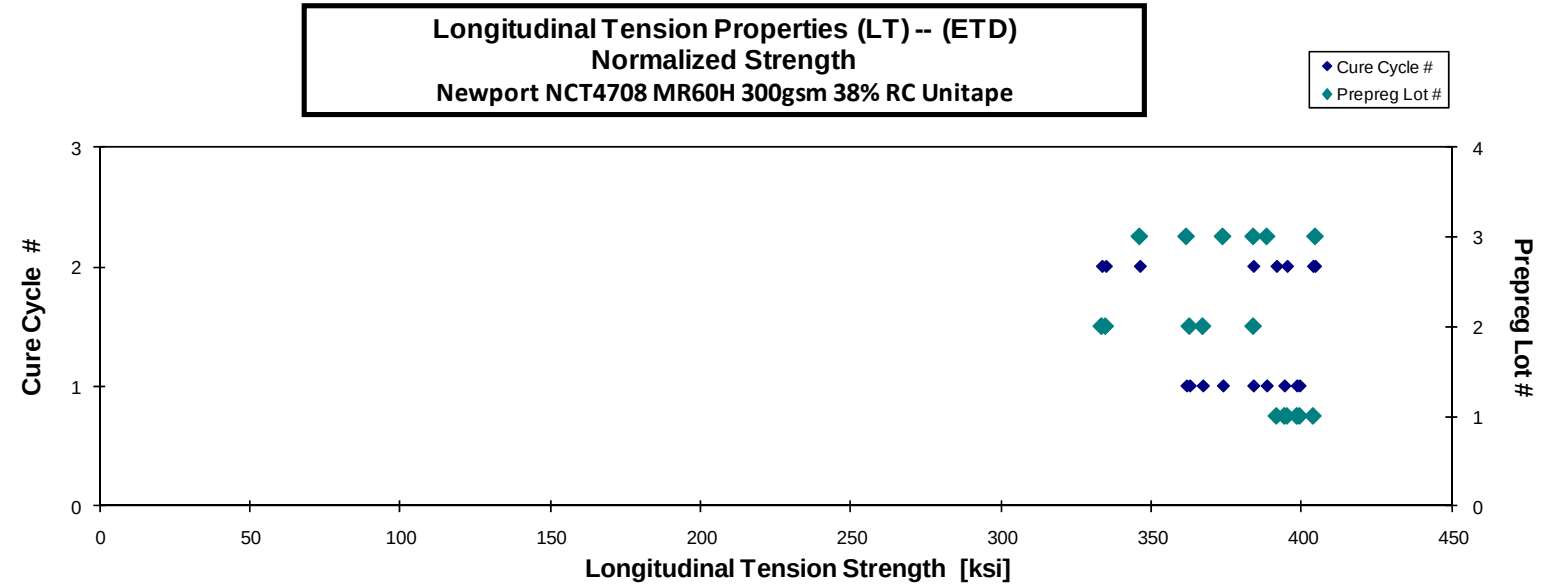
Longitudinal Tension Properties (LT) -- (ETD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

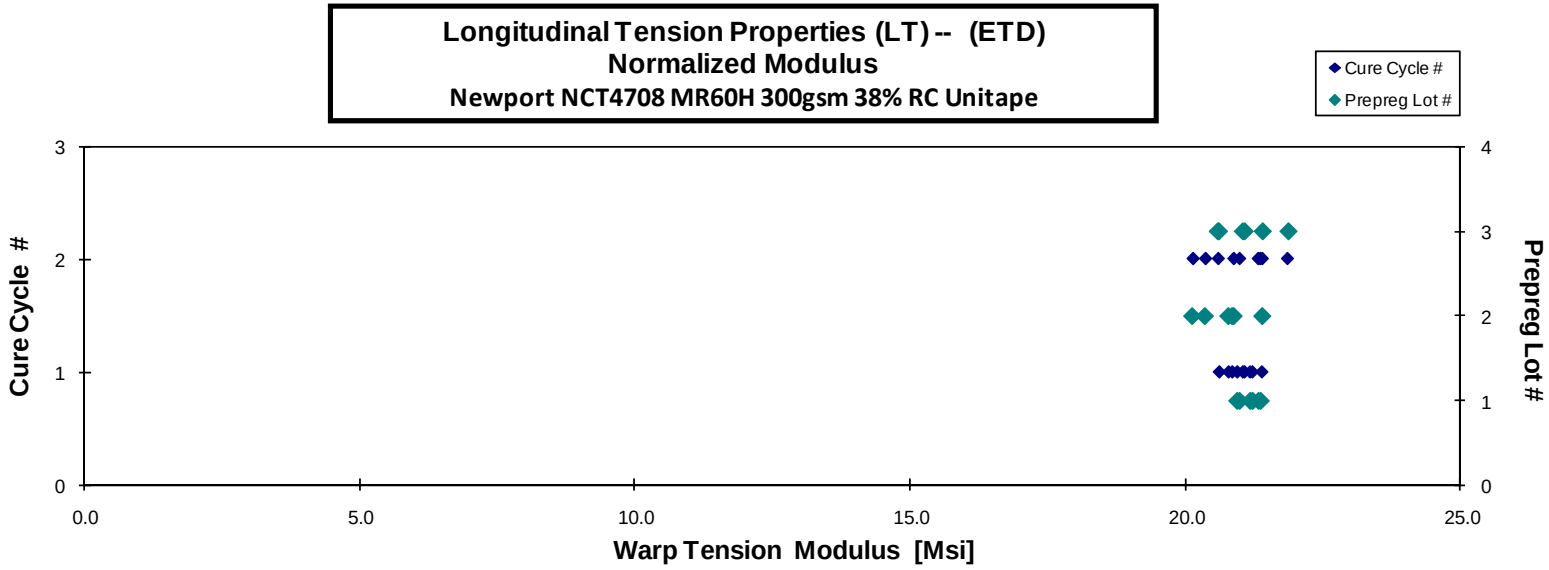
normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFJA117G	A	C1	1	1	405.308	21.308	0.339	0.050	4	XGM	0.0124	398.472	20.948
WFJA118G	A	C1	1	1	413.299	21.966	0.338	0.049	4	XGM	0.0122	399.359	21.225
WFJA119G	A	C1	1	1	408.092	21.920	0.362	0.049	4	XGM	0.0122	394.327	21.181
WFJA217G	A	C2	1	2	403.041	20.949	0.325	0.051	4	XGM	0.0126	403.840	20.991
WFJA218G	A	C2	1	2	394.170	21.276	0.334	0.051	4	XGM	0.0126	395.213	21.332
WFJA219G	A	C2	1	2	390.415	21.299	0.356	0.051	4	XGM	0.0126	391.706	21.370
WFJB117G	B	C1	2	1	360.547	20.478	0.347	0.051	4	XGM	0.0128	367.224	20.857
WFJB118G	B	C1	2	1	377.768	21.050	0.341	0.051	4	XGM	0.0128	384.014	21.398
WFJB119G	B	C1	2	1	355.331	20.358	0.367	0.051	4	XGM	0.0129	362.851	20.788
WFJB217G	B	C2	2	2	333.440	20.788	0.321	0.051	4	XGM	0.0127	334.984	20.884
WFJB218G[1]	B	C2	2	2		20.105	0.358	0.050	4	LIT/XGM	0.0126		20.138
WFJB219G	B	C2	2	2	334.012	20.387	0.323	0.050	4	XGM	0.0126	333.681	20.367
WFJC117G	C	C1	3	1	365.414	20.826	0.362	0.050	4	XGM	0.0125	361.789	20.619
WFJC118G	C	C1	3	1	380.811	21.439	0.358	0.049	4	XGM	0.0124	373.885	21.049
WFJC119G	C	C1	3	1	396.467	21.515	0.337	0.049	4	XGM	0.0123	388.469	21.081
WFJC217G	C	C2	3	2	352.949	20.996	0.359	0.049	4	XGM	0.0124	346.296	20.600
WFJC218G	C	C2	3	2	409.815	22.154	0.311	0.050	4	XGM	0.0124	404.529	21.868
WFJC219G	C	C2	3	2	394.449	21.988	0.374	0.049	4	XGM	0.0123	384.014	21.406

[1] Strength data points removed due to bad failure

Average	**380.902**	**21.156**	**0.345**	**$Average_{norm}$**	**0.0125**	**377.921**	**21.006**
Standard Dev.	**26.165**	**0.609**	**0.018**	**$Standard\ Dev._{norm}$**		**23.217**	**0.416**
Coeff. of Var. [%]	**6.869**	**2.880**	**5.249**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.143**	**1.982**
Min.	**333.440**	**20.105**	**0.311**	**Min.**	**0.0122**	**333.681**	**20.138**
Max.	**413.299**	**22.154**	**0.374**	**Max.**	**0.0129**	**404.529**	**21.868**
Number of Spec.	**17**	**18**	**18**	**Number of Spec.**		**17**	**18**


Longitudinal Tension Properties (LT) -- (ETD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
50
100
150
200
250
300
350
400
450
Longitudinal Tension Strength [ksi]

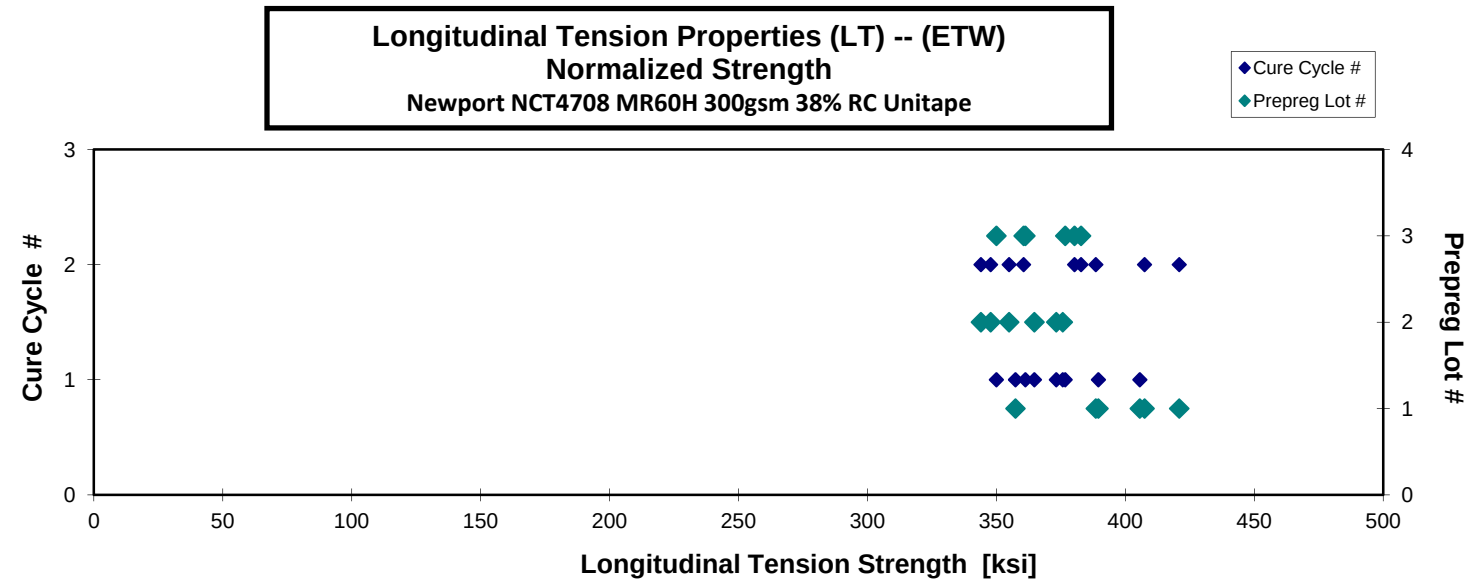

Longitudinal Tension Properties (LT) -- (ETD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
Warp Tension Modulus [Msi]

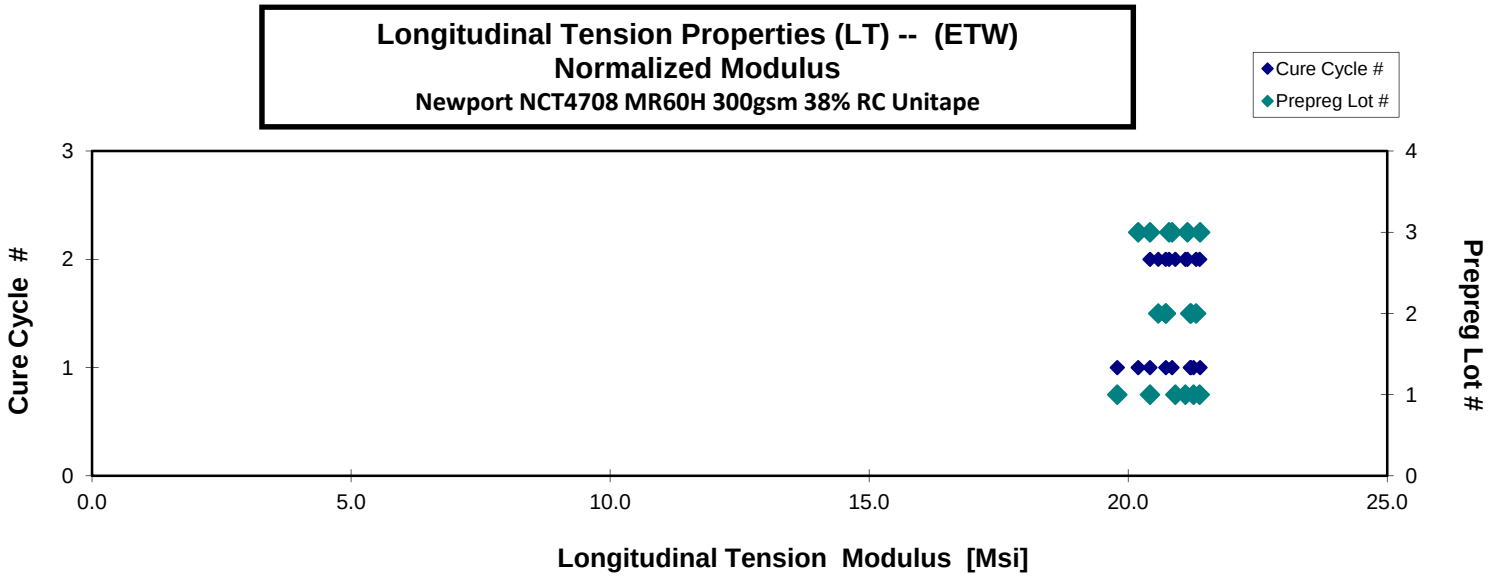
Longitudinal Tension Properties (LT) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFJA11AF	A	C1	1	1	423.770	22.214	0.315	0.048	4	XGM	0.0121	405.553	21.259
WFJA11BF	A	C1	1	1	402.268	21.088	0.309	0.049	4	XGM	0.0122	389.498	20.418
WFJA11CF	A	C1	1	1	368.803	20.422	0.357	0.049	4	XGM	0.0122	357.339	19.787
WFJA21AF	A	C2	1	2	407.660	21.117	0.331	0.050	4	XGM	0.0126	407.391	21.103
WFJA21BF	A	C2	1	2	421.534	21.413	0.299	0.050	4	XGM	0.0126	420.837	21.378
WFJA21CF	A	C2	1	2	387.864	20.873	0.353	0.050	4	XGM	0.0126	388.505	20.908
WFJB11BF	B	C1	2	1	363.361	21.119	0.328	0.051	4	XGM	0.0126	364.683	21.196
WFJB11CF	B	C1	2	1	363.528	20.055	0.311	0.052	4	XGM	0.0130	375.670	20.725
WFJB11DF	B	C1	2	1	365.790	20.792	0.330	0.051	4	XGM	0.0129	373.169	21.211
WFJB21AF	B	C2	2	2	360.605	21.652	0.289	0.050	4	XGM	0.0124	354.881	21.308
WFJB21BF	B	C2	2	2	354.151	20.960	0.366	0.049	4	XGM	0.0124	347.710	20.578
WFJB21CF	B	C2	2	2	350.804	21.134	0.305	0.049	4	XGM	0.0124	343.959	20.722
WFJC11AF	C	C1	3	1	364.677	20.386	0.326	0.050	4	XGM	0.0125	361.179	20.191
WFJC11BF	C	C1	3	1	377.375	21.428	0.359	0.050	4	XGM	0.0126	376.627	21.385
WFJC11CF	C	C1	3	1	355.576	21.181	0.346	0.050	4	XGM	0.0124	349.932	20.845
WFJC21AF	C	C2	3	2	391.120	21.381	0.332	0.049	4	XGM	0.0123	380.256	20.787
WFJC21BF	C	C2	3	2	392.353	21.672	0.334	0.049	4	XGM	0.0123	382.751	21.141
WFJC21CF	C	C2	3	2	367.787	20.833	0.267	0.049	4	XGM	0.0124	360.490	20.420

Average	**378.835**	**21.096**	**0.325**	**$Average_{norm}$**	**0.0125**	**374.468**	**20.853**
Standard Dev.	**22.977**	**0.512**	**0.026**	**$Standard\ Dev._{norm}$**		**21.864**	**0.447**
Coeff. of Var. [%]	**6.065**	**2.429**	**8.037**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**5.839**	**2.141**
Min.	**350.804**	**20.055**	**0.267**	**Min.**	**0.0121**	**343.959**	**19.787**
Max.	**423.770**	**22.214**	**0.366**	**Max.**	**0.0130**	**420.837**	**21.385**
Number of Spec.	**18**	**18**	**18**	**Number of Spec.**		**18**	**18**


Longitudinal Tension Properties (LT) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
50
100
150
200
250
300
350
400
450
500
Longitudinal Tension Strength [ksi]

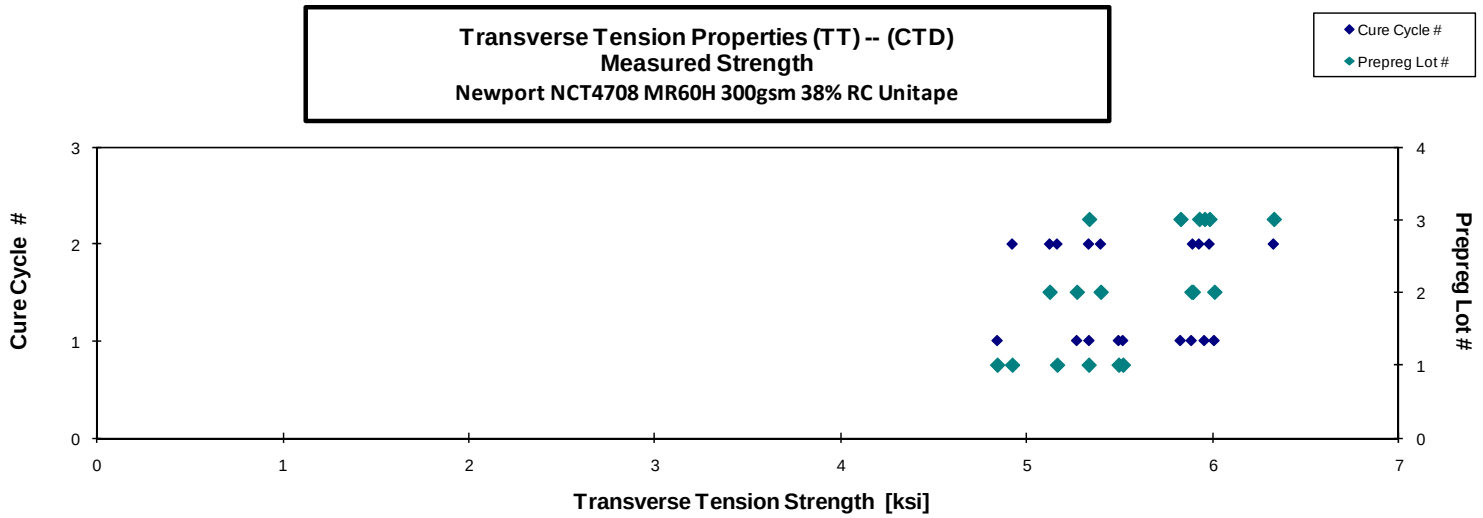

Longitudinal Tension Properties (LT) -- (ETW)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
Longitudinal Tension Modulus [Msi]

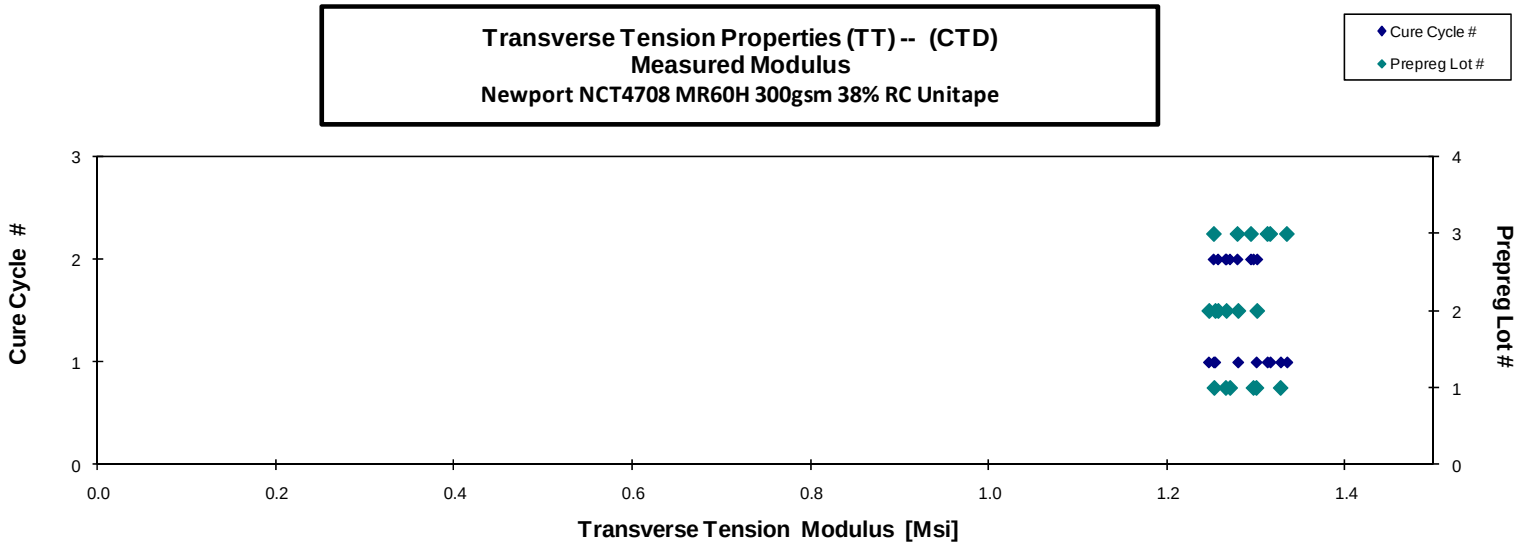
4.2 Transverse Tension Properties

Transverse Tension Properties (TT) -- (CTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode
WFUA111B	A	C1	1	1	5.496	1.329	0.097	8	LAB
WFUA112B	A	C1	1	1	5.520	1.301	0.101	8	LAB
WFUA113B	A	C1	1	1	4.844	1.254	0.102	8	LAB
WFUA211B	A	C2	1	2	4.924	1.298	0.099	8	LAB
WFUA212B	A	C2	1	2	5.336	1.267	0.102	8	LGM
WFUA213B	A	C2	1	2	5.166	1.272	0.102	8	LGM
WFUB111B	B	C1	2	1	5.888	1.281	0.099	8	LGM
WFUB112B	B	C1	2	1	5.272	1.248	0.101	8	LAB
WFUB113B	B	C1	2	1	6.011	1.255	0.102	8	LAT
WFUB211B	B	C2	2	2	5.126	1.268	0.101	8	LGM / LAT
WFUB212B	B	C2	2	2	5.895	1.302	0.102	8	LAT
WFUB213B	B	C2	2	2	5.400	1.258	0.102	8	LAT
WFUC111B	C	C1	3	1	5.958	1.336	0.097	8	LGM
WFUC112B	C	C1	3	1	5.338	1.317	0.099	8	LGM
WFUC113B	C	C1	3	1	5.829	1.314	0.099	8	LGM / LAT
WFUC211B	C	C2	3	2	5.985	1.280	0.096	8	LAB
WFUC212B	C	C2	3	2	5.930	1.295	0.098	8	LGM / LAT / LAB
WFUC213B	C	C2	3	2	6.331	1.253	0.098	8	LGM

Average	**5.569**	**1.285**
Standard Dev.	**0.423**	**0.028**
Coeff. of Var. [%]	**7.593**	**2.153**
Min.	**4.844**	**1.248**
Max.	**6.331**	**1.336**
Number of Spec.	**18**	**18**


Transverse Tension Properties (TT) -- (CTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Strength [ksi]


Transverse Tension Properties (TT) -- (CTD)
Measured Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Modulus [Msi]

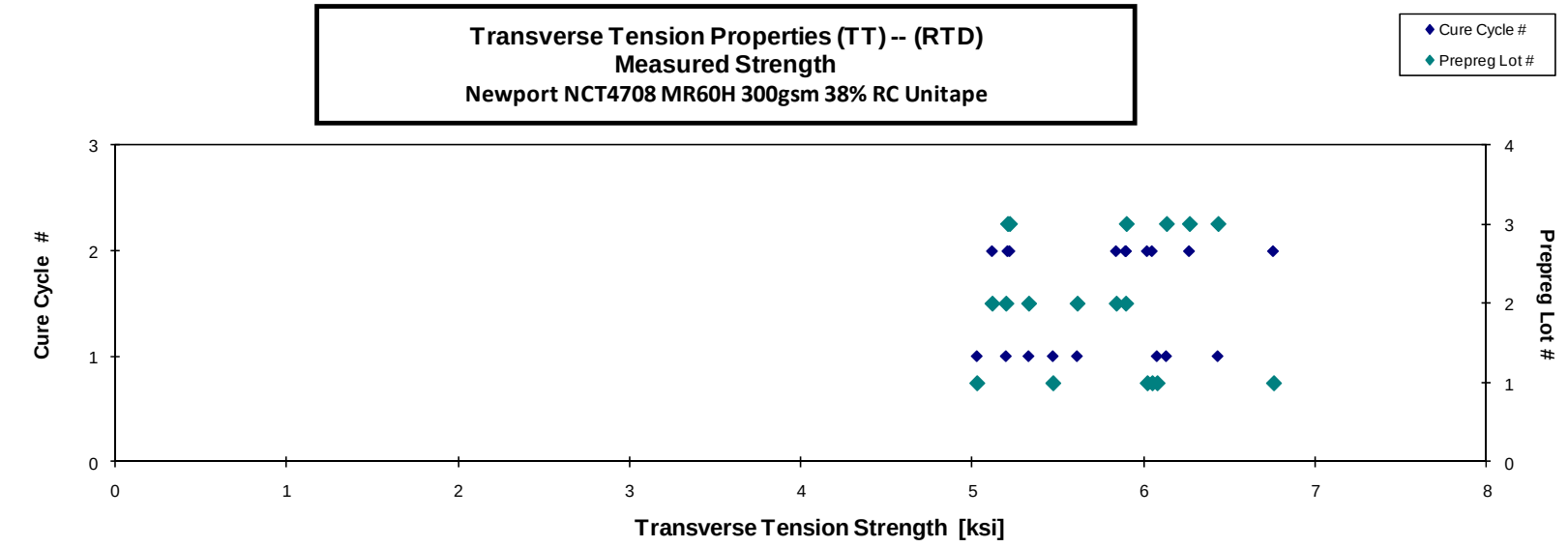
Transverse Tension Properties (TT) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

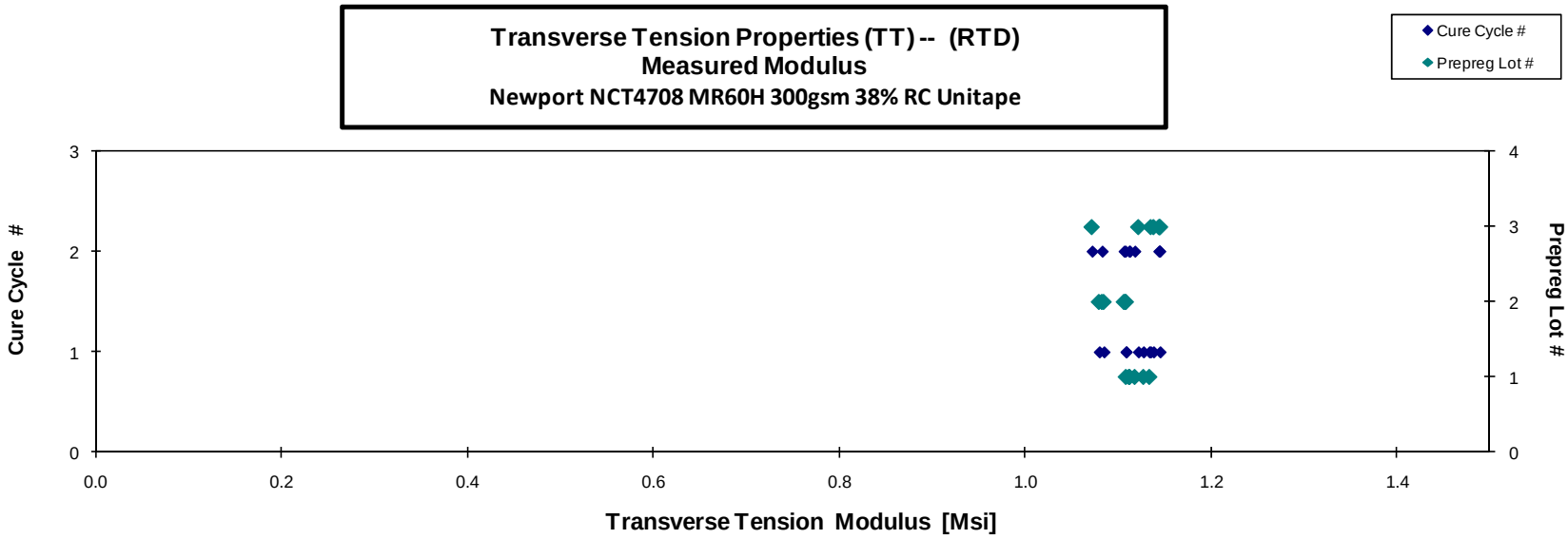
Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode
WFUA115A	A	C1	1	1	5.028	1.109	0.100	8	LAB
WFUA116A	A	C1	1	1	6.079	1.128	0.100	8	LAB
WFUA117A	A	C1	1	1	5.471	1.134	0.101	8	LAB
WFUA215A	A	C2	1	2	6.021	1.112	0.101	8	LAT
WFUA216A	A	C2	1	2	6.050	1.118	0.101	8	LWB
WFUA217A	A	C2	1	2	6.758	1.113	0.101	8	LAT
WFUB115A	B	C1	2	1	5.330	1.085	0.101	8	LAB
WFUB116A	B	C1	2	1	5.613	1.080	0.102	8	LAT
WFUB117A	B	C1	2	1	5.197	1.109	0.102	8	LGM
WFUB215A	B	C2	2	2	5.841	1.108	0.102	8	LAT
WFUB216A	B	C2	2	2	5.896	1.083	0.102	8	LAT
WFUB217A	B	C2	2	2	5.117	1.107	0.102	8	LAB
WFUC115A	C	C1	3	1	6.434	1.135	0.100	8	LAT
WFUC116A	C	C1	3	1		1.138	0.099	8	LAT[1]
WFUC117A	C	C1	3	1	6.134	1.122	0.100	8	LAB
WFUC114B*	C	C1	3	1		1.145	0.099	8	LAT[1]
WFUC215A	C	C2	3	2	5.218	1.145	0.098	8	LAB
WFUC216A	C	C2	3	2	6.267	1.145	0.098	8	LAT
WFUC217A	C	C2	3	2	5.207	1.144	0.098	8	LAT
WFUC214B*	C	C2	3	2	5.899	1.072	0.098	8	LAT

[1] Strength data points removed due to thickness taper at grip area

* Extra specimens taken from CTD

Average	**5.753**	**1.117**
Standard Dev.	**0.503**	**0.023**
Coeff. of Var. [%]	**8.744**	**2.071**
Min.	**5.028**	**1.072**
Max.	**6.758**	**1.145**
Number of Spec.	**18**	**20**


Transverse Tension Properties (TT) -- (RTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Strength [ksi]
0
1
2
3
4
5
6
7
8

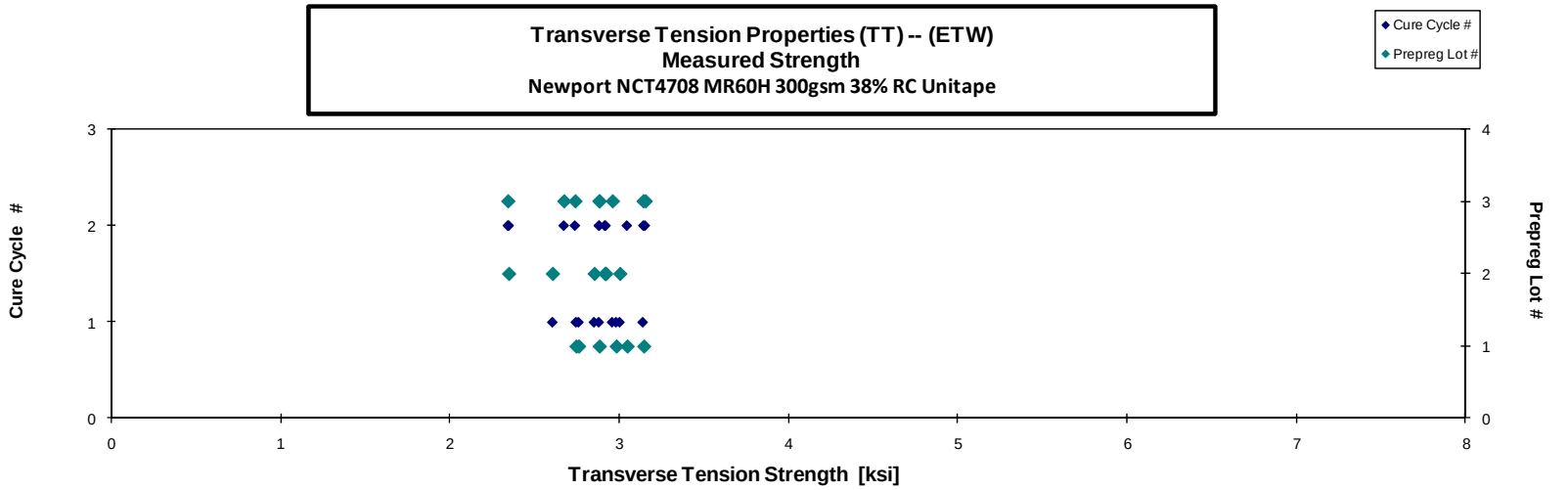

Transverse Tension Properties (TT) -- (RTD)
Measured Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Modulus [Msi]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4

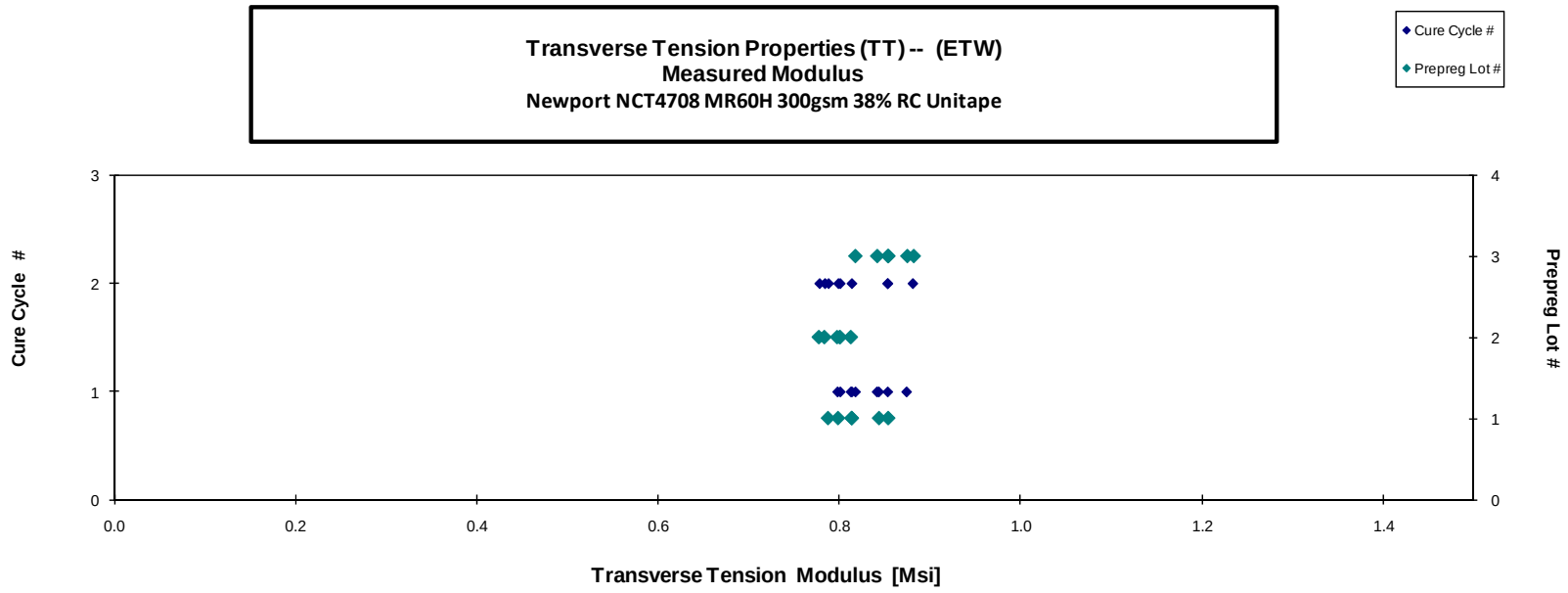
Transverse Tension Properties (TT) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode
WFUA118F	A	1	1	1	2.985	0.854	0.101	8	LWT
WFUA119F	A	1	1	1	2.763	0.844	0.100	8	LGM
WFUA11AF	A	1	1	1	2.748	0.814	0.101	8	LGM
WFUA218F	A	2	1	2	3.147	0.799	0.101	8	LAT
WFUA219F	A	2	1	2	3.049	0.788	0.101	8	LGM
WFUA21AF	A	2	1	2	2.885	0.814	0.101	8	LAT
WFUB118F	B	1	2	1	3.006	0.813	0.102	8	LGM
WFUB119F	B	1	2	1	2.855	0.798	0.101	8	LGM
WFUB11AF	B	1	2	1	2.609	0.801	0.102	8	LGM
WFUB218F	B	2	2	2	2.351	0.801	0.102	8	LAT
WFUB219F	B	2	2	2	2.918	0.784	0.102	8	LWT
WFUB21AF	B	2	2	2	2.923	0.778	0.102	8	LWB
WFUC118F	C	1	3	1	3.143	0.842	0.100	8	LGM
WFUC119F	C	1	3	1	2.883	0.818	0.100	8	LGM
WFUC11AF	C	1	3	1	2.962	0.875	0.100	8	LGM
WFUC218F	C	2	3	2	3.156	0.882	0.098	8	LGM
WFUC219F*	C	2	3	2	2.346		0.098	8	LAB
WFUC21AF	C	2	3	2	2.742	0.854	0.098	8	LAT
WFUC21BF*	C	2	3	2	2.676		0.098	8	LAB
WFUC21CF	C	2	3	2	2.885	0.854	0.098	8	LAT

*Strain gage error

Average	**2.851**	**0.823**
Standard Dev.	**0.229**	**0.032**
Coeff. of Var. [%]	**8.034**	**3.854**
Min.	**2.346**	**0.778**
Max.	**3.156**	**0.882**
Number of Spec.	**20**	**18**


Transverse Tension Properties (TT) -- (ETW)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Strength [ksi]


Transverse Tension Properties (TT) -- (ETW)
Measured Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Modulus [Msi]

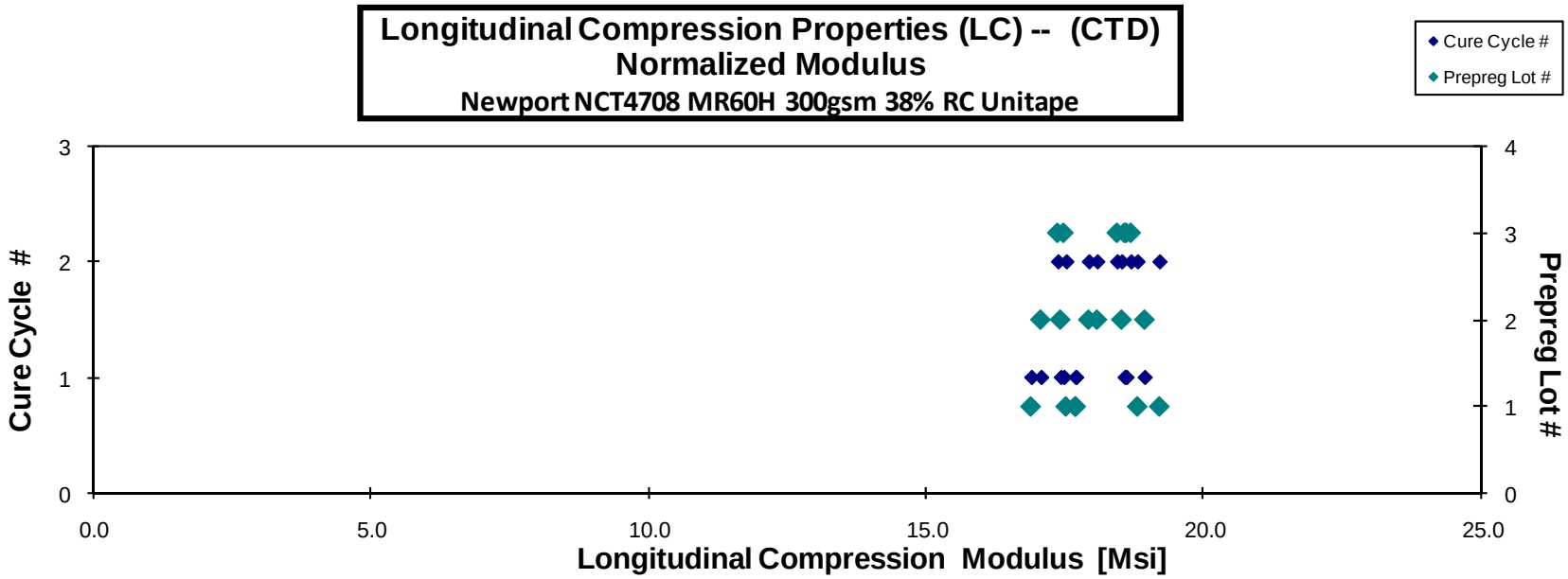
4.3 Longitudinal Compression Properties

Longitudinal Compression Properties (LC) -- (CTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_p [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
WFLA111B	A	C1	1	1	18.181	0.338	0.117	10	0.0117	16.909
WFLA112B	A	C1	1	1	18.199	0.356	0.123	10	0.0123	17.703
WFLA113B	A	C1	1	1	17.605	0.372	0.127	10	0.0127	17.714
WFLA212B	A	C2	1	2	17.213	0.399	0.128	10	0.0128	17.537
WFLA213B	A	C2	1	2	18.243	0.325	0.130	10	0.0130	18.818
WFLA214B	A	C2	1	2	18.484	0.371	0.131	10	0.0131	19.213
WFLB111B	B	C1	2	1	19.566	0.307	0.110	10	0.0110	17.084
WFLB112B	B	C1	2	1	18.817	0.352	0.117	10	0.0117	17.438
WFLB113B	B	C1	2	1	20.056	0.370	0.119	10	0.0119	18.947
WFLB213B	B	C2	2	2	18.258	0.359	0.124	10	0.0124	17.943
WFLB214B	B	C2	2	2	18.647	0.332	0.125	10	0.0125	18.534
WFLB215B	B	C2	2	2	18.231	0.382	0.125	10	0.0125	18.094
WFLC111B	C	C1	3	1	18.906	0.357	0.117	10	0.0117	17.495
WFLC112B	C	C1	3	1	19.594	0.350	0.120	10	0.0120	18.619
WFLC113B	C	C1	3	1	19.233	0.364	0.122	10	0.0122	18.586
WFLC211B	C	C2	3	2	18.244	0.396	0.120	10	0.0120	17.387
WFLC212B	C	C2	3	2	19.430	0.366	0.121	10	0.0121	18.700
WFLC213B	C	C2	3	2	19.075	0.369	0.122	10	0.0122	18.451

Average	**18.666**	**0.359**	**$Average_{norm}$**	**0.0122**	**18.065**
Standard Dev.	**0.735**	**0.023**	**$Standard\ Dev._{norm}$**		**0.688**
Coeff. of Var. [%]	**3.938**	**6.543**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.806**
Min.	**17.213**	**0.307**	**Min.**	**0.0110**	**16.909**
Max.	**20.056**	**0.399**	**Max.**	**0.0131**	**19.213**
Number of Spec.	**18**	**18**	**Number of Spec.**		**18**


Longitudinal Compression Properties (LC) -- (CTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
Longitudinal Compression Modulus [Msi]

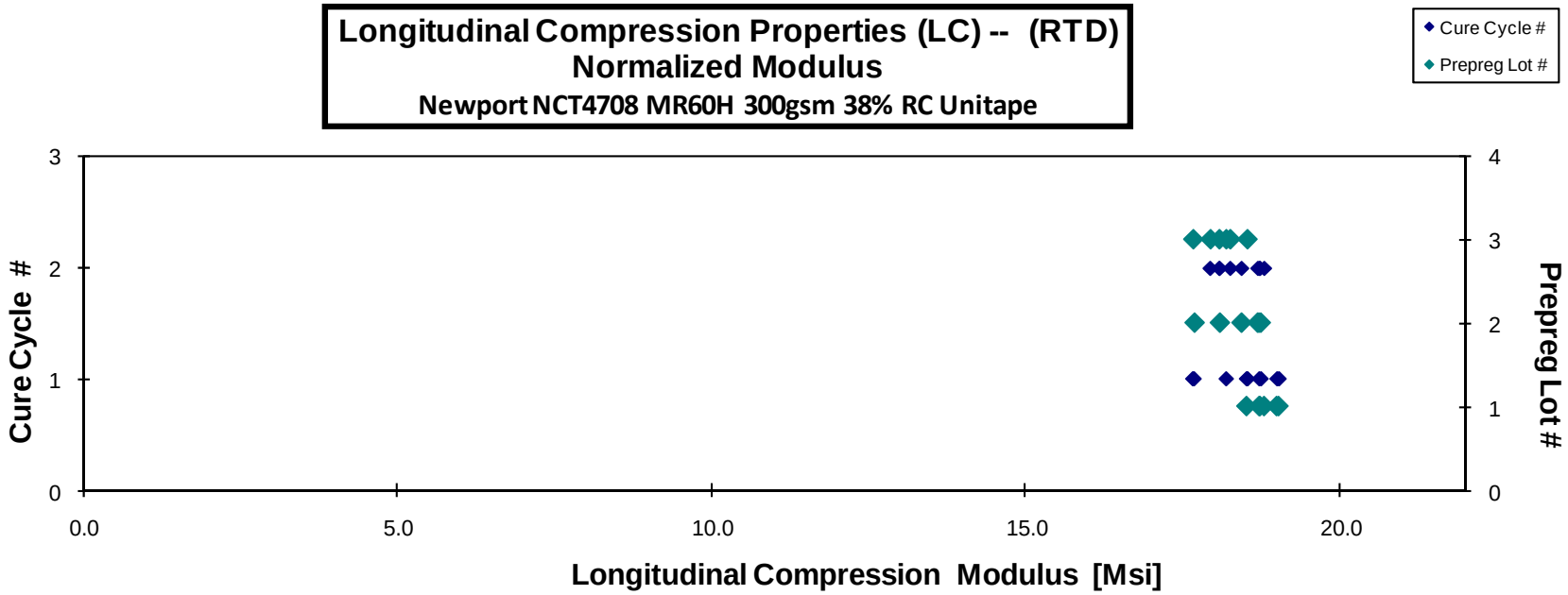
Longitudinal Compression Properties (LC) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_p [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
WFLA117A	A	C1	1	1	19.230	0.280	0.125	10	0.0125	19.017
WFLA118A	A	C1	1	1	19.401	0.376	0.124	10	0.0124	19.047
WFLA119A	A	C1	1	1	18.920	0.368	0.123	10	0.0123	18.535
WFLA217A	A	C2	1	2	18.337	0.346	0.129	10	0.0129	18.738
WFLA218A	A	C2	1	2	18.441	0.376	0.128	10	0.0128	18.751
WFLA219A	A	C2	1	2	18.559	0.366	0.128	10	0.0128	18.815
WFLB117A	B	C1	2	1	19.673	0.405	0.120	10	0.0120	18.764
WFLB118A	B	C1	2	1	19.377	0.328	0.122	10	0.0122	18.736
WFLB119A	B	C1	2	1	18.269	0.340	0.122	10	0.0122	17.706
WFLB217A	B	C2	2	2	18.784	0.357	0.124	10	0.0124	18.441
WFLB218A	B	C2	2	2	19.019	0.341	0.124	10	0.0124	18.698
WFLB219A	B	C2	2	2	18.422	0.355	0.124	10	0.0124	18.101
WFLC117A	C	C1	3	1	18.729	0.376	0.123	10	0.0123	18.214
WFLC118A	C	C1	3	1	19.061	0.390	0.123	10	0.0123	18.552
WFLC119A	C	C1	3	1	18.127	0.330	0.123	10	0.0123	17.686
WFLC217A	C	C2	3	2	18.707	0.371	0.122	10	0.0122	18.103
WFLC218A	C	C2	3	2	18.611	0.326	0.122	10	0.0122	17.961
WFLC219A	C	C2	3	2	18.795	0.352	0.123	10	0.0123	18.277

Average	**18.804**	**0.355**
Standard Dev.	**0.427**	**0.029**
Coeff. of Var. [%]	**2.271**	**8.074**
Min.	**18.127**	**0.280**
Max.	**19.673**	**0.405**
Number of Spec.	**18**	**18**

$Average_{norm}$	**0.0124**	**18.452**
$Standard\ Dev._{norm}$		**0.416**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.257**
Min.	**0.0120**	**17.686**
Max.	**0.0129**	**19.047**
Number of Spec.		**18**

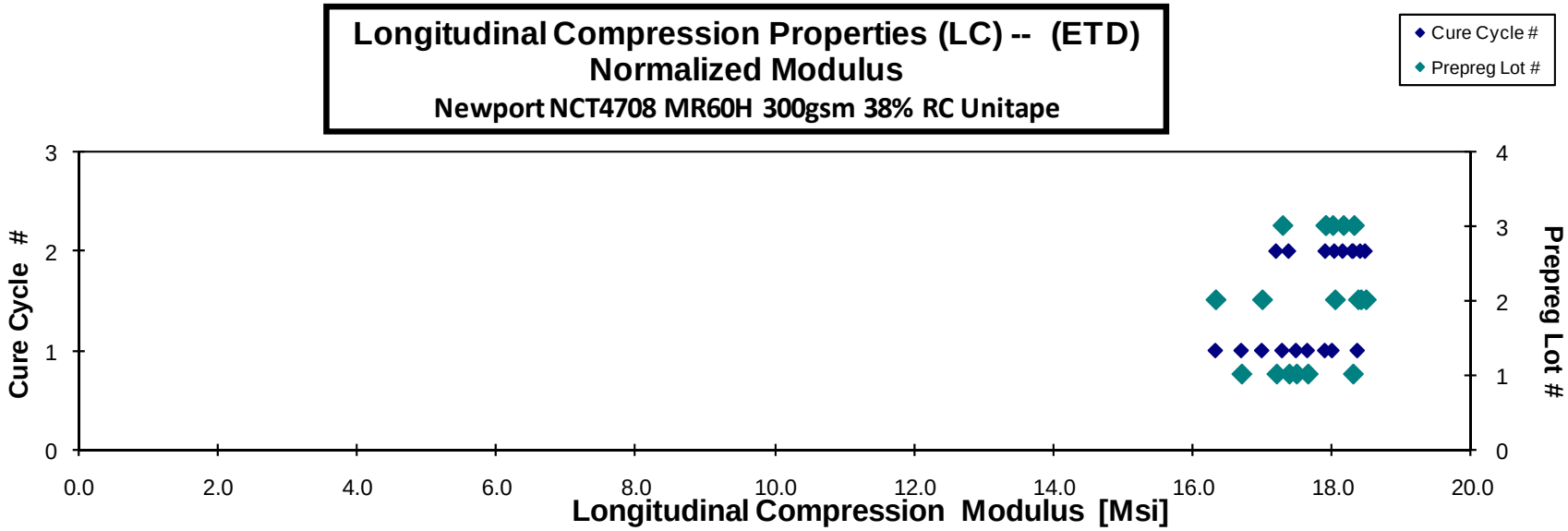

Longitudinal Compression Properties (LC) -- (RTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
Longitudinal Compression Modulus [Msi]

Longitudinal Compression Properties (LC) -- (ETD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
WFLA11DG	A	C1	1	1	18.104	0.391	0.116	10	0.0116	16.698
WFLA11EG	A	C1	1	1	18.056	0.365	0.122	10	0.0122	17.488
WFLA11FG	A	C1	1	1	17.586	0.369	0.126	10	0.0126	17.651
WFLA21DG	A	C2	1	2	17.338	0.374	0.125	10	0.0125	17.200
WFLA21EG	A	C2	1	2	17.050	0.363	0.128	10	0.0128	17.382
WFLA21FG	A	C2	1	2	17.732	0.301	0.130	10	0.0130	18.299
WFLB11DG	B	C1	2	1	18.554	0.411	0.111	10	0.0111	16.325
WFLB11EG	B	C1	2	1	19.574	0.364	0.109	10	0.0109	16.995
WFLB11FG	B	C1	2	1	20.023	0.380	0.116	10	0.0116	18.373
WFLB21CG	B	C2	2	2	18.816	0.365	0.124	10	0.0124	18.486
WFLB21GG	B	C2	2	2	18.561	0.379	0.125	10	0.0125	18.414
WFLB21HG	B	C2	2	2	18.126	0.431	0.125	10	0.0125	18.041
WFLC11DG	C	C1	3	1	18.646	0.370	0.117	10	0.0117	17.287
WFLC11EG	C	C1	3	1	18.770	0.345	0.120	10	0.0120	17.903
WFLC11FG	C	C1	3	1	18.583	0.371	0.122	10	0.0122	18.008
WFLC21DG	C	C2	3	2	18.813	0.390	0.120	10	0.0120	17.910
WFLC21EG	C	C2	3	2	18.852	0.358	0.121	10	0.0121	18.161
WFLC21FG	C	C2	3	2	18.876	0.343	0.122	10	0.0122	18.314

Average	**18.448**	**0.371**	**$Average_{norm}$**	**0.0121**	**17.719**
Standard Dev.	**0.742**	**0.027**	**$Standard\ Dev._{norm}$**		**0.631**
Coeff. of Var. [%]	**4.023**	**7.420**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.564**
Min.	**17.050**	**0.301**	**Min.**	**0.0109**	**16.325**
Max.	**20.023**	**0.431**	**Max.**	**0.0130**	**18.486**
Number of Spec.	**18**	**18**	**Number of Spec.**		**18**

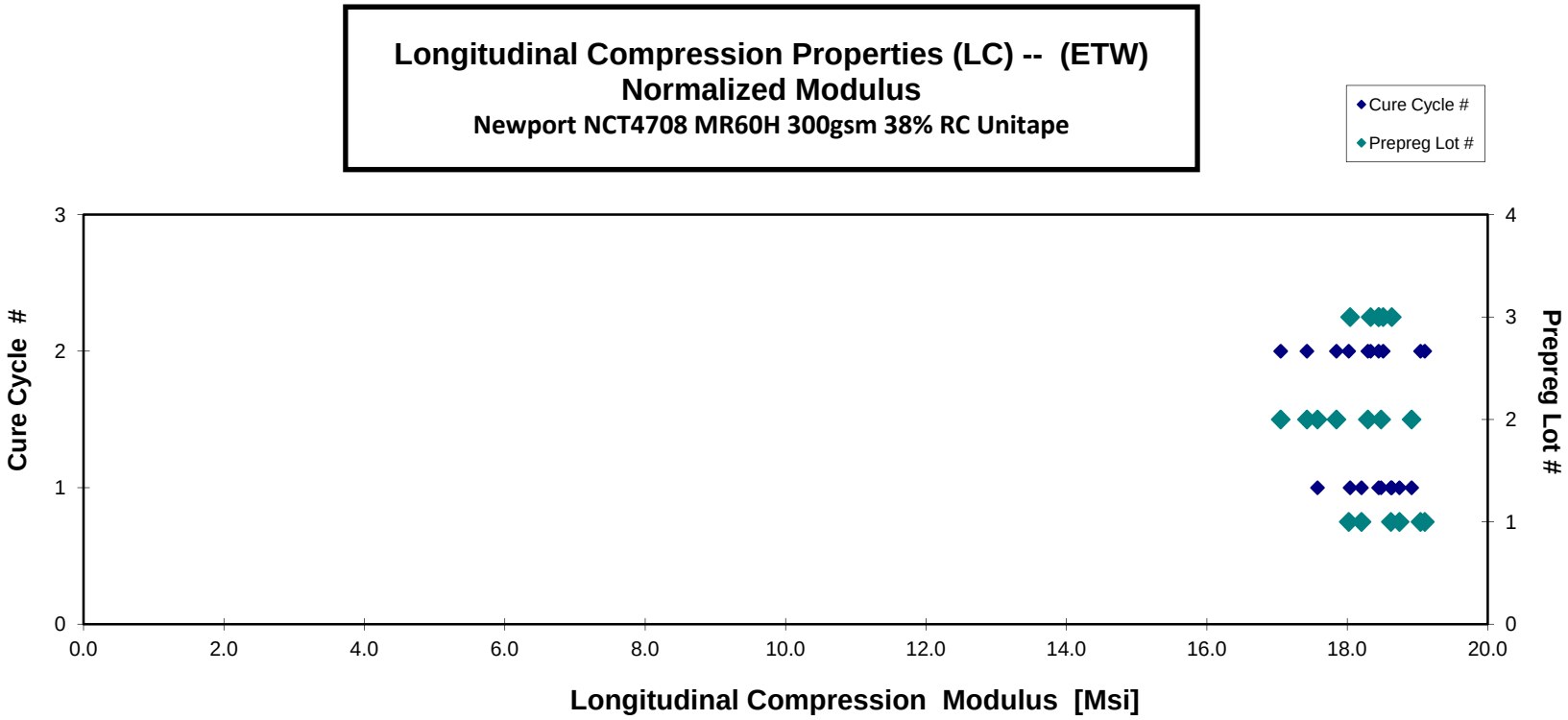

Longitudinal Compression Properties (LC) -- (ETD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Longitudinal Compression Modulus [Msi]

Longitudinal Compression Properties (LC) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
WFLA11JF	A	C1	1	1	18.644	0.363	0.126	10	0.0126	18.619
WFLA11KF	A	C1	1	1	18.874	0.349	0.125	10	0.0125	18.742
WFLA11LF	A	C1	1	1	18.476	0.369	0.124	10	0.0124	18.200
WFLA21KF	A	C2	1	2	18.889	0.361	0.127	10	0.0127	19.101
WFLA21LF	A	C2	1	2	18.824	0.331	0.127	10	0.0127	19.041
WFLA21MF	A	C2	1	2	17.870	0.365	0.127	10	0.0127	18.019
WFLB11JF	B	C1	2	1	18.930	0.395	0.123	10	0.0123	18.479
WFLB11KF	B	C1	2	1	19.471	0.394	0.122	10	0.0122	18.914
WFLB11LF	B	C1	2	1	17.934	0.353	0.123	10	0.0123	17.574
WFLB21JF	B	C2	2	2	18.528	0.317	0.124	10	0.0124	18.291
WFLB21KF	B	C2	2	2	18.096	0.352	0.124	10	0.0124	17.843
WFLB21LF	B	C2	2	2	17.674	0.378	0.124	10	0.0124	17.423
WFLB21MF	B	C2	2	2	17.279	0.399	0.124	10	0.0124	17.049
WFLC11JF	C	C1	3	1	18.511	0.343	0.123	10	0.0123	18.038
WFLC11KF	C	C1	3	1	18.866	0.401	0.123	10	0.0123	18.445
WFLC11LF	C	C1	3	1	19.083	0.437	0.123	10	0.0123	18.631
WFLC21JF	C	C2	3	2	19.054	0.351	0.122	10	0.0122	18.444
WFLC21KF	C	C2	3	2	18.837	0.349	0.123	10	0.0123	18.331
WFLC21LF	C	C2	3	2	18.976	0.376	0.123	10	0.0123	18.509

Average	**18.569**	**0.367**	**$Average_{norm}$**	**0.0124**	**18.300**
Standard Dev.	**0.559**	**0.028**	**$Standard\ Dev._{norm}$**		**0.544**
Coeff. of Var. [%]	**3.011**	**7.738**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**2.971**
Min.	**17.279**	**0.317**	**Min.**	**0.0122**	**17.049**
Max.	**19.471**	**0.437**	**Max.**	**0.0127**	**19.101**
Number of Spec.	**19**	**19**	**Number of Spec.**		**19**


Longitudinal Compression Properties (LC) -- (ETW)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Longitudinal Compression Modulus [Msi]

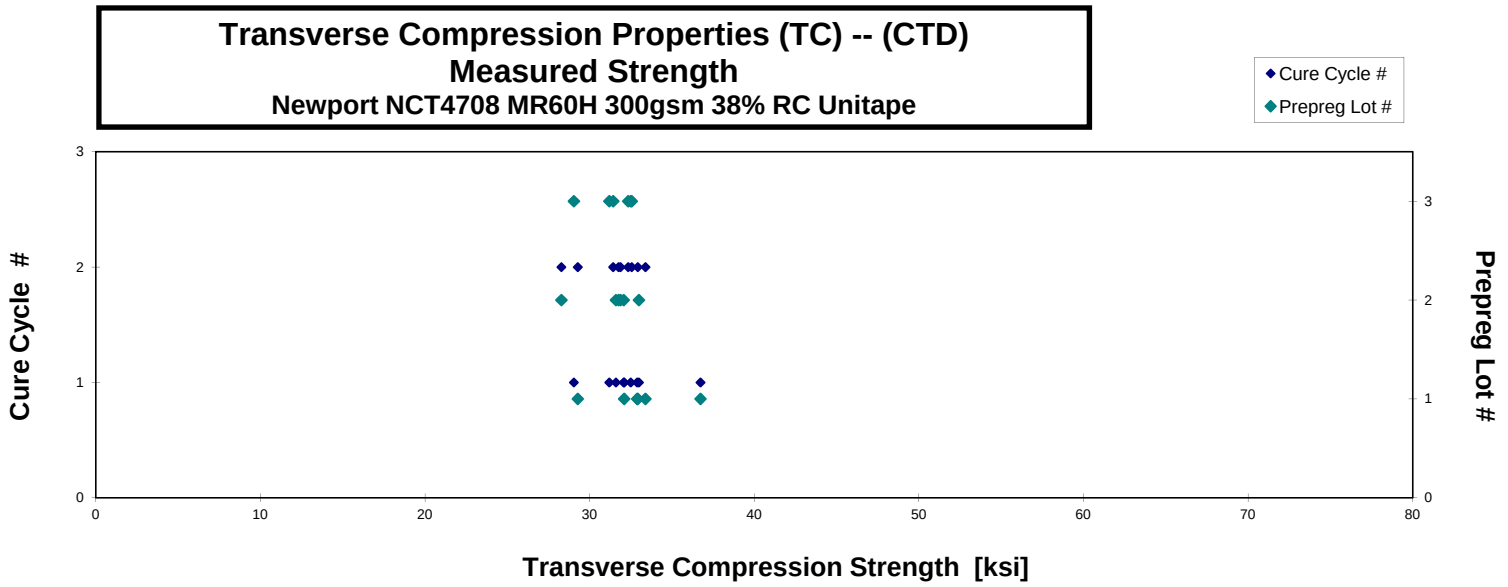
4.4 Transverse Compression Properties

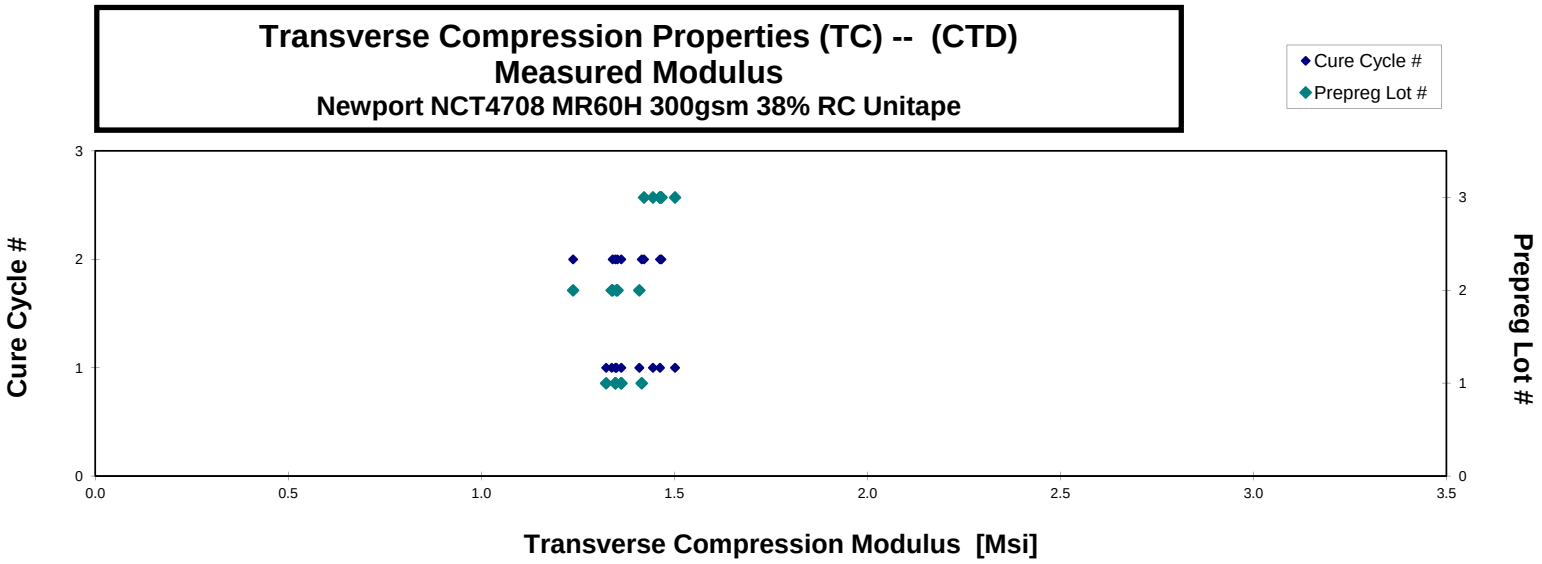
Transverse Compression Properties (TC) -- (CTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode
WFZA111B	A	C1	1	1	32.886	1.323	0.019	0.123	10	HGM/HAB
WFZA112B	A	C1	1	1	36.732	1.347	0.019	0.125	10	HGM/HAB
WFZA113B	A	C1	1	1	32.094	1.362	0.031	0.126	10	HAT/HGM
WFZA211B	A	C2	1	2	32.924	1.415	0.028	0.126	10	HGM
WFZA212B	A	C2	1	2	33.387	1.362	0.023	0.126	10	HGM
WFZA213B	A	C2	1	2	29.276	1.347	0.030	0.129	10	HAT/HGM
WFZB111B	B	C1	2	1	32.069	1.409	0.033	0.121	10	HGM/HAB
WFZB112B*	B	C1	2	1	32.991	1.350		0.124	10	HAB
WFZB113B	B	C1	2	1	31.598	1.337	0.037	0.126	10	HAB
WFZB211B*	B	C2	2	2	31.875	1.237		0.122	10	HAT/HGM
WFZB212B	B	C2	2	2	31.758	1.340	0.031	0.125	10	HAT/HGM
WFZB213B	B	C2	2	2	28.283	1.352	0.041	0.125	10	HAT
WFZC111B	C	C1	3	1	32.499	1.501	0.035	0.121	10	HAT/HGM
WFZC112B	C	C1	3	1	31.191	1.462	0.025	0.123	10	HAB
WFZC113B	C	C1	3	1	29.041	1.444	0.030	0.124	10	HGM
WFZC217B*	C	C2	3	2	32.344	1.466		0.121	10	HAT
WFZC218B*	C	C2	3	2	32.556	1.462		0.122	10	HGM
WFZC219B	C	C2	3	2	31.431	1.421	0.022	0.122	10	HAT/HGM

* Poisson's ratio were not reported due to non linear data.

Average	**31.941**	**1.386**	**0.029**
Standard Dev.	**1.859**	**0.066**	**0.007**
Coeff. of Var. [%]	**5.821**	**4.779**	**22.904**
Min.	**28.283**	**1.237**	**0.019**
Max.	**36.732**	**1.501**	**0.041**
Number of Spec.	**18**	**18**	**14**


Transverse Compression Properties (TC) -- (CTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
0
1
2
3


Transverse Compression Properties (TC) -- (CTD)
Measured Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Modulus [Msi]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
1
2
3

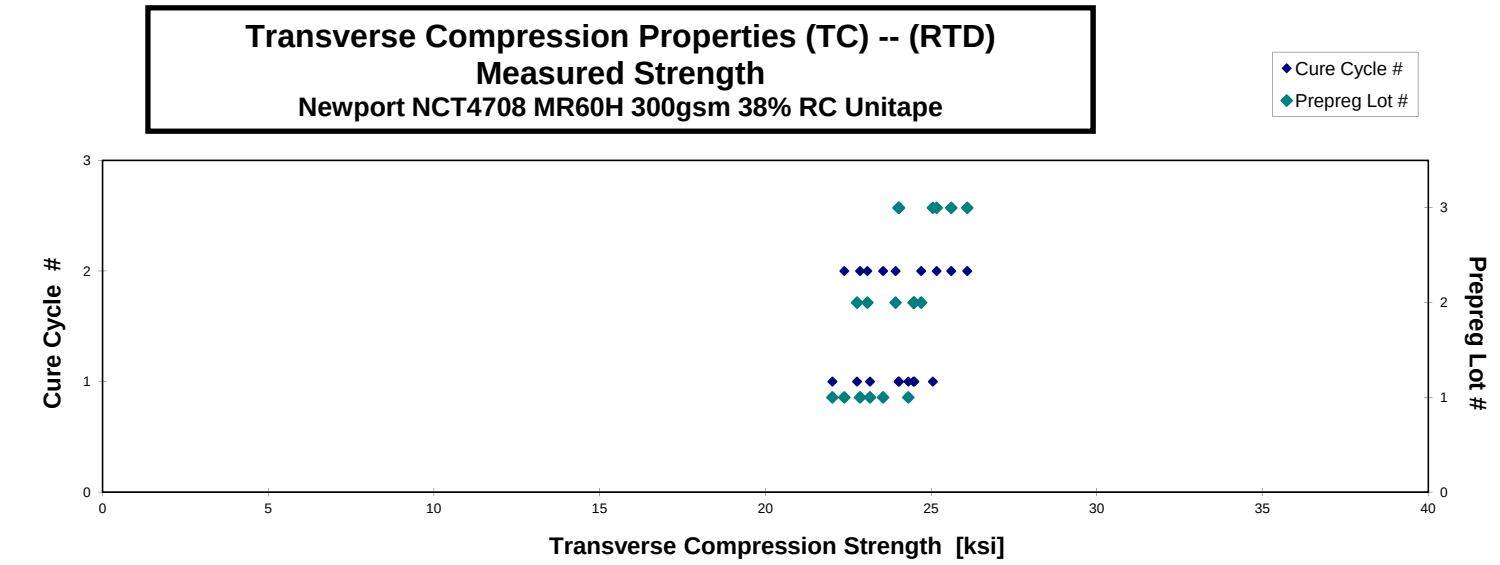
Transverse Compression Properties (TC) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

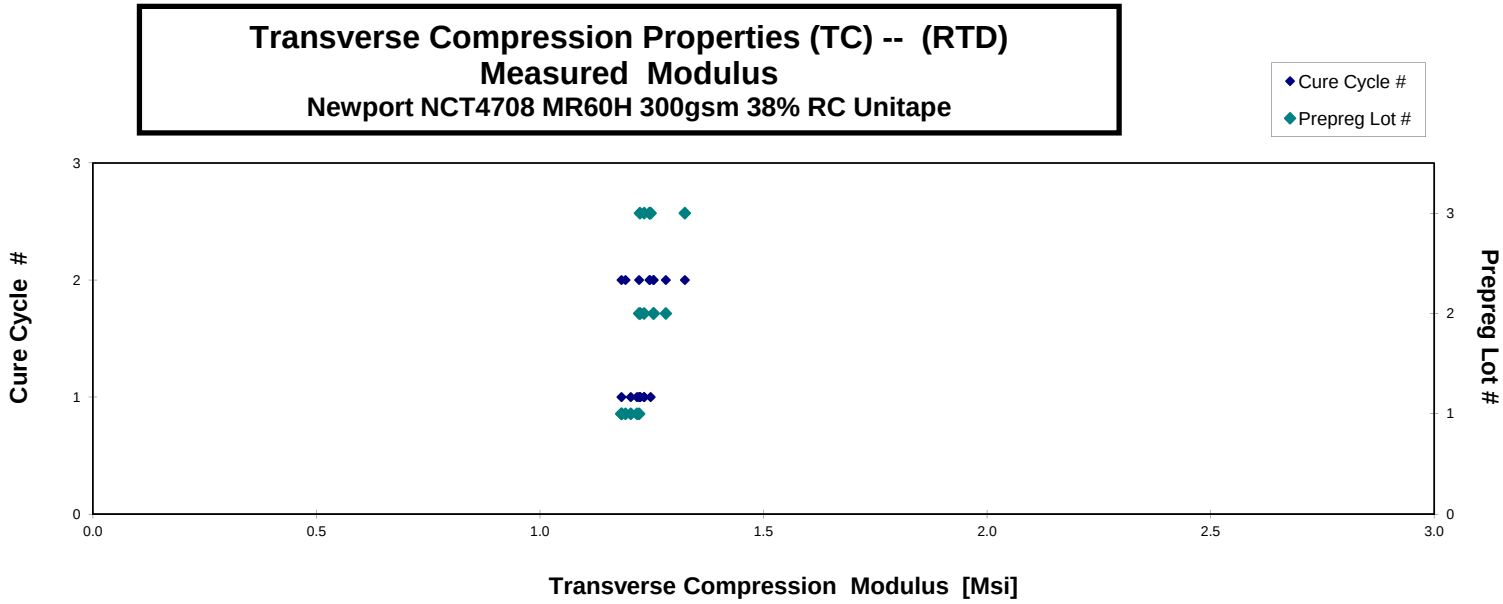
Specimen Number	Newport Batch #	Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode
WFZA117A[1]	A	C1	1	1		1.203	0.024	0.126	10	HIB
WFZA118A	A	C1	1	1	24.310	1.182	0.021	0.126	10	BGM
WFZA11AA	A	C1	1	1	23.154	1.217	0.025	0.127	10	HAB
WFZA11BA[2]	A	C1	1	1	22.018			0.127	10	HGM
WFZA217A	A	C2	1	2	22.378	1.182	0.023	0.127	10	BGM
WFZA218A	A	C2	1	2	22.853	1.191	0.027	0.128	10	HAT
WFZA219A	A	C2	1	2	23.550	1.221	0.024	0.129	10	HAT
WFZB117A	B	C1	2	1	22.764	1.224	0.024	0.126	10	HGM
WFZB118A	B	C1	2	1	24.489	1.233	0.024	0.126	10	HGM
WFZB119A	B	C1	2	1	24.468	1.222	0.025	0.126	10	HGM
WFZB217A	B	C2	2	2	23.074	1.281	0.026	0.125	10	HAT
WFZB218A	B	C2	2	2	23.925	1.254	0.025	0.127	10	HGM
WFZB219A	B	C2	2	2	24.699	1.254	0.028	0.127	10	HGM
WFZC117A	C	C1	3	1	24.027	1.223	0.030	0.123	10	HGM
WFZC118A	C	C1	3	1	25.051	1.247	0.025	0.124	10	HGM
WFZC119A	C	C1	3	1	24.015	1.233	0.028	0.123	10	HGM
WFZC21DA	C	C2	3	2	26.087	1.324	0.027	0.122	10	HGM
WFZC21EA	C	C2	3	2	25.604	1.245	0.026	0.122	10	HGM
WFZC21FA	C	C2	3	2	25.164	1.245	0.022	0.123	10	HAT

[1] Strength data point were not added due to bad failure mode.

[2] Modulus and poisson's ratio were not added due to bad strain readings.

Average	**23.980**	**1.232**	**0.025**
Standard Dev.	**1.127**	**0.035**	**0.002**
Coeff. of Var. [%]	**4.702**	**2.816**	**8.540**
Min.	**22.018**	**1.182**	**0.021**
Max.	**26.087**	**1.324**	**0.030**
Number of Spec.	**18**	**18**	**18**

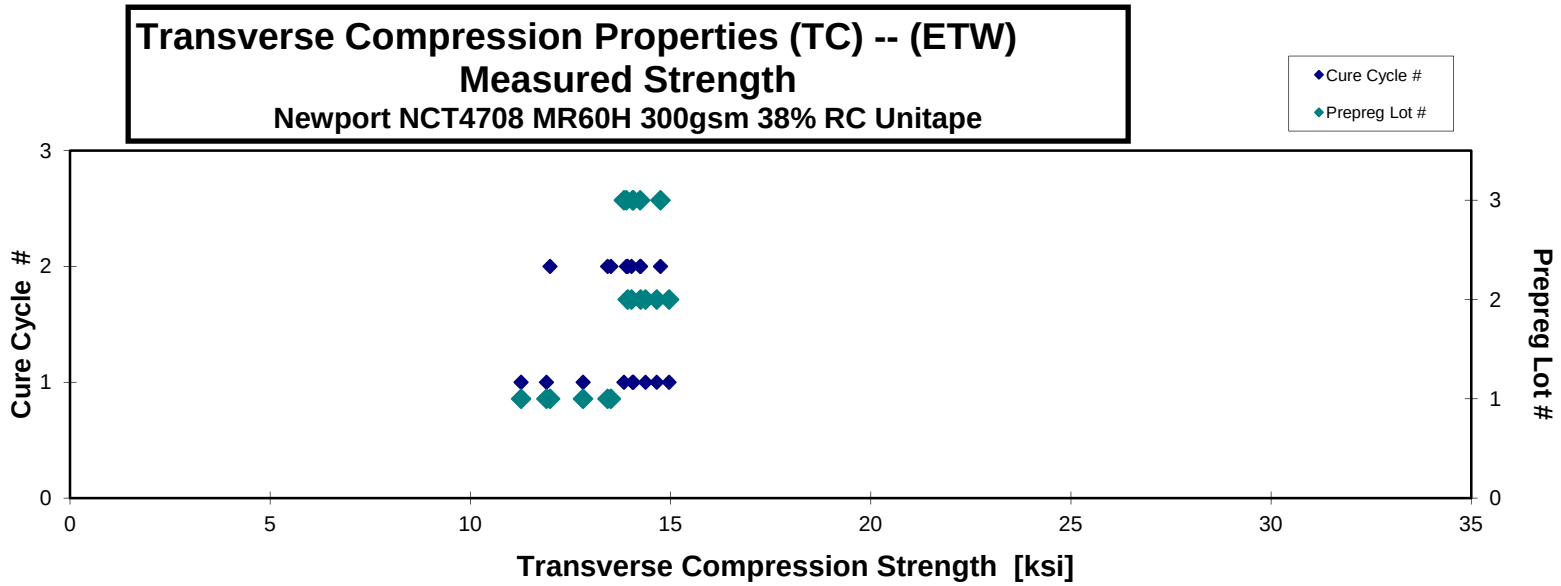

Transverse Compression Properties (TC) -- (RTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Strength [ksi]
0
5
10
15
20
25
30
35
40
0
1
2
3

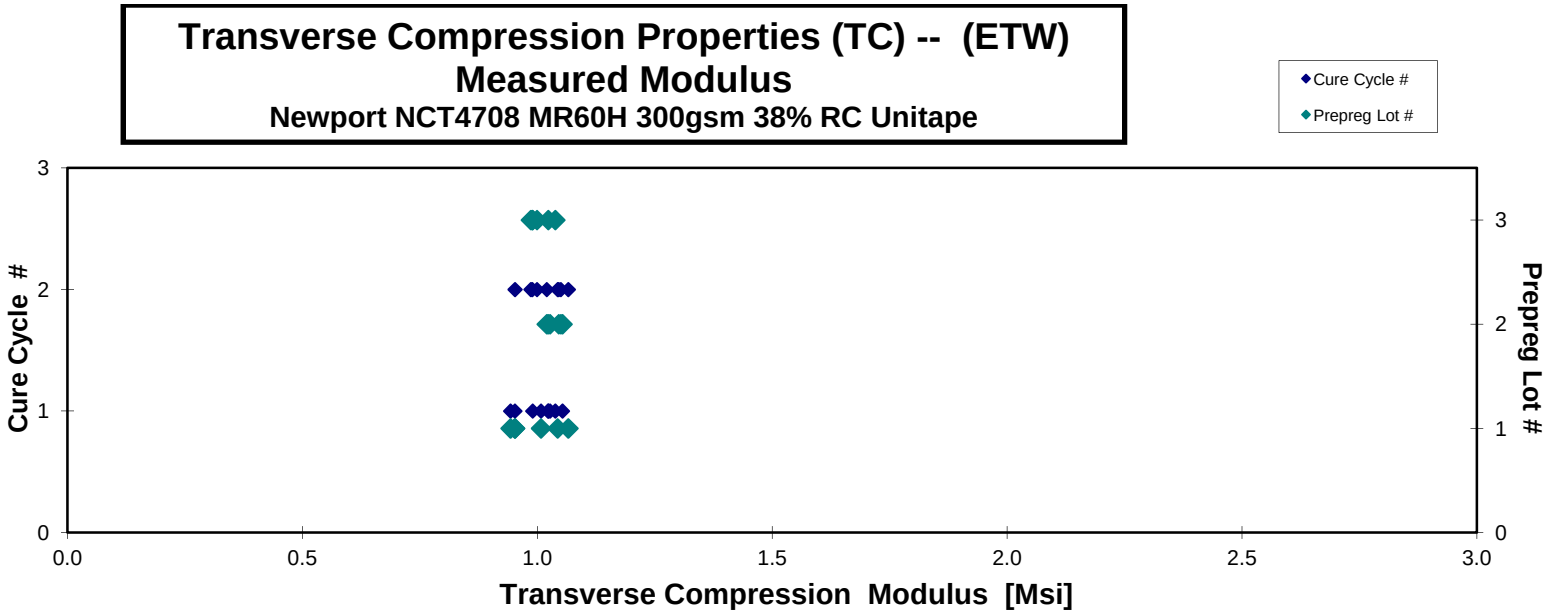

Transverse Compression Properties (TC) -- (RTD)
Measured Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Modulus [Msi]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
1
2
3

Transverse Compression Properties (TC) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode
WFZA11FF	A	C1	1	1	11.899	0.952	0.018	0.127	10	HGM
WFZA11GF	A	C1	1	1	12.813	1.008	0.021	0.127	10	HGM
WFZA11HF	A	C1	1	1	11.265	0.943	0.016	0.128	10	HGM
WFZA21DF	A	C2	1	2	13.426	1.043	0.022	0.129	10	HGM
WFZA21EF	A	C2	1	2	13.509	1.066	0.024	0.128	10	HGM
WFZA21FF	A	C2	1	2	11.988	0.952	0.019	0.128	10	HGM
WFZB11DF	B	C1	2	1	14.653	1.053	0.017	0.125	10	HGM
WFZB11EF	B	C1	2	1	14.961	1.023	0.019	0.125	10	HGM
WFZB11FF	B	C1	2	1	14.373	1.027	0.020	0.126	10	HAB
WFZB21DF	B	C2	2	2	14.024	1.050	0.024	0.127	10	HGM
WFZB21EF	B	C2	2	2	14.250	1.045	0.023	0.126	10	HGM
WFZB21FF	B	C2	2	2	13.928	1.020	0.022	0.126	10	HGM
WFZC11DF	C	C1	3	1	14.049	0.990	0.020	0.123	10	HGM / HAB
WFZC11EF	C	C1	3	1	13.834	1.038	0.018	0.124	10	HGM
WFZC11FF	C	C1	3	1	14.069	1.023	0.019	0.123	10	HGM
WFZC211F	C	C2	3	2	14.239	0.989	0.018	0.120	10	HGM / HAB
WFZC212F	C	C2	3	2	14.747	0.986	0.020	0.120	10	HGM / HAT / HAB
WFZC213F	C	C2	3	2	13.897	0.999	0.019	0.121	10	HGM

Average	**13.663**	**1.012**	**0.020**
Standard Dev.	**1.032**	**0.037**	**0.002**
Coeff. of Var. [%]	**7.550**	**3.646**	**11.105**
Min.	**11.265**	**0.943**	**0.016**
Max.	**14.961**	**1.066**	**0.024**
Number of Spec.	**18**	**18**	**18**


Transverse Compression Properties (TC) -- (ETW)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Strength [ksi]
0
5
10
15
20
25
30
35
0
1
2
3


Transverse Compression Properties (TC) -- (ETW)
Measured Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Modulus [Msi]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
1
2
3

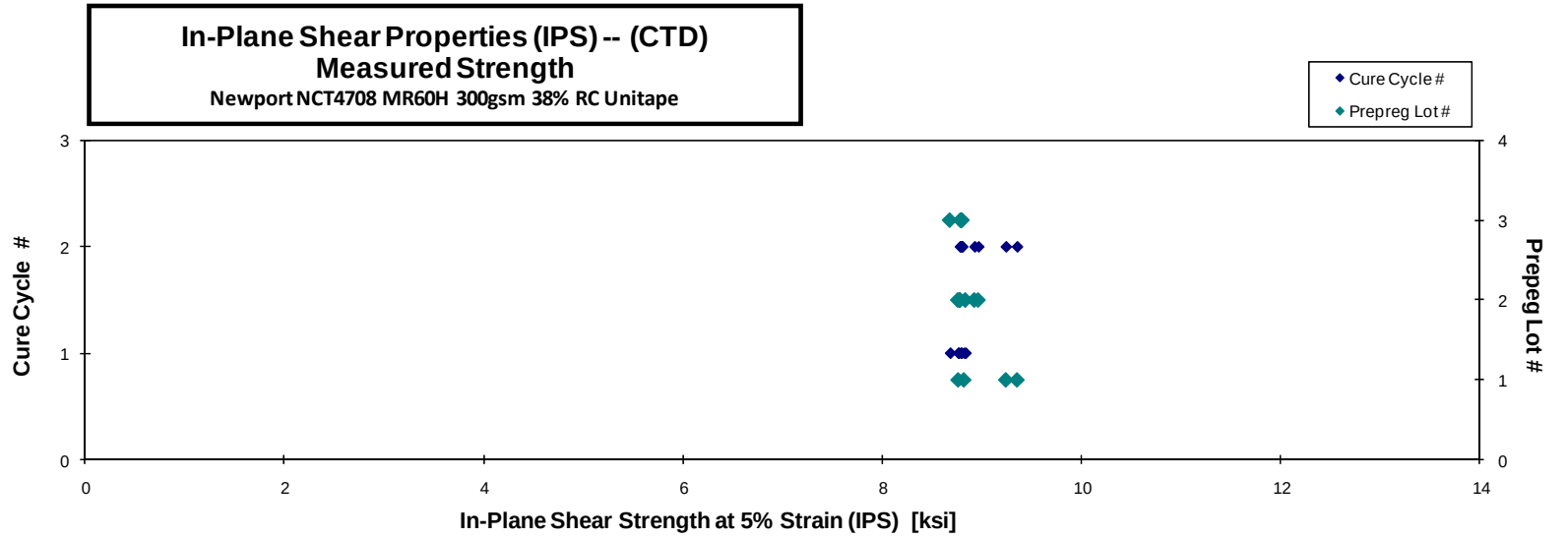
4.5 In-Plane Shear Properties

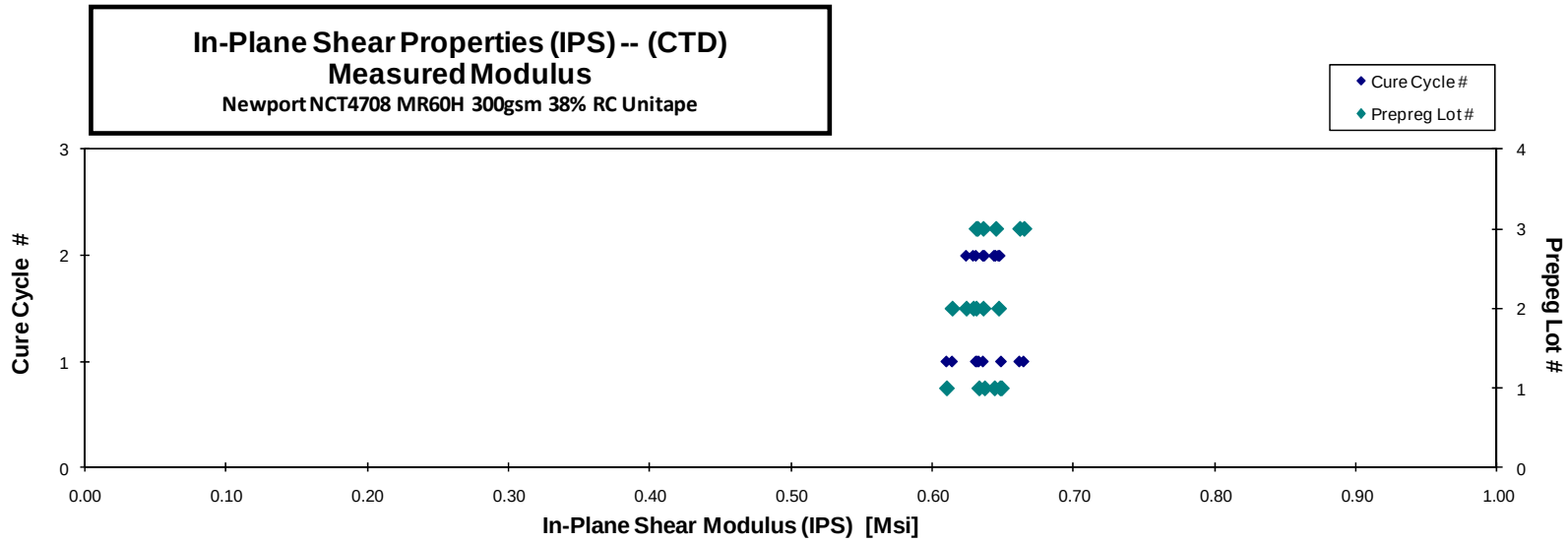
In-Plane Shear Properties (IPS) -- (CTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength at 5% Strain [ksi]	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
WFNA111B*	A	C1	1	1		7.8970	0.649	0.204	16	0.0128
WFNA112B	A	C1	1	1	8.770	7.8450	0.633	0.207	16	0.0129
WFNA113B	A	C1	1	1	8.827	7.6490	0.610	0.208	16	0.0130
WFNA211B	A	C2	1	2	9.249	7.730	0.648	0.203	16	0.0127
WFNA212B	A	C2	1	2	9.362	8.070	0.644	0.204	16	0.0128
WFNA213B*	A	C2	1	2		7.712	0.637	0.205	16	0.0128
WFNB111B	B	C1	2	1	8.767	7.966	0.614	0.201	16	0.0126
WFNB112B	B	C1	2	1	8.842	7.853	0.636	0.203	16	0.0127
WFNB113B	B	C1	2	1	8.791	8.514	0.631	0.203	16	0.0127
WFNB211B	B	C2	2	2	8.932	7.811	0.624	0.203	16	0.0127
WFNB212B	B	C2	2	2	8.971	7.584	0.629	0.205	16	0.0128
WFNB213B	B	C2	2	2	8.784	7.927	0.647	0.205	16	0.0128
WFNC111B	C	C1	3	1	8.685	8.100	0.662	0.197	16	0.0123
WFNC112B	C	C1	3	1	8.800	8.027	0.665	0.198	16	0.0124
WFNC113B*	C	C1	3	1		7.923	0.632	0.197	16	0.0123
WFNC213B	C	C2	3	2	8.801	7.838	0.631	0.201	16	0.0126
WFNC214B	C	C2	3	2	8.793	7.748	0.636	0.201	16	0.0126
WFNC215B	C	C2	3	2	8.809	7.857	0.645	0.200	16	0.0125

*Peak before 5% Strain

Average	**8.879**	**7.892**	**0.637**	**Average**	**0.0127**
Standard Dev.	**0.187**	**0.208**	**0.014**	**Standard Dev.**	
Coeff. of Var. [%]	**2.105**	**2.636**	**2.248**	**Coeff. of Var. [%]**	
Min.	**8.685**	**7.584**	**0.610**	**Min.**	**0.0123**
Max.	**9.362**	**8.514**	**0.665**	**Max.**	**0.0130**
Number of Spec.	**15**	**18**	**18**	**Number of Spec.**	**18**

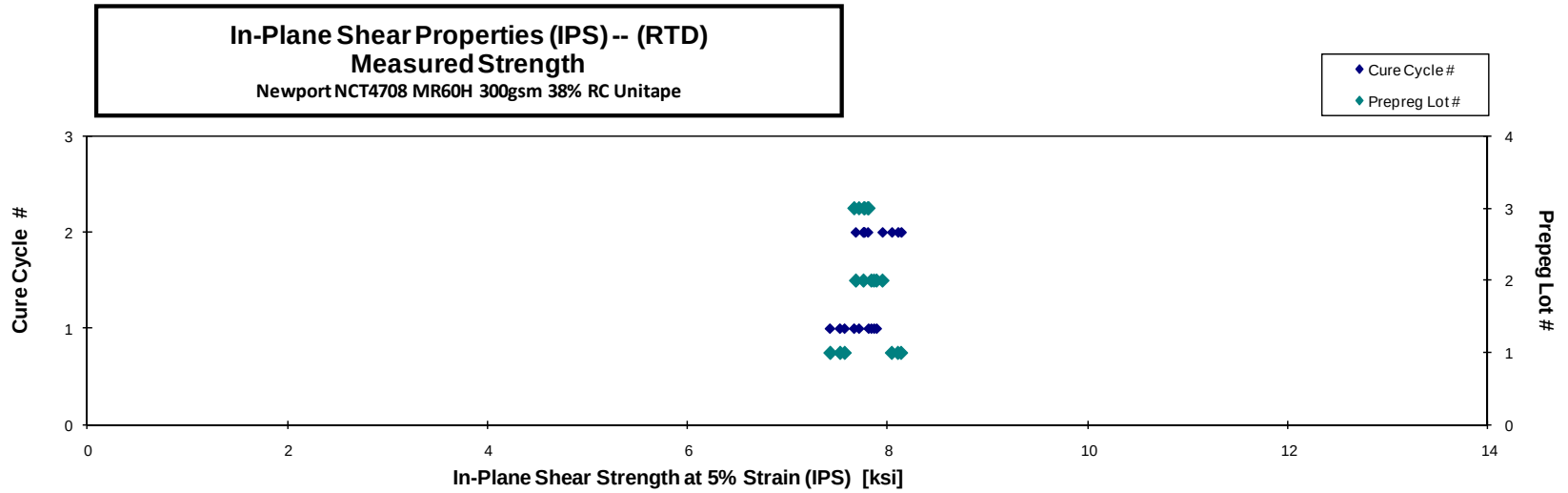

In-Plane Shear Properties (IPS) -- (CTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
0
1
2
3
4
0
2
4
6
8
10
12
14
In-Plane Shear Strength at 5% Strain (IPS) [ksi]

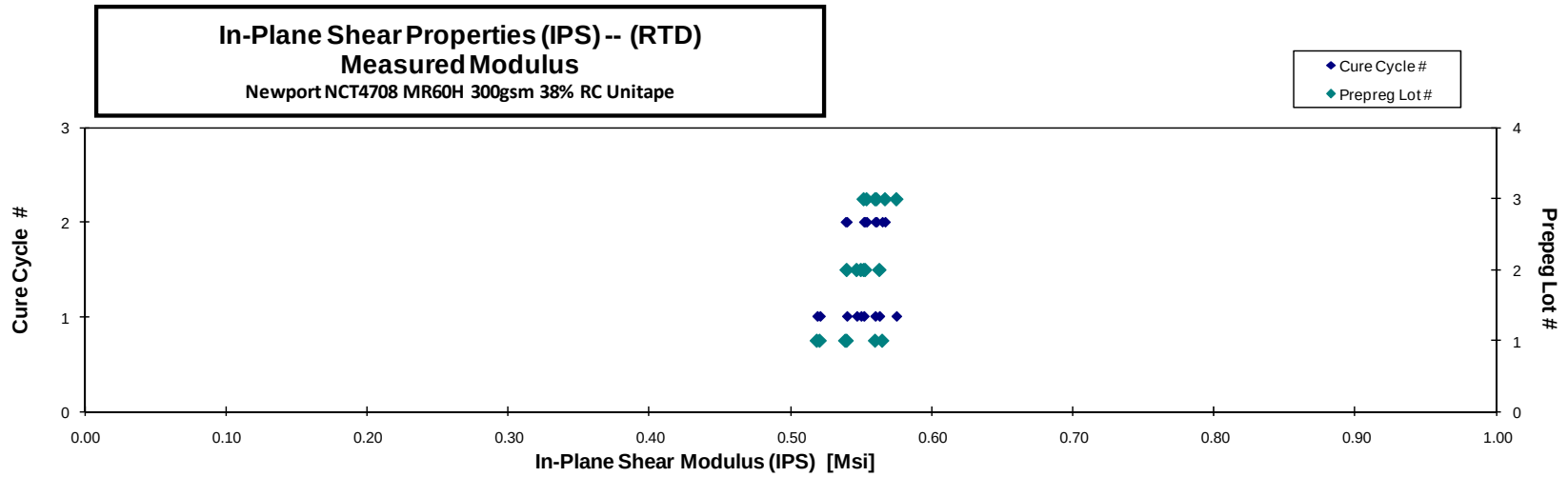

In-Plane Shear Properties (IPS) -- (CTD)
Measured Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
0
1
2
3
4
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
In-Plane Shear Modulus (IPS) [Msi]

In-Plane Shear Properties (IPS) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength at 5% Strain [ksi]	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
WFNA114A	A	C1	1	1	7.569	5.964	0.540	0.208	16	0.0130
WFNA115A	A	C1	1	1	7.523	5.923	0.519	0.209	16	0.0131
WFNA116A	A	C1	1	1	7.423	5.870	0.521	0.209	16	0.0131
WFNA214A	A	C2	1	2	8.107	6.094	0.539	0.205	16	0.0128
WFNA215A	A	C2	1	2	8.045	6.120	0.560	0.205	16	0.0128
WFNA216A	A	C2	1	2	8.139	6.134	0.565	0.206	16	0.0129
WFNB115A	B	C1	2	1	7.891	6.093	0.547	0.203	16	0.0127
WFNB116A	B	C1	2	1	7.865	6.124	0.563	0.202	16	0.0126
WFNB117A	B	C1	2	1	7.838	6.151	0.550	0.202	16	0.0126
WFNB214A	B	C2	2	2	7.951	6.002	0.540	0.204	16	0.0128
WFNB215A	B	C2	2	2	7.759	6.024	0.552	0.204	16	0.0128
WFNB216A	B	C2	2	2	7.682	6.072	0.553	0.204	16	0.0128
WFNC114A	C	C1	3	1	7.714	6.190	0.552	0.197	16	0.0123
WFNC115A	C	C1	3	1	7.810	6.288	0.575	0.197	16	0.0123
WFNC116A	C	C1	3	1	7.665	6.251	0.560	0.197	16	0.0123
WFNC216A	C	C2	3	2	7.770	6.230	0.567	0.200	16	0.0125
WFNC217A	C	C2	3	2	7.804	6.159	0.554	0.200	16	0.0125
WFNC218A	C	C2	3	2	7.764	6.171	0.561	0.200	16	0.0125

Average	**7.796**	**6.103**	**0.551**	**Average**	**0.0127**
Standard Dev.	**0.191**	**0.113**	**0.015**	**Standard Dev.**	
Coeff. of Var. [%]	**2.452**	**1.843**	**2.705**	**Coeff. of Var. [%]**	
Min.	**7.423**	**5.870**	**0.519**	**Min.**	**0.0123**
Max.	**8.139**	**6.288**	**0.575**	**Max.**	**0.0131**
Number of Spec.	**18**	**18**	**18**	**Number of Spec.**	**18**

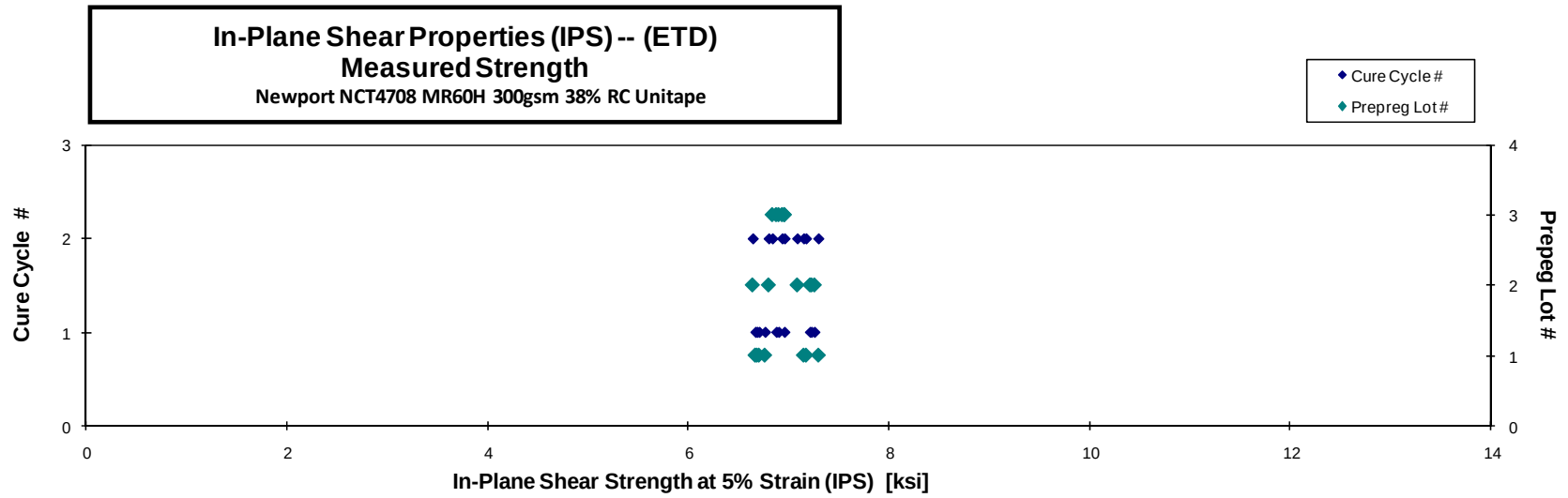

In-Plane Shear Properties (IPS) -- (RTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
2
4
6
8
10
12
14
In-Plane Shear Strength at 5% Strain (IPS) [ksi]

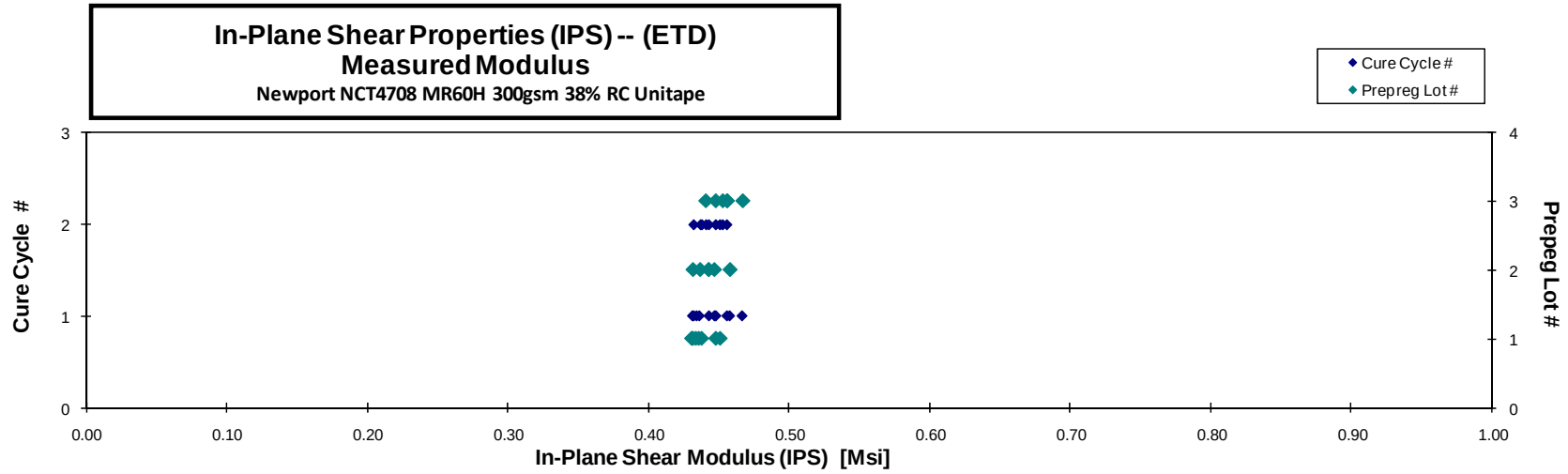

In-Plane Shear Properties (IPS) -- (RTD)
Measured Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
In-Plane Shear Modulus (IPS) [Msi]

In-Plane Shear Properties (IPS) -- (ETD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength at 5% Strain [ksi]	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
WFNA117G	A	C1	1	1	6.708	4.314	0.431	0.209	16	0.0131
WFNA118G	A	C1	1	1	6.766	4.302	0.434	0.209	16	0.0131
WFNA119G	A	C1	1	1	6.687	4.320	0.436	0.209	16	0.0131
WFNA11AG	A	C1	1	1	6.671	4.301	0.432	0.209	16	0.0131
WFNA217G	A	C2	1	2	7.150	4.365	0.448	0.207	16	0.0129
WFNA218G	A	C2	1	2	7.297	4.478	0.451	0.207	16	0.0129
WFNA219G	A	C2	1	2	7.174	4.370	0.438	0.207	16	0.0129
WFNB118G	B	C1	2	1	7.214	4.435	0.443	0.202	16	0.0126
WFNB119G	B	C1	2	1	7.229	4.479	0.447	0.203	16	0.0127
WFNB11AG	B	C1	2	1	7.258	4.533	0.458	0.203	16	0.0127
WFNB217G	B	C2	2	2	6.803	4.302	0.437	0.204	16	0.0128
WFNB218G	B	C2	2	2	7.087	4.370	0.443	0.203	16	0.0127
WFNB219G	B	C2	2	2	6.644	4.269	0.432	0.203	16	0.0127
WFNC117G	C	C1	3	1	6.959	4.475	0.456	0.197	16	0.0123
WFNC118G	C	C1	3	1	6.902	4.514	0.467	0.197	16	0.0123
WFNC119G	C	C1	3	1	6.879	4.368	0.448	0.197	16	0.0123
WFNC219G	C	C2	3	2	6.840	4.341	0.441	0.200	16	0.0125
WFNC21AG	C	C2	3	2	6.961	4.494	0.456	0.200	16	0.0125
WFNC21BG	C	C2	3	2	6.937	4.407	0.453	0.199	16	0.0124

Average	**6.956**	**4.391**	**0.445**	**Average**	**0.0127**
Standard Dev.	**0.217**	**0.083**	**0.010**	**Standard Dev.**	
Coeff. of Var. [%]	**3.116**	**1.896**	**2.303**	**Coeff. of Var. [%]**	
Min.	**6.644**	**4.269**	**0.431**	**Min.**	**0.0123**
Max.	**7.297**	**4.533**	**0.467**	**Max.**	**0.0131**
Number of Spec.	**19**	**19**	**19**	**Number of Spec.**	**19**


In-Plane Shear Properties (IPS) -- (ETD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Strength at 5% Strain (IPS) [ksi]
0
2
4
6
8
10
12
14

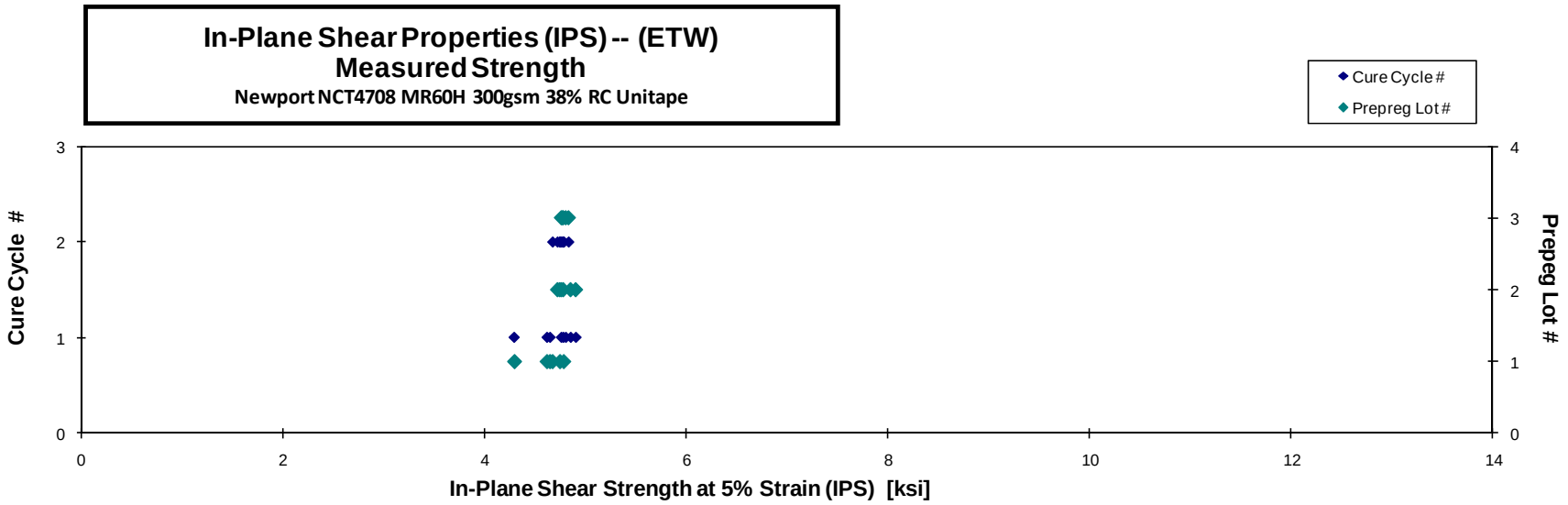

In-Plane Shear Properties (IPS) -- (ETD)
Measured Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Modulus (IPS) [Msi]
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00

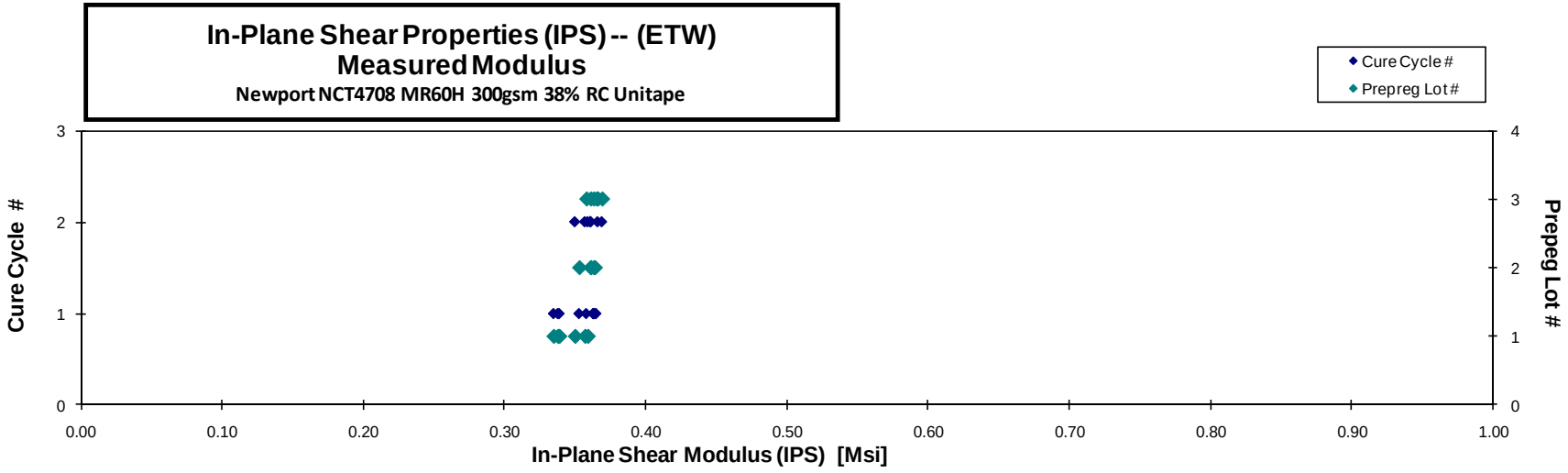
In-Plane Shear Properties (IPS) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength at 5% Strain [ksi]	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
WFNA11BF	A	C1	1	1	4.296	3.119	0.338	0.209	16	0.0131
WFNA11CF	A	C1	1	1	4.622	3.145	0.335	0.209	16	0.0131
WFNA11DF	A	C1	1	1	4.652	3.200	0.339	0.209	16	0.0131
WFNA21BF	A	C2	1	2	4.790	3.333	0.357	0.207	16	0.0129
WFNA21CF	A	C2	1	2	4.752	3.326	0.359	0.207	16	0.0129
WFNA21DF	A	C2	1	2	4.678	3.272	0.350	0.207	16	0.0129
WFNB11CF	B	C1	2	1	4.908	3.385	0.364	0.202	16	0.0126
WFNB11DF	B	C1	2	1	4.784	3.305	0.353	0.202	16	0.0126
WFNB11EF	B	C1	2	1	4.857	3.380	0.363	0.202	16	0.0126
WFNB21BF	B	C2	2	2	4.765	3.338	0.361	0.203	16	0.0127
WFNB21CF	B	C2	2	2	4.748	3.335	0.361	0.203	16	0.0127
WFNB21DF	B	C2	2	2	4.726	3.331	0.361	0.202	16	0.0126
WFNC11BF	C	C1	3	1	4.809	3.388	0.365	0.197	16	0.0123
WFNC11CF	C	C1	3	1	4.764	3.309	0.358	0.197	16	0.0123
WFNC11DF*	C	C1	3	1		3.340	0.363	0.197	16	0.0123
WFNC21CF	C	C2	3	2	4.782	3.379	0.366	0.200	16	0.0125
WFNC21DF	C	C2	3	2	4.779	3.357	0.361	0.200	16	0.0125
WFNC21EF	C	C2	3	2	4.836	3.415	0.369	0.199	16	0.0124

*Peak before 5% Strain

Average	**4.738**	**3.314**	**0.357**	**Average**	**0.0127**
Standard Dev.	**0.134**	**0.082**	**0.010**	**Standard Dev.**	
Coeff. of Var. [%]	**2.831**	**2.483**	**2.813**	**Coeff. of Var. [%]**	
Min.	**4.296**	**3.119**	**0.335**	**Min.**	**0.0123**
Max.	**4.908**	**3.415**	**0.369**	**Max.**	**0.0131**
Number of Spec.	**17**	**18**	**18**	**Number of Spec.**	**18**


In-Plane Shear Properties (IPS) -- (ETW)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Strength at 5% Strain (IPS) [ksi]
0
2
4
6
8
10
12
14


In-Plane Shear Properties (IPS) -- (ETW)
Measured Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Modulus (IPS) [Msi]
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00

4.6 Unnotched Compression 0 Properties

Laminate Unnotched Compression Properties (UNC0) -- (CTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

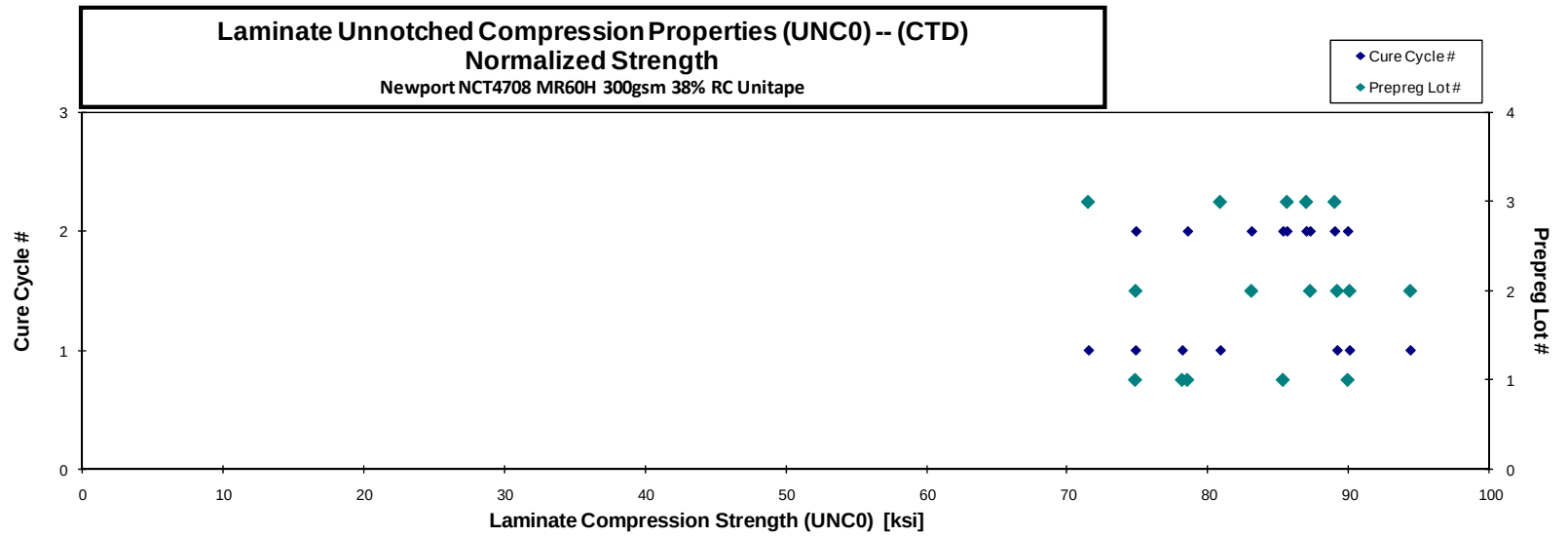
Specimen Number	Newport Batch #	Cytec Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFRA111B*	A	C1	1	1	75.110	7.243		0.113	9	BGM	0.0125	74.580	7.192
WFRA112B	A	C1	1	1	77.088	6.741	0.037	0.115	9	BGM	0.0127	77.994	6.820
WFRA113B[1]	A	C1	1	1		6.993	0.022	0.116	9	BGM / HIB[1]	0.0129		7.175
WFRA211B	A	C2	1	2	86.418	7.045	0.032	0.112	9	BAB	0.0124	85.275	6.952
WFRA212B	A	C2	1	2	87.941	6.882	0.025	0.116	9	BGM	0.0129	90.190	7.058
WFRA213B	A	C2	1	2	75.491	6.647	0.037	0.118	9	BAT	0.0131	78.253	6.890
WFRB111B	B	C1	2	1	92.870	7.441	0.033	0.110	9	BGM	0.0122	90.250	7.231
WFRB112B	B	C1	2	1	94.744	7.666	0.035	0.113	9	BAT	0.0125	94.242	7.625
WFRB113B	B	C1	2	1	88.731	6.921	0.037	0.114	9	BGM	0.0127	89.162	6.954
WFRB21AB	B	C2	2	2	73.197	6.623	0.031	0.116	9	BGM	0.0129	74.673	6.756
WFRB21BB[2]	B	C2	2	2	81.951			0.115	9	BGM[2]	0.0128	83.423	
WFRB21CB	B	C2	2	2	86.067	7.041	0.037	0.115	9	BGM	0.0128	87.243	7.137
WFRC111B[1]	C	C1	3	1		7.216	0.038	0.108	9	HIT / BGM[1]	0.0120		6.884
WFRC112B	C	C1	3	1	73.708	8.037	0.031	0.110	9	BGM	0.0122	71.409	7.786
WFRC113B	C	C1	3	1	81.894	7.128	0.032	0.112	9	BGM	0.0124	80.540	7.010
WFRC212B	C	C2	3	2	86.701	6.723	0.038	0.112	9	BGM	0.0124	85.554	6.634
WFRC213B	C	C2	3	2	89.341	6.845	0.032	0.113	9	BAT	0.0125	88.642	6.791
WFRC214B	C	C2	3	2	87.311	6.760	0.034	0.113	9	BAT	0.0125	86.782	6.719

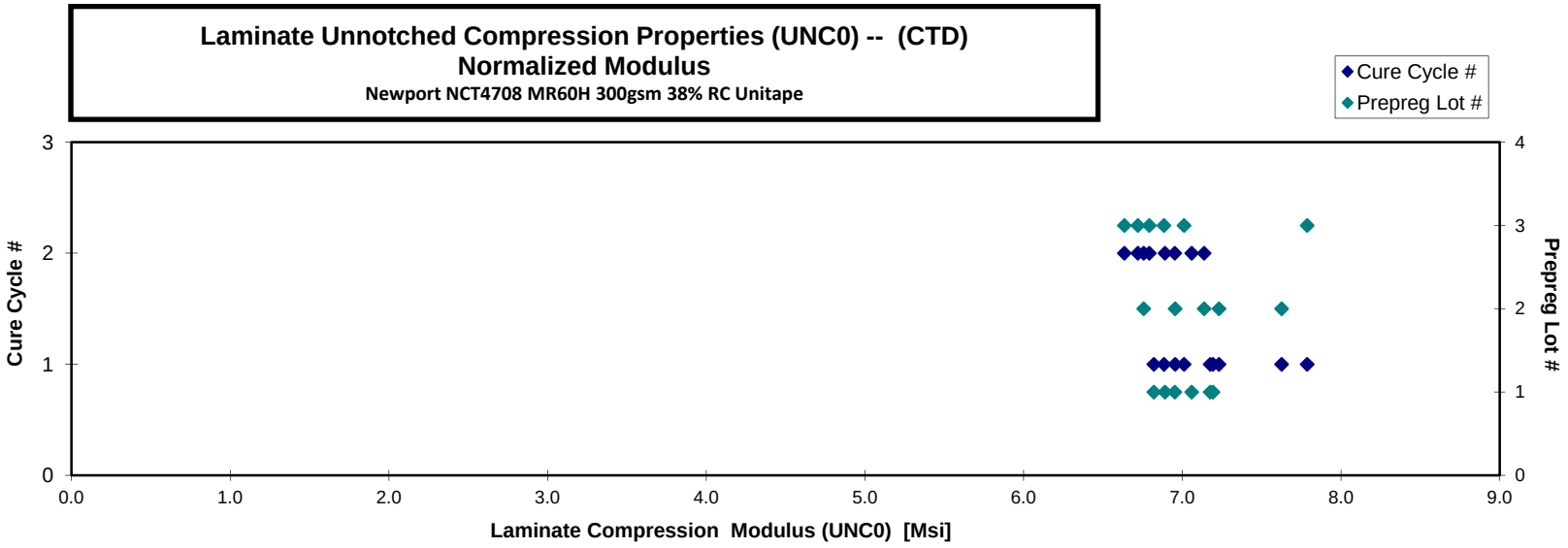
[1] Strength data points removed due to bad failure

[2] Modulus and Poisson's ratio data point removed due to gage mounting problem

* Poisson's ratio data removed due to non-linear data

Average	**83.660**	**7.056**	**0.033**	**$Average_{norm}$**	**0.0126**	**83.638**	**7.036**
Standard Dev.	**6.917**	**0.379**	**0.005**	**$Standard\ Dev._{norm}$**		**6.665**	**0.307**
Coeff. of Var. [%]	**8.267**	**5.371**	**14.295**	**Coeff. of Var. [%]$_{norm}$**		**7.969**	**4.363**
Min.	**73.197**	**6.623**	**0.022**	**Min.**	**0.0120**	**71.409**	**6.634**
Max.	**94.744**	**8.037**	**0.038**	**Max.**	**0.0131**	**94.242**	**7.786**
Number of Spec.	**16**	**17**	**16**	**Number of Spec.**		**16**	**17**


Laminate Unnotched Compression Properties (UNC0) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC0) [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4


Laminate Unnotched Compression Properties (UNC0) -- (CTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC0) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
0
1
2
3
4

Laminate Unnotched Compression Properties (UNC0) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

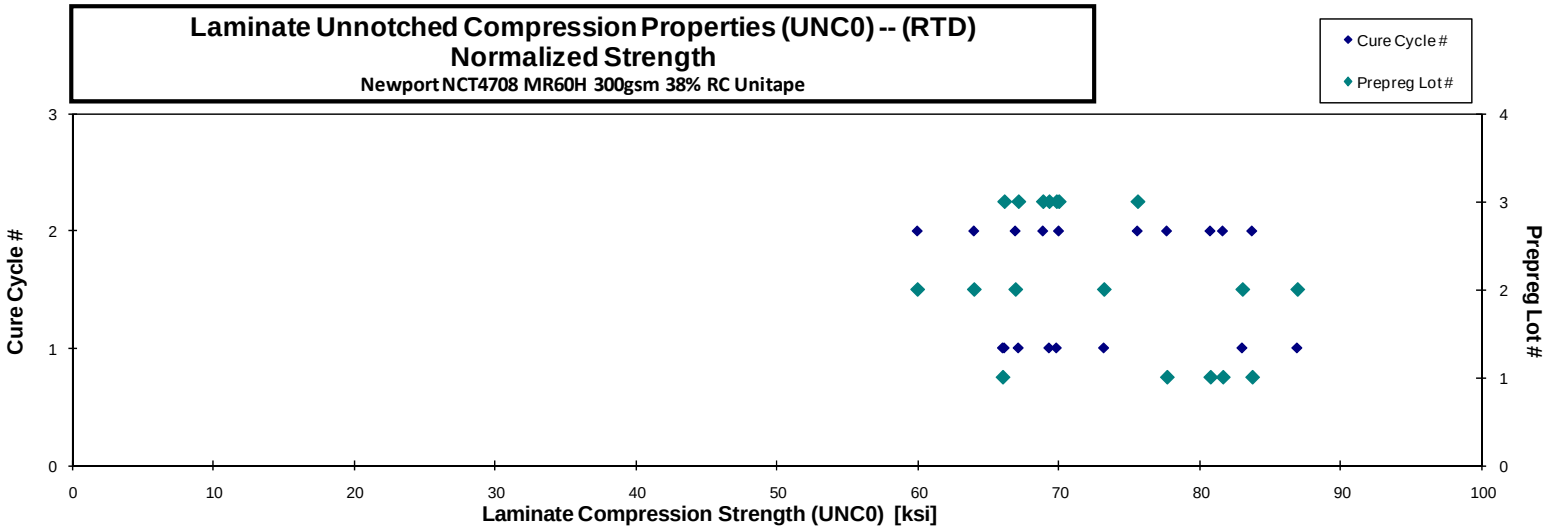
Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFRA11AA[1]	A	C1	1	1		6.800	0.032	0.115	9	BGM / ENDCRUSH	0.0128		6.915
WFRA11BA[1]	A	C1	1	1		6.819	0.034	0.115	9	BGM / HIT	0.0128		6.926
WFRA11CA[1]	A	C1	1	1		6.982	0.028	0.115	9	HIT / BGM	0.0128		7.091
WFRA11DA[2]	A	C1	1	1	68.053			0.110	9	HAT / BGM	0.0122	66.133	
WFRA217A	A	C2	1	2	79.639	6.802	0.030	0.115	9	BGM	0.0128	80.786	6.900
WFRA218A[1]	A	C2	1	2		7.012	0.029	0.115	9	HIT / BGM	0.0128		7.130
WFRA219A[1]	A	C2	1	2		6.975	0.031	0.115	9	HIB / BGM	0.0128		7.064
WFRA21AA[2]	A	C2	1	2	82.569			0.115	9	BGM	0.0128	83.721	
WFRA21BA[2]	A	C2	1	2	80.517			0.115	9	BGM	0.0128	81.713	
WFRA21CA[2]	A	C2	1	2	76.597			0.115	9	BGM	0.0128	77.689	
WFRB117A[1]	B	C1	2	1		7.150	0.029	0.114	9	BGM / HIT	0.0126		7.160
WFRB118A	B	C1	2	1	87.247	7.652	0.029	0.113	9	BGM	0.0126	87.272	7.654
WFRB119A	B	C1	2	1	82.599	7.023	0.028	0.114	9	BGM	0.0126	82.672	7.029
WFRB11BA[2]	B	C1	2	1	72.817			0.114	9	BGM / HAB	0.0126	72.913	
WFRB216A	B	C2	2	2	58.609	6.293	0.036	0.116	9	BAT	0.0129	59.934	6.435
WFRB217A	B	C2	2	2	62.538	6.876	0.035	0.116	9	BAT	0.0129	63.821	7.017
WFRB218A	B	C2	2	2	65.415	7.070	0.026	0.116	9	BAT	0.0129	66.922	7.233
WFRC117A[1]	C	C1	3	1		6.837	0.029	0.112	9	BGM / HIT	0.0124		6.739
WFRC118A[1]	C	C1	3	1		7.241	0.033	0.112	9	BAT / HIB	0.0124		7.137
WFRC119A	C	C1	3	1	70.177	7.050	0.038	0.112	9	BAT	0.0125	69.350	6.967
WFRC11AA[2]	C	C1	3	1	66.956			0.112	9	BAT	0.0124	66.019	
WFRC11BA[2]	C	C1	3	1	70.706			0.112	9	BAT	0.0125	70.005	
WFRC11CA[2]	C	C1	3	1	67.968			0.112	9	BGM	0.0125	67.316	
WFRC217A	C	C2	3	2	70.874	7.042	0.031	0.112	9	BAB	0.0124	69.835	6.939
WFRC218A	C	C2	3	2	69.736	6.724	0.038	0.112	9	BGM	0.0124	68.629	6.618
WFRC219A	C	C2	3	2	77.225	7.276	0.032	0.111	9	BAT	0.0124	75.718	7.134

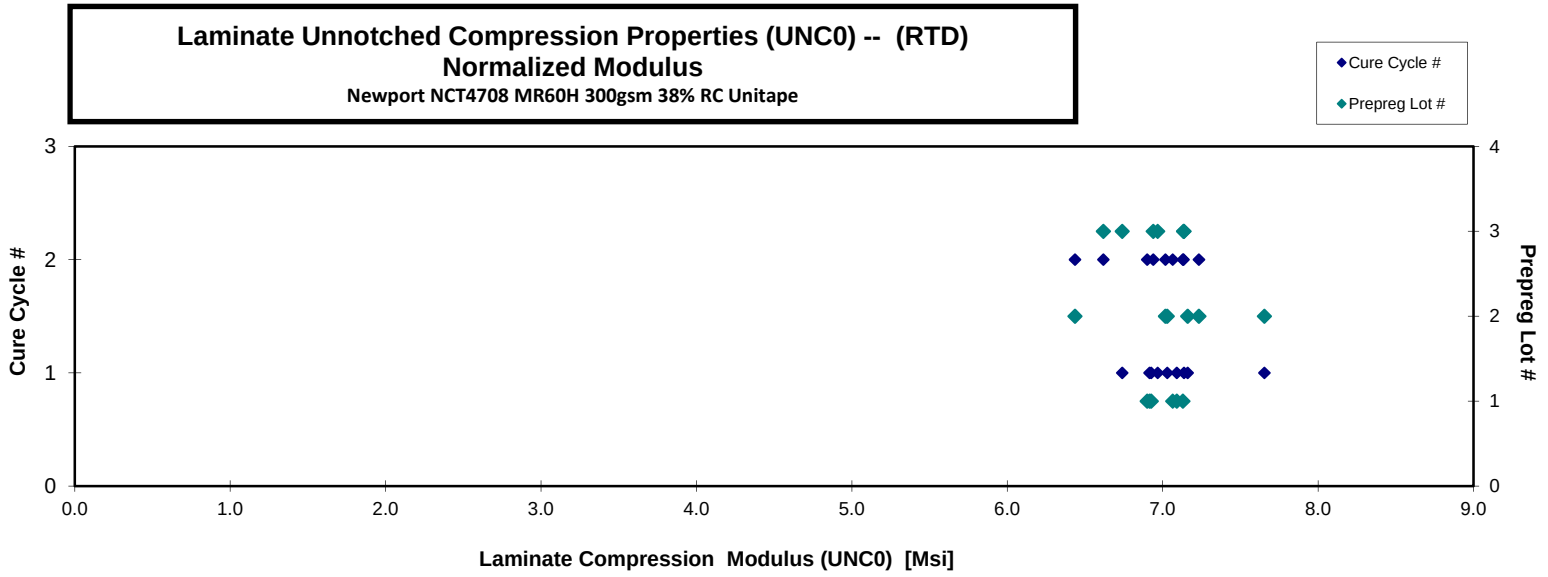
[1] Strength data points removed due to bad failure

[2] Modulus and Poisson's ratio data was not available

	Strength	Modulus	Poisson's Ratio
Average	**72.791**	**6.979**	**0.032**
Standard Dev.	**7.693**	**0.278**	**0.003**
Coeff. of Var. [%]	**10.569**	**3.984**	**10.686**
Min.	**58.609**	**6.293**	**0.026**
Max.	**87.247**	**7.652**	**0.038**
Number of Spec.	**18**	**18**	**18**

	Avg. t_{ply}	$Strength_{norm}$	$Modulus_{norm}$
$Average_{norm}$	**0.0126**	**72.803**	**7.005**
Standard $Dev._{norm}$		**7.855**	**0.258**
Coeff. of Var. $[\%]_{norm}$		**10.790**	**3.689**
Min.	**0.0122**	**59.934**	**6.435**
Max.	**0.0129**	**87.272**	**7.654**
Number of Spec.		**18**	**18**


Laminate Unnotched Compression Properties (UNC0) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC0) [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4


Laminate Unnotched Compression Properties (UNC0) -- (RTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC0) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
0
1
2
3
4

Laminate Unnotched Compression Properties (UNC0) -- (ETD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

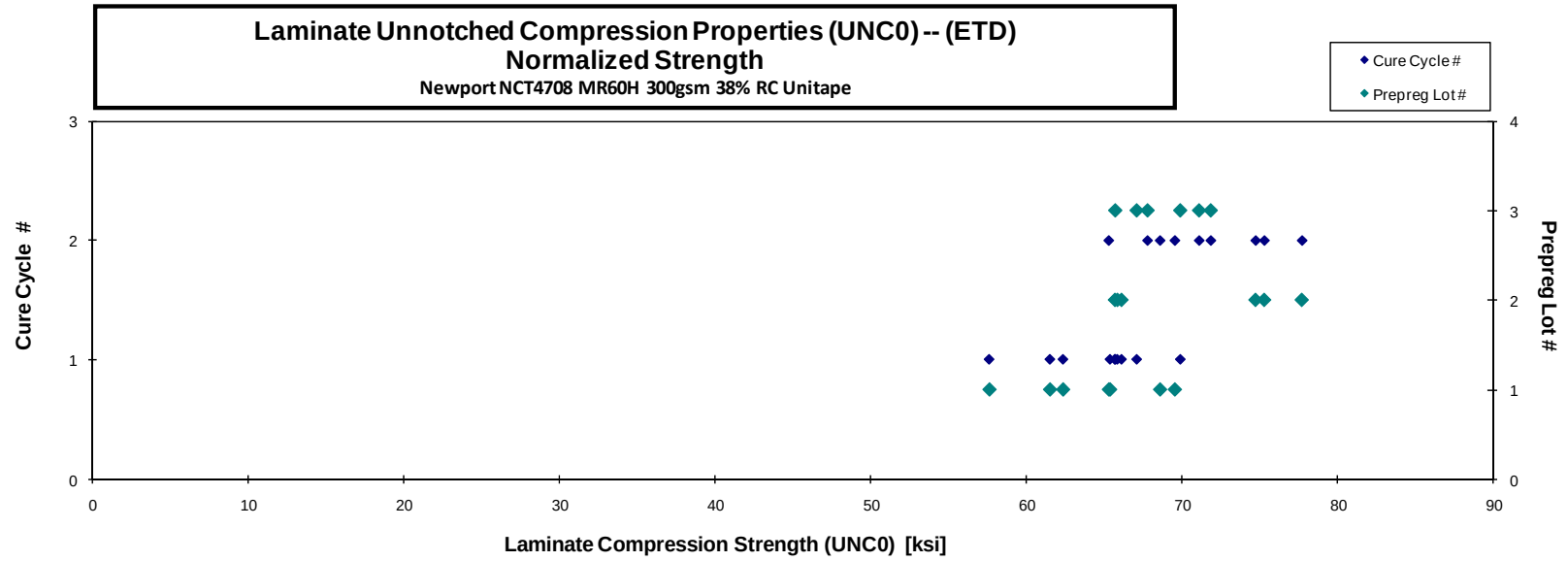
Specimen Number	Newport Batch #	Cytec Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFRA11EG	A	C1	1	1	62.067	6.411	0.027	0.114	9	BAT	0.0126	62.149	6.419
WFRA11FG	A	C1	1	1	61.229	6.422	0.023	0.114	9	BAB	0.0127	61.661	6.468
WFRA11JG	A	C1	1	1	65.652	6.990	0.029	0.113	9	BGM	0.0126	65.411	6.964
WFRA11LG[2]	A	C1	1	1	57.855			0.113	9	BAT	0.0125	57.558	
WFRA21DG[1]	A	C2	1	2		6.743	0.025	0.113	9	BAT/HIT	0.0125		6.694
WFRA21EG[1]	A	C2	1	2		6.717	0.026	0.116	9	BAT/END CRUSH	0.0129		6.894
WFRA21FG[1]	A	C2	1	2		6.580	0.022	0.118	9	HIB	0.0131		6.856
WFRA21GG[2]	A	C2	1	2	66.880			0.118	9	BAT	0.0132	69.800	
WFRA21HG[2]	A	C2	1	2	66.528			0.117	9	BAT	0.0130	68.894	
WFRA21JG[2]	A	C2	1	2	63.878			0.116	9	BAB	0.0129	65.183	
WFRB11DG[1]	B	C1	2	1		7.016	0.026	0.111	9	END CRUSH	0.0123		6.854
WFRB11EG	B	C1	2	1	65.384	7.452	0.027	0.114	9	BAT	0.0126	65.615	7.479
WFRB11FG[1]	B	C1	2	1		6.577	0.030	0.115	9	BAB/HIB	0.0127		6.647
WFRB11GG[2]	B	C1	2	1	64.973			0.115	9	BAT	0.0127	65.690	
WFRB11HG[2]	B	C1	2	1	65.805			0.114	9	BAT	0.0127	66.105	
WFRB21EG	B	C2	2	2	74.392	6.856	0.031	0.114	9	BGM	0.0126	74.654	6.881
WFRB21FG	B	C2	2	2	74.299	6.692	0.025	0.115	9	BGM	0.0127	75.052	6.760
WFRB21GG	B	C2	2	2	76.686	6.835	0.028	0.115	9	BGM	0.0128	77.718	6.927
WFRC11DG[1]	C	C1	3	1		6.674	0.031	0.108	9	HIT	0.0120		6.365
WFRC11EG	C	C1	3	1	69.206	6.878	0.031	0.110	9	BGM	0.0123	67.413	6.700
WFRC11FG[1]	C	C1	3	1		6.842	0.028	0.111	9	HIB	0.0123		6.699
WFRC11GG[2]	C	C1	3	1	66.573			0.112	9	BGM	0.0124	65.677	
WFRC11HG[2]	C	C1	3	1	70.813			0.112	9	BAT	0.0124	69.665	
WFRC21EG	C	C2	3	2	72.800	7.071	0.039	0.112	9	BGM	0.0125	72.069	7.000
WFRC21FG[1]	C	C2	3	2		7.361	0.038	0.113	9	BAB/HIB	0.0125		7.318
WFRC21GG	C	C2	3	2	71.403	7.264	0.031	0.113	9	BAB	0.0125	71.017	7.225
WFRC21HG[2]	C	C2	3	2	68.682			0.112	9	BAT	0.0125	67.970	

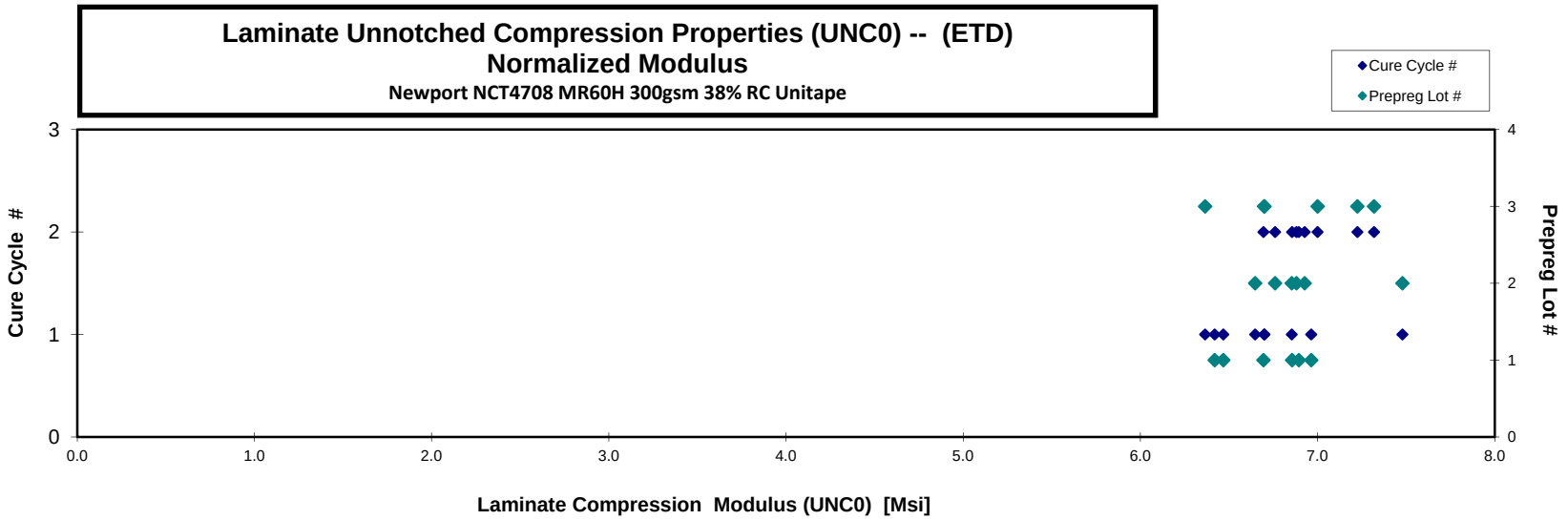
[1] Strength data points removed due to bad failure

[2] Modulus and Poisson's ratio data was not available

	Strength [ksi]	Modulus [Msi]	Poisson's Ratio
Average	**67.637**	**6.855**	**0.029**
Standard Dev.	**4.891**	**0.297**	**0.004**
Coeff. of Var. [%]	**7.232**	**4.334**	**15.224**
Min.	**57.855**	**6.411**	**0.022**
Max.	**76.686**	**7.452**	**0.039**
Number of Spec.	**19**	**18**	**18**

	t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	**0.0126**	**67.858**	**6.842**
Standard $Dev._{norm}$		**4.938**	**0.295**
Coeff. of Var. $[\%]_{norm}$		**7.278**	**4.318**
Min.	**0.0120**	**57.558**	**6.365**
Max.	**0.0132**	**77.718**	**7.479**
Number of Spec.		**19**	**18**


Laminate Unnotched Compression Properties (UNC0) -- (ETD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC0) [ksi]
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4


Laminate Unnotched Compression Properties (UNC0) -- (ETD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC0) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
0
1
2
3
4

Laminate Unnotched Compression Properties (UNC0) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

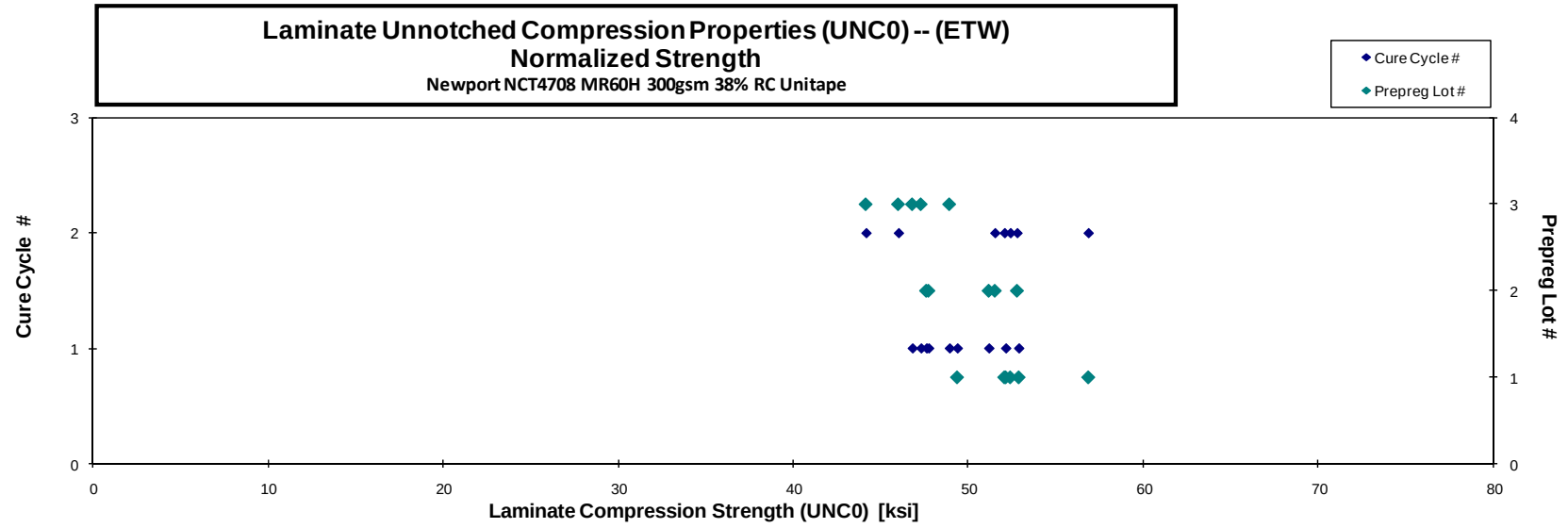
normalizing t_{ply} [in]: 0.0126

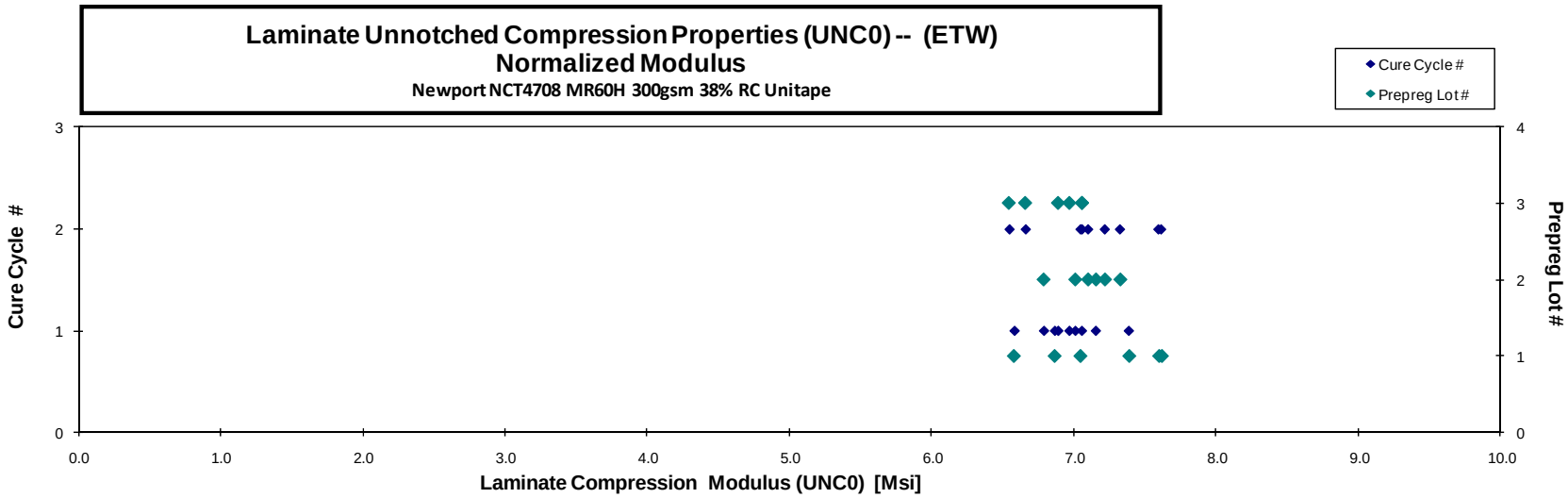
Specimen Number	Cytec Batch #	Cytec Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFRA11GF	A	C1	1	1	51.891	6.546	0.023	0.114	9	BAB	0.0127	52.234	6.589
WFRA11HF	A	C1	1	1	49.133	6.830	0.020	0.114	9	BAB	0.0126	49.242	6.845
WFRA11IF	A	C1	1	1	53.097	7.415	0.018	0.113	9	BAB	0.0126	53.011	7.403
WFRA21IF	A	C2	1	2	55.607	6.889	0.020	0.116	9	BAT	0.0129	57.021	7.064
WFRA21KF	A	C2	1	2	51.697	7.511	0.019	0.115	9	BAB	0.0128	52.540	7.633
WFRA21LF	A	C2	1	2	51.365	7.492	0.017	0.115	9	BAB	0.0128	52.157	7.607
WFRB11JF	B	C1	2	1	50.928	6.753	0.014	0.114	9	BAT	0.0127	51.250	6.796
WFRB11KF	B	C1	2	1	47.380	7.118	0.015	0.114	9	BAB	0.0127	47.714	7.168
WFRB11LF	B	C1	2	1	47.503	6.974	0.014	0.114	9	BAB	0.0127	47.755	7.011
WFRB21JF[1*]	B	C2	2	2		7.118		0.115	9	BAB	0.0128		7.204
WFRB21KF	B	C2	2	2	50.828	7.002	0.030	0.115	9	BAB	0.0128	51.484	7.092
WFRB21LF	B	C2	2	2	52.078	7.224	0.016	0.115	9	BGM	0.0127	52.653	7.303
WFRC11JF	C	C1	3	1	49.555	6.976	0.019	0.112	9	BAT	0.0124	48.927	6.888
WFRC11KF	C	C1	3	1	47.909	7.056	0.029	0.112	9	BAT	0.0125	47.455	6.989
WFRC11LF	C	C1	3	1	47.410	7.145	0.016	0.112	9	BAT	0.0125	47.003	7.083
WFRC21JF[1]	C	C2	3	2		6.627	0.014	0.112	9	BAB	0.0124		6.547
WFRC21KF	C	C2	3	2	46.603	6.743	0.012	0.112	9	BAB	0.0124	45.930	6.646
WFRC21LF	C	C2	3	2	44.726	7.146	0.006	0.112	9	BAB	0.0124	44.070	7.041

[1] Strength data removed due thickness taper at grip area

* Poisson's ratio data removed due to non-linear data

	Strength	Modulus	Poisson's Ratio			$Strength_{norm}$	$Modulus_{norm}$
Average	**49.857**	**7.031**	**0.018**	**$Average_{norm}$**	**0.0126**	**50.028**	**7.051**
Standard Dev.	**2.821**	**0.276**	**0.006**	**$Standard\ Dev._{norm}$**		**3.311**	**0.311**
Coeff. of Var. [%]	**5.658**	**3.925**	**32.441**	**Coeff. of Var. [%]$_{norm}$**		**6.618**	**4.414**
Min.	**44.726**	**6.546**	**0.006**	**Min.**	**0.0124**	**44.070**	**6.547**
Max.	**55.607**	**7.511**	**0.030**	**Max.**	**0.0129**	**57.021**	**7.633**
Number of Spec.	**16**	**18**	**17**	**Number of Spec.**		**16**	**18**


Laminate Unnotched Compression Properties (UNC0) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC0) [ksi]
0
10
20
30
40
50
60
70
80


Laminate Unnotched Compression Properties (UNC0) -- (ETW)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC0) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0

4.7 Unnotched Tension 0 Properties

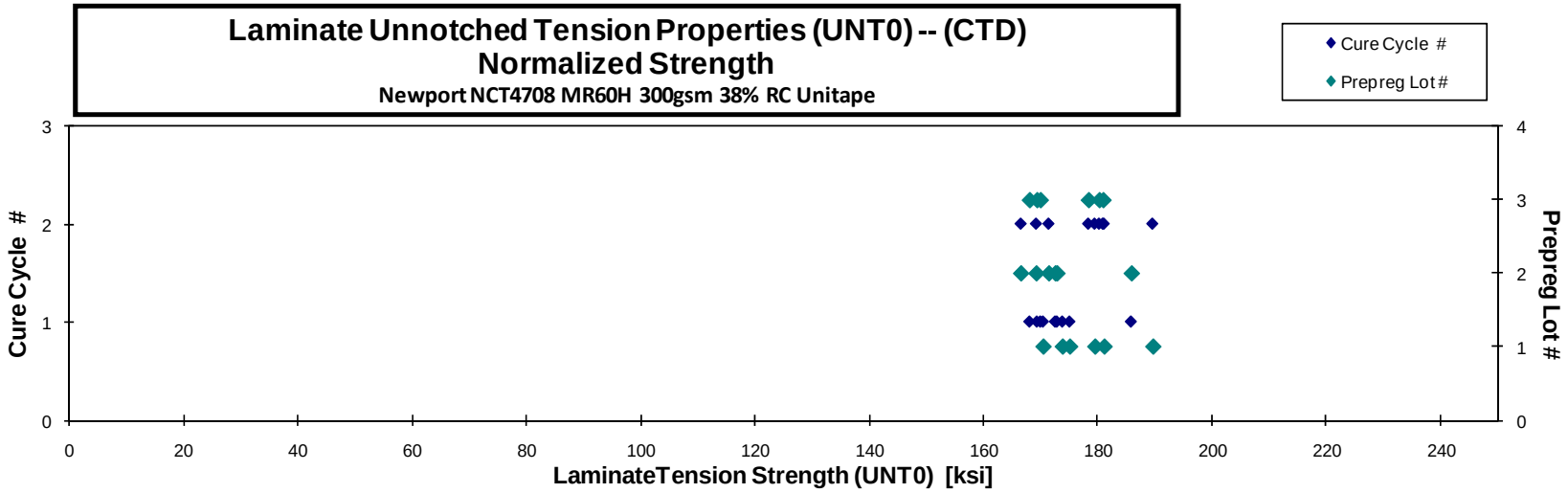
Laminate Unnotched Tension Properties (UNT0) -- (CTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

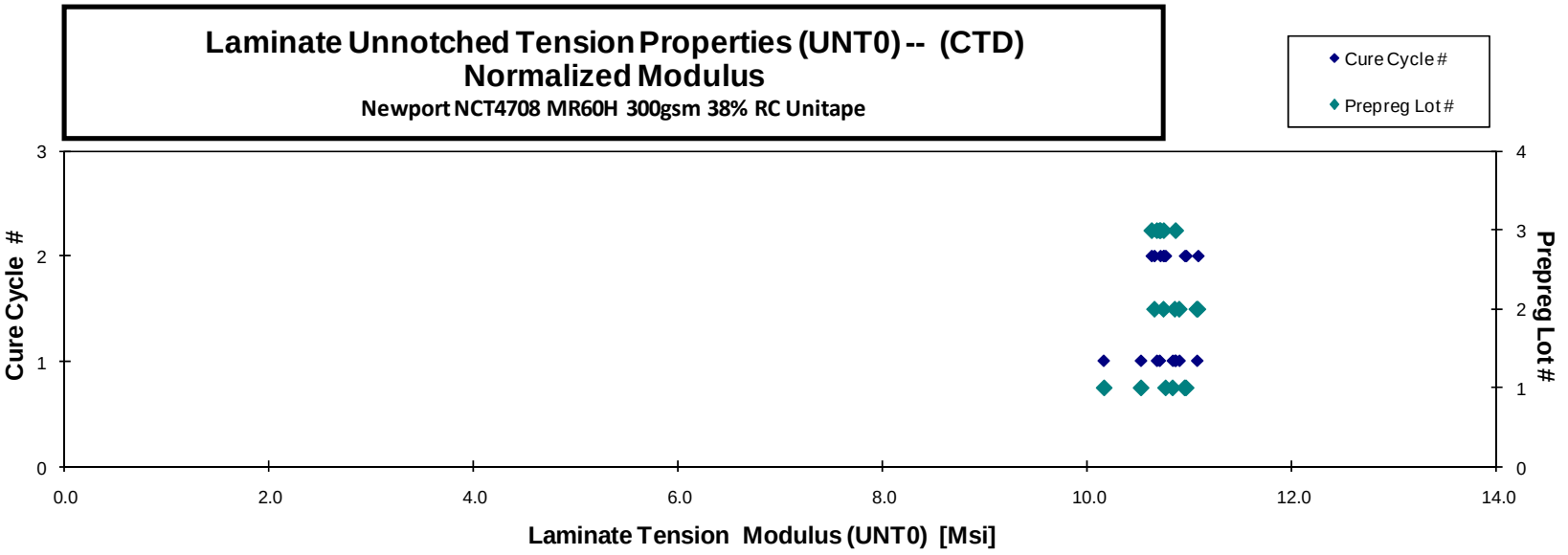
normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFPA111B	A	C1	1	1	176.835	10.627	0.100	8	LGM	0.0125	175.080	10.522
WFPA112B	A	C1	1	1	167.238	9.971	0.103	8	LWB/LWT	0.0128	170.418	10.161
WFPA113B	A	C1	1	1	172.008	10.720	0.102	8	LGM / LWT	0.0127	173.800	10.831
WFPA211B	A	C2	1	2	182.354	11.125	0.099	8	LGM	0.0124	179.490	10.950
WFPA212B	A	C2	1	2	178.172	10.588	0.102	8	LGM	0.0128	181.118	10.763
WFPA213B	A	C2	1	2	186.005	10.752	0.103	8	LGM	0.0128	189.665	10.963
WFPB111B	B	C1	2	1	174.762	10.973	0.100	8	LGM / LWT	0.0125	172.854	10.853
WFPB112B	B	C1	2	1	186.103	11.081	0.101	8	LWT / LWB / LGM	0.0126	185.888	11.068
WFPB113B	B	C1	2	1	173.172	10.936	0.100	8	LGM	0.0126	172.542	10.896
WFPB211B	B	C2	2	2	170.497	10.824	0.100	8	LWT / LWB	0.0125	169.201	10.742
WFPB212B	B	C2	2	2	170.128	10.997	0.102	8	LWT / LGM	0.0127	171.393	11.079
WFPB213B	B	C2	2	2	165.492	10.589	0.101	8	LWT / LWB	0.0127	166.504	10.654
WFPC111B	C	C1	3	1	175.060	11.189	0.098	8	LWT / LGM	0.0122	169.937	10.862
WFPC112B	C	C1	3	1	171.341	10.804	0.100	8	LGM	0.0125	169.330	10.678
WFPC113B	C	C1	3	1	170.289	10.848	0.099	8	LWT / LGM	0.0124	168.037	10.705
WFPC211B	C	C2	3	2	185.043	11.024	0.097	8	LGM	0.0121	178.373	10.627
WFPC212B	C	C2	3	2	186.062	11.051	0.098	8	LWT / LWB	0.0123	180.924	10.745
WFPC213B	C	C2	3	2	185.573	11.028	0.098	8	LGM	0.0122	180.265	10.713

	Strength [ksi]	Modulus [Msi]
Average	**176.452**	**10.840**
Standard Dev.	**7.078**	**0.285**
Coeff. of Var. [%]	**4.011**	**2.625**
Min.	**165.492**	**9.971**
Max.	**186.103**	**11.189**
Number of Spec.	**18**	**18**

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	**0.0125**	**175.268**	**10.767**
Standard $Dev._{norm}$		**6.518**	**0.213**
Coeff. of Var. $[\%]_{norm}$		**3.719**	**1.981**
Min.	**0.0121**	**166.504**	**10.161**
Max.	**0.0128**	**189.665**	**11.079**
Number of Spec.		**18**	**18**


Laminate Unnotched Tension Properties (UNT0) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
160
180
200
220
240
LaminateTension Strength (UNT0) [ksi]


Laminate Unnotched Tension Properties (UNT0) -- (CTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Laminate Tension Modulus (UNT0) [Msi]

Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

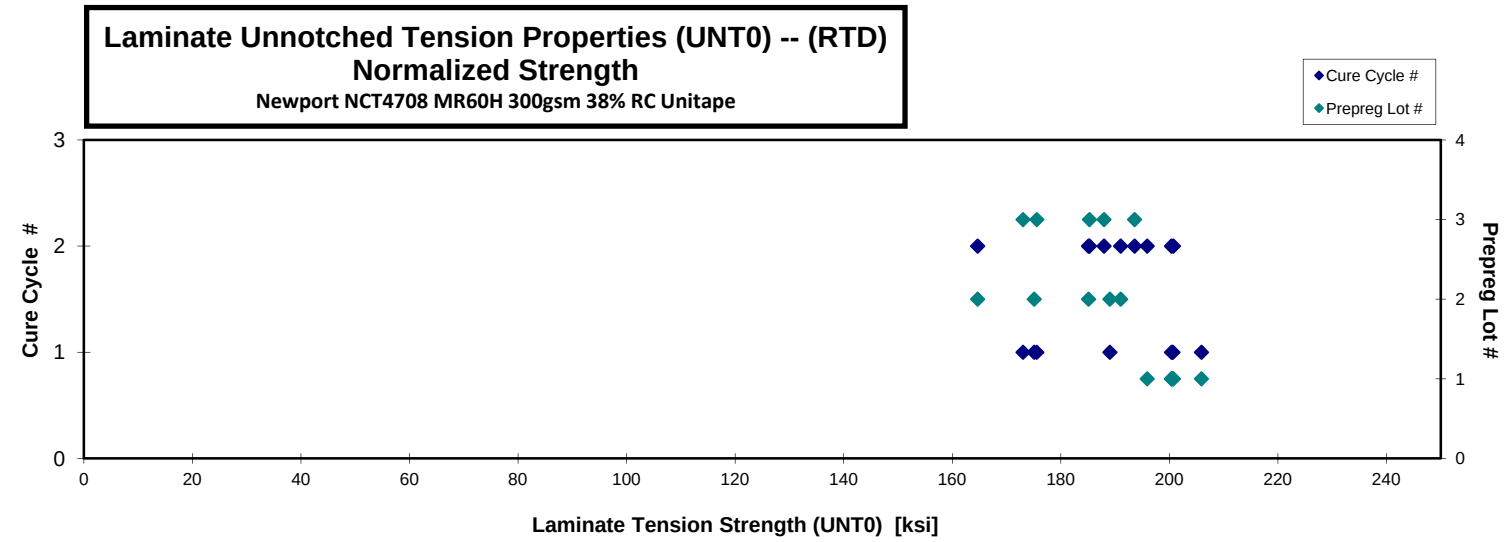
normalizing t_{ply} [in]: 0.0126

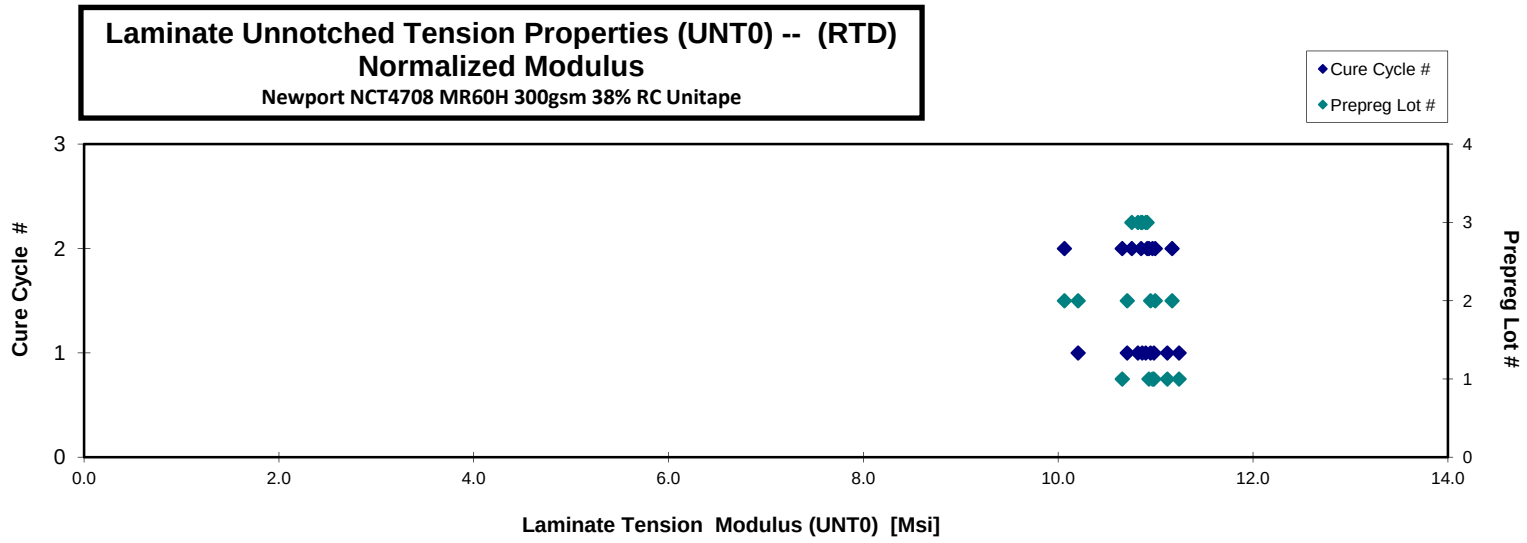
Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFPA114A	A	C1	1	1	198.904	11.023	0.102	8	LWT/LWB	0.0127	200.647	11.119
WFPA115A	A	C1	1	1	205.220	10.946	0.101	8	LWT/LWB	0.0126	205.899	10.982
WFPA116A	A	C1	1	1	198.905	11.157	0.102	8	LWT/LWB	0.0127	200.385	11.240
WFPA214A	A	C2	1	2	195.622	10.404	0.103	8	LWT/LIB	0.0129	200.377	10.657
WFPA215A	A	C2	1	2	195.335	10.637	0.104	8	LAT/LAB/LGM	0.0129	200.729	10.931
WFPA216A	A	C2	1	2	188.184	10.535	0.105	8	LWB/LWT	0.0131	195.901	10.967
WFPB114A	B	C1	2	1	186.955	10.828	0.102	8	LAT/LWB	0.0127	189.026	10.948
WFPB115A	B	C1	2	1	170.924	10.454	0.103	8	DGM/LGM	0.0129	175.078	10.708
WFPB116A[1]	B	C1	2	1		9.949	0.103	8	LGM/LWB	0.0129		10.204
WFPB214A	B	C2	2	2	183.910	11.097	0.101	8	LAT/LWB	0.0127	185.096	11.169
WFPB215A	B	C2	2	2	185.819	10.696	0.104	8	LWT/LWB	0.0130	191.012	10.995
WFPB216A	B	C2	2	2	161.951	9.898	0.102	8	LWT/LIB	0.0128	164.656	10.063
WFPC114A	C	C1	3	1	178.089	11.056	0.099	8	LWT/LWB	0.0124	175.557	10.899
WFPC115A	C	C1	3	1	173.912	10.918	0.100	8	LWT/LWB	0.0125	173.021	10.862
WFPC116A[1]	C	C1	3	1		10.814	0.101	8	LWT/LWB/LGM	0.0126		10.818
WFPC214A	C	C2	3	2	199.172	11.228	0.098	8	LAT/LWB	0.0122	193.574	10.912
WFPC215A	C	C2	3	2	190.459	11.057	0.098	8	LGM/LWB/LWT	0.0123	185.263	10.755
WFPC216A	C	C2	3	2	191.393	11.049	0.099	8	LWT/LGM	0.0124	187.943	10.850

[1] Strength data points removed due to pinching marks on coupon.

	Strength	Modulus
Average	**187.797**	**10.764**
Standard Dev.	**11.768**	**0.389**
Coeff. of Var. [%]	**6.267**	**3.618**
Min.	**161.951**	**9.898**
Max.	**205.220**	**11.228**
Number of Spec.	**16**	**18**

	t_{ply}	$Strength_{norm}$	$Modulus_{norm}$
$Average_{norm}$	**0.0127**	**189.010**	**10.838**
Standard $Dev._{norm}$		**11.953**	**0.297**
Coeff. of Var. $[\%]_{norm}$		**6.324**	**2.744**
Min.	**0.0122**	**164.656**	**10.063**
Max.	**0.0131**	**205.899**	**11.240**
Number of Spec.		**16**	**18**


Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Strength (UNT0) [ksi]


Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT0) [Msi]

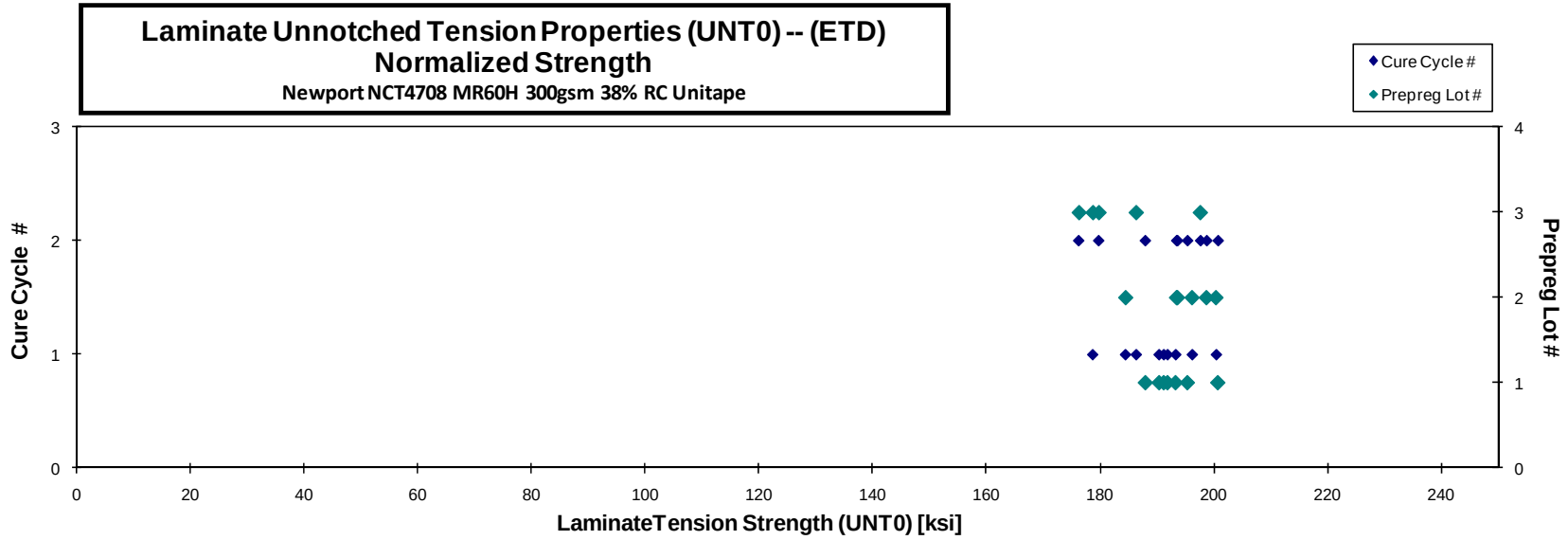
Laminate Unnotched Tension Properties (UNT0) -- (ETD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

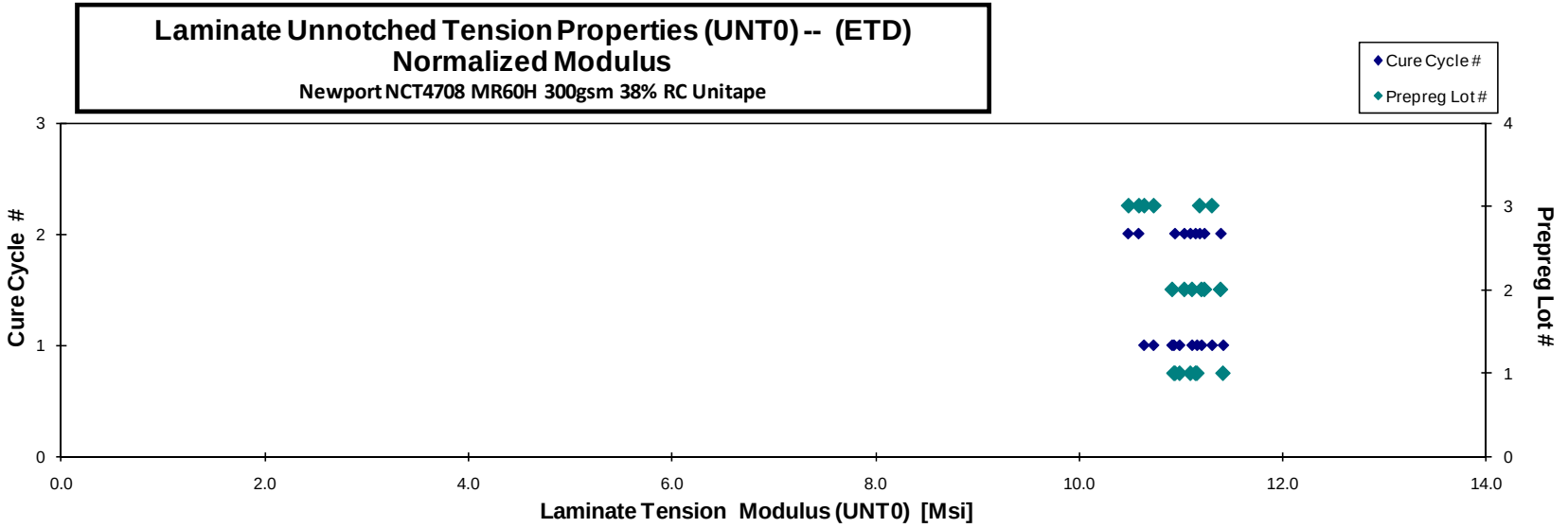
normalizing t_{ply} [in]: 0.0126

Specimen Number	Cytec Batch #	Cytec Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFPA117G	A	C1	1	1	189.336	10.837	0.102	8	LAT/LAB	0.0128	191.872	10.982
WFPA118G	A	C1	1	1	187.819	10.956	0.103	8	LAT/LWB	0.0128	191.204	11.153
WFPA119G	A	C1	1	1	189.066	10.688	0.103	8	LAB/LGM/LWT	0.0129	193.286	10.926
WFPA11AG	A	C1	1	1	185.658	11.127	0.103	8	LWT/LGM/LAB	0.0129	190.386	11.410
WFPA217G	A	C2	1	2	188.639	10.755	0.104	8	LWB/LWT/LGM	0.0131	195.376	11.139
WFPA218G	A	C2	1	2	181.415	10.556	0.104	8	LAT/LAB/LWB/LGM	0.0131	187.954	10.937
WFPA219G	A	C2	1	2	194.072	10.719	0.104	8	LAT/LWB/LGM	0.0130	200.746	11.088
WFPB117G	B	C1	2	1	193.484	10.951	0.102	8	LAT/LGM/LAB	0.0128	196.204	11.104
WFPB118G	B	C1	2	1	199.519	11.148	0.101	8	LAT/LWT/LAB	0.0127	200.410	11.198
WFPB119G	B	C1	2	1	182.647	10.800	0.102	8	LAT/LAB	0.0127	184.489	10.909
WFPB217G	B	C2	2	2	186.634	10.831	0.104	8	LGM/LWB	0.0131	193.454	11.226
WFPB218G	B	C2	2	2	194.772	11.159	0.103	8	LGM/LWT	0.0129	198.733	11.386
WFPB219G	B	C2	2	2	189.758	10.809	0.103	8	LGM/LWT/LAB	0.0129	193.617	11.028
WFPC117G	C	C1	3	1	178.666	10.630	0.101	8	LWT/LWB/LAB	0.0126	178.725	10.633
WFPC118G*	C	C1	3	1		10.791	0.100	8	LGM/LAT	0.0125		10.727
WFPC119G	C	C1	3	1	187.410	11.364	0.100	8	LGM/LAT/LAB	0.0125	186.357	11.300
WFPC217G	C	C2	3	2	182.357	10.630	0.099	8	LGM/LWB/LAB	0.0124	179.764	10.479
WFPC218G	C	C2	3	2	179.786	10.791	0.099	8	LWB/LAT	0.0124	176.278	10.581
WFPC219G	C	C2	3	2	200.919	11.364	0.099	8	LGM/LAT/LAB	0.0124	197.663	11.180

* Strength data point removed due to pinching marks on coupon.

Average	**188.442**	**10.890**	**Average$_{norm}$**	**0.0128**	**190.918**	**11.020**
Standard Dev.	**6.331**	**0.239**	**Standard Dev.$_{norm}$**		**7.356**	**0.264**
Coeff. of Var. [%]	**3.360**	**2.194**	**Coeff. of Var. [%]$_{norm}$**		**3.853**	**2.400**
Min.	**178.666**	**10.556**	**Min.**	**0.0124**	**176.278**	**10.479**
Max.	**200.919**	**11.364**	**Max.**	**0.0131**	**200.746**	**11.410**
Number of Spec.	**18**	**19**	**Number of Spec.**		**18**	**19**


Laminate Unnotched Tension Properties (UNT0) -- (ETD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
160
180
200
220
240
LaminateTension Strength (UNT0) [ksi]


Laminate Unnotched Tension Properties (UNT0) -- (ETD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Laminate Tension Modulus (UNT0) [Msi]

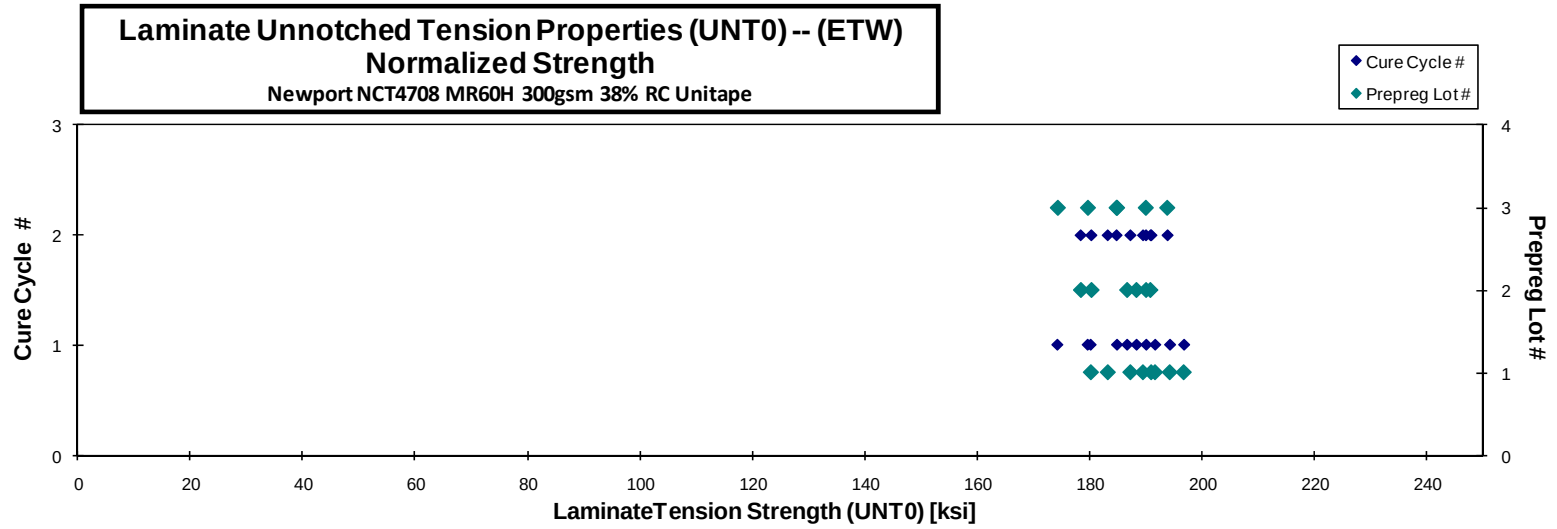
Laminate Unnotched Tension Properties (UNT0) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

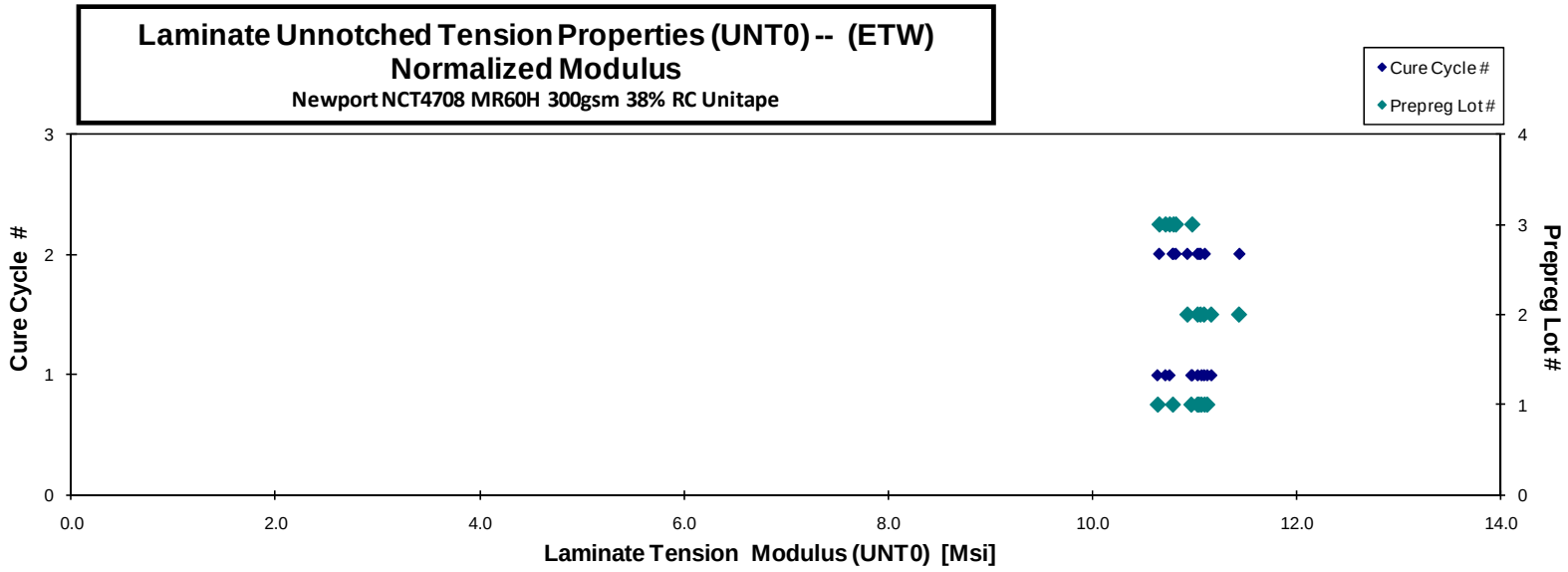
normalizing t_{ply} [in]: 0.0126

Specimen Number	Cytec Batch #	Cytec Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFPA11BF	A	C1	1	1	192.697	10.888	0.103	8	LWB / LWT	0.0129	196.966	11.130
WFPA11CF	A	C1	1	1	176.481	10.447	0.103	8	LAT / LAB / LGM	0.0128	179.808	10.643
WFPA11DF	A	C1	1	1	189.519	10.899	0.102	8	LAT / LWB	0.0128	192.558	11.074
WFPA11EF	A	C1	1	1	192.118	10.825	0.102	8	LWT / LAB / LGM	0.0128	194.755	10.973
WFPA21BF	A	C2	1	2	177.714	10.507	0.104	8	LAT / LAB / LGM	0.0129	182.533	10.792
WFPA21CF	A	C2	1	2	187.014	10.792	0.103	8	LAT / LAB / LGM	0.0129	191.219	11.035
WFPA21DF	A	C2	1	2	183.380	10.868	0.103	8	LAT / LAB / LGM	0.0129	187.382	11.105
WFPA21EF	A	C2	1	2	189.247	11.038	0.101	8	LAT / LAB / LGM	0.0126	189.466	11.051
WFPB11BF	B	C1	2	1	188.100	11.196	0.101	8	LAB / LAT / LGM	0.0126	187.633	11.169
WFPB11CF	B	C1	2	1	189.817	10.964	0.101	8	LAB / LAT / LGM	0.0127	191.073	11.036
WFPB11DF	B	C1	2	1	184.611	10.937	0.102	8	LWB / LWT	0.0128	187.327	11.098
WFPB21BF	B	C2	2	2	178.331	10.919	0.102	8	LGM	0.0128	180.690	11.064
WFPB21CF	B	C2	2	2	174.752	10.726	0.103	8	LAT / LAB	0.0128	178.161	10.935
WFPB21DF	B	C2	2	2	186.875	11.226	0.103	8	LAT / LAB	0.0128	190.490	11.443
WFPC11BF	C	C1	3	1	181.249	11.086	0.100	8	LAB / LAT / LGM	0.0125	179.570	10.983
WFPC11CF	C	C1	3	1	175.630	10.793	0.100	8	LAB / LAT / LGM	0.0125	174.439	10.720
WFPC11DF	C	C1	3	1	186.306	10.841	0.100	8	LAT / LGM	0.0125	184.920	10.761
WFPC21BF	C	C2	3	2	189.242	10.908	0.099	8	LWT / LAB / LGM	0.0123	184.924	10.660
WFPC21CF	C	C2	3	2	199.301	11.099	0.098	8	LAT / LWB / LGM	0.0123	193.897	10.798
WFPC21DF	C	C2	3	2	193.142	10.993	0.099	8	LAT / LAB / LGM	0.0124	190.140	10.822

	Strength [ksi]	Modulus [Msi]
Average	185.776	10.898
Standard Dev.	6.677	0.195
Coeff. of Var. [%]	3.594	1.793
Min.	174.752	10.447
Max.	199.301	11.226
Number of Spec.	20	20

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	0.0127	186.898	10.965
$Standard\ Dev._{norm}$		6.122	0.199
$Coeff.\ of\ Var.\ [\%]_{norm}$		3.276	1.813
Min.	0.0123	174.439	10.643
Max.	0.0129	196.966	11.443
Number of Spec.		20	20


Laminate Unnotched Tension Properties (UNT0) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT0) [ksi]
0
20
40
60
80
100
120
140
160
180
200
220
240


Laminate Unnotched Tension Properties (UNT0) -- (ETW)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT0) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0

4.8 Unnotched Tension 1 Properties

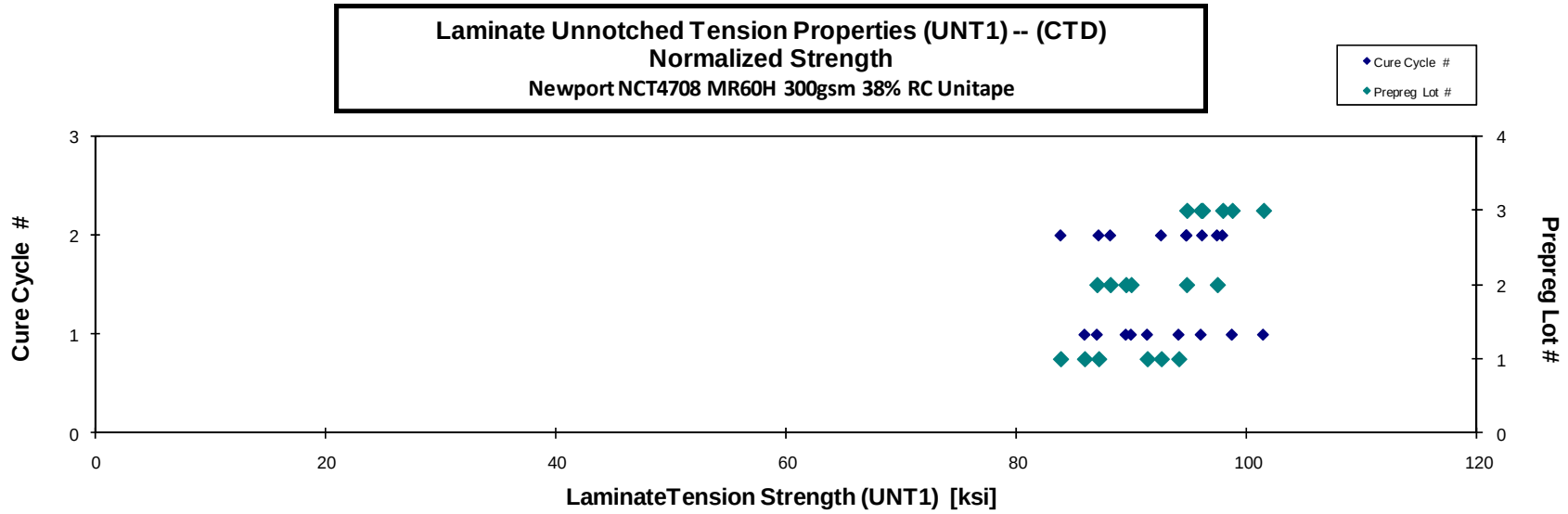
Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

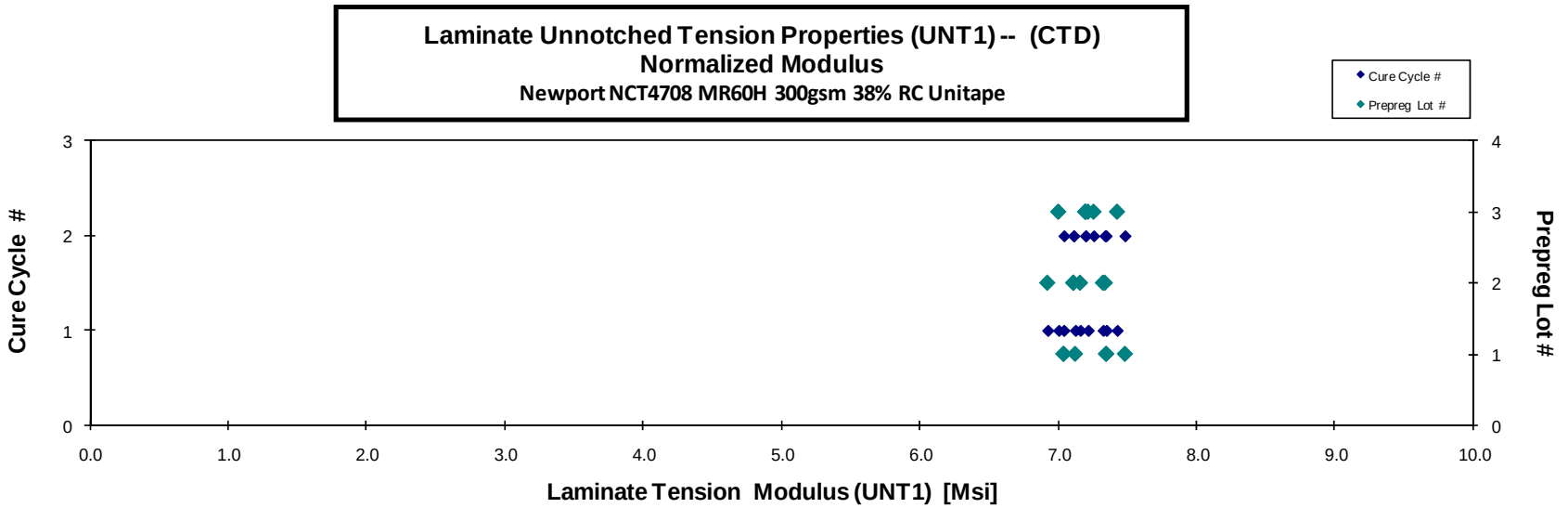
normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFAA111B	A	C1	1	1	85.674	7.018	0.101	8	MGM	0.0126	85.957	7.041
WFAA112B	A	C1	1	1	91.452	7.143	0.104	8	MGM	0.0130	94.114	7.350
WFAA113B	A	C1	1	1	89.102	6.948	0.103	8	MGM	0.0129	91.386	7.126
WFAA211B	A	C2	1	2	83.162	7.286	0.102	8	MGM	0.0127	83.877	7.349
WFAA212B	A	C2	1	2	85.427	7.335	0.103	8	MGM	0.0129	87.178	7.485
WFAA213B	A	C2	1	2	91.169	6.934	0.102	8	MGM	0.0128	92.601	7.043
WFAB111B	B	C1	2	1	90.257	7.182	0.101	8	MGM	0.0126	89.988	7.161
WFAB112B	B	C1	2	1	88.180	6.820	0.102	8	MGM	0.0128	89.536	6.925
WFAB113B	B	C1	2	1	86.457	7.278	0.101	8	MGM	0.0127	87.028	7.326
WFAB211B	B	C2	2	2	89.715	7.467	0.099	8	MGM	0.0124	88.187	7.340
WFAB212B	B	C2	2	2	98.153	7.164	0.100	8	MGM	0.0125	97.455	7.113
WFAB213B	B	C2	2	2	95.214	7.145	0.100	8	MGM	0.0125	94.789	7.113
WFAC111B	C	C1	3	1	105.993	7.541	0.096	8	MGM	0.0121	101.454	7.218
WFAC112B	C	C1	3	1	98.504	7.619	0.098	8	MGM	0.0123	96.045	7.428
WFAC113B	C	C1	3	1	101.804	7.222	0.098	8	MGM	0.0122	98.741	7.004
WFAC211B	C	C2	3	2	100.566	7.396	0.098	8	MGM	0.0123	97.922	7.201
WFAC212B	C	C2	3	2	97.514	7.299	0.099	8	MGM	0.0124	96.159	7.198
WFAC213B	C	C2	3	2	95.826	7.336	0.100	8	MGM	0.0125	94.812	7.258

Average	**93.009**	**7.230**	
Standard Dev.	**6.448**	**0.212**	
Coeff. of Var. [%]	**6.933**	**2.936**	
Min.	**83.162**	**6.820**	
Max.	**105.993**	**7.619**	
Number of Spec.	**18**	**18**	

$Average_{norm}$	**0.0126**	**92.624**	**7.204**
$Standard\ Dev._{norm}$		**4.984**	**0.154**
Coeff. of Var. [%]$_{norm}$		**5.381**	**2.137**
Min.	**0.0121**	**83.877**	**6.925**
Max.	**0.0130**	**101.454**	**7.485**
Number of Spec.		**18**	**18**


Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
LaminateTension Strength (UNT1) [ksi]

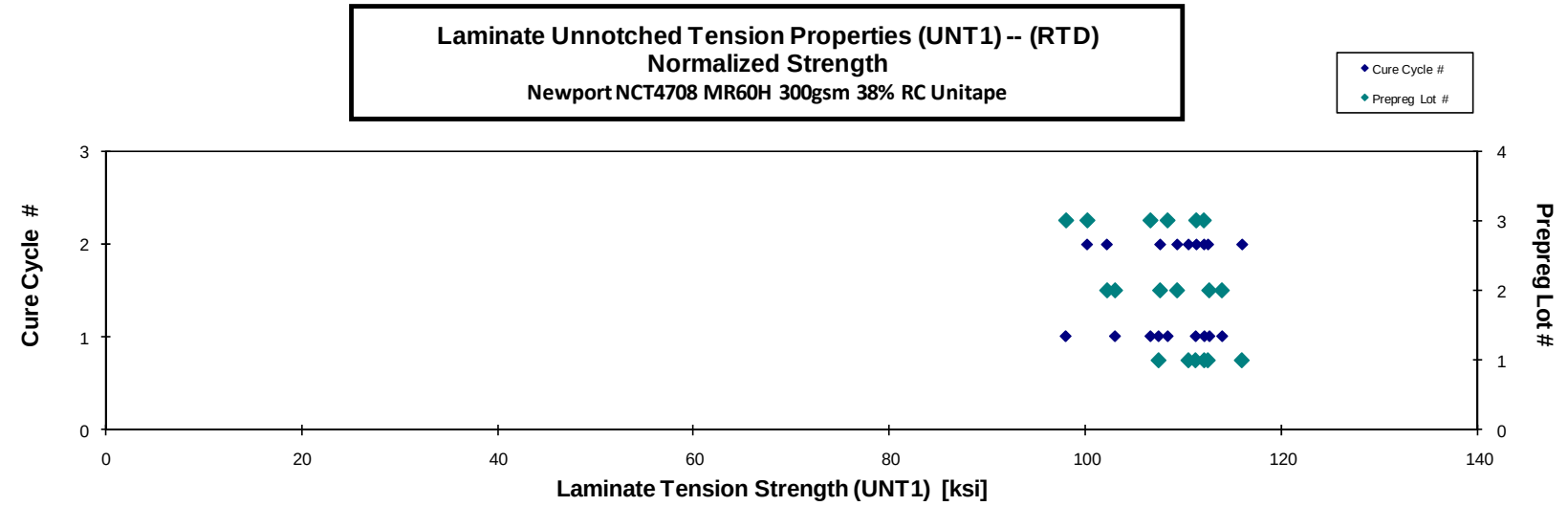

Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Laminate Tension Modulus (UNT1) [Msi]

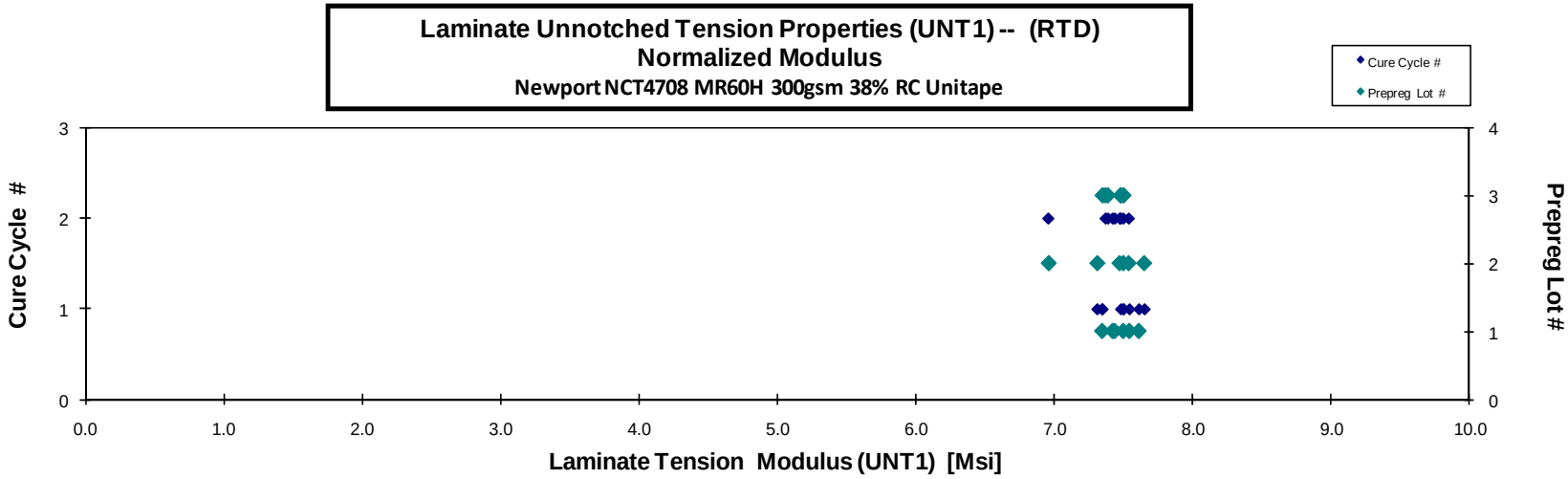
Laminate Unnotched Tension Properties (UNT1) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFAA115A	A	C1	1	1	108.788	7.186	0.103	8	MGM	0.0129	111.217	7.347
WFAA116A	A	C1	1	1	110.335	7.493	0.102	8	MGM	0.0128	112.104	7.613
WFAA117A	A	C1	1	1	106.546	7.482	0.102	8	MGM	0.0127	107.427	7.544
WFAA215A	A	C2	1	2	114.432	7.340	0.102	8	MGM	0.0128	115.965	7.438
WFAA216A	A	C2	1	2	108.749	7.381	0.102	8	MGM	0.0128	110.494	7.500
WFAA217A	A	C2	1	2	111.143	7.334	0.102	8	MGM	0.0128	112.484	7.423
WFAB115A	B	C1	2	1	102.865	7.304	0.101	8	MGM	0.0126	102.984	7.312
WFAB116A	B	C1	2	1	112.305	7.480	0.101	8	MGM	0.0126	112.621	7.501
WFAB117A	B	C1	2	1	113.997	7.658	0.101	8	MGM	0.0126	113.922	7.653
WFAB215A	B	C2	2	2	109.265	7.534	0.101	8	MGM	0.0126	109.337	7.539
WFAB216A	B	C2	2	2	101.654	6.925	0.101	8	MGM	0.0127	102.158	6.959
WFAB217A	B	C2	2	2	107.312	7.454	0.101	8	MGM	0.0126	107.596	7.473
WFAC115A	C	C1	3	1	110.342	7.766	0.097	8	MGM	0.0122	106.602	7.503
WFAC116A	C	C1	3	1	111.781	7.719	0.098	8	MGM	0.0122	108.362	7.483
WFAC117A	C	C1	3	1	101.009	7.579	0.098	8	MGM	0.0122	97.953	7.350
WFAC215A	C	C2	3	2	113.879	7.602	0.099	8	MGM	0.0124	112.072	7.481
WFAC216A	C	C2	3	2	101.362	7.479	0.100	8	MGM	0.0124	100.139	7.389
WFAC217A	C	C2	3	2	112.808	7.471	0.099	8	MGM	0.0124	111.298	7.371

Average	**108.810**	**7.455**	**$Average_{norm}$**	**0.0126**	**108.596**	**7.438**
Standard Dev.	**4.484**	**0.198**	**Standard $Dev._{norm}$**		**4.975**	**0.150**
Coeff. of Var. [%]	**4.121**	**2.650**	**Coeff. of Var. $[\%]_{norm}$**		**4.582**	**2.019**
Min.	**101.009**	**6.925**	**Min.**	**0.0122**	**97.953**	**6.959**
Max.	**114.432**	**7.766**	**Max.**	**0.0129**	**115.965**	**7.653**
Number of Spec.	**18**	**18**	**Number of Spec.**		**18**	**18**


Laminate Unnotched Tension Properties (UNT1) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Strength (UNT1) [ksi]
0
20
40
60
80
100
120
140

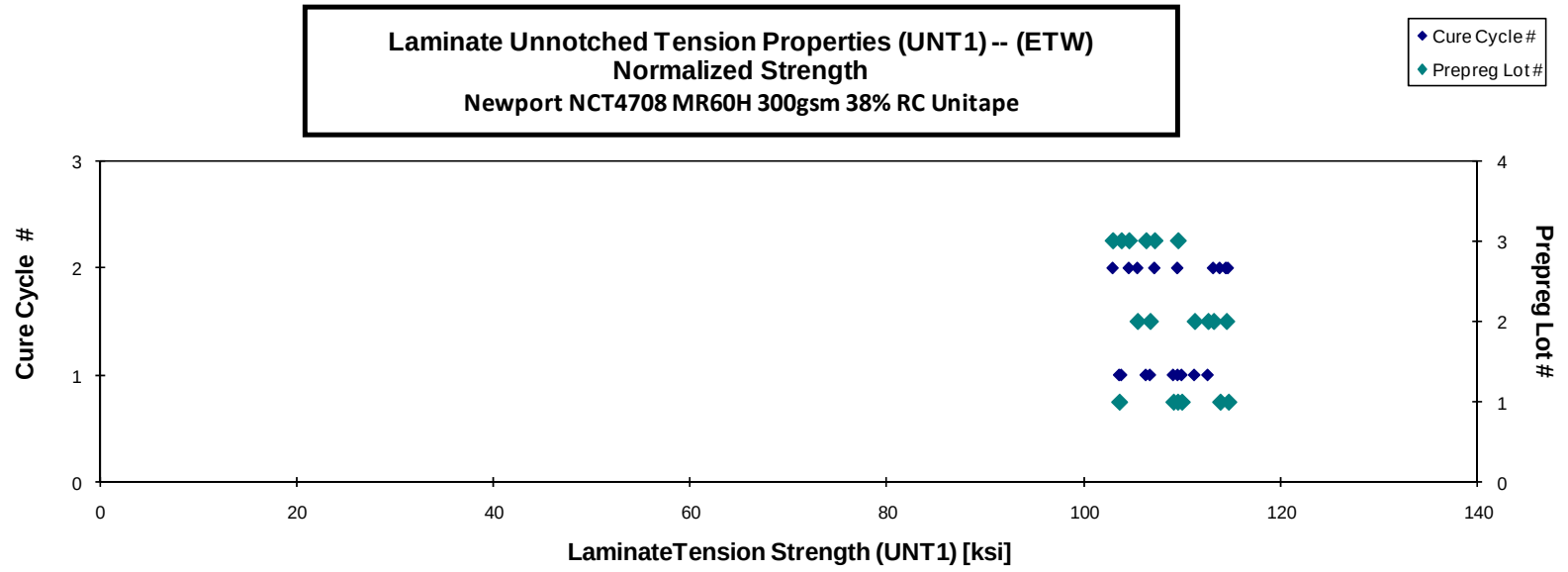

Laminate Unnotched Tension Properties (UNT1) -- (RTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT1) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0

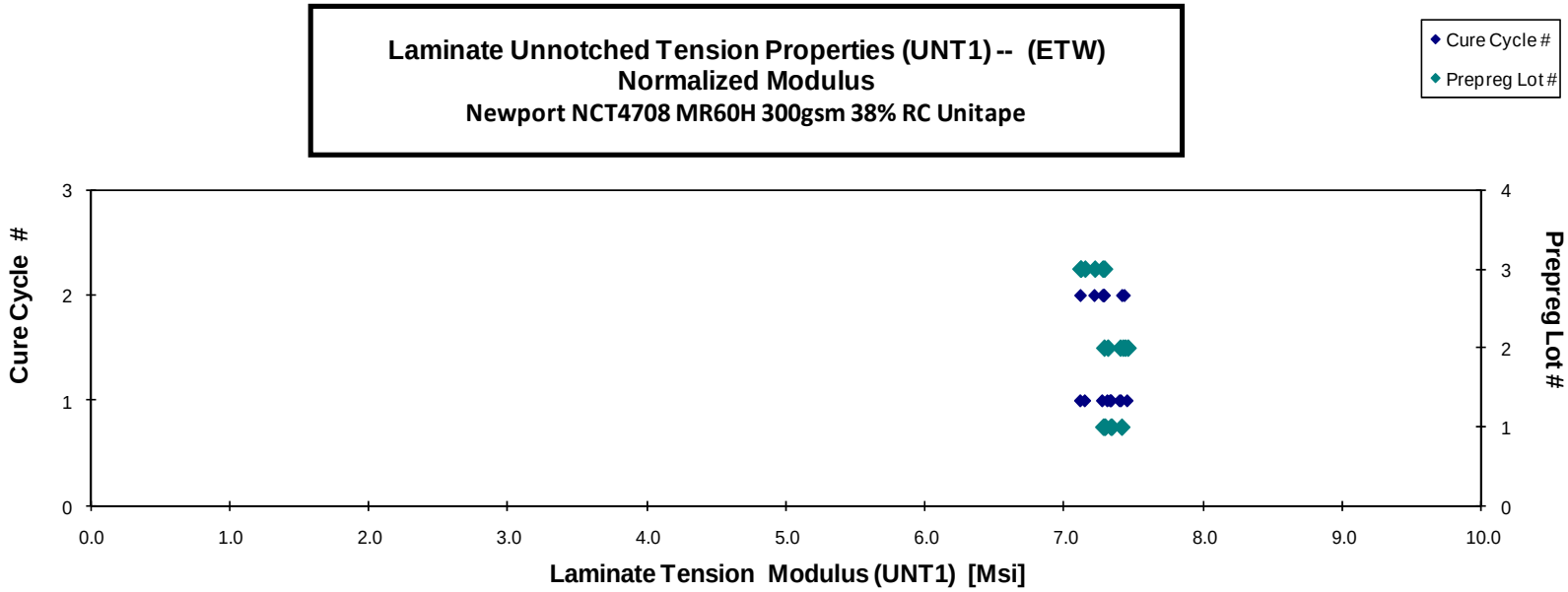
Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFAA118F	A	C1	1	1	108.780	7.261	0.102	8	DGM	0.0127	109.968	7.340
WFAA119F	A	C1	1	1	102.343	7.245	0.102	8	DGM	0.0128	103.596	7.334
WFAA11AF	A	C1	1	1	107.300	7.289	0.103	8	DGM	0.0128	109.109	7.412
WFAA218F	A	C2	1	2	112.294	7.191	0.102	8	DGM	0.0128	113.872	7.292
WFAA219F	A	C2	1	2	108.270	7.203	0.102	8	DGM	0.0127	109.541	7.287
WFAA21AF	A	C2	1	2	112.191	7.119	0.103	8	DGM	0.0129	114.714	7.279
WFAB118F	B	C1	2	1	112.120	7.279	0.101	8	DGM	0.0127	112.639	7.312
WFAB119F	B	C1	2	1	105.567	7.375	0.102	8	DGM	0.0127	106.736	7.457
WFAB11AF	B	C1	2	1	110.939	7.380	0.101	8	DGM	0.0126	111.270	7.402
WFAB218F	B	C2	2	2	113.189	7.436	0.101	8	DGM	0.0126	113.207	7.437
WFAB219F	B	C2	2	2	105.122	7.398	0.101	8	DGM	0.0126	105.452	7.421
WFAB21AF	B	C2	2	2	115.063	7.321	0.100	8	DGM	0.0125	114.511	7.286
WFAC118F	C	C1	3	1	110.141	7.371	0.097	8	DGM	0.0122	106.317	7.115
WFAC119F	C	C1	3	1	113.417	7.399	0.097	8	DGM	0.0122	109.573	7.148
WFAC11AF	C	C1	3	1	107.226	7.515	0.098	8	DGM	0.0122	103.804	7.275
WFAC218F	C	C2	3	2	104.416	7.323	0.099	8	DGM	0.0124	102.931	7.218
WFAC219F	C	C2	3	2	109.364	7.435	0.099	8	DGM	0.0124	107.194	7.287
WFAC21AF	C	C2	3	2	106.716	7.262	0.099	8	DGM	0.0123	104.581	7.117

Average	**109.137**	**7.322**	**$Average_{norm}$**	**0.0126**	**108.834**	**7.301**
Standard Dev.	**3.543**	**0.101**	**Standard $Dev._{norm}$**		**3.946**	**0.104**
Coeff. of Var. [%]	**3.247**	**1.374**	**Coeff. of Var. $[\%]_{norm}$**		**3.625**	**1.419**
Min.	**102.343**	**7.119**	**Min.**	**0.0122**	**102.931**	**7.115**
Max.	**115.063**	**7.515**	**Max.**	**0.0129**	**114.714**	**7.457**
Number of Spec.	**18**	**18**	**Number of Spec.**		**18**	**18**


Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
LaminateTension Strength (UNT1) [ksi]


Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Laminate Tension Modulus (UNT1) [Msi]

4.9 Unnotched Tension 2 Properties

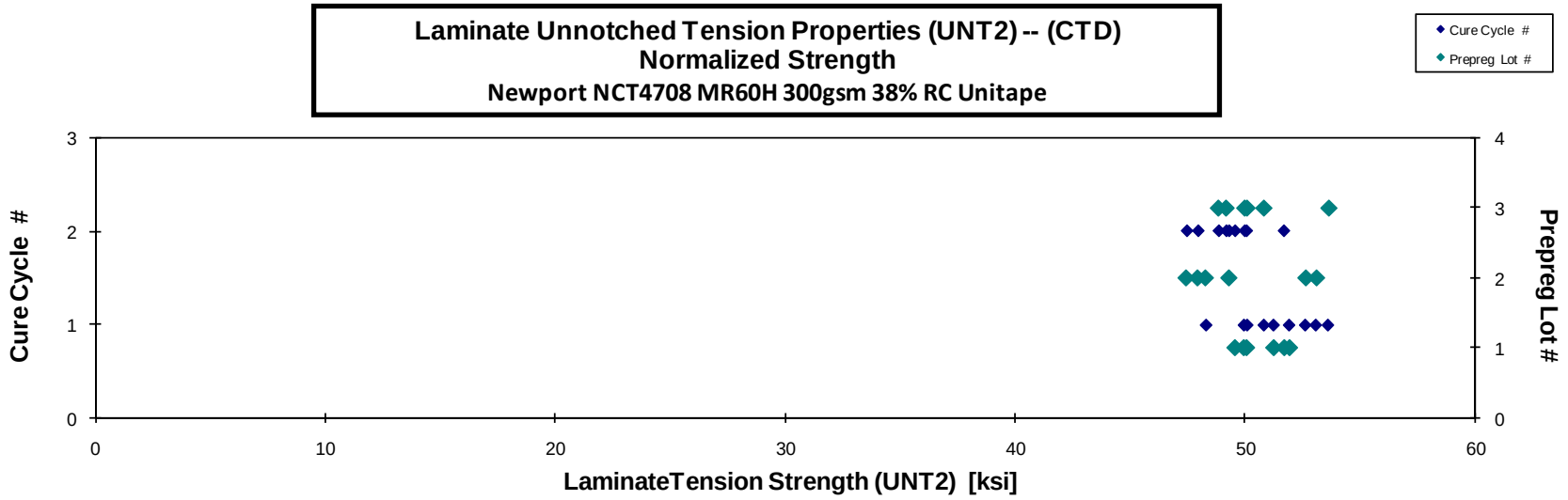
Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

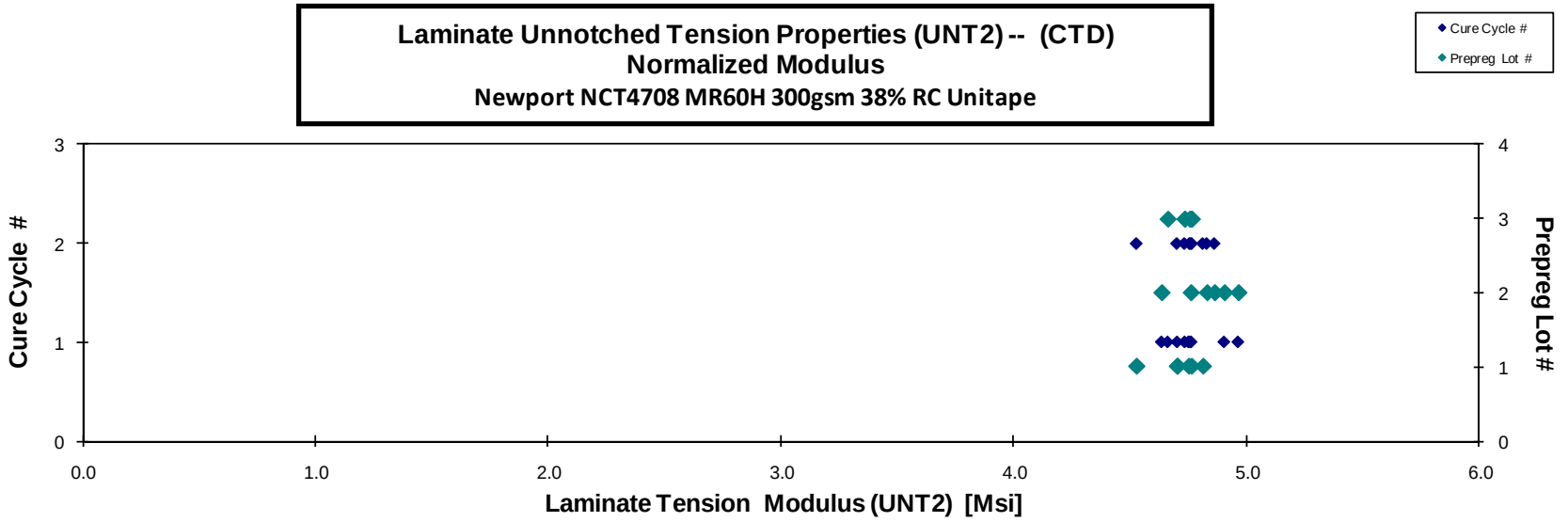
normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFBA111B	A	C1	1	1	51.461	4.664	0.140	11	LGM/DGM	0.0127	51.925	4.706
WFBA112B	A	C1	1	1	48.780	4.655	0.142	11	LGM/DGM	0.0129	49.947	4.767
WFBA113B	A	C1	1	1	50.091	4.648	0.142	11	LGM/DGM	0.0129	51.242	4.755
WFBA211B	A	C2	1	2	49.023	4.653	0.140	11	LGM/DGM	0.0127	49.566	4.705
WFBA212B	A	C2	1	2	48.887	4.702	0.142	11	LGM/DGM	0.0129	50.068	4.816
WFBA213B	A	C2	1	2	50.373	4.415	0.142	11	LGM/DGM	0.0129	51.699	4.531
WFBB111B	B	C1	2	1	48.668	4.676	0.138	11	LGM/DGM	0.0125	48.288	4.639
WFBB112B	B	C1	2	1	52.896	4.949	0.139	11	LGM/DGM	0.0126	53.093	4.967
WFBB113B	B	C1	2	1	52.650	4.909	0.139	11	LGM/DGM	0.0126	52.631	4.907
WFBB211B	B	C2	2	2	47.873	4.909	0.137	11	LGM/DGM	0.0125	47.453	4.865
WFBB212B	B	C2	2	2	49.037	4.738	0.139	11	LGM/DGM	0.0127	49.302	4.764
WFBB213B	B	C2	2	2	47.564	4.794	0.140	11	LGM/DGM	0.0127	47.947	4.833
WFBC111B	C	C1	3	1	52.165	4.859	0.133	11	LGM/DGM	0.0121	50.088	4.665
WFBC112B	C	C1	3	1	52.210	4.869	0.135	11	LGM/DGM	0.0123	50.817	4.739
WFBC113B	C	C1	3	1	55.261	4.907	0.135	11	LGM/DGM	0.0122	53.626	4.762
WFBC211B	C	C2	3	2	50.930	4.849	0.136	11	LGM/DGM	0.0124	49.987	4.759
WFBC212B	C	C2	3	2	49.180	4.801	0.138	11	LGM/DGM	0.0125	48.849	4.769
WFBC213B	C	C2	3	2	49.853	4.802	0.137	11	LGM/DGM	0.0124	49.182	4.737

Average	**50.383**	**4.767**
Standard Dev.	**2.039**	**0.135**
Coeff. of Var. [%]	**4.047**	**2.828**
Min.	**47.564**	**4.415**
Max.	**55.261**	**4.949**
Number of Spec.	**18**	**18**

$Average_{norm}$	**0.0126**	**50.317**	**4.760**
$Standard\ Dev._{norm}$		**1.765**	**0.099**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.507**	**2.084**
Min.	**0.0121**	**47.453**	**4.531**
Max.	**0.0129**	**53.626**	**4.967**
Number of Spec.		**18**	**18**


Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
LaminateTension Strength (UNT2) [ksi]


Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Laminate Tension Modulus (UNT2) [Msi]

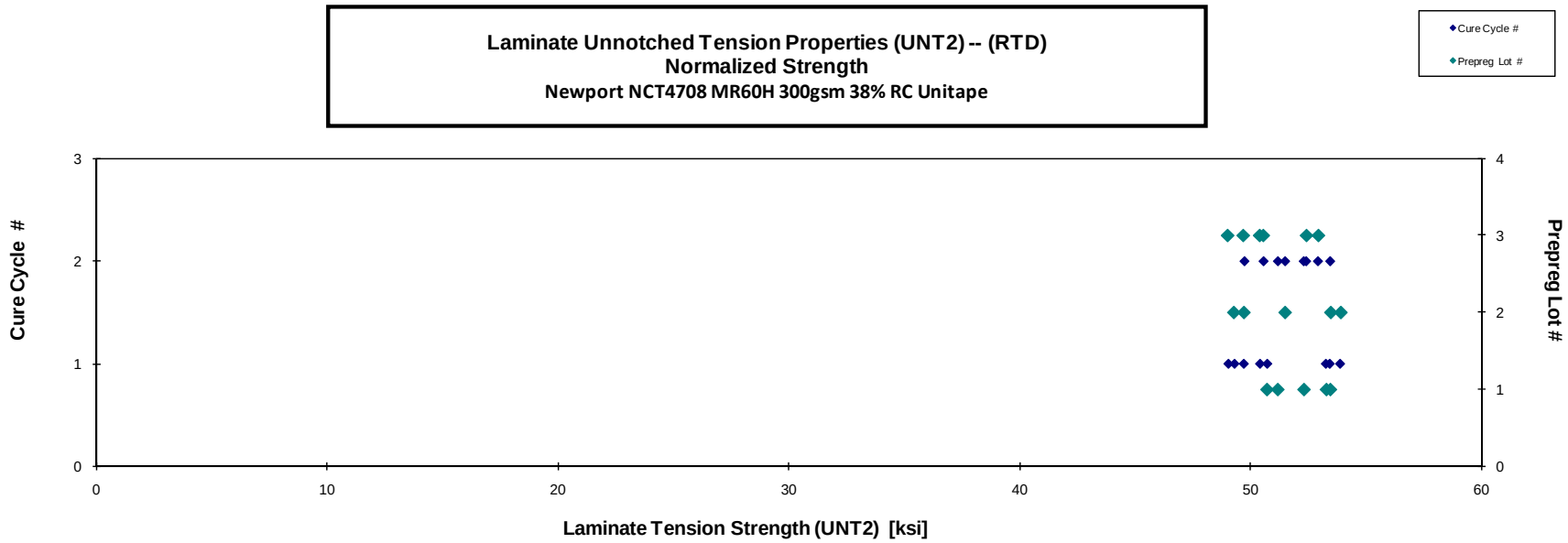
Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

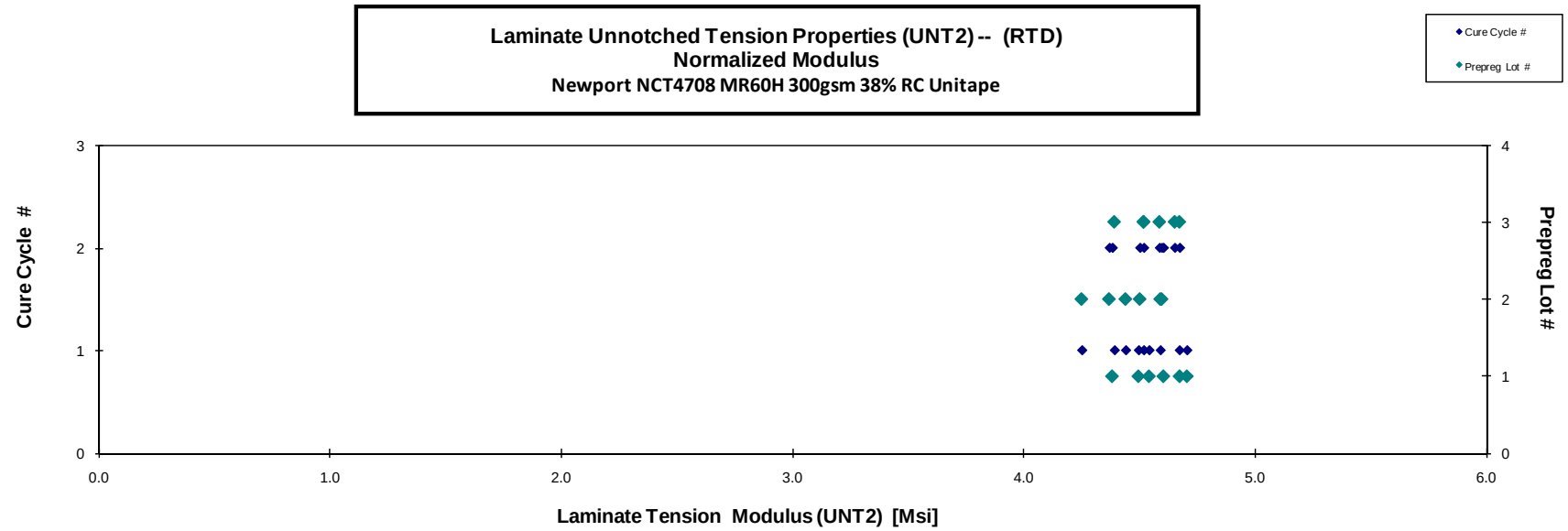
normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFBA115A	A	C1	1	1	52.237	4.442	0.142	11	LGM/DGM	0.0129	53.424	4.543
WFBA116A	A	C1	1	1	49.661	4.610	0.142	11	LGM/DGM	0.0129	50.700	4.707
WFBA117A	A	C1	1	1	52.145	4.403	0.142	11	LGM/DGM	0.0129	53.255	4.497
WFBA215A	A	C2	1	2	50.122	4.580	0.141	11	LGM/DGM	0.0129	51.165	4.675
WFBA216A*	A	C2	1	2		4.510	0.142	11	DGM	0.0129		4.605
WFBA217A	A	C2	1	2	51.302	4.301	0.141	11	LGM/DGM	0.0128	52.290	4.384
WFBB115A*	B	C1	2	1		4.439	0.139	11	DGM	0.0126		4.441
WFBB116A	B	C1	2	1	53.869	4.591	0.139	11	LGM/DGM	0.0126	53.875	4.592
WFBB117A	B	C1	2	1	49.499	4.271	0.138	11	LGM/DGM	0.0125	49.273	4.251
WFBB215A	B	C2	2	2	52.281	4.498	0.142	11	LGM/DGM	0.0129	53.444	4.598
WFBB216A	B	C2	2	2	48.948	4.304	0.141	11	LGM/DGM	0.0128	49.707	4.370
WFBB217A	B	C2	2	2	51.172	4.476	0.139	11	LGM/DGM	0.0127	51.479	4.503
WFBC115A	C	C1	3	1	50.531	4.529	0.134	11	LGM/DGM	0.0122	49.006	4.393
WFBC116A	C	C1	3	1	51.256	4.823	0.134	11	LGM/DGM	0.0122	49.678	4.674
WFBC117A	C	C1	3	1	51.934	4.658	0.134	11	LGM/DGM	0.0122	50.385	4.519
WFBC215A	C	C2	3	2	51.285	4.722	0.137	11	LGM/DGM	0.0124	50.539	4.654
WFBC216A	C	C2	3	2	53.929	4.676	0.136	11	LGM/DGM	0.0124	52.911	4.588
WFBC217A	C	C2	3	2	53.360	4.603	0.136	11	LGM/DGM	0.0124	52.398	4.520

*Strength data removed due to bad failure mode.

Average	**51.471**	**4.524**	**$Average_{norm}$**	**0.0126**	**51.471**	**4.528**
Standard Dev.	**1.499**	**0.151**	**$Standard\ Dev._{norm}$**		**1.638**	**0.123**
Coeff. of Var. [%]	**2.912**	**3.327**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.182**	**2.727**
Min.	**48.948**	**4.271**	**Min.**	**0.0122**	**49.006**	**4.251**
Max.	**53.929**	**4.823**	**Max.**	**0.0129**	**53.875**	**4.707**
Number of Spec.	**16**	**18**	**Number of Spec.**		**16**	**18**


Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
Laminate Tension Strength (UNT2) [ksi]


Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Laminate Tension Modulus (UNT2) [Msi]

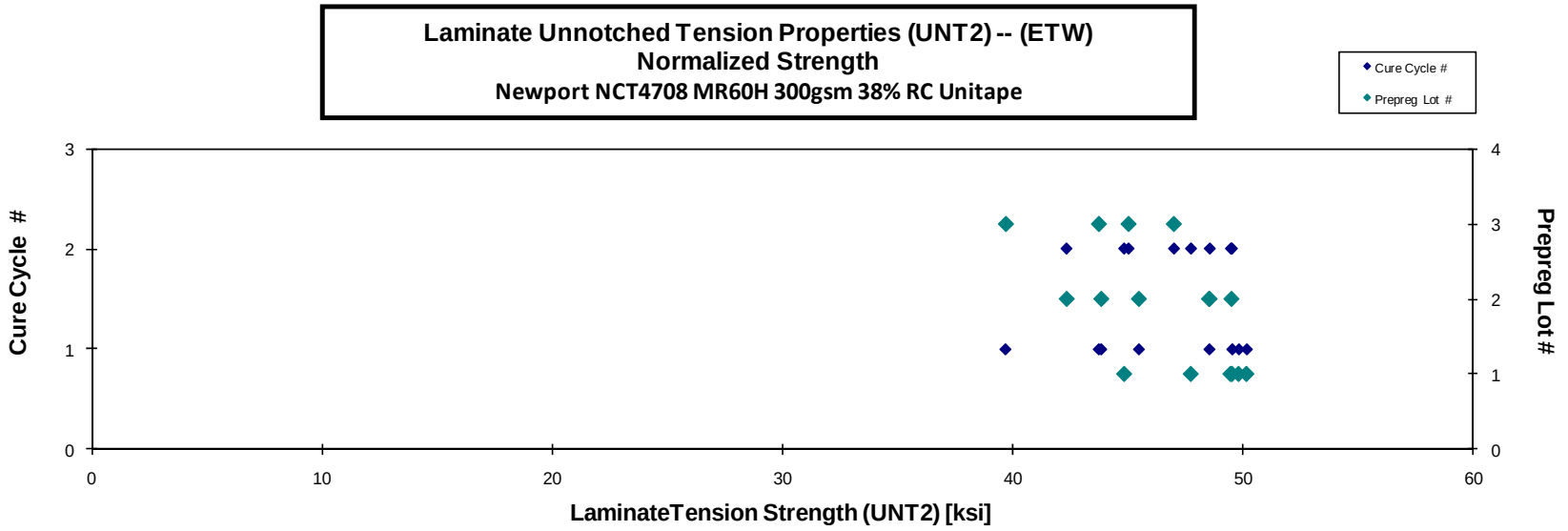
Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

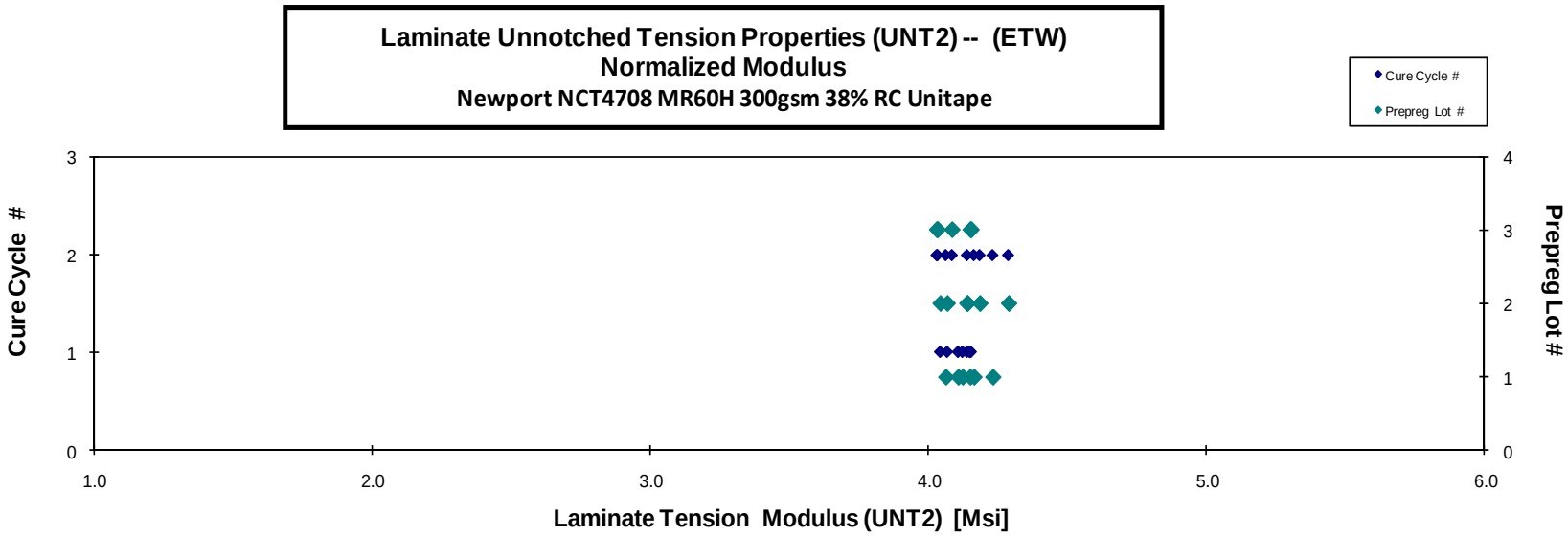
normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFBA118F	A	C1	1	1	49.135	4.024	0.142	11	LGM/DGM	0.0129	50.180	4.110
WFBA119F	A	C1	1	1	48.674	4.079	0.141	11	LGM/DGM	0.0128	49.552	4.152
WFBA11AF	A	C1	1	1	48.961	4.053	0.141	11	LGM/DGM	0.0128	49.838	4.126
WFBA218F	A	C2	1	2	46.807	3.984	0.141	11	LGM/DGM	0.0129	47.764	4.066
WFBA219F	A	C2	1	2	44.065	4.091	0.141	11	LGM/DGM	0.0128	44.870	4.166
WFBA21AF	A	C2	1	2	48.504	4.149	0.141	11	LGM/DGM	0.0129	49.489	4.233
WFBB118F	B	C1	2	1	48.609	4.146	0.138	11	LGM/DGM	0.0126	48.562	4.142
WFBB119F	B	C1	2	1	43.963	4.054	0.138	11	LGM/DGM	0.0126	43.879	4.046
WFBB11AF	B	C1	2	1	45.550	4.074	0.138	11	LGM/DGM	0.0126	45.512	4.071
WFBB218F	B	C2	2	2	49.183	4.158	0.140	11	LGM/DGM	0.0127	49.532	4.187
WFBB219F	B	C2	2	2	41.822	4.234	0.140	11	LGM/DGM	0.0128	42.376	4.290
WFBB21AF	B	C2	2	2	48.160	4.106	0.140	11	LGM/DGM	0.0127	48.577	4.142
WFBC118F	C	C1	3	1	44.930	4.262	0.135	11	LGM/DGM	0.0123	43.774	4.153
WFBC11AF	C	C1	3	1	40.836	4.271	0.135	11	LGM/DGM	0.0123	39.736	4.156
WFBC218F	C	C2	3	2	47.556	4.133	0.137	11	LGM/DGM	0.0125	47.030	4.088
WFBC219F	C	C2	3	2	45.705	4.091	0.137	11	LGM/DGM	0.0124	45.062	4.033
WFBC21AF[1]	C	C2	3	2		4.099	0.136	11	DGM	0.0124		4.036

[1] Strength data were not added due to bad failure

Average	**46.404**	**4.118**	**$Average_{norm}$**	**0.0126**	**46.608**	**4.129**
Standard Dev.	**2.677**	**0.080**	**$Standard\ Dev._{norm}$**		**3.111**	**0.070**
Coeff. of Var. [%]	**5.770**	**1.936**	**Coeff. of Var. $[\%]_{norm}$**		**6.674**	**1.690**
Min.	**40.836**	**3.984**	**Min.**	**0.0123**	**39.736**	**4.033**
Max.	**49.183**	**4.271**	**Max.**	**0.0129**	**50.180**	**4.290**
Number of Spec.	**16**	**17**	**Number of Spec.**		**16**	**17**


Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT2) [ksi]
0
10
20
30
40
50
60
0
1
2
3
4


Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT2) [Msi]
1.0
2.0
3.0
4.0
5.0
6.0
0
1
2
3
4

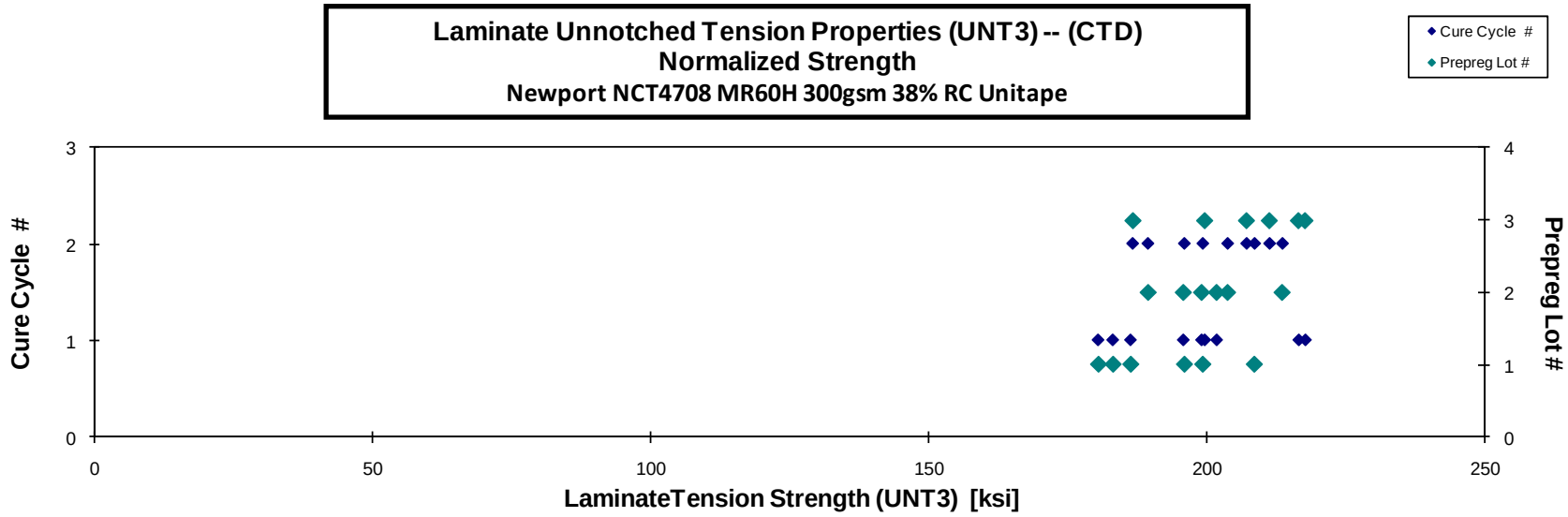
4.10 Unnotched Tension 3 Properties

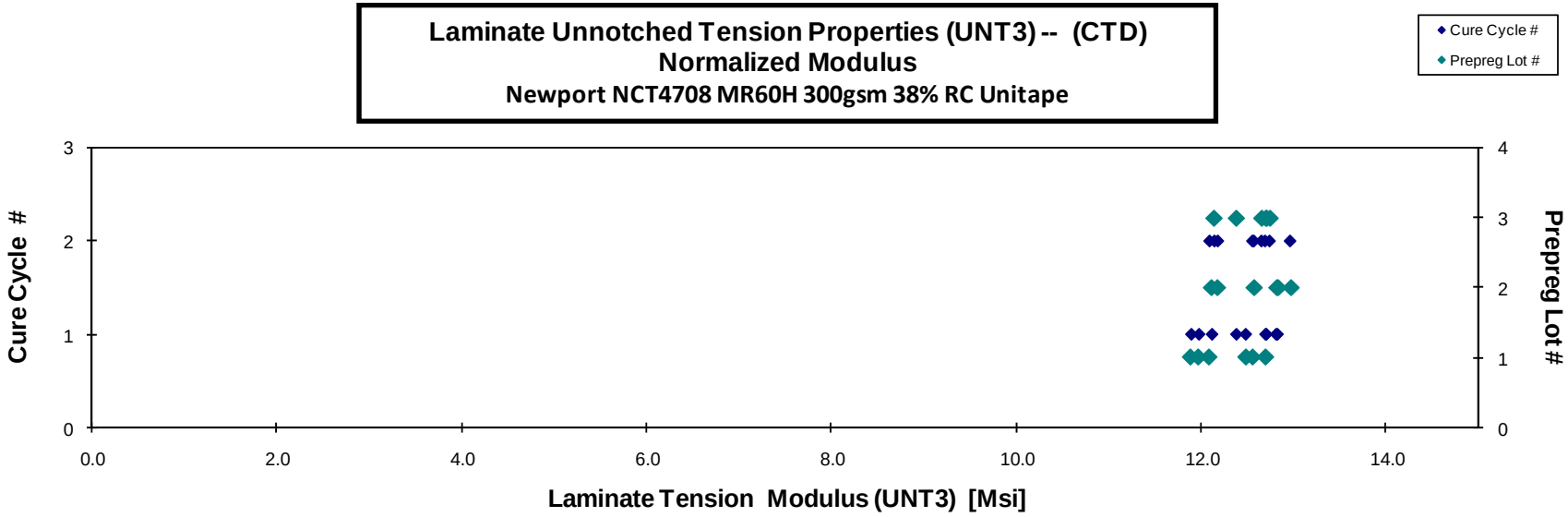
Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFCA111B	A	C1	1	1	182.729	11.941	0.139	11	AGM / DGM	0.0126	183.279	11.977
WFCA112B	A	C1	1	1	175.695	11.568	0.143	11	AGM / DGM	0.0130	180.639	11.893
WFCA113B	A	C1	1	1	183.614	12.299	0.141	11	AGM / DGM	0.0128	186.462	12.490
WFCA211B	A	C2	1	2	200.161	12.340	0.136	11	AGM / DGM	0.0123	196.142	12.092
WFCA212B	A	C2	1	2	197.860	12.461	0.140	11	AGM / DGM	0.0127	199.455	12.562
WFCA213B	A	C2	1	2	207.360	12.616	0.140	11	AGM / DGM	0.0127	208.757	12.701
WFCB111B	B	C1	2	1	198.846	12.813	0.139	11	AGM / DGM	0.0126	199.229	12.838
WFCB112B	B	C1	2	1	192.060	11.880	0.141	11	AGM / DGM	0.0129	195.940	12.120
WFCB113B	B	C1	2	1	198.289	12.591	0.141	11	AGM / DGM	0.0128	201.937	12.822
WFCB211B	B	C2	2	2	192.438	12.366	0.137	11	AGM / DGM	0.0124	189.591	12.184
WFCB212B	B	C2	2	2	205.177	12.656	0.138	11	AGM / DGM	0.0125	203.919	12.578
WFCB213B	B	C2	2	2	215.079	13.055	0.138	11	AGM / DGM	0.0125	213.760	12.975
WFCC111B	C	C1	3	1	206.209	12.785	0.134	11	AGM / DGM	0.0122	199.787	12.387
WFCC112B	C	C1	3	1	221.989	12.955	0.136	11	AGM / DGM	0.0124	217.878	12.715
WFCC113B	C	C1	3	1	220.190	12.910	0.136	11	AGM / DGM	0.0124	216.695	12.705
WFCC211B	C	C2	3	2	191.953	12.478	0.135	11	AGM / DGM	0.0123	186.851	12.147
WFCC212B	C	C2	3	2	209.698	12.806	0.137	11	AGM / DGM	0.0125	207.327	12.661
WFCC213B	C	C2	3	2	213.454	12.871	0.137	11	AGM / DGM	0.0125	211.452	12.750

Average	**200.711**	**12.522**	**Average$_{norm}$**	**0.0126**	**199.950**	**12.478**
Standard Dev.	**12.960**	**0.405**	**Standard Dev.$_{norm}$**		**11.426**	**0.330**
Coeff. of Var. [%]	**6.457**	**3.231**	**Coeff. of Var. [%]$_{norm}$**		**5.715**	**2.645**
Min.	**175.695**	**11.568**	**Min.**	**0.0122**	**180.639**	**11.893**
Max.	**221.989**	**13.055**	**Max.**	**0.0130**	**217.878**	**12.975**
Number of Spec.	**18**	**18**	**Number of Spec.**		**18**	**18**


Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
50
100
150
200
250
LaminateTension Strength (UNT3) [ksi]

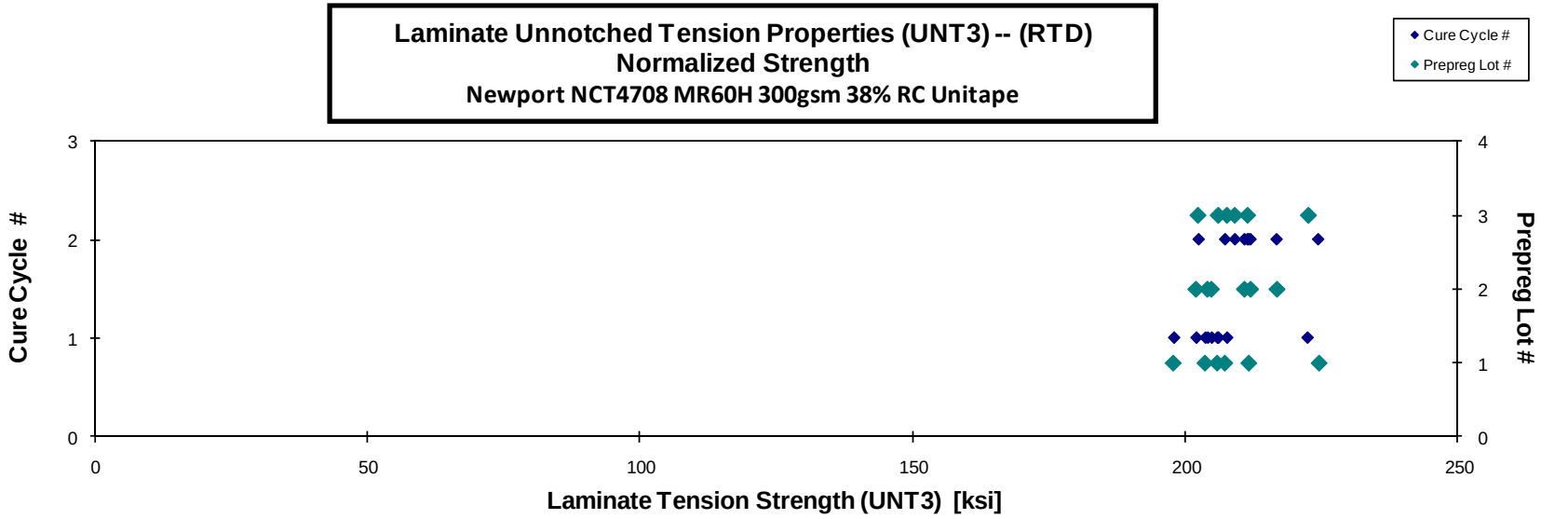

Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Laminate Tension Modulus (UNT3) [Msi]

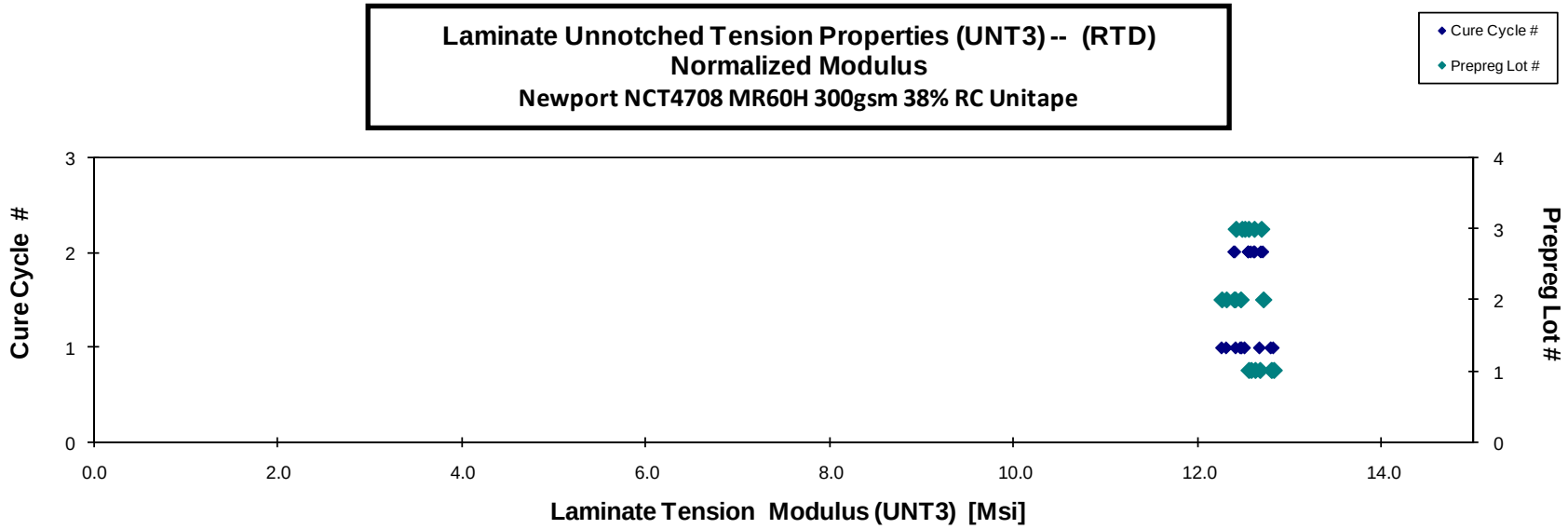
Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFCA115A	A	C1	1	1	202.518	12.599	0.139	11	XGM	0.0127	203.736	12.675
WFCA116A	A	C1	1	1	203.991	12.701	0.140	11	SGM/DGM	0.0127	205.953	12.823
WFCA117A	A	C1	1	1	196.583	12.708	0.140	11	SGM/DGM	0.0127	197.954	12.797
WFCA215A	A	C2	1	2	209.053	12.465	0.140	11	SGM/DGM	0.0128	211.718	12.624
WFCA216A	A	C2	1	2	221.326	12.402	0.141	11	SGM/DGM	0.0128	224.519	12.581
WFCA217A	A	C2	1	2	205.770	12.459	0.140	11	SGM/DGM	0.0127	207.353	12.555
WFCB115A	B	C1	2	1	201.923	12.331	0.140	11	LWT/LWB/DGM	0.0127	204.181	12.469
WFCB116A	B	C1	2	1	203.872	12.206	0.139	11	LWT/AWB/DGM	0.0127	204.902	12.267
WFCB117A	B	C1	2	1	201.769	12.297	0.139	11	AGM/DGM	0.0126	202.084	12.316
WFCB215A	B	C2	2	2	212.730	12.450	0.138	11	LGM/LWB	0.0126	212.039	12.410
WFCB216A	B	C2	2	2	212.529	12.493	0.138	11	LWT/LAB	0.0125	210.919	12.398
WFCB217A	B	C2	2	2	218.428	12.804	0.138	11	LGM/LWB	0.0125	216.852	12.711
WFCC115A	C	C1	3	1	211.192	12.625	0.136	11	AWT/DGM	0.0124	207.738	12.418
WFCC116A	C	C1	3	1	210.325	12.735	0.136	11	XGM	0.0124	206.152	12.483
WFCC117A	C	C1	3	1	227.298	12.780	0.136	11	XGM	0.0123	222.569	12.514
WFCC215A	C	C2	3	2	214.846	12.753	0.136	11	AWB/LWT	0.0124	211.487	12.554
WFCC216A	C	C2	3	2	211.447	12.828	0.137	11	LWT/LAB	0.0125	209.158	12.690
WFCC217A	C	C2	3	2	203.773	12.695	0.138	11	LWB/LAT	0.0125	202.475	12.614

Average	**209.410**	**12.574**	**$Average_{norm}$**	**0.0126**	**208.988**	**12.550**
Standard Dev.	**7.797**	**0.191**	**Standard $Dev._{norm}$**		**6.924**	**0.156**
Coeff. of Var. [%]	**3.723**	**1.517**	**Coeff. of Var. $[\%]_{norm}$**		**3.313**	**1.244**
Min.	**196.583**	**12.206**	**Min.**	**0.0123**	**197.954**	**12.267**
Max.	**227.298**	**12.828**	**Max.**	**0.0128**	**224.519**	**12.823**
Number of Spec.	**18**	**18**	**Number of Spec.**		**18**	**18**


Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
50
100
150
200
250
Laminate Tension Strength (UNT3) [ksi]


Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Laminate Tension Modulus (UNT3) [Msi]

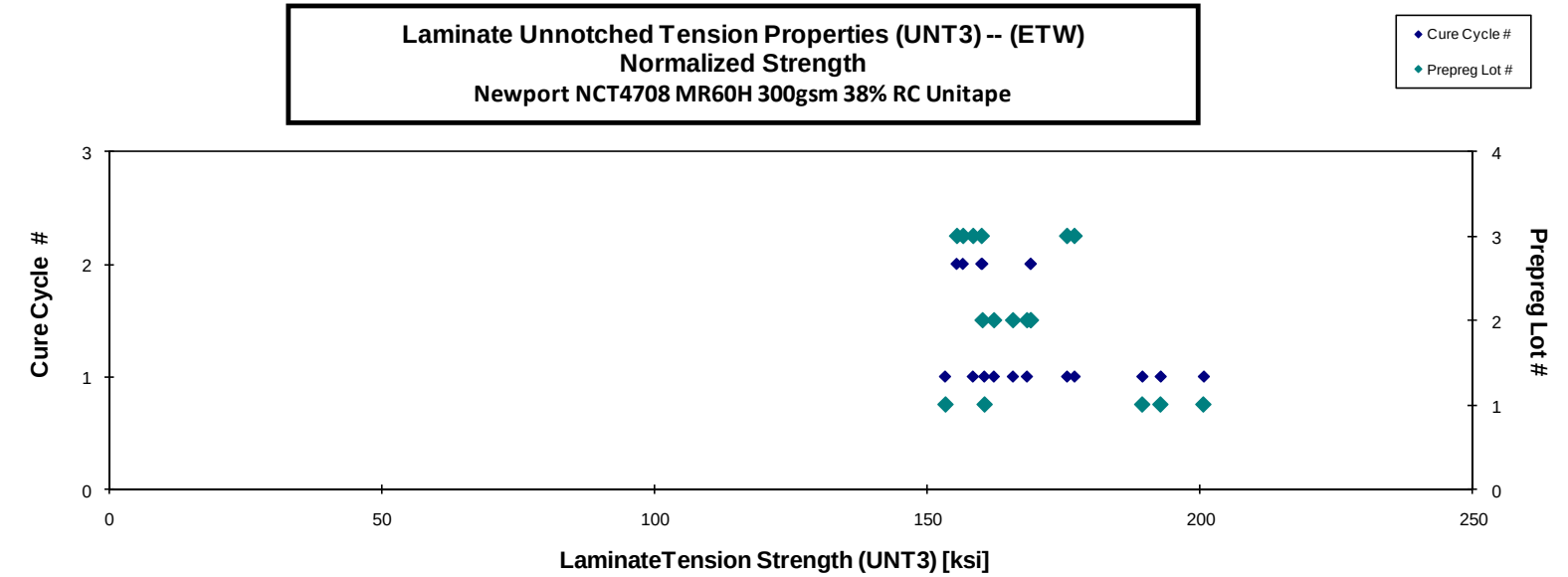
Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

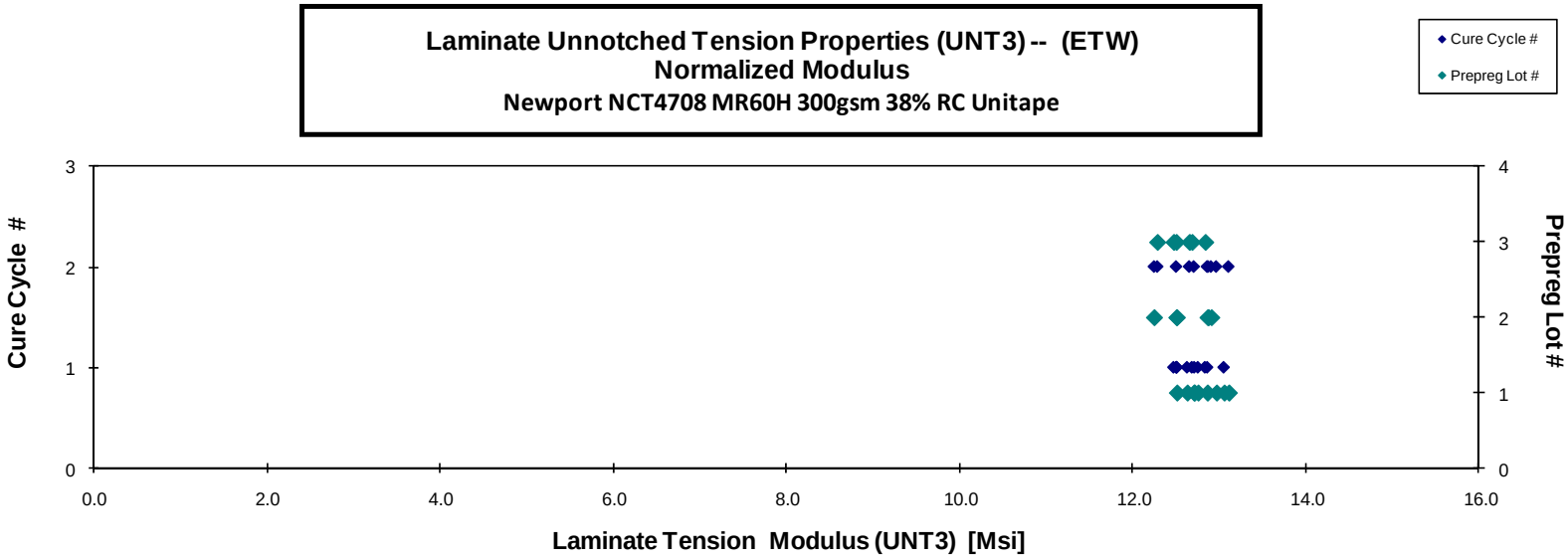
normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFCA118F	A	C1	1	1	198.289	12.909	0.140	11	XGM	0.0127	200.602	13.060
WFCA119F	A	C1	1	1	187.215	12.491	0.140	11	SGM	0.0127	189.376	12.635
WFCA11AF	A	C1	1	1	188.882	12.465	0.141	11	SGM	0.0129	192.721	12.718
WFCA11BF	A	C1	1	1	156.534	12.448	0.142	11	SGM	0.0129	160.469	12.761
WFCA11CF	A	C1	1	1	149.716	12.225	0.142	11	SGM	0.0129	153.298	12.517
WFCA218F[1]	A	C2	1	2		12.899	0.139	11	DGM	0.0127		12.972
WFCA219F[1]	A	C2	1	2		13.053	0.139	11	DGM	0.0127		13.114
WFCA21BF[1]	A	C2	1	2		12.752	0.140	11	DGM	0.0127		12.867
WFCA21CF[1]	A	C2	1	2		12.665	0.139	11	DGM	0.0126		12.713
WFCB118F	B	C1	2	1	162.190	12.510	0.139	11	SGM	0.0126	162.210	12.512
WFCB119F	B	C1	2	1	169.092	12.933	0.138	11	SGM	0.0125	168.258	12.869
WFCB11AF	B	C1	2	1	165.454	12.497	0.139	11	SGM	0.0126	165.693	12.516
WFCB218F	B	C2	2	2	161.145	12.335	0.138	11	DGM/LWT/LWB	0.0125	160.098	12.255
WFCB219F	B	C2	2	2	170.226	13.009	0.138	11	XGM	0.0125	168.957	12.912
WFCB21AF	B	C2	2	2	170.397	12.991	0.137	11	XGM	0.0125	168.922	12.878
WFCC118F	C	C1	3	1	178.699	13.069	0.136	11	XGM	0.0124	175.604	12.842
WFCC119F	C	C1	3	1	161.070	12.692	0.136	11	XGM	0.0124	158.378	12.480
WFCC11AF	C	C1	3	1	180.049	12.911	0.136	11	XGM	0.0124	176.975	12.690
WFCC218F	C	C2	3	2	160.750	12.725	0.138	11	XGM	0.0125	159.938	12.661
WFCC219F	C	C2	3	2	155.885	12.329	0.138	11	SGM	0.0126	155.417	12.292
WFCC21AF	C	C2	3	2	157.640	12.597	0.138	11	XGM	0.0125	156.540	12.509

[1] Strength data points removed due to bad failure

	Strength	Modulus		$Strength_{norm}$	$Modulus_{norm}$
Average	**169.014**	**12.691**	**Average$_{norm}$**	**169.027**	**12.704**
Standard Dev.	**13.427**	**0.262**	**Standard Dev.$_{norm}$**	**13.862**	**0.234**
Coeff. of Var. [%]	**7.944**	**2.064**	**Coeff. of Var. [%]$_{norm}$**	**8.201**	**1.838**
Min.	**149.716**	**12.225**	**Min.**	**153.298**	**12.255**
Max.	**198.289**	**13.069**	**Max.**	**200.602**	**13.114**
Number of Spec.	**17**	**21**	**Number of Spec.**	**17**	**21**


Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT3) [ksi]
0
50
100
150
200
250
0
1
2
3
4


Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT3) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
0
1
2
3
4

4.11 Unnotched Compression 1 Properties

Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

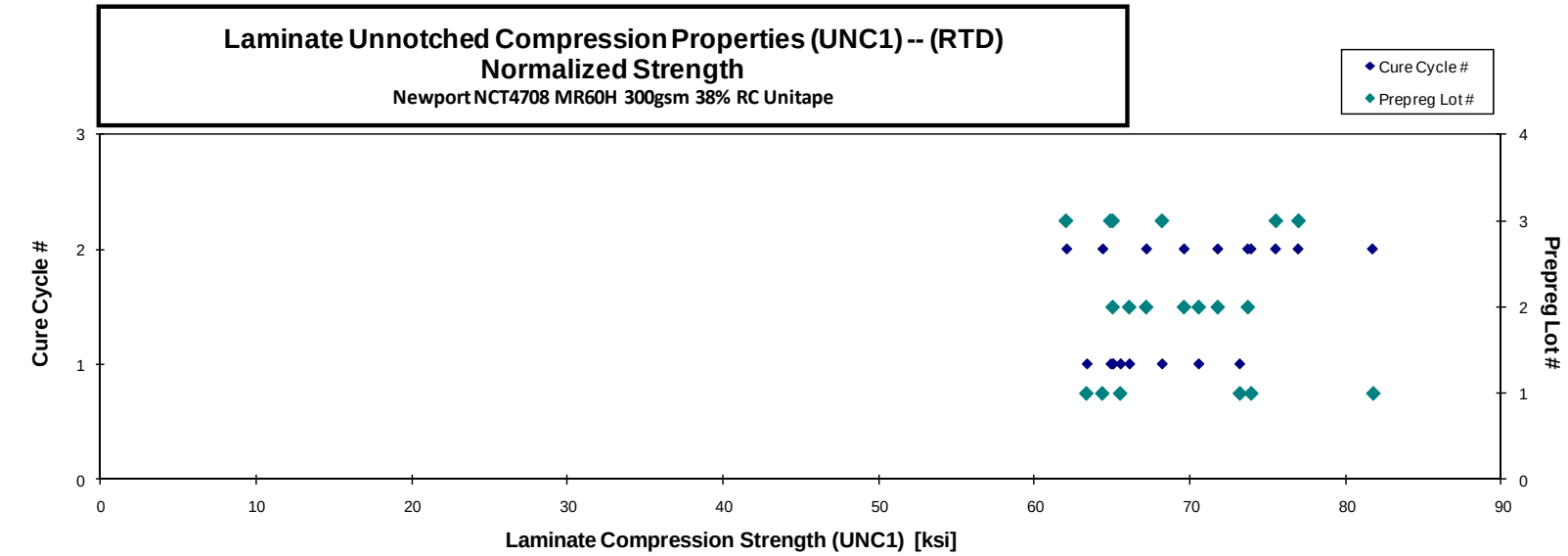
Specimen Number	Cytec Batch #	Cytec Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFWA112A	A	C1	1	1	72.653	6.388	0.336	0.102	8	BGM	0.0127	73.212	6.437
WFWA113A[1]	A	C1	1	1		6.174	0.349	0.103	8	BAT / HIB	0.0128		6.288
WFWA114A	A	C1	1	1	62.167	6.241	0.331	0.103	8	BGM	0.0128	63.369	6.361
WFWA115A[3]	A	C1	1	1	64.292			0.103	8	BAT	0.0128	65.535	
WFWA211A[1]	A	C2	1	2		6.950	0.344	0.100	8	BGM / ENDCRUSH	0.0125		6.882
WFWA212A	A	C2	1	2	74.489	6.892	0.359	0.100	8	BGM	0.0125	73.935	6.840
WFWA213A	A	C2	1	2	82.120	7.475	0.327	0.100	8	BGM	0.0125	81.764	7.443
WFWA214A[3]	A	C2	1	2	64.716			0.100	8	BGM	0.0125	64.387	
WFWB111A[1]	B	C1	2	1		6.365	0.342	0.097	8	ENDCRUSH	0.0121		6.120
WFWB112A[1]	B	C1	2	1		6.505	0.268	0.099	8	ENDCRUSH	0.0124		6.386
WFWB113A	B	C1	2	1	71.233	7.074	0.371	0.100	8	BGM	0.0125	70.570	7.009
WFWB114A[3]	B	C1	2	1	65.467			0.100	8	BGM	0.0125	65.053	
WFWB117A[3]	B	C1	2	1	66.665			0.100	8	BGM	0.0125	66.111	
WFWB211A[2]	B	C2	2	2		6.469	0.355	0.099	8	BGM	0.0124		6.380
WFWB212A	B	C2	2	2	73.809	7.069	0.358	0.101	8	BGM	0.0126	73.723	7.061
WFWB213A	B	C2	2	2	66.958	7.035	0.369	0.101	8	BGM	0.0126	67.201	7.061
WFWB214A[3]	B	C2	2	2	71.708			0.101	8	BGM	0.0126	71.791	
WFWB215A[3]	B	C2	2	2	69.473			0.101	8	BGM	0.0126	69.623	
WFWC111A[1]	C	C1	3	1		6.971	0.352	0.097	8	ENDCRUSH	0.0121		6.699
WFWC112A[1]	C	C1	3	1		6.453	0.354	0.099	8	HIB	0.0124		6.352
WFWC113A	C	C1	3	1	69.103	6.703	0.365	0.100	8	BGM	0.0124	68.212	6.617
WFWC114A[3]	C	C1	3	1	65.896			0.099	8	BGM	0.0124	64.905	
WFWC115A[3]	C	C1	3	1	66.043			0.099	8	BGM	0.0124	65.049	
WFWC211A	C	C2	3	2	65.903	6.623	0.347	0.095	8	BGM	0.0119	62.057	6.237
WFWC212A	C	C2	3	2	79.738	6.840	0.351	0.095	8	BGM	0.0119	75.519	6.478
WFWC213A[1]	C	C2	3	2		7.413	0.389	0.096	8	HIB	0.0121		7.096
WFWC216A[3]	C	C2	3	2	79.754			0.097	8	BGM	0.0122	76.972	

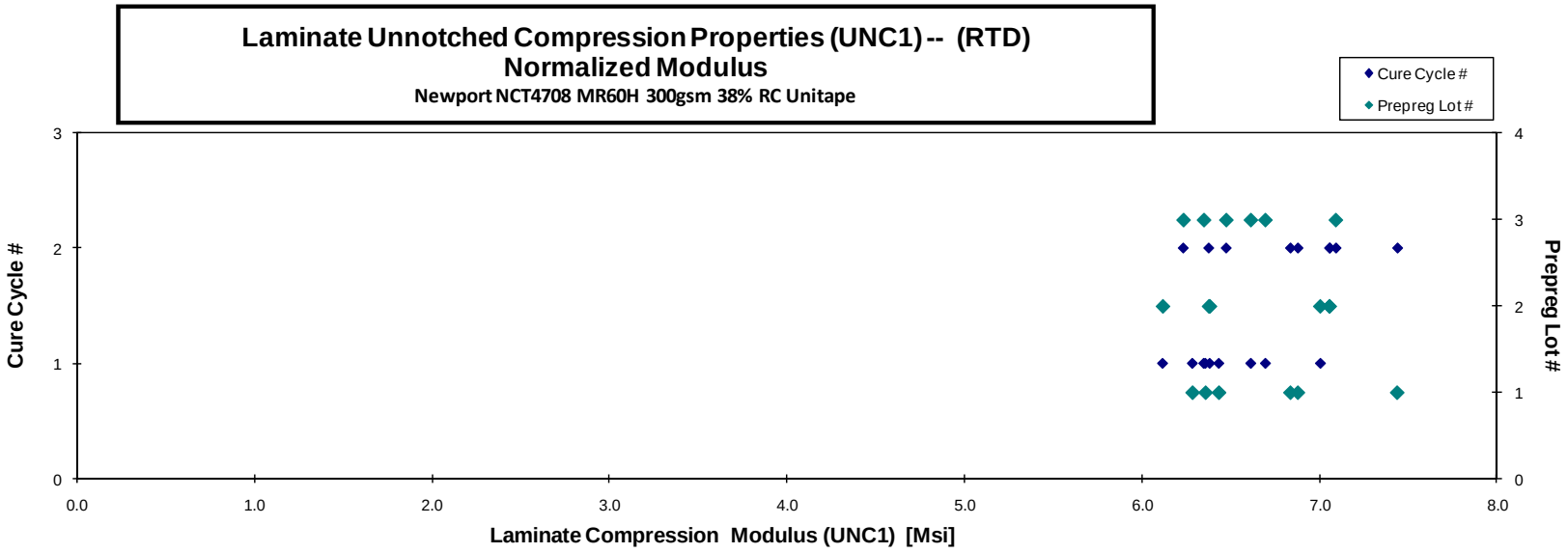
[1] Strength data points were not added due to bad failure

[2] Strength data points were not added due to thickness taper at specimen ends.

[3] modulus data was not available.

Average	**70.115**	**6.758**	**0.348**	**$Average_{norm}$**	**0.0124**	**69.420**	**6.653**
Standard Dev.	**5.754**	**0.382**	**0.025**	**$Standard\ Dev._{norm}$**		**5.344**	**0.373**
Coeff. of Var. [%]	**8.206**	**5.659**	**7.198**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.698**	**5.600**
Min.	**62.167**	**6.174**	**0.268**	**Min.**	**0.0119**	**62.057**	**6.120**
Max.	**82.120**	**7.475**	**0.389**	**Max.**	**0.0128**	**81.764**	**7.443**
Number of Spec.	**19**	**18**	**18**	**Number of Spec.**		**19**	**18**


Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC1) [ksi]
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4


Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC1) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
0
1
2
3
4

Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

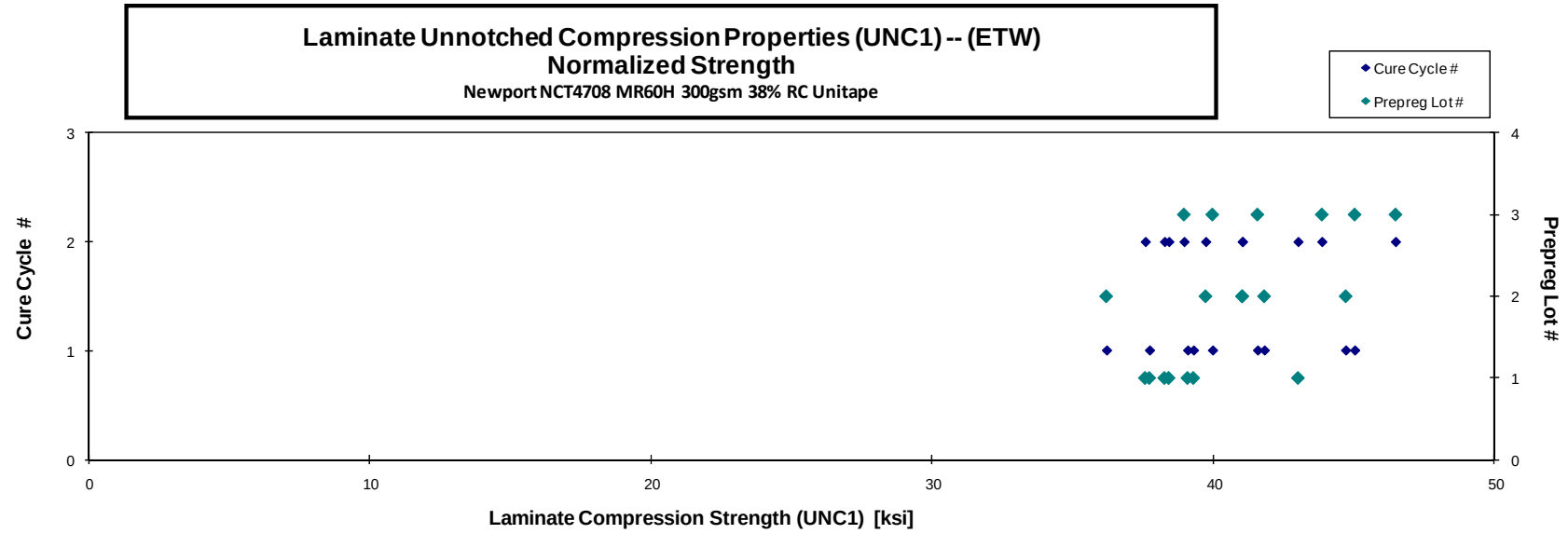
normalizing t_{ply} [in]: 0.0126

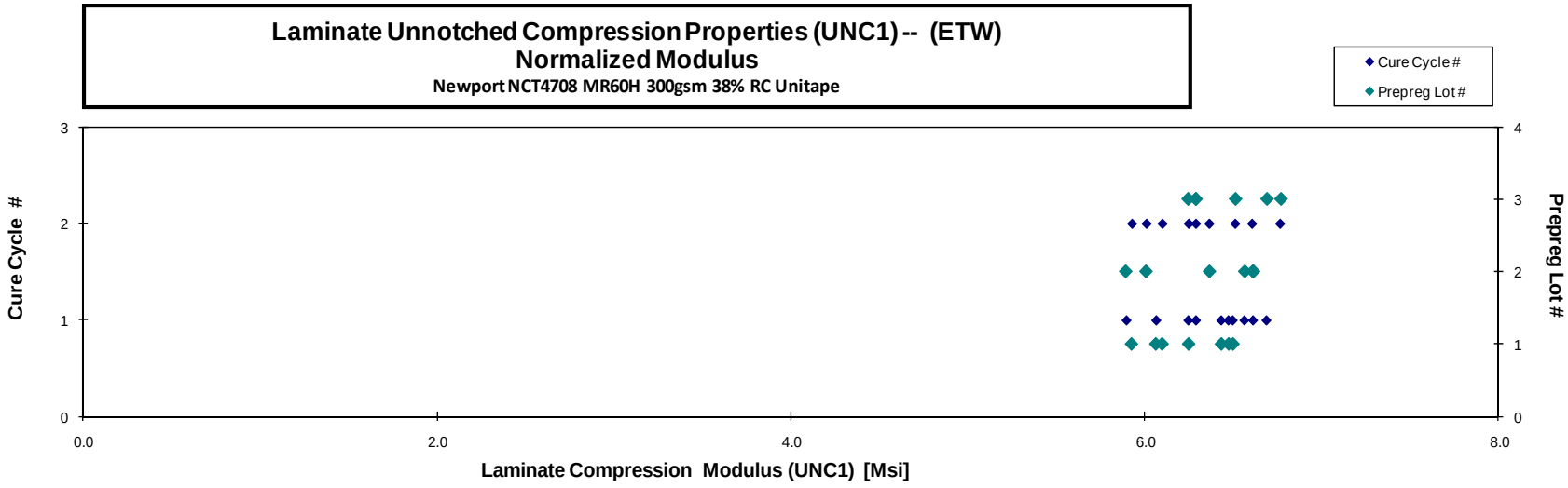
Specimen Number	Cytec Batch #	Cytec Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFWA117F[1]	A	C1	1	1		6.402	0.362	0.102	8	HIB	0.0127		6.476
WFWA119F	A	C1	1	1	37.500	6.028	0.379	0.101	8	BAB	0.0127	37.737	6.066
WFWA11AF	A	C1	1	1	38.350	6.313	0.409	0.103	8	BAB	0.0128	39.092	6.435
WFWA11DF	A	C1	1	1	38.624	6.389	0.382	0.103	8	BAB	0.0128	39.299	6.500
WFWA218F	A	C2	1	2	39.274	6.261	0.375	0.098	8	BAB	0.0123	38.270	6.101
WFWA219F[2]	A	C2	1	2	38.158			0.099	8	BAT	0.0124	37.585	
WFWA21AF	A	C2	1	2	38.716	6.298	0.370	0.100	8	BAB	0.0125	38.423	6.251
WFWA21BF	A	C2	1	2	43.381	5.979	0.398	0.100	8	BAB	0.0125	43.015	5.929
WFWB118F	B	C1	2	1	37.210	6.060	0.343	0.098	8	BAB	0.0123	36.209	5.897
WFWB119F	B	C1	2	1	45.534	6.687	0.362	0.099	8	BAB	0.0124	44.709	6.566
WFWB11AF	B	C1	2	1	42.219	6.679	0.383	0.100	8	BAB	0.0125	41.816	6.616
WFWB218F	B	C2	2	2	42.570	6.236	0.385	0.097	8	BAB	0.0121	41.036	6.011
WFWB219F	B	C2	2	2	40.470	6.486	0.391	0.099	8	BAB	0.0124	39.734	6.368
WFWB21AF	B	C2	2	2	41.413	6.671	0.410	0.100	8	BAB	0.0125	41.036	6.611
WFWC118F	C	C1	3	1	42.313	6.613	0.351	0.095	8	BAB	0.0119	39.976	6.248
WFWC119F	C	C1	3	1	42.569	6.442	0.368	0.098	8	BAB	0.0123	41.577	6.291
WFWC11AF	C	C1	3	1	45.979	6.833	0.374	0.099	8	BAB	0.0123	45.028	6.692
WFWC218F	C	C2	3	2	46.769	6.709	0.349	0.095	8	BAB	0.0118	43.862	6.292
WFWC219F	C	C2	3	2	41.113	6.874	0.357	0.096	8	BAB	0.0119	38.965	6.515
WFWC21AF	C	C2	3	2	48.762	7.102	0.392	0.096	8	BAB	0.0120	46.480	6.770

[1] Strength data points removed due to bad failure

[2] modulus data was not available due to strain error.

Average	**41.627**	**6.477**	**0.376**	**$Average_{norm}$**	**0.0124**	**40.729**	**6.349**
Standard Dev.	**3.343**	**0.305**	**0.019**	**$Standard\ Dev._{norm}$**		**2.834**	**0.260**
Coeff. of Var. [%]	**8.032**	**4.705**	**5.139**	**Coeff. of Var. $[\%]_{norm}$**		**6.958**	**4.098**
Min.	**37.210**	**5.979**	**0.343**	**Min.**	**0.0118**	**36.209**	**5.897**
Max.	**48.762**	**7.102**	**0.410**	**Max.**	**0.0128**	**46.480**	**6.770**
Number of Spec.	**19**	**19**	**19**	**Number of Spec.**		**19**	**19**


Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC1) [ksi]
0
10
20
30
40
50
0
1
2
3
4


Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC1) [Msi]
0.0
2.0
4.0
6.0
8.0
0
1
2
3
4

4.12 Unnotched Compression 2 Properties

Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

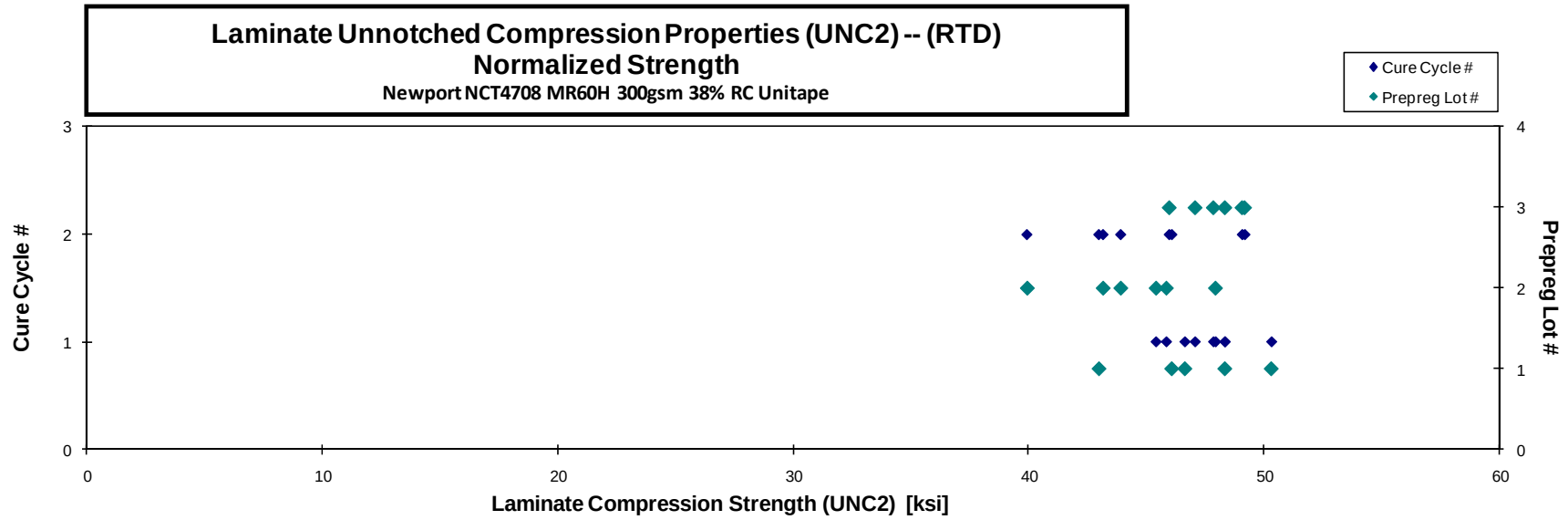
normalizing t_{ply} [in]: 0.0126

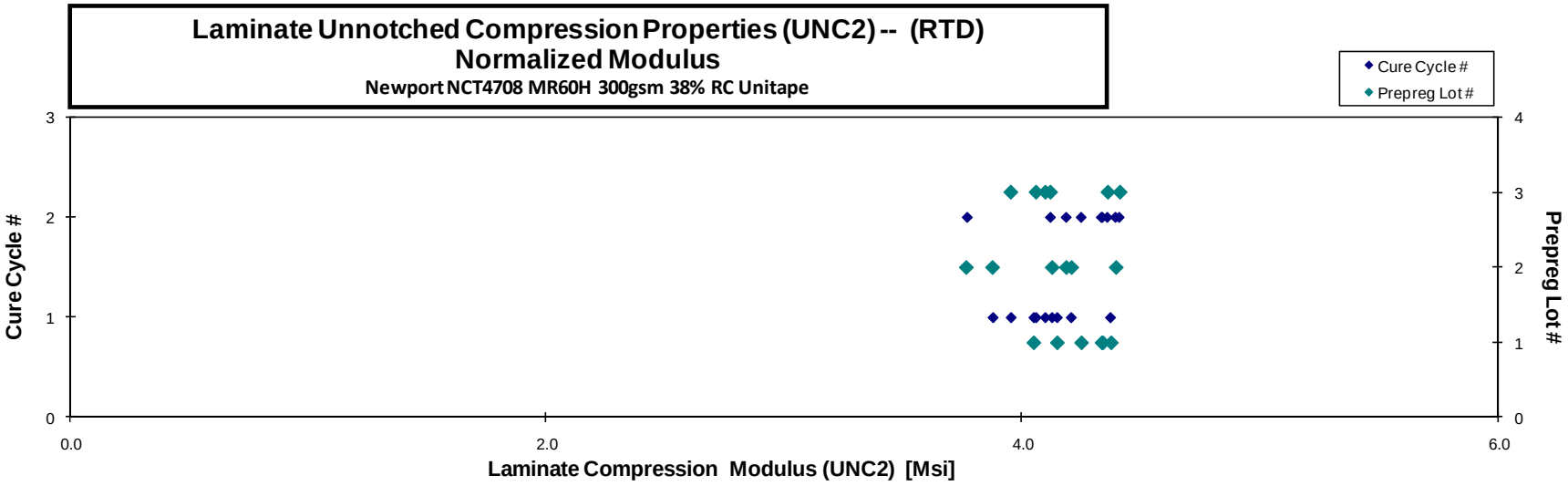
Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFXA111A	A	C1	1	1	50.615	4.172	0.538	0.138	11	BGM	0.0125	50.336	4.149
WFXA112A	A	C1	1	1	47.900	4.012	0.508	0.140	11	BGM	0.0127	48.358	4.050
WFXA113A	A	C1	1	1	45.811	4.294	0.555	0.141	11	BGM	0.0128	46.658	4.374
WFXA212A	A	C2	1	2	42.425	4.277	0.546	0.141	11	BGM	0.0128	43.007	4.335
WFXA213A[1]	A	C2	1	2		4.243	0.575	0.142	11	BGM[1]	0.0129		4.339
WFXA214A	A	C2	1	2	44.958	4.144	0.544	0.142	11	BGM	0.0129	46.102	4.250
WFXB111A	B	C1	2	1	46.149	4.274	0.560	0.136	11	BGM	0.0124	45.437	4.208
WFXB112A	B	C1	2	1	48.421	3.915	0.516	0.137	11	BGM	0.0125	47.962	3.878
WFXB113A	B	C1	2	1	46.174	4.154	0.586	0.138	11	BGM	0.0125	45.874	4.127
WFXB211A[1]	B	C2	2	2		3.853	0.484	0.136	11	BGM[1]	0.0123		3.768
WFXB212A	B	C2	2	2	40.856	4.493	0.527	0.136	11	BGM	0.0123	39.957	4.395
WFXB213A	B	C2	2	2	44.054	4.271	0.513	0.136	11	BGM	0.0124	43.185	4.186
WFXB214A[2]	B	C2	2	2	44.714			0.136	11	BGM	0.0124	43.934	
WFXC112A	C	C1	3	1	49.557	4.202	0.591	0.134	11	BGM	0.0122	47.872	4.059
WFXC113A	C	C1	3	1	49.597	4.055	0.523	0.135	11	BGM	0.0123	48.358	3.954
WFXC114A	C	C1	3	1	48.295	4.203	0.541	0.135	11	BGM	0.0123	47.093	4.098
WFXC211A	C	C2	3	2	51.095	4.591	0.552	0.133	11	BGM	0.0121	49.091	4.411
WFXC212A	C	C2	3	2	50.606	4.485	0.527	0.135	11	BGM	0.0123	49.201	4.360
WFXC213A	C	C2	3	2	47.234	4.231	0.525	0.135	11	BGM	0.0123	45.994	4.120

[1] Strength data points removed due to uneven grip area/ thickness taper

[2] modulus data w as not available

Average	**46.968**	**4.215**	**0.540**	**$Average_{norm}$**	**0.0125**	**46.378**	**4.170**
Standard Dev.	**2.961**	**0.189**	**0.028**	**$Standard\ Dev._{norm}$**		**2.673**	**0.185**
Coeff. of Var. [%]	**6.303**	**4.487**	**5.130**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**5.763**	**4.431**
Min.	**40.856**	**3.853**	**0.484**	**Min.**	**0.0121**	**39.957**	**3.768**
Max.	**51.095**	**4.591**	**0.591**	**Max.**	**0.0129**	**50.336**	**4.411**
Number of Spec.	**17**	**18**	**18**	**Number of Spec.**		**17**	**18**


Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
Laminate Compression Strength (UNC2) [ksi]


Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
Laminate Compression Modulus (UNC2) [Msi]

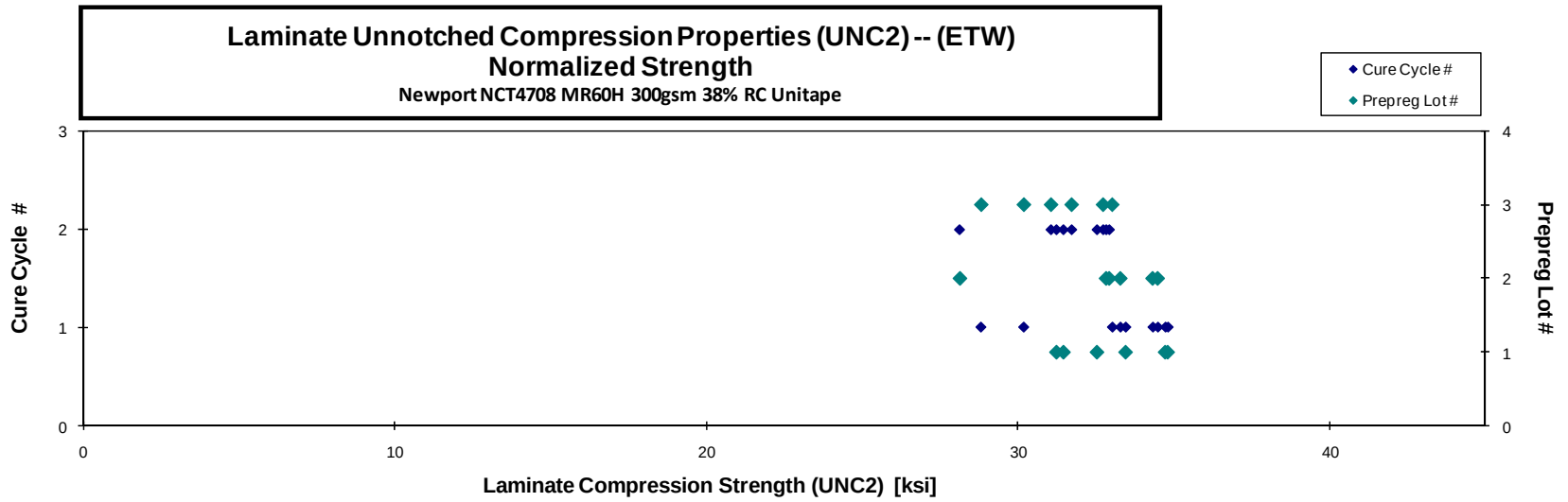
Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

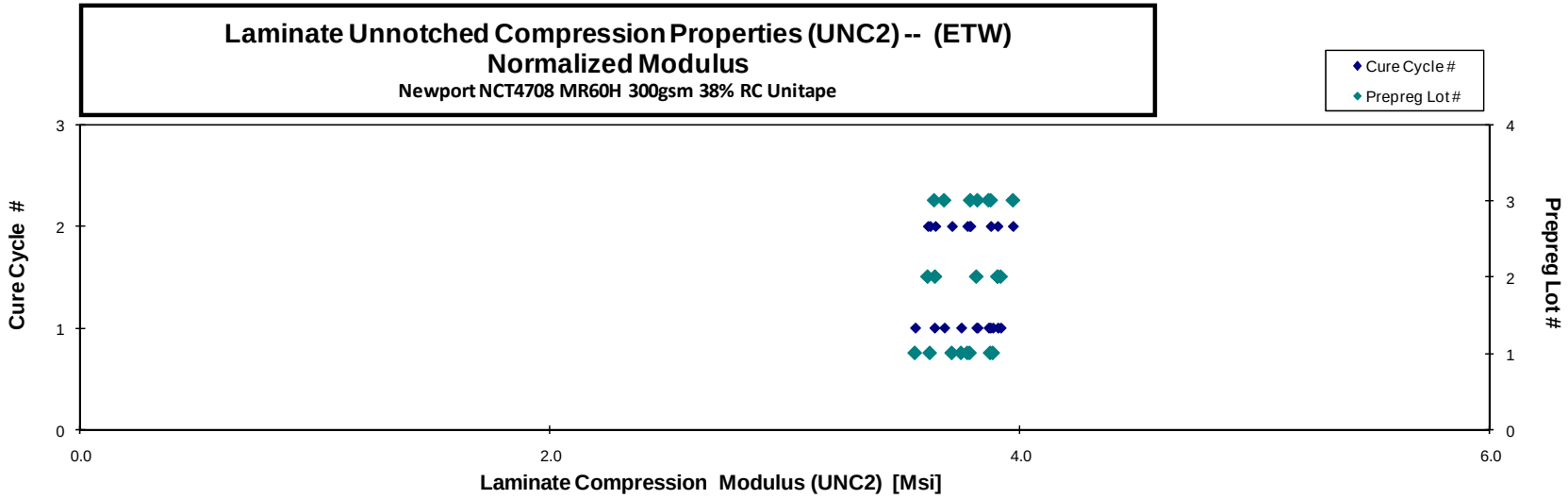
normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFXA118F[1]	A	C1	1	1		3.790	0.625	0.137	11	HIT	0.0125		3.752
WFXA119F	A	C1	1	1	34.636	3.876	0.632	0.139	11	BGM	0.0126	34.723	3.886
WFXA11AF	A	C1	1	1	34.521	3.843	0.622	0.140	11	BGM	0.0127	34.807	3.875
WFXA11BF	A	C1	1	1	33.093	3.518	0.585	0.140	11	BGM	0.0127	33.452	3.556
WFXA219F	A	C2	1	2	32.145	3.733	0.665	0.140	11	BGM	0.0128	32.530	3.778
WFXA21AF[1]	A	C2	1	2		3.555	0.648	0.141	11	HIT	0.0128		3.620
WFXA21BF	A	C2	1	2	30.607	3.712	0.688	0.141	11	BGM	0.0129	31.228	3.788
WFXA21DF	A	C2	1	2	31.099	3.671	0.665	0.140	11	BGM	0.0127	31.452	3.712
WFXB118F	B	C1	2	1	35.133	4.012	0.633	0.135	11	DGM	0.0123	34.322	3.919
WFXB119F	B	C1	2	1	35.170	3.893	0.614	0.136	11	BGM	0.0124	34.482	3.816
WFXB11AF	B	C1	2	1	33.740	3.961	0.642	0.137	11	BGM	0.0124	33.281	3.907
WFXB218F	B	C2	2	2	34.658	3.834	0.584	0.132	11	BGM	0.0120	32.924	3.642
WFXB219F	B	C2	2	2	33.792	4.021	0.611	0.135	11	BGM	0.0122	32.825	3.906
WFXB21AF	B	C2	2	2	28.682	3.682	0.646	0.136	11	BGM	0.0124	28.123	3.610
WFXC118F	C	C1	3	1	31.548	3.847	0.626	0.133	11	DGM / BGM	0.0121	30.180	3.680
WFXC119F[1]	C	C1	3	1		3.741	0.616	0.135	11	END CRUSH	0.0123		3.638
WFXC11AF	C	C1	3	1	29.474	3.957	0.635	0.135	11	BGM	0.0123	28.809	3.868
WFXC11BF	C	C1	3	1	33.881	3.920	0.653	0.135	11	DGM / BGM	0.0123	33.023	3.821
WFXC218F	C	C2	3	2	33.177	4.154	0.626	0.133	11	BGM	0.0120	31.717	3.971
WFXC219F	C	C2	3	2	32.135	3.923	0.570	0.134	11	BGM	0.0122	31.054	3.791
WFXC21AF	C	C2	3	2	33.723	3.995	0.639	0.135	11	BGM	0.0122	32.728	3.877

[1] Strength data points removed due to bad failure

Average	**32.845**	**3.840**	**0.630**	**$Average_{norm}$**	**0.0124**	**32.314**	**3.782**
Standard Dev.	**1.926**	**0.160**	**0.028**	**$Standard\ Dev._{norm}$**		**1.919**	**0.120**
Coeff. of Var. [%]	**5.865**	**4.157**	**4.456**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**5.938**	**3.173**
Min.	**28.682**	**3.518**	**0.570**	**Min.**	**0.0120**	**28.123**	**3.556**
Max.	**35.170**	**4.154**	**0.688**	**Max.**	**0.0129**	**34.807**	**3.971**
Number of Spec.	**18**	**21**	**21**	**Number of Spec.**		**18**	**21**


Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
Laminate Compression Strength (UNC2) [ksi]


Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
Laminate Compression Modulus (UNC2) [Msi]

4.13 Unnotched Compression 3 Properties

Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

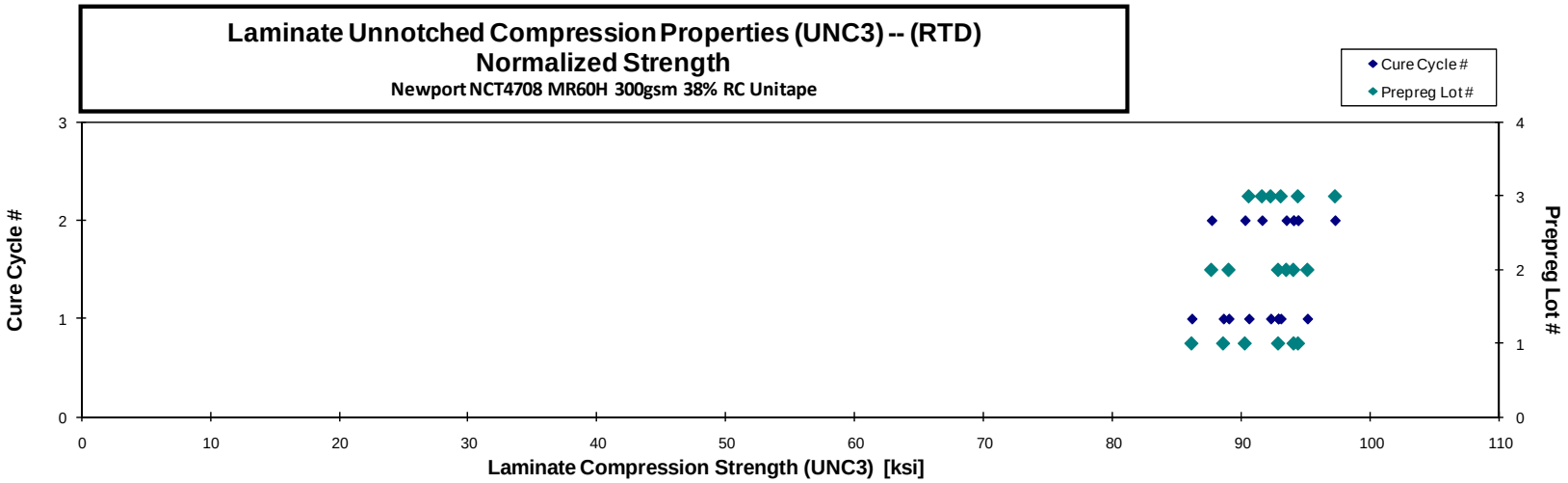
Specimen Number	Cytec Batch #	Cytec Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFYA111A[1]	A	C1	1	1		11.077	0.472	0.134	11	ENDCRUSH	0.0122		10.699
WFYA112A	A	C1	1	1	90.388	11.339	0.472	0.136	11	HAT / BGM	0.0124	88.619	11.117
WFYA113A[1]	A	C1	1	1		11.764	0.461	0.137	11	ENDCRUSH	0.0124		11.589
WFYA114A[2]	A	C1	1	1	93.934			0.137	11	BGM	0.0125	92.875	
WFYA115A[2]	A	C1	1	1	87.523			0.136	11	BGM	0.0124	86.165	
WFYA211A	A	C2	1	2	94.644	11.409	0.474	0.138	11	BGM / HAB	0.0126	94.416	11.381
WFYA212A	A	C2	1	2	88.715	11.211	0.473	0.141	11	BGM	0.0128	90.294	11.411
WFYA213A	A	C2	1	2	91.789	11.136	0.452	0.142	11	BGM	0.0129	94.074	11.413
WFYB111A[1]	B	C1	2	1		11.845	0.473	0.135	11	HIT	0.0123		11.540
WFYB112A	B	C1	2	1	96.145	11.302	0.453	0.137	11	BGM	0.0125	95.139	11.184
WFYB113A	B	C1	2	1	93.051	11.444	0.482	0.138	11	BGM	0.0126	92.872	11.422
WFYB115A[2]	B	C1	2	1	89.500			0.138	11	BGM	0.0125	89.038	
WFYB212A	B	C2	2	2	96.557	12.059	0.482	0.135	11	BGM	0.0123	94.049	11.746
WFYB213A[1]	B	C2	2	2		11.679	0.489	0.137	11	HIT	0.0125		11.544
WFYB215A	B	C2	2	2	88.724	11.628	0.489	0.137	11	BGM	0.0125	87.700	11.494
WFYB217A[2]	B	C2	2	2	94.593			0.137	11	BGM	0.0125	93.501	
WFYC111A	C	C1	3	1	94.179	11.747	0.504	0.133	11	BGM	0.0121	90.600	11.300
WFYC112A	C	C1	3	1	95.323	11.532	0.461	0.135	11	BGM	0.0123	93.076	11.260
WFYC113A[1]	C	C1	3	1		11.370	0.468	0.137	11	HIB	0.0124		11.212
WFYC114A[2]	C	C1	3	1	93.371			0.137	11	BGM	0.0125	92.293	
WFYC211A	C	C2	3	2	95.279	11.227	0.438	0.133	11	BGM	0.0121	91.618	10.796
WFYC212A[1]	C	C2	3	2		11.233	0.508	0.136	11	HIB	0.0123		10.991
WFYC213A	C	C2	3	2	95.629	11.603	0.469	0.137	11	BGM	0.0124	94.404	11.454
WFYC214A[2]	C	C2	3	2	98.418			0.137	11	BGM	0.0125	97.281	

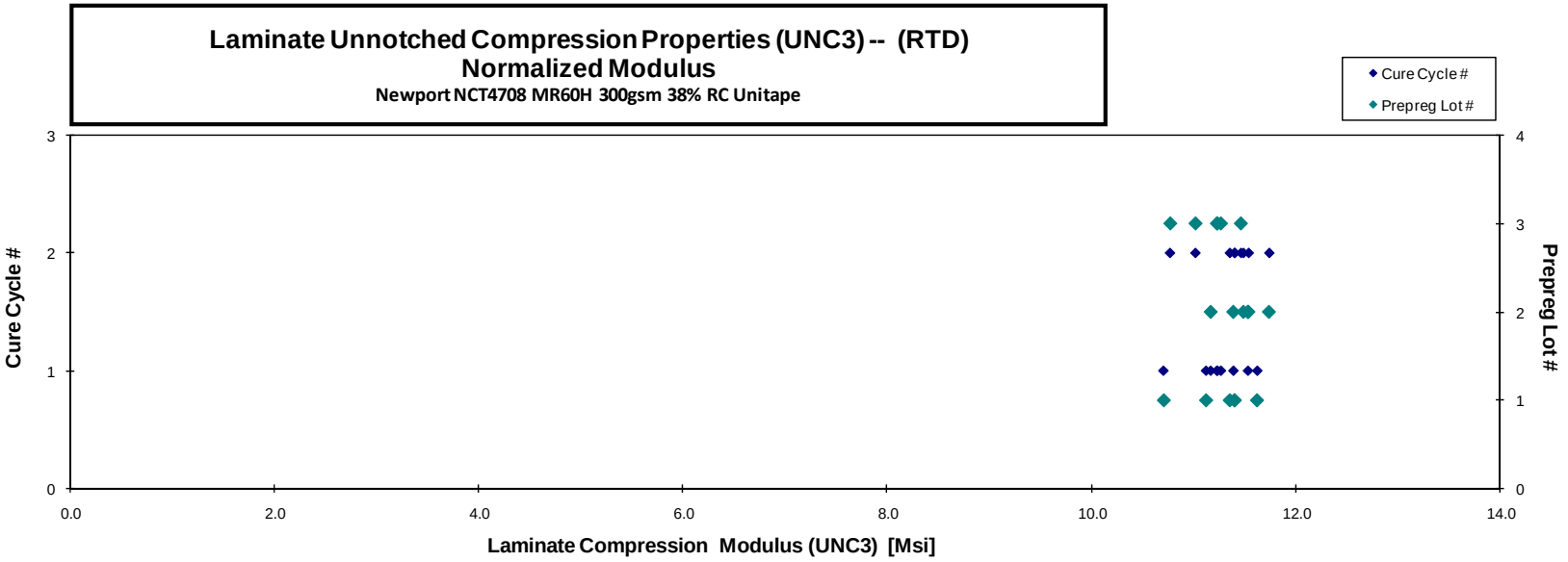
[1] Strength data points removed due to bad failure

[2] Modulus data was not available.

	Strength	Modulus	Poisson's Ratio
Average	**93.209**	**11.478**	**0.473**
Standard Dev.	**3.101**	**0.271**	**0.018**
Coeff. of Var. [%]	**3.326**	**2.360**	**3.724**
Min.	**87.523**	**11.077**	**0.438**
Max.	**98.418**	**12.059**	**0.508**
Number of Spec.	**18**	**18**	**18**

	t_{ply}	$Strength_{norm}$	$Modulus_{norm}$
$Average_{norm}$	**0.0124**	**92.112**	**11.309**
$Standard\ Dev._{norm}$		**2.874**	**0.274**
Coeff. of Var. [%]$_{norm}$		**3.120**	**2.421**
Min.	**0.0121**	**86.165**	**10.699**
Max.	**0.0129**	**97.281**	**11.746**
Number of Spec.		**18**	**18**


Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
10
20
30
40
50
60
70
80
90
100
110
Laminate Compression Strength (UNC3) [ksi]


Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Laminate Compression Modulus (UNC3) [Msi]

Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Strength & Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape

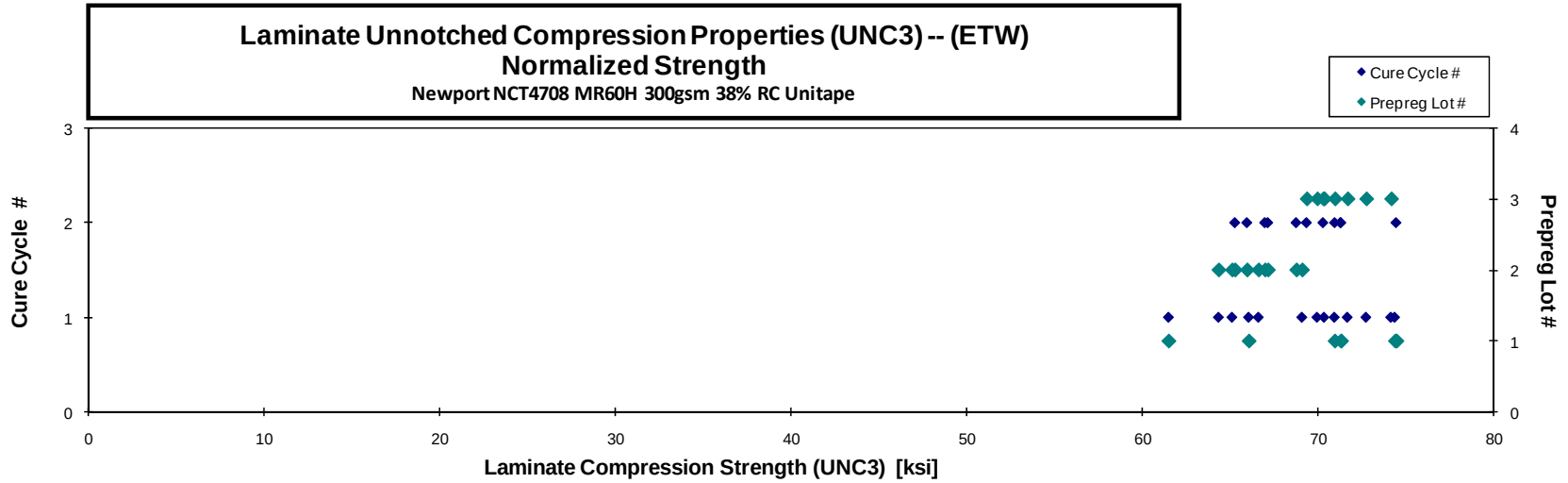
normalizing t_{ply} [in]: 0.0126

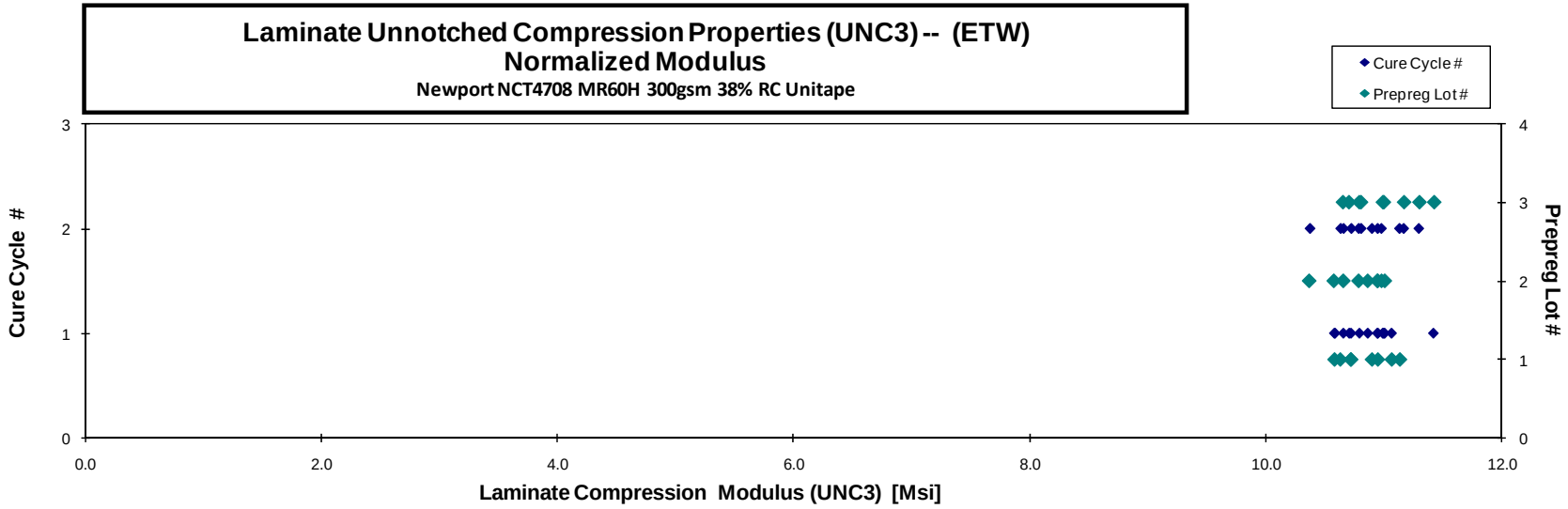
Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
WFYA119F	A	C1	1	1	67.187	10.761	0.482	0.136	11	BAB	0.0124	66.102	10.587
WFYA11BF	A	C1	1	1	75.069	11.165	0.490	0.137	11	HIT / HAB	0.0125	74.419	11.068
WFYA11CF	A	C1	1	1	62.394	11.104	0.516	0.137	11	BAB	0.0124	61.539	10.952
WFYA11DF	A	C1	1	1	72.135	10.897	0.517	0.136	11	HIT / HAB	0.0124	70.984	10.723
WFYA218F	A	C2	1	2	71.677	11.191	0.550	0.138	11	BAB	0.0125	71.333	11.137
WFYA219F	A	C2	1	2	73.597	10.596	0.520	0.140	11	BAB	0.0128	74.500	10.726
WFYA21AF[1]	A	C2	1	2		10.680	0.487	0.141	11	HIT	0.0129		10.902
WFYA21BF	A	C2	1	2	70.140	10.455	0.539	0.141	11	BAB	0.0128	71.355	10.636
WFYB118F	B	C1	2	1	69.490	11.478	0.521	0.133	11	BGM / BIT	0.0121	66.657	11.010
WFYB119F	B	C1	2	1	66.319	11.060	0.515	0.136	11	BAB	0.0124	65.154	10.866
WFYB11AF	B	C1	2	1	64.815	10.652	0.524	0.138	11	BAB	0.0125	64.387	10.581
WFYB11BF	B	C1	2	1	69.328	10.978	0.506	0.138	11	BAB / HIB	0.0126	69.136	10.948
WFYB21AF	B	C2	2	2	66.240	10.942	0.531	0.137	11	HIT / BAB	0.0124	65.316	10.789
WFYB21BF	B	C2	2	2	66.609	10.469	0.550	0.137	11	BAB	0.0125	66.001	10.374
WFYB21CF	B	C2	2	2	67.314	10.707	0.547	0.138	11	HIT / BAB	0.0125	67.022	10.660
WFYB21DF	B	C2	2	2	67.813	11.083	0.527	0.137	11	BAB	0.0125	67.193	10.982
WFYB21EF	B	C2	2	2	69.106	10.998	0.519	0.138	11	HIT / BAB	0.0125	68.807	10.950
WFYC118F	C	C1	3	1	75.118	11.163	0.525	0.132	11	HIT / BAT	0.0120	71.722	10.658
WFYC119F	C	C1	3	1	72.580	11.847	0.508	0.134	11	HIB / BAB	0.0122	69.997	11.426
WFYC11AF	C	C1	3	1	72.272	11.287	0.484	0.135	11	HIB / BAB	0.0123	70.395	10.994
WFYC11BF	C	C1	3	1	74.542	10.967	0.538	0.135	11	HIB / BAB	0.0123	72.785	10.708
WFYC11CF[1]	C	C1	3	1		11.083	0.502	0.135	11	HIT	0.0123		10.795
WFYC11DF	C	C1	3	1	75.621	11.212	0.505	0.136	11	HIT / BAT	0.0124	74.203	11.001
WFYC219F	C	C2	3	2	71.098	11.074	0.456	0.135	11	BAB	0.0123	69.399	10.810
WFYC21AF	C	C2	3	2	71.412	11.474	0.499	0.137	11	BAB	0.0124	70.336	11.301
WFYC21BF	C	C2	3	2	72.016	11.331	0.517	0.137	11	BAB	0.0124	71.002	11.172

[1] Strength data points removed due to bad failure

	Strength [ksi]	Modulus [Msi]	Poisson's Ratio
Average	**70.162**	**11.025**	**0.514**
Standard Dev.	**3.540**	**0.325**	**0.023**
Coeff. of Var. [%]	**5.046**	**2.947**	**4.393**
Min.	**62.394**	**10.455**	**0.456**
Max.	**75.621**	**11.847**	**0.550**
Number of Spec.	**24**	**26**	**26**

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	**0.0124**	**69.156**	**10.875**
$Standard\ Dev._{norm}$		**3.408**	**0.238**
Coeff. of Var. $[\%]_{norm}$		**4.928**	**2.190**
Min.	**0.0120**	**61.539**	**10.374**
Max.	**0.0129**	**74.500**	**11.426**
Number of Spec.		**24**	**26**


Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC3) [ksi]
0
10
20
30
40
50
60
70
80


Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Normalized Modulus
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC3) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0

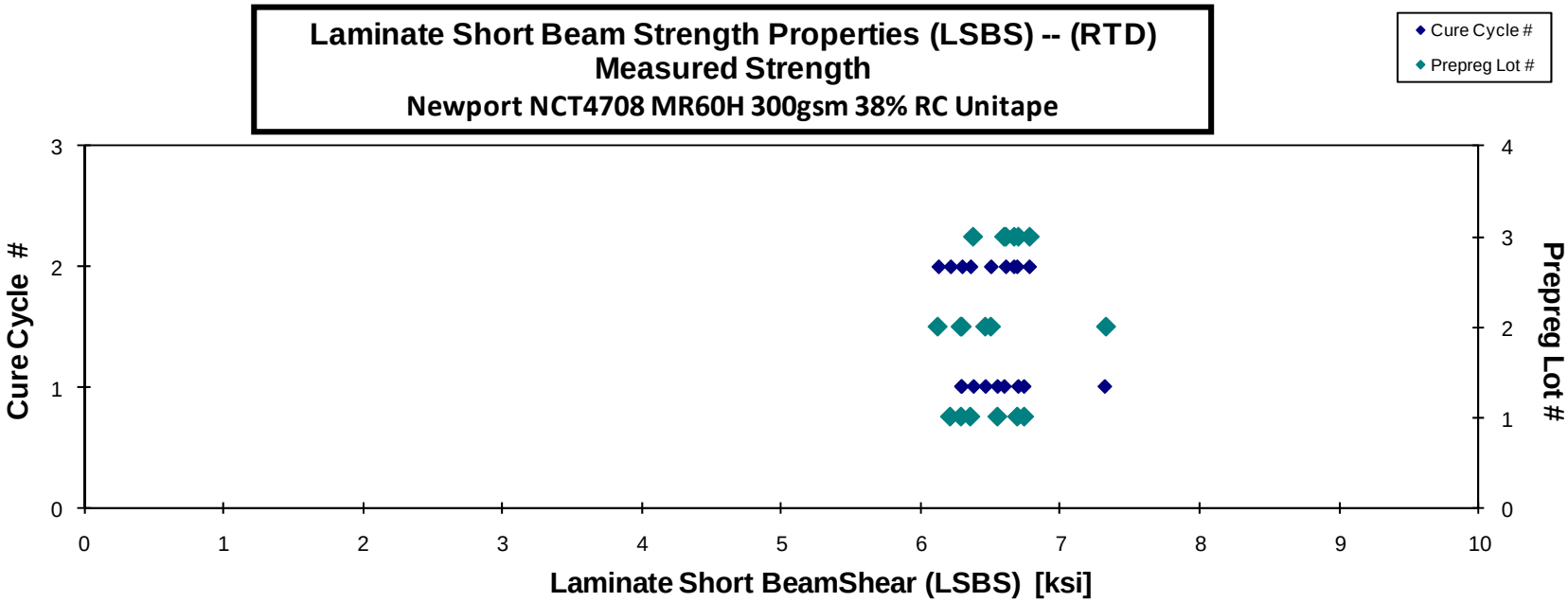
4.14 Laminate Short Beam Strength Properties

Laminate Short Beam Strength Properties (LSBS) -- (RTD) Strength

Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
WFqA111A	A	C1	1	1	6.743	0.200	16	0.0125	Interlaminar Shear
WFqA112A	A	C1	1	1	6.552	0.202	16	0.0127	Interlaminar Shear
WFqA113A	A	C1	1	1	6.292	0.203	16	0.0127	Interlaminar Shear
WFqA213A	A	C2	1	2	6.693	0.203	16	0.0127	Interlaminar Shear
WFqA214A	A	C2	1	2	6.214	0.203	16	0.0127	Interlaminar Shear
WFqA216A	A	C2	1	2	6.358	0.203	16	0.0127	Interlaminar Shear
WFqB112A	B	C1	2	1	6.290	0.197	16	0.0123	Interlaminar Shear
WFqB113A	B	C1	2	1	7.326	0.197	16	0.0123	Interlaminar Shear
WFqB114A	B	C1	2	1	6.465	0.197	16	0.0123	Interlaminar Shear
WFqB212A	B	C2	2	2	6.505	0.200	16	0.0125	Interlaminar Shear
WFqB213A	B	C2	2	2	6.126	0.201	16	0.0126	Interlaminar Shear
WFqB214A	B	C2	2	2	6.297	0.202	16	0.0126	Interlaminar Shear
WFqC112A	C	C1	3	1	6.702	0.197	16	0.0123	Interlaminar Shear
WFqC113A	C	C1	3	1	6.600	0.198	16	0.0124	Interlaminar Shear
WFqC114A	C	C1	3	1	6.378	0.199	16	0.0124	Interlaminar Shear
WFqC212A	C	C2	3	2	6.782	0.199	16	0.0124	Interlaminar Shear
WFqC213A	C	C2	3	2	6.671	0.199	16	0.0125	Interlaminar Shear
WFqC214A	C	C2	3	2	6.612	0.199	16	0.0125	Interlaminar Shear

Average	**6.534**	**Average**	**0.0125**
Standard Dev.	**0.279**	**Standard Dev.**	
Coeff. of Var. [%]	**4.264**	**Coeff. of Var. [%]**	
Min.	**6.126**	**Min.**	**0.0123**
Max.	**7.326**	**Max.**	**0.0127**
Number of Spec.	**18**	**Number of Spec.**	**18**

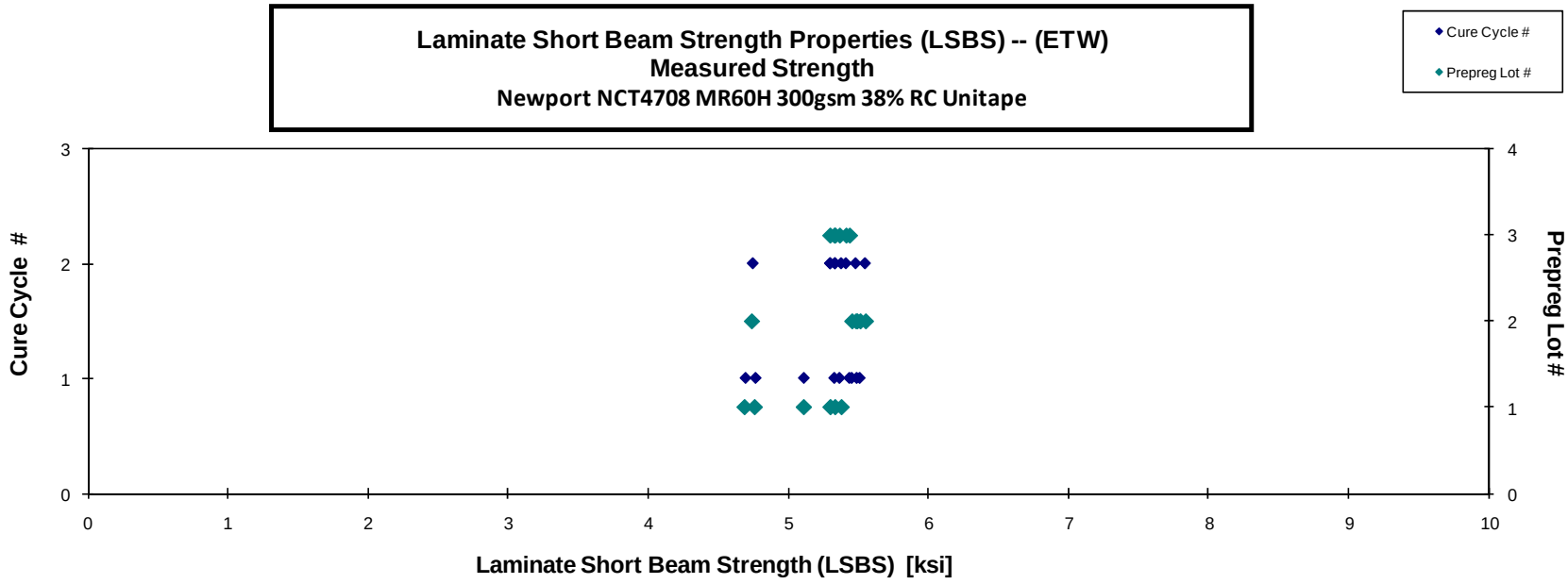

Laminate Short Beam Strength Properties (LSBS) -- (RTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Short BeamShear (LSBS) [ksi]
0
1
2
3
4
5
6
7
8
9
10

Laminate Short Beam Strength Properties (LSBS) -- (ETW) Strength

Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
WFqA117F	A	C1	1	1	4.690	0.207	16	0.0129	Interlaminar Shear
WFqA119F	A	C1	1	1	4.762	0.206	16	0.0129	Interlaminar Shear
WFqA11CF	A	C1	1	1	5.110	0.204	16	0.0128	Interlaminar Shear
WFqA217F	A	C2	1	2	5.333	0.203	16	0.0127	Interlaminar Shear
WFqA21BF	A	C2	1	2	5.299	0.203	16	0.0127	Interlaminar Shear
WFqA21CF	A	C2	1	2	5.378	0.194	16	0.0122	Interlaminar Shear
WFqB117F	B	C1	2	1	5.512	0.197	16	0.0123	Interlaminar Shear
WFqB118F	B	C1	2	1	5.454	0.197	16	0.0123	Interlaminar Shear
WFqB119F	B	C1	2	1	5.490	0.197	16	0.0123	Interlaminar Shear
WFqB217F	B	C2	2	2	4.742	0.201	16	0.0126	Interlaminar Shear
WFqB21BF	B	C2	2	2	5.482	0.200	16	0.0125	Interlaminar Shear
WFqB21CF	B	C2	2	2	5.550	0.196	16	0.0123	Interlaminar Shear
WFqC116F	C	C1	3	1	5.366	0.198	16	0.0124	Interlaminar Shear
WFqC117F	C	C1	3	1	5.329	0.198	16	0.0124	Interlaminar Shear
WFqC118F	C	C1	3	1	5.437	0.199	16	0.0124	Interlaminar Shear
WFqC216F	C	C2	3	2	5.412	0.199	16	0.0124	Interlaminar Shear
WFqC217F	C	C2	3	2	5.298	0.199	16	0.0125	Interlaminar Shear
WFqC21BF	C	C2	3	2	5.334	0.198	16	0.0124	Interlaminar Shear

Average	**5.277**	**Average**	**0.0125**
Standard Dev.	**0.271**	**Standard Dev.**	
Coeff. of Var. [%]	**5.128**	**Coeff. of Var. [%]**	
Min.	**4.690**	**Min.**	**0.0122**
Max.	**5.550**	**Max.**	**0.0129**
Number of Spec.	**18**	**Number of Spec.**	**18**


Laminate Short Beam Strength Properties (LSBS) -- (ETW)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Short Beam Strength (LSBS) [ksi]
0
1
2
3
4
5
6
7
8
9
10

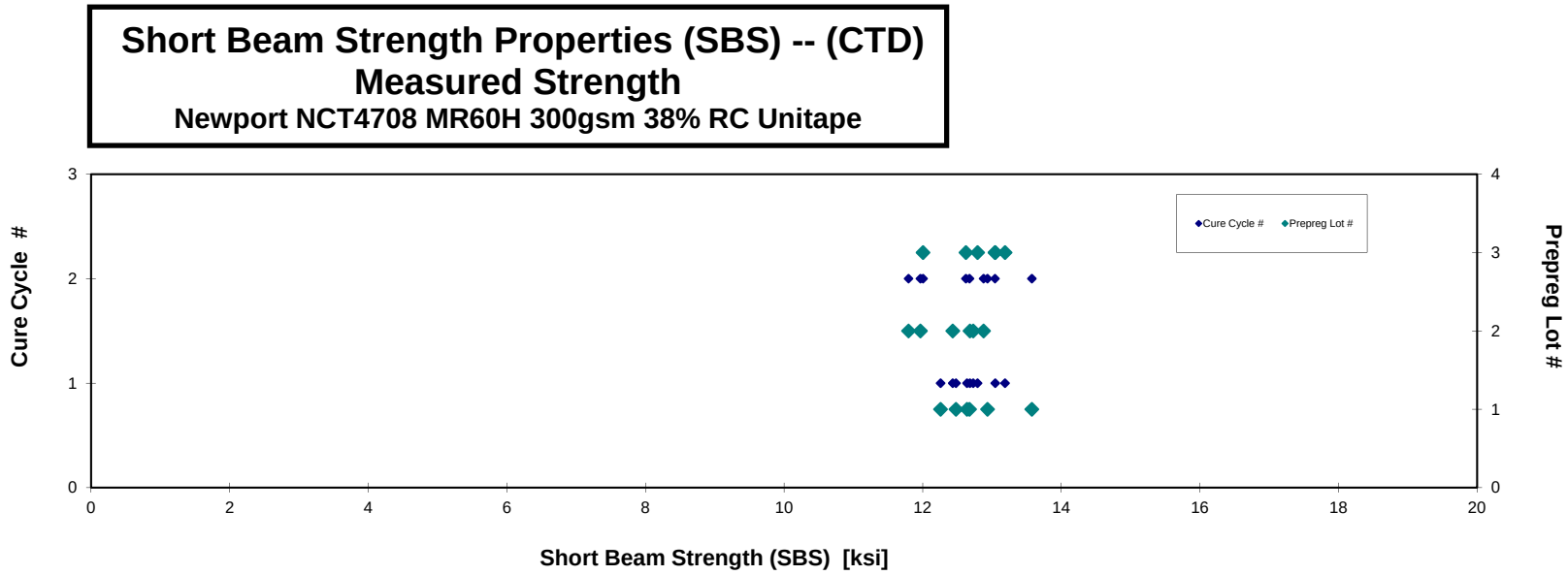
4.15 Lamina Short Beam Strength Properties

Short Beam Strength Properties (SBS) -- (CTD)

Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
WFQA113B	A	C1	1	1	12.257	0.261	21	0.0124	INTERLAMINAR SHEAR
WFQA114B	A	C1	1	1	12.479	0.267	21	0.0127	INTERLAMINAR SHEAR
WFQA115B	A	C1	1	1	12.639	0.269	21	0.0128	INTERLAMINAR SHEAR
WFQA213B	A	C2	1	2	13.574	0.265	21	0.0126	INTERLAMINAR SHEAR
WFQA214B	A	C2	1	2	12.674	0.271	21	0.0129	INTERLAMINAR SHEAR
WFQA215B	A	C2	1	2	12.935	0.273	21	0.0130	INTERLAMINAR SHEAR
WFQB113B	B	C1	2	1	12.728	0.266	21	0.0127	INTERLAMINAR SHEAR
WFQB11EB	B	C1	2	1	12.682	0.266	21	0.0127	INTERLAMINAR SHEAR
WFQB11GB	B	C1	2	1	12.433	0.267	21	0.0127	INTERLAMINAR SHEAR
WFQB213B	B	C2	2	2	11.795	0.259	21	0.0123	INTERLAMINAR SHEAR
WFQB214B	B	C2	2	2	11.966	0.265	21	0.0126	INTERLAMINAR SHEAR
WFQB215B	B	C2	2	2	12.878	0.268	21	0.0128	INTERLAMINAR SHEAR
WFQC112B	C	C1	3	1	13.188	0.254	21	0.0121	INTERLAMINAR SHEAR
WFQC113B	C	C1	3	1	13.046	0.258	21	0.0123	INTERLAMINAR SHEAR
WFQC114B	C	C1	3	1	12.791	0.260	21	0.0124	INTERLAMINAR SHEAR
WFQC212B	C	C2	3	2	12.623	0.259	21	0.0124	INTERLAMINAR SHEAR
WFQC213B	C	C2	3	2	12.004	0.268	21	0.0127	INTERLAMINAR SHEAR
WFQC214B	C	C2	3	2	13.043	0.268	21	0.0128	INTERLAMINAR SHEAR

Average	**12.652**	**Average**	**0.0126**
Standard Dev.	**0.451**	**Standard Dev.**	
Coeff. of Var. [%]	**3.567**	**Coeff. of Var. [%]**	
Min.	**11.795**	**Min.**	**0.0121**
Max.	**13.574**	**Max.**	**0.0130**
Number of Spec.	**18**	**Number of Spec.**	**18**

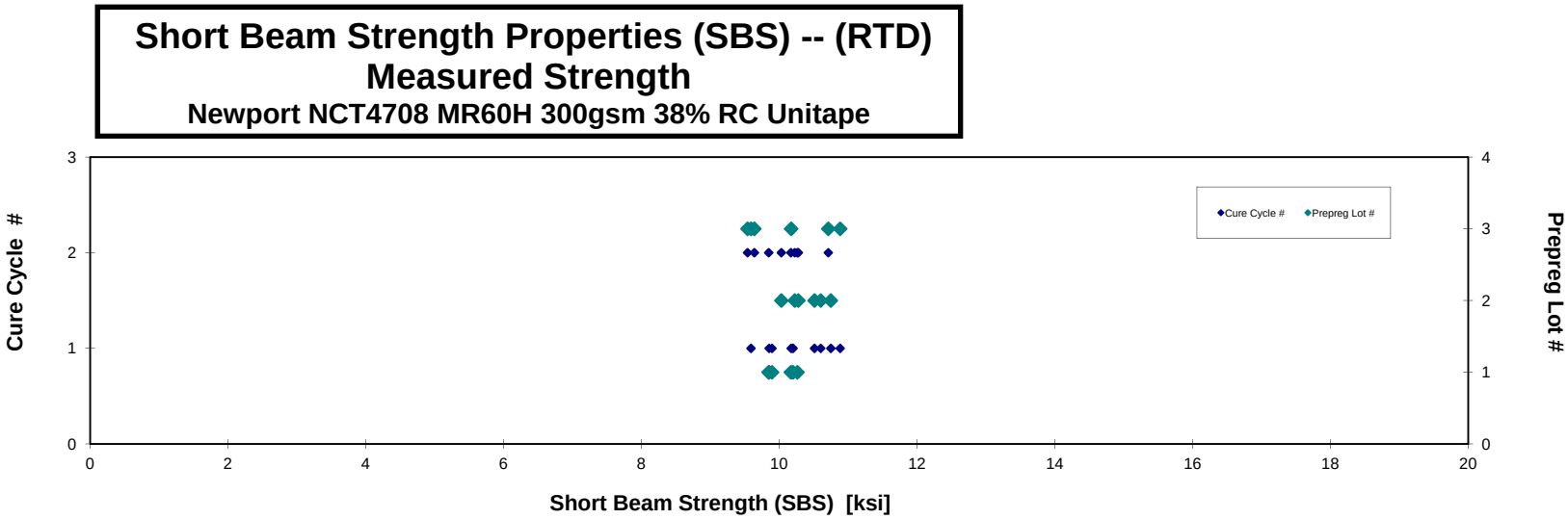

Short Beam Strength Properties (SBS) -- (CTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
2
4
6
8
10
12
14
16
18
20
Short Beam Strength (SBS) [ksi]

Short Beam Strength Properties (SBS) -- (RTD)

Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
WFQA116A	A	C1	1	1	10.200	0.270	21	0.0128	INTERLAMINAR SHEAR
WFQA117A	A	C1	1	1	9.853	0.268	21	0.0127	INTERLAMINAR SHEAR
WFQA118A	A	C1	1	1	9.895	0.264	21	0.0126	INTERLAMINAR SHEAR
WFQA216A	A	C2	1	2	10.264	0.274	21	0.0131	INTERLAMINAR SHEAR
WFQA217A	A	C2	1	2	9.847	0.274	21	0.0130	INTERLAMINAR SHEAR
WFQA218A	A	C2	1	2	10.169	0.271	21	0.0129	INTERLAMINAR SHEAR
WFQB116A	B	C1	2	1	10.512	0.271	21	0.0129	INTERLAMINAR SHEAR
WFQB117A	B	C1	2	1	10.602	0.268	21	0.0128	INTERLAMINAR SHEAR
WFQB11AA	B	C1	2	1	10.748	0.248	21	0.0118	INTERLAMINAR SHEAR
WFQB216A	B	C2	2	2	10.277	0.269	21	0.0128	INTERLAMINAR SHEAR
WFQB217A	B	C2	2	2	10.031	0.269	21	0.0128	INTERLAMINAR SHEAR
WFQB218A	B	C2	2	2	10.225	0.266	21	0.0127	INTERLAMINAR SHEAR
WFQC115A	C	C1	3	1	10.884	0.260	21	0.0124	INTERLAMINAR SHEAR
WFQC116A	C	C1	3	1	10.173	0.260	21	0.0124	INTERLAMINAR SHEAR
WFQC117A	C	C1	3	1	9.590	0.259	21	0.0123	INTERLAMINAR SHEAR
WFQC215A	C	C2	3	2	10.712	0.260	21	0.0124	INTERLAMINAR SHEAR
WFQC216A	C	C2	3	2	9.638	0.261	21	0.0124	INTERLAMINAR SHEAR
WFQC217A	C	C2	3	2	9.540	0.262	21	0.0125	INTERLAMINAR SHEAR

Average	**10.176**	**Average**	**0.0126**
Standard Dev.	**0.405**	**Standard Dev.**	
Coeff. of Var. [%]	**3.975**	**Coeff. of Var. [%]**	
Min.	**9.540**	**Min.**	**0.0118**
Max.	**10.884**	**Max.**	**0.0131**
Number of Spec.	**18**	**Number of Spec.**	**18**

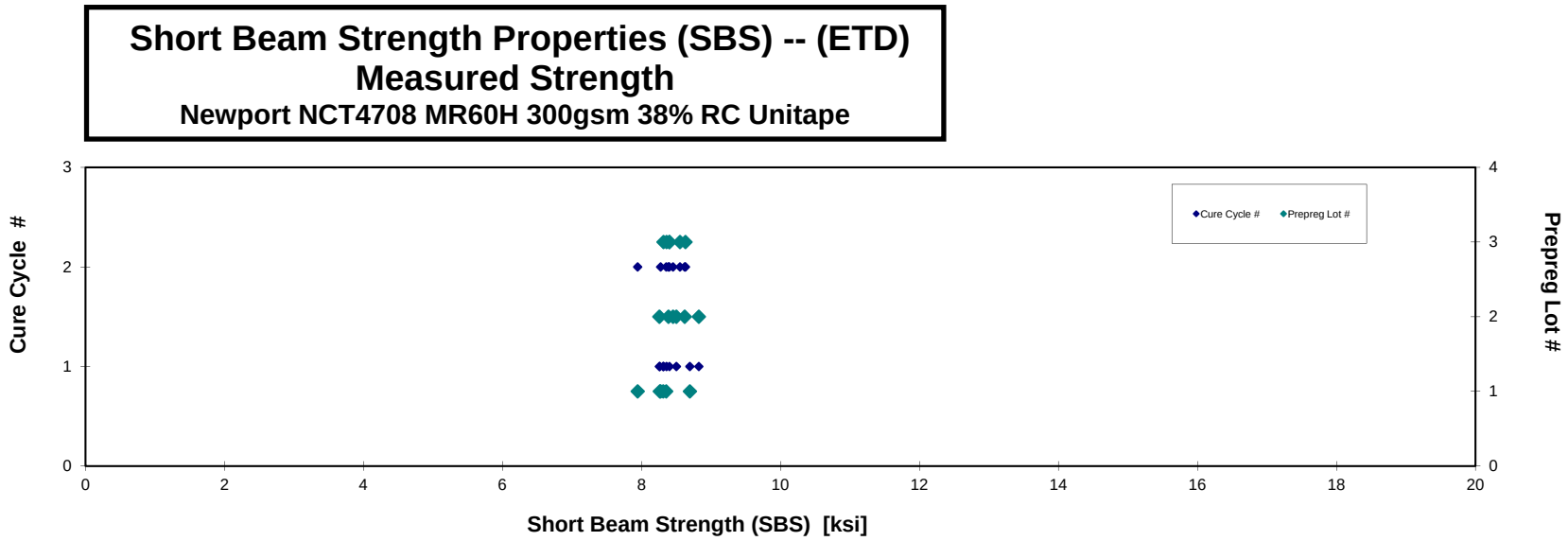

Short Beam Strength Properties (SBS) -- (RTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short Beam Strength (SBS) [ksi]
0
1
2
3
4
0
2
4
6
8
10
12
14
16
18
20

Short Beam Strength Properties (SBS) -- (ETD)

Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
WFQA11BG	A	C1	1	1	8.311	0.250	21	0.0119	INTERLAMINAR SHEAR
WFQA11DG	A	C1	1	1	8.695	0.265	21	0.0126	INTERLAMINAR SHEAR
WFQA11FG	A	C1	1	1	8.263	0.274	21	0.0131	INTERLAMINAR SHEAR
WFQA21CG	A	C2	1	2	7.944	0.258	21	0.0123	INTERLAMINAR SHEAR
WFQA21DG	A	C2	1	2	8.275	0.267	21	0.0127	INTERLAMINAR SHEAR
WFQA21EG	A	C2	1	2	8.355	0.273	21	0.0130	INTERLAMINAR SHEAR
WFQB11BG	B	C1	2	1	8.257	0.249	21	0.0119	INTERLAMINAR SHEAR
WFQB11CG	B	C1	2	1	8.824	0.256	21	0.0122	INTERLAMINAR SHEAR
WFQB11DG	B	C1	2	1	8.501	0.262	21	0.0125	INTERLAMINAR SHEAR
WFQB21CG	B	C2	2	2	8.622	0.248	21	0.0118	INTERLAMINAR SHEAR
WFQB21DG	B	C2	2	2	8.387	0.257	21	0.0122	INTERLAMINAR SHEAR
WFQB21EG	B	C2	2	2	8.454	0.263	21	0.0125	INTERLAMINAR SHEAR
WFQC119G	C	C1	3	1	8.402	0.256	21	0.0122	INTERLAMINAR SHEAR
WFQC11AG	C	C1	3	1	8.316	0.253	21	0.0120	INTERLAMINAR SHEAR
WFQC11BG	C	C1	3	1	8.359	0.251	21	0.0120	INTERLAMINAR SHEAR
WFQC218G	C	C2	3	2	8.553	0.267	21	0.0127	INTERLAMINAR SHEAR
WFQC219G	C	C2	3	2	8.399	0.259	21	0.0124	INTERLAMINAR SHEAR
WFQC21AG	C	C2	3	2	8.632	0.259	21	0.0124	INTERLAMINAR SHEAR

Average	**8.419**	**Average**	**0.0124**
Standard Dev.	**0.200**	**Standard Dev.**	
Coeff. of Var. [%]	**2.379**	**Coeff. of Var. [%]**	
Min.	**7.944**	**Min.**	**0.0118**
Max.	**8.824**	**Max.**	**0.0131**
Number of Spec.	**18**	**Number of Spec.**	**18**

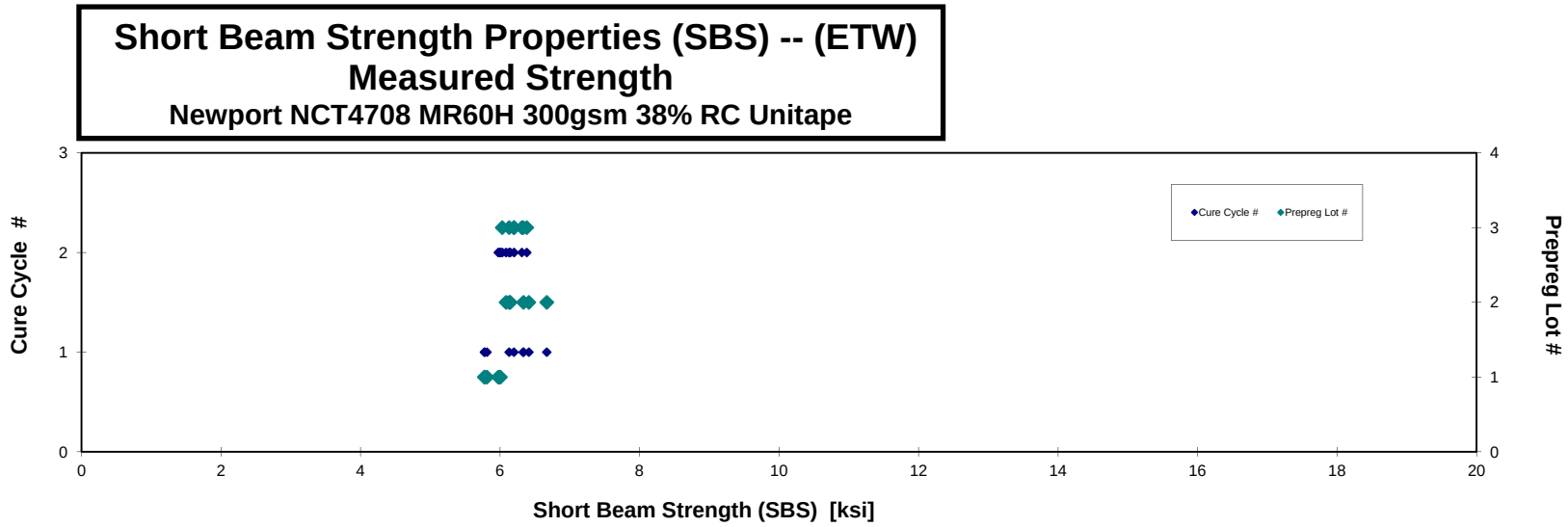

Short Beam Strength Properties (SBS) -- (ETD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short Beam Strength (SBS) [ksi]
0
1
2
3
4
0
2
4
6
8
10
12
14
16
18
20

Short Beam Strength Properties (SBS) -- (ETW)

Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
WFQA11GF	A	C1	1	1	5.775	0.274	21	0.0131	INTERLAMINAR SHEAR / COMPRESSION
WFQA11HF	A	C1	1	1	5.812	0.273	21	0.0130	INTERLAMINAR SHEAR / COMPRESSION
WFQA11KF	A	C1	1	1	5.778	0.256	21	0.0122	INTERLAMINAR SHEAR / COMPRESSION
WFQA21HF	A	C2	1	2	5.975	0.276	21	0.0131	INTERLAMINAR SHEAR / COMPRESSION
WFQA21IF	A	C2	1	2	5.993	0.273	21	0.0130	INTERLAMINAR SHEAR / COMPRESSION
WFQA21KF	A	C2	1	2	6.004	0.258	21	0.0123	INTERLAMINAR SHEAR / COMPRESSION
WFQB11FF	B	C1	2	1	6.669	0.267	21	0.0127	INTERLAMINAR SHEAR / COMPRESSION
WFQB11HF	B	C1	2	1	6.412	0.265	21	0.0126	INTERLAMINAR SHEAR / COMPRESSION
WFQB11IF	B	C1	2	1	6.335	0.262	21	0.0125	INTERLAMINAR SHEAR / COMPRESSION
WFQB21GF	B	C2	2	2	6.146	0.267	21	0.0127	INTERLAMINAR SHEAR / COMPRESSION
WFQB21IF	B	C2	2	2	6.129	0.265	21	0.0126	INTERLAMINAR SHEAR / COMPRESSION
WFQB21JF	B	C2	2	2	6.085	0.260	21	0.0124	INTERLAMINAR SHEAR / COMPRESSION
WFQC11EF	C	C1	3	1	6.330	0.262	21	0.0125	INTERLAMINAR SHEAR / COMPRESSION
WFQC11FF	C	C1	3	1	6.129	0.263	21	0.0125	INTERLAMINAR SHEAR / COMPRESSION
WFQC11GF	C	C1	3	1	6.199	0.262	21	0.0125	INTERLAMINAR SHEAR / COMPRESSION
WFQC21BF	C	C2	3	2	6.383	0.260	21	0.0124	INTERLAMINAR SHEAR / INELASTIC DEFORMATION
WFQC21CF	C	C2	3	2	6.312	0.255	21	0.0121	INTERLAMINAR SHEAR / INELASTIC DEFORMATION
WFQC21DF	C	C2	3	2	6.200	0.263	21	0.0125	INTERLAMINAR SHEAR / INELASTIC DEFORMATION
WFQC21EF	C	C2	3	2	6.030	0.266	21	0.0127	INTERLAMINAR SHEAR / INELASTIC DEFORMATION

Average	**6.142**	**Average**	**0.0126**
Standard Dev.	**0.233**	**Standard Dev.**	
Coeff. of Var. [%]	**3.796**	**Coeff. of Var. [%]**	
Min.	**5.775**	**Min.**	**0.0121**
Max.	**6.669**	**Max.**	**0.0131**
Number of Spec.	**19**	**Number of Spec.**	**19**


Short Beam Strength Properties (SBS) -- (ETW)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short Beam Strength (SBS) [ksi]
0
1
2
3
4
0
2
4
6
8
10
12
14
16
18
20

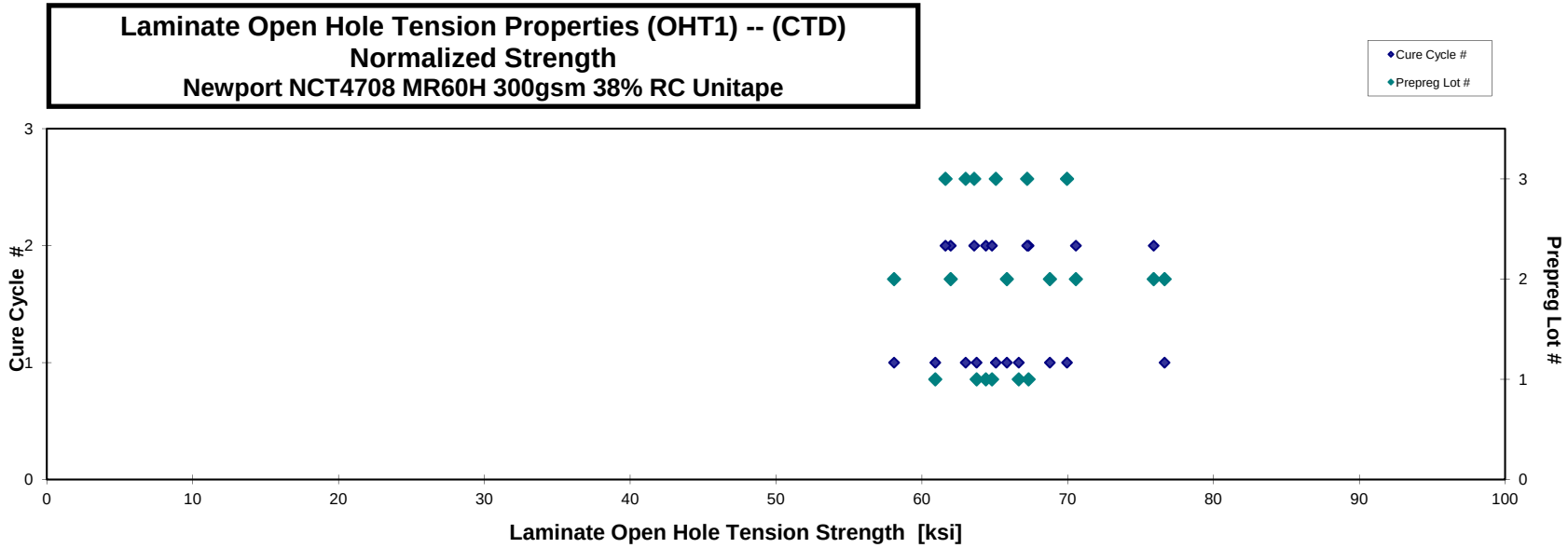
4.16 Open Hole Tension 1 Properties

Laminate Open Hole Tension Properties (OHT1) -- (CTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.01260

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFDA111B	A	C1	1	1	66.930	0.100	8	0.0125	AGM / DGM	0.0125	66.643
WFDA112B	A	C1	1	1	59.444	0.103	8	0.0129	AGM / DGM	0.0129	60.919
WFDA113B	A	C1	1	1	62.445	0.103	8	0.0129	AGM / DGM	0.0129	63.756
WFDA211B	A	C2	1	2	63.504	0.102	8	0.0128	AGM / DGM	0.0128	64.386
WFDA212B	A	C2	1	2	63.920	0.102	8	0.0128	AGM / DGM	0.0128	64.808
WFDA213B	A	C2	1	2	66.016	0.103	8	0.0128	AGM / DGM	0.0128	67.315
WFDB111B	B	C1	2	1	76.453	0.101	8	0.0126	AGM / DGM	0.0126	76.643
WFDB112B	B	C1	2	1	65.193	0.102	8	0.0127	AGM / DGM	0.0127	65.829
WFDB113B	B	C1	2	1	57.844	0.101	8	0.0127	AGM / DGM	0.0127	58.093
WFDB114B	B	C1	2	1	68.970	0.101	8	0.0126	AGM / DGM	0.0126	68.776
WFDB211B	B	C2	2	2	76.388	0.100	8	0.0125	AGM / DGM	0.0125	75.895
WFDB212B	B	C2	2	2	61.520	0.102	8	0.0127	AGM / DGM	0.0127	61.978
WFDB213B	B	C2	2	2	71.053	0.100	8	0.0125	AGM / DGM	0.0125	70.560
WFDC111B	C	C1	3	1	71.840	0.098	8	0.0123	AGM / DGM	0.0123	69.951
WFDC112B	C	C1	3	1	64.528	0.098	8	0.0123	AGM / DGM	0.0123	63.002
WFDC114B	C	C1	3	1	66.725	0.098	8	0.0123	AGM / DGM	0.0123	65.070
WFDC211B	C	C2	3	2	68.508	0.099	8	0.0124	AGM / DGM	0.0124	67.217
WFDC212B	C	C2	3	2	64.062	0.100	8	0.0125	AGM / DGM	0.0125	63.585
WFDC213B	C	C2	3	2	62.579	0.099	8	0.0124	AGM / DGM	0.0124	61.616

Average	**66.207**	**Average**	**0.0126**	**$Average_{norm}$**	**0.0126**	**66.108**
Standard Dev.	**5.075**			**$Standard\ Dev._{norm}$**		**4.756**
Coeff. of Var. [%]	**7.665**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.195**
Min.	**57.844**	**Min.**	**0.0123**	**Min.**	**0.0123**	**58.093**
Max.	**76.453**	**Max.**	**0.0129**	**Max.**	**0.0129**	**76.643**
Number of Spec.	**19**			**Number of Spec.**		**19**


Laminate Open Hole Tension Properties (OHT1) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3

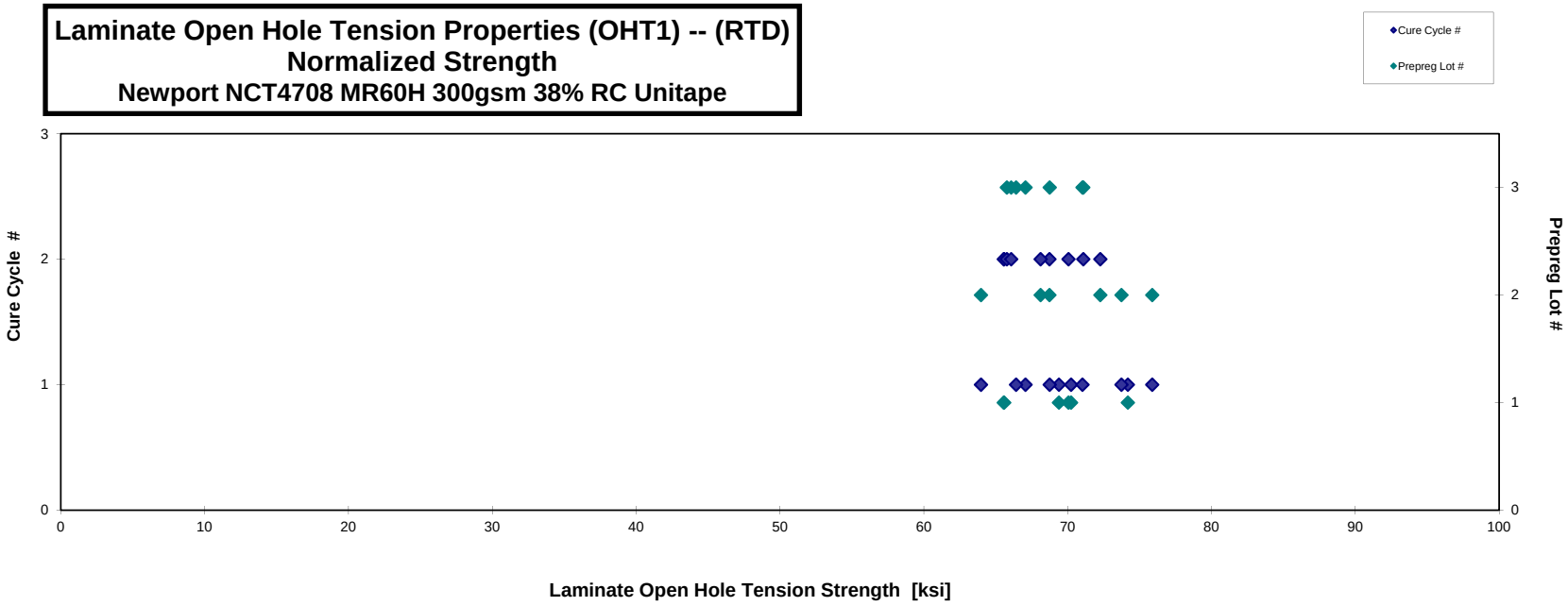
Laminate Open Hole Tension Properties (OHT1) -- (RTD) Strength

Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.01260

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFDA115A	A	C1	1	1	68.489	0.103	8	0.0129	MGM	0.0129	70.233
WFDA116A	A	C1	1	1	71.363	0.105	8	0.0131	MGM	0.0131	74.183
WFDA117A	A	C1	1	1	67.128	0.104	8	0.0130	MGM	0.0130	69.392
WFDA215A	A	C2	1	2	63.917	0.103	8	0.0129	MGM	0.0129	65.566
WFDA216A	A	C2	1	2	67.544	0.105	8	0.0131	MGM	0.0131	70.057
WFDA217A	A	C2	1	2	63.292	0.104	8	0.0131	MGM	0.0131	65.573
WFDB115A	B	C1	2	1	74.216	0.100	8	0.0125	MGM	0.0125	73.738
WFDB116A	B	C1	2	1	64.493	0.100	8	0.0125	MGM	0.0125	63.971
WFDB117A	B	C1	2	1	75.479	0.101	8	0.0127	MGM	0.0127	75.878
WFDB215A	B	C2	2	2	68.824	0.101	8	0.0126	MGM	0.0126	68.732
WFDB216A	B	C2	2	2	68.264	0.101	8	0.0126	MGM	0.0126	68.117
WFDB217A	B	C2	2	2	72.628	0.100	8	0.0125	MGM	0.0125	72.268
WFDC115A	C	C1	3	1	68.239	0.099	8	0.0124	MGM	0.0124	67.066
WFDC116A	C	C1	3	1	67.730	0.099	8	0.0124	MGM	0.0124	66.409
WFDC117A	C	C1	3	1	69.939	0.099	8	0.0124	MGM	0.0124	68.748
WFDC118A	C	C1	3	1	72.271	0.099	8	0.0124	MGM	0.0124	71.028
WFDC215A	C	C2	3	2	72.560	0.099	8	0.0123	MGM	0.0123	71.085
WFDC216A	C	C2	3	2	67.422	0.098	8	0.0123	MGM	0.0123	65.772
WFDC217A	C	C2	3	2	67.809	0.098	8	0.0123	MGM	0.0123	66.071

Average	**69.032**	**Average**	**0.0126**	**$Average_{norm}$**	**0.01302**	**69.152**
Standard Dev.	**3.362**			**$Standard\ Dev._{norm}$**		**3.311**
Coeff. of Var. [%]	**4.870**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**4.788**
Min.	**63.292**	**Min.**	**0.0123**	**Min.**	**0.0129**	**63.971**
Max.	**75.479**	**Max.**	**0.0131**	**Max.**	**0.0131**	**75.878**
Number of Spec.	**19**			**Number of Spec.**		**19**

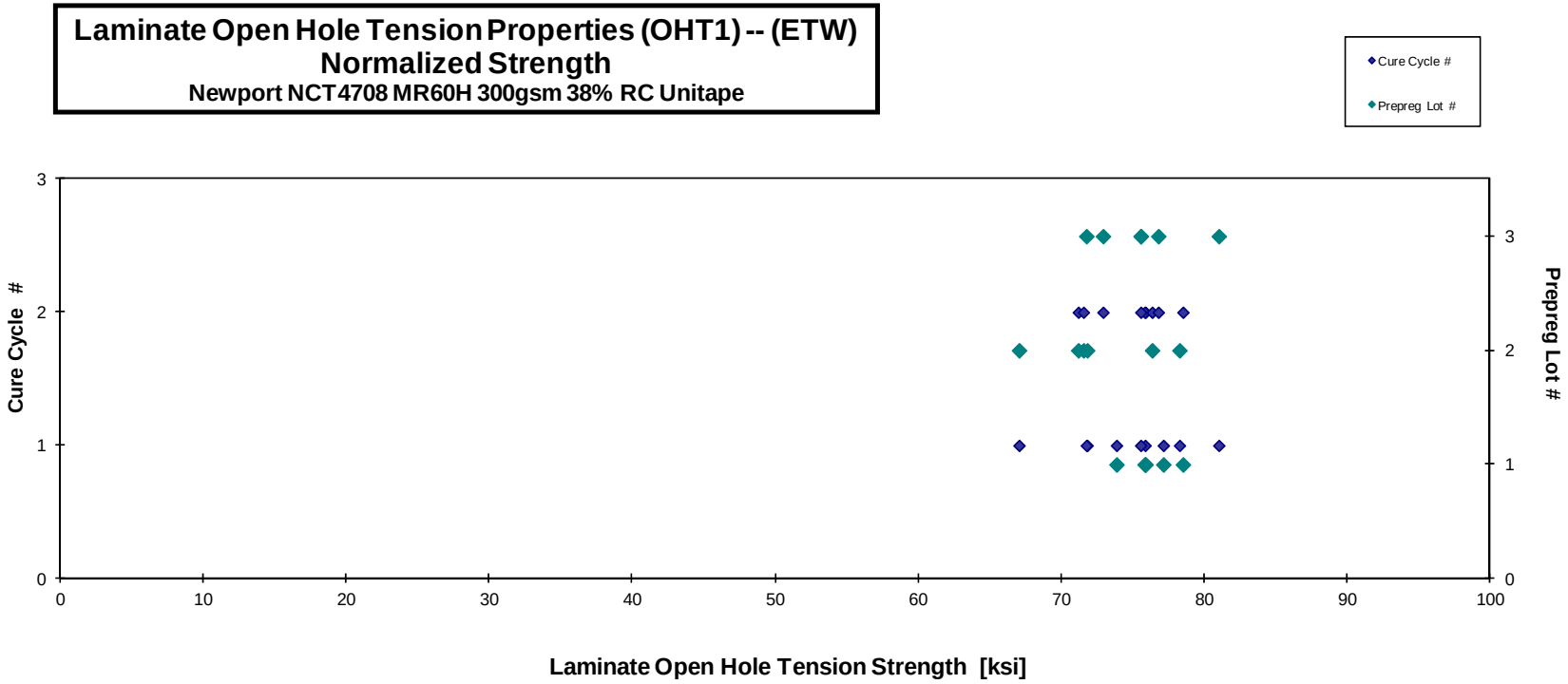

Laminate Open Hole Tension Properties (OHT1) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
10
20
30
40
50
60
70
80
90
100
Laminate Open Hole Tension Strength [ksi]

Laminate Open Hole Tension Properties (OHT1) -- (ETW)
Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.01260

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFDA118F	A	C1	1	1	73.367	0.104	8	0.0130	AGM	0.0130	75.866
WFDA119F	A	C1	1	1	73.219	0.106	8	0.0133	AGM	0.0133	77.142
WFDA11AF	A	C1	1	1	71.639	0.104	8	0.0130	AGM	0.0130	73.866
WFDA218F	A	C2	1	2	73.182	0.105	8	0.0131	AGM	0.0131	75.892
WFDA219F	A	C2	1	2	74.016	0.103	8	0.0129	AGM	0.0129	75.839
WFDA21AF	A	C2	1	2	76.525	0.103	8	0.0129	AGM	0.0129	78.512
WFDB118F	B	C1	2	1	79.069	0.100	8	0.0125	AGM	0.0125	78.272
WFDB119F	B	C1	2	1	67.802	0.100	8	0.0125	AGM	0.0125	67.051
WFDB11AF	B	C1	2	1	72.794	0.099	8	0.0124	AGM	0.0124	71.819
WFDB218F	B	C2	2	2	71.931	0.100	8	0.0125	AGM	0.0125	71.193
WFDB219F	B	C2	2	2	72.453	0.100	8	0.0124	AGM	0.0124	71.555
WFDB21AF	B	C2	2	2	77.861	0.099	8	0.0124	AGM	0.0124	76.355
WFDC119F	C	C1	3	1	76.866	0.099	8	0.0124	AGM	0.0124	75.557
WFDC11AF	C	C1	3	1	81.969	0.100	8	0.0125	AGM	0.0125	81.021
WFDC11BF	C	C1	3	1	72.452	0.100	8	0.0125	AGM	0.0125	71.757
WFDC218F	C	C2	3	2	77.291	0.099	8	0.0123	AGM	0.0123	75.566
WFDC219F	C	C2	3	2	74.312	0.099	8	0.0124	AGM	0.0124	72.923
WFDC21AF	C	C2	3	2	78.437	0.099	8	0.0123	AGM	0.0123	76.790

Average	**74.733**	**Average**	**0.0126**	**$Average_{norm}$**	**0.01262**	**74.832**
Standard Dev.	**3.394**			**$Standard\ Dev._{norm}$**		**3.317**
Coeff. of Var. [%]	**4.542**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**4.433**
Min.	**67.802**	**Min.**	**0.0123**	**Min.**	**0.0123**	**67.051**
Max.	**81.969**	**Max.**	**0.0133**	**Max.**	**0.0133**	**81.021**
Number of Spec.	**18**			**Number of Spec.**		**18**


Laminate Open Hole Tension Properties (OHT1) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
10
20
30
40
50
60
70
80
90
100
Laminate Open Hole Tension Strength [ksi]

4.17 Open Hole Tension 2 Properties

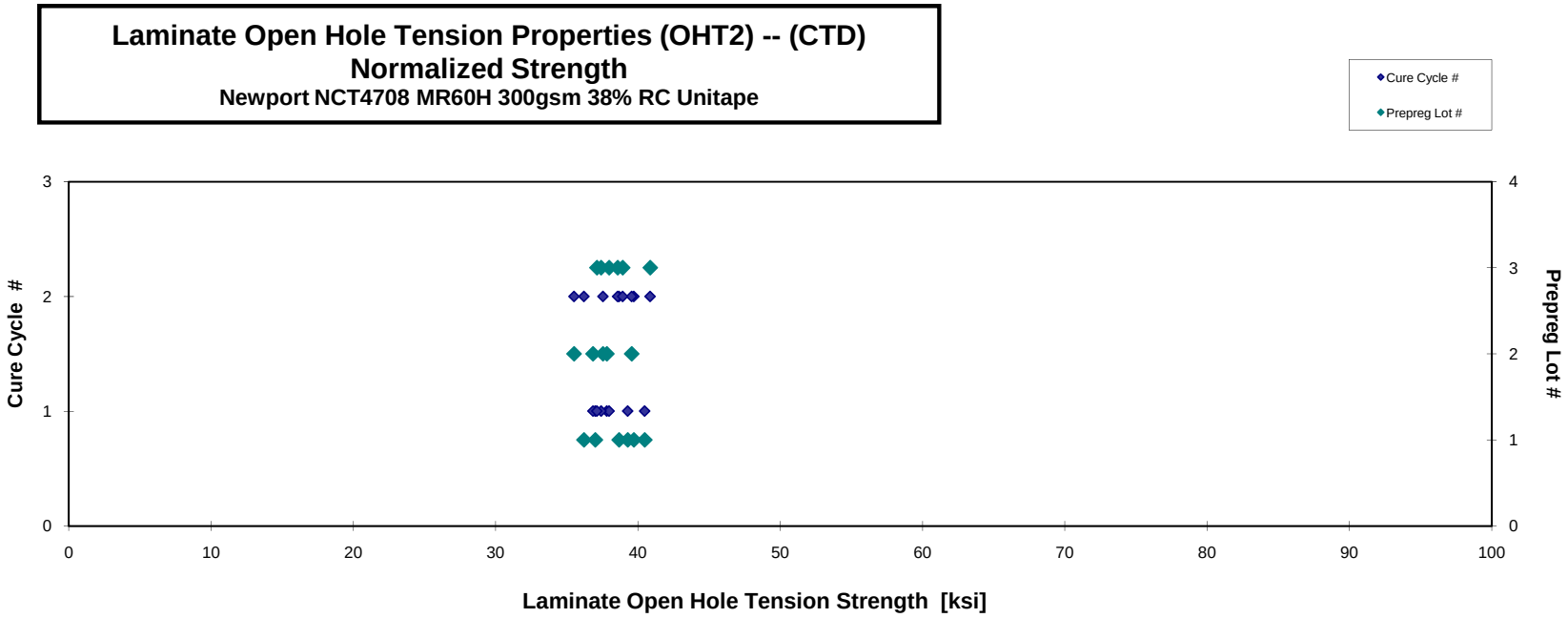
Laminate Open Hole Tension Properties (OHT2) -- (CTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.01260

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFEA111B	A	C1	1	1	36.275	0.141	11	0.0129	AGM/DGM	0.0129	36.999
WFEA112B	A	C1	1	1	38.000	0.143	11	0.0130	AGM/DGM	0.0130	39.280
WFEA113B	A	C1	1	1	39.462	0.142	11	0.0129	AGM/DGM	0.0129	40.473
WFEA211B	A	C2	1	2	37.298	0.144	11	0.0131	AGM/DGM	0.0131	38.670
WFEA212B	A	C2	1	2	34.791	0.144	11	0.0131	AGM/DGM	0.0131	36.205
WFEA213B	A	C2	1	2	38.262	0.144	11	0.0131	AGM/DGM	0.0131	39.712
WFEB111B	B	C1	2	1	37.288	0.137	11	0.0124	AGM/DGM	0.0124	36.839
WFEB112B	B	C1	2	1	38.147	0.137	11	0.0125	AGM/DGM	0.0125	37.812
WFEB113B[1]	B	C1	2	1		0.137	11	0.0125	DGM	0.0125	
WFEB211B	B	C2	2	2	39.188	0.140	11	0.0127	AGM/DGM	0.0127	39.556
WFEB212B	B	C2	2	2	37.173	0.140	11	0.0127	AGM/DGM	0.0127	37.540
WFEB213B	B	C2	2	2	35.305	0.139	11	0.0127	AGM/DGM	0.0127	35.509
WFEC111B	C	C1	3	1	38.823	0.136	11	0.0123	AGM/DGM	0.0123	37.973
WFEC112B	C	C1	3	1	38.037	0.136	11	0.0124	AGM/DGM	0.0124	37.410
WFEC113B	C	C1	3	1	37.534	0.137	11	0.0125	AGM/DGM	0.0125	37.114
WFEC211B	C	C2	3	2	39.004	0.137	11	0.0125	AGM/DGM	0.0125	38.572
WFEC212B	C	C2	3	2	39.444	0.137	11	0.0124	AGM/DGM	0.0124	38.927
WFEC213B	C	C2	3	2	41.744	0.136	11	0.0123	AGM/DGM	0.0123	40.855

[1] Strength data points removed due to bad failure

Average	**37.987**	**Average**	**0.0127**	**$Average_{norm}$**	**0.0127**	**38.203**
Standard Dev.	**1.656**			**$Standard\ Dev._{norm}$**		**1.486**
Coeff. of Var. [%]	**4.358**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.891**
Min.	**34.791**	**Min.**	**0.0123**	**Min.**	**0.0123**	**35.509**
Max.	**41.744**	**Max.**	**0.0131**	**Max.**	**0.0131**	**40.855**
Number of Spec.	**17**			**Number of Spec.**		**17**


Laminate Open Hole Tension Properties (OHT2) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100
Laminate Open Hole Tension Strength [ksi]

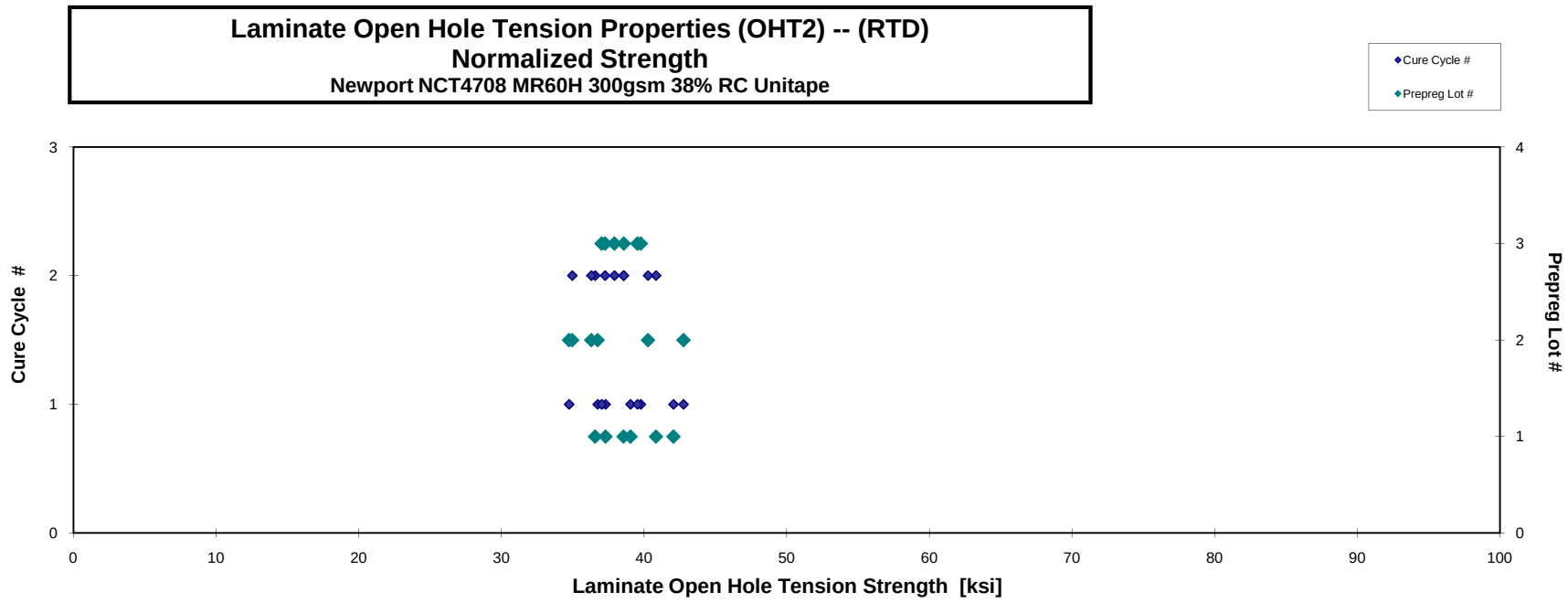
Laminate Open Hole Tension Properties (OHT2) -- (RTD) Strength

Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.01260

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFEA115A	A	C1	1	1	40.717	0.143	11	0.0130	AGM/DGM	0.0130	42.063
WFEA116A	A	C1	1	1	35.920	0.144	11	0.0131	AGM/DGM	0.0131	37.302
WFEA117A	A	C1	1	1	37.699	0.144	11	0.0131	AGM/DGM	0.0131	39.050
WFEA215A	A	C2	1	2	35.306	0.144	11	0.0131	AGM/DGM	0.0131	36.572
WFEA216A	A	C2	1	2	37.211	0.144	11	0.0131	AGM/DGM	0.0131	38.563
WFEA217A	A	C2	1	2	39.275	0.144	11	0.0131	AGM/DGM	0.0131	40.838
WFEB115A	B	C1	2	1	36.924	0.138	11	0.0125	AGM/DGM	0.0125	36.751
WFEB116A	B	C1	2	1	35.092	0.137	11	0.0125	AGM/DGM	0.0125	34.746
WFEB117A	B	C1	2	1	43.231	0.137	11	0.0125	AGM/DGM	0.0125	42.769
WFEB215A	B	C2	2	2	35.041	0.138	11	0.0126	AGM/DGM	0.0126	34.969
WFEB216A	B	C2	2	2	36.156	0.139	11	0.0127	AGM/DGM	0.0127	36.308
WFEB217A	B	C2	2	2	40.128	0.139	11	0.0126	AGM/DGM	0.0126	40.278
WFEC115A	C	C1	3	1	40.883	0.135	11	0.0123	AGM/DGM	0.0123	39.772
WFEC116A	C	C1	3	1	37.740	0.136	11	0.0124	AGM/DGM	0.0124	37.032
WFEC117A	C	C1	3	1	40.136	0.137	11	0.0124	AGM/DGM	0.0124	39.542
WFEC215A	C	C2	3	2	38.837	0.138	11	0.0125	AGM/DGM	0.0125	38.585
WFEC216A	C	C2	3	2	37.401	0.138	11	0.0126	AGM/DGM	0.0126	37.271
WFEC217A	C	C2	3	2	38.587	0.136	11	0.0124	AGM/DGM	0.0124	37.924

Average	**38.127**	**Average**	**0.0127**	**$Average_{norm}$**	**0.01268**	**38.352**
Standard Dev.	**2.288**			**$Standard\ Dev._{norm}$**		**2.246**
Coeff. of Var. [%]	**6.002**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**5.856**
Min.	**35.041**	**Min.**	**0.0123**	**Min.**	**0.0123**	**34.746**
Max.	**43.231**	**Max.**	**0.0131**	**Max.**	**0.0131**	**42.769**
Number of Spec.	**18**			**Number of Spec.**		**18**

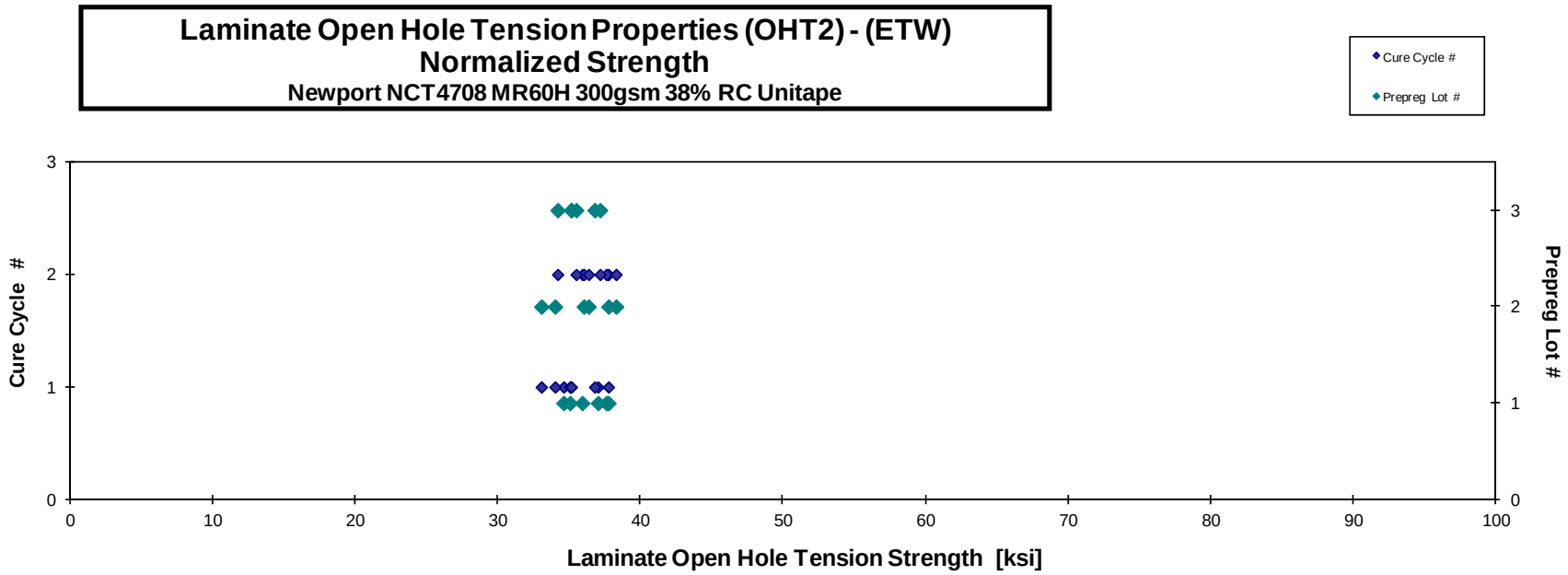

Laminate Open Hole Tension Properties (OHT2) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4

Laminate Open Hole Tension Properties (OHT2) -- (ETW)
Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.01260

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFEA118F	A	C1	1	1	33.486	0.143	11	0.0130	AGM / DGM	0.0130	34.613
WFEA119F	A	C1	1	1	33.990	0.143	11	0.0130	AGM / DGM	0.0130	35.057
WFEA11AF	A	C1	1	1	36.277	0.141	11	0.0129	AGM / DGM	0.0129	37.028
WFEA218F	A	C2	1	2	36.442	0.144	11	0.0131	AGM / DGM	0.0131	37.757
WFEA219F	A	C2	1	2	34.927	0.143	11	0.0130	AGM / DGM	0.0130	35.923
WFEA21AF	A	C2	1	2	36.657	0.142	11	0.0129	AGM / DGM	0.0129	37.609
WFEB118F	B	C1	2	1	33.361	0.137	11	0.0125	AGM / DGM	0.0125	33.056
WFEB119F	B	C1	2	1	34.198	0.138	11	0.0125	AGM / DGM	0.0125	34.013
WFEB11AF	B	C1	2	1	37.685	0.139	11	0.0126	AGM / DGM	0.0126	37.758
WFEB218F	B	C2	2	2	35.929	0.139	11	0.0126	AGM / DGM	0.0126	36.037
WFEB219F	B	C2	2	2	38.549	0.138	11	0.0125	AGM / DGM	0.0125	38.294
WFEB21AF	B	C2	2	2	36.698	0.137	11	0.0125	AGM / DGM	0.0125	36.367
WFEC118F	C	C1	3	1	37.427	0.136	11	0.0124	AGM / DGM	0.0124	36.792
WFEC119F	C	C1	3	1	35.518	0.137	11	0.0125	AGM / DGM	0.0125	35.143
WFEC11AF	C	C1	3	1	35.912	0.136	11	0.0123	AGM / DGM	0.0123	35.148
WFEC218F	C	C2	3	2	35.688	0.138	11	0.0125	AGM / DGM	0.0125	35.495
WFEC219F	C	C2	3	2	34.873	0.136	11	0.0124	AGM / DGM	0.0124	34.197
WFEC21AF	C	C2	3	2	37.945	0.136	11	0.0123	AGM / DGM	0.0123	37.170

Average	**35.865**	**Average**	**0.0126**	**$Average_{norm}$**	**0.01264**	**35.970**
Standard Dev.	**1.522**			**$Standard\ Dev._{norm}$**		**1.487**
Coeff. of Var. [%]	**4.242**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**4.135**
Min.	**33.361**	**Min.**	**0.0123**	**Min.**	**0.0123**	**33.056**
Max.	**38.549**	**Max.**	**0.0131**	**Max.**	**0.0131**	**38.294**
Number of Spec.	**18**			**Number of Spec.**		**18**


Laminate Open Hole Tension Properties (OHT2) - (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3

4.18 Open Hole Tension 3 Properties

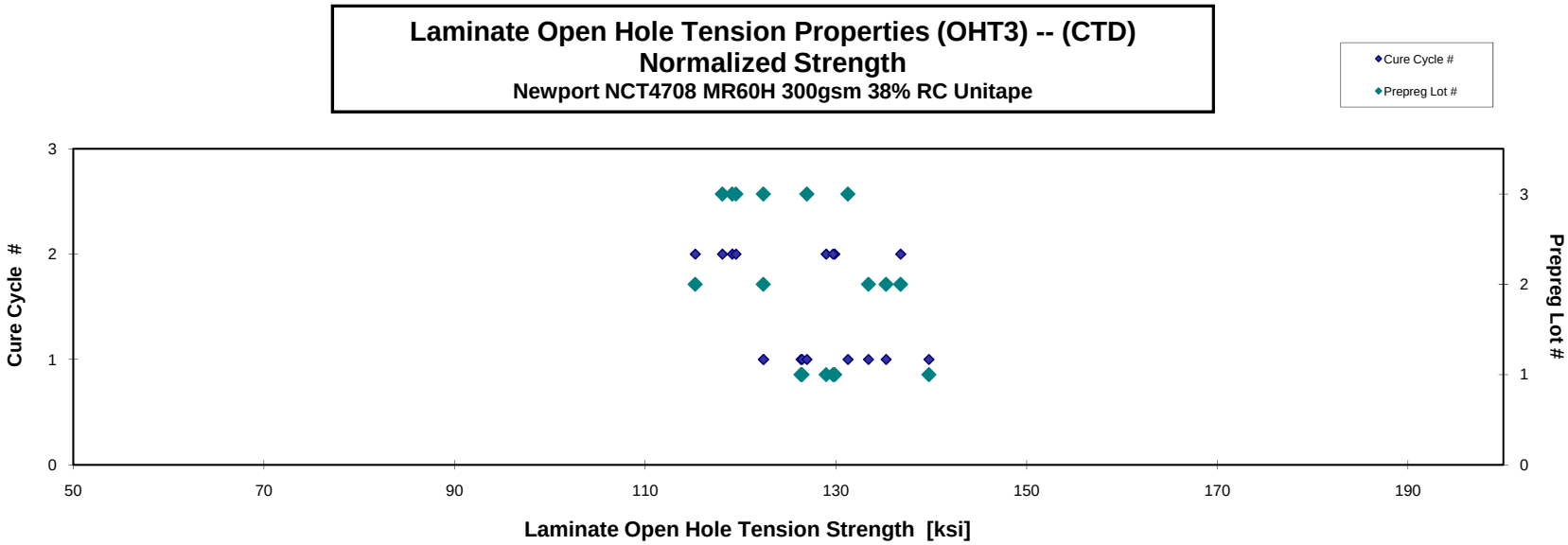
Laminate Open Hole Tension Properties (OHT3) -- (CTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.01260

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFFA111B	A	C1	1	1	126.423	0.139	11	0.0126	AGM / DGM	0.0126	126.332
WFFA112B	A	C1	1	1	137.128	0.141	11	0.0128	AGM / DGM	0.0128	139.750
WFFA113B	A	C1	1	1	124.495	0.141	11	0.0128	AGM / DGM	0.0128	126.457
WFFA211B	A	C2	1	2	130.754	0.138	11	0.0125	AGM / DGM	0.0125	129.874
WFFA212B	A	C2	1	2	128.099	0.140	11	0.0127	AGM / DGM	0.0127	128.977
WFFA213B	A	C2	1	2	129.387	0.139	11	0.0126	AGM / DGM	0.0126	129.698
WFFB111B	B	C1	2	1	135.051	0.137	11	0.0124	AGM / DGM	0.0124	133.411
WFFB112B	B	C1	2	1	134.116	0.140	11	0.0127	AGM / DGM	0.0127	135.261
WFFB113B	B	C1	2	1	121.876	0.139	11	0.0127	AGM / DGM	0.0127	122.389
WFFB211B	B	C2	2	2	141.058	0.134	11	0.0122	AGM / DGM	0.0122	136.783
WFFB212B	B	C2	2	2	117.101	0.136	11	0.0124	AGM / DGM	0.0124	115.243
WFFB213B[1]	B	C2	2	2		0.138	11	0.0125	DGM	0.0125	
WFFC111B	C	C1	3	1	125.241	0.135	11	0.0123	AGM / DGM	0.0123	122.394
WFFC112B	C	C1	3	1	129.718	0.136	11	0.0123	AGM / DGM	0.0123	126.957
WFFC113B	C	C1	3	1	133.345	0.136	11	0.0124	AGM / DGM	0.0124	131.261
WFFC211B	C	C2	3	2	122.696	0.135	11	0.0122	AGM / DGM	0.0122	119.126
WFFC212B	C	C2	3	2	120.882	0.135	11	0.0123	AGM / DGM	0.0123	118.091
WFFC213B	C	C2	3	2	122.823	0.135	11	0.0123	AGM / DGM	0.0123	119.514

[1] Strength data points removed due to bad failure

Average	**128.247**	**Average**	**0.0125**	**$Average_{norm}$**	**0.0125**	**127.148**
Standard Dev.	**6.448**			**$Standard\ Dev._{norm}$**		**6.999**
Coeff. of Var. [%]	**5.028**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**5.504**
Min.	**117.101**	**Min.**	**0.0122**	**Min.**	**0.0122**	**115.243**
Max.	**141.058**	**Max.**	**0.0128**	**Max.**	**0.0128**	**139.750**
Number of Spec.	**17**			**Number of Spec.**		**17**


Laminate Open Hole Tension Properties (OHT3) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
50
70
90
110
130
150
170
190
Laminate Open Hole Tension Strength [ksi]

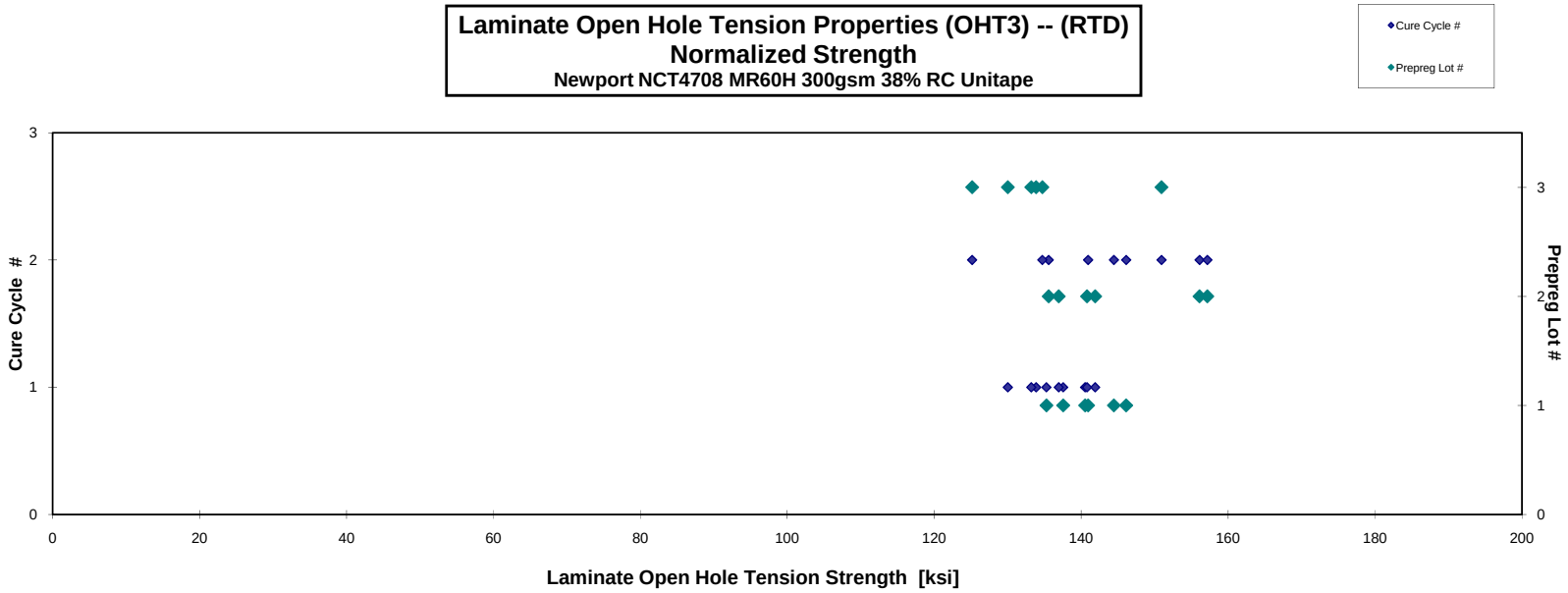
Laminate Open Hole Tension Properties (OHT3) -- (RTD) Strength

Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.01260

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFFA115A	A	C1	1	1	135.718	0.144	11	0.0130	MGM	0.0130	140.532
WFFA116A	A	C1	1	1	129.791	0.144	11	0.0131	MGM	0.0131	135.269
WFFA117A	A	C1	1	1	132.105	0.144	11	0.0131	MGM	0.0131	137.554
WFFA215A	A	C2	1	2	138.331	0.141	11	0.0128	MGM	0.0128	140.942
WFFA216A	A	C2	1	2	142.564	0.142	11	0.0129	MGM	0.0129	146.129
WFFA217A	A	C2	1	2	140.290	0.143	11	0.0130	MGM	0.0130	144.457
WFFB115A	B	C1	2	1	135.759	0.140	11	0.0127	MGM	0.0127	136.951
WFFB116A	B	C1	2	1	141.122	0.139	11	0.0127	MGM	0.0127	141.902
WFFB117A	B	C1	2	1	140.340	0.139	11	0.0126	MGM	0.0126	140.796
WFFB215A	B	C2	2	2	160.080	0.135	11	0.0123	MGM	0.0123	156.114
WFFB216A	B	C2	2	2	161.346	0.135	11	0.0123	MGM	0.0123	157.174
WFFB217A	B	C2	2	2	137.462	0.137	11	0.0124	MGM	0.0124	135.578
WFFC115A	C	C1	3	1	136.344	0.136	11	0.0124	MGM	0.0124	133.869
WFFC116A	C	C1	3	1	135.642	0.136	11	0.0124	MGM	0.0124	133.211
WFFC117A	C	C1	3	1	132.344	0.136	11	0.0124	MGM	0.0124	130.020
WFFC215A	C	C2	3	2	129.553	0.134	11	0.0122	MGM	0.0122	125.160
WFFC216A	C	C2	3	2	154.390	0.136	11	0.0123	MGM	0.0123	150.937
WFFC217A	C	C2	3	2	138.289	0.135	11	0.0123	MGM	0.0123	134.713

Average	**140.082**	**Average**	**0.0126**	**$Average_{norm}$**	**0.01261**	**140.073**
Standard Dev.	**9.359**			**$Standard\ Dev._{norm}$**		**8.491**
Coeff. of Var. [%]	**6.681**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.062**
Min.	**129.553**	**Min.**	**0.0122**	**Min.**	**0.0122**	**125.160**
Max.	**161.346**	**Max.**	**0.0131**	**Max.**	**0.0131**	**157.174**
Number of Spec.	**18**			**Number of Spec.**		**18**


Laminate Open Hole Tension Properties (OHT3) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
20
40
60
80
100
120
140
160
180
200
0
1
2
3

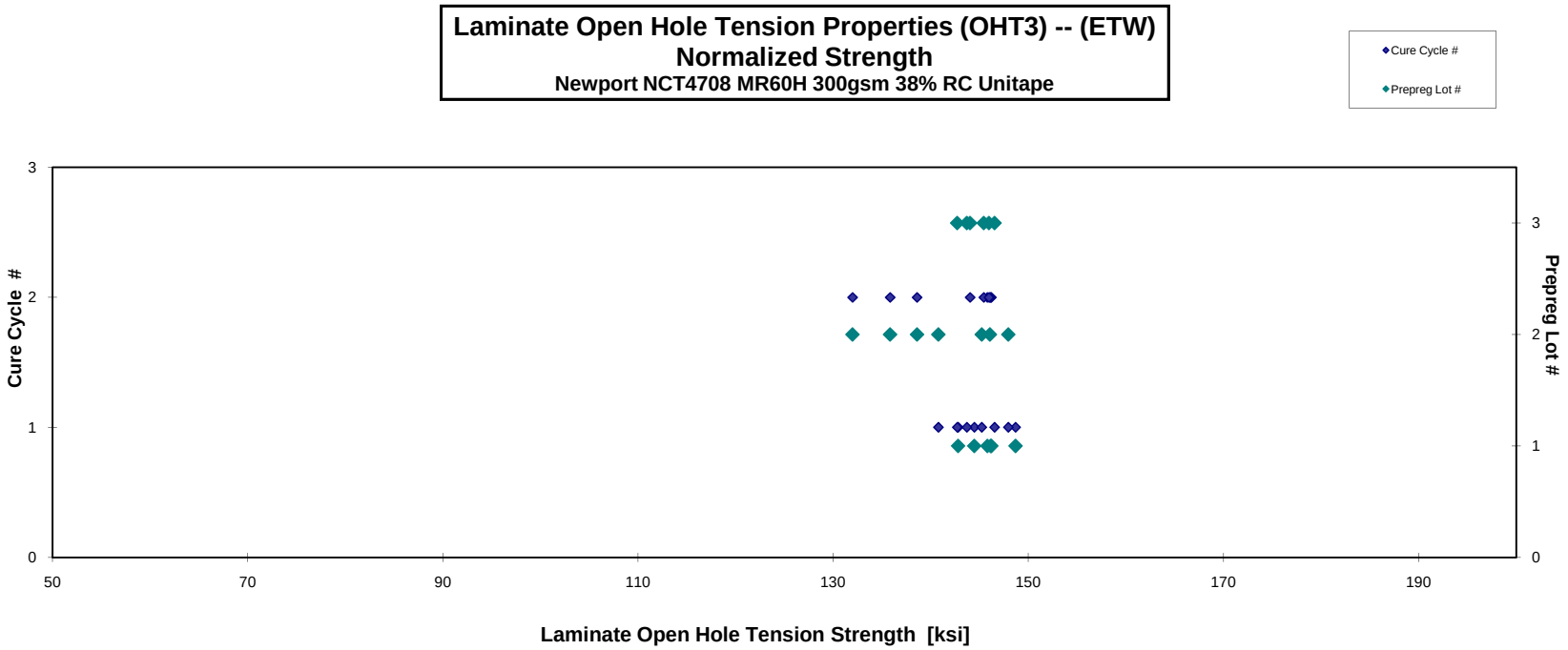
Laminate Open Hole Tension Properties (OHT3) -- (ETW) Strength

Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.01260

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFFA118F	A	C1	1	1	138.904	0.144	11	0.0131	DGM / SGM	0.0131	144.467
WFFA119F	A	C1	1	1	136.724	0.145	11	0.0132	DGM / SGM	0.0132	142.807
WFFA11AF	A	C1	1	1	142.606	0.145	11	0.0131	DGM / SGM	0.0131	148.693
WFFA218F	A	C2	1	2	142.132	0.143	11	0.0130	DGM / SGM	0.0130	146.149
WFFA219F	A	C2	1	2	142.458	0.142	11	0.0129	DGM / SGM	0.0129	146.209
WFFA21AF	A	C2	1	2	142.986	0.141	11	0.0128	DGM / SGM	0.0128	145.806
WFFB118F	B	C1	2	1	145.736	0.138	11	0.0126	DGM / SGM	0.0126	145.227
WFFB119F	B	C1	2	1	148.095	0.138	11	0.0126	DGM / SGM	0.0126	147.952
WFFB11AF	B	C1	2	1	140.514	0.139	11	0.0126	DGM / SGM	0.0126	140.785
WFFB218F	B	C2	2	2	132.817	0.138	11	0.0125	DGM / SGM	0.0125	131.987
WFFB219F	B	C2	2	2	145.490	0.139	11	0.0127	DGM / SGM	0.0127	146.067
WFFB21AF	B	C2	2	2	140.610	0.137	11	0.0124	DGM / SGM	0.0124	138.598
WFFB21BF	B	C2	2	2	137.158	0.137	11	0.0125	DGM / SGM	0.0125	135.839
WFFC118F	C	C1	3	1	146.107	0.136	11	0.0124	DGM / SGM	0.0124	143.700
WFFC119F	C	C1	3	1	148.506	0.137	11	0.0124	DGM / SGM	0.0124	146.542
WFFC11AF	C	C1	3	1	144.329	0.137	11	0.0125	DGM / SGM	0.0125	142.715
WFFC218F	C	C2	3	2	147.837	0.135	11	0.0123	DGM / SGM	0.0123	144.032
WFFC219F	C	C2	3	2	149.871	0.135	11	0.0122	DGM / SGM	0.0122	145.438
WFFC21AF	C	C2	3	2	150.344	0.135	11	0.0122	DGM / SGM	0.0122	145.969

Average	**143.328**	**Average**	**0.0126**	**$Average_{norm}$**	**0.01263**	**143.631**
Standard Dev.	**4.778**			**$Standard\ Dev._{norm}$**		**4.215**
Coeff. of Var. [%]	**3.334**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**2.935**
Min.	**132.817**	**Min.**	**0.0122**	**Min.**	**0.0122**	**131.987**
Max.	**150.344**	**Max.**	**0.0132**	**Max.**	**0.0132**	**148.693**
Number of Spec.	**19**			**Number of Spec.**		**19**


Laminate Open Hole Tension Properties (OHT3) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
50
70
90
110
130
150
170
190
Laminate Open Hole Tension Strength [ksi]

4.19 Filled-Hole Tension 1 Properties

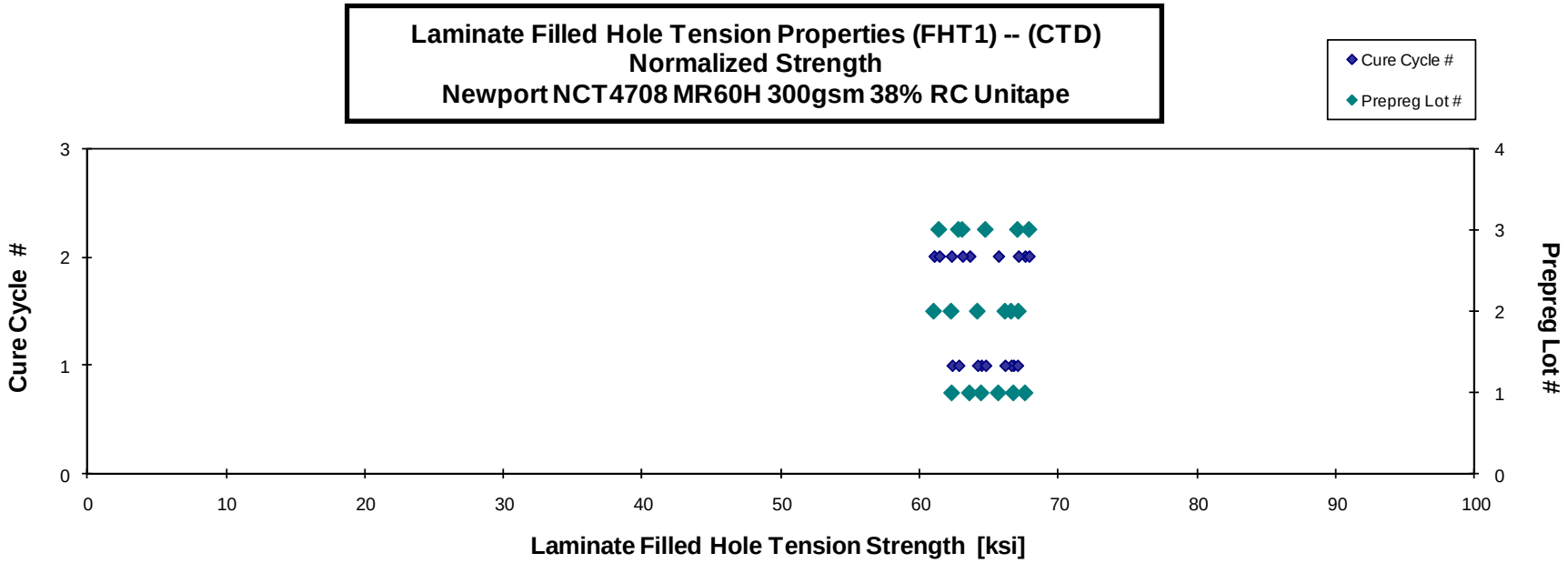
Laminate Filled Hole Tension Properties (FHT1) -- (CTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF4A111B	A	C1	1	1	65.289	0.103	8	AGM / DGM	0.0129	66.801
WF4A112B	A	C1	1	1	60.708	0.104	8	AGM / DGM	0.0129	62.364
WF4A113B	A	C1	1	1	63.285	0.103	8	AGM / DGM	0.0128	64.477
WF4A211B	A	C2	1	2	61.930	0.104	8	AGM / DGM	0.0129	63.641
WF4A212B	A	C2	1	2	63.762	0.104	8	AGM / DGM	0.0130	65.712
WF4A213B	A	C2	1	2	65.663	0.104	8	AGM / DGM	0.0130	67.639
WF4B111B	B	C1	2	1	64.903	0.100	8	AGM / DGM	0.0125	64.205
WF4B112B	B	C1	2	1	66.883	0.100	8	AGM / DGM	0.0126	66.640
WF4B113B	B	C1	2	1	66.512	0.100	8	AGM / DGM	0.0125	66.193
WF4B211B	B	C2	2	2	68.162	0.099	8	AGM / DGM	0.0124	67.159
WF4B212B	B	C2	2	2	62.585	0.100	8	AGM / DGM	0.0125	62.316
WF4B213B	B	C2	2	2	61.436	0.100	8	AGM / DGM	0.0125	61.060
WF4C111B	C	C1	3	1	66.399	0.098	8	AGM / DGM	0.0123	64.785
WF4C112B	C	C1	3	1	68.478	0.099	8	AGM / DGM	0.0123	67.097
WF4C113B	C	C1	3	1	64.494	0.098	8	AGM / DGM	0.0123	62.841
WF4C211B	C	C2	3	2	62.889	0.098	8	AGM / DGM	0.0123	61.433
WF4C212B	C	C2	3	2	69.197	0.099	8	AGM / DGM	0.0124	67.927
WF4C213B	C	C2	3	2	64.194	0.099	8	AGM / DGM	0.0124	63.111

Average	**64.820**	
Standard Dev.	**2.470**	
Coeff. of Var. [%]	**3.810**	
Min.	**60.708**	
Max.	**69.197**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0126**	**64.744**
$Standard\ Dev._{norm}$		**2.232**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.448**
Min.	**0.0123**	**61.060**
Max.	**0.0130**	**67.927**
Number of Spec.		**18**


Laminate Filled Hole Tension Properties (FHT1) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4

Laminate Filled Hole Tension Properties (FHT1) -- (RTD) Strength

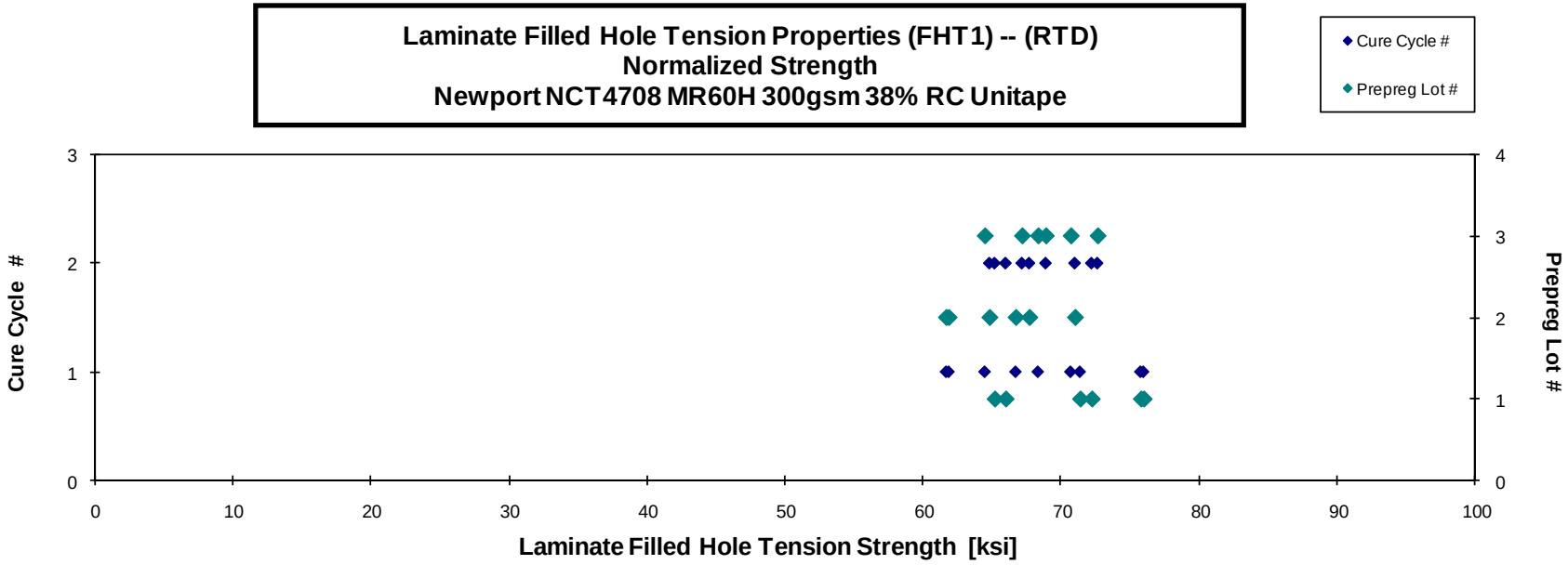
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF4A115A	A	C1	1	1	74.419	0.103	8	LGM / DGM	0.0128	75.810
WF4A116A	A	C1	1	1	70.030	0.103	8	LGM / DGM	0.0129	71.419
WF4A117A	A	C1	1	1	74.583	0.103	8	LGM / DGM	0.0128	76.014
WF4A215A	A	C2	1	2	63.224	0.105	8	LGM / DGM	0.0132	66.036
WF4A216A	A	C2	1	2	61.885	0.106	8	LGM / DGM	0.0133	65.241
WF4A217A	A	C2	1	2	69.140	0.105	8	LGM / DGM	0.0132	72.261
WF4B115A	B	C1	2	1	62.153	0.100	8	LGM / DGM	0.0125	61.732
WF4B116A	B	C1	2	1	62.409	0.100	8	LGM / DGM	0.0125	61.914
WF4B117A	B	C1	2	1	67.953	0.099	8	LGM / DGM	0.0124	66.762
WF4B215A	B	C2	2	2	71.878	0.100	8	LGM / DGM	0.0125	71.047
WF4B216A	B	C2	2	2	65.570	0.100	8	LGM / DGM	0.0125	64.866
WF4B217A	B	C2	2	2	68.767	0.099	8	LGM / DGM	0.0124	67.744
WF4C115A	C	C1	3	1	70.623	0.098	8	LGM / DGM	0.0122	68.381
WF4C116A	C	C1	3	1	66.609	0.098	8	LGM / DGM	0.0122	64.527
WF4C117A	C	C1	3	1	72.652	0.098	8	LGM / DGM	0.0123	70.742
WF4C215A	C	C2	3	2	73.991	0.099	8	LGM / DGM	0.0124	72.682
WF4C216A	C	C2	3	2	70.242	0.099	8	LGM / DGM	0.0124	68.941
WF4C217A	C	C2	3	2	68.568	0.099	8	LGM / DGM	0.0124	67.219

Average	**68.594**	
Standard Dev.	**4.218**	
Coeff. of Var. [%]	**6.150**	
Min.	**61.885**	
Max.	**74.583**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0126**	**68.519**
$Standard\ Dev._{norm}$		**4.214**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**6.150**
Min.	**0.0122**	**61.732**
Max.	**0.0133**	**76.014**
Number of Spec.		**18**


Laminate Filled Hole Tension Properties (FHT1) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100

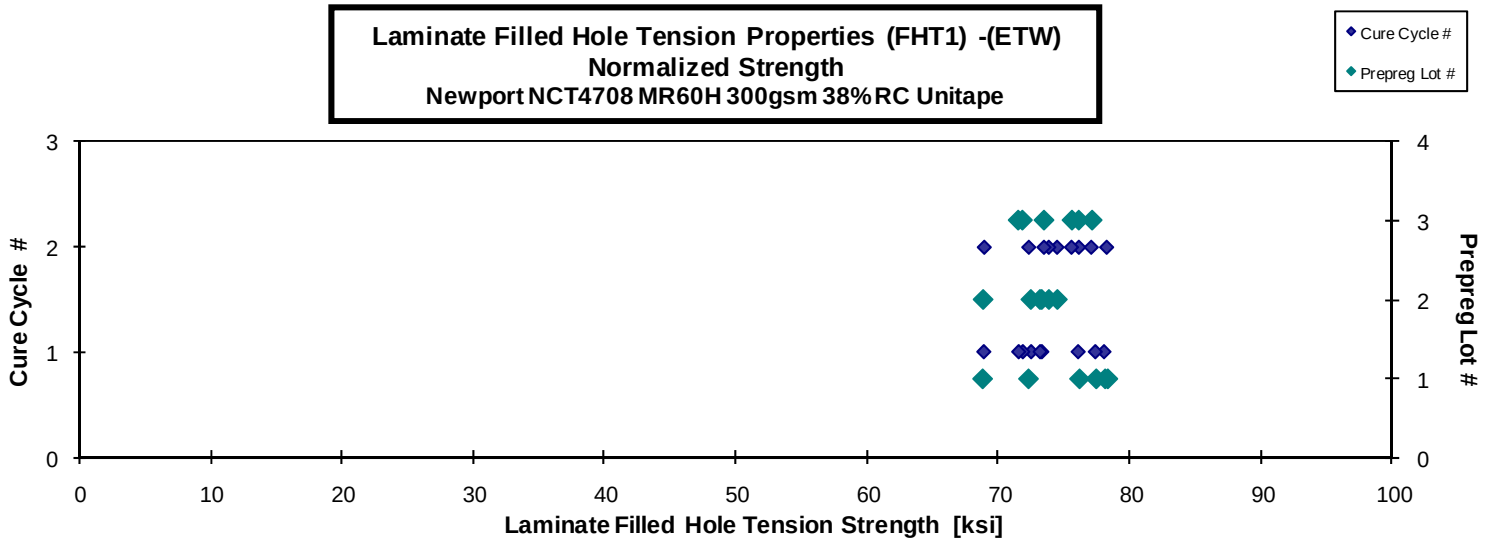
Laminate Filled Hole Tension Properties (FHT1) -- (ETW)
Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF4A118F	A	C1	1	1	76.761	0.103	8	AGM/DGM	0.0128	78.131
WF4A119F	A	C1	1	1	67.841	0.102	8	AGM/DGM	0.0128	68.851
WF4A11AF	A	C1	1	1	76.898	0.102	8	AGM/DGM	0.0127	77.458
WF4A218F	A	C2	1	2	75.058	0.105	8	AGM/DGM	0.0132	78.334
WF4A219F	A	C2	1	2	69.103	0.106	8	AGM/DGM	0.0132	72.325
WF4A21AF	A	C2	1	2	73.143	0.105	8	AGM/DGM	0.0131	76.191
WF4B118F	B	C1	2	1	74.160	0.099	8	AGM/DGM	0.0123	72.504
WF4B119F	B	C1	2	1	74.611	0.099	8	AGM/DGM	0.0124	73.328
WF4B11AF	B	C1	2	1	74.666	0.099	8	AGM/DGM	0.0124	73.197
WF4B218F	B	C2	2	2	75.572	0.099	8	AGM/DGM	0.0124	74.510
WF4B219F	B	C2	2	2	69.389	0.100	8	AGM/DGM	0.0125	68.885
WF4B21AF	B	C2	2	2	74.397	0.100	8	AGM/DGM	0.0125	73.868
WF4C118F	C	C1	3	1	77.817	0.099	8	AGM/DGM	0.0123	76.131
WF4C119F	C	C1	3	1	73.008	0.099	8	AGM/DGM	0.0124	71.861
WF4C11AF	C	C1	3	1	73.163	0.099	8	AGM/DGM	0.0123	71.542
WF4C218F	C	C2	3	2	76.943	0.099	8	AGM/DGM	0.0124	75.620
WF4C219F	C	C2	3	2	78.507	0.099	8	AGM/DGM	0.0124	77.144
WF4C21AF	C	C2	3	2	75.354	0.098	8	AGM/DGM	0.0123	73.498

Average	**74.244**	
Standard Dev.	**2.975**	
Coeff. of Var. [%]	**4.008**	
Min.	**67.841**	
Max.	**78.507**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0126**	**74.077**
$Standard\ Dev._{norm}$		**2.865**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.867**
Min.	**0.0123**	**68.851**
Max.	**0.0132**	**78.334**
Number of Spec.		**18**


Laminate Filled Hole Tension Properties (FHT1) -(ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4

4.20 Filled-Hole Tension 2 Properties

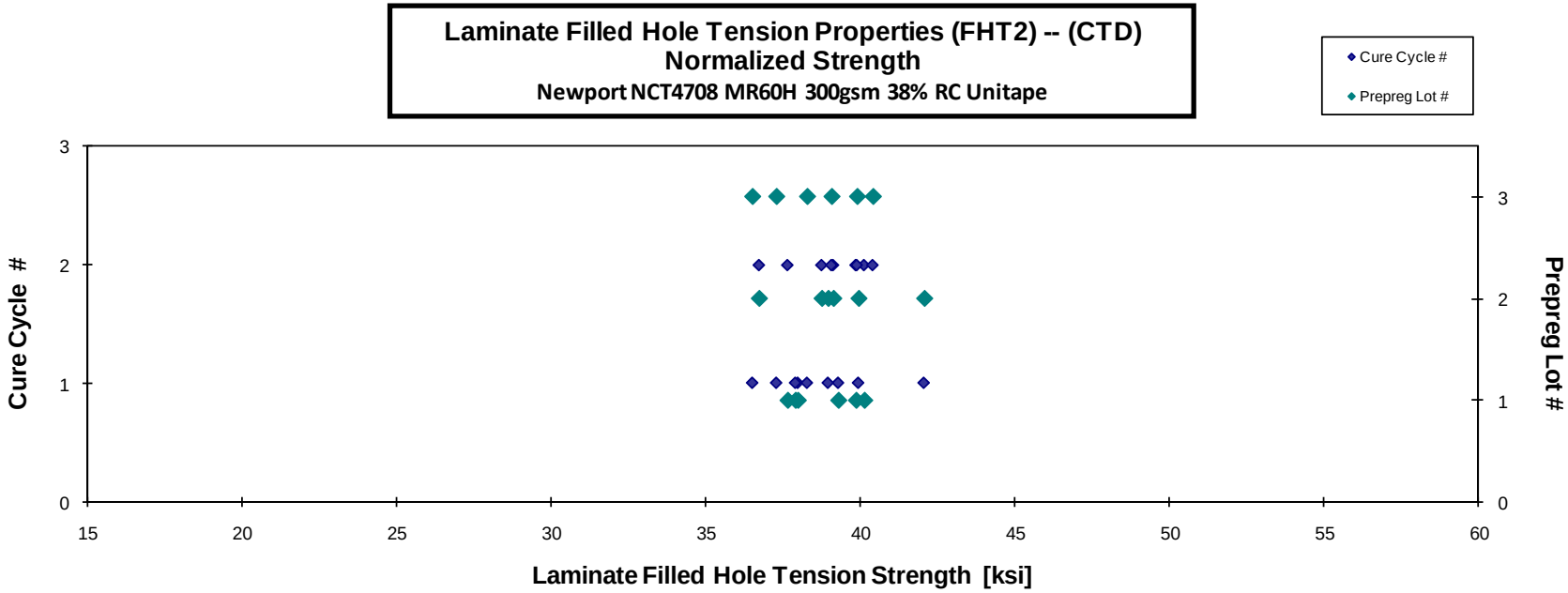
Laminate Filled Hole Tension Properties (FHT2) -- (CTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF5A112B	A	C1	1	1	37.676	0.140	11	AGM / DGM	0.0127	38.011
WF5A113B	A	C1	1	1	37.344	0.141	11	AGM / DGM	0.0128	37.932
WF5A114B	A	C1	1	1	38.309	0.142	11	AGM / DGM	0.0129	39.318
WF5A211B	A	C2	1	2	39.306	0.141	11	AGM / DGM	0.0128	39.887
WF5A213B	A	C2	1	2	39.532	0.141	11	AGM / DGM	0.0128	40.155
WF5A214B	A	C2	1	2	36.751	0.142	11	AGM / DGM	0.0129	37.679
WF5B111B	B	C1	2	1	41.613	0.140	11	AGM / DGM	0.0127	42.089
WF5B112B	B	C1	2	1	38.370	0.141	11	AGM / DGM	0.0128	38.988
WF5B114B	B	C1	2	1	39.720	0.139	11	AGM / DGM	0.0127	39.969
WF5B211B	B	C2	2	2	39.331	0.138	11	AGM / DGM	0.0125	39.156
WF5B212B	B	C2	2	2	37.025	0.138	11	AGM / DGM	0.0125	36.757
WF5B213B	B	C2	2	2	39.144	0.137	11	AGM / DGM	0.0125	38.782
WF5C111B	C	C1	3	1	38.138	0.136	11	AGM / DGM	0.0123	37.317
WF5C112B	C	C1	3	1	39.187	0.136	11	AGM / DGM	0.0123	38.311
WF5C113B	C	C1	3	1	37.313	0.136	11	AGM / DGM	0.0123	36.541
WF5C211B	C	C2	3	2	40.815	0.137	11	AGM / DGM	0.0125	40.433
WF5C212B	C	C2	3	2	40.033	0.138	11	AGM / DGM	0.0126	39.922
WF5C213B	C	C2	3	2	39.503	0.137	11	AGM / DGM	0.0125	39.100

Average	**38.840**	
Standard Dev.	**1.328**	
Coeff. of Var. [%]	**3.418**	
Min.	**36.751**	
Max.	**41.613**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0126**	**38.908**
$Standard\ Dev._{norm}$		**1.410**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.623**
Min.	**0.0123**	**36.541**
Max.	**0.0129**	**42.089**
Number of Spec.		**18**


Laminate Filled Hole Tension Properties (FHT2) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
1
2
3
15
20
25
30
35
40
45
50
55
60

Laminate Filled Hole Tension Properties (FHT2) -- (RTD) Strength

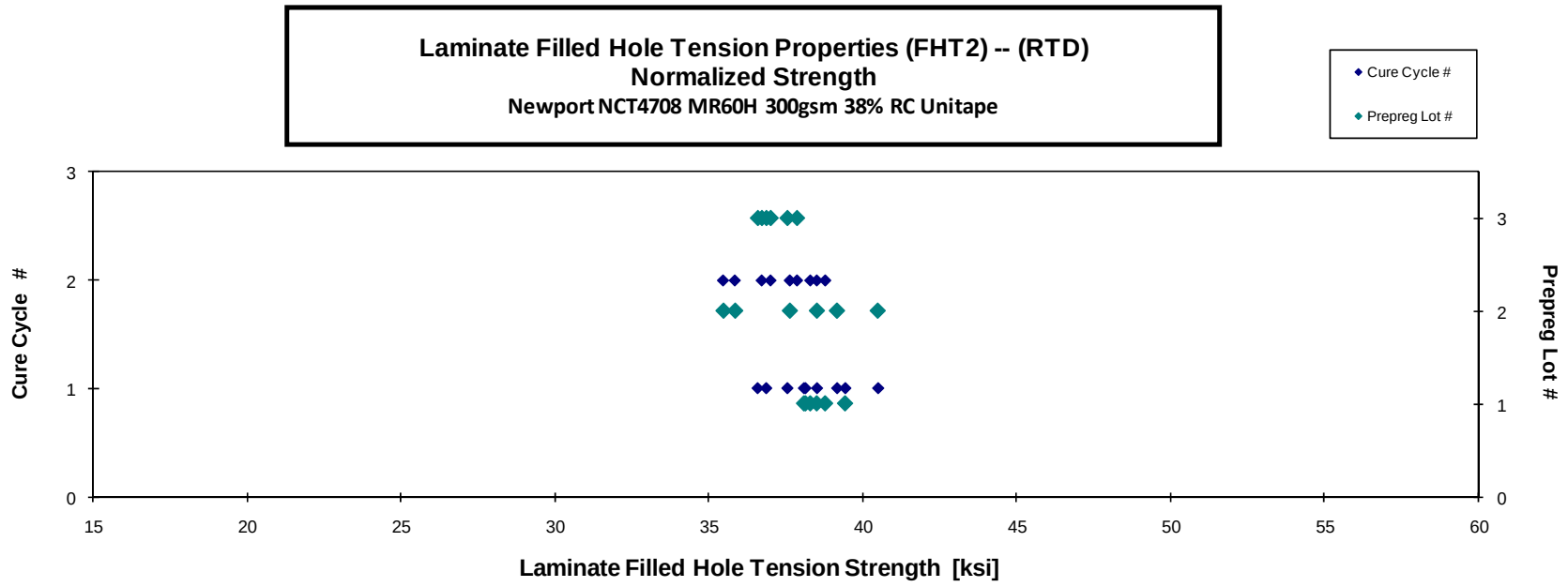
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF5A115A	A	C1	1	1	38.196	0.143	11	AGM/DGM	0.0130	39.427
WF5A116A	A	C1	1	1	36.856	0.143	11	AGM/DGM	0.0130	38.084
WF5A117A	A	C1	1	1	36.836	0.143	11	AGM/DGM	0.0130	38.134
WF5A215A	A	C2	1	2	37.320	0.142	11	AGM/DGM	0.0129	38.289
WF5A216A	A	C2	1	2	37.517	0.142	11	AGM/DGM	0.0129	38.500
WF5A217A	A	C2	1	2	37.625	0.143	11	AGM/DGM	0.0130	38.774
WF5B115A	B	C1	2	1	40.107	0.140	11	AGM/DGM	0.0127	40.493
WF5B116A	B	C1	2	1	38.527	0.139	11	AGM/DGM	0.0126	38.508
WF5B117A	B	C1	2	1	39.044	0.139	11	AGM/DGM	0.0126	39.162
WF5B215A	B	C2	2	2	37.806	0.138	11	AGM/DGM	0.0125	37.624
WF5B216A	B	C2	2	2	35.755	0.137	11	AGM/DGM	0.0125	35.458
WF5B217A	B	C2	2	2	36.100	0.138	11	AGM/DGM	0.0125	35.840
WF5C115A	C	C1	3	1	37.376	0.136	11	AGM/DGM	0.0123	36.581
WF5C116A	C	C1	3	1	37.702	0.136	11	AGM/DGM	0.0123	36.859
WF5C117A	C	C1	3	1	38.495	0.135	11	AGM/DGM	0.0123	37.546
WF5C215A	C	C2	3	2	37.619	0.136	11	AGM/DGM	0.0124	36.999
WF5C216A	C	C2	3	2	38.773	0.135	11	AGM/DGM	0.0123	37.859
WF5C217A	C	C2	3	2	37.756	0.135	11	AGM/DGM	0.0123	36.712

Average	**37.745**	
Standard Dev.	**1.040**	
Coeff. of Var. [%]	**2.755**	
Min.	**35.755**	
Max.	**40.107**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0126**	**37.825**
$Standard\ Dev._{norm}$		**1.277**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.377**
Min.	**0.0123**	**35.458**
Max.	**0.0130**	**40.493**
Number of Spec.		**18**


Laminate Filled Hole Tension Properties (FHT2) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
15
20
25
30
35
40
45
50
55
60
Laminate Filled Hole Tension Strength [ksi]

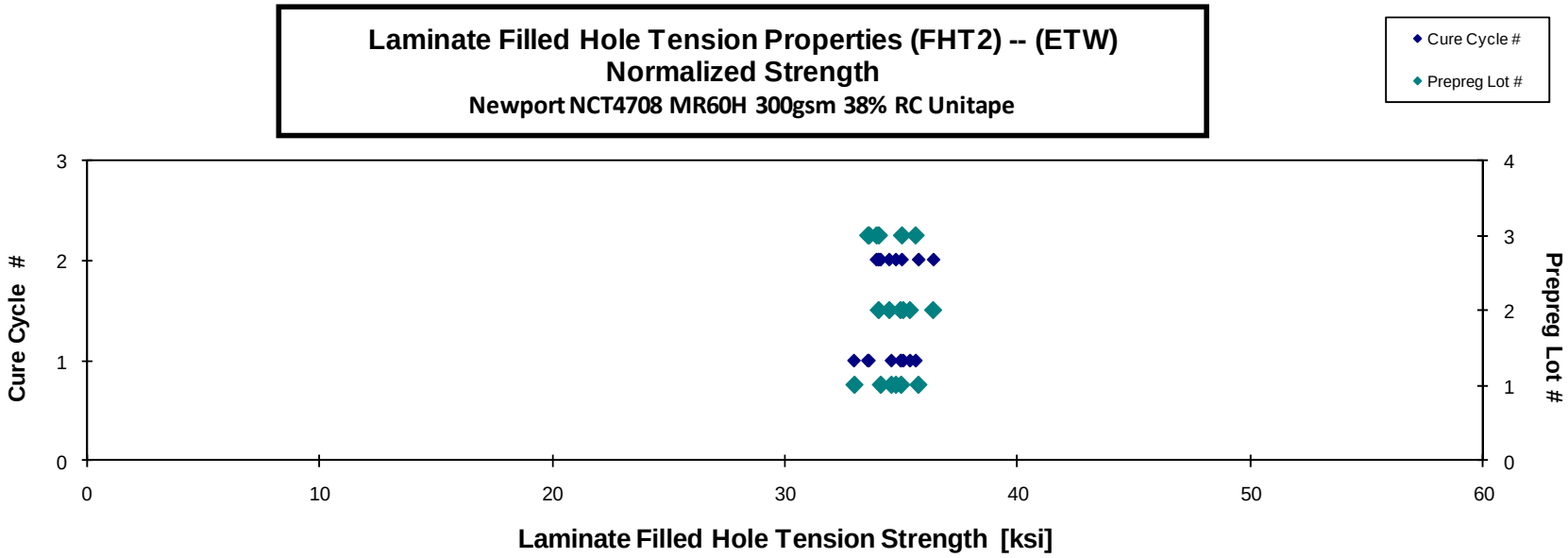
Laminate Filled Hole Tension Properties (FHT2) -- (ETW)
Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF5A118F	A	C1	1	1	33.998	0.143	11	AGM/DGM	0.0130	35.004
WF5A119F	A	C1	1	1	33.562	0.143	11	AGM/DGM	0.0130	34.583
WF5A11AF	A	C1	1	1	31.928	0.143	11	AGM/DGM	0.0130	32.980
WF5A218F	A	C2	1	2	34.605	0.143	11	AGM/DGM	0.0130	35.750
WF5A219F	A	C2	1	2	33.815	0.143	11	AGM/DGM	0.0130	34.778
WF5A21AF	A	C2	1	2	33.268	0.142	11	AGM/DGM	0.0129	34.120
WF5B118F	B	C1	2	1	34.898	0.139	11	AGM/DGM	0.0127	35.091
WF5B119F	B	C1	2	1	34.850	0.139	11	AGM/DGM	0.0126	34.975
WF5B11AF	B	C1	2	1	35.186	0.139	11	AGM/DGM	0.0127	35.380
WF5B218F	B	C2	2	2	34.305	0.137	11	AGM/DGM	0.0125	34.028
WF5B219F	B	C2	2	2	34.835	0.137	11	AGM/DGM	0.0125	34.492
WF5B21AF	B	C2	2	2	36.939	0.137	11	AGM/DGM	0.0124	36.388
WF5C118F	C	C1	3	1	36.608	0.135	11	AGM/DGM	0.0123	35.627
WF5C119F	C	C1	3	1	34.539	0.135	11	AGM/DGM	0.0123	33.621
WF5C11AF	C	C1	3	1	34.542	0.135	11	AGM/DGM	0.0122	33.574
WF5C218F	C	C2	3	2	35.998	0.135	11	AGM/DGM	0.0123	35.037
WF5C219F	C	C2	3	2	34.972	0.135	11	AGM/DGM	0.0122	33.941
WF5C21AF	C	C2	3	2	35.242	0.134	11	AGM/DGM	0.0122	34.038

Average	**34.672**
Standard Dev.	**1.176**
Coeff. of Var. [%]	**3.393**
Min.	**31.928**
Max.	**36.939**
Number of Spec.	**18**

$Average_{norm}$	**0.0126**	**34.634**
$Standard\ Dev._{norm}$		**0.871**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.513**
Min.	**0.0122**	**32.980**
Max.	**0.0130**	**36.388**
Number of Spec.		**18**


Laminate Filled Hole Tension Properties (FHT2) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
Laminate Filled Hole Tension Strength [ksi]

4.21 Filled-Hole Tension 3 Properties

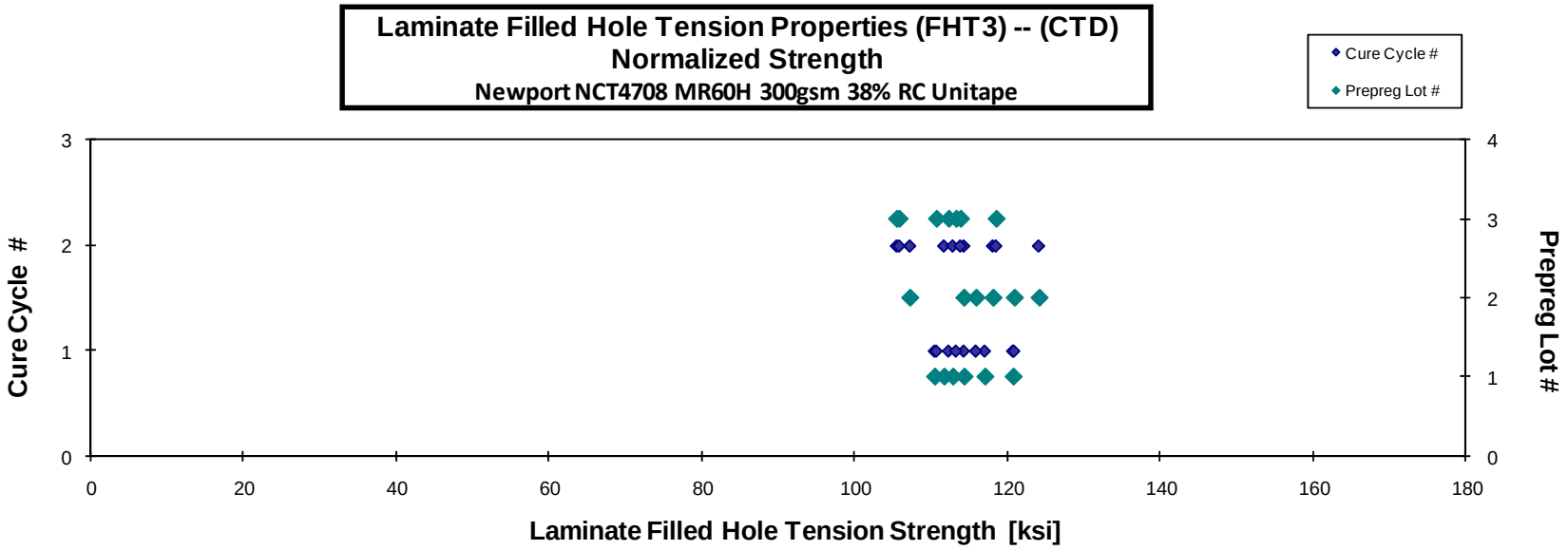
Laminate Filled Hole Tension Properties (FHT3) -- (CTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF6A111B	A	C1	1	1	108.526	0.141	11	AGM / DGM	0.0128	110.562
WF6A112B	A	C1	1	1	112.637	0.144	11	AGM / DGM	0.0131	117.134
WF6A114B	A	C1	1	1	116.403	0.144	11	AGM / DGM	0.0131	120.826
WF6A211B	A	C2	1	2	111.349	0.139	11	AGM / DGM	0.0127	111.791
WF6A212B	A	C2	1	2	114.317	0.139	11	AGM / DGM	0.0126	114.413
WF6A213B	A	C2	1	2	112.258	0.139	11	AGM / DGM	0.0127	112.946
WF6B111B	B	C1	2	1	113.185	0.140	11	AGM / DGM	0.0127	114.383
WF6B112B	B	C1	2	1	114.811	0.140	11	AGM / DGM	0.0127	115.971
WF6B113B	B	C1	2	1	120.579	0.139	11	AGM / DGM	0.0126	120.985
WF6B211B	B	C2	2	2	125.946	0.137	11	AGM / DGM	0.0124	124.220
WF6B212B	B	C2	2	2	118.538	0.138	11	AGM / DGM	0.0126	118.196
WF6B213B	B	C2	2	2	107.412	0.138	11	AGM / DGM	0.0126	107.321
WF6C111B	C	C1	3	1	113.815	0.135	11	AGM / DGM	0.0123	110.804
WF6C112B	C	C1	3	1	114.699	0.136	11	AGM / DGM	0.0123	112.396
WF6C113B	C	C1	3	1	115.466	0.136	11	AGM / DGM	0.0124	113.370
WF6C211B	C	C2	3	2	116.233	0.136	11	AGM / DGM	0.0124	113.954
WF6C212B	C	C2	3	2	120.933	0.136	11	AGM / DGM	0.0124	118.607
WF6C213B	C	C2	3	2	107.766	0.136	11	AGM / DGM	0.0123	105.589
WF6C214B	C	C2	3	2	108.037	0.136	11	AGM / DGM	0.0124	105.932

Average	**114.364**	
Standard Dev.	**4.869**	
Coeff. of Var. [%]	**4.257**	
Min.	**107.412**	
Max.	**125.946**	
Number of Spec.	**19**	

$Average_{norm}$	**0.0126**	**114.179**
$Standard\ Dev._{norm}$		**5.075**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.444**
Min.	**0.0123**	**105.589**
Max.	**0.0131**	**124.220**
Number of Spec.		**19**


Laminate Filled Hole Tension Properties (FHT3) -- (CTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
160
180
Laminate Filled Hole Tension Strength [ksi]

Laminate Filled Hole Tension Properties (FHT3) -- (RTD) Strength

Newport NCT4708 MR60H 300gsm 38% RC Unitape

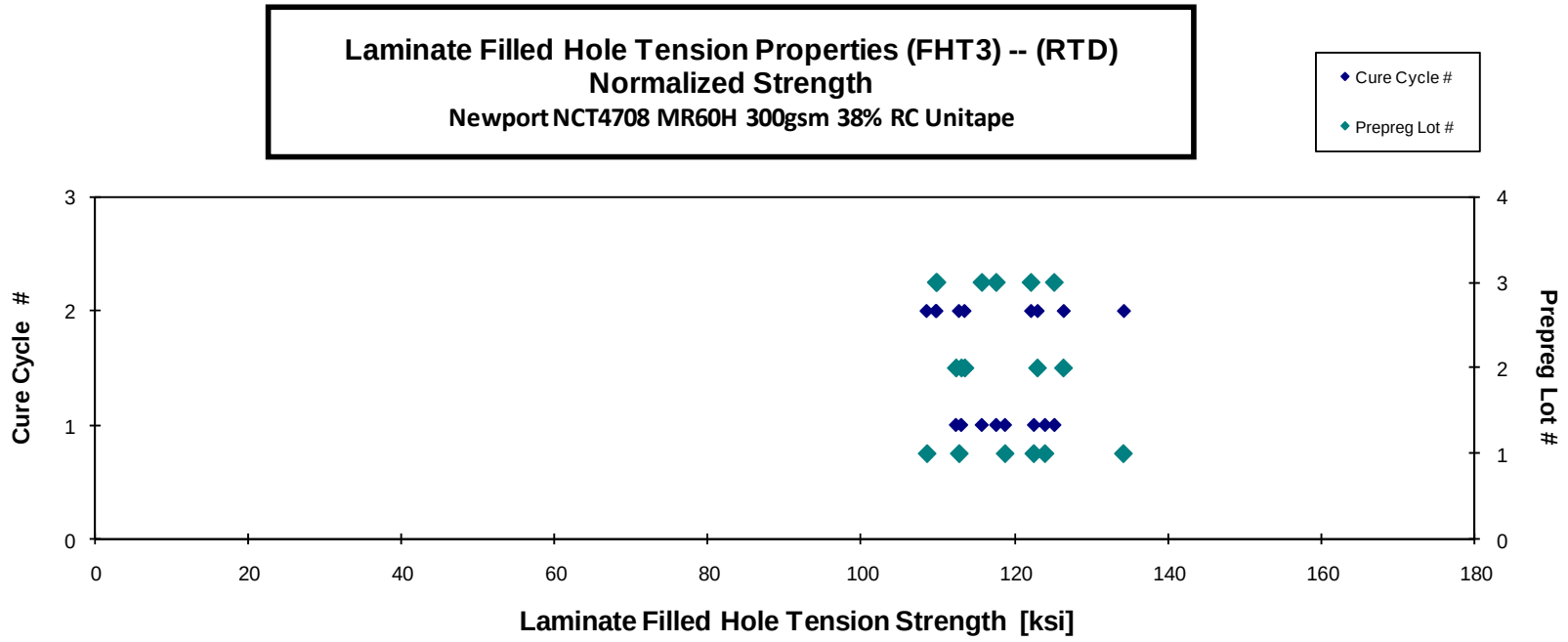
normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF6A115A	A	C1	1	1	118.831	0.145	11	AGM/DGM	0.0131	124.003
WF6A116A	A	C1	1	1	117.620	0.144	11	AGM/DGM	0.0131	122.543
WF6A117A	A	C1	1	1	114.071	0.144	11	AGM/DGM	0.0131	118.776
WF6A215A	A	C2	1	2	105.608	0.142	11	AGM/DGM	0.0130	108.542
WF6A216A	A	C2	1	2	109.316	0.143	11	AGM/DGM	0.0130	112.760
WF6A217A	A	C2	1	2	130.408	0.143	11	AGM/DGM	0.0130	134.297
WF6B115A[1]	B	C1	2	1		0.137	11	DGM	0.0125	
WF6B116A	B	C1	2	1	112.822	0.138	11	AGM/DGM	0.0125	112.361
WF6B117A	B	C1	2	1	113.616	0.138	11	AGM/DGM	0.0125	113.056
WF6B215A	B	C2	2	2	123.729	0.138	11	AGM/DGM	0.0125	123.030
WF6B216A	B	C2	2	2	114.156	0.138	11	AGM/DGM	0.0125	113.497
WF6B217A	B	C2	2	2	126.894	0.138	11	AGM/DGM	0.0126	126.436
WF6C115A	C	C1	3	1	119.812	0.136	11	AGM/DGM	0.0124	117.622
WF6C116A	C	C1	3	1	117.490	0.137	11	AGM/DGM	0.0124	115.738
WF6C117A	C	C1	3	1	128.093	0.136	11	AGM/DGM	0.0123	125.228
WF6C215A	C	C2	3	2	111.053	0.137	11	AGM/DGM	0.0125	109.744
WF6C216A	C	C2	3	2	111.549	0.136	11	AGM/DGM	0.0124	109.832
WF6C217A	C	C2	3	2	123.953	0.137	11	AGM/DGM	0.0124	122.179

[1] Strength data removed due to bad failure.

	Strength	$Strength_{norm}$
Average	**117.590**	**118.214**
Standard Dev.	**7.070**	**7.167**
Coeff. of Var. [%]	**6.013**	**6.063**
Min.	**105.608**	**108.542**
Max.	**130.408**	**134.297**
Number of Spec.	**17**	**17**

	Avg. t_{ply}	$Strength_{norm}$
$Average_{norm}$	**0.0127**	**118.214**
Standard $Dev._{norm}$		**7.167**
Coeff. of Var. $[\%]_{norm}$		**6.063**
Min.	**0.0123**	**108.542**
Max.	**0.0131**	**134.297**
Number of Spec.		**17**


Laminate Filled Hole Tension Properties (FHT3) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
160
180
Laminate Filled Hole Tension Strength [ksi]

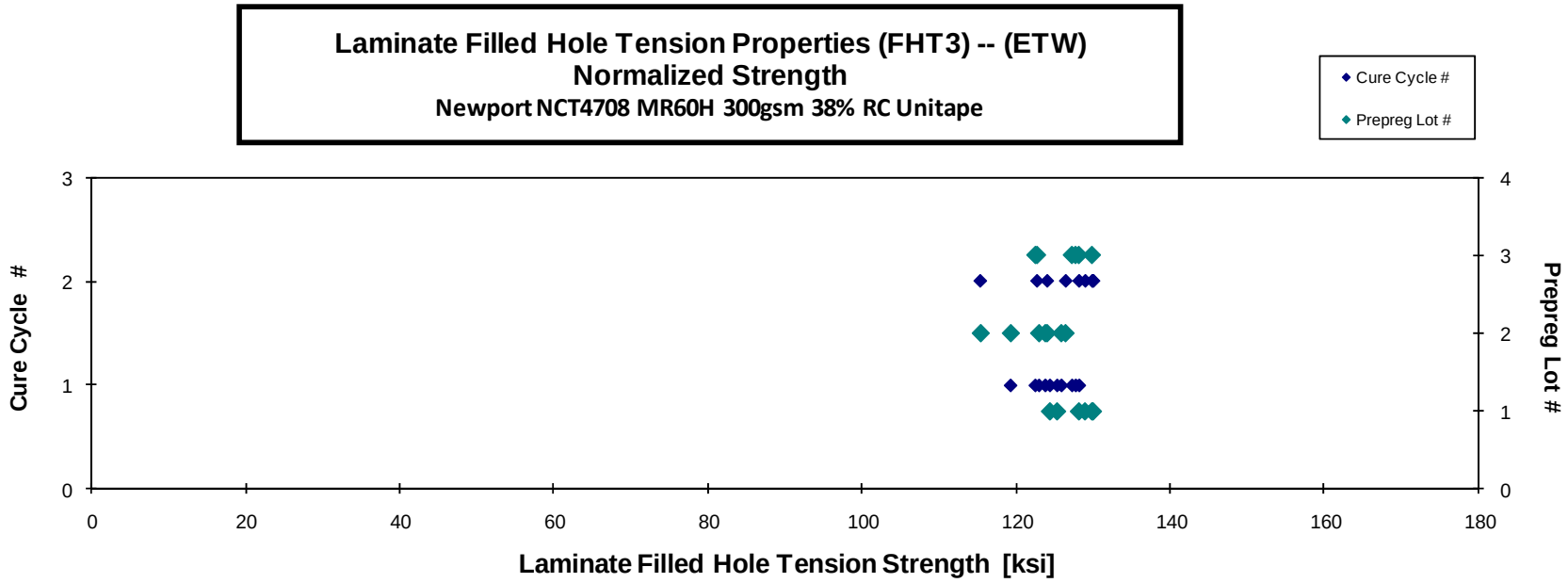
Laminate Filled Hole Tension Properties (FHT3) -- (ETW)
Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF6A118F	A	C1	1	1	120.984	0.144	11	MGM	0.0131	125.378
WF6A119F	A	C1	1	1	124.034	0.143	11	MGM	0.0130	128.210
WF6A11AF	A	C1	1	1	121.154	0.142	11	MGM	0.0129	124.446
WF6A218F	A	C2	1	2	125.437	0.144	11	MGM	0.0130	129.902
WF6A219F	A	C2	1	2	124.602	0.143	11	MGM	0.0130	128.992
WF6A21AF	A	C2	1	2	126.214	0.143	11	MGM	0.0130	130.039
WF6B119F	B	C1	2	1	123.430	0.138	11	MGM	0.0126	123.044
WF6B11AF	B	C1	2	1	125.578	0.139	11	MGM	0.0126	125.926
WF6B11BF	B	C1	2	1	117.792	0.140	11	MGM	0.0128	119.379
WF6B11CF	B	C1	2	1	121.597	0.141	11	MGM	0.0128	123.849
WF6B218F	B	C2	2	2	116.016	0.138	11	MGM	0.0125	115.472
WF6B219F	B	C2	2	2	123.731	0.139	11	MGM	0.0126	124.088
WF6B21AF	B	C2	2	2	125.312	0.140	11	MGM	0.0127	126.473
WF6C118F	C	C1	3	1	131.044	0.135	11	MGM	0.0122	127.294
WF6C119F	C	C1	3	1	131.575	0.135	11	MGM	0.0122	127.762
WF6C11AF	C	C1	3	1	124.961	0.136	11	MGM	0.0124	122.556
WF6C218F	C	C2	3	2	124.639	0.137	11	MGM	0.0124	122.781
WF6C219F	C	C2	3	2	128.147	0.139	11	MGM	0.0126	128.193
WF6C21AF	C	C2	3	2	130.900	0.138	11	MGM	0.0125	129.892

Average	**124.587**	
Standard Dev.	**4.108**	
Coeff. of Var. [%]	**3.298**	
Min.	**116.016**	
Max.	**131.575**	
Number of Spec.	**19**	

$Average_{norm}$	**0.0127**	**125.457**
Standard $Dev._{norm}$		**3.811**
Coeff. of Var. $[\%]_{norm}$		**3.038**
Min.	**0.0122**	**115.472**
Max.	**0.0131**	**130.039**
Number of Spec.		**19**


Laminate Filled Hole Tension Properties (FHT3) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
20
40
60
80
100
120
140
160
180
0
1
2
3
4

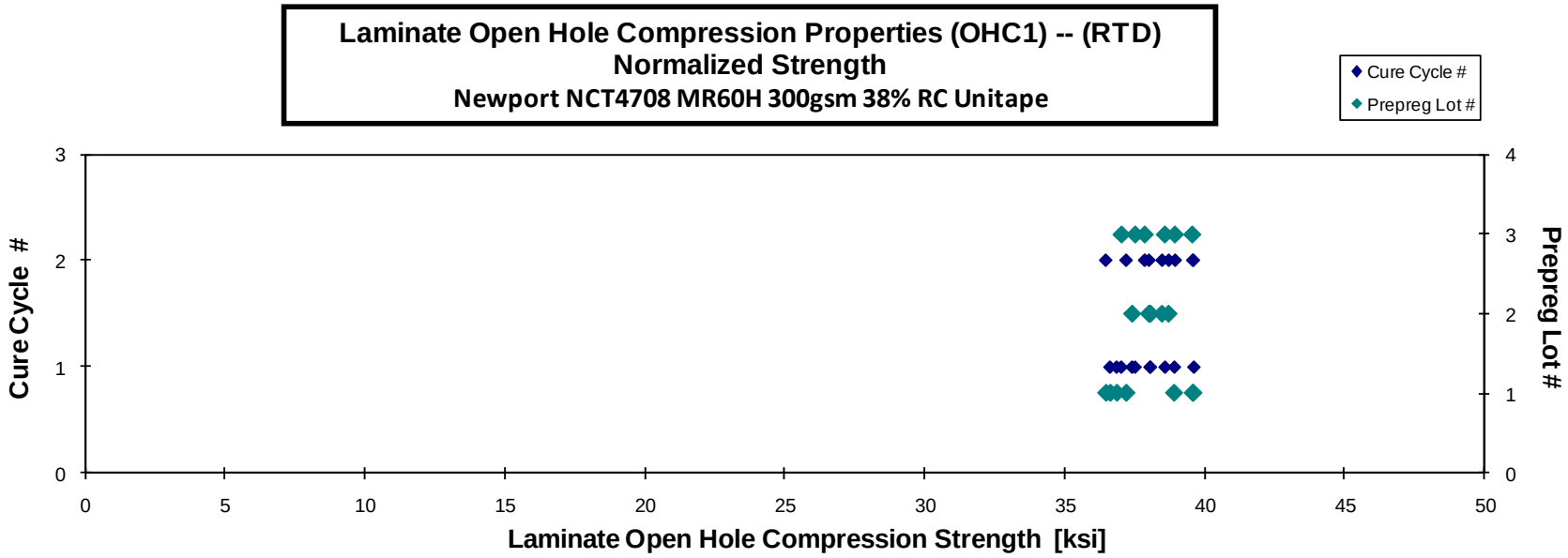
4.22 Open Hole Compression 1 Properties

Laminate Open Hole Compression Properties (OHC1) -- (RTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFGA111A	A	C1	1	1	36.607	0.203	16	LGM	0.0127	36.874
WFGA112A	A	C1	1	1	38.759	0.206	16	LGM	0.0129	39.621
WFGA113A	A	C1	1	1	35.595	0.208	16	LGM	0.0130	36.640
WFGA114A	A	C1	1	1	37.870	0.207	16	LGM	0.0130	38.929
WFGA211A	A	C2	1	2	37.578	0.200	16	LGM	0.0125	37.211
WFGA212A	A	C2	1	2	36.702	0.200	16	LGM	0.0125	36.487
WFGA213A	A	C2	1	2	39.670	0.201	16	LGM	0.0126	39.601
WFGB111A	B	C1	2	1	37.896	0.202	16	LGM	0.0127	38.062
WFGB112A	B	C1	2	1	38.100	0.201	16	LGM	0.0126	38.075
WFGB113A	B	C1	2	1	37.318	0.202	16	LGM	0.0126	37.423
WFGB211A	B	C2	2	2	38.110	0.201	16	LGM	0.0126	38.024
WFGB212A	B	C2	2	2	38.376	0.202	16	LGM	0.0126	38.494
WFGB213A	B	C2	2	2	38.745	0.202	16	LGM	0.0126	38.729
WFGC111A	C	C1	3	1	37.722	0.198	16	LGM	0.0124	37.040
WFGC112A	C	C1	3	1	39.384	0.198	16	LGM	0.0123	38.596
WFGC113A	C	C1	3	1	38.029	0.199	16	LGM	0.0124	37.533
WFGC211A	C	C2	3	2	38.560	0.198	16	LGM	0.0124	37.872
WFGC212A	C	C2	3	2	40.303	0.198	16	LGM	0.0124	39.580
WFGC213A	C	C2	3	2	39.496	0.199	16	LGM	0.0124	38.957

Average	**38.149**		**Average$_{norm}$**	**0.0126**	**38.092**
Standard Dev.	**1.145**		**Standard Dev.$_{norm}$**		**0.999**
Coeff. of Var. [%]	**3.001**		**Coeff. of Var. [%]$_{norm}$**		**2.623**
Min.	**35.595**		**Min.**	**0.0123**	**36.487**
Max.	**40.303**		**Max.**	**0.0130**	**39.621**
Number of Spec.	**19**		**Number of Spec.**		**19**


Laminate Open Hole Compression Properties (OHC1) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
5
10
15
20
25
30
35
40
45
50
Laminate Open Hole Compression Strength [ksi]

Laminate Open Hole Compression Properties (OHC1) -- (ETW) Strength

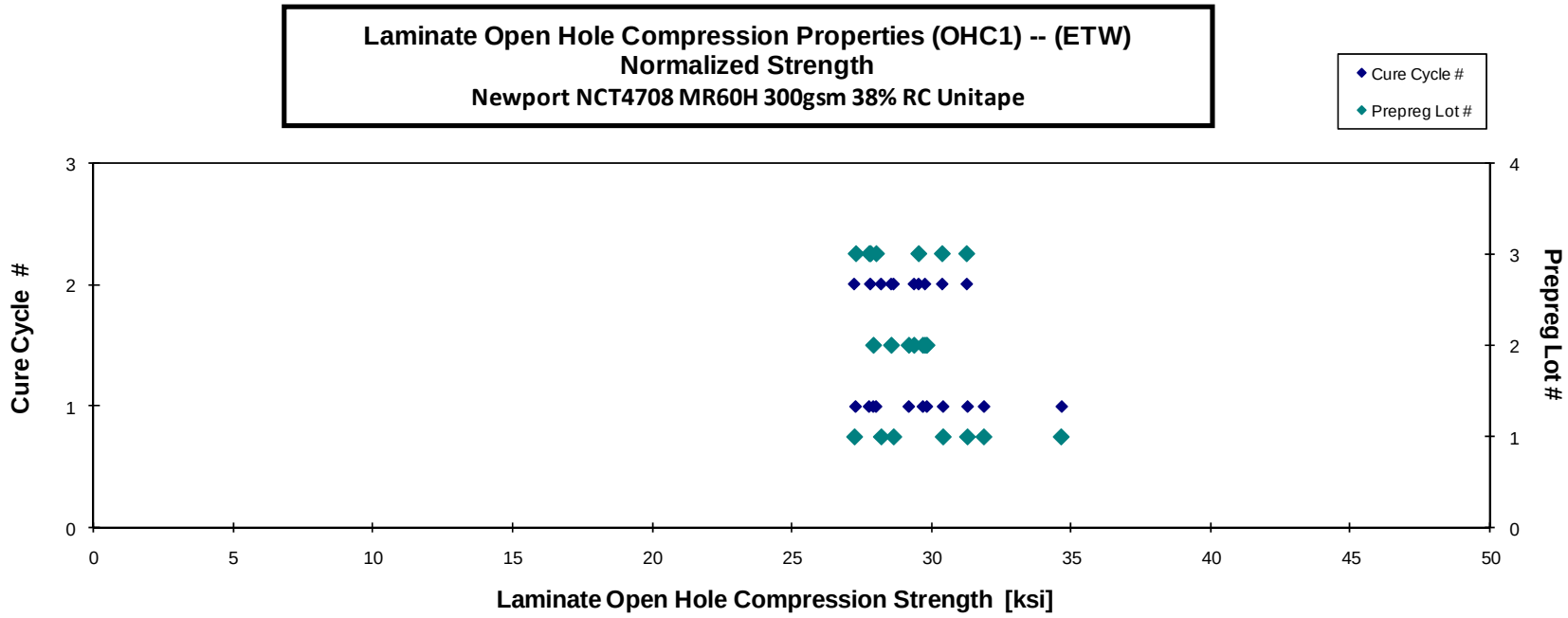
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFGA116F	A	C1	1	1	33.506	0.208	16	LGM	0.0130	34.650
WFGA117F	A	C1	1	1	30.642	0.206	16	LGM	0.0129	31.296
WFGA118F	A	C1	1	1	29.946	0.205	16	LGM	0.0128	30.424
WFGA119F	A	C1	1	1	31.497	0.204	16	LGM	0.0128	31.882
WFGA216F	A	C2	1	2	28.137	0.205	16	LGM	0.0128	28.655
WFGA217F	A	C2	1	2	26.685	0.206	16	LGM	0.0129	27.254
WFGA218F	A	C2	1	2	27.599	0.206	16	LGM	0.0129	28.213
WFGB116F	B	C1	2	1	29.830	0.202	16	LGM	0.0126	29.844
WFGB117F	B	C1	2	1	27.881	0.202	16	LGM	0.0126	27.934
WFGB118F	B	C1	2	1	29.789	0.201	16	LGM	0.0126	29.703
WFGB119F	B	C1	2	1	29.192	0.202	16	LGM	0.0126	29.202
WFGB216F	B	C2	2	2	29.812	0.201	16	LGM	0.0126	29.777
WFGB217F	B	C2	2	2	28.734	0.200	16	LGM	0.0125	28.573
WFGB218F	B	C2	2	2	29.416	0.201	16	LGM	0.0126	29.387
WFGC114F	C	C1	3	1	28.129	0.199	16	LGM	0.0124	27.787
WFGC115F	C	C1	3	1	28.434	0.199	16	LGM	0.0124	28.035
WFGC116F	C	C1	3	1	27.634	0.199	16	LGM	0.0125	27.307
WFGC216F	C	C2	3	2	30.091	0.198	16	LGM	0.0124	29.551
WFGC217F	C	C2	3	2	28.380	0.198	16	LGM	0.0124	27.829
WFGC218F	C	C2	3	2	31.782	0.198	16	LGM	0.0124	31.267
WFGC219F	C	C2	3	2	30.750	0.199	16	LGM	0.0125	30.392

Average	**29.422**	
Standard Dev.	**1.632**	
Coeff. of Var. [%]	**5.547**	
Min.	**26.685**	
Max.	**33.506**	
Number of Spec.	**21**	

$Average_{norm}$	**0.0126**	**29.474**
$Standard\ Dev._{norm}$		**1.788**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**6.066**
Min.	**0.0124**	**27.254**
Max.	**0.0130**	**34.650**
Number of Spec.		**21**


Laminate Open Hole Compression Properties (OHC1) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40
45
50

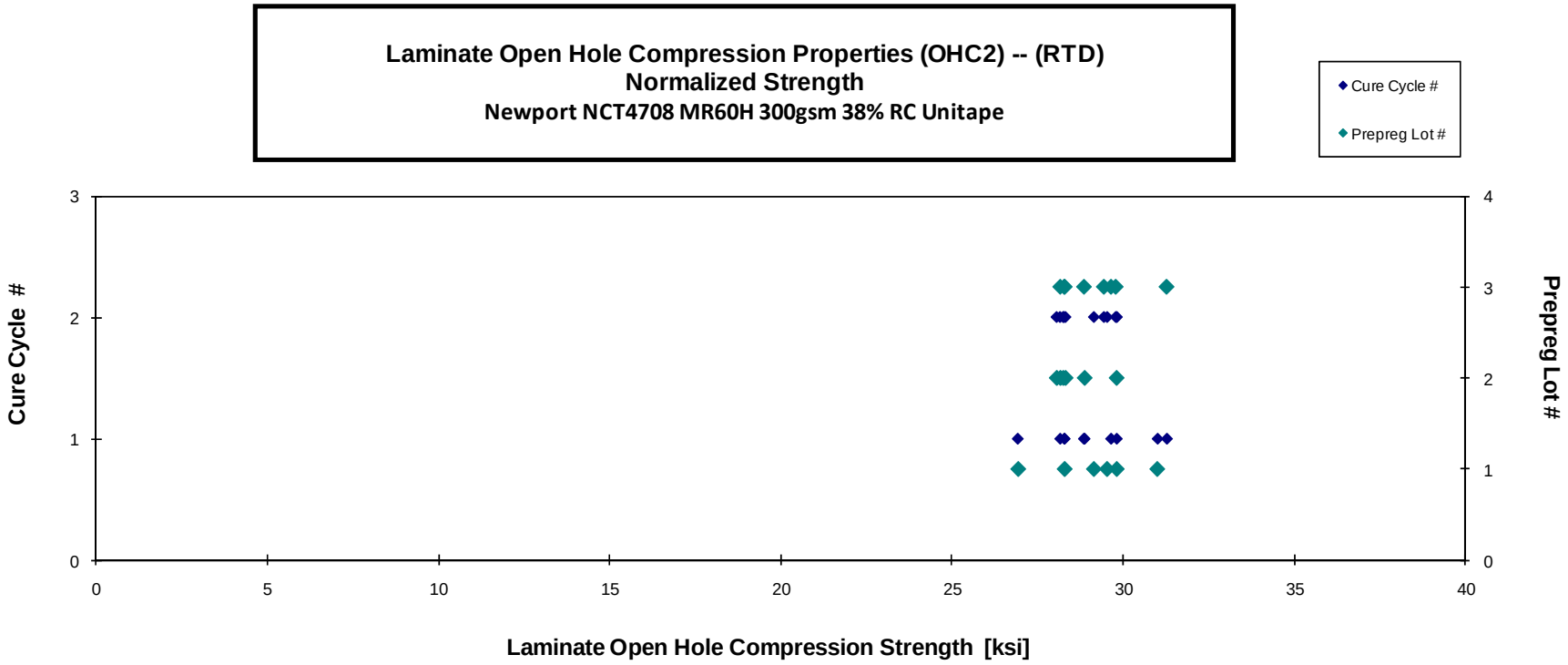
4.23 Open Hole Compression 2 Properties

Laminate Open Hole Compression Properties (OHC2) -- (RTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFHA111A	A	C1	1	1	27.192	0.137	11	MGM	0.0125	26.931
WFHA112A	A	C1	1	1	30.599	0.140	11	MGM	0.0128	31.000
WFHA113A	A	C1	1	1	27.924	0.140	11	MGM	0.0128	28.290
WFHA212A	A	C2	1	2	29.636	0.139	11	MGM	0.0127	29.814
WFHA214A	A	C2	1	2	29.121	0.141	11	MGM	0.0128	29.531
WFHA216A	A	C2	1	2	29.012	0.139	11	MGM	0.0127	29.145
WFHB111A	B	C1	2	1	28.015	0.139	11	MGM	0.0127	28.167
WFHB112A	B	C1	2	1	28.970	0.138	11	MGM	0.0126	28.876
WFHB113A	B	C1	2	1	29.854	0.138	11	MGM	0.0126	29.811
WFHB211A	B	C2	2	2	28.366	0.138	11	MGM	0.0125	28.250
WFHB212A	B	C2	2	2	28.151	0.138	11	MGM	0.0126	28.060
WFHB213A	B	C2	2	2	28.407	0.138	11	MGM	0.0126	28.318
WFHC111A	C	C1	3	1	31.978	0.136	11	MGM	0.0123	31.270
WFHC112A	C	C1	3	1	28.902	0.136	11	MGM	0.0123	28.291
WFHC113A	C	C1	3	1	29.296	0.137	11	MGM	0.0124	28.855
WFHC114A	C	C1	3	1	30.266	0.136	11	MGM	0.0123	29.647
WFHC211A	C	C2	3	2	30.402	0.134	11	MGM	0.0122	29.437
WFHC212A	C	C2	3	2	28.983	0.135	11	MGM	0.0122	28.160
WFHC213A	C	C2	3	2	29.097	0.135	11	MGM	0.0122	28.274
WFHC214A	C	C2	3	2	30.593	0.135	11	MGM	0.0123	29.783

	Strength [ksi]		$Strength_{norm}$ [ksi]
Average	29.238	$Average_{norm}$	28.995
Standard Dev.	1.136	$Standard\ Dev._{norm}$	1.055
Coeff. of Var. [%]	3.885	$Coeff.\ of\ Var.\ [\%]_{norm}$	3.640
Min.	27.192	Min.	26.931
Max.	31.978	Max.	31.270
Number of Spec.	20	Number of Spec.	20


Laminate Open Hole Compression Properties (OHC2) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
5
10
15
20
25
30
35
40
Laminate Open Hole Compression Strength [ksi]

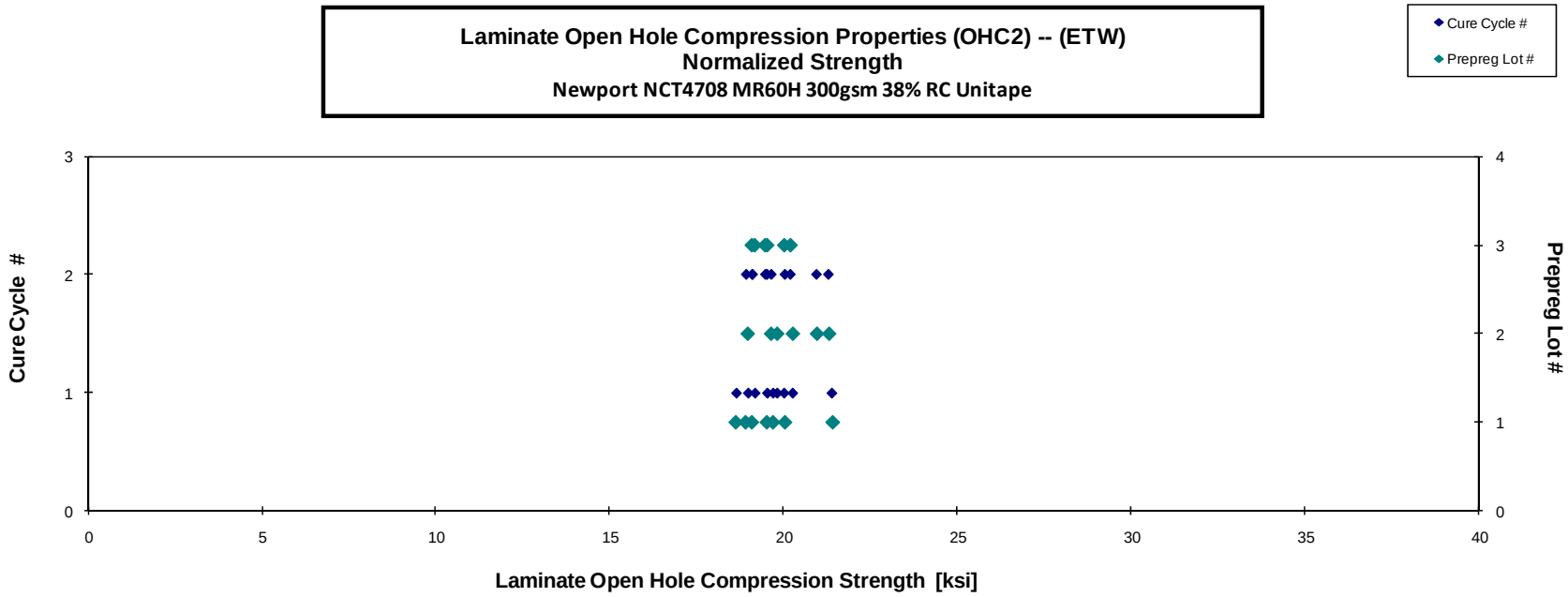
Laminate Open Hole Compression Properties (OHC2) -- (ETW)
Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFHA116F	A	C1	1	1	20.807	0.143	11	AGM	0.0130	21.410
WFHA117F	A	C1	1	1	18.086	0.143	11	AGM	0.0130	18.640
WFHA118F	A	C1	1	1	19.105	0.143	11	AGM	0.0130	19.704
WFHA215F	A	C2	1	2	19.917	0.140	11	AGM	0.0127	20.046
WFHA217F	A	C2	1	2	19.041	0.139	11	AGM	0.0126	19.100
WFHA218F	A	C2	1	2	18.729	0.140	11	AGM	0.0127	18.921
WFHA219F	A	C2	1	2	19.442	0.139	11	AGM	0.0127	19.528
WFHB116F	B	C1	2	1	19.845	0.138	11	AGM	0.0126	19.823
WFHB117F	B	C1	2	1	20.280	0.139	11	AGM	0.0126	20.273
WFHB118F	B	C1	2	1	19.045	0.138	11	AGM	0.0126	18.983
WFHB216F	B	C2	2	2	21.292	0.139	11	AGM	0.0126	21.310
WFHB217F	B	C2	2	2	20.981	0.138	11	AGM	0.0126	20.963
WFHB218F	B	C2	2	2	19.801	0.138	11	AGM	0.0125	19.651
WFHC116F	C	C1	3	1	20.003	0.135	11	AGM	0.0123	19.536
WFHC117F	C	C1	3	1	19.485	0.136	11	AGM	0.0124	19.181
WFHC118F	C	C1	3	1	20.374	0.136	11	AGM	0.0124	20.026
WFHC216F	C	C2	3	2	20.722	0.135	11	AGM	0.0123	20.204
WFHC217F	C	C2	3	2	19.581	0.135	11	AGM	0.0123	19.101
WFHC218F	C	C2	3	2	19.968	0.135	11	AGM	0.0123	19.478

Average	**19.816**	
Standard Dev.	**0.820**	
Coeff. of Var. [%]	**4.140**	
Min.	**18.086**	
Max.	**21.292**	
Number of Spec.	**19**	

$Average_{norm}$	**0.0126**	**19.783**
$Standard\ Dev._{norm}$		**0.787**
Coeff. of Var. $[\%]_{norm}$		**3.977**
Min.	**0.0123**	**18.640**
Max.	**0.0130**	**21.410**
Number of Spec.		**19**


Laminate Open Hole Compression Properties (OHC2) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40

4.24 Open Hole Compression 3 Properties

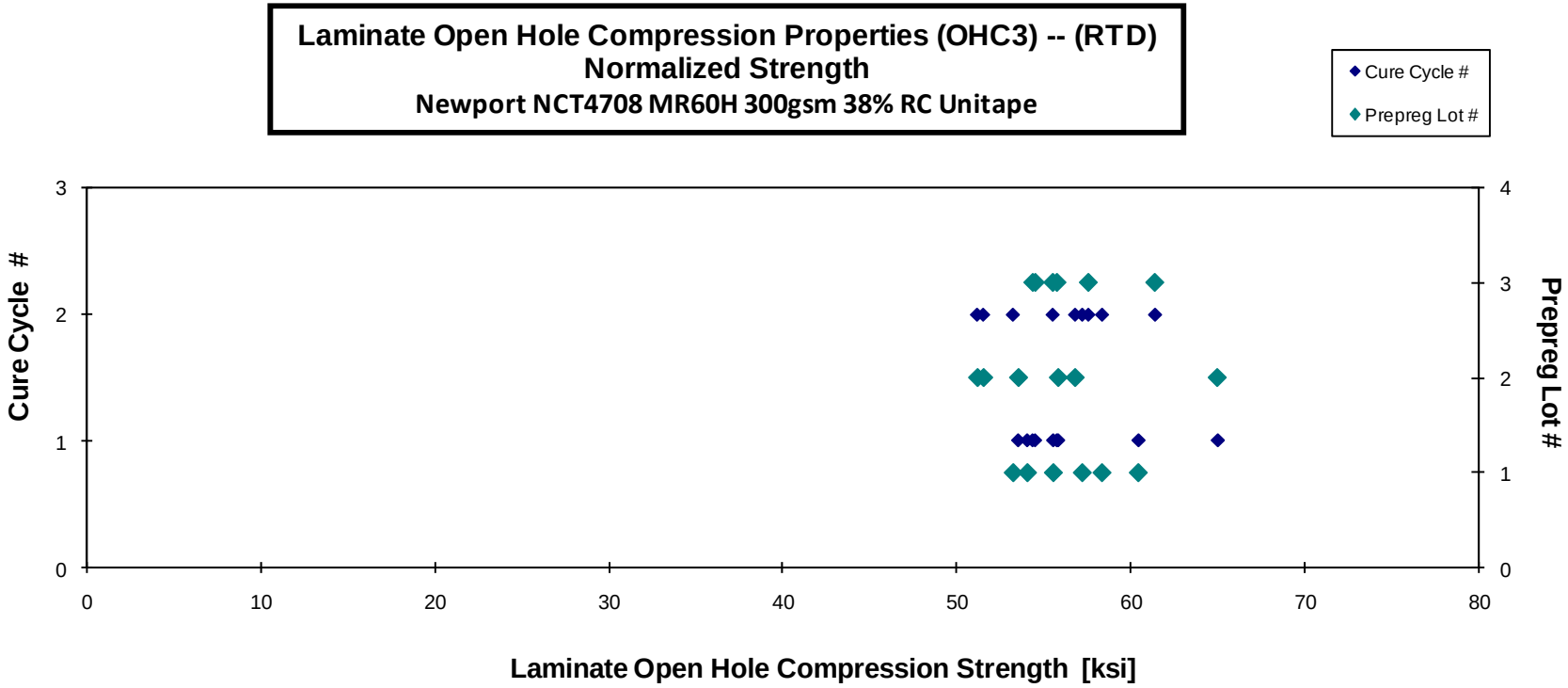
Laminate Open Hole Compression Properties (OHC3) -- (RTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFIA111A	A	C1	1	1	54.127	0.138	11	LGM	0.0126	54.081
WFIA112A	A	C1	1	1	59.934	0.140	11	LGM	0.0127	60.453
WFIA113A	A	C1	1	1	54.851	0.140	11	LGM	0.0128	55.570
WFIA211A	A	C2	1	2	57.301	0.138	11	LGM	0.0126	57.233
WFIA212A	A	C2	1	2	52.888	0.140	11	LGM	0.0127	53.263
WFIA213A	A	C2	1	2	57.441	0.141	11	LGM	0.0128	58.367
WFIB111A	B	C1	2	1	52.930	0.140	11	LGM	0.0128	53.567
WFIB112A	B	C1	2	1	54.943	0.141	11	LGM	0.0128	55.855
WFIB113A	B	C1	2	1	63.425	0.142	11	LGM	0.0129	64.989
WFIB211A	B	C2	2	2	50.871	0.140	11	LGM	0.0127	51.213
WFIB212A	B	C2	2	2	55.566	0.142	11	LGM	0.0129	56.823
WFIB213A	B	C2	2	2	50.696	0.141	11	LGM	0.0128	51.562
WFIC111A	C	C1	3	1	55.850	0.135	11	LGM	0.0123	54.534
WFIC112A	C	C1	3	1	56.482	0.137	11	LGM	0.0124	55.776
WFIC113A	C	C1	3	1	55.183	0.137	11	LGM	0.0124	54.387
WFIC211A	C	C2	3	2	63.531	0.134	11	LGM	0.0122	61.399
WFIC212A	C	C2	3	2	58.674	0.136	11	LGM	0.0124	57.581
WFIC213A	C	C2	3	2	56.304	0.137	11	LGM	0.0124	55.539

Average	**56.167**	
Standard Dev.	**3.585**	
Coeff. of Var. [%]	**6.382**	
Min.	**50.696**	
Max.	**63.531**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0126**	**56.233**
$Standard\ Dev._{norm}$		**3.464**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**6.161**
Min.	**0.0122**	**51.213**
Max.	**0.0129**	**64.989**
Number of Spec.		**18**


Laminate Open Hole Compression Properties (OHC3) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
80
Laminate Open Hole Compression Strength [ksi]

Laminate Open Hole Compression Properties (OHC3) -- (ETW) Strength

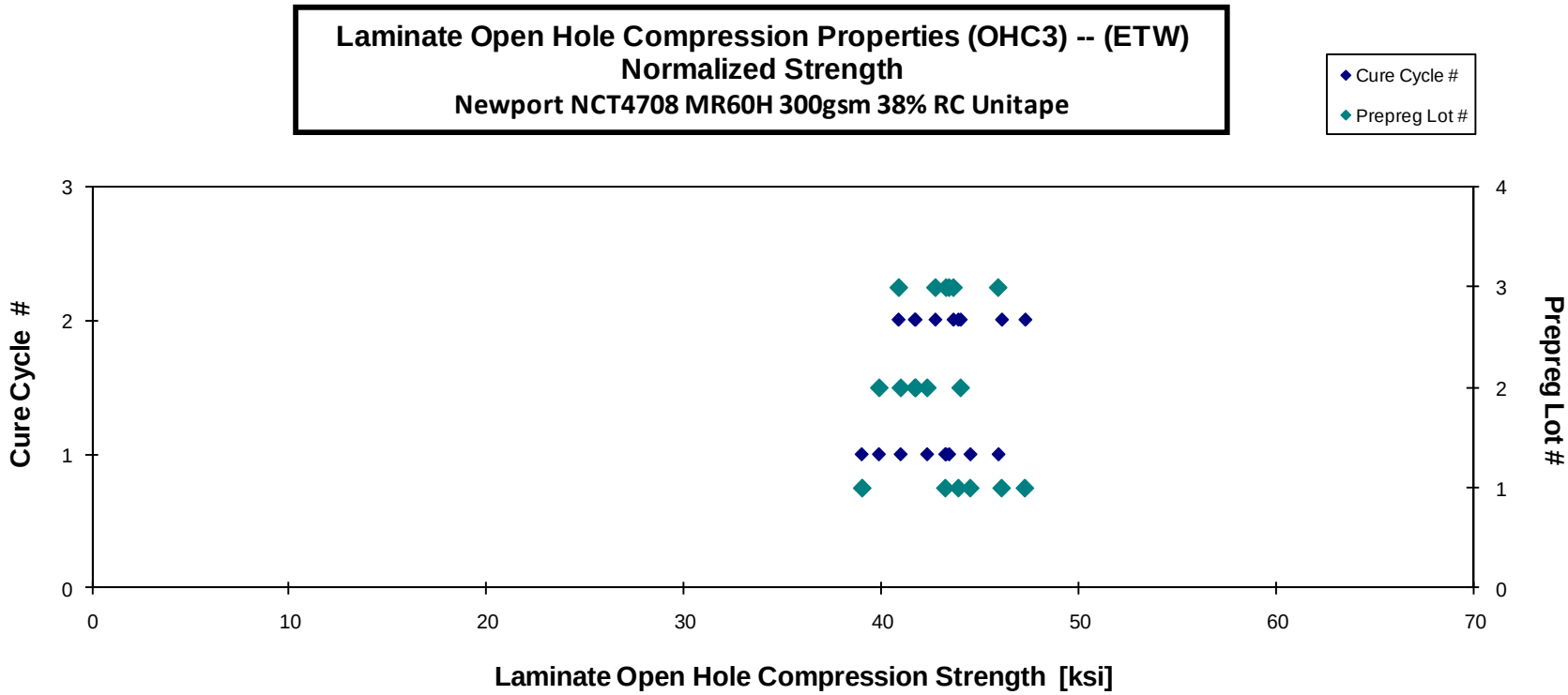
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFIA116F	A	C1	1	1	43.869	0.141	11	LGM	0.0128	44.544
WFIA117F	A	C1	1	1	42.625	0.141	11	LGM	0.0128	43.271
WFIA118F	A	C1	1	1	38.407	0.141	11	LGM	0.0128	39.026
WFIA216F	A	C2	1	2	45.276	0.141	11	LGM	0.0128	46.148
WFIA217F	A	C2	1	2	42.846	0.142	11	LGM	0.0129	43.938
WFIA218F	A	C2	1	2	46.217	0.142	11	LGM	0.0129	47.334
WFIB116F	B	C1	2	1	40.337	0.141	11	LGM	0.0128	41.001
WFIB117F	B	C1	2	1	39.196	0.141	11	LGM	0.0128	39.899
WFIB118F	B	C1	2	1	41.593	0.141	11	LGM	0.0128	42.348
WFIB216F	B	C2	2	2	41.912	0.138	11	LGM	0.0126	41.760
WFIB217F	B	C2	2	2	41.734	0.139	11	LGM	0.0126	41.723
WFIB218F	B	C2	2	2	44.092	0.138	11	LGM	0.0126	44.055
WFIC116F	C	C1	3	1	43.654	0.138	11	LGM	0.0125	43.465
WFIC117F	C	C1	3	1	46.513	0.137	11	LGM	0.0125	45.970
WFIC118F	C	C1	3	1	43.950	0.137	11	LGM	0.0124	43.310
WFIC216F	C	C2	3	2	41.775	0.136	11	LGM	0.0123	40.896
WFIC217F	C	C2	3	2	43.575	0.136	11	LGM	0.0124	42.768
WFIC218F	C	C2	3	2	44.288	0.137	11	LGM	0.0124	43.686

Average	42.881	
Standard Dev.	2.196	
Coeff. of Var. [%]	5.121	
Min.	38.407	
Max.	46.513	
Number of Spec.	18	

$Average_{norm}$	0.0127	43.063
$Standard\ Dev._{norm}$		2.171
$Coeff.\ of\ Var.\ [\%]_{norm}$		5.042
Min.	0.0123	39.026
Max.	0.0129	47.334
Number of Spec.		18


Laminate Open Hole Compression Properties (OHC3) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
10
20
30
40
50
60
70
0
1
2
3
4

4.25 Filled-Hole Compression 1 Properties

Laminate Filled Hole Compression Properties (FHC1) -- (RTD) Strength

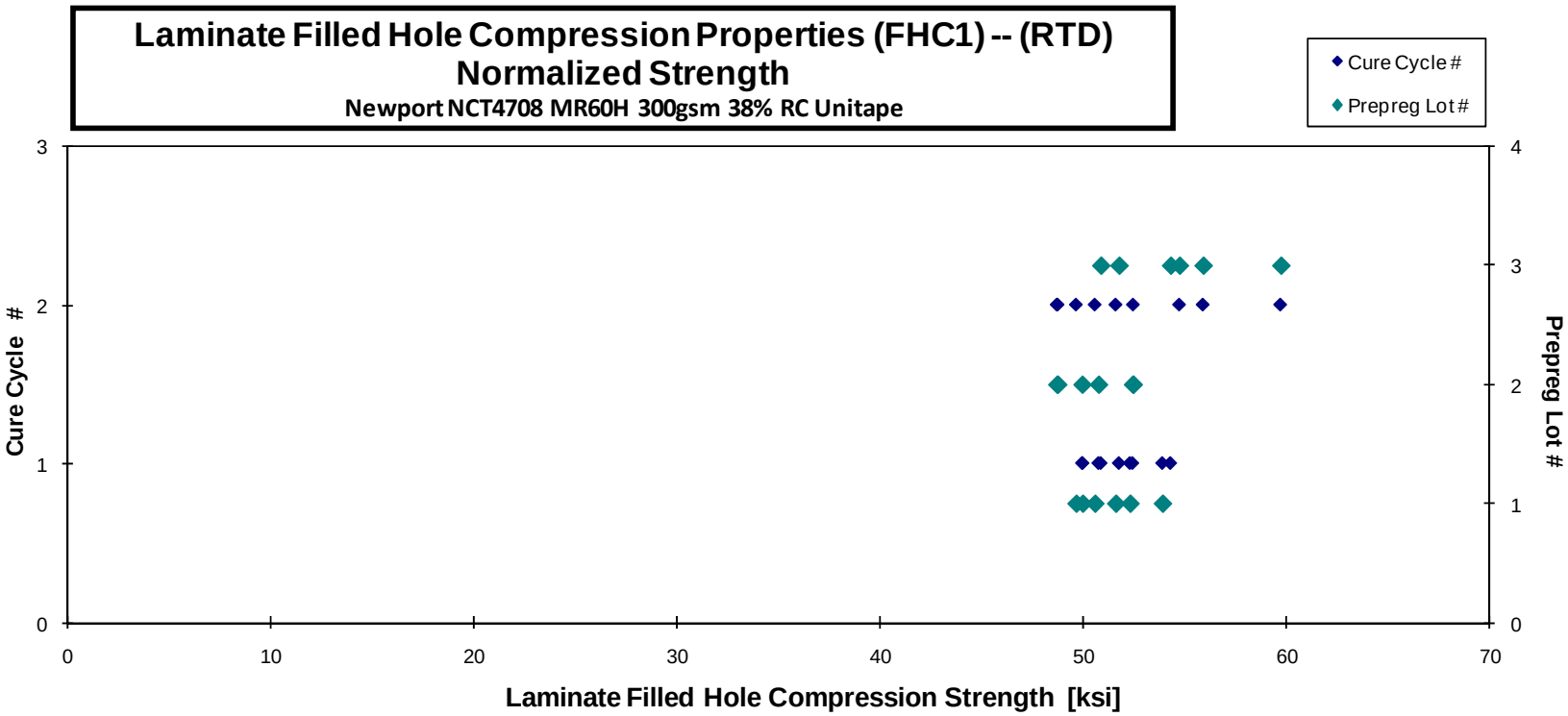
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF7A111A	A	C1	1	1	51.988	0.203	16	LGM	0.0127	52.319
WF7A112A	A	C1	1	1	52.861	0.206	16	LGM	0.0129	53.914
WF7A115A	A	C1	1	1	49.236	0.205	16	LGM	0.0128	49.989
WF7A211A	A	C2	1	2	47.502	0.211	16	LGM	0.0132	49.666
WF7A212A	A	C2	1	2	49.632	0.205	16	LGM	0.0128	50.588
WF7A213A	A	C2	1	2	50.451	0.206	16	LGM	0.0129	51.615
WF7B111A	B	C1	2	1	49.644	0.203	16	LGM	0.0127	49.964
WF7B112A	B	C1	2	1	52.299	0.202	16	LGM	0.0126	52.446
WF7B113A	B	C1	2	1	50.818	0.201	16	LGM	0.0126	50.768
WF7B211A	B	C2	2	2	48.988	0.201	16	LGM	0.0125	48.720
WF7B212A	B	C2	2	2	48.706	0.202	16	LGM	0.0126	48.762
WF7B213A	B	C2	2	2	52.287	0.202	16	LGM	0.0126	52.473
WF7C111A	C	C1	3	1	52.269	0.196	16	LGM	0.0123	50.882
WF7C112A	C	C1	3	1	52.561	0.199	16	LGM	0.0124	51.779
WF7C113A	C	C1	3	1	54.972	0.199	16	LGM	0.0124	54.313
WF7C211A	C	C2	3	2	55.756	0.202	16	LGM	0.0126	55.913
WF7C212A	C	C2	3	2	54.630	0.202	16	LGM	0.0126	54.747
WF7C213A	C	C2	3	2	60.297	0.200	16	LGM	0.0125	59.733

Average	**51.939**	
Standard Dev.	**3.093**	
Coeff. of Var. [%]	**5.956**	
Min.	**47.502**	
Max.	**60.297**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0127**	**52.144**
$Standard\ Dev._{norm}$		**2.783**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**5.337**
Min.	**0.0123**	**48.720**
Max.	**0.0132**	**59.733**
Number of Spec.		**18**


Laminate Filled Hole Compression Properties (FHC1) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
Laminate Filled Hole Compression Strength [ksi]

Laminate Filled Hole Compression Properties (FHC1) -- (ETW) Strength

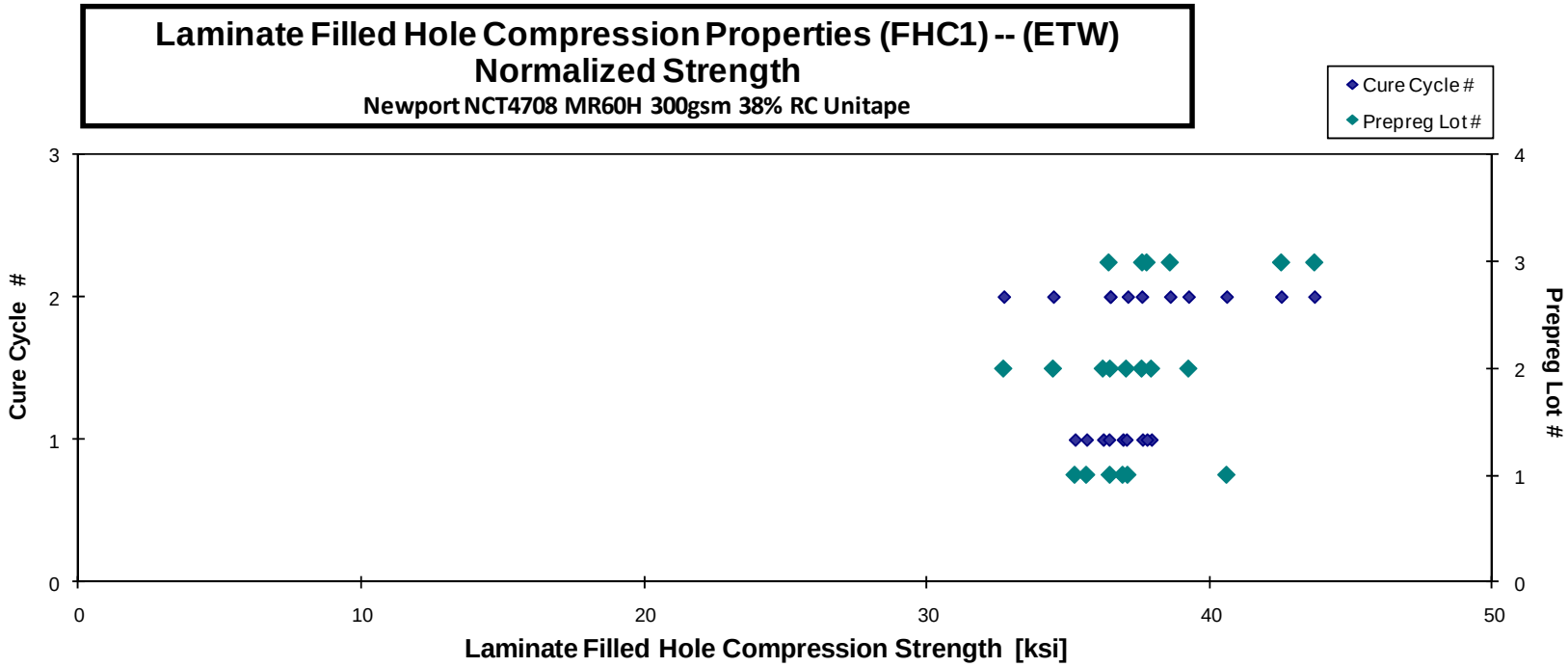
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF7A116F	A	C1	1	1	36.464	0.204	16	MGF	0.013	36.931
WF7A117F	A	C1	1	1	34.883	0.204	16	MGF	0.013	35.235
WF7A118F	A	C1	1	1	35.443	0.203	16	MGF	0.013	35.646
WF7A216F	A	C2	1	2	36.118	0.207	16	MGF	0.013	37.103
WF7A217F	A	C2	1	2	35.620	0.206	16	MGF	0.013	36.477
WF7A218F	A	C2	1	2	39.786	0.206	16	MGF	0.013	40.599
WF7B116F	B	C1	2	1	37.935	0.202	16	MGF	0.013	37.938
WF7B117F	B	C1	2	1	36.526	0.200	16	MGF	0.012	36.233
WF7B118F	B	C1	2	1	37.293	0.200	16	MGF	0.013	37.052
WF7B216F	B	C2	2	2	34.305	0.203	16	LGM	0.013	34.470
WF7B217F	B	C2	2	2	32.239	0.205	16	LGM	0.013	32.716
WF7B218F	B	C2	2	2	36.088	0.204	16	LGM	0.013	36.485
WF7B219F	B	C2	2	2	38.654	0.205	16	LGM	0.013	39.255
WF7B21AF	B	C2	2	2	37.257	0.203	16	LGM	0.013	37.602
WF7C116F	C	C1	3	1	38.088	0.199	16	LGM	0.012	37.622
WF7C117F	C	C1	3	1	36.961	0.199	16	LGM	0.012	36.438
WF7C118F	C	C1	3	1	38.308	0.199	16	LGM	0.012	37.779
WF7C216F	C	C2	3	2	44.732	0.197	16	LGF	0.012	43.704
WF7C217F	C	C2	3	2	39.327	0.198	16	LGF	0.012	38.602
WF7C218F	C	C2	3	2	43.260	0.198	16	LGM	0.012	42.534

Average	**37.464**	
Standard Dev.	**2.859**	
Coeff. of Var. [%]	**7.633**	
Min.	**32.239**	
Max.	**44.732**	
Number of Spec.	**20**	

$Average_{norm}$	**0.0126**	**37.521**
Standard $Dev._{norm}$		**2.556**
Coeff. of Var. $[\%]_{norm}$		**6.813**
Min.	**0.0123**	**32.716**
Max.	**0.0129**	**43.704**
Number of Spec.		**20**


Laminate Filled Hole Compression Properties (FHC1) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Compression Strength [ksi]
0
10
20
30
40
50
0
1
2
3
4

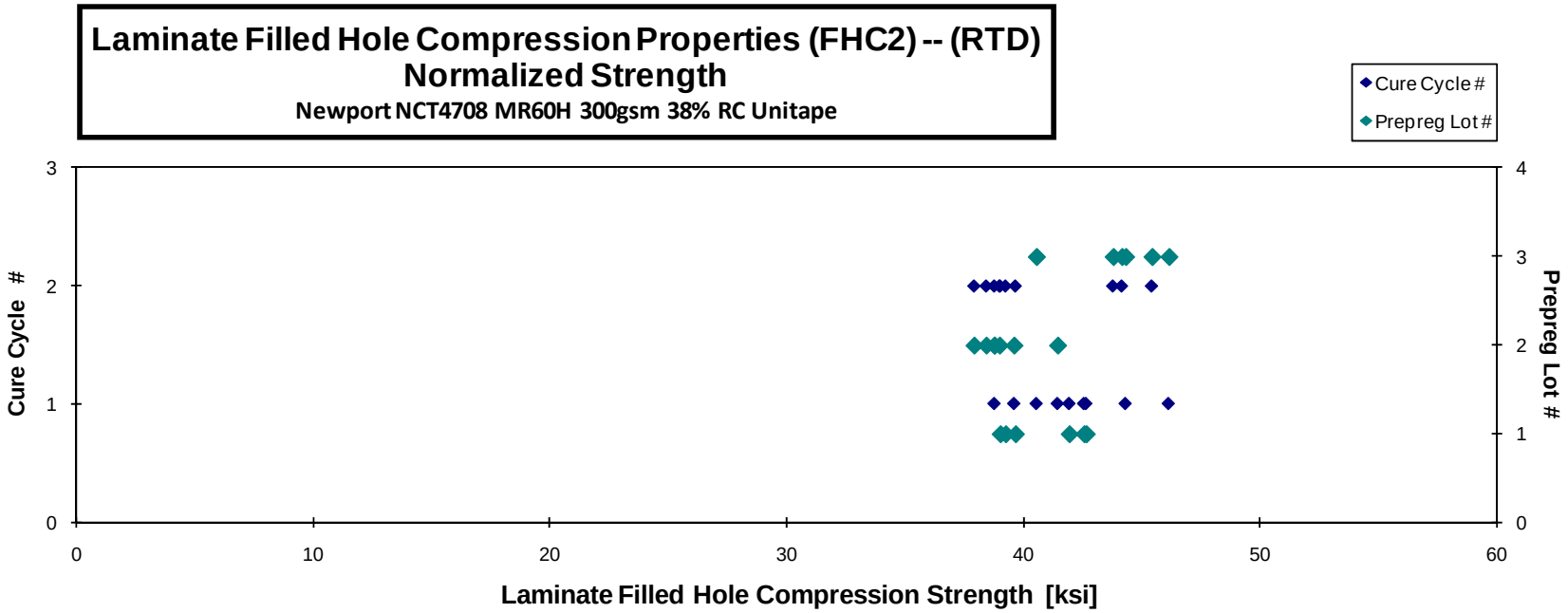
4.26 Filled-Hole Compression 2 Properties

Laminate Filled Hole Compression Properties (FHC2) -- (RTD)
Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	Cytec Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF8A111A	A	C1	1	1	41.885	0.141	11	AGF	0.0128	42.570
WF8A113A	A	C1	1	1	41.813	0.141	11	AGF	0.0129	42.663
WF8A114A	A	C1	1	1	40.878	0.142	11	AGF	0.0129	41.945
WF8A211A	A	C2	1	2	39.709	0.138	11	AGF	0.0126	39.671
WF8A212A	A	C2	1	2	38.795	0.139	11	AGF	0.0127	39.028
WF8A214A	A	C2	1	2	38.544	0.141	11	AGF	0.0128	39.253
WF8B112A	B	C1	2	1	39.990	0.137	11	AGF	0.0125	39.610
WF8B113A	B	C1	2	1	39.159	0.137	11	AGF	0.0125	38.773
WF8B115A	B	C1	2	1	42.133	0.136	11	AGF	0.0124	41.454
WF8B211A	B	C2	2	2	39.122	0.137	11	AGF	0.0125	38.778
WF8B212A	B	C2	2	2	38.651	0.138	11	AGF	0.0125	38.437
WF8B213A	B	C2	2	2	38.184	0.138	11	AGF	0.0125	37.923
WF8B214A	B	C2	2	2	39.157	0.138	11	AGF	0.0125	38.997
WF8C111A	C	C1	3	1	46.848	0.137	11	AGF	0.0124	46.156
WF8C112A	C	C1	3	1	40.857	0.138	11	AGF	0.0125	40.557
WF8C113A	C	C1	3	1	44.988	0.137	11	AGF	0.0124	44.328
WF8C213A	C	C2	3	2	46.018	0.137	11	AGF	0.0124	45.443
WF8C214A	C	C2	3	2	44.184	0.137	11	AGF	0.0125	43.802
WF8C215A	C	C2	3	2	44.504	0.138	11	AGF	0.0125	44.172

Average	**41.338**		**Average$_{norm}$**	**0.0126**	**41.240**
Standard Dev.	**2.745**		**Standard Dev.$_{norm}$**		**2.596**
Coeff. of Var. [%]	**6.641**		**Coeff. of Var. [%]$_{norm}$**		**6.295**
Min.	**38.184**		**Min.**	**0.0124**	**37.923**
Max.	**46.848**		**Max.**	**0.0129**	**46.156**
Number of Spec.	**19**		**Number of Spec.**		**19**


Laminate Filled Hole Compression Properties (FHC2) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Compression Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
4

Laminate Filled Hole Compression Properties (FHC2) -- (ETW) Strength

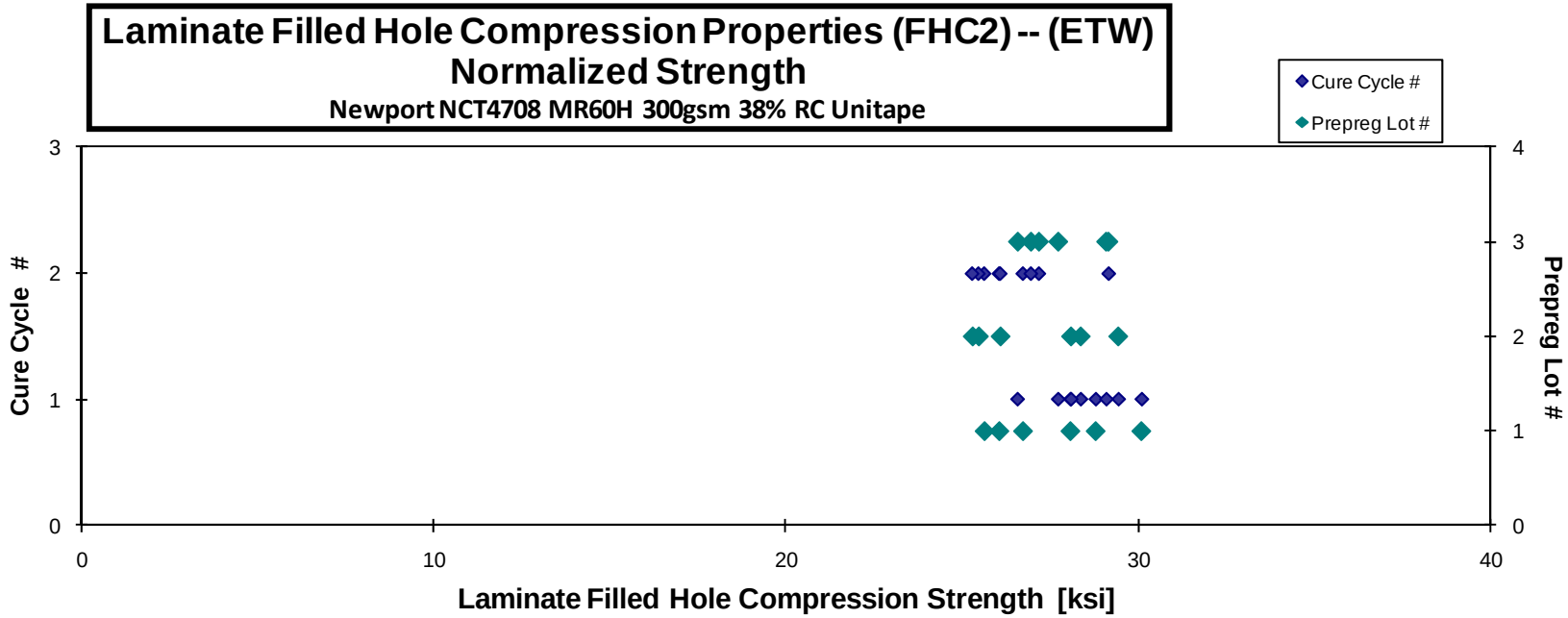
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Cytec Batch #	Cytec Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF8A116F	A	C1	1	1	29.197	0.143	11	LGM	0.0130	30.103
WF8A117F	A	C1	1	1	27.248	0.143	11	LGM	0.0130	28.077
WF8A119F	A	C1	1	1	28.167	0.142	11	LGM	0.0129	28.797
WF8A216F	A	C2	1	2	25.268	0.141	11	AGM	0.0128	25.623
WF8A217F	A	C2	1	2	25.658	0.141	11	AGM	0.0128	26.047
WF8A218F	A	C2	1	2	26.331	0.141	11	AGM	0.0128	26.723
WF8B116F	B	C1	2	1	28.862	0.136	11	MGM	0.0124	28.372
WF8B117F	B	C1	2	1	28.615	0.136	11	AGM/LGM	0.0124	28.095
WF8B118F	B	C1	2	1	29.978	0.136	11	AGM/LGM	0.0124	29.443
WF8B216F	B	C2	2	2	25.984	0.139	11	AGM	0.0126	26.081
WF8B217F	B	C2	2	2	25.336	0.139	11	AGM	0.0127	25.461
WF8B218F	B	C2	2	2	25.262	0.139	11	AGM	0.0126	25.283
WF8C116F	C	C1	3	1	28.253	0.136	11	AGM/LGM	0.0124	27.729
WF8C117F	C	C1	3	1	27.040	0.136	11	AGM/LGM	0.0124	26.575
WF8C118F	C	C1	3	1	29.662	0.136	11	AGM/LGM	0.0124	29.098
WF8C216F	C	C2	3	2	27.402	0.137	11	AGM	0.0125	27.178
WF8C217F	C	C2	3	2	29.495	0.137	11	AGM	0.0125	29.162
WF8C218F	C	C2	3	2	27.067	0.138	11	AGM	0.0125	26.950

Average	**27.490**	
Standard Dev.	**1.609**	
Coeff. of Var. [%]	**5.851**	
Min.	**25.262**	
Max.	**29.978**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0126**	**27.489**
$Standard\ Dev._{norm}$		**1.488**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**5.413**
Min.	**0.0124**	**25.283**
Max.	**0.0130**	**30.103**
Number of Spec.		**18**


Laminate Filled Hole Compression Properties (FHC2) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Compression Strength [ksi]
0
10
20
30
40
0
1
2
3
4

4.27 Filled-Hole Compression 3 Properties

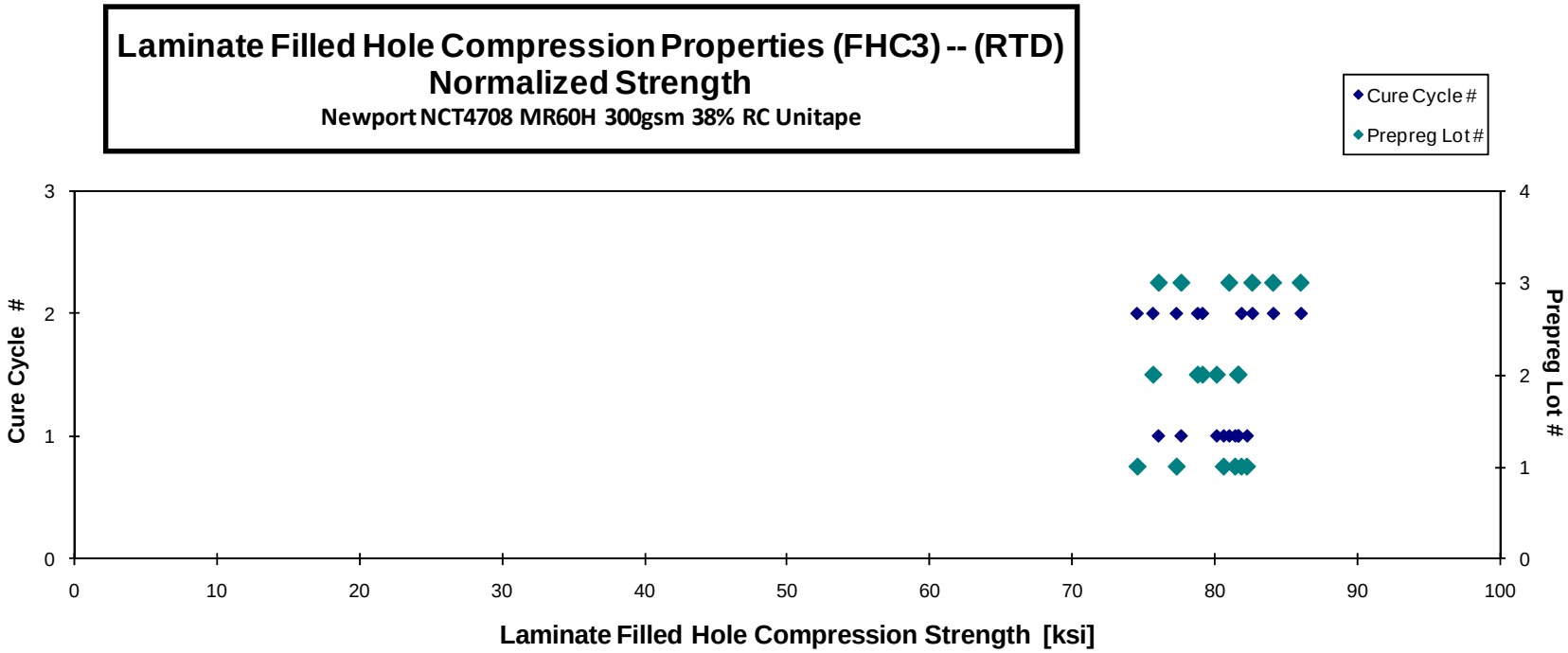
Laminate Filled Hole Compression Properties (FHC3) -- (RTD)
Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF9A111A	A	C1	1	1	82.442	0.138	11	LGF	0.0126	82.254
WF9A112A	A	C1	1	1	79.853	0.140	11	LGF	0.0127	80.621
WF9A113A	A	C1	1	1	80.295	0.141	11	LGF	0.0128	81.424
WF9A211A	A	C2	1	2	81.767	0.139	11	LGF	0.0126	81.865
WF9A212A	A	C2	1	2	75.944	0.141	11	LGF	0.0128	77.313
WF9A213A	A	C2	1	2	72.946	0.142	11	LGM	0.0129	74.560
WF9B111A	B	C1	2	1	82.205	0.138	11	MGM	0.0125	81.662
WF9B112A	B	C1	2	1	81.589	0.139	11	LGF	0.0126	81.628
WF9B113A	B	C1	2	1	80.471	0.138	11	LGM / LGF	0.0125	80.132
WF9B211A	B	C2	2	2	80.698	0.136	11	LGF	0.0124	79.136
WF9B212A	B	C2	2	2	79.891	0.137	11	LGF	0.0124	78.796
WF9B213A	B	C2	2	2	77.275	0.136	11	LGF	0.0123	75.668
WF9C111A	C	C1	3	1	78.991	0.133	11	LGF	0.0121	76.055
WF9C112A	C	C1	3	1	79.145	0.136	11	LGF	0.0124	77.641
WF9C113A	C	C1	3	1	82.850	0.136	11	LGF	0.0123	81.007
WF9C212A	C	C2	3	2	85.593	0.136	11	LGF	0.0124	84.090
WF9C213A	C	C2	3	2	84.143	0.136	11	LGF	0.0124	82.625
WF9C214A	C	C2	3	2	87.618	0.136	11	LGF	0.0124	86.027

Average	**80.762**	
Standard Dev.	**3.403**	
Coeff. of Var. [%]	**4.213**	
Min.	**72.946**	
Max.	**87.618**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0125**	**80.139**
Standard $Dev._{norm}$		**3.028**
Coeff. of Var. $[\%]_{norm}$		**3.779**
Min.	**0.0121**	**74.560**
Max.	**0.0129**	**86.027**
Number of Spec.		**18**

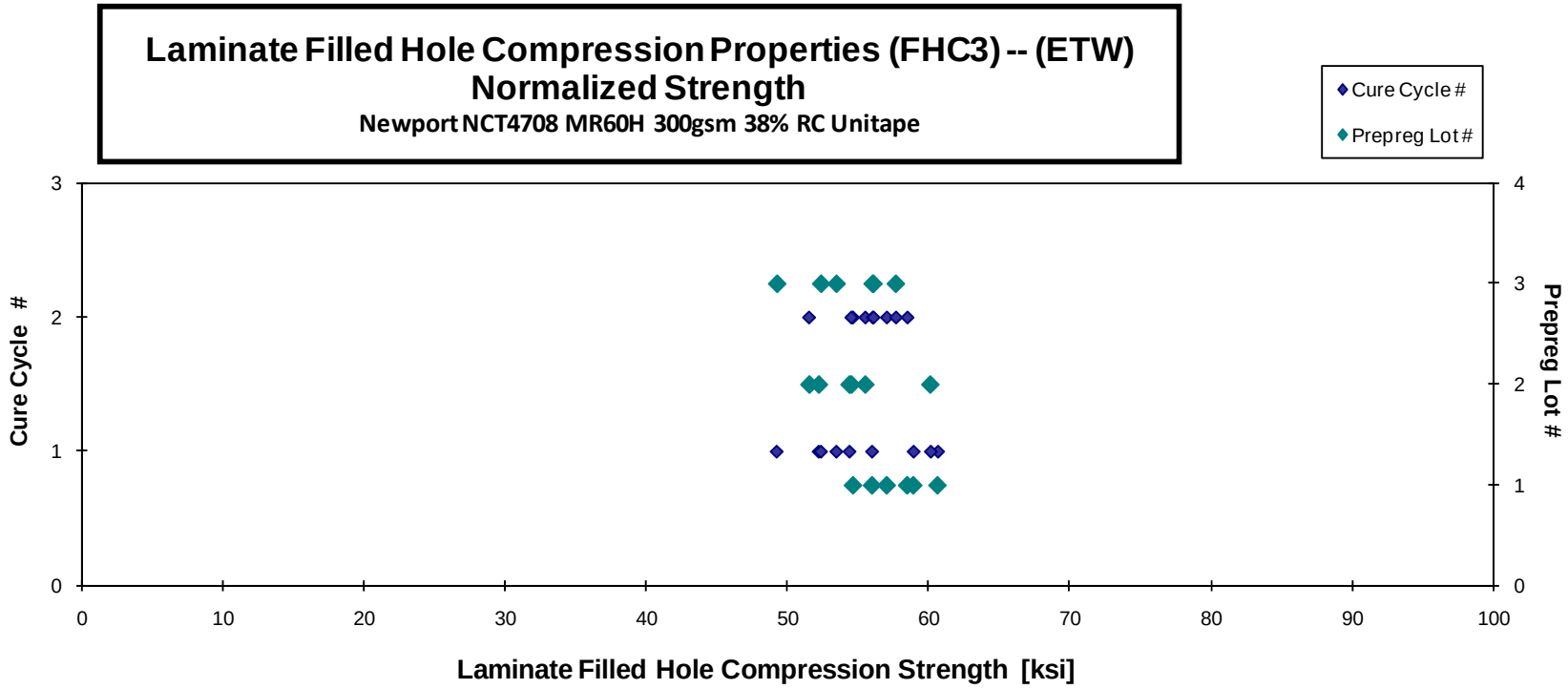

Laminate Filled Hole Compression Properties (FHC3) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100
Laminate Filled Hole Compression Strength [ksi]

Laminate Filled Hole Compression Properties (FHC3) -- (ETW)
Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]
0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WF9A116F	A	C1	1	1	57.979	0.141	11	MGF	0.013	58.941
WF9A117F	A	C1	1	1	54.897	0.141	11	MGF	0.013	56.020
WF9A118F	A	C1	1	1	59.551	0.141	11	MGF	0.013	60.654
WF9A216F	A	C2	1	2	57.288	0.142	11	MGF	0.013	58.507
WF9A217F	A	C2	1	2	53.710	0.141	11	MGF	0.013	54.672
WF9A218F	A	C2	1	2	56.079	0.141	11	MGF	0.013	57.057
WF9B116F	B	C1	2	1	60.193	0.139	11	MGF	0.013	60.149
WF9B117F	B	C1	2	1	54.638	0.138	11	MGF	0.013	54.427
WF9B118F	B	C1	2	1	52.645	0.138	11	MGF	0.013	52.259
WF9B216F	B	C2	2	2	54.959	0.138	11	LGF	0.013	54.563
WF9B217F	B	C2	2	2	52.083	0.137	11	MGF	0.012	51.588
WF9B218F	B	C2	2	2	56.171	0.137	11	LGF	0.012	55.550
WF9C116F	C	C1	3	1	53.397	0.136	11	LGF	0.012	52.421
WF9C117F	C	C1	3	1	54.559	0.136	11	LGF	0.012	53.510
WF9C11AF	C	C1	3	1	50.533	0.135	11	LGF	0.012	49.305
WF9C216F	C	C2	3	2	58.956	0.136	11	LGF	0.012	57.708
WF9C217F	C	C2	3	2	57.520	0.135	11	LGF	0.012	56.068
WF9C218F	C	C2	3	2	57.300	0.136	11	LGF	0.012	56.122

Average	**55.692**		**Average$_{norm}$**	**0.0126**	**55.529**
Standard Dev.	**2.674**		**Standard Dev.$_{norm}$**		**3.045**
Coeff. of Var. [%]	**4.802**		**Coeff. of Var. [%]$_{norm}$**		**5.484**
Min.	**50.533**		**Min.**	**0.0123**	**49.305**
Max.	**60.193**		**Max.**	**0.0129**	**60.654**
Number of Spec.	**18**		**Number of Spec.**		**18**


Laminate Filled Hole Compression Properties (FHC3) -- (ETW)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100
Laminate Filled Hole Compression Strength [ksi]

4.28 Single Shear Bearing 1 Properties

Laminate Single Shear Bearing Properties (SSB1) -- (RTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

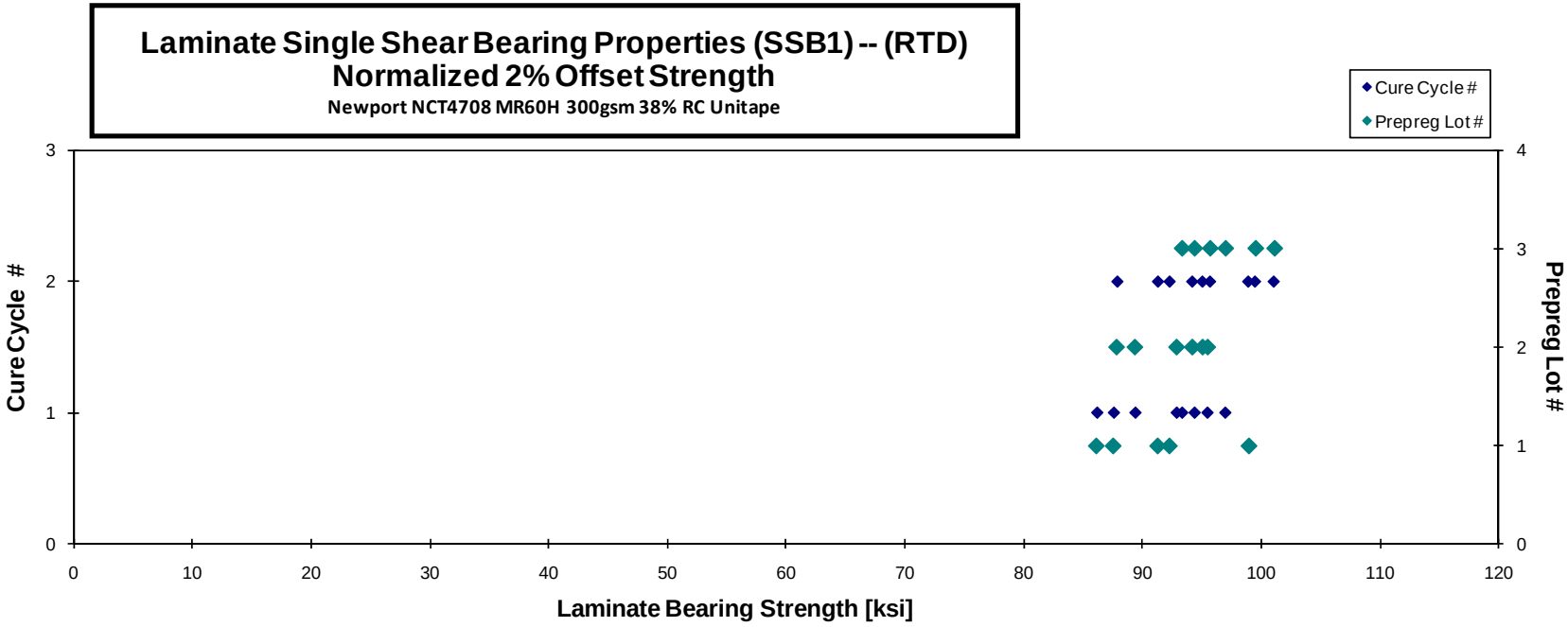
Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Strength$_{norm}$ [ksi]
WFSA111A*	A	C1	1	1			0.097	8	B1I	0.0121		
WFSA112A	A	C1	1	1	88.477	103.662	0.100	8	B1I	0.0125	87.570	102.599
WFSA113A	A	C1	1	1	87.634	106.935	0.099	8	B1I	0.0124	86.156	105.132
WFSA211A	A	C2	1	2	94.233	110.625	0.099	8	B1I	0.0123	92.285	108.339
WFSA212A	A	C2	1	2	91.449	104.380	0.101	8	B1I	0.0126	91.297	104.207
WFSA213A	A	C2	1	2	99.706	107.290	0.100	8	B1I	0.0125	98.948	106.474
WFSB112A	B	C1	2	1	94.132	108.212	0.099	8	B1I	0.0124	92.887	106.780
WFSB113A	B	C1	2	1	92.434	106.467	0.097	8	B1I	0.0122	89.392	102.963
WFSB114A	B	C1	2	1	97.132	107.910	0.099	8	B1I	0.0124	95.494	106.090
WFSB211A	B	C2	2	2	89.126	102.025	0.099	8	B1I	0.0124	87.858	100.574
WFSB212A	B	C2	2	2	93.381	106.350	0.103	8	B1I	0.0128	95.064	108.267
WFSB213A	B	C2	2	2	93.154	104.659	0.102	8	B1I	0.0127	94.201	105.836
WFSC111A	C	C1	3	1	98.567	111.915	0.095	8	B1I	0.0119	93.352	105.994
WFSC112A	C	C1	3	1	100.768	113.587	0.097	8	B1I	0.0121	97.003	109.342
WFSC113A	C	C1	3	1	98.235	112.900	0.097	8	B1I	0.0121	94.402	108.495
WFSC211A	C	C2	3	2	100.455	113.558	0.096	8	B1I	0.0120	95.705	108.188
WFSC212A	C	C2	3	2	103.666	114.673	0.097	8	B1I	0.0121	99.518	110.084
WFSC213A	C	C2	3	2	105.683	116.377	0.096	8	B1I	0.0121	101.105	111.335

* Strength data was remove due thickness taper on specimen

Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)

	2% Offset Strength [ksi]	Ultimate Strength [ksi]
Average	95.778	108.913
Standard Dev.	5.302	4.290
Coeff. of Var. [%]	5.535	3.939
Min.	87.634	102.025
Max.	105.683	116.377
Number of Spec.	17	17

	t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Strength$_{norm}$ [ksi]
Average$_{norm}$	0.0123	93.661	106.512
Standard Dev.$_{norm}$		4.277	2.834
Coeff. of Var. [%]$_{norm}$		4.566	2.661
Min.	0.0119	86.156	100.574
Max.	0.0128	101.105	111.335
Number of Spec.		17	17


Laminate Single Shear Bearing Properties (SSB1) -- (RTD)
Normalized 2% Offset Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120
0
1
2
3
4

Laminate Single Shear Bearing Properties (SSB1) -- (ETW) Strength

Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

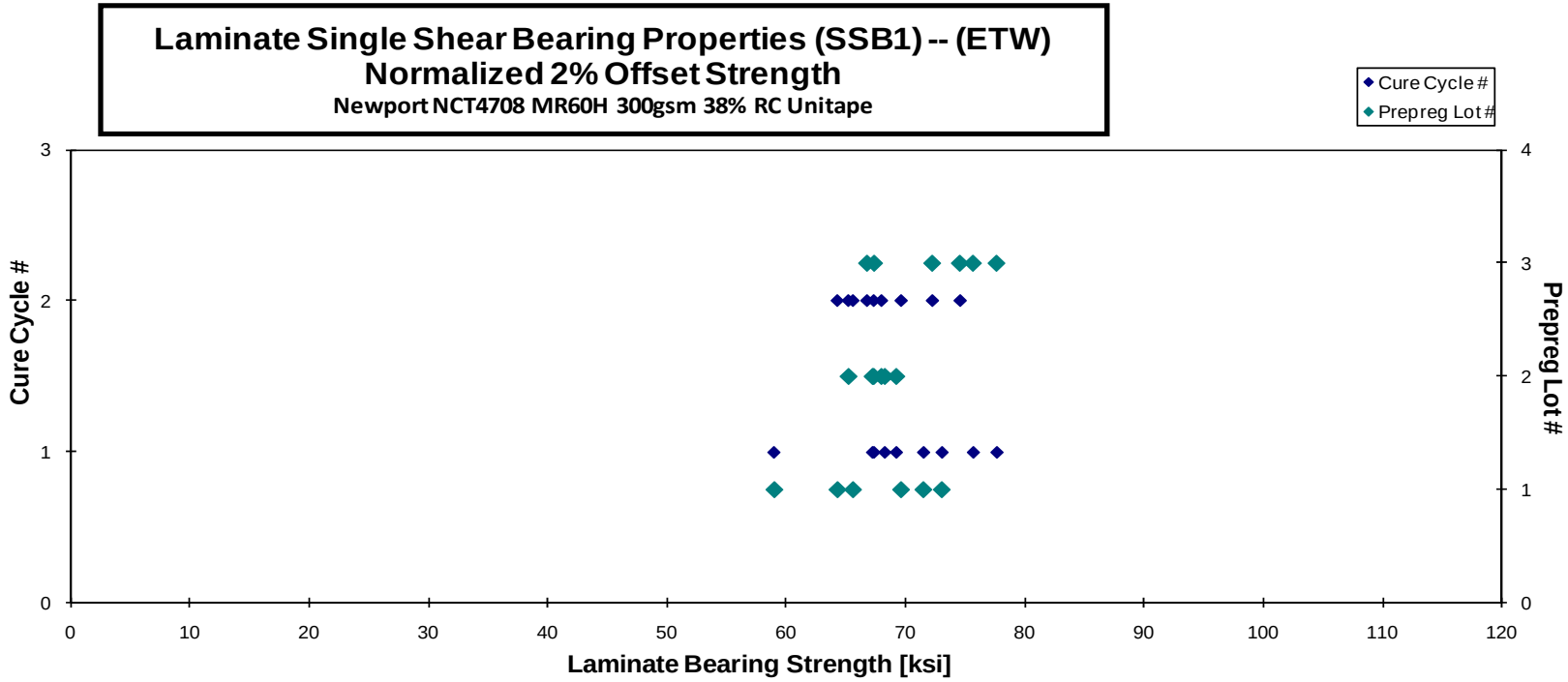
Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Strength$_{norm}$ [ksi]
WFSA116F	A	C1	1	1	59.635	81.052	0.100	8	B1[1] / D1[2]	0.0125	58.985	80.168
WFSA117F	A	C1	1	1	71.393	88.768	0.101	8	B1[1] / D1[2]	0.0126	71.535	88.944
WFSA118F	A	C1	1	1	73.473	86.482	0.100	8	B1[1] / D1[2]	0.0125	73.085	86.025
WFSA216F	A	C2	1	2	63.895	81.798	0.101	8	B1[1] / D1[2]	0.0127	64.297	82.312
WFSA217F	A	C2	1	2	65.059	81.501	0.102	8	B1[1] / D1[2]	0.0127	65.607	82.188
WFSA218F	A	C2	1	2	69.766	83.475	0.101	8	B1[1] / D1[2]	0.0126	69.651	83.337
WFSB116F	B	C1	2	1	69.001	84.026	0.098	8	B1[1] / D1[2]	0.0123	67.255	81.900
WFSB117F	B	C1	2	1	69.087	79.990	0.100	8	B1[1] / D1[2]	0.0125	68.288	79.064
WFSB118F	B	C1	2	1	70.416	84.249	0.099	8	B1[1] / D1[2]	0.0124	69.252	82.856
WFSB216F	B	C2	2	2	69.418	83.610	0.098	8	B1[1] / D1[2]	0.0122	67.352	81.122
WFSB217F	B	C2	2	2	65.224	84.176	0.101	8	B1[1] / D1[2]	0.0126	65.224	84.176
WFSB218F	B	C2	2	2	68.191	84.028	0.101	8	B1[1] / D1[2]	0.0126	67.999	83.792
WFSC117F	C	C1	3	1	68.248	86.714	0.100	8	B1[1] / D1[2]	0.0124	67.379	85.610
WFSC118F	C	C1	3	1	77.086	88.011	0.099	8	B1[1] / D1[2]	0.0124	75.710	86.440
WFSC119F	C	C1	3	1	79.059	85.621	0.099	8	B1[1] / D1[2]	0.0124	77.686	84.135
WFSC216F	C	C2	3	2	69.511	85.569	0.097	8	B1[1] / D1[2]	0.0121	66.787	82.216
WFSC217F	C	C2	3	2	74.681	88.442	0.098	8	B1[1] / D1[2]	0.0122	72.273	85.591
WFSC218F	C	C2	3	2	77.618	89.373	0.097	8	B1[1] / D1[2]	0.0121	74.602	85.900

Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)

[1]: Primary Failure

[2]: Secondary Failure

Average	**70.042**	**84.827**	**Average$_{norm}$**	**0.0124**	**69.054**	**83.654**
Standard Dev.	**5.012**	**2.767**	**Standard Dev.$_{norm}$**		**4.532**	**2.473**
Coeff. of Var. [%]	**7.156**	**3.261**	**Coeff. of Var. [%]$_{norm}$**		**6.562**	**2.956**
Min.	**59.635**	**79.990**	**Min.**	**0.0121**	**58.985**	**79.064**
Max.	**79.059**	**89.373**	**Max.**	**0.0127**	**77.686**	**88.944**
Number of Spec.	**18**	**18**	**Number of Spec.**		**18**	**18**


Laminate Single Shear Bearing Properties (SSB1) -- (ETW)
Normalized 2% Offset Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100
110
120

4.29 Single Shear Bearing 2 Properties

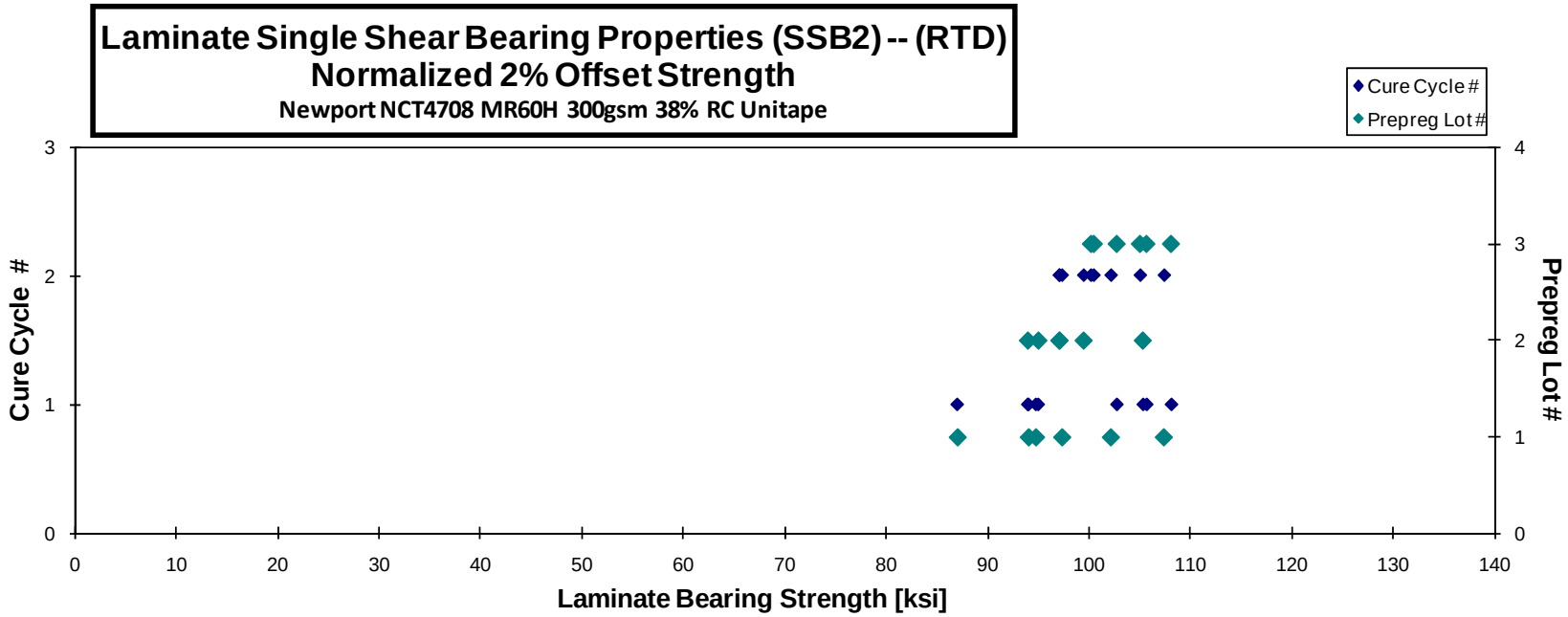
Laminate Single Shear Bearing Properties (SSB2) -- (RTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Strength$_{norm}$ [ksi]
WF2A111A	A	C1	1	1	83.811	105.229	0.144	11	B1I	0.0131	87.036	109.279
WF2A112A	A	C1	1	1	91.218	113.681	0.143	11	B1I	0.0130	94.070	117.235
WF2A113A	A	C1	1	1	90.752	114.440	0.145	11	B1I	0.0132	94.790	119.532
WF2A211A	A	C2	1	2	101.976	119.108	0.139	11	B1I	0.0126	102.209	119.380
WF2A212A	A	C2	1	2	96.547	113.093	0.140	11	B1I	0.0127	97.383	114.072
WF2A213A	A	C2	1	2	107.246	121.530	0.139	11	B1I	0.0126	107.453	121.764
WF2B111A	B	C1	2	1	105.992	120.580	0.138	11	B1I	0.0125	105.367	119.870
WF2B112A	B	C1	2	1	94.398	114.168	0.138	11	B1I	0.0125	93.989	113.674
WF2B113A	B	C1	2	1	95.200	112.353	0.138	11	B1I	0.0126	95.028	112.150
WF2B211A	B	C2	2	2	100.816	116.942	0.137	11	B1I	0.0124	99.507	115.423
WF2B212A	B	C2	2	2	97.884	118.933	0.138	11	B1I	0.0125	97.107	117.989
WF2B213A	B	C2	2	2	98.509	118.914	0.137	11	B1I	0.0124	97.123	117.241
WF2C111A	C	C1	3	1	111.137	121.325	0.135	11	B1I	0.0123	108.157	118.072
WF2C112A	C	C1	3	1	107.608	123.392	0.136	11	B1I	0.0124	105.719	121.225
WF2C113A	C	C1	3	1	104.718	122.091	0.136	11	B1I	0.0124	102.779	119.830
WF2C211A	C	C2	3	2	103.066	117.840	0.135	11	B1I	0.0123	100.513	114.921
WF2C212A	C	C2	3	2	101.327	123.805	0.137	11	B1I	0.0125	100.230	122.465
WF2C213A	C	C2	3	2	107.493	119.783	0.136	11	B1I	0.0123	105.089	117.104

Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)

Average	**99.983**	**117.623**	**Average$_{norm}$**	**0.0126**	**99.642**	**117.290**
Standard Dev.	**7.122**	**4.724**	**Standard Dev.$_{norm}$**		**5.610**	**3.507**
Coeff. of Var. [%]	**7.123**	**4.017**	**Coeff. of Var. [%]$_{norm}$**		**5.630**	**2.990**
Min.	**83.811**	**105.229**	**Min.**	**0.0123**	**87.036**	**109.279**
Max.	**111.137**	**123.805**	**Max.**	**0.0132**	**108.157**	**122.465**
Number of Spec.	**18**	**18**	**Number of Spec.**		**18**	**18**


Laminate Single Shear Bearing Properties (SSB2) -- (RTD)
Normalized 2% Offset Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
0
1
2
3
4

Laminate Single Shear Bearing Properties (SSB2) -- (ETW) Strength

Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Strength$_{norm}$ [ksi]
WF2A117F	A	C1	1	1	68.751	84.867	0.143	11	B1[1] / D1[2]	0.0130	70.892	87.510
WF2A118F	A	C1	1	1	72.592	83.151	0.142	11	B1[1] / D1[2]	0.0130	74.617	85.471
WF2A119F	A	C1	1	1	65.538	85.528	0.143	11	B1[1] / D1[2]	0.0130	67.461	88.037
WF2A216F	A	C2	1	2	75.431	95.022	0.140	11	B1[1] / D1[2]	0.0127	75.948	95.673
WF2A217F	A	C2	1	2	77.119	89.420	0.141	11	B1[1] / D1[2]	0.0128	78.445	90.958
WF2A218F	A	C2	1	2	74.159	91.485	0.140	11	B1[1] / D1[2]	0.0127	74.703	92.156
WF2B116F	B	C1	2	1	76.081	91.193	0.138	11	B1[1] / D1[2]	0.0126	75.870	90.941
WF2B117F	B	C1	2	1	71.507	86.769	0.138	11	B1[1] / D1[2]	0.0126	71.301	86.519
WF2B118F	B	C1	2	1	74.948	91.448	0.137	11	B1[1] / D1[2]	0.0125	74.245	90.590
WF2B216F	B	C2	2	2	74.461	92.722	0.138	11	B1[1] / D1[2]	0.0126	74.398	92.644
WF2B217F	B	C2	2	2	74.570	86.688	0.139	11	B1[1] / D1[2]	0.0127	74.938	87.115
WF2B218F	B	C2	2	2	73.039	91.124	0.140	11	B1[1] / D1[2]	0.0127	73.592	91.814
WF2C116F	C	C1	3	1	72.575	92.925	0.137	11	B1[1] / D1[2]	0.0124	71.632	91.718
WF2C117F	C	C1	3	1	74.636	85.433	0.138	11	B1[1] / D1[2]	0.0125	74.313	85.063
WF2C118F	C	C1	3	1	72.670	87.606	0.138	11	B1[1] / D1[2]	0.0125	72.146	86.974
WF2C216F	C	C2	3	2	72.958	89.893	0.137	11	B1[1] / D1[2]	0.0124	71.888	88.574
WF2C217F	C	C2	3	2	72.818	93.234	0.137	11	B1[1] / D1[2]	0.0124	71.838	91.978
WF2C218F	C	C2	3	2	74.479	92.932	0.136	11	B1[1] / D1[2]	0.0124	73.073	91.178

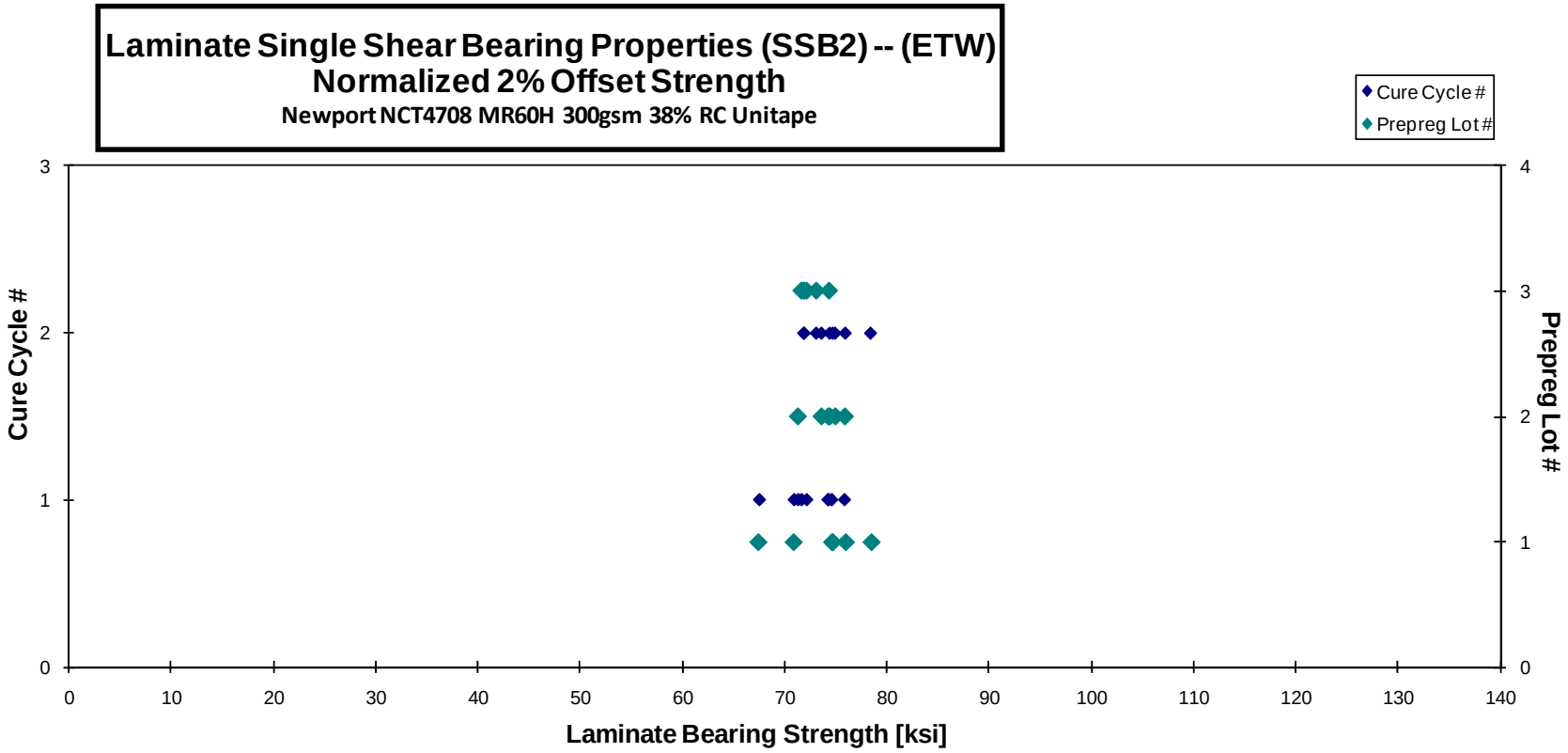
Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)

[1]: Primary Failure

[2]: Secondary Failure

Average	**73.241**	**89.524**	
Standard Dev.	**2.683**	**3.470**	
Coeff. of Var. [%]	**3.663**	**3.877**	
Min.	**65.538**	**83.151**	
Max.	**77.119**	**95.022**	
Number of Spec.	**18**	**18**	

age$_{norm}$	**0.0126**	**73.405**	**89.717**
Standard Dev.$_{norm}$		**2.446**	**2.897**
Coeff. of Var. [%]$_{norm}$		**3.332**	**3.229**
Min.	**0.0124**	**67.461**	**85.063**
Max.	**0.0130**	**78.445**	**95.673**
Number of Spec.		**18**	**18**


Laminate Single Shear Bearing Properties (SSB2) -- (ETW)
Normalized 2% Offset Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140

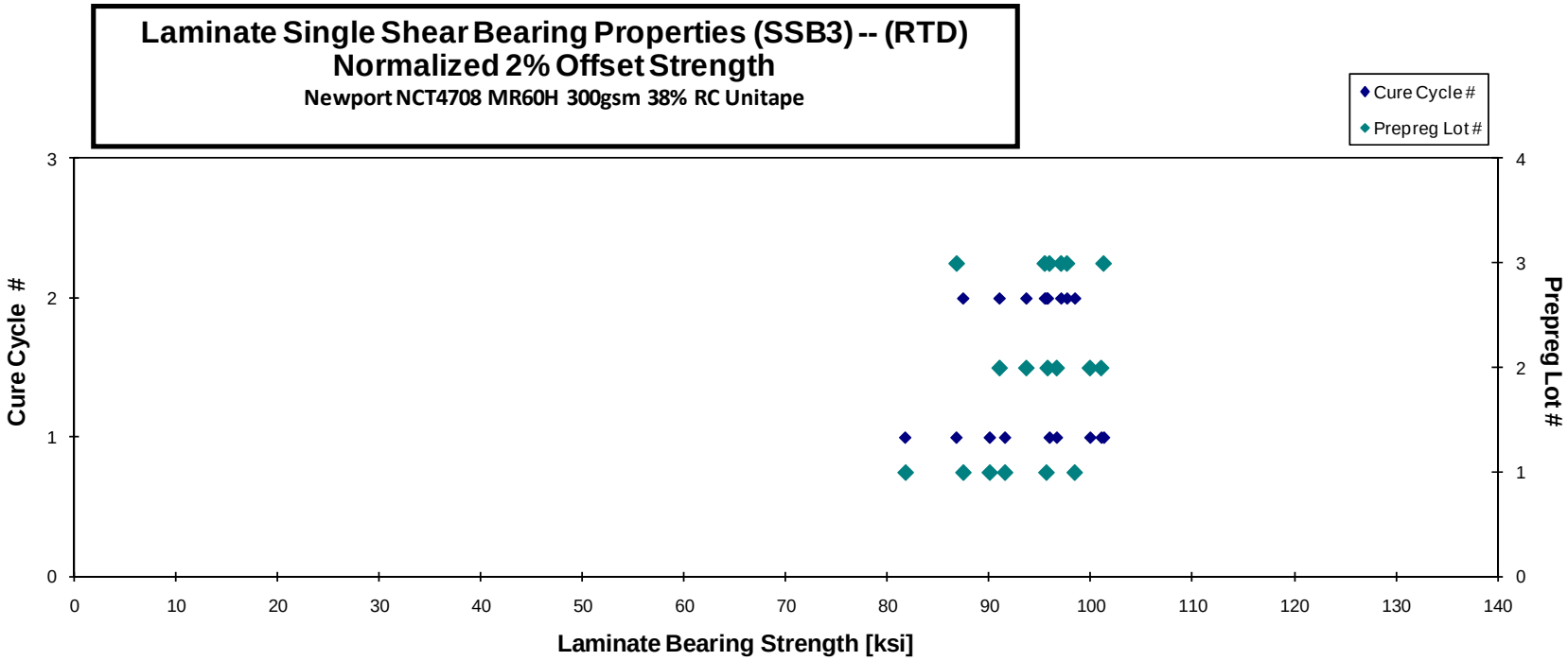
4.30 Single Shear Bearing 3 Properties

Laminate Single Shear Bearing Properties (SSB3) -- (RTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Strength$_{norm}$ [ksi]
WF3A111A	A	C1	1	1	89.475	115.735	0.140	11	B1I	0.0127	90.100	116.542
WF3A112A	A	C1	1	1	89.913	110.844	0.141	11	B1I	0.0128	91.600	112.923
WF3A115A	A	C1	1	1	81.164	109.309	0.140	11	B1I	0.0127	81.789	110.151
WF3A211A	A	C2	1	2	87.783	112.076	0.138	11	B1I	0.0126	87.487	111.699
WF3A212A	A	C2	1	2	95.799	118.978	0.138	11	B1I	0.0126	95.684	118.835
WF3A213A	A	C2	1	2	98.390	120.730	0.139	11	B1I	0.0126	98.473	120.831
WF3B111A	B	C1	2	1	99.381	116.891	0.135	11	B1I	0.0123	96.692	113.729
WF3B112A	B	C1	2	1	102.456	111.456	0.135	11	B1I	0.0123	99.979	108.762
WF3B113A	B	C1	2	1	103.532	115.530	0.135	11	B1I	0.0123	101.079	112.793
WF3B211A	B	C2	2	2	95.546	115.568	0.136	11	B1I	0.0124	93.696	113.330
WF3B212A	B	C2	2	2	96.265	118.500	0.138	11	B1I	0.0125	95.802	117.930
WF3B213A	B	C2	2	2	91.787	115.901	0.138	11	B1I	0.0125	91.059	114.981
WF3C111A	C	C1	3	1	89.859	117.011	0.134	11	B1I	0.0122	86.822	113.057
WF3C112A	C	C1	3	1	97.625	118.203	0.136	11	B1I	0.0124	95.981	116.213
WF3C113A	C	C1	3	1	102.082	122.027	0.138	11	B1I	0.0125	101.320	121.117
WF3C211A	C	C2	3	2	99.564	123.516	0.133	11	B1I	0.0121	95.518	118.495
WF3C212A	C	C2	3	2	100.683	121.313	0.135	11	B1I	0.0122	97.705	117.724
WF3C213A	C	C2	3	2	100.086	121.539	0.135	11	B1I	0.0122	97.125	117.944
									Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)			

Average	**95.633**	**116.951**	**Average$_{norm}$**	**0.0124**	**94.328**	**115.392**
Standard Dev.	**6.074**	**4.112**	**Standard Dev.$_{norm}$**		**5.277**	**3.555**
Coeff. of Var. [%]	**6.351**	**3.516**	**Coeff. of Var. [%]$_{norm}$**		**5.594**	**3.080**
Min.	**81.164**	**109.309**	**Min.**	**0.0121**	**81.789**	**108.762**
Max.	**103.532**	**123.516**	**Max.**	**0.0128**	**101.320**	**121.117**
Number of Spec.	**18**	**18**	**Number of Spec.**		**18**	**18**


Laminate Single Shear Bearing Properties (SSB3) -- (RTD)
Normalized 2% Offset Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140

Laminate Single Shear Bearing Properties (SSB3) -- (ETW) Strength

Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.0126

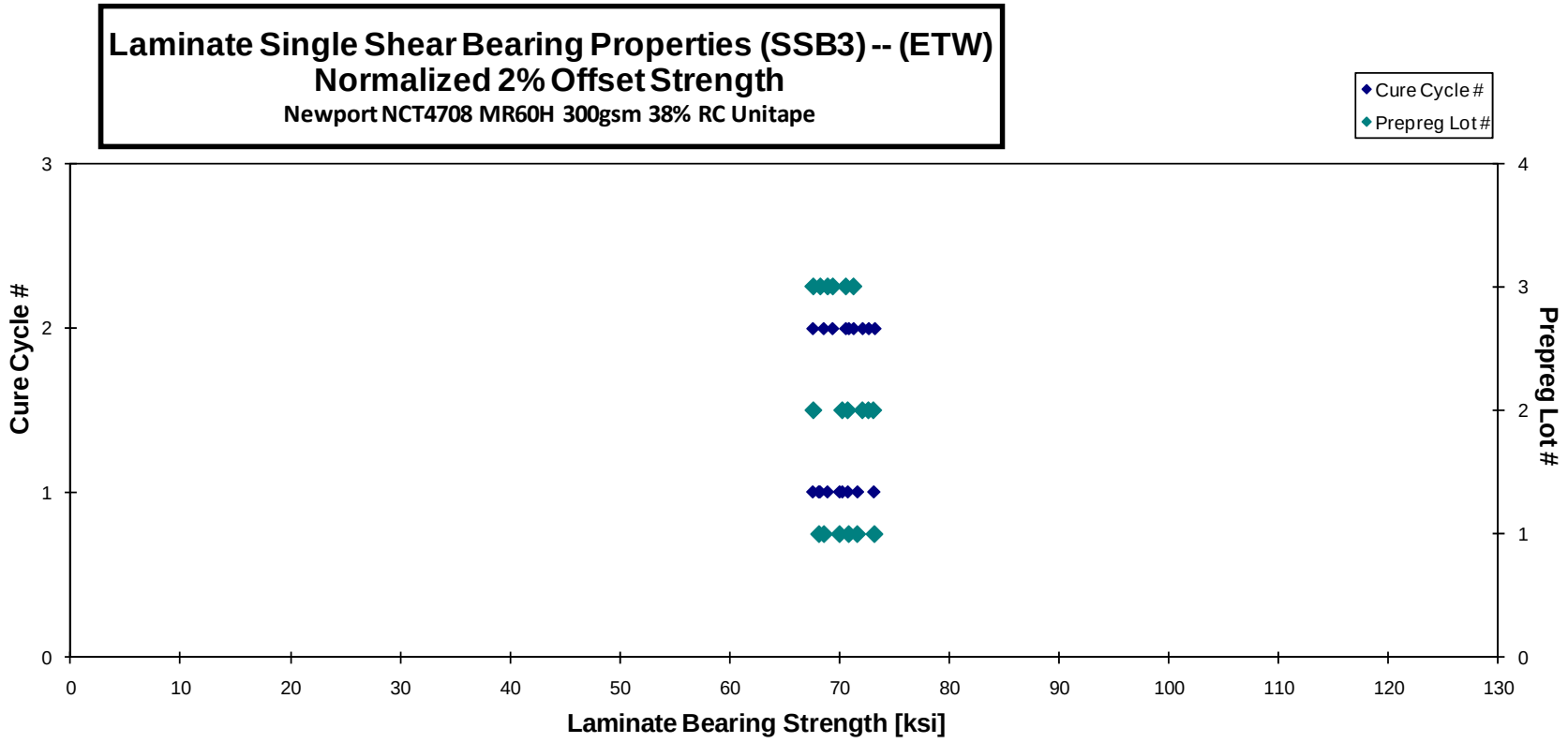
Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Strength$_{norm}$ [ksi]
WF3A116F	A	C1	1	1	66.274	83.059	0.142	11	B1[1] / D1[2]	0.0130	68.115	85.366
WF3A117F	A	C1	1	1	67.520	76.414	0.144	11	B1[1] / D1[2]	0.0131	69.989	79.208
WF3A118F	A	C1	1	1	70.110	80.664	0.142	11	B1[1] / D1[2]	0.0129	71.602	82.381
WF3A216F	A	C2	1	2	70.556	84.523	0.139	11	B1[1] / D1[2]	0.0126	70.828	84.848
WF3A217F	A	C2	1	2	72.187	83.149	0.140	11	B1[1] / D1[2]	0.0128	73.168	84.278
WF3A218F	A	C2	1	2	67.371	85.233	0.141	11	B1[1] / D1[2]	0.0128	68.570	86.750
WF3B116F	B	C1	2	1	71.846	86.323	0.135	11	B1[1] / D1[2]	0.0123	70.231	84.382
WF3B117F	B	C1	2	1	71.916	84.804	0.136	11	B1[1] / D1[2]	0.0124	70.731	83.407
WF3B118F	B	C1	2	1	73.859	86.949	0.137	11	B1[1] / D1[2]	0.0125	73.069	86.019
WF3B216F	B	C2	2	2	72.308	85.560	0.138	11	B1[1] / D1[2]	0.0126	72.073	85.283
WF3B217F	B	C2	2	2	72.336	84.850	0.139	11	B1[1] / D1[2]	0.0126	72.615	85.176
WF3B218F	B	C2	2	2	67.462	85.617	0.139	11	B1[1] / D1[2]	0.0126	67.600	85.792
WF3C116F	C	C1	3	1	71.051	86.410	0.133	11	B1[1] / D1[2]	0.0121	68.231	82.981
WF3C117F	C	C1	3	1	68.947	85.079	0.136	11	B1[1] / D1[2]	0.0124	67.588	83.401
WF3C118F	C	C1	3	1	70.123	84.833	0.136	11	B1[1] / D1[2]	0.0124	68.900	83.353
WF3C216F	C	C2	3	2	73.693	87.292	0.133	11	B1[1] / D1[2]	0.0121	70.556	83.576
WF3C217F	C	C2	3	2	71.516	88.609	0.134	11	B1[1] / D1[2]	0.0122	69.366	85.946
WF3C218F	C	C2	3	2	73.483	90.753	0.134	11	B1[1] / D1[2]	0.0122	71.256	88.003

Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)

[1]: Primary Failure

[2]: Secondary Failure

Average	**70.698**	**85.007**	**erage$_{norm}$**	**0.0125**	**70.249**	**84.453**
Standard Dev.	**2.336**	**3.065**	**Standard Dev.$_{norm}$**		**1.833**	**1.951**
Coeff. of Var. [%]	**3.305**	**3.606**	**Coeff. of Var. [%]$_{norm}$**		**2.609**	**2.311**
Min.	**66.274**	**76.414**	**Min.**	**0.0121**	**67.588**	**79.208**
Max.	**73.859**	**90.753**	**Max.**	**0.0131**	**73.168**	**88.003**
Number of Spec.	**18**	**18**	**Number of Spec.**		**18**	**18**


Laminate Single Shear Bearing Properties (SSB3) -- (ETW)
Normalized 2% Offset Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100
110
120
130

4.31 Compression Strength After Impact 1 Properties

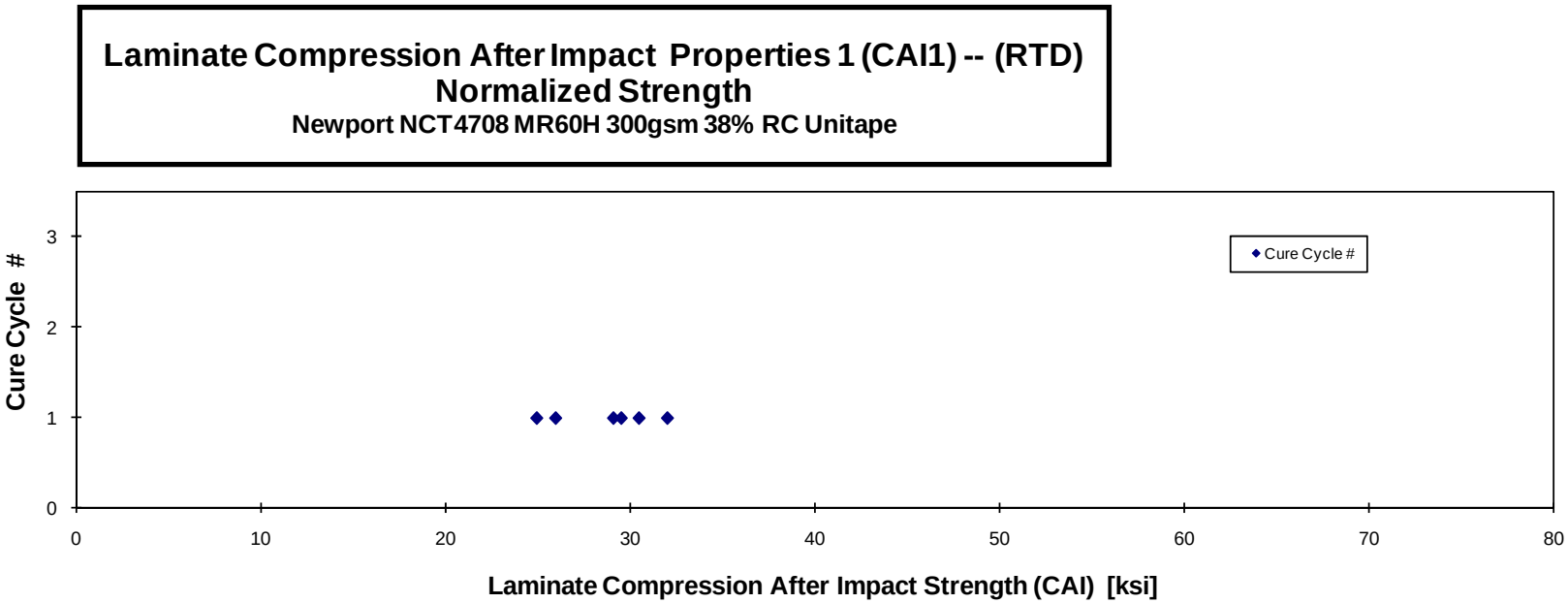
Laminate Compression After Impact Properties (CAI) -- (RTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

normalizing t_{ply} [in]: 0.01260

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Measured Impact Energy (in-lbf)	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
WFKC111A	C	C1	3	1	314.18	30.526	0.212	16	LDM	0.0132	32.029
WFKC112A	C	C1	3	1	320.37	28.207	0.211	16	LDM	0.0132	29.512
WFKC113A	C	C1	3	1	315.27	23.768	0.211	16	LDM	0.0132	24.905
WFKC114A	C	C1	3	1	312.96	27.801	0.211	16	LDM	0.0132	29.085
WFKC115A	C	C1	3	1	315.59	29.042	0.212	16	LDM	0.0132	30.480
WFKC116A	C	C1	3	1	322.30	24.705	0.212	16	LDM	0.0132	25.936

Average	**27.341**	
Standard Dev.	**2.597**	
Coeff. of Var. [%]	**9.498**	
Min.	**23.768**	
Max.	**30.526**	
Number of Spec.	**6**	

$Average_{norm}$	**0.01321**	**28.658**
$Standard\ Dev._{norm}$		**2.723**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**9.503**
Min.	**0.0132**	**24.905**
Max.	**0.0132**	**32.029**
Number of Spec.		**6**


Laminate Compression After Impact Properties 1 (CAI1) -- (RTD)
Normalized Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Cure Cycle #
0
1
2
3
0
10
20
30
40
50
60
70
80
Laminate Compression After Impact Strength (CAI) [ksi]

4.32 Interlaminar Tension Properties

Laminate Curved Beam Strength Properties (ILT) -- (CTD) Strength

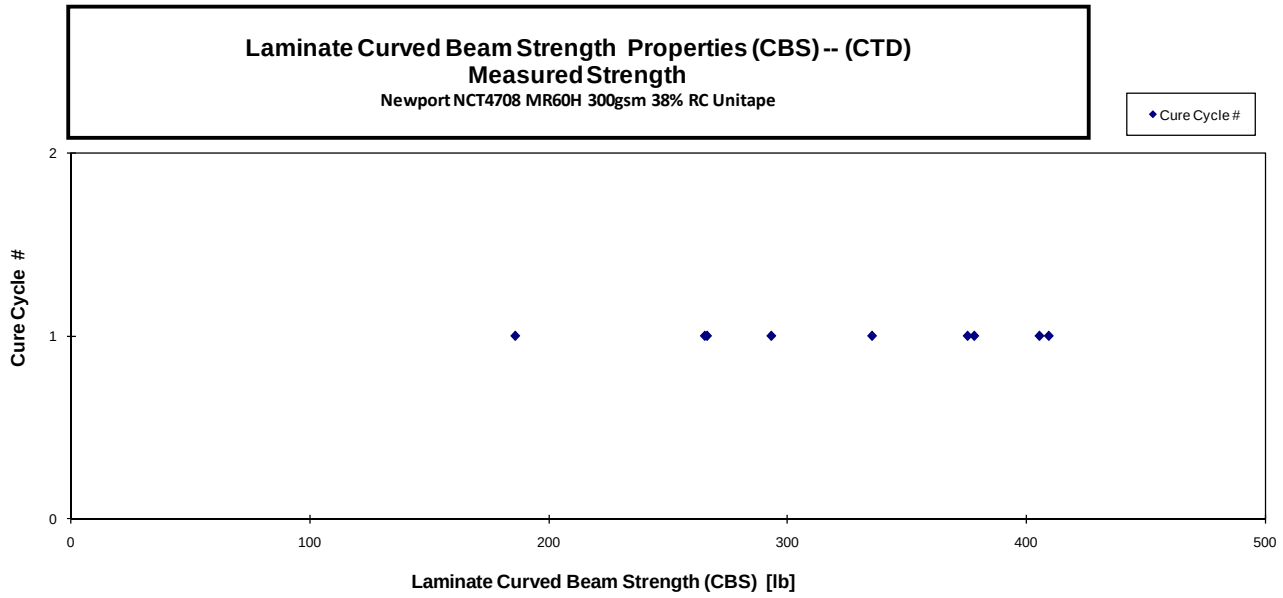
Newport NCT4708 MR60H 300gsm 38% RC Unitape

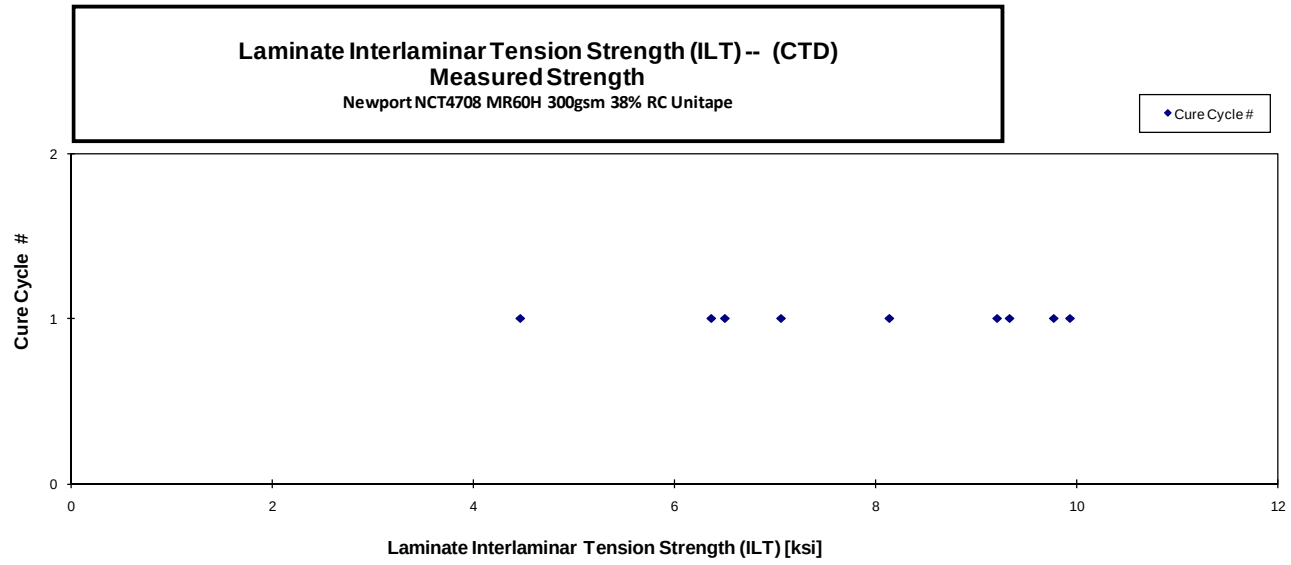
Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
WFMC111B	C	C1	3	1	185.853	4.468	0.188	15
WFMC112B	C	C1	3	1	293.021	7.057	0.188	15
WFMC113B	C	C1	3	1	335.187	8.133	0.187	15
WFMC114B	C	C1	3	1	265.175	6.365	0.189	15
WFMC115B	C	C1	3	1	266.139	6.500	0.186	15
WFMC116B	C	C1	3	1	405.251	9.926	0.186	15
WFMC117B	C	C1	3	1	377.963	9.327	0.184	15
WFMC118B	C	C1	3	1	375.169	9.203	0.185	15
WFMC11GA*	C	C1	3	1	409.142	9.766	0.190	15

Basis values are not calcuated on ILT/CBS due to variation in processing

*Specimen taken from RTD

Average	**323.656**	**7.861**
Standard Dev.	**76.123**	**1.876**
Coeff. of Var. [%]	**23.520**	**23.870**
Min.	**185.853**	**4.468**
Max.	**409.142**	**9.926**
Number of Spec.	**9**	**9**


Laminate Curved Beam Strength Properties (CBS) -- (CTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Cure Cycle #
0
1
2
0
100
200
300
400
500
Laminate Curved Beam Strength (CBS) [lb]


Laminate Interlaminar Tension Strength (ILT) -- (CTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Cure Cycle #
0
1
2
0
2
4
6
8
10
12
Laminate Interlaminar Tension Strength (ILT) [ksi]

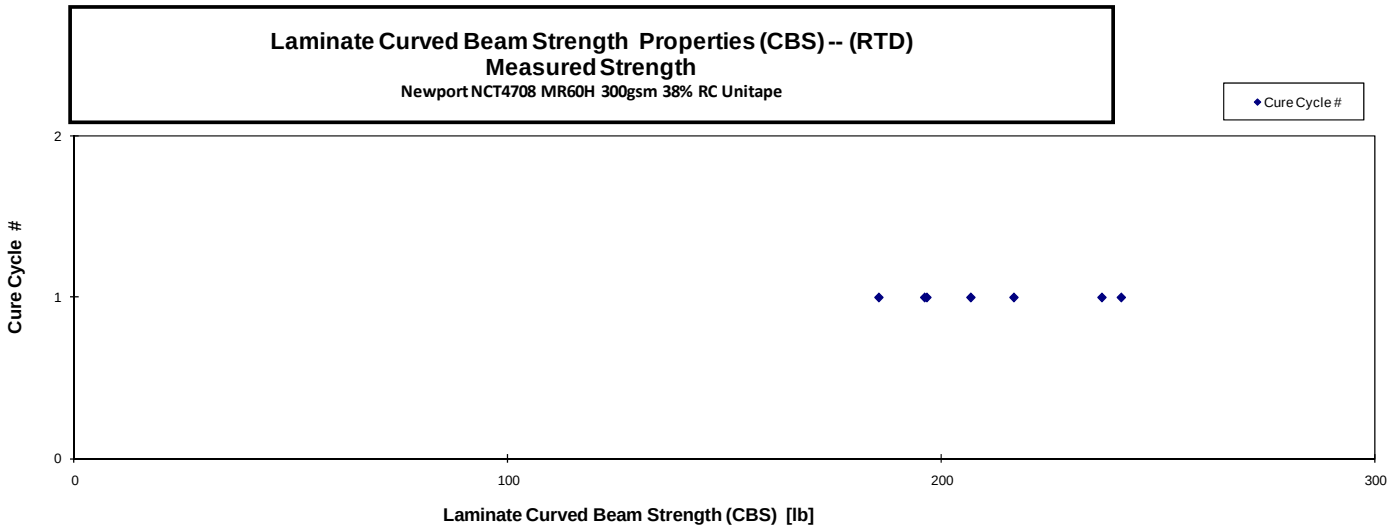
Laminate Curved Beam Strength Properties (ILT) -- (RTD) Strength

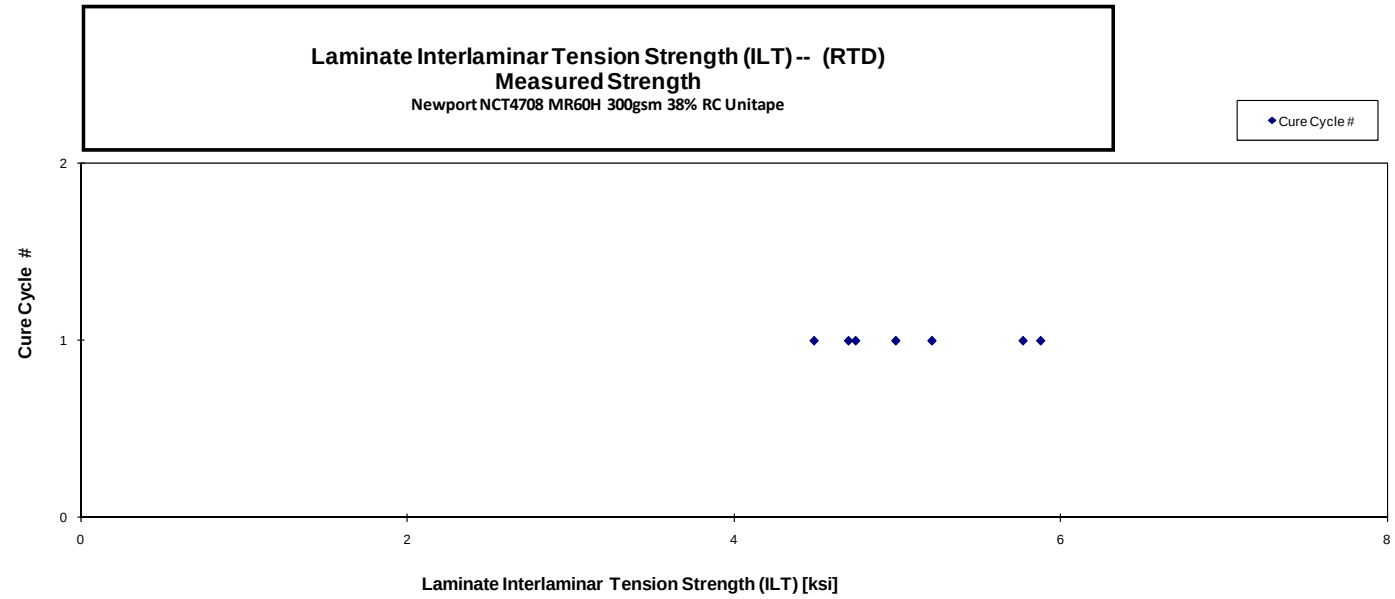
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
WFMC119A	C	C1	3	1	237.080	5.769	0.187	15
WFMC11AA	C	C1	3	1	185.664	4.490	0.188	15
WFMC11BA	C	C1	3	1	216.792	5.211	0.188	15
WFMC11CA	C	C1	3	1	206.859	4.990	0.188	15
WFMC11DA	C	C1	3	1	196.737	4.744	0.188	15
WFMC11EA	C	C1	3	1	196.212	4.701	0.189	15
WFMC11FA	C	C1	3	1	241.548	5.877	0.187	15

Basis values are not calcuated on ILT/CBS due to variation in processing

Average	**211.556**	**5.112**
Standard Dev.	**21.315**	**0.538**
Coeff. of Var. [%]	**10.075**	**10.517**
Min.	**185.664**	**4.490**
Max.	**241.548**	**5.877**
Number of Spec.	**7**	**7**


Laminate Curved Beam Strength Properties (CBS) -- (RTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Cure Cycle #
0
1
2
0
100
200
300
Laminate Curved Beam Strength (CBS) [lb]


Laminate Interlaminar Tension Strength (ILT) -- (RTD)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Cure Cycle #
0
1
2
0
2
4
6
8
Laminate Interlaminar Tension Strength (ILT) [ksi]

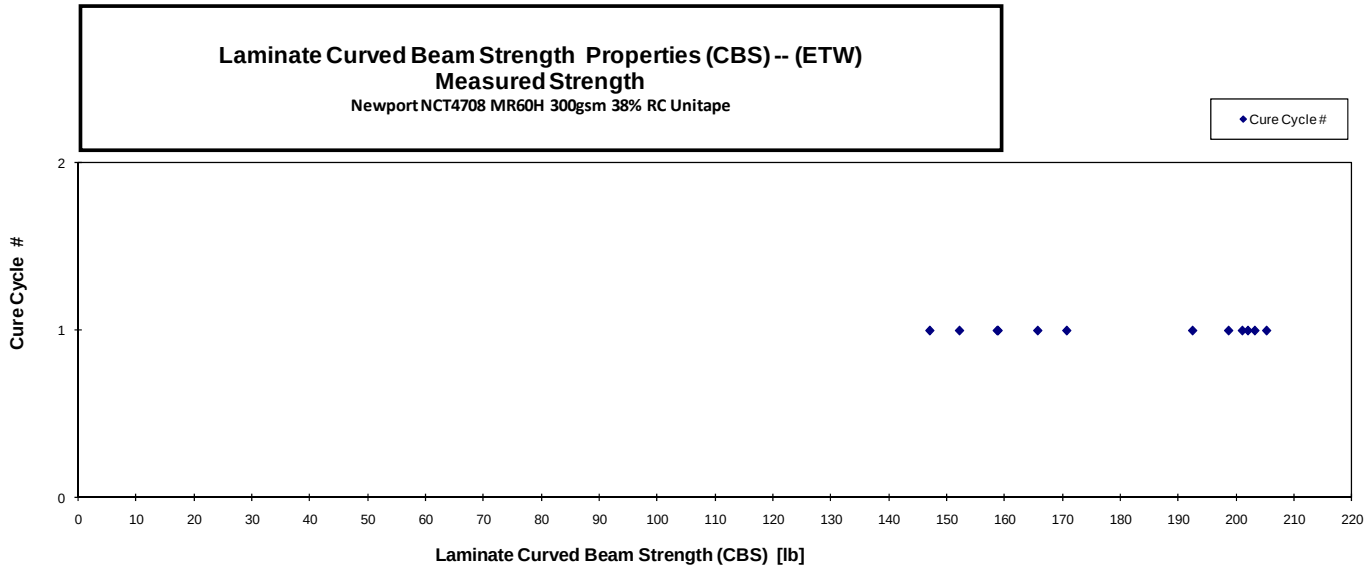
Laminate Curved Beam Strength Properties (ILT) -- (ETW) Strength

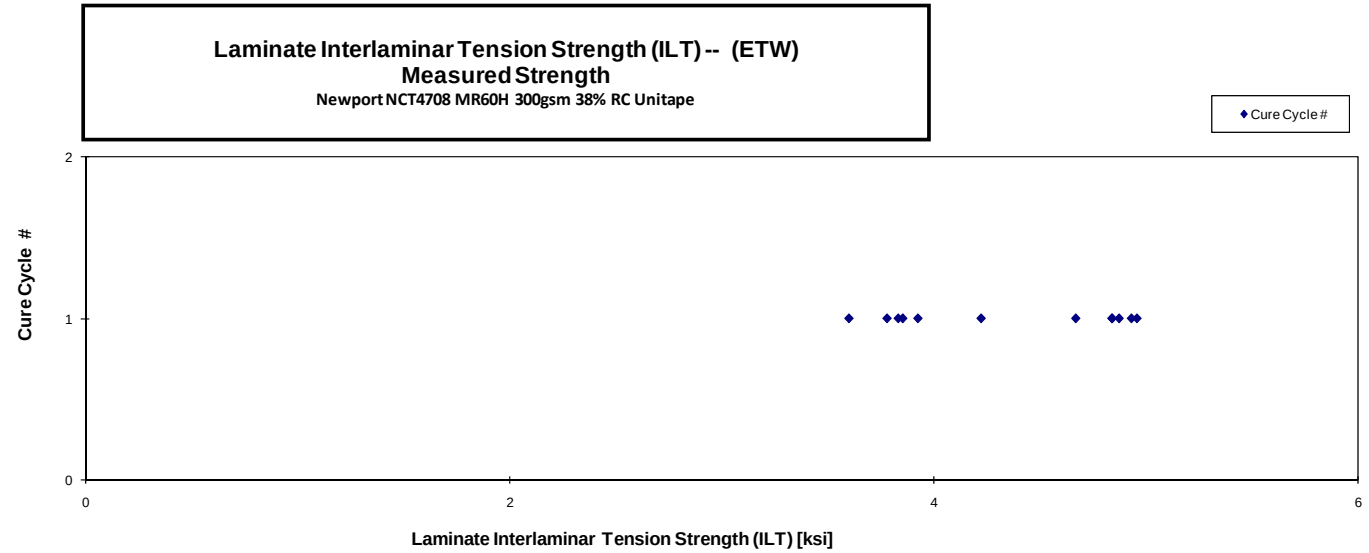
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
WFMC11HF	C	C1	3	1	202.159	4.842	0.189	15
WFMC11IF	C	C1	3	1	158.975	3.856	0.187	15
WFMC11JF	C	C1	3	1	147.187	3.603	0.186	15
WFMC11KF	C	C1	3	1	152.311	3.782	0.184	15
WFMC11LF	C	C1	3	1	170.839	4.225	0.184	15
WFMC11MF	C	C1	3	1	192.587	4.670	0.187	15
WFMC11NF	C	C1	3	1	205.383	4.958	0.188	15
WFMC11OF	C	C1	3	1	198.812	4.840	0.187	15
WFMC11PF	C	C1	3	1	203.344	4.932	0.187	15
WFMC11QF	C	C1	3	1	158.838	3.835	0.188	15
WFMC11RF	C	C1	3	1	201.193	4.874	0.187	15
WFMC11SF	C	C1	3	1	165.834	3.927	0.191	15

Basis values are not calcuated on ILT/CBS due to variation in processing

Average	**179.788**	**4.362**
Standard Dev.	**22.682**	**0.535**
Coeff. of Var. [%]	**12.616**	**12.266**
Min.	**147.187**	**3.603**
Max.	**205.383**	**4.958**
Number of Spec.	**12**	**12**


Laminate Curved Beam Strength Properties (CBS) -- (ETW)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Cure Cycle #
0
1
2
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220
Laminate Curved Beam Strength (CBS) [lb]


Laminate Interlaminar Tension Strength (ILT) -- (ETW)
Measured Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape
Cure Cycle #
Cure Cycle #
0
1
2
0 2 4 6
Laminate Interlaminar Tension Strength (ILT) [ksi]

5. Shear Stress vs. Shear Strain, RTD

Figure 5-1 illustrates a shear stress vs shear strain curve that was obtained from a biaxial strain gage. ASTM D3518 In-plane Shear test method was used to obtain this data.

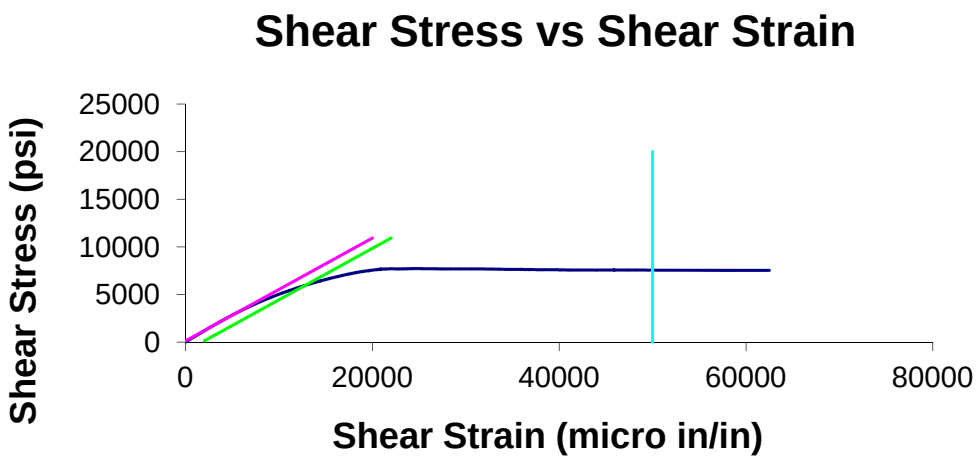


Figure 5-1: Shear Stress vs Shear Strain Curve for RTD

6. FLUID SENSITIVITY COMPARISON

Fluid	Average Interlaminar Shear Strength With Fluid (ksi)	Same Environment Interlaminar Shear Strength Without Fluid (ksi) (RTD)	Worst Case Environment Interlaminar Shear Strength (ksi) (RTW)	% Strength Reduction With Respect to RTD (no fluid)
1	10.080	10.362	8.997	2.715
2	9.936	10.362	8.997	4.108
3	9.830	10.362	8.997	5.139
4	9.937	10.362	8.997	4.098
5	10.266	10.362	8.997	0.930
6	10.064	10.362	8.997	2.877
7	9.961	10.362	8.997	3.867
8	10.230	10.362	8.997	1.277
9	9.643	10.362	8.997	6.941
10	10.355	10.362	8.997	0.064
11	10.354	10.362	8.997	0.073
12	10.521	10.362	8.997	-1.538
13	9.620	10.362	8.997	7.161
14	10.362	10.362	8.997	0.000
15	8.997	10.362	8.997	13.169

	Extended Contact
1	100 Low Lead Aviation Fuel (ASTM D910)
2	SAE AMS 2629 Jet Reference Fluid
3	MIL-PRF-5606 Hydraulic Oil
4	MIL-PRF-83282 Hydraulic Oil
5	MIL-PRF-7808 Engine Oil
6	MIL-PRF-23699, Class STD Engine Oil
7	Sea Water (ASTM D1141 or equiv.)
8	Skydrol LD-4 (SAE AS1241, Type IV, Class 1)
9	50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)
	Short Duration Contact
10	MEK washing fluid. ASTM D740
11	Polypropylene Glycol Deicer (Type I) Mil-A-824 3
12	Isopropyl Alcohol Deicing Agent (TT-I-735)
	Control Tests
13	Distilled Water
14	Dry
15	85% Relative Humidity

Table 6-1: Fluid Sensitivity Results Comparison for RT

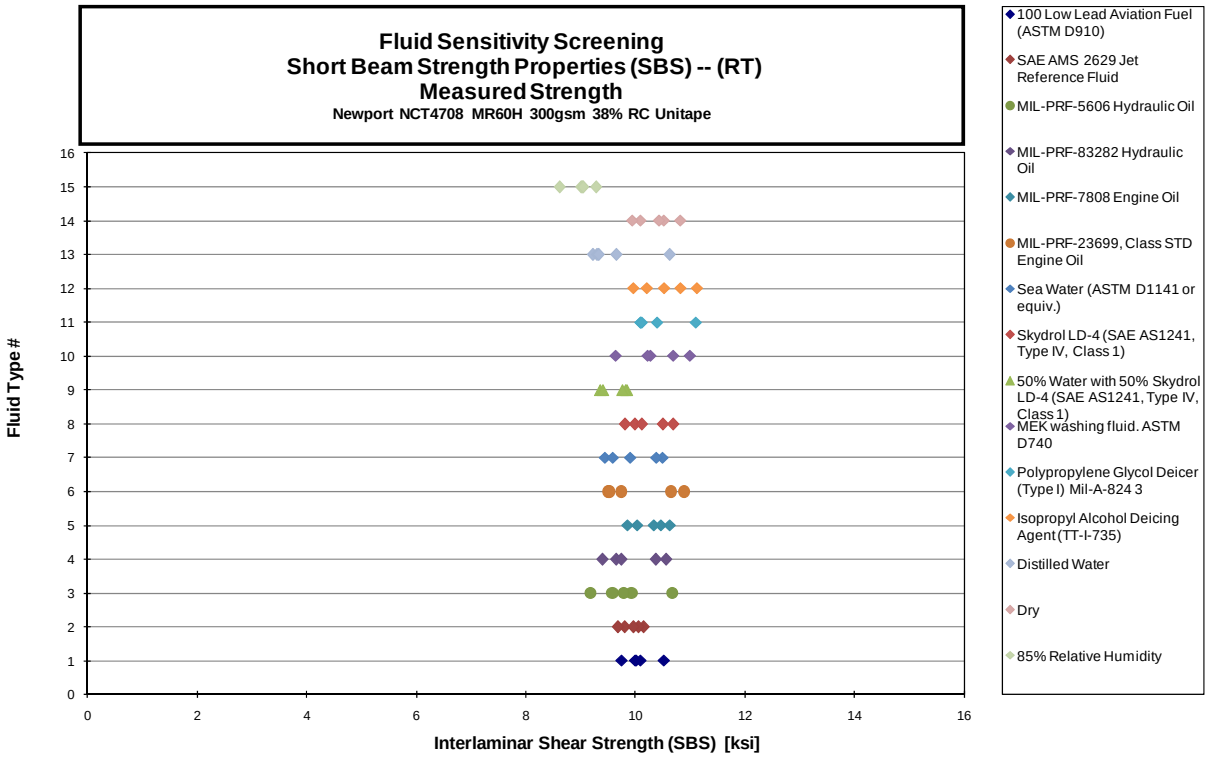


Figure 6-2: Plot of Fluid Sensitivity Results for RT

Fluid Sensitivity Screening
Interlaminar Shear Properties (SBS) -- (RTD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Fluid	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode	Average Strength [ksi]
WFQC21G4	C	C2	3	1	10.002	0.265	21	0.0126	Interlaminar Shear	
WFQC21H4	C	C2	3	1	10.099	0.259	21	0.0124	Interlaminar Shear	
WFQC21I4	C	C2	3	1	10.524	0.248	21	0.0118	Interlaminar Shear	10.080
WFQC21J4	C	C2	3	1	9.754	0.258	21	0.0123	Interlaminar Shear	
WFQC21K5	C	C2	3	1	10.022	0.267	21	0.0127	Interlaminar Shear	
WFQC21Q6	C	C2	3	2	10.153	0.266	21	0.0127	Interlaminar Shear	
WFQC21R6	C	C2	3	2	10.061	0.245	21	0.0116	Interlaminar Shear	
WFQC21S6	C	C2	3	2	9.811	0.247	21	0.0118	Interlaminar Shear	9.936
WFQC21T6	C	C2	3	2	9.688	0.267	21	0.0127	Interlaminar Shear	
WFQC21U6	C	C2	3	2	9.969	0.261	21	0.0124	Interlaminar Shear	
WFQC21128	C	C2	3	3	10.679	0.259	21	0.0123	Interlaminar Shear	
WFQC21138	C	C2	3	3	9.183	0.267	21	0.0127	Interlaminar Shear	
WFQC21148	C	C2	3	3	9.924	0.258	21	0.0123	Interlaminar Shear	9.830
WFQC21158	C	C2	3	3	9.577	0.258	21	0.0123	Interlaminar Shear	
WFQC21168	C	C2	3	3	9.784	0.254	21	0.0121	Interlaminar Shear	
WFQC211DC	C	C2	3	4	10.367	0.261	21	0.0124	Interlaminar Shear	
WFQC211EC	C	C2	3	4	9.389	0.266	21	0.0126	Interlaminar Shear	
WFQC211FC	C	C2	3	4	10.555	0.245	21	0.0117	Interlaminar Shear	9.937
WFQC211GC	C	C2	3	4	9.641	0.261	21	0.0124	Interlaminar Shear	
WFQC211HC	C	C2	3	4	9.734	0.252	21	0.0120	Interlaminar Shear	
WFQC211OH	C	C2	3	5	10.467	0.262	21	0.0125	Interlaminar Shear	
WFQC211PH	C	C2	3	5	9.859	0.265	21	0.0126	Interlaminar Shear	
WFQC211QH	C	C2	3	5	10.036	0.237	21	0.0113	Interlaminar Shear	10.266
WFQC211RH	C	C2	3	5	10.627	0.259	21	0.0123	Interlaminar Shear	
WFQC211SH	C	C2	3	5	10.338	0.253	21	0.0120	Interlaminar Shear	
WFQC211ZJ	C	C2	3	6	9.503	0.264	21	0.0126	Interlaminar Shear	
WFQC2121J	C	C2	3	6	10.894	0.259	21	0.0123	Interlaminar Shear	
WFQC2122J	C	C2	3	6	10.647	0.259	21	0.0124	Interlaminar Shear	10.064
WFQC2123J	C	C2	3	6	9.746	0.259	21	0.0123	Interlaminar Shear	
WFQC2124J	C	C2	3	6	9.530	0.248	21	0.0118	Interlaminar Shear	
WFQC212BL	C	C2	3	7	10.486	0.264	21	0.0126	Interlaminar Shear	
WFQC212CL	C	C2	3	7	9.904	0.258	21	0.0123	Interlaminar Shear	
WFQC212DL	C	C2	3	7	9.450	0.260	21	0.0124	Interlaminar Shear	9.961
WFQC212EL	C	C2	3	7	9.591	0.258	21	0.0123	Interlaminar Shear	
WFQC212FL	C	C2	3	7	10.375	0.258	21	0.0123	Interlaminar Shear	
WFQC212MN	C	C2	3	8	9.999	0.259	21	0.0123	Interlaminar Shear	
WFQC212NN	C	C2	3	8	10.696	0.235	21	0.0112	Interlaminar Shear	
WFQC212ON	C	C2	3	8	9.819	0.265	21	0.0126	Interlaminar Shear	10.230
WFQC212PN	C	C2	3	8	10.125	0.264	21	0.0126	Interlaminar Shear	
WFQC212QN	C	C2	3	8	10.509	0.252	21	0.0120	Interlaminar Shear	
WFQC212XP	C	C2	3	9	9.365	0.266	21	0.0127	Interlaminar Shear	
WFQC212YP	C	C2	3	9	9.846	0.254	21	0.0121	Interlaminar Shear	
WFQC212ZP	C	C2	3	9	9.822	0.261	21	0.0124	Interlaminar Shear	9.643
WFQC2131P	C	C2	3	9	9.766	0.258	21	0.0123	Interlaminar Shear	
WFQC2132P	C	C2	3	9	9.415	0.261	21	0.0124	Interlaminar Shear	
WFQC2139R*	C	C2	3	10	10.983	0.265	21	0.0126	Compression/ Interlaminar Shear	
WFQC213AR*	C	C2	3	10	9.633	0.259	21	0.0123	Compression/ Interlaminar Shear	
WFQC213BR*	C	C2	3	10	10.266	0.259	21	0.0123	Compression/ Interlaminar Shear	10.355
WFQC213CR*	C	C2	3	10	10.215	0.260	21	0.0124	Compression/ Interlaminar Shear	
WFQC213DR*	C	C2	3	10	10.680	0.266	21	0.0127	Compression/ Interlaminar Shear	
WFQC213KT*	C	C2	3	11	11.093	0.266	21	0.0127	Compression/ Interlaminar Shear	
WFQC213LT*	C	C2	3	11	10.087	0.260	21	0.0124	Compression/ Interlaminar Shear	
WFQC213MT*	C	C2	3	11	10.091	0.259	21	0.0123	Compression/ Interlaminar Shear	10.354
WFQC213NT*	C	C2	3	11	10.390	0.264	21	0.0126	Compression/ Interlaminar Shear	
WFQC213OT*	C	C2	3	11	10.111	0.257	21	0.0122	Compression/ Interlaminar Shear	
WFQC213VV	C	C2	3	12	10.816	0.259	21	0.0124	Interlaminar Shear	
WFQC213WV	C	C2	3	12	10.517	0.264	21	0.0126	Interlaminar Shear	
WFQC213XV	C	C2	3	12	10.202	0.237	21	0.0113	Interlaminar Shear	10.521
WFQC213YV	C	C2	3	12	9.956	0.262	21	0.0125	Interlaminar Shear	
WFQC213ZV	C	C2	3	12	11.116	0.267	21	0.0127	Interlaminar Shear	
WFQC2147X	C	C2	3	13	9.218	0.266	21	0.0127	Interlaminar Shear	
WFQC2148X	C	C2	3	13	9.646	0.255	21	0.0121	Interlaminar Shear	
WFQC2149X	C	C2	3	13	9.292	0.258	21	0.0123	Interlaminar Shear	9.620
WFQC214AX	C	C2	3	13	9.322	0.259	21	0.0124	Interlaminar Shear	
WFQC214BX	C	C2	3	13	10.623	0.260	21	0.0124	Interlaminar Shear	
WFQC214Ia*	C	C2	3	14	10.811	0.258	21	0.0123	Compression/ Interlaminar Shear	
WFQC214Ja*	C	C2	3	14	10.517	0.254	21	0.0121	Compression/ Interlaminar Shear	
WFQC214Ka*	C	C2	3	14	10.098	0.261	21	0.0124	Compression/ Interlaminar Shear	10.362
WFQC214La*	C	C2	3	14	9.951	0.258	21	0.0123	Compression/ Interlaminar Shear	
WFQC214Ma*	C	C2	3	14	10.431	0.265	21	0.0126	Compression/ Interlaminar Shear	
WFQC214Tm	C	C2	3	15	9.032	0.262	21	0.0125	Interlaminar Shear	
WFQC214Um	C	C2	3	15	8.610	0.264	21	0.0126	Interlaminar Shear	
WFQC214Vm	C	C2	3	15	9.010	0.262	21	0.0125	Interlaminar Shear	8.997
WFQC214Wm	C	C2	3	15	9.047	0.262	21	0.0125	Interlaminar Shear	
WFQC214Xm	C	C2	3	15	9.287	0.263	21	0.0125	Interlaminar Shear	

*A combination of interlaminar shear and compression failure modes were observed in the specimens; however, it appeared that compression failure occurred before interlaminar shear failure during the tests

Table 6-2: Fluid Sensitivity Test Summary for RT

Fluid	Average Interlaminar Shear Strength With Fluid (ksi)	Same Environment Interlaminar Shear Strength Without Fluid (ksi) (ETD)	Worst Case Environment Interlaminar Shear Strength (ksi) (ETW)	% Strength Reduction With Respect to ETD (no fluid)
1	8.246	8.481	6.342	2.762
2	8.385	8.481	6.342	1.132
3	8.323	8.481	6.342	1.858
4	8.343	8.481	6.342	1.627
5	8.046	8.481	6.342	5.127
6	8.143	8.481	6.342	3.984
7	7.773	8.481	6.342	8.345
8	8.289	8.481	6.342	2.255
9	7.518	8.481	6.342	11.356
10	8.463	8.481	6.342	0.203
11	8.537	8.481	6.342	-0.669
12	8.279	8.481	6.342	2.380
13	7.464	8.481	6.342	11.984
14	8.481	8.481	6.342	0.000
15	6.342	8.481	6.342	25.214

Extended Contact

1 100 Low Lead Aviation Fuel (ASTM D910)
2 SAE AMS 2629 Jet Reference Fluid
3 MIL-PRF-5606 Hydraulic Oil
4 MIL-PRF-83282 Hydraulic Oil
5 MIL-PRF-7808 Engine Oil
6 MIL-PRF-23699, Class STD Engine Oil
7 Sea Water (ASTM D1141 or equiv.)
8 Skydrol LD-4 (SAE AS1241, Type IV, Class 1)
9 50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)

Short Duration Contact

10 MEK washing fluid. ASTM D740
11 Polypropylene Glycol Deicer (Type I) Mil-A-824 3
12 Isopropyl Alcohol Deicing Agent (TT-I-735)

Control Tests

13 Distilled Water
14 Dry
15 85% Relative Humidity

Table 6-3: Fluid Sensitivity Results Comparison for ET

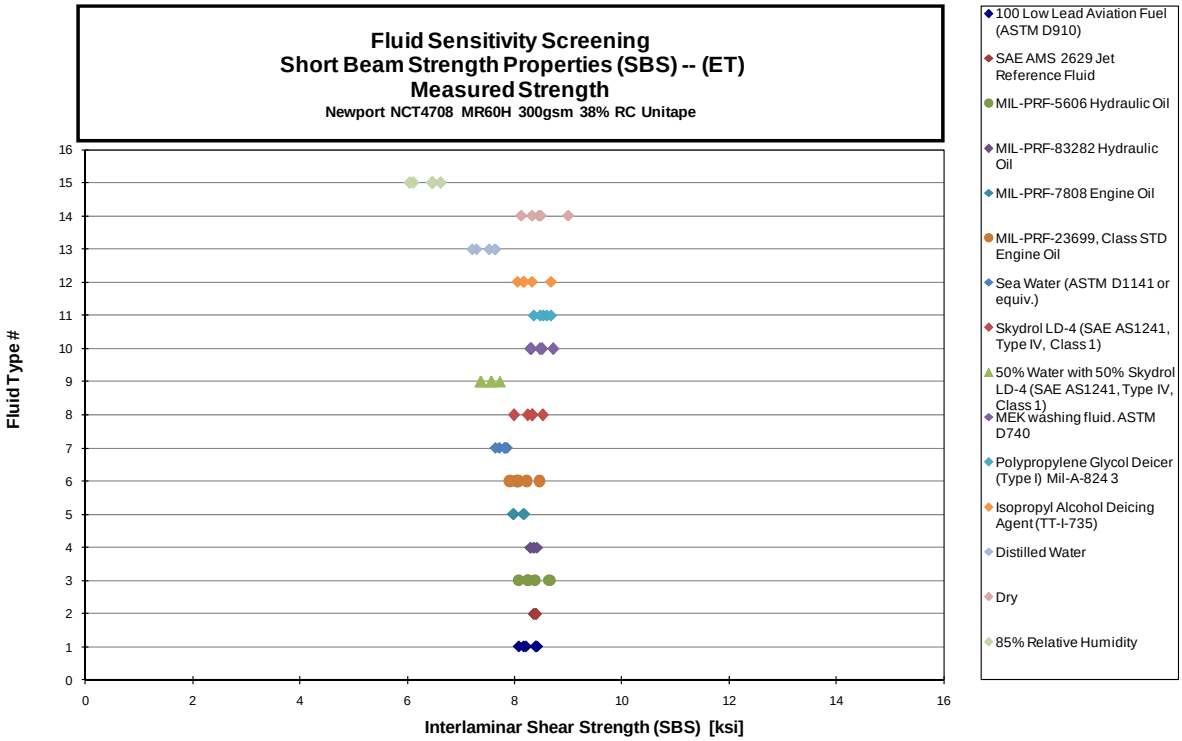


Figure 6-2: Plot of Fluid Sensitivity Results for ET

Fluid Sensitivity Screening
Interlaminar Shear Properties (SBS) -- (ETD) Strength
Newport NCT4708 MR60H 300gsm 38% RC Unitape

Specimen Number	Newport Batch #	WSU Cure Cycle	Prepreg Lot #	Fluid	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode	Average Strength [ksi]
WFQC21L5	C	C2	3	1	8.162	0.259	21	0.0123	Interlaminar Shear	
WFQC21M5	C	C2	3	1	8.408	0.263	21	0.0125	Interlaminar Shear	
WFQC21N5	C	C2	3	1	8.383	0.263	21	0.0125	Interlaminar Shear	8.246
WFQC21O5	C	C2	3	1	8.205	0.258	21	0.0123	Interlaminar Shear	
WFQC21P5	C	C2	3	1	8.075	0.261	21	0.0124	Interlaminar Shear	
WFQC21V7	C	C2	3	2	8.364	0.236	21	0.0112	Interlaminar Shear	
WFQC21W7	C	C2	3	2	8.355	0.263	21	0.0125	Interlaminar Shear	
WFQC21X7	C	C2	3	2	8.405	0.262	21	0.0125	Interlaminar Shear	8.385
WFQC21Y7	C	C2	3	2	8.393	0.264	21	0.0126	Interlaminar Shear	
WFQC21117	C	C2	3	2	8.406	0.258	21	0.0123	Interlaminar Shear	
WFQC21179	C	C2	3	3	8.253	0.263	21	0.0125	Interlaminar Shear	
WFQC21189	C	C2	3	3	8.651	0.247	21	0.0118	Interlaminar Shear	
WFQC21199	C	C2	3	3	8.083	0.264	21	0.0126	Interlaminar Shear	8.323
WFQC211B9	C	C2	3	3	8.383	0.253	21	0.0120	Interlaminar Shear	
WFQC211C9	C	C2	3	3	8.244	0.263	21	0.0125	Interlaminar Shear	
WFQC211ID	C	C2	3	4	8.292	0.262	21	0.0125	Interlaminar Shear	
WFQC211JD	C	C2	3	4	8.294	0.259	21	0.0123	Interlaminar Shear	
WFQC211KD	C	C2	3	4	8.362	0.261	21	0.0125	Interlaminar Shear	8.343
WFQC211LD	C	C2	3	4	8.353	0.258	21	0.0123	Interlaminar Shear	
WFQC211MD	C	C2	3	4	8.412	0.264	21	0.0126	Interlaminar Shear	
WFQC211TI	C	C2	3	5	7.976	0.258	21	0.0123	Interlaminar Shear	
WFQC211UI	C	C2	3	5	7.969	0.259	21	0.0123	Interlaminar Shear	
WFQC211WI	C	C2	3	5	7.961	0.257	21	0.0122	Interlaminar Shear	8.046
WFQC211XI	C	C2	3	5	8.150	0.262	21	0.0125	Interlaminar Shear	
WFQC211YI	C	C2	3	5	8.172	0.244	21	0.0116	Interlaminar Shear	
WFQC2125K	C	C2	3	6	8.064	0.262	21	0.0125	Interlaminar Shear	
WFQC2126K	C	C2	3	6	8.044	0.236	21	0.0112	Interlaminar Shear	
WFQC2127K	C	C2	3	6	7.913	0.257	21	0.0123	Interlaminar Shear	8.143
WFQC2128K	C	C2	3	6	8.227	0.245	21	0.0116	Interlaminar Shear	
WFQC2129K	C	C2	3	6	8.465	0.246	21	0.0117	Interlaminar Shear	
WFQC212GM	C	C2	3	7	7.716	0.260	21	0.0124	Interlaminar Shear	
WFQC212IM	C	C2	3	7	7.860	0.263	21	0.0125	Interlaminar Shear	
WFQC212JM	C	C2	3	7	7.829	0.259	21	0.0123	Interlaminar Shear	7.773
WFQC212KM	C	C2	3	7	7.816	0.263	21	0.0125	Interlaminar Shear	
WFQC212LM	C	C2	3	7	7.644	0.258	21	0.0123	Interlaminar Shear	
WFQC212RO	C	C2	3	8	7.990	0.258	21	0.0123	Interlaminar Shear	
WFQC212SO	C	C2	3	8	8.249	0.259	21	0.0123	Interlaminar Shear	
WFQC212TO	C	C2	3	8	8.335	0.263	21	0.0125	Interlaminar Shear	8.289
WFQC212UO	C	C2	3	8	8.337	0.259	21	0.0123	Interlaminar Shear	
WFQC212WO	C	C2	3	8	8.536	0.257	21	0.0122	Interlaminar Shear	
WFQC2133Q	C	C2	3	9	7.573	0.260	21	0.0124	Interlaminar Shear	
WFQC2134Q	C	C2	3	9	7.557	0.264	21	0.0126	Interlaminar Shear	
WFQC2135Q	C	C2	3	9	7.356	0.263	21	0.0125	Interlaminar Shear	7.518
WFQC2137Q	C	C2	3	9	7.729	0.260	21	0.0124	Interlaminar Shear	
WFQC2138Q	C	C2	3	9	7.373	0.262	21	0.0125	Interlaminar Shear	
WFQC213ES*	C	C2	3	10	8.723	0.267	21	0.0127	Compression/ Interlaminar Shear	
WFQC213FS*	C	C2	3	10	8.293	0.261	21	0.0124	Compression/ Interlaminar Shear	
WFQC213GS*	C	C2	3	10	8.310	0.254	21	0.0121	Compression/ Interlaminar Shear	8.463
WFQC213IS*	C	C2	3	10	8.515	0.265	21	0.0126	Compression/ Interlaminar Shear	
WFQC213JS*	C	C2	3	10	8.477	0.260	21	0.0124	Compression/ Interlaminar Shear	
WFQC213PU*	C	C2	3	11	8.606	0.263	21	0.0125	Compression/ Interlaminar Shear	
WFQC213QU*	C	C2	3	11	8.542	0.254	21	0.0121	Compression/ Interlaminar Shear	
WFQC213RU*	C	C2	3	11	8.684	0.254	21	0.0121	Compression/ Interlaminar Shear	8.537
WFQC213SU*	C	C2	3	11	8.368	0.263	21	0.0125	Compression/ Interlaminar Shear	
WFQC213UU*	C	C2	3	11	8.486	0.253	21	0.0121	Compression/ Interlaminar Shear	
WFQC2141W	C	C2	3	12	8.685	0.258	21	0.0123	Interlaminar Shear/Compression	
WFQC2142W	C	C2	3	12	8.050	0.258	21	0.0123	Interlaminar Shear/Compression	
WFQC2143W	C	C2	3	12	8.324	0.258	21	0.0123	Interlaminar Shear/Compression	8.279
WFQC2144W	C	C2	3	12	8.163	0.261	21	0.0124	Interlaminar Shear/Compression	
WFQC2145W	C	C2	3	12	8.172	0.262	21	0.0125	Interlaminar Shear/Compression	
WFQC214CY	C	C2	3	13	7.291	0.257	21	0.0122	Interlaminar Shear	
WFQC214DY	C	C2	3	13	7.650	0.257	21	0.0122	Interlaminar Shear	
WFQC214EY	C	C2	3	13	7.531	0.266	21	0.0126	Interlaminar Shear	7.464
WFQC214FY	C	C2	3	13	7.207	0.259	21	0.0123	Interlaminar Shear	
WFQC214GY	C	C2	3	13	7.643	0.257	21	0.0123	Interlaminar Shear	
WFQC214Nb*	C	C2	3	14	8.454	0.256	21	0.0122	Compression/ Interlaminar Shear	
WFQC214Ob*	C	C2	3	14	8.490	0.266	21	0.0127	Compression/ Interlaminar Shear	
WFQC214Pb*	C	C2	3	14	8.333	0.260	21	0.0124	Compression/ Interlaminar Shear	8.481
WFQC214Qb*	C	C2	3	14	8.993	0.259	21	0.0124	Compression/ Interlaminar Shear	
WFQC214Rb*	C	C2	3	14	8.133	0.263	21	0.0125	Compression/ Interlaminar Shear	
WFQC214Zn	C	C2	3	15	6.623	0.261	21	0.0124	Interlaminar Shear / Inelastic Deformation	
WFQC2152n	C	C2	3	15	6.109	0.261	21	0.0124	Interlaminar Shear / Inelastic Deformation	
WFQC2153n	C	C2	3	15	6.477	0.258	21	0.0123	Interlaminar Shear / Inelastic Deformation	6.342
WFQC2154n	C	C2	3	15	6.459	0.261	21	0.0124	Interlaminar Shear / Inelastic Deformation	
WFQC2155n	C	C2	3	15	6.044	0.261	21	0.0124	Interlaminar Shear / Inelastic Deformation	

*A combination of interlaminar shear and compression failure modes were observed in the specimens; however, it appeared that compression failure occurred before interlaminar shear failure during the tests

Table 6-4: Fluid Sensitivity Test Summary for ET

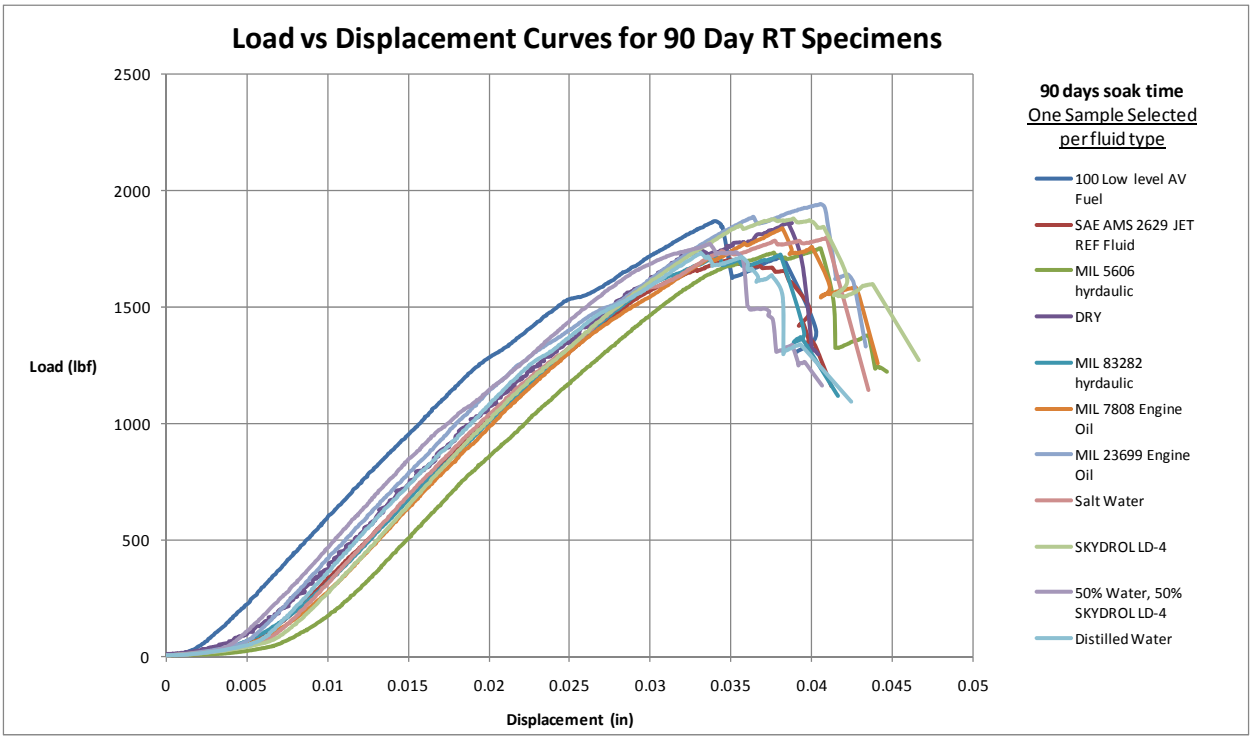


Figure 6-3: 90 Days Soak, RT

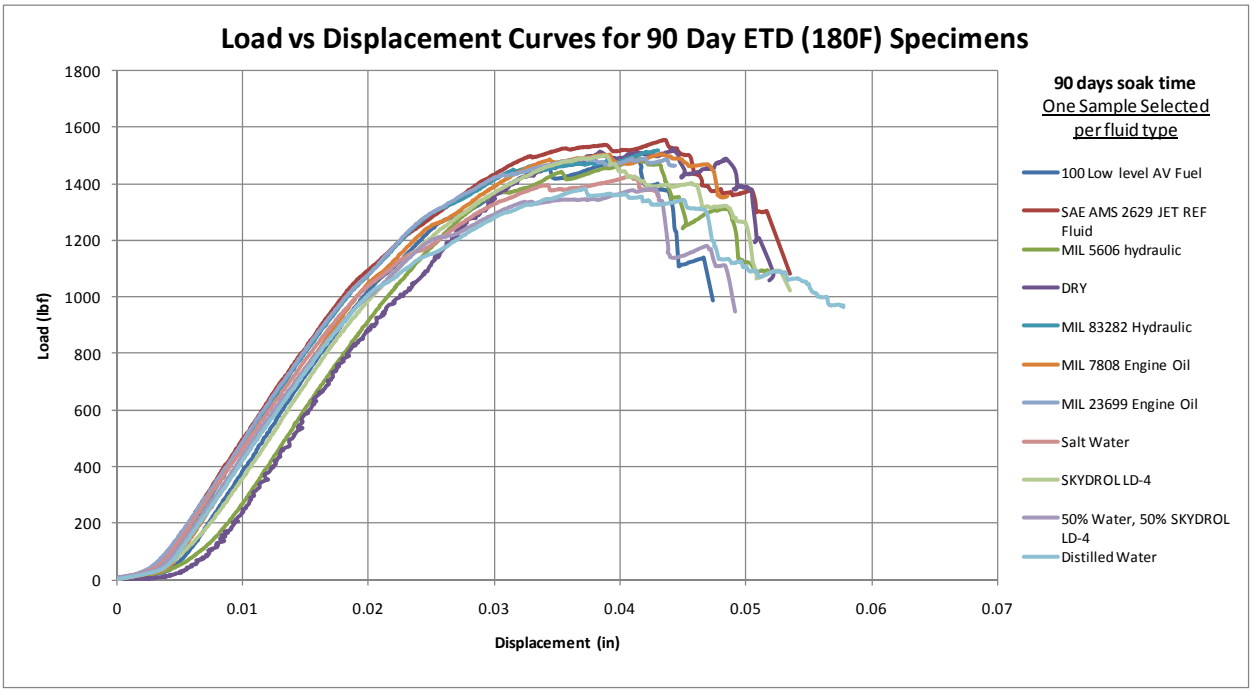


Figure 6-4: 90 Days Soak, ET

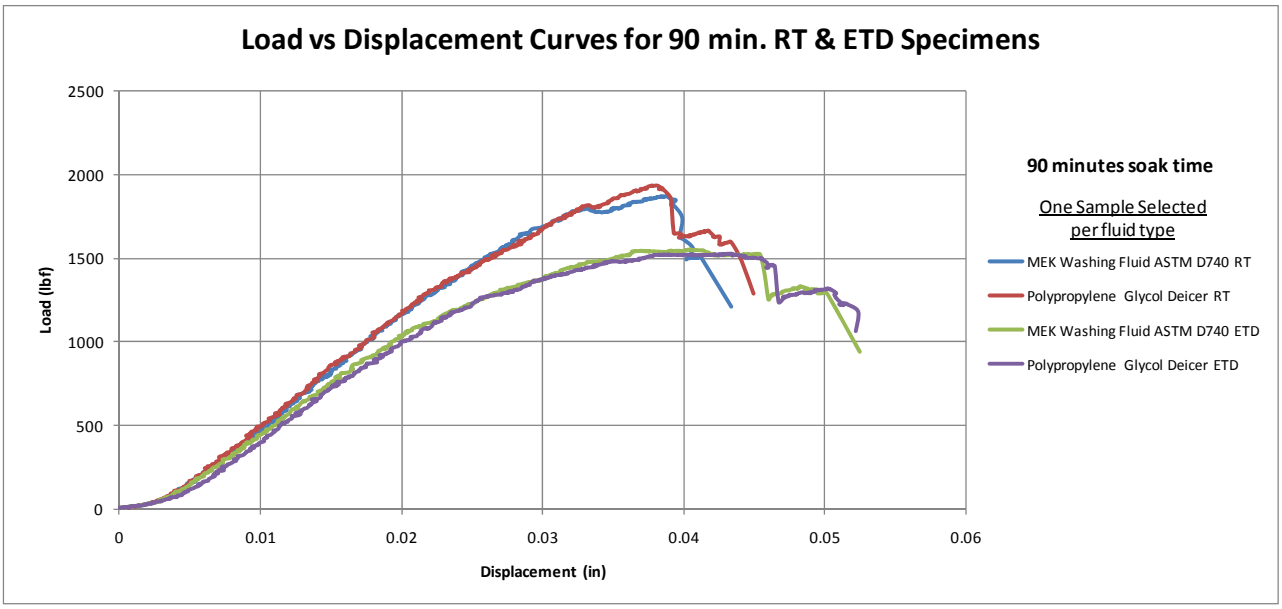


Figure 6-3: 90 Minutes Soak, RT & ET

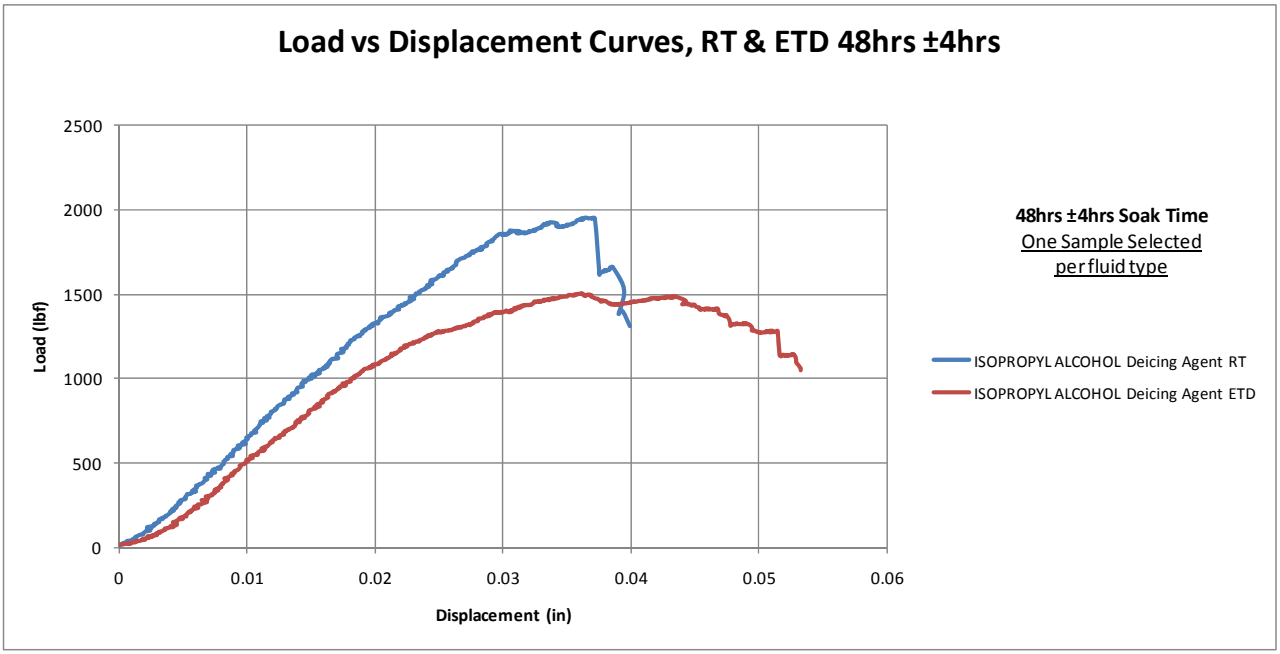


Figure 6-4: 48 hours ±4 hours Soak, RT & ET

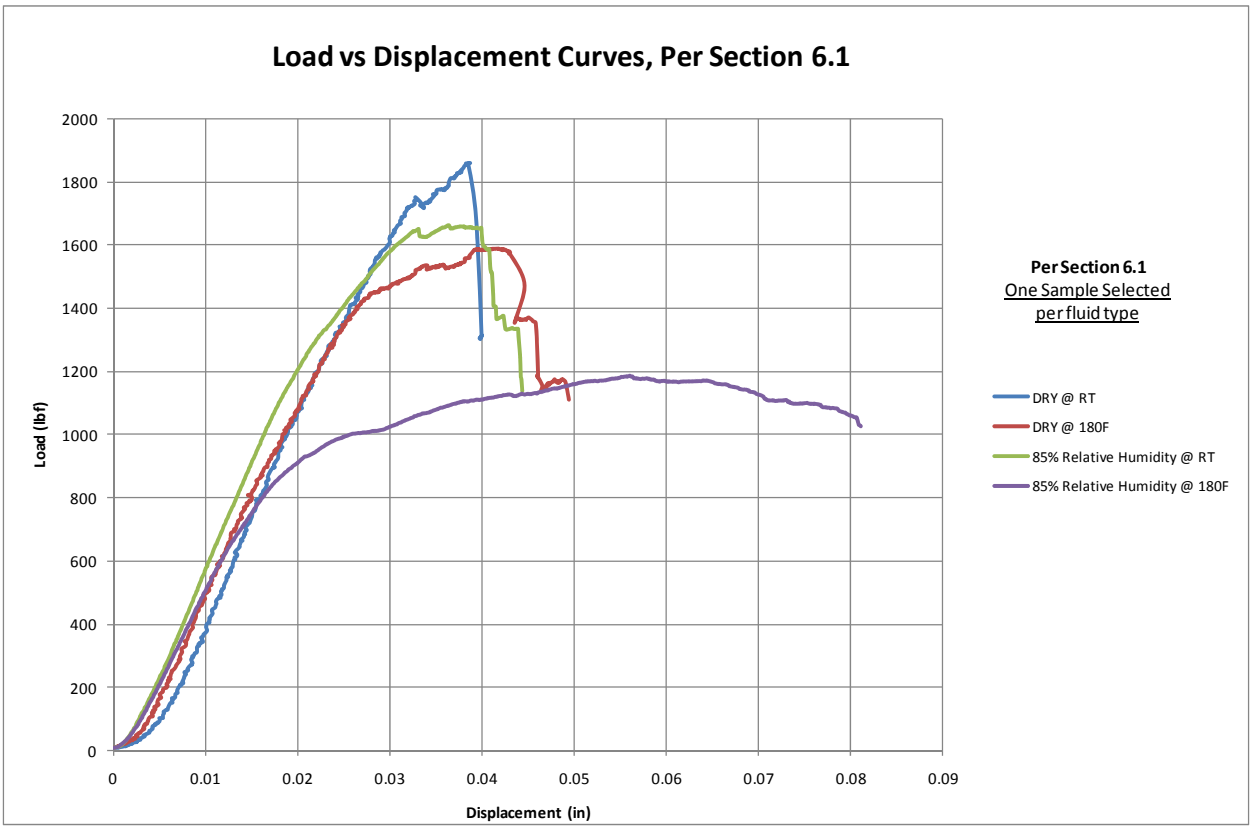
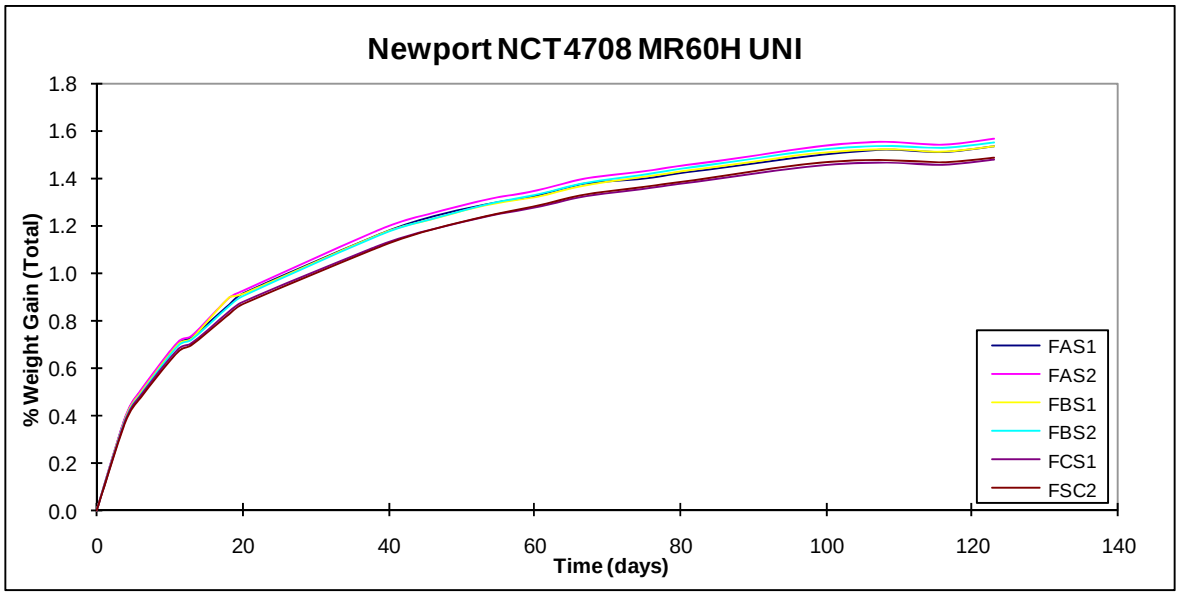


Figure 6-5: Control Tests per section 6.1, RT & ET

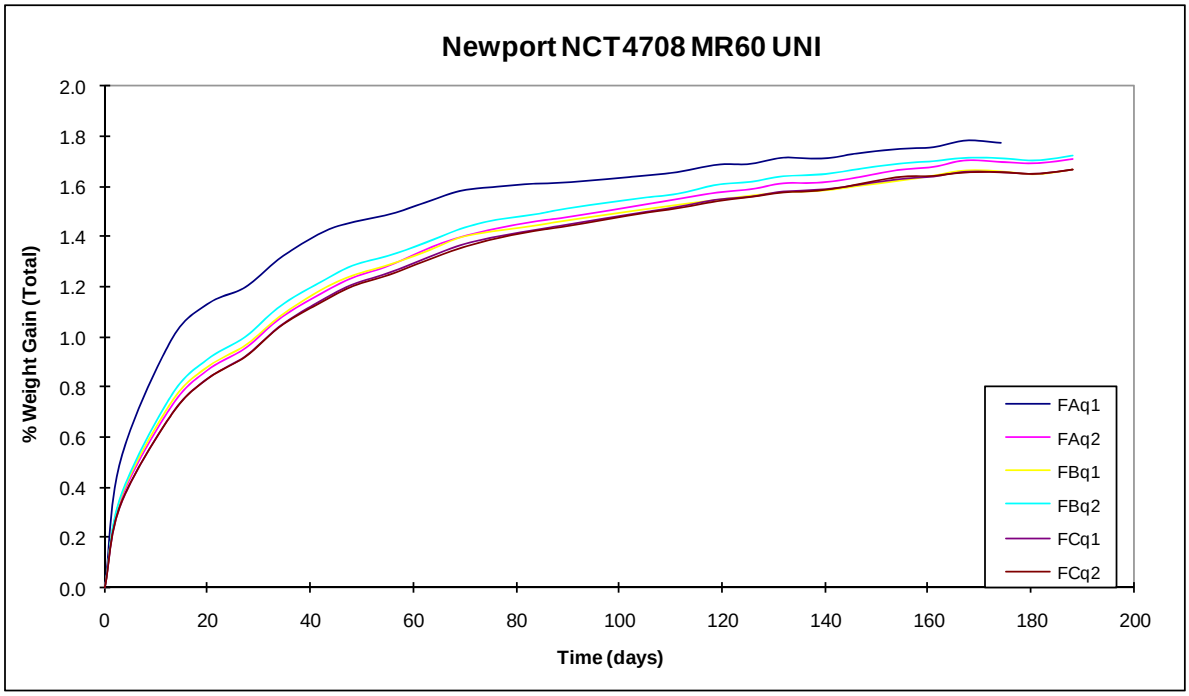
7. MOISTURE CONDITIONING CHARTS

7.1 Single Shear Bearing 1– Thinnest Panel*



* The thinnest panel was longitudinal tension panel. However the longitudinal tension panel does not meet the weight requirement for conditioning. Therefore it was substituted by Single Shear Bearing 1 panel with the thicknesses of 8 piles.

7.2 Short Beam Strength - Thickest Panel



The rest of the curves can be found on the CD that accompanies this report.

8. DMA Results

The Wet DMA specimens were prepared by Newport and tested by three test labs (Newport, NIAR and third party test lab). On the other hand the Dry DMA Specimens were prepared and tested at NIAR Composites Lab. The charts and graphs below are only examples. The remaining files can be obtained from the CD provided with this report.

Environmental Conditioning

Tg specimens (dried @ 220±5°F for 2 hours) were conditioned in a water bath @ 180±5°F until 1.6-1.9% weight gain was attained (6-18 days depending on specimen size and thickness). A Moisture absorption weight gain value of 1.6% had been previously determine by conditioned specimens @ 160±5°F and 85±5% relative humidity for 120 - 180 days till equilibrium (<0.02% weight change for two consecutive 7-day apart determinations).
Wet Tg values were determined by DMA analysis according to ASTM D-7028.

Average value was derived from:

10 dual cantilever specimens
22 20-mm span 3-point bend specimens
24 50-mm span 3-point bend specimens
48 1.3 mm thick specimens
9 2.6 mm thick specimens

Specimen sizes:

Dual cantilever: 57mm x 12.7mm x thickness (1.3 or 2.6) mm
3-Point bend: (30 or 57) mm x 12.7mm x thickness (1.3 or 2.6) mm

NCT 4708 MR60H G300 Wet Tg (DMA,E') Data RD# 10-59, 10-64

Summary of results from three test labs

	Onset Storage Modulus		Peak of Tangent Delta	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
Newport Dual Cantilever	50 mm Span		50 mm Span	
Average	115.11	239.20	134.77	274.59
Standard Deviation	3.04	5.47	2.95	5.31

	Onset Storage Modulus		Peak of Tangent Delta	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
Newport 3-pt bend	20 mm Span		20 mm Span	
Average	118.78	245.81	131.81	269.26
Standard Deviation	4.26	7.66	3.47	6.25
Third Party Lab 3-pt bend				
Average	117.53	243.55	132.59	270.67
Standard Deviation	2.18	3.93	1.30	2.34
NCAMP 3-pt bend				
Average	108.45	227.21	123.87	254.96
Standard Deviation	1.50	2.69	1.53	2.76
Three Labs 3-pt bend Results				
Average	114.97	238.95	129.18	264.53
Standard Deviation	5.79	10.42	4.72	8.50

	Onset Storage Modulus		Peak of Tangent Delta	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
Newport 3-pt bend	50 mm Span		50 mm Span	
Average	112.36	234.24	124.62	256.31
Standard Deviation	4.75	8.55	2.41	4.34
Third Party Lab 3-pt bend				
Average	116.96	242.53	131.67	269.00
Standard Deviation	2.11	3.80	3.26	5.87
NCAMP 3-pt bend				
Average	115.40	239.71	129.39	264.90
Standard Deviation	1.67	3.01	1.39	2.50
Three Labs 3-pt bend Results				
Average	114.81	238.67	128.42	263.16
Standard Deviation	3.62	6.51	3.78	6.81

	Onset Storage Modulus		Peak of Tangent Delta	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
All 3-pt bend Results (20mm & 50mm)				
Average	114.89	238.81	128.80	263.84
Standard Deviation	4.77	8.59	4.25	7.65

	Onset Storage Modulus		Peak of Tangent Delta	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
All 3-pt bend and Dual Cantilever Results				
Average	114.93	238.88	129.87	265.76
Standard Deviation	4.49	8.08	4.64	8.35

Table 8-1: DMA Wet Results

DMA Results Summary

Newport Dual Cantilever Results of Wet Samples

Sample #	Thickness (mm)	Thickness (inch)	Onset Storage Modulus Tg [°C]	Onset Storage Modulus Tg [°F]	Peak of Tangent Delta Tg [°C]	Peak of Tangent Delta Tg [°F]	Moisture Content %
50mm Span							
Lot# 51588, 8-1	2.70	0.106	117.19	242.94	138.85	281.93	1.63
Lot# 51621, 1-2	2.55	0.100	116.37	241.47	138.04	280.47	1.66
Lot# 51733, 3-1	2.47	0.097	107.86	226.15	129.29	264.72	1.64
Lot# 51733, 3-3	2.57	0.101	113.77	236.79	136.22	277.20	1.60
Lot# 64390, 0-2	2.54	0.100	115.97	240.75	137.13	278.83	1.63
Lot# 51588, 8-1	1.34	0.053	116.20	241.16	134.13	273.43	1.62
Lot# 51621, 1-2	1.34	0.053	113.57	236.43	133.37	272.07	1.66
Lot# 51733, 3-2	1.31	0.052	115.44	239.79	132.64	270.75	1.67
Lot# 51733, 3-3	1.32	0.052	115.37	239.67	132.39	270.30	1.65
Lot# 64390, 0-1	1.33	0.052	119.39	246.90	135.64	276.15	1.63
Average			115.11	239.20	134.77	274.59	1.64
Standard Deviation			3.04	5.47	2.95	5.31	0.02

Conditioning: Wet

Test Parameters:

Machine:	TA DMA 2980
Test Fixture:	Dual Cantilever
Test Method:	ASTM D7028
Strain:	0.005% (thin) and 0.013% (thick)
Frequency:	1 Hz
Ramp Rate:	5ºC/min
Temperature Range:	40ºC to 160ºC

DMA Results Summary

Newport 3-Point Bend Results of Wet Samples

Sample #	Thickness (mm)	Thickness (inch)	Onset Storage Modulus Tg [°C]	Onset Storage Modulus Tg [°F]	Peak of Tangent Delta Tg [°C]	Peak of Tangent Delta Tg [°F]	Moisture Content %
20mm Span							
Lot# 51588, Short 8-4	1.35	0.053	116.31	241.36	131.56	268.81	1.63
Lot# 51588, Short 8-1	1.38	0.054	124.09	255.36	134.81	274.66	1.66
Lot# 51621, Short 1-4	1.26	0.050	110.15	230.27	124.29	255.72	1.61
Lot# 51621, Short 1-1	1.30	0.051	120.83	249.49	132.34	270.21	1.70
Lot# 51733, Short 3-2	1.32	0.052	122.16	251.89	131.71	269.08	1.62
Lot# 51733, Short 3-4	1.33	0.052	118.00	244.40	129.69	265.44	1.69
Lot# 51733, Short 3-3	1.30	0.051	118.70	245.66	132.59	270.66	1.61
Lot# 51733, Short 3-5	1.31	0.052	118.36	245.05	132.19	269.94	1.67
Lot# 51733, Short 3-5	2.56	0.100	123.93	255.07	137.03	278.65	1.60
Lot# 64390, Short 0-3	1.28	0.050	113.62	236.52	128.53	263.35	1.63
Lot# 64390, Short 0-2	1.30	0.051	120.48	248.86	135.19	275.34	1.60
Average			118.78	245.81	131.81	269.26	1.64
Standard Deviation			4.26	7.66	3.47	6.25	0.04

Sample #	Thickness (mm)	Thickness (inch)	Onset Storage Modulus Tg [°C]	Onset Storage Modulus Tg [°F]	Peak of Tangent Delta Tg [°C]	Peak of Tangent Delta Tg [°F]	Moisture Content %
50mm Span							
Lot# 51588, Long 8-5	1.39	0.055	116.75	242.15	127.77	261.99	1.61
Lot# 51588, Long 8-2	1.38	0.054	112.54	234.57	126.11	259.00	1.69
Lot# 51621, Long 1-4	1.29	0.051	108.27	226.89	121.72	251.10	1.68
Lot# 51621, Long 1-5	1.28	0.050	117.30	243.14	125.81	258.46	1.67
Lot# 51733, Long 3-3	1.31	0.052	106.29	223.32	121.87	251.37	1.62
Lot# 51733, Long 3-2	1.30	0.051	118.13	244.63	127.17	260.91	1.61
Lot# 64390, Long 0-3	1.28	0.050	112.44	234.39	123.84	254.91	1.62
Lot# 64390, Long 0-4	1.30	0.051	107.12	224.82	122.63	252.73	1.63
Average			112.36	234.24	124.62	256.31	1.64
Standard Deviation			4.75	8.55	2.41	4.34	0.03

Conditioning: Wet

Test Parameters:

Machine:	TA DMA 2980
Test Fixture:	50mm (Long) and 20mm (Short) 3-point bend clamps
Test Method:	ASTM D7028
Strain:	0.002% (Long) and 0.004% (Short)
Frequency:	1 Hz
Ramp Rate:	5ºC/min
Temperature Range:	40ºC to 160ºC

DMA Results Summary

NCAMP 3-Point Bend Results of Wet Samples

Sample #	Thickness (mm)	Thickness (inch)	Onset Storage Modulus Tg [°C]	Onset Storage Modulus Tg [°F]	Peak of Tangent Delta Tg [°C]	Peak of Tangent Delta Tg [°F]	Moisture Content %
20mm Span							
Lot# 51588, Short 8-2	1.28	0.050	108.27	226.89	124.14	255.45	1.72
Lot# 51588, Short 8-3	1.36	0.054	108.32	226.98	126.31	259.36	1.83
Lot# 51621, Short 1-2	1.30	0.051	109.64	229.35	124.74	256.53	1.83
Lot# 51621, Short 1-3	1.36	0.054	107.63	225.73	123.81	254.86	1.77
Lot# 51733, Short 3-1	1.31	0.052	111.21	232.18	124.57	256.23	1.78
Lot# 51733, Short 3-3	1.32	0.052	106.11	223.00	123.77	254.79	1.84
Lot# 64390, Short 0-3	1.29	0.051	107.82	226.08	121.25	250.25	1.83
Lot# 64390, Short 0-4	1.31	0.052	108.60	227.48	122.34	252.21	1.92
Average			108.45	227.21	123.87	254.96	1.82
Standard Deviation			1.50	2.69	1.53	2.76	0.06

Sample #	Thickness (mm)	Thickness (inch)	Onset Storage Modulus Tg [°C]	Onset Storage Modulus Tg [°F]	Peak of Tangent Delta Tg [°C]	Peak of Tangent Delta Tg [°F]	Moisture Content %
50mm Span							
Lot# 51588, Long 8-3	1.37	0.054	117.69	243.84	131.84	269.31	1.78
Lot# 51588, Long 8-4	1.37	0.054	117.79	244.02	131.28	268.30	1.84
Lot# 51621, Long 1-1	1.28	0.050	113.88	236.98	129.05	264.29	1.75
Lot# 51621, Long 1-3	1.30	0.051	113.85	236.93	128.92	264.06	1.72
Lot# 51733, Long 3-4	1.31	0.052	113.76	236.77	128.48	263.26	1.82
Lot# 51733, Long 3-5	1.30	0.051	114.90	238.82	129.02	264.24	1.81
Lot# 64390, Long 0-2	1.30	0.051	115.02	239.04	128.25	262.85	1.87
Lot# 64390, Long 0-5	1.32	0.052	116.27	241.29	128.26	262.87	1.83
Average			115.40	239.71	129.39	264.90	1.80
Standard Deviation			1.67	3.01	1.39	2.50	0.05

Conditioning: Wet

Test Parameters:

Machine:	TA DMA Q800
Test Fixture:	50mm (Long) and 20mm (Short) 3-point bend clamps
Test Method:	ASTM D7028
Strain:	0.008% (Long) and 0.013% (Short)
Frequency:	1 Hz
Ramp Rate:	5ºC/min
Temperature Range:	30ºC to 180ºC

DMA Results Summary

Third Party Lab 3-point bend Results of Wet Samples

Sample #	Thickness (mm)	Thickness (inch)	Onset Storage Modulus Tg [°C]	Onset Storage Modulus Tg [°F]	Peak of Tangent Delta Tg [°C]	Peak of Tangent Delta Tg [°F]	Moisture Content %
20mm Span							
Lot# 51588, short 8-2	1.30	0.051	114.78	238.60	131.99	269.58	1.70
Lot# 51621, short 1-2	1.29	0.051	116.88	242.39	131.71	269.07	1.46
Lot# 51733, short 3-2	1.33	0.052	119.75	247.55	134.53	274.15	1.73
Lot# 64390, short 0-2	1.32	0.052	118.71	245.67	132.16	269.88	1.77
Average			117.53	243.55	132.59	270.67	1.67
Standard Deviation			2.18	3.93	1.30	2.34	0.14

Sample #	Thickness (mm)	Thickness (inch)	Onset Storage Modulus Tg [°C]	Onset Storage Modulus Tg [°F]	Peak of Tangent Delta Tg [°C]	Peak of Tangent Delta Tg [°F]	Moisture Content %
50mm Span							
Lot# 51588, long 8-1	1.35	0.053	117.44	243.39	130.86	267.54	1.79
Lot# 51588, long 8-2	2.72	0.107	120.72	249.30	137.36	279.24	1.67
Lot# 51621, long 1-1	1.31	0.052	115.73	240.31	129.44	265.00	1.66
Lot# 51733, long 3-1	1.30	0.051	114.54	238.18	130.01	266.02	1.84
Lot# 51733, long 3-2	2.52	0.099	115.61	240.10	128.60	263.48	1.80
Lot# 64390, long 0-1	1.30	0.051	116.14	241.05	130.29	266.53	1.87
Lot# 64390, long 0-1	2.53	0.100	118.56	245.41	135.09	275.17	1.67
Average			116.96	242.53	131.67	269.00	1.76
Standard Deviation			2.11	3.80	3.26	5.87	0.09

Conditioning: Wet

Test Parameters:

Machine:	TA DMA Q800
Test Fixture:	50mm (Long) and 20mm (Short) 3-point bend clamps
Test Method:	ASTM D7028
Strain:	0.008% (Long) and 0.013% (Short)
Frequency:	1 Hz
Ramp Rate:	5ºC/min
Temperature Range:	30ºC to 180ºC

DMA Results Summary

Newport 090914C1 WFDX XX RTD

Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
WFDA 1F (UNI-OHT3-A-C1-DMA DRY)	150.24	302.43	173.87	344.97
WFDA 2F (UNI-OHT3-A-C2-DMA DRY)	147.51	297.52	173.94	345.09
WFDB 1F (UNI-OHT3-B-C1-DMA DRY)	146.77	296.19	176.67	350.01
WFDB 2F (UNI-OHT3-B-C2-DMA DRY)	146.71	296.08	175.00	347.00
WFDC 1F (UNI-OHT3-C-C1-DMA DRY)	147.04	296.67	176.90	350.42
WFDC 2F (UNI-OHT3-C-C2-DMA DRY)	147.39	297.30	175.27	347.49
WFDA 1I (UNI-OHC3-A-C1-DMA DRY)	143.22	289.80	175.09	347.16
WFDA 2I (UNI-OHC3-A-C2-DMA DRY)	142.84	289.11	174.49	346.08
WFDB 1I (UNI-OHC3-B-C1-DMA DRY)	148.80	299.84	177.62	351.72
WFDB 2I (UNI-OHC3-B-C2-DMA DRY)	149.57	301.23	178.21	352.78
WFDC 1I (UNI-OHC3-C-C1-DMA DRY)	149.92	301.86	177.03	350.65
WFDC 2I (UNI-OHC3-C-C2-DMA DRY)	151.02	303.84	177.67	351.81
WFDA 1P (UNI-UNT0-A-C1-DMA DRY)	148.38	299.08	173.29	343.92
WFDA 2P (UNI-UNT0-A-C2-DMA DRY)	152.45	306.41	175.73	348.31
WFDB 1P (UNI-UNT0-B-C1-DMA DRY)	151.53	304.75	175.04	347.07
WFDB 2P (UNI-UNT0-B-C2-DMA DRY)	146.51	295.72	174.66	346.39
WFDC 1P (UNI-UNT0-C-C1-DMA DRY)	150.52	302.94	174.56	346.21
WFDC 2P (UNI-UNT0-C-C2-DMA DRY)	150.16	302.29	175.83	348.49
WFDA 1Y (UNI-UNC3-A-C1-DMA DRY)	147.01	296.62	174.26	345.67
WFDA 2Y (UNI-UNC3-A-C2-DMA DRY)	144.36	291.85	174.67	346.41
WFDB 1Y (UNI-UNC3-B-C1-DMA DRY)	149.93	301.87	175.64	348.15
WFDB 2Y (UNI-UNC3-B-C2-DMA DRY)	143.21	289.78	174.44	345.99
WFDC 1Y (UNI-UNC3-C-C1-DMA DRY)	146.29	295.32	177.79	352.02
WFDC 2Y (UNI-UNC3-C-C2-DMA DRY)	144.92	292.86	177.95	352.31
Average	147.76	297.97	175.65	348.17
Standard Deviation	2.74	4.93	1.47	2.65

Table 8-2: DMA Dry Results

Test Parameters:

Machine: TA DMA Q800

Test Fixture: 20mm 3-point bend clamp

Test Method: 0.02% strain

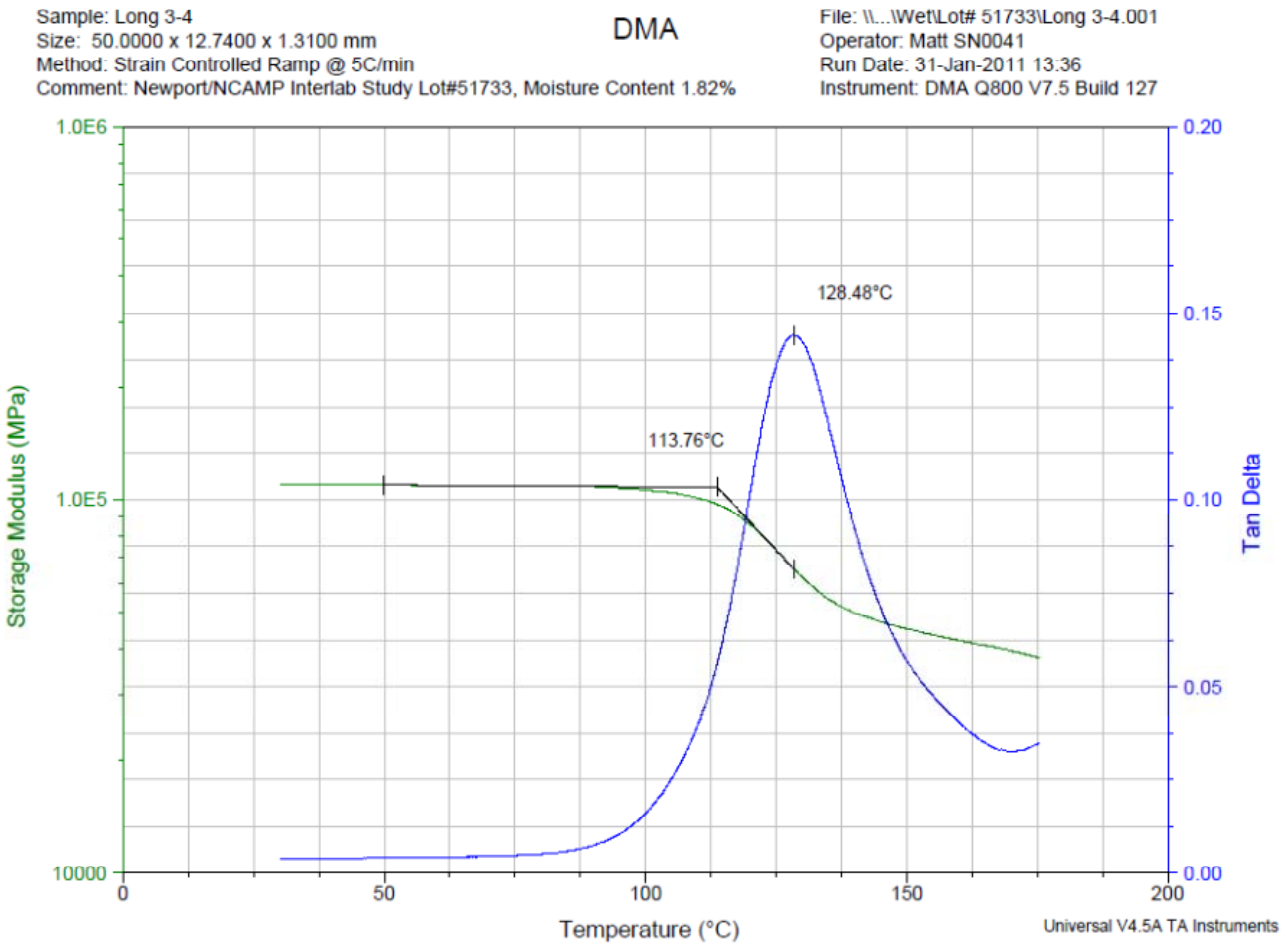
Frequency: 1 Hz

Ramp Rate: 5°C/min

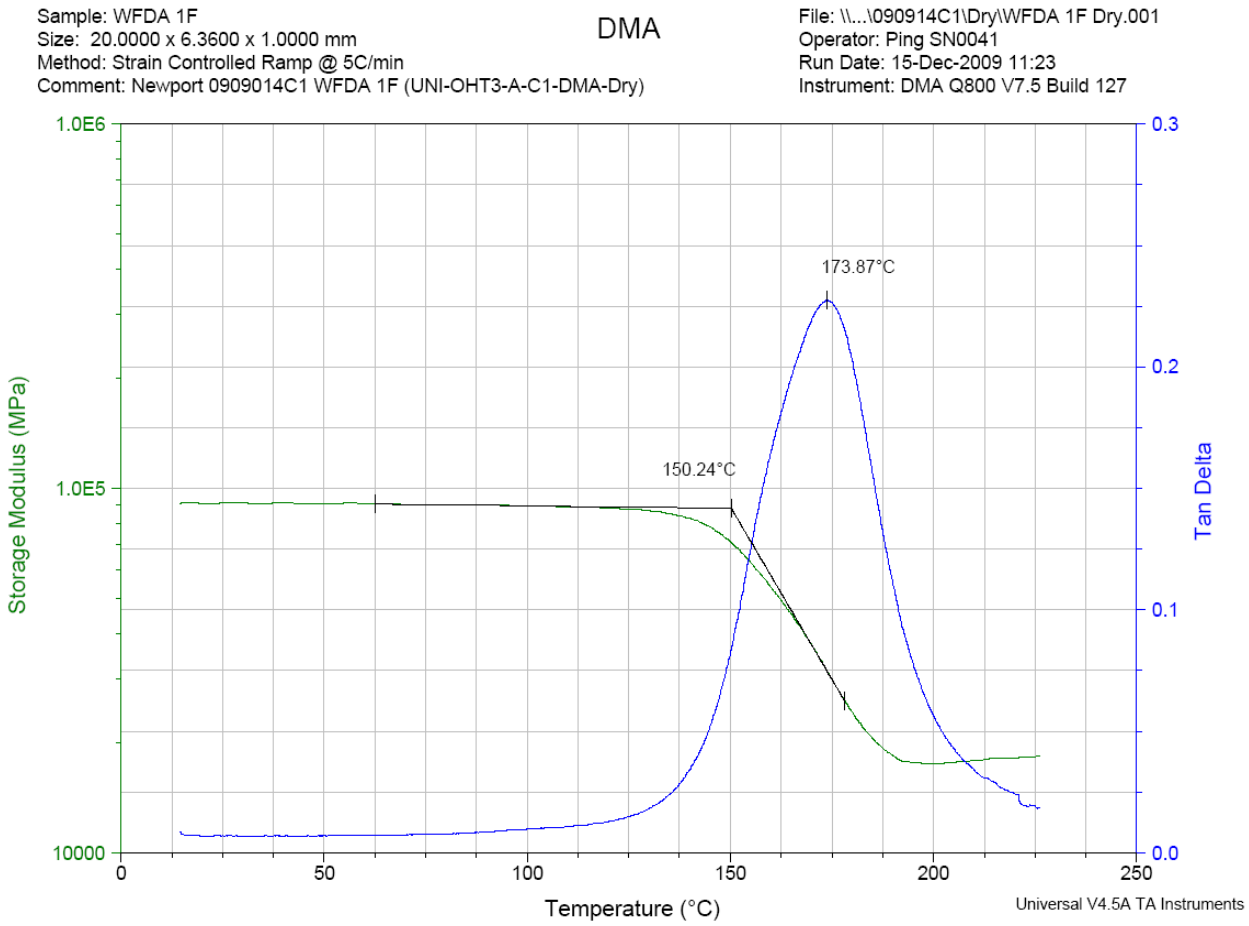
Temperature Range: 60°C to 240°C

8.1 DMA Wet Sample Batch A

The charts below are only examples. The remaining files can be obtained from the CD provided with this report.



8.2 DMA Dry Sample Batch A



9. Physical Test Results

D3171-06 Fiber Content by Matrix Digestion (Test Method I Procedure B)								D2734-97 Void Content	
Sample Name	Dry Spec. Weight [g]	Filter Weight [g]	Filter +Fiber Weight [g]	Fiber Weight [%]	Fiber Density [g/cc]	Resin Weight [%]	Fiber Volume [%]	Resin Density [g/cc]	Void Content Volume [%]
NEW-K11-WSU-FHC1-A-C1									
FA71-1	1.2038	24.4437	25.1744	60.70	1.804	39.30	51.57	1.246	0.09
FA71-2	1.2157	23.6708	24.4028	60.21	1.804	39.79	51.18	1.246	-0.15
FA71-3	1.1889	22.6466	23.3719	61.01	1.804	38.99	52.35	1.246	-0.80
NEW-K11-WSU-UNT3-A-C2									
FAC2-1	1.1738	23.9608	24.6606	59.62	1.804	40.38	50.69	1.246	-0.40
FAC2-2	1.1662	22.4249	23.1322	60.65	1.804	39.35	51.72	1.246	-0.31
FAC2-3	1.1698	24.3944	25.0866	59.17	1.804	40.83	50.36	1.246	-0.67
NEW-K11-WSU-OHC3-A-C2									
FAI2-1	0.8747	24.2916	24.8186	60.25	1.804	39.75	50.94	1.246	0.39
FAI2-2	0.8597	24.1342	24.6402	58.86	1.804	41.14	49.87	1.246	-0.34
FAI2-3	0.8903	22.8280	23.3535	59.03	1.804	40.97	49.67	1.246	0.40
NEW-K11-WSU-SBS1-A-C1									
FAq1-1	1.3556	23.7228	24.5509	61.09	1.804	38.91	51.63	1.246	0.75
FAq1-2	1.2169	23.6175	24.3629	61.25	1.804	38.75	51.90	1.246	0.58
FAq1-3	1.3287	22.4778	23.2751	60.01	1.804	39.99	51.05	1.246	-0.30
NEW-K11-WSU-FHC1-B-C1									
FB71-1	1.2298	23.4432	24.1737	59.40	1.804	40.60	50.44	1.246	-0.35
FB71-2	1.2368	22.6071	23.3489	59.98	1.804	40.02	51.26	1.246	-0.79
FB71-3	1.1844	23.7419	24.4475	59.57	1.804	40.43	50.76	1.246	-0.64
NEW-K11-WSU-UNT1-B-C1									
FBA1-1	1.0993	24.3600	25.0156	59.64	1.804	40.36	50.35	1.246	0.31
FBA1-2	1.1082	21.9055	22.5700	59.96	1.804	40.04	50.88	1.246	-0.07
FBA1-3	1.1243	22.0406	22.7148	59.97	1.804	40.03	50.90	1.246	-0.10
NEW-K11-WSU-OHC3-B-C1									
FBI1-1	1.1662	23.7755	24.4673	59.32	1.804	40.68	50.51	1.246	-0.66
FBI1-2	1.2316	22.5652	23.2877	58.66	1.804	41.34	49.86	1.246	-0.73
FBI1-3	1.1902	23.6958	24.3875	58.12	1.804	41.88	49.35	1.246	-0.83
NEW-K11-WSU-SBS1-B-C1									
FBq1-1	1.0325	22.4218	23.0519	61.03	1.804	38.97	52.17	1.246	-0.40
FBq1-2	1.1490	23.7081	24.4145	61.48	1.804	38.52	52.30	1.246	0.26
FBq1-3	1.4034	23.9166	24.7679	60.66	1.804	39.34	51.68	1.246	-0.20
NEW-K11-WSU-UNT1-C-C2									
FCA2-1	1.0882	23.7333	24.3860	59.98	1.804	40.02	51.08	1.246	-0.42
FCA2-2	1.0834	23.7240	24.3727	59.88	1.804	40.12	51.13	1.246	-0.74
FCA2-3	1.0478	23.6722	24.3018	60.09	1.804	39.91	51.00	1.246	-0.05
NEW-K11-WSU-OHC3-C-C1									
FCI1-1	1.1534	23.7233	24.4315	61.40	1.804	38.60	52.32	1.246	0.06
FCI1-2	1.1078	22.1329	22.7989	60.12	1.804	39.88	51.49	1.246	-0.94
FCI1-3	1.0969	23.6177	24.2858	60.91	1.804	39.09	51.97	1.246	-0.26
NEW-K11-WSU-SBS-C-C1									
FCQ1-1	1.4193	23.5254	24.3944	61.23	1.804	38.77	52.59	1.246	-0.80
FCQ1-2	1.3226	24.4384	25.2480	61.21	1.804	38.79	52.43	1.246	-0.53
FCQ1-3	1.1604	22.5640	23.2728	61.08	1.804	38.92	52.32	1.246	-0.59
NEW-K11-WSU-UNC3-C-C1									
FCY1-1	1.2981	21.9046	22.6940	60.81	1.804	39.19	52.19	1.246	-0.87
FCY1-2	1.1689	24.4393	25.1443	60.31	1.804	39.69	51.71	1.246	-0.96
FCY1-3	1.2740	22.5482	23.3293	61.31	1.804	38.69	52.42	1.246	-0.30
			AVERAGE (composite)	60.2210		39.7790	51.2785		-0.3160
			STANDARD DEVIATION	0.8571		0.8571	0.8703		0.4516
			COEFF. OF VARIATION	1.4233		2.1547	1.6971		-142.9450
			Minimum	58.1163		38.5205	49.3457		-0.9643
			Maximum	61.4795		41.8837	52.5871		0.7523
			Number of Specimens	36		36	36		36

*Remaining results required per section 4 of the test plan can be found on the CD accompanying this report.

Table 9-1: Physical Test Results

10. Deviations

For fluid sensitivity testing Jet Reference fluid called out in the NCAMP test plan is a rare fuel and therefore extremely expensive. As a replacement, we used Jet Fuel A per ASTM D1655. AMS2629 is a jet reference fuel intended to simulate jet engine fuel only. This was approved by all participating panel fabricators.