Hexcel 8552 AS4 Unidirectional Prepreg at 190 gsm & 35% RC Qualification Material Property Data Report

FAA Special Project Number SP4614WI-Q

NCAMP Test Report Number: CAM-RP-2010-002 Rev A

May 6, 2011

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REVISIONS:

Rev	By	Date	Rev App By	Pages Revised or Added
A	Kristin Marlett	5/6/2011	Yeow Ng	Ultimate Bearing Strength data added
N/C	Kristin Marlett	4/14/2011	Yeow Ng	ILT Values Updated. Test Summary for UNC0, UNC2 and UNC3 updated. Raw data for UNC3 updated. Section 1.5.7 - FSBS deleted.
N/C	Kristin Marlett	7/22/2010	Yeow Ng	Processing changed on lamina/laminate sheet; updated CAI individual test chart. Update template section 1.5.8
N/C	Kristin Marlett	8/2/2010	Yeow Ng	Stress Strain/values changed and edits made to Introduction (material spec release date) and other minor chart updates
N/C	Kristin Marlett	8/12/2010	Yeow Ng	DMA results chart modified to only include qualification data. Change in Tg also reflected in lamina/laminate sheets .
N/C	Kristin Marlett	8/16/2010	Yeow Ng	SBS Conditioning Chart added.
N/C	Kristin Marlett	8/18/2010	Yeow Ng	OHT2 RTD value edited based on outlier and physical testing values changed for OHT2
N/C	Kristin Marlett	8/23/2010	Yeow Ng	Wet TMA values added
N/C	Kristin Marlett	11/17/2010	Yeow Ng	Minor lamina chart template change
N/C	Kristin Marlett	12/20/2010	Yeow Ng	Modified SBS Conditioning Chart added.

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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 FAA oversight through FAA Special Project Number SP4614WI-Q and also meet the requirements of NCAMP Standard Operating Procedure NSP 100; the test panels, test specimens, and test setups have been conformed by the FAA and the testing has been witnessed by the FAA. However, the data may not fulfill all the needs of any specific company's programs; specific properties, environments, laminate architecture, and loading situations 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 Hexcel 8552 AS4 Unidirectional Qualification Statistical Analysis Report panels were fabricated by Cessna Aircraft Company, 5800 E Pawnee, Wichita, KS 67218. The qualification material was procured to NCAMP Material Specification NMS 128/1 Rev - Initial Release February 6, 2007. The qualification test panels were cured in accordance with Baseline Cure Cycle (M) of NCAMP Process Specification NPS 81228 Rev A Cure Cycle “M.” The NCAMP Test Plan NTP 1128Q1 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 128/1. NMS 128/1 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 128/1.* NMS 128/1 is a free, publicly available, non-proprietary aerospace industry material specification.

The data contained 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). Data that is subject to export control regulations, if any, will be made available on a case by case basis through written request to NCAMP.

1.2 Symbols Used

ν_{12}^{t}	major Poisson's ratio, tension
$\mu\varepsilon$	micro-strain
E_1^{c}	compressive modulus, Warp / Longitudinal direction
E_1^{t}	tensile modulus, Warp / Longitudinal direction
E_2^{c}	compressive modulus, Transverse / Fill direction
E_2^{t}	tensile modulus, Transverse / Fill direction
F_1^{cu}	ultimate compressive strength, Warp / Longitudinal direction
F_1^{tu}	ultimate tensile strength, Warp / Longitudinal 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; Warp / Longitudinal direction
(parallel to Warp direction of reinforcement)
2 – axis; Transverse / Fill direction
(parallel to Fill direction of reinforcement)
12; in-plane

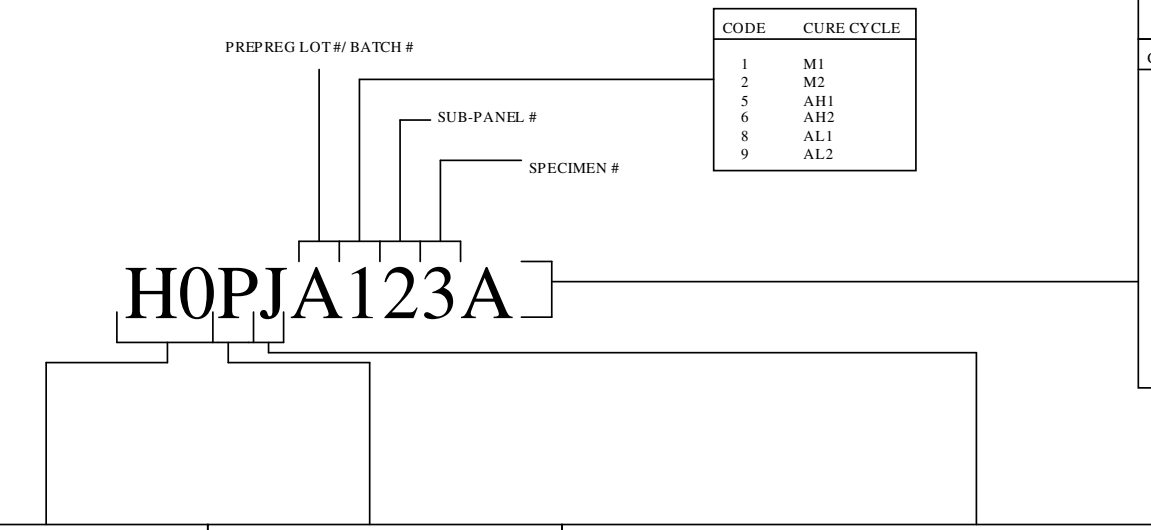
Acronyms and Definitions

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

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

1.3 NIAR– Hexcel Specimen Naming Format

NIAR NCAMP— HEXCEL SPECIMEN NAMING FORMAT



CODE	CURE CYCLE
1	M1
2	M2
5	AH1
6	AH2
8	AL1
9	AL2

CODE	CONDITIONING
A	RTD (70±10°F)
B	CTD (-65°F)
C	ETD (250°F)
D	ETW (250°F)

CODE	FSBS Fluid (70°F, 250°F)
a,1	100 Low Lead
b,2	SAE AMS 2629
c,3	MIL-PRF-5606
d,4	MIL-PRF-83282
e,5	MIL-PRF-7808
f,6	MIL-PRF-23699
g,7	Salt Water
h,8	Skydrol LD-4
i,9	50% Water w/ 50% Skydrol
j,m	MEK washing fluid
k,n	Polypropylene Glycol Deicer
l,p	Isopropyl Alcohol Deicing
r,s	Distilled Water
A,C	Dry
t,D	85% Relative Humidity

CODE	COMPANY
HO	Hexcel
HT	ATK Space Systems
HB	Bell Helicopter
HE	Boeing Helicopters
HF	Cessna Aircraft Company
HG	General Atomics
HW	Goodrich
HU	Gulfstream Aerospace
HY	Hawker Beechcraft
HJ	Israel Aircraft Industries
HL	Lockheed Martin Aeronautics
HN	Northrop Grumman
HP	Spirit AeroSystems

CODE	MATERIAL SYSTEM
P	(H11) AS4 PW Fab Prepreg 38%RC-1628
I	(H12) IM7 Uni Prepreg 38% RC-1828
U	(H13) AS4 Uni Prepreg 35% RC-1128Q1

CODE	TEST METHOD	CODE	TEST METHOD
J	(WT) Warp Tension/ (LT) Longitudinal Tension (D3039)	Q	(SBS) Short Beam Shear (D2344)
U	(FT) Fill Tension/ (TT) Transverse Tension (D3039)	q	(SBS1) Laminate Short Beam Shear
L	(WC) Warp Compression/ (LC) Longitudinal Compression (D6641)		
Z	(FC) Fill Compression/ (TC) Transverse Compression (D6641)		
N	(IPS) In Plane Shear (D3518)		
A	(UNT1) Un-notched Tension Layup 1 (D3039)	1	(SSB1) Single Shear Pin Bearing Layup 1 (D5961)
B	(UNT2) Un-notched Tension Layup 2 (D3039)	2	(SSB2) Single Shear Pin Bearing Layup 2 (D5961)
C	(UNT3) Un-notched Tension Layup 3 (D3039)	3	(SSB3) Single Shear Pin Bearing Layup 3 (D5961)
W	(UNC1) Un-notched Compression Layup 1 (D6641)	P	(UNT0) Un-notched Tension 0/90 (D3039)
X	(UNC2) Un-notched Compression Layup 2 (D6641)	R	(UNC0) Un-notched Compression 0/90 (D6641)
Y	(UNC3) Un-notched Compression Layup 3 (D6641)		
D	(OHT1) Open Hole Tension Layup 1 (D5766)	4	(FHT1) Filled Hole Tension Layup 1 (D6742)
E	(OHT2) Open Hole Tension Layup 2 (D5766)	5	(FHT2) Filled Hole Tension Layup 2 (D6742)
F	(OHT3) Open Hole Tension Layup 3 (D5766)	6	(FHT3) Filled Hole Tension Layup 3 (D6742)
G	(OHC1) Open Hole Compression 1 (D6484)	7	(FHC1) Filled Hole Compression Layup 1 (D6484)
H	(OHC2) Open Hole Compression 2 (D6484)	8	(FHC2) Filled Hole Compression Layup 2 (D6484)
I	(OHC3) Open Hole Compression 3 (D6484)	9	(FHC3) Filled Hole Compression Layup 3 (D6484)
K	(CAI1) Compression After Impact Layup 1 (SRM-2R)		
M	(ILT1) Interlaminar Tension Layup 1 (D6415)		
T	(MOL) Material Operating Limit Short Beam Shear (D2344)		
V	(MOLC) Material Operating Limit Open Hole Compression (D2344)		

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.

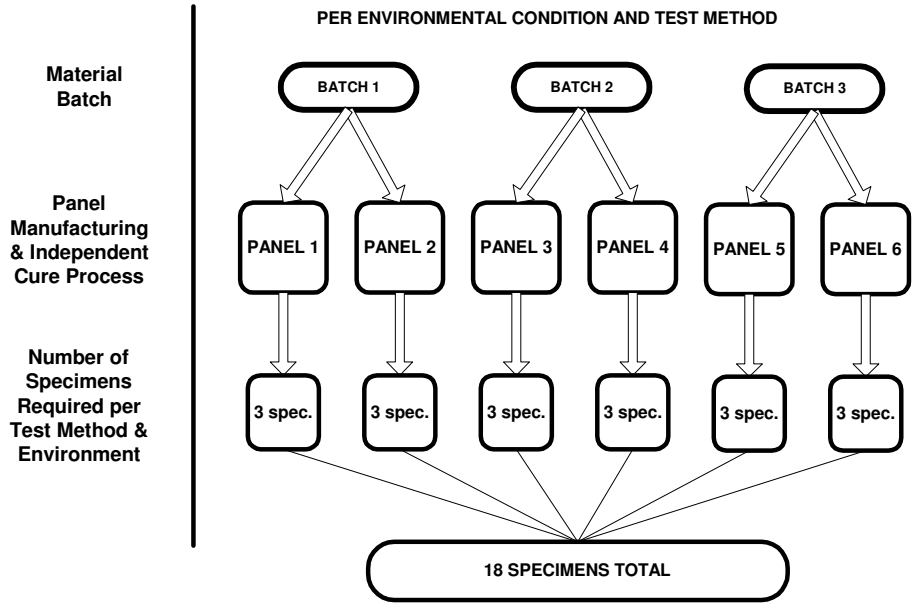


Figure 1-1: Specimen Selection Methodology

All panels were fabricated in accordance with NCAMP Process Specification NPS 81228 Cure Cycle "M."

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.

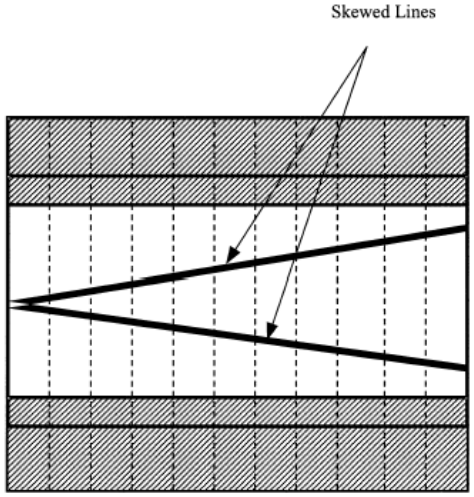


Figure 1-2: Specimen Traceability Line

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.

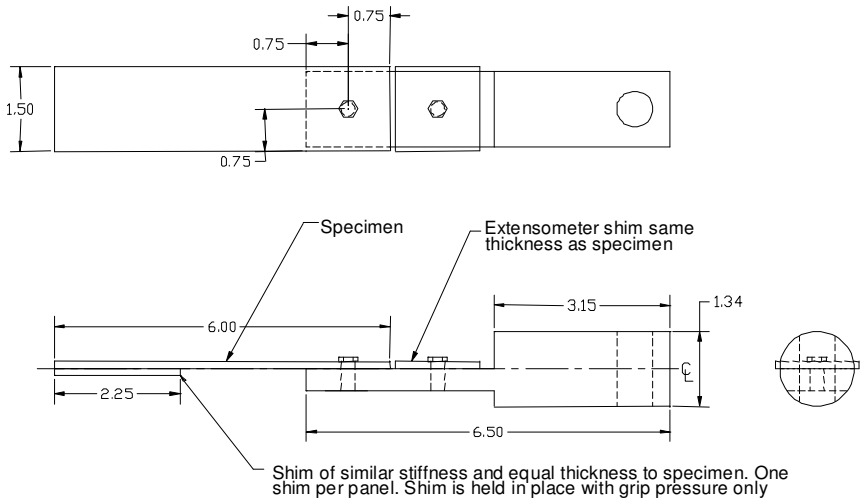


Figure 1-3: Modified ASTM D5961 (Single Shear Bearing) Specimen and Loading Arrangement

1.5.2 Specimen & Testing Details

1.5.2.1 Tabbing

Tabs were used on LT 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 MS 21084 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

The tables below show the lay-ups and test matrices used for lamina and laminate level testing.

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
$[0]_6$	ASTM D3039 0° Tension	Strength, Modulus and Poisson's Ratio	3x2x3	3x2x3		3x2x3
$[0]_{14}$	ASTM D6641 0° Compression (Note 1)	Modulus	3x2x3	3x2x3	3x2x3	3x2x3
$[90]_{11}$	ASTM D3039 90° Tension	Strength and Modulus	3x2x3	3x2x3		3x2x3
$[90]_{14}$	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
$[90/0/90]_5$	ASTM D6641 0° Compression (see Note 1 & 2)	Strength and Modulus	3x2x3	3x2x3	3x2x3	3x2x3
$[45/-45]_{3S}$	ASTM D3518 In-Plane Shear	Strength and Modulus	3x2x3	3x2x3		3x2x3
$[0]_{34}$	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]s)
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]2S	Strength & modulus	3x2x3	3x2x3	3x2x3
(10/80/10) UNT2	ASTM D3039 Un-notched Tension [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength & modulus	3x2x3	3x2x3	3x2x3
(50/40/10) UNT3	ASTM D3039 Un-notched Tension [0/45/0/90/0/-45/0/45/0/-45]S	Strength & modulus	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) UNC1	ASTM D6641 Un-notched Compression (4) [45/0/-45/90]2S	Strength & modulus		3x2x3	3x2x3
(10/80/10) UNC2	ASTM D6641 Un-notched Compression (4) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength & modulus		3x2x3	3x2x3
(50/40/10) UNC3	ASTM D6641 Un-notched Compression (4) [45/0/90/0/-45/0/45/0/-45/0]S	Strength & modulus		3x2x3	3x2x3
(25/50/25 - QI) SBS1	ASTM D2344 Short Beam (specimens may be taken from panels designed for (25/50/25 - QI) CAI1)	Strength		3x2x3	3x2x3
(25/50/25 - QI) OHT1	ASTM D5766 Open Hole Tension (1) [45/0/-45/90]2S	Strength	3x2x3	3x2x3	3x2x3
(10/80/10) OHT2	ASTM D5766 Open Hole Tension (1) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength	3x2x3	3x2x3	3x2x3
(50/40/10) OHT3	ASTM D5766 Open Hole Tension (1) [0/45/0/90/0/-45/0/45/0/-45]S	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) FHT1	ASTM D6742 Filled Hole Tension (2) [45/0/-45/90]2S	Strength	3x2x3	3x2x3	3x2x3
(10/80/10) FHT2	ASTM D6742 Filled Hole Tension (2) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength	3x2x3	3x2x3	3x2x3
(50/40/10) FHT3	ASTM D6742 Filled Hole Tension (2) [0/45/0/90/0/-45/0/45/0/-45]S	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) OHC1	ASTM D6484 Open Hole Compression (1)(4) [45/0/-45/90]3S	Strength		3x2x3	3x2x3
(10/80/10) OHC2	ASTM D6484 Open Hole Compression (1)(4) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength		3x2x3	3x2x3
(50/40/10) OHC3	ASTM D6484 Open Hole Compression (1)(4) [0/45/0/90/0/-45/0/45/0/-45]S	Strength		3x2x3	3x2x3
(25/50/25 - QI)	ASTM D6484 Filled Hole Compression (2)	Strength		3x2x3	3x2x3

FHC1	[45/0/-45/90]3S				
(10/80/10) FHC2	ASTM D6484 Filled Hole Compression (2) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength		3x2x3	3x2x3
(50/40/10) FHC3	ASTM D6484 Filled Hole Compression (2) [0/45/0/90/0/-45/0/45/0/-45]S	Strength		3x2x3	3x2x3
(25/50/25 - QI) SSB1	ASTM D5961 Single Shear Bearing (3) (6) [45/0/-45/90]2S	Strength & Deformation		3x2x3	3x2x3
(10/80/10) SSB2	ASTM D5961 Single Shear Bearing (3) (6) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength & Deformation		3x2x3	3x2x3
(50/40/10) SSB3	ASTM D5961 Single Shear Bearing (3) (6) [0/45/0/90/0/-45/0/45/0/-45]S	Strength & Deformation		3x2x3	3x2x3
(100/0/0) ILT	ASTM D6415 Interlaminar Tension [0]22	Strength	1x1x6	1x1x6	1x1x6
(25/50/25 - QI) CAI1	ASTM D7136 & D7137 Compression After Impact (1500 in.lb/in) (4) [45/0/-45/90]3S	Strength		1x1x6	

(1) Open-hole configuration: 0.25" hole diameter, 1.5 inch width.
(2) Filled-hole test configuration: 0.25" diameter, protruding head 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 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.

CTD = -65±5°F, dry
RTD = 70±10°F, room temperature dry
ETD = 250±5°F, dry
ETW = 250±5°F, wet (equilibrium moisture content)

Within each test method and test environment, the failure mode was evaluated immediately after each test by an FAA DER. 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 0.05% for three consecutive readings which are 7 ±0.5 days apart and may be expressed by:

$$\frac{W_i - W_{i-1}}{W_b} < 0.0005$$

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 three 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 2^{+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 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.

For unidirectional materials the fiber areal weight cannot be measured in advance of impregnation, hence Method I of ASTM D3171, utilizing acid digestion, will be used to verify the CPT method in accordance with note (2) of Table 1-3.

Method I Fiber Volume (%vol) is 59.716 and Method 2 Fiber Volume (%vol) is 58.733. 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 ~190 gsm. Based on the FAW data from Hexcel (Avg ~190 gsm) and our Method I Phys test data (Avg. void content ~ 0% except for a panel where it is close to 4%) it is appropriate to use the CPT Method for normalization.

The average cured ply thickness of 0.0074 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.

1.5.8 Conformity

The 3-batch qualification panels have been fabricated according to the requirements of the test plan and conformed by the FAA. The test specimens and test setups have also been conformed by the FAA.

Testing was witnessed by the FAA. Witnessing was delegated to a DER. Mechanical testing was carried out at the National Institute for Aviation Research, Wichita State University. The test setup and procedures were reviewed by NCAMP IAB and NCAMP staff during a facility audit. FAA conformity inspection records and approvals are included in the CD accompanying this report.

1.5.9 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:	Hexcel Corporation - Hexcel 8552 AS4 Unidirectional NMS 128/1 Material Specification				**Hexcel 8552 AS4 Unidirectional Tape Lamina Properties Summary**
Fiber:	AS4 Unidirectional		**Resin:**	Hexcel 8552	
Tg(dry):	400.27°F	**Tg(wet):**	321.04 °F	**Tg METHOD:**	DMA (SRM 18-94)
PROCESSING:	NPS 81228 Cure Cycle "M"				

	Lot 1	Lot 2	Lot 3		
Date of fiber manufacture	1/4/2007	12/17/2006	1/21/2007	**Date of testing**	2/11/2009 to 4/6/2010
Date of resin manufacture	2/26/2007	1/25/2007	2/21/2007	**Date of data submittal**	4/8/2010
Date of prepreg manufacture	2/26/2007	1/25/2007	2/21/2007		
Date of composite manufacture	12/1/2007 to 2/1/2007				

LAMINA MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT= 0.0074 inch)

	CTD Mean		RTD Mean		ETD Mean		ETW Mean	
	Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_1^{tu} (ksi) from LT	295.06	299.95	289.47	299.22	---	---	244.68	247.84
from UNT0	236.95	240.12	271.47	279.61	---	---	279.17	284.85
E_1^t (Msi) of LT	18.17	18.48	18.46	19.09	---	---	18.76	19.00
E (Msi) of UNT0	9.70	9.82	9.77	10.04	---	---	9.81	10.00
ν_{12}^t	---	0.275	---	0.302	---	---	---	0.366
F_2^{tu} (ksi)	---	9.73	---	9.27	---	---	---	3.49
E_2^t (Msi) of TT	---	1.50	---	1.34	---	---	---	0.81
F_1^{cu} (ksi) from UNC0	247.73	252.51	202.70	215.29	218.47	220.63	150.22	158.78
E_1^c (Msi) of LC	15.43	15.57	16.17	16.76	16.53	16.70	16.66	17.00
E (Msi) of UNC0	6.26	6.36	6.16	6.50	6.21	6.33	5.96	6.12
ν_{12}^c	---	0.335	---	0.335	---	0.348	---	0.386
F_2^{cu} (ksi) of TC	---	51.49	---	38.85	---	---	---	19.71
E_2^c (Msi) of TC	---	1.56	---	1.43	---	---	---	1.14
ν_{21}^c of TC	---	0.033	---	0.029	---	---	---	0.023
ν of UNC0	---	0.041	---	0.037	---	0.033	---	0.027
$F_{12}^{s5\%strain}$ (ksi)	---	---	---	13.28	---	---	---	5.51
$F_{12}^{s0.2\%}$ (ksi)	---	10.73	---	8.00	---	---	---	3.36
G_{12}^s (Msi)	---	0.81	---	0.70	---	---	---	0.34
SBS (ksi)	---	20.87	---	16.63	---	10.95	---	8.25

*** Derived from cross-ply using back-out factor**

Table 2-1: Lamina Summary Data

2.2 Laminate Level Test Summary

Prepreg Material:	Hexcel Corporation - Hexcel 8552 AS4 Unidirectional NMS 128/1 Material Specification				**Hexcel 8552 AS4 Unitape Laminate Properties Summary**
Fiber:	AS4 Unidirectional		**Resin**	Hexcel 8552	
Tg(dry):	400.27°F	**Tg(wet):**	321.04 °F	**Tg METHOD:**	DMA (SRM 18-94)
PROCESSING:	NPS81228 Cure Cycle "M"				

	Lot 1	Lot 2	Lot 3		
Date of fiber manufacture	1/4/2007	12/17/2006	1/21/2007	**Date of testing**	2/11/2009 to 4/6/2010
Date of resin manufacture	2/26/2007	1/25/2007	2/21/2007	**Date of data submittal**	4/8/2010
Date of prepreg manufacture	2/26/2007	1/25/2007	2/21/2007		
Date of composite manufacture		12/1/2007 to 2/1/2007			

LAMINATE MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT= .0074 inch)

	Layup:	**25/50/25**		**10/80/10**		**50/40/10**	
	Test Condition	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
OHT	**CTD**	45.05	45.27	40.06	41.21	62.56	63.95
Strength (ksi)	**RTD**	47.63	47.84	39.17	40.13	68.55	70.28
	ETW	51.68	51.79	32.08	32.55	79.07	80.38
OHC	**RTD**	47.28	47.82	40.63	41.78	62.78	64.09
Strength (ksi)	**ETW**	33.09	33.46	26.41	27.02	48.36	49.32
UNT	**CTD**	84.21	85.14	66.61	67.21	149.38	151.36
Strength (ksi)	**RTD**	88.61	90.09	63.62	64.14	152.32	154.86
	ETW	95.18	95.91	48.17	48.37	144.59	145.49
	CTD	7.03	7.11	4.72	4.76	10.53	10.67
Modulus (Msi)	**RTD**	6.96	7.08	4.53	4.57	10.55	10.73
	ETW	6.61	6.66	3.76	3.77	10.41	10.48
UNC	**RTD**	81.32	84.27	62.42	65.39	131.05	134.64
Strength (ksi)	**ETW**	62.93	64.34	45.60	46.55	88.01	89.16
Modulus (Msi)	**RTD**	6.43	6.66	4.30	4.51	9.63	9.89
	ETW	6.30	6.40	3.84	3.93	9.59	9.69
νUNC	**RTD**	--	0.300	--	0.526	--	0.430
	ETW	--	0.334	--	0.581	--	0.415
FHT	**CTD**	51.52	52.75	45.86	46.72	65.96	67.78
Strength (ksi)	**RTD**	53.35	54.62	44.08	44.65	74.02	75.29
	ETW	55.13	55.73	35.93	36.46	78.30	79.37
FHC	**RTD**	76.02	78.08	57.65	59.17	100.15	102.10
Strength (ksi)	**ETW**	54.87	56.04	38.79	39.94	74.96	76.13
LSBS	**RTD**	--	11.94	--	--	--	--
Strength (ksi)	**ETW**	--	6.81	--	--	--	--
SSB							
Ultimate Bearing	**RTD**	135.55	141.16	137.87	144.68	133.34	137.45
Strength (ksi)	**ETW**	106.12	111.96	106.52	111.46	106.28	107.63
2% offset	**RTD**	103.24	107.49	97.45	102.23	104.96	108.18
Strength (ksi)	**ETW**	97.58	102.97	83.27	87.07	85.93	87.01
ILT	**CTD**	---	8.42	---	---	---	---
Strength (ksi)	**RTD**	---	7.90	---	---	---	---
	ETW	---	4.25	---	---	---	---
CAI							
Strength (ksi)	**RTD**	25.57	25.56	---	---	---	---

Table 2-2: Laminate Summary Data

2.3 Individual Test Summaries

2.3.1 Longitudinal Tension Properties

Material:	Hexcel 8552 - AS4 UNI							**Tension, 1-axis** Gr/ Ep Hexcel 8552 - AS4 UNI [0]6	
Resin content:	33.28 % weight		**Comp. density:**	1.59 [g/cc]					
Fiber volume:	59.56 % vol								
Ply count:	6								
Test method:	ASTM D3039-00		**Modulus calculation:**	1000 to 3000 microstrain					
Normalized by:	0.0074	in. CPT							
			CTD		**RTD**		**ETW**		
Test Temperature [°F]			-65		75		250		
Moisture Conditioning			dry		dry		equilibrium		
Equilibrium at T, RH							160 F,85%		
Source code			HFUJXXXXB		HFUJXXXXA		HFUJXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	
	Mean		295.06	299.95	289.47	299.22	244.68	247.84	
	Minimum		266.88	270.95	246.92	264.86	207.98	207.75	
	Maximum		309.94	315.50	333.58	350.00	297.09	296.87	
F_1^{tu} (ksi)	**C.V.(%)**		3.88	3.96	8.76	7.98	10.36	10.65	
	No. Specimens		19		21		24		
	No. Prepreg Lots		3		3		3		
	Mean		18.17	18.48	18.46	19.09	18.76	19.00	
	Minimum		17.94	18.18	16.29	18.29	18.34	18.60	
	Maximum		18.60	18.89	19.15	20.69	19.09	19.36	
E_1^t (Msi)	**C.V.(%)**		0.91	1.16	3.28	3.07	1.03	1.20	
	No. Specimens		19		21		24		
	No. Prepreg Lots		3		3		3		
	Mean		0.275		0.302		0.366		
ν_{12}	**No. Specimens**		19		21		24		
	No. Prepreg Lots		3		3		3		

2.3.2 Transverse Tension Properties

Material:	Hexcel 8552 - AS4 UNI							**Tension, 2-axis** **Gr/ Ep** **Hexcel 8552 - AS4 UNI** **[90]11**	
Resin content:	34.03 % w eight	**Comp. density:**	1.58 [g/cc]						
Fiber volume:	58.72 % vol								
Ply count:	11								
Test method:	ASTM D3039-00	**Modulus calculation:**	1000 to 3000 microstrain						
Normalized by:	NA								
		CTD		**RTD**		**ETW**			
Test Temperature [°F]		-65		75		250			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		HFUUXXXXB		HFUUXXXXA		HFUUXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean		9.73		9.27		3.49		
	Minimum		7.99		7.29		3.14		
	Maximum		11.04		10.26		3.80		
F_2^{tu} (ksi)	**C.V.(%)**		8.39		9.47		6.11		
	No. Specimens		18		17		19		
	No. Prepreg Lots		2		2		3		
	Mean		1.50		1.34		0.81		
	Minimum		1.37		1.29		0.67		
	Maximum		1.63		1.39		0.97		
E_2^t (Msi)	**C.V.(%)**		5.38		2.56		7.39		
	No. Specimens		18		17		19		
	No. Prepreg Lots		2		2		3		

2.3.3 Longitudinal Compression Properties

Material:	Hexcel 8552 - AS4 UNI							**Compression, 1-axis** Gr/ Ep Hexcel 8552 - AS4 UNI [0]14	
Resin content:	31.14 % weight	**Comp. density** 1.60 [g/cc]							
Fiber volume:	61.76 % vol								
Ply count:	14								
Test method:	ASTM D6641-01^{E1}	**Modulus calculation:**	1000 to 3000 microstrain						
Normalized by:	0.0074	in. CPT							
		CTD		**RTD**		**ETD**		**ETW**	
Test Temperature [°F]		-65		75		250		250	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		HFULXXXXB		HFULXXXXA		HFULXXXXC		HFULXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
E_1^c (Msi)	**Mean**	15.43	15.57	16.17	16.76	16.53	16.70	16.66	17.00
	Minimum	12.44	12.75	14.32	15.29	16.30	16.43	14.84	16.22
	Maximum	18.24	18.22	17.26	17.26	17.08	17.19	17.27	17.42
	C.V.(%)	9.33	8.79	5.03	2.52	1.24	1.16	3.47	1.58
	No. Specimens	20		19		19		21	
	No. Prepreg Lots	3		3		3		3	
ν_{12}	**Mean**	0.335		0.335		0.348		0.386	
	No. Specimens	20		19		19		21	
	No. Prepreg Lots	3		3		3		3	

2.3.4 Transverse Compression Properties

Material:	Hexcel 8552 - AS4 UNI							**Compression, 2-axis** Gr/ Ep Hexcel 8552 - AS4 UNI [90]14	
Resin content:	30.95 % w eight	**Comp. density** 1.58 [g/cc]							
Fiber volume:	61.48 % vol								
Ply count:	14								
Test method:	ASTM D6641-01^{E1}	**Modulus calculation:**	1000 to 3000 microstrain						
Normalized by:	NA								
		CTD		**RTD**		**ETW**			
Test Temperature [°F]		-65		75		250			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		HFUZXXXXB		HFUZXXXXA		HFUZXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
F_2^{cu} (ksi)	**Mean**		51.49		38.85		19.71		
	Minimum		45.06		37.22		17.77		
	Maximum		56.60		40.64		22.42		
	C.V.(%)		6.25		2.35		5.94		
	No. Specimens	20		19		19			
	No. Prepreg Lots	3		3		3			
E_2^c (Msi)	**Mean**		1.56		1.43		1.14		
	Minimum		1.46		1.37		1.04		
	Maximum		1.65		1.50		1.31		
	C.V.(%)		3.55		2.94		6.59		
	No. Specimens	20		19		19			
	No. Prepreg Lots	3		3		3			
ν_{12}^c	**Mean**	0.033		0.029		0.023			
	No. Specimens	20		19		18			
	No. Prepreg Lots	3		3		3			

2.3.5 Unnotched Compression 0 Properties

Material:	Hexcel 8552 AS4 Uni Prepreg							**Unnotched Compression 0** Gr/ Ep Hexcel 8552 AS4 Uni Prepreg [90/0/90]5	
Resin content:	30.51 % weight			**Comp. density:** 1.59 [g/cc]					
Fiber volume:	62.08 % vol								
Ply count:	15								
Test method:	ASTM D6641-01^{E1}			**Modulus calculation:** 1000 to 3000 microstrain					
Normalized by:	0.0074	in. CPT							
		CTD		**RTD**		**ETD**		**ETW**	
Test Temperature [°F]		-65		75 F		250 F		250 F	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		HFURXXXXB		HFURXXXXA		HFURXXXXC		HFURXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	99.02	100.79	79.36	83.85	82.13	83.69	56.86	59.95
	Minimum	89.26	91.69	70.79	75.96	76.08	77.48	51.38	52.36
	Maximum	108.17	112.08	85.22	94.42	89.17	90.37	66.60	68.50
UNC0	**C.V.(%)**	5.99	6.09	4.57	5.54	3.87	3.89	7.38	8.35
Strength (ksi)									
	No. Specimens	15		20		18		21	
	No. Prepreg Lots	3		3		3		3	
	Mean	6.26	6.36	6.16	6.50	6.21	6.33	5.96	6.12
	Minimum	5.73	5.83	5.56	6.06	5.83	5.89	5.12	5.22
	Maximum	6.52	6.73	6.50	6.93	6.47	6.57	6.43	6.91
UNC0	**C.V.(%)**	3.18	3.46	4.02	3.45	3.87	2.77	6.57	6.54
Modulus (Msi)									
	No. Specimens	19		20		19		21	
	No. Prepreg Lots	3		3		3		3	
	Mean	0.041		0.037		0.033		0.027	
νUNC0	**No. Specimens**	19		20		19		19	
	No. Prepreg Lots	3		3		3		3	

2.3.6 Unnotched Tension 0 Properties

Material:	Hexcel 8552 - AS4 UNI							**Unnotched Tension 0** **Gr/ Ep** **Hexcel 8552 - AS4 UNI** **[0,90]2S**	
Resin content:	34.15 % w eight		**Comp. density:** 1.58 [g/cc]						
Fiber volume:	58.40 % vol								
Ply count:	8								
Test method:	ASTM D3039-00		**Modulus calculation:** 1000 to 3000 microstrain						
Normalized by:	0.0074	in. CPT							
			CTD		**RTD**		**ETW**		
Test Temperature [°F]			-65		70		250		
Moisture Conditioning			dry		dry		equilibrium		
Equilibrium at T, RH							160 F,85%		
Source code			HFUPXXXXB		HFUPXXXXA		HFUPXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	
	Mean		128.14	129.69	145.45	149.48	145.54	148.42	
	Minimum		118.40	120.40	135.40	136.34	136.89	137.12	
	Maximum		133.92	137.24	155.51	164.11	154.94	158.97	
UNT0 Strength (ksi)	**C.V.(%)**		3.18	3.28	4.13	4.52	3.07	3.61	
	No. Specimens		19		19		20		
	No. Prepreg Lots		3		3		3		
	Mean		9.70	9.82	9.77	10.04	9.81	10.00	
	Minimum		9.48	9.54	9.38	9.59	9.47	9.63	
	Maximum		10.08	10.25	10.33	11.29	10.18	10.35	
UNT0 Modulus (Msi)	**C.V.(%)**		1.53	1.62	2.58	3.96	1.88	1.80	
	No. Specimens		19		19		20		
	No. Prepreg Lots		3		3		3		

2.3.7 In-Plane Shear Properties

Material:	Hexcel 8552 - AS4 UNI							**In-Plane Shear** Gr/ Ep Hexcel 8552 - AS4 UNI [45/-45]3s	
Resin content:	33.72 % w eight	**Comp. density:**	1.58 [g/cc]						
Fiber volume:	58.85 % vol								
Ply count:	12								
Test method:	ASTM D3518-94								
		Modulus calculation:	2000 to 6000 microstrain						
Normalized by:	N/A								
		CTD		**RTD**		**ETW**			
Test Temperature [°F]		-65		75		250			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		HFUNXXXXB		HFUNXXXXA		HFUNXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean				13.28		5.51		
	Minimum				12.51		5.04		
	Maximum				13.95		6.13		
$F_{12}^{s5\% \text{ strain}}$ (ksi)	**C.V.(%)**				2.74		6.48		
	No. Specimens			16		19			
	No. Prepreg Lots			3		3			
	Mean		10.73		8.00		3.36		
	Minimum		10.35		7.63		3.19		
	Maximum		11.68		8.53		3.73		
$F_{12}^{s0.2\%}$ (ksi)	**C.V.(%)**		3.43		2.98		4.49		
	No. Specimens	20		22		19			
	No. Prepreg Lots	3		3		3			
	Mean		0.81		0.70		0.34		
	Minimum		0.79		0.66		0.32		
	Maximum		0.85		0.75		0.39		
G_{12}^{s} (Msi)	**C.V.(%)**		2.37		3.41		5.03		
	No. Specimens	20		22		19			
	No. Prepreg Lots	3		3		3			

Note: ALL CTD SPECIMENS FAILED BEFORE IT REACHED 5% STRAIN.

2.3.8 Lamina Short Beam Strength Properties

Material:	Hexcel 8552 - AS4 UNI							**Short Beam Strength** Gr/ Ep Hexcel 8552 - AS4 UNI [0]34	
Resin content:	35.65 % weight		**Comp. density** 1.58 [g/cc]						
Fiber volume:	57.08 % vol								
Ply count:	34								
Test method:	ASTM D2344-00^{E1}								
Normalized by:	NA								
		CTD		**RTD**		**ETD**		**ETW**	
Test Temperature [°F]		-65		70		250		250	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		HFUQXXXXB		HFUQXXXXA		HFUQXXXXC		HFUQXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		20.87		16.63		10.95		8.25
	Minimum		19.61		16.12		10.60		7.65
	Maximum		21.87		17.06		11.68		8.60
SBS	**C.V.(%)**		2.82		1.68		2.50		3.52
Strength (ksi)									
	No. Specimens	24		19		19		19	
	No. Prepreg Lots	3		3		3		3	

2.3.9 Unnotched Tension 1 Properties

Material:	Hexcel 8552 - AS4 UNI						
Resin content:	35.33 % weight	**Comp. density:** 1.57 [g/cc]					
Fiber volume:	57.13 % vol						
Ply count:	16						
Test method:	ASTM D3039-00	**Modulus calculation: 1000 to 3000 microstrain**					
Normalized by:	0.0074	in. CPT					

Unnotched Tension 1
Gr/ Ep
Hexcel 8552 - AS4 UNI
[45/0/-45/90]2s

		CTD		RTD		ETW	
Test Temperature [°F]		-65		70		250	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFUAXXXXB		HFUAXXXXA		HFUAXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	84.21	85.14	88.61	90.09	95.18	95.91
	Minimum	80.88	81.70	81.73	83.50	87.53	88.21
	Maximum	88.20	89.81	96.39	96.03	99.96	100.76
UNT1 Strength (ksi)	**C.V.(%)**	2.24	2.33	4.91	4.17	3.80	3.80
	No. Specimens	19		19		20	
	No. Prepreg Lots	3		3		3	
	Mean	7.03	7.11	6.96	7.08	6.61	6.66
	Minimum	6.82	6.91	6.69	6.85	6.30	6.35
	Maximum	7.34	7.43	7.16	7.53	7.01	6.99
UNT1 Modulus (Msi)	**C.V.(%)**	2.02	2.16	1.76	2.56	2.80	2.53
	No. Specimens	19		19		20	
	No. Prepreg Lots	3		3		3	

2.3.10 Unnotched Tension 2 Properties

Material:	Hexcel 8552 - AS4 UNI					**Unnotched Tension 2** **Gr/ Ep** **Hexcel 8552 - AS4 UNI** **[45/-45/0/45/-45/90/45/-45/45/-45]s**	
Resin content:	35.58 % w eight		**Comp. density:** 1.57 [g/cc]				
Fiber volume:	56.94 % vol						
Ply count:	20						
Test method:	ASTM D3039-00		**Modulus calculation:** 1000 to 3000 microstrain				
Normalized by:	0.0074	in. CPT					
			CTD		**RTD**		**ETW**	
Test Temperature [°F]			-65		75		250	
Moisture Conditioning			dry		dry		equilibrium	
Equilibrium at T, RH							160 F,85%	
Source code			HFUBXXXXB		HFUBXXXXA		HFUBXXXXD	
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		66.61	67.21	63.62	64.14	48.17	48.37
	Minimum		61.11	62.36	61.25	62.78	43.93	43.13
	Maximum		69.66	69.84	65.91	66.24	50.26	50.51
UNT2 Strength (ksi)	**C.V.(%)**		3.00	2.54	1.95	1.57	3.79	3.96
	No. Specimens		19		19		19	
	No. Prepreg Lots		3		3		3	
	Mean		4.72	4.76	4.53	4.57	3.76	3.77
	Minimum		4.59	4.58	4.32	4.43	3.47	3.45
	Maximum		4.86	4.93	4.69	4.72	3.90	3.92
UNT2 Modulus (Msi)	**C.V.(%)**		1.93	1.98	2.10	1.99	3.15	3.10
	No. Specimens		19		19		19	
	No. Prepreg Lots		3		3		3	

2.3.11 Unnotched Tension 3 Properties

Material: Hexcel 8552 - AS4 UNI

Unnotched Tension 3
Gr/ Ep
Hexcel 8552 - AS4 UNI
[0/45/0/90/0/-45/0/45/0/-45]s

Resin content: 35.65 % weight **Comp. density:** 1.57 [g/cc]
Fiber volume: 56.86 % vol
Ply count: 20

Test method: ASTM D3039-00 **Modulus calculation:** 1000 to 3000 microstrain

Normalized by: 0.0074 in. CPT

		CTD		RTD		ETW	
Test Temperature [°F]		-65		70		250	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFUCXXXXB		HFUCXXXXA		HFUCXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
UNT3 Strength (ksi)	**Mean**	149.38	151.36	152.32	154.86	144.59	145.49
	Minimum	138.21	144.34	138.75	140.06	134.44	134.96
	Maximum	158.16	162.75	161.42	163.00	155.38	155.70
	C.V.(%)	2.81	2.73	3.82	3.11	3.29	3.29
	No. Specimens	21		38		19	
	No. Prepreg Lots	3		3		3	
UNT3 Modulus (Msi)	**Mean**	10.53	10.67	10.55	10.73	10.41	10.48
	Minimum	10.26	10.36	9.92	10.44	10.17	10.27
	Maximum	11.08	11.29	11.62	12.60	10.78	10.82
	C.V.(%)	1.82	1.99	2.66	3.27	1.72	1.54
	No. Specimens	21		39		20	
	No. Prepreg Lots	3		3		3	

2.3.12 Unnotched Compression 1 Properties

Material:	Hexcel 8552 - AS4 UNI					**Unnotched Compression 1**	
						Gr/ Ep	
Resin content:	34.42 % weight		**Comp. density:**	1.59 [g/cc]		Hexcel 8552 - AS4 UNI	
Fiber volume:	58.42 % vol					**[45/0/-45/90]2S**	
Ply count:	16						
Test method:	ASTM D6641-01^{E1}		**Modulus calculatio**	1000 to 3000 microstrain			
Normalized by:	0.0074	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			75 F		250 F		
Moisture Conditioning					equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFUWXXXXA		HFUWXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	
	Mean		81.32	84.27	62.93	64.34	
	Minimum		68.96	75.75	55.29	56.80	
	Maximum		93.16	96.41	71.96	74.12	
UNC1	**C.V.(%)**		7.22	5.89	7.95	7.50	
Strength (ksi)							
	No. Specimens		19		23		
	No. Prepreg Lots		3		3		
	Mean		6.43	6.66	6.30	6.40	
	Minimum		5.85	6.20	5.98	6.14	
	Maximum		6.97	7.33	6.69	6.72	
UNC1	**C.V.(%)**		4.32	3.57	2.93	2.68	
Modulus (Msi)							
	No. Specimens		19		19		
	No. Prepreg Lots		3		3		
	Mean		0.300		0.334		
νUNC1	**No. Specimens**		19		18		
	No. Prepreg Lots		3		3		

2.3.13 Unnotched Compression 2 Properties

Material:	Hexcel 8552 - AS4 UNI					**Unnotched Compression 2**	
Resin content:	35.17 % weight		**Comp. density:** 1.58 [g/cc]			**Gr/ Ep**	
Fiber volume:	57.64 % vol					Hexcel 8552 - AS4 UNI	
Ply count:	20					**[45/-45/0/45/-45/90/45/-45/45/-45]s**	
Test method:	ASTM D6641-01^{E1}		**Modulus calculation:**		1000 to 3000 microstrain		
Normalized by:	0.0074	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			75 F		250 F		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFUXXXXXA		HFUXXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	
	Mean		62.42	65.39	45.60	46.55	
	Minimum		55.87	59.18	42.20	42.76	
	Maximum		65.53	69.42	51.58	53.58	
UNC2 Strength (ksi)	**C.V.(%)**		4.17	4.58	5.46	5.97	
	No. Specimens		19		22		
	No. Prepreg Lots		3		3		
	Mean		4.30	4.51	3.84	3.93	
	Minimum		4.03	4.14	3.67	3.71	
	Maximum		4.49	4.72	4.01	4.11	
UNC2 Modulus (Msi)	**C.V.(%)**		3.08	3.05	2.69	2.69	
	No. Specimens		19		19		
	No. Prepreg Lots		3		3		
	Mean		0.526		0.581		
νUNC2	**No. Specimens**		19		19		
	No. Prepreg Lots		3		3		

2.3.14 Unnotched Compression 3 Properties

Material:	Hexcel 8552 - AS4 UNI					**Unnotched Compression 3** Gr/ Ep Hexcel 8552 - AS4 UNI **[45/0/90/0/-45/0/45/0/-45/0]s**	
Resin content:	34.96 % w eight		**Comp. density:** 1.58 [g/cc]				
Fiber volume:	57.57 % vol						
Ply count:	20						
Test method:	ASTM D6641-01^{E1}		**Modulus calculation:**		1000 to 3000 microstrain		
Normalized by:	0.0074	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			70 F		250 F		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFUYXXXXA		HFUYXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	
	Mean		131.05	134.64	88.01	89.16	
	Minimum		123.68	124.11	78.03	78.81	
	Maximum		140.28	146.13	102.09	101.71	
UNC3	**C.V.(%)**		3.79	4.54	6.86	6.46	
Strength (ksi)							
	No. Specimens		19		21		
	No. Prepreg Lots		3		3		
	Mean		9.63	9.89	9.59	9.69	
	Minimum		9.04	9.60	9.14	9.31	
	Maximum		9.98	10.52	10.02	10.03	
UNC3	**C.V.(%)**		2.71	2.32	1.98	1.86	
Modulus (Msi)							
	No. Specimens		19		19		
	No. Prepreg Lots		3		3		
	Mean		0.430		0.415		
νUNC3	**No. Specimens**		19		19		
	No. Prepreg Lots		3		3		

2.3.15 Laminate Short Beam Strength Properties

Material:	Hexcel 8552 - AS4 UNI					**Laminate Short Beam Strength** **Gr/ Ep** **Hexcel 8552 - AS4 UNI** **[45/0/-45/90]3s**	
Resin content:	See FHC1	**Comp. density:** See FHC1					
Fiber volume:	See FHC1						
Ply count:	24						
Test method:	ASTM D2344-00^{E1}						
Normalized by:	NA						
		RTD		**ETW**			
Test Temperature [°F]		70 F		250 F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFUqXXXXA		HFUqXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**		
	Mean		11.94		6.81		
	Minimum		10.52		6.49		
	Maximum		12.97		7.13		
LSBS (ksi)	**C.V.(%)**		5.69		3.06		
	No. Specimens	19		19			
	No. Prepreg Lots	3		3			

2.3.16 Open Hole Tension 1 Properties

Material:	Hexcel 8552 - AS4 UNI							**Open Hole Tension 1** Gr/ Ep Hexcel 8552 - AS4 UNI [45/0/-45/90]2S	
Resin content:	35.79 % weight		**Comp. density** 1.57 [g/cc]						
Fiber volume:	56.76 % vol								
Ply count:	16								
Test method:	ASTM D5766-02a								
Normalized by:	0.0074	in. CPT							
			CTD		**RTD**		**ETW**		
Test Temperature [°F]			-65		75		250		
Moisture Conditioning			dry		dry		equilibrium		
Equilibrium at T, RH							160 F,85%		
Source code			HFUDXXXXB		HFUDXXXXA		HFUDXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	
	Mean		45.05	45.27	47.63	47.84	51.68	51.79	
	Minimum		41.95	43.34	44.91	44.86	49.09	48.62	
	Maximum		46.87	47.29	49.64	49.85	57.02	56.81	
OHT1	**C.V.(%)**		2.74	2.76	2.79	3.04	3.26	3.48	
Strength (ksi)									
	No. Specimens		20		19		22		
	No. Prepreg Lots		3		3		3		

2.3.17 Open Hole Tension 2 Properties

Material:	Hexcel 8552 - AS4 UNI							**Open Hole Tension 2**	
								Gr/ Ep	
Resin content:	32.84 % w eight		**Comp. density:**	1.59 [g/cc]				Hexcel 8552 - AS4 UNI	
Fiber volume:	59.87 % vol							**[45/-45/0/45/-45/90/45/-45/45/-45]s**	
Ply count:	20								
Test method:	ASTM D5766-02a								
Normalized by:	0.0074	in. CPT							
			CTD		**RTD**		**ETW**		
Test Temperature [°F]			-65		70		250		
Moisture Conditioning			dry		dry		equilibrium		
Equilibrium at T, RH							160 F,85%		
Source code			HFUEXXXXB		HFUEXXXXA		HFUEXXXXD		
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	40.06	41.21	39.17	40.13	32.08	32.55		
	Minimum	38.03	40.30	37.64	38.57	31.30	31.55		
	Maximum	41.51	42.45	40.69	41.00	33.38	33.61		
OHT2	**C.V.(%)**	2.02	1.67	2.16	1.48	1.69	1.81		
Strength (ksi)									
	No. Specimens		19		18		22		
	No. Prepreg Lots		3		3		3		

2.3.18 Open Hole Tension 3 Properties

Material:	Hexcel 8552 - AS4 UNI							**Open Hole Tension 3** **Gr/ Ep** Hexcel 8552 - AS4 UNI **[0/45/0/90/0/-45/0/45/0/-45]S**	
Resin content:	32.30 % w eight		**Comp. density** 1.58 [g/cc]						
Fiber volume:	60.24 % vol								
Ply count:	20								
Test method:	ASTM D5766-02a								
Normalized by:	0.0074	in. CPT							
			CTD		**RTD**		**ETW**		
Test Temperature [°F]			-65		75		250		
Moisture Conditioning			dry		dry		equilibrium		
Equilibrium at T, RH							160 F,85%		
Source code			HFUFXXXXB		HFUFXXXXA		HFUFXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		62.56	63.95	68.55	70.28	79.07	80.38		
	Minimum		58.33	59.60	63.42	66.04	73.42	75.00		
	Maximum		66.78	67.21	73.31	76.53	83.51	84.43		
OHT3	**C.V.(%)**		3.92	3.87	4.50	4.09	3.27	3.06		
Strength (ksi)										
	No. Specimens		19		19		22			
	No. Prepreg Lots		3		3		3			

2.3.19 Filled-Hole Tension 1 Properties

Material:	Hexcel 8552 - AS4 UNI					**Filled Hole Tension 1** Gr/ Ep Hexcel 8552 - AS4 UNI [45/0/-45/90]2S	
Resin content:	34.29 % weight		**Comp. density:** 1.58 [g/cc]				
Fiber volume:	58.38 % vol						
Ply count:	16						
Test method:	ASTM D6742-02						
Normalized by:	0.0074	in. CPT					
			CTD		**RTD**		**ETW**
Test Temperature [°F]			-65		70		250
Moisture Conditioning			dry		dry		equilibrium
Equilibrium at T, RH							160 F,85%
Source code			HFU4XXXXB		HFU4XXXXA		HFU4XXXXD
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		51.52	52.75	53.35	54.62	55.13	55.73
	Minimum		47.83	49.50	50.62	51.22	52.91	53.83
	Maximum		55.12	56.62	56.23	57.50	59.02	60.38
FHT1	**C.V.(%)**		3.70	3.96	3.08	3.02	2.97	3.11
Strength (ksi)								
	No. Specimens		19		19		19	
	No. Prepreg Lots		3		3		3	

2.3.20 Filled-Hole Tension 2 Properties

Material:	Hexcel 8552 - AS4 UNI					**Filled Hole Tension 2** Gr/ Ep Hexcel 8552 - AS4 UNI [45/-45/0/45/-45/90/45/-45/45/-45]S	
Resin content:	33.84 % weight		**Comp. density:** 1.58 g/cc				
Fiber volume:	58.86 % vol						
Ply count:	20						
Test method:	ASTM D6742-02						
Normalized by:	0.0074	in. CPT					
			CTD		**RTD**		**ETW**	
Test Temperature [°F]			-65		75		250	
Moisture Conditioning			dry		dry		equilibrium	
Equilibrium at T, RH							160 F,85%	
Source code			HFU5XXXXB		HFU5XXXXA		HFU5XXXXD	
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		45.86	46.72	44.08	44.65	35.93	36.46
	Minimum		44.35	45.44	42.57	43.41	34.36	34.98
	Maximum		47.28	47.96	46.62	46.70	36.77	37.43
FHT2 Strength (ksi)	**C.V.(%)**		1.86	1.41	2.29	1.91	1.92	1.89
	No. Specimens		19		18		20	
	No. Prepreg Lots		3		3		3	

2.3.21 Filled-Hole Tension 3 Properties

Material:	Hexcel 8552 - AS4 UNI					**Filled Hole Tension 3**	
						Gr/ Ep	
Resin content:	32.69 % weight		**Comp. density:** 1.58 [g/cc]			Hexcel 8552 - AS4 UNI	
Fiber volume:	59.80 % vol					**[0/45/0/90/0/-45/0/45/0/-45]S**	
Ply count:	20						
Test method:	ASTM D6742-02						
Normalized by:	0.0074	in. CPT					
		CTD		**RTD**		**ETW**	
Test Temperature [°F]		-65		70		250	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFU6XXXXB		HFU6XXXXA		HFU6XXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	65.96	67.78	74.02	75.29	78.30	79.37
	Minimum	59.07	62.20	69.21	69.81	75.02	75.93
	Maximum	69.46	72.05	79.63	79.83	81.30	82.71
FHT3 Strength (ksi)	**C.V.(%)**	4.04	3.68	3.98	3.58	2.12	2.19
	No. Specimens	19		19		19	
	No. Prepreg Lots	3		3		3	

2.3.22 Open Hole Compression 1 Properties

Material:	Hexcel 8552 - AS4 UNI					**Open Hole Compression 1** **Gr/ Ep** **Hexcel 8552 - AS4 UNI** **[45/0/-45/90]3s**	
Resin content:	35.58 % w eight	**Comp. density**	1.57 [g/cc]				
Fiber volume:	56.95 % vol						
Ply count:	24						
Test method:	ASTM D6484-04						
Normalized by:	0.0074	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			75		250		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFUGXXXXA		HFUGXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	
	Mean		47.28	47.82	33.09	33.46	
	Minimum		45.95	46.63	31.72	32.05	
	Maximum		48.61	49.72	34.61	35.52	
OHC1	**C.V.(%)**		1.72	2.00	2.19	2.91	
Strength (ksi)							
	No. Specimens		19		21		
	No. Prepreg Lots		3		3		

2.3.23 Open Hole Compression 2 Properties

Material:	Hexcel 8552 - AS4 UNI			**Open Hole Compression 2**			
				Gr/ Ep			
Resin content:	32.90 % w eight	**Comp. density**	1.58 [g/cc]	Hexcel 8552 - AS4 UNI			
Fiber volume:	59.72 % vol			**[45/-45/0/45/-45/90/45/-45/45/-45]s**			
Ply count:	20						
Test method:	ASTM D6484-04						
Normalized by:	0.0074	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			70		250		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFUHXXXXA		HFUHXXXXD		
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	40.63	41.78	26.41	27.02		
	Minimum	35.78	39.03	23.56	25.11		
	Maximum	43.23	43.67	28.26	28.67		
OHC2	**C.V.(%)**	5.17	3.70	4.63	3.43		
Strength (ksi)							
	No. Specimens	19		19			
	No. Prepreg Lots	3		3			

2.3.24 Open Hole Compression 3 Properties

Material:	Hexcel 8552 - AS4 UNI			**Open Hole Compression 3**			
				Gr/ Ep			
Resin content:	33.75 % w eight	**Comp. density**	1.58 [g/cc]	Hexcel 8552 - AS4 UNI			
Fiber volume:	58.82 % vol			**[0/45/0/90/0/-45/0/45/0/-45]S**			
Ply count:	20						
Test method:	ASTM D6484-04						
Normalized by:	0.0074	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			70		250		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFUIXXXXA		HFUIXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		62.78	64.09	48.36	49.32		
	Minimum		58.95	60.88	44.01	45.73		
	Maximum		67.17	67.57	54.31	54.11		
OHC3 Strength (ksi)	**C.V.(%)**		3.73	3.51	5.70	4.97		
	No. Specimens		19		19			
	No. Prepreg Lots		3		3			

2.3.25 Filled-Hole Compression 1 Properties

Material:	Hexcel 8552-AS4 Uni					**Filled Hole Compression 1** Gr/ Ep HEXCEL 8552-AS4 UNI [45/0/-45/90]3S	
Resin content:	33.43 % weight	**Comp. density:**	1.59 [g/cc]				
Fiber volume:	59.29 % vol						
Ply count:	24						
Test method:	ASTM D6742-02						
Normalized by:	0.0074	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			75		250		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFU7XXXXA		HFU7XXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		76.02	78.08	54.87	56.04		
	Minimum		70.91	72.19	50.76	53.81		
	Maximum		84.08	84.80	59.33	60.79		
FHC1 Strength (ksi)	**C.V.(%)**		4.05	3.92	3.85	3.21		
	No. Specimens		19		19			
	No. Prepreg Lots		3		3			

2.3.26 Filled-Hole Compression 2 Properties

Material:	Hexcel 8552-AS4 Unidirectional					**Filled Hole Compression 2** Gr/ Ep HEXCEL8552 AS4 UNI [45/-45,0,45,-45/90/45/-45/45/-45]s	
Resin content:	31.86 % w eight	**Comp. density:**	1.59 [g/cc]				
Fiber volume:	60.74 % vol						
Ply count:	20						
Test method:	ASTM D6742-02						
Normalized by:	0.0074	in. CPT					
		RTD		**ETW**			
Test Temperature [°F]		75		250			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFU8XXXXA		HFU8XXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	57.65	59.17	38.79	39.94		
	Minimum	54.48	55.59	34.86	35.94		
	Maximum	61.24	64.33	42.45	44.19		
FHC2	**C.V.(%)**	3.17	3.37	5.27	5.58		
Strength (ksi)							
	No. Specimens	20		19			
	No. Prepreg Lots	3		3			

2.3.27 Filled-Hole Compression 3 Properties

Material:	HEXCEL 8552-AS4 Uni			**Filled Hole Compression 3** Gr/ Ep HEXCEL 8552-AS4 Uni [0/45/0/90/0/-45/0/45/0/-45]s			
Resin content:	32.34 % weight	**Comp. density:**	1.58 [g/cc]				
Fiber volume:	60.20 % vol						
Ply count:	20						
Test method:	ASTM D6742-02						
Normalized by:	0.0074	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			70		250		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFU9XXXXA		HFU9XXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		100.15	102.10	74.96	76.13		
	Minimum		87.32	88.21	66.06	67.10		
	Maximum		110.13	111.66	82.26	83.52		
FHC3 Strength (ksi)	**C.V.(%)**		4.61	4.53	6.39	6.16		
	No. Specimens		20		19			
	No. Prepreg Lots		3		3			

2.3.28 Single Shear Bearing 1 Properties

Material:	Hexcel 8552 - AS4 UNI			**Single Shear Bearing 1**	
				Gr/ Ep	
Resin content:	35.66 % w eight	**Comp. density:** 1.58 [g/cc]		Hexcel 8552 - AS4 UNI	
Fiber volume:	57.01 % vol			**[45/0/-45/90]2S**	
Ply count:	16				
Test method:	ASTM D5961-05				
Normalized by:	0.0074				
		RTD		**ETW**	
Test Temperature [°F]		75		250	
Moisture Conditioning		dry		equilibrium	
Equilibrium at T, RH				160 F,85%	
Source code		HFU1XXXXA		HFU1XXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**
	Mean	135.55	141.16	106.12	111.96
	Minimum	124.34	131.45	99.20	101.48
	Maximum	147.83	148.76	120.12	123.77
SSB1	**C.V.(%)**	4.95	3.92	5.39	5.26
Ultimate Bearing Strength					
(ksi)	**No. Specimens**	19		20	
	No. Prepreg Lots	3		3	
	Mean	103.24	107.49	97.58	102.97
	Minimum	91.82	96.98	84.04	89.12
	Maximum	121.01	126.85	109.47	123.46
SSB1	**C.V.(%)**	7.34	6.34	7.80	8.08
2% offset Strength					
(ksi)	**No. Specimens**	19		20	
	No. Prepreg Lots	3		3	

Physical testing results only available from one batch and cure cycle.

2.3.29 Single Shear Bearing 2 Properties

Material:	Hexcel 8552 - AS4 UNI					**Single Shear Bearing 2** **Gr/ Ep** Hexcel 8552 - AS4 UNI **[45/-45/0/45/-45/90/45/-45/45/-45]S**
Resin content:	34.63 % w eight	**Comp. density:** 1.58 [g/cc]				
Fiber volume:	58.09 % vol					
Ply count:	20					
Test method:	ASTM D5961-05					
Normalized by:	0.0074					
		RTD		**ETW**		
Test Temperature [°F]		75		250		
Moisture Conditioning		dry		equilibrium		
Equilibrium at T, RH				160 F,85%		
Source code		HFU2XXXXA		HFU2XXXXD		
		Normalized	**Measured**	**Normalized**	**Measured**	
	Mean	137.87	144.68	106.52	111.46	
	Minimum	127.02	130.19	97.27	102.64	
	Maximum	147.58	153.64	112.76	122.50	
SSB2	**C.V.(%)**	3.81	3.74	4.45	4.68	
Ultimate Bearing Strength						
(ksi)	**No. Specimens**	19		25		
	No. Prepreg Lots	3		3		
	Mean	97.45	102.23	83.27	87.07	
	Minimum	85.54	93.76	63.81	68.50	
	Maximum	105.66	108.20	98.60	103.45	
SSB2	**C.V.(%)**	5.17	4.32	10.43	9.88	
2% offset Strength						
(ksi)	**No. Specimens**	19		25		
	No. Prepreg Lots	3		3		

2.3.30 Single Shear Bearing 3 Properties

Material:	Hexcel 8552 - AS4 UNI					**Single Shear Bearing 3** Gr/ Ep Hexcel 8552 - AS4 UNI **[0/45/0/90/0/-45/0/45/0/-45]S**	
Resin content:	34.54 % weight	**Comp. density:** 1.58 [g/cc]					
Fiber volume:	58.06 % vol						
Ply count:	20						
Test method:	ASTM D5961-05						
Normalized by:	0.0074						
		RTD		**ETW**			
Test Temperature [°F]		75		250			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFU3XXXXA		HFU3XXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**		
	Mean	133.34	137.45	106.28	107.63		
	Minimum	114.38	117.48	99.42	99.81		
	Maximum	140.51	146.84	116.83	118.00		
SSB3	**C.V.(%)**	5.23	5.78	4.53	4.56		
Ultimate Bearing Strength							
(ksi)	**No. Specimens**	19		22			
	No. Prepreg Lots	3		3			
	Mean	104.96	108.18	85.93	87.01		
	Minimum	89.52	91.34	66.59	67.20		
	Maximum	113.05	117.56	93.59	95.99		
SSB3	**C.V.(%)**	6.00	6.19	7.89	7.78		
2% offset Strength							
(ksi)	**No. Specimens**	19		22			
	No. Prepreg Lots	3		3			

2.3.31 Compression After Impact Properties

Material:	Hexcel 8552-AS4 Unidirectional					**Compression After Impact** Gr/ Ep Hexcel 8552-AS4 Uni [45,0,-45,90]3s	
Resin content:	35.92 % w eight		**Comp. density:**	1.57 [g/cc]			
Fiber volume:	56.69 % vol						
Ply count:	24						
Test method:	ASTM D7136 & D7137						
Normalized by:	0.0074	in. CPT					
			RTD				
Test Temperature [°F]			75				
Moisture Conditioning			dry				
Equilibrium at T, RH							
Source code			HFUKXXXXA				
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	25.57	25.56				
	Minimum	25.08	24.83				
	Maximum	26.26	26.39				
CAI	**C.V.(%)**	1.57	2.05				
Strength (ksi)							
	No. Specimens		7				
	No. Prepreg Lots		1				

2.3.32 Interlaminar Tension Properties

Material:	Hexcel 8552 - AS4 UNI			**Interlaminar Tension**	
				Gr/ Ep	
Resin content:	36.80 % w eight	**Comp. density:**	1.58 [g/cc]	Hexcel 8552 - AS4 UNI	
Fiber volume:	56.15 % vol			**[0]22**	
Ply count:	22				
Test method:	ASTM D6415-99^{E1}				
Normalized by:	NA				

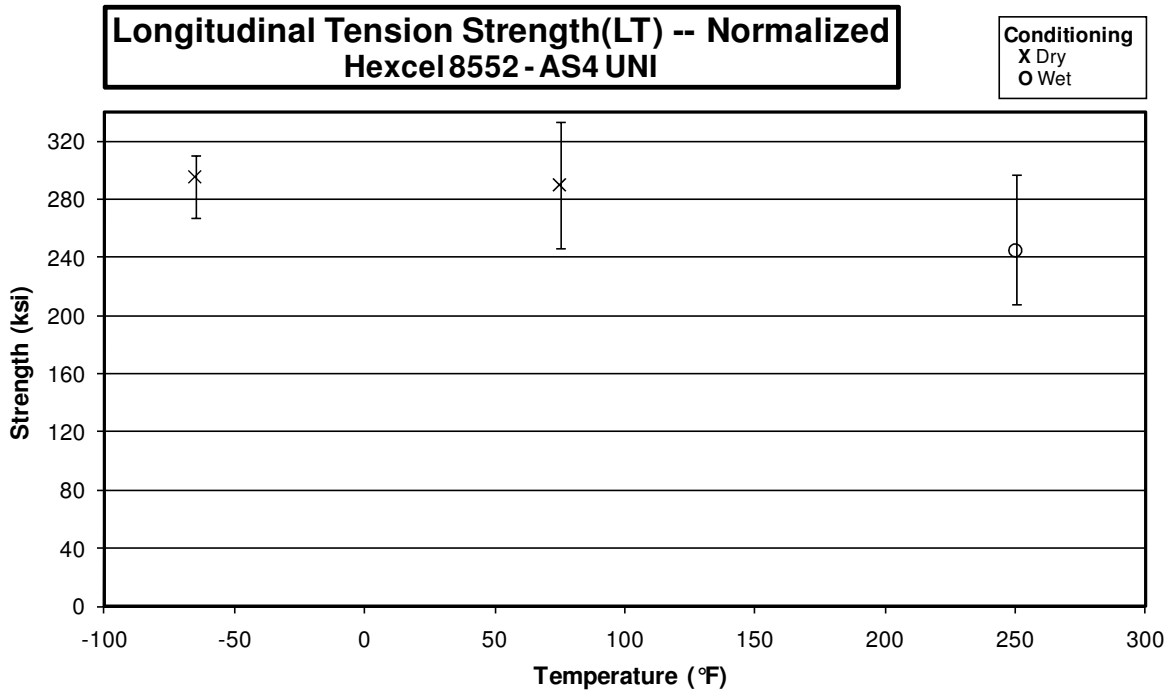
		CTD		RTD		ETW	
Test Temperature [°F]		-65		75		250	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFUMXXXXB		HFUMXXXXA		HFUMXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**		
	Mean		8.42		7.90		4.25
	Minimum		6.38		5.49		3.81
	Maximum		12.13		11.47		5.02
ILT	**C.V.(%)**		23.35		25.49		12.21
Strength (ksi)							
	No. Specimens	8		6		6	
	No. Prepreg Lots	1		1		1	

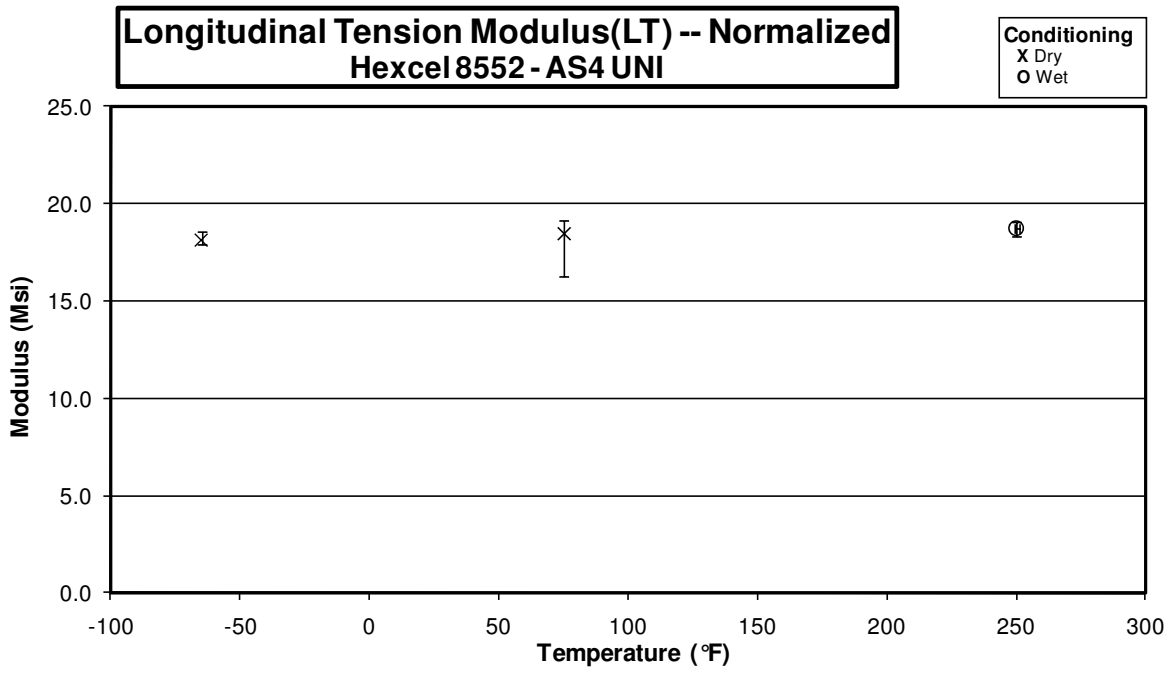
Physical testing w as not conducted on ILT

3. Individual Test Charts

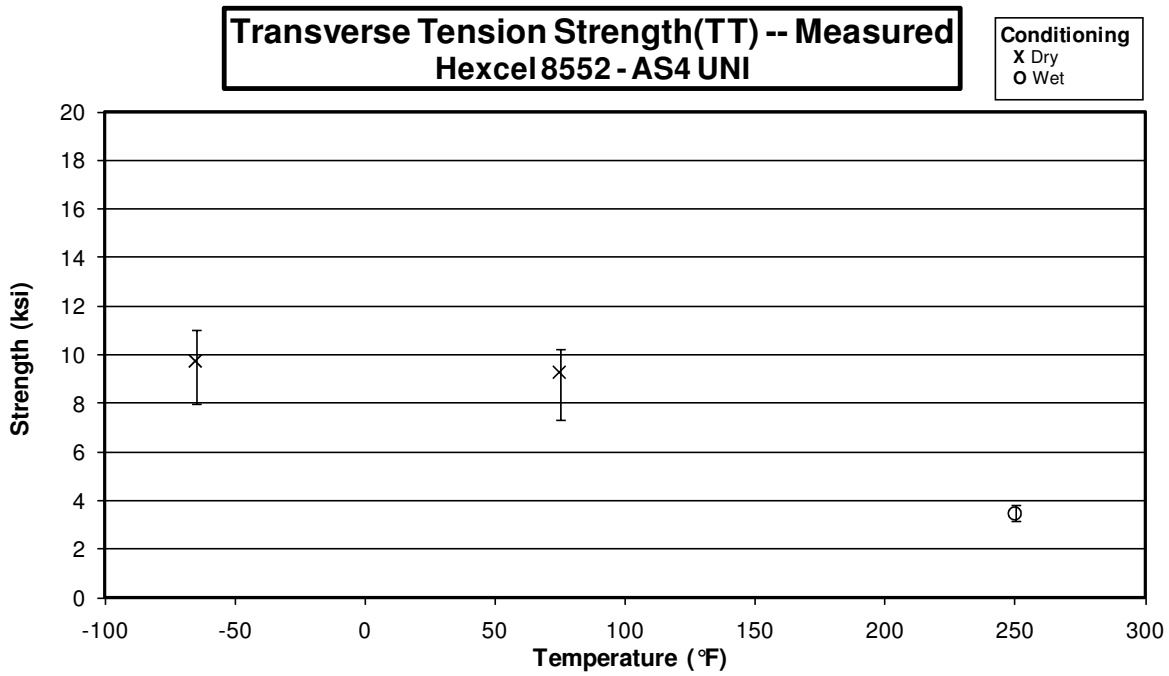
These charts combine all three batches of data and plot the minimum and maximum modulus and strength range based on the test temperature.

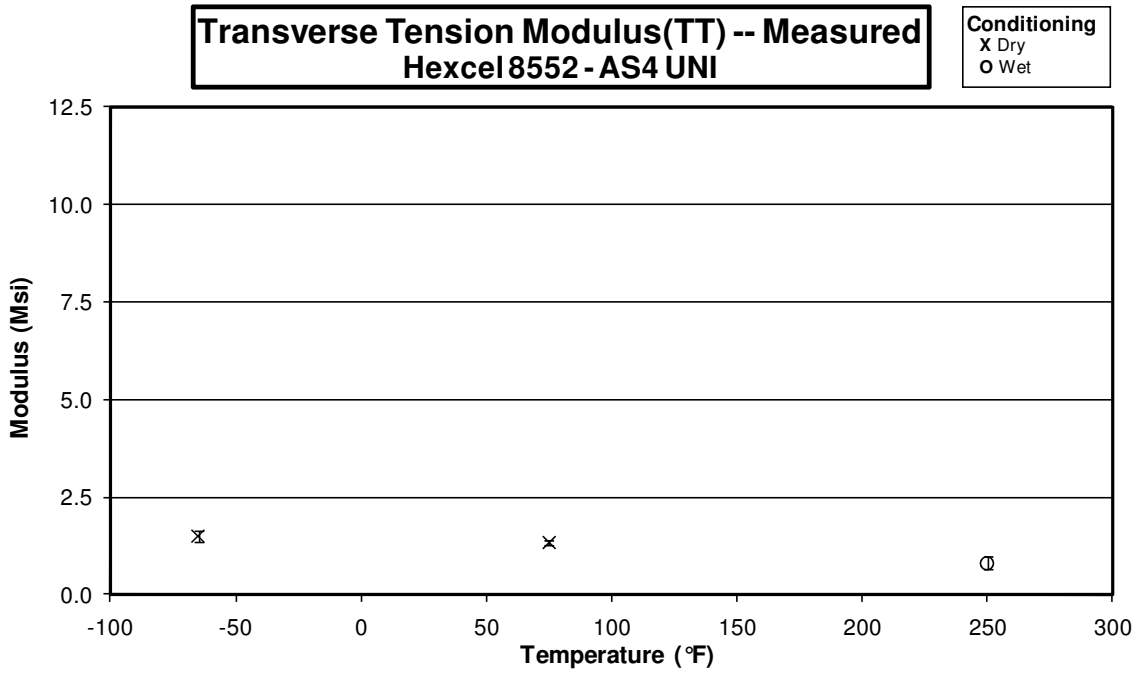
3.1 Longitudinal Tension Properties



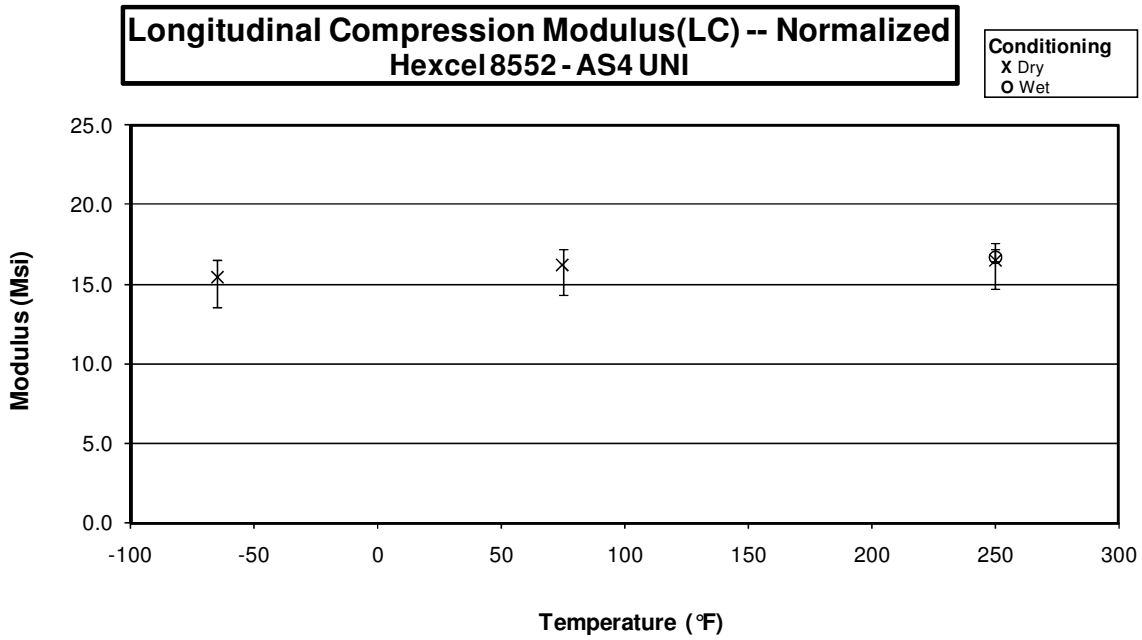


3.2 Transverse Tension Properties

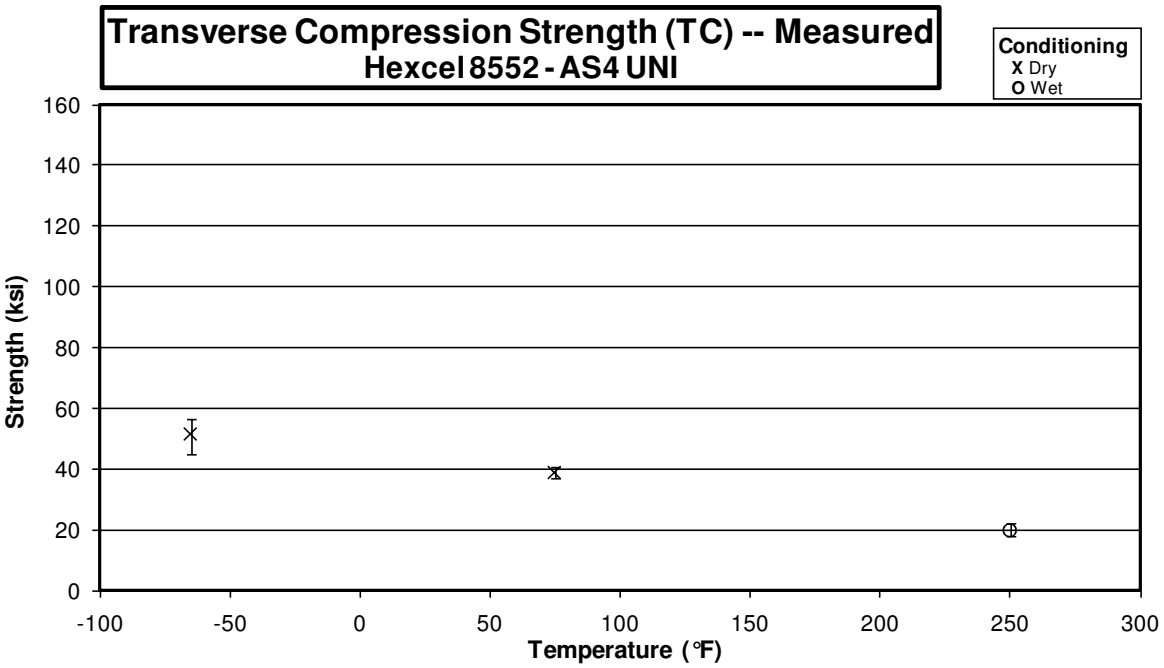


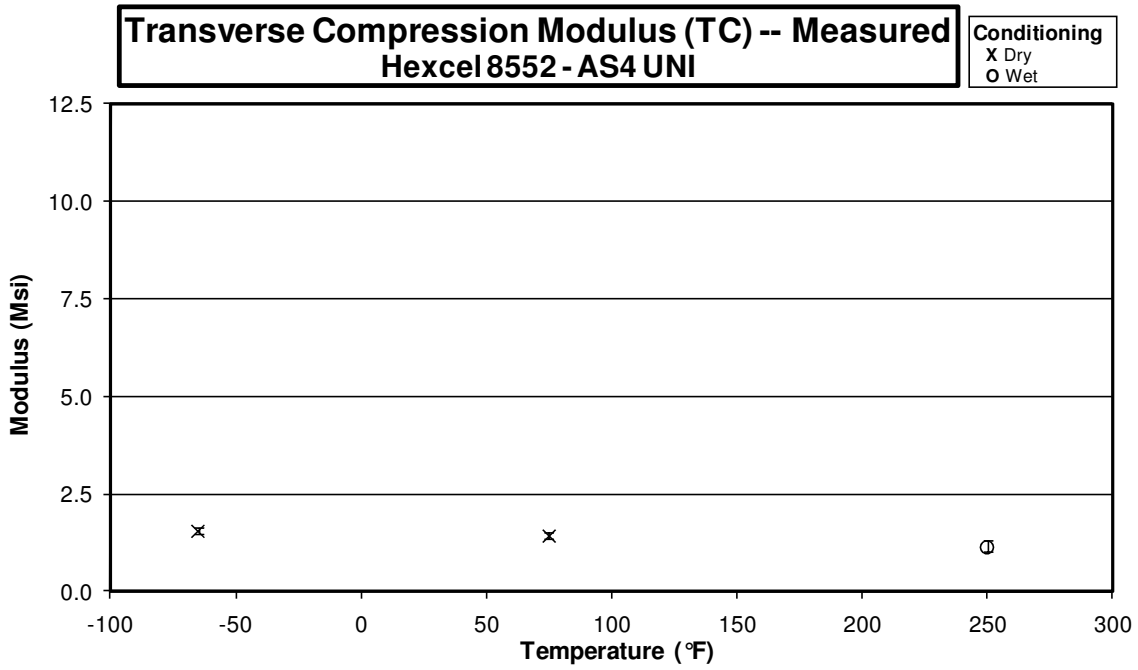


3.3 Longitudinal Compression Properties

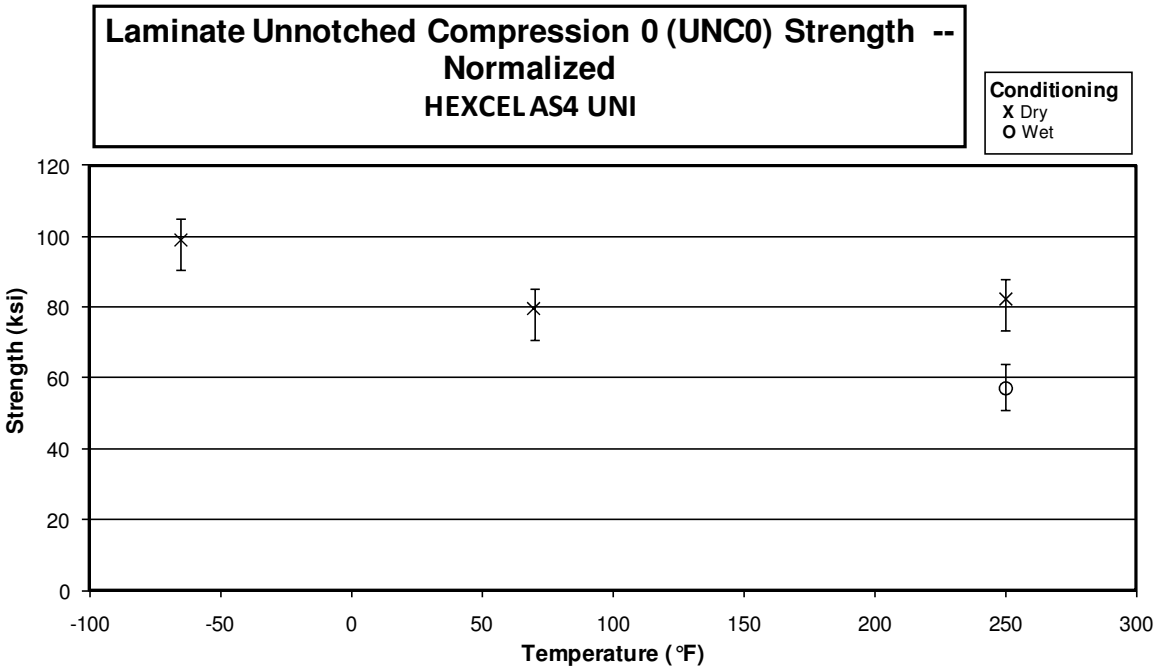


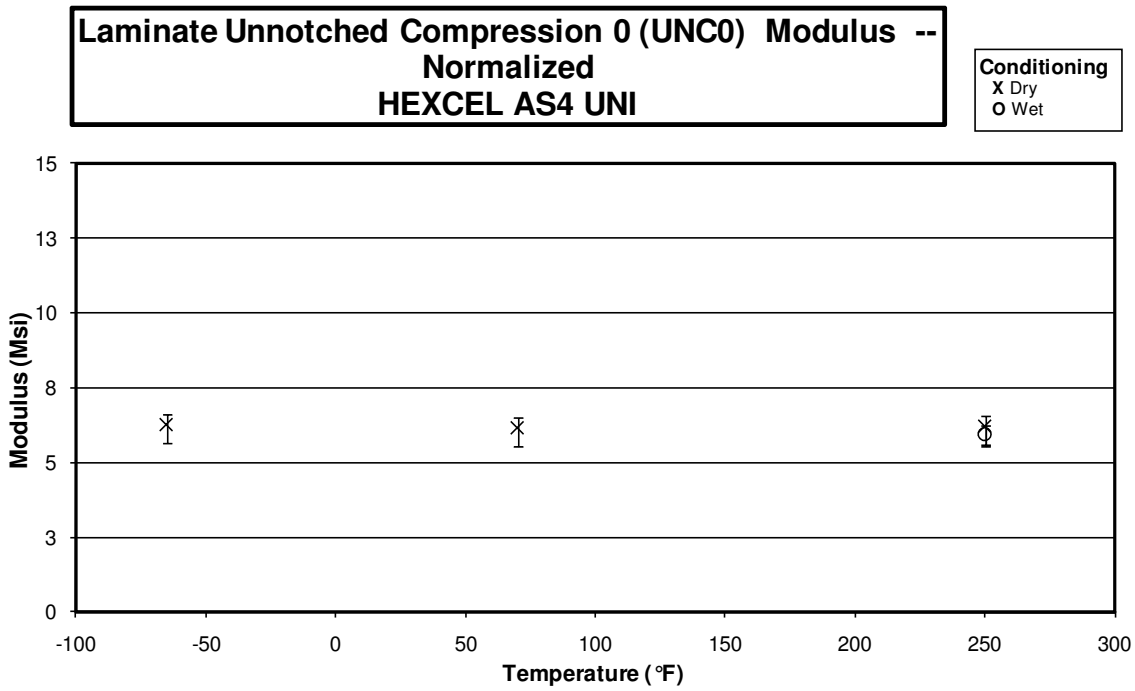
3.4 Transverse Compression Properties



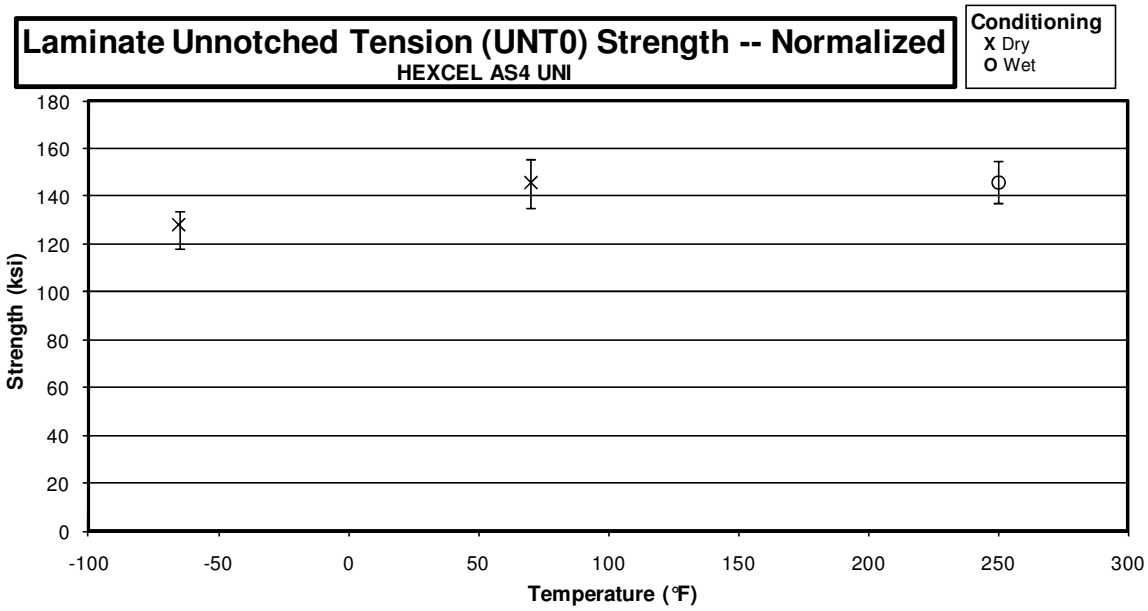


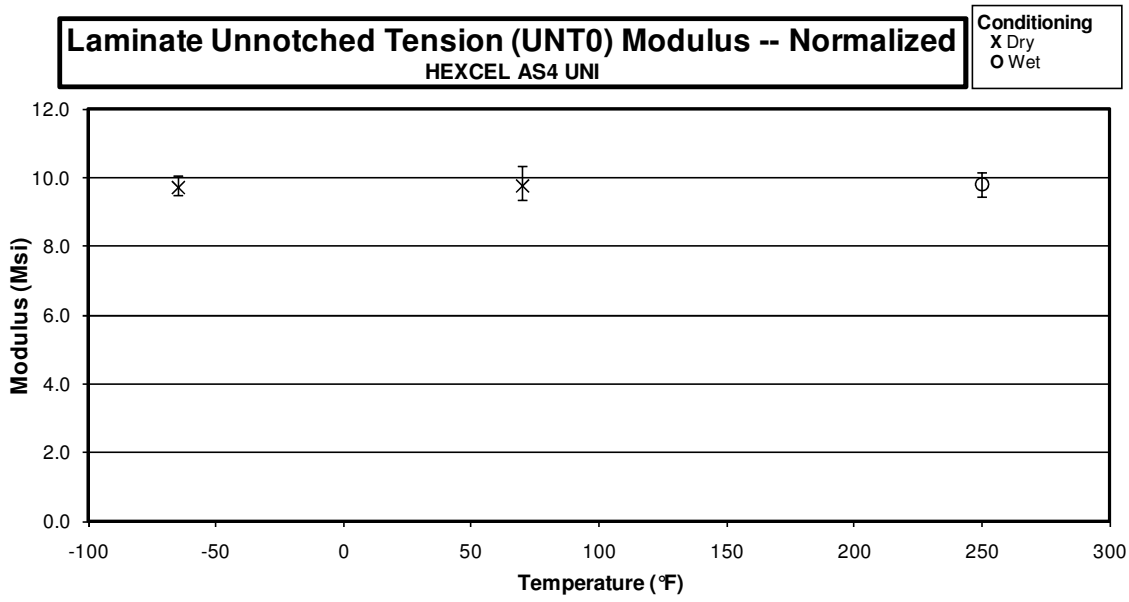
3.5 Unnotched Compression Properties 0



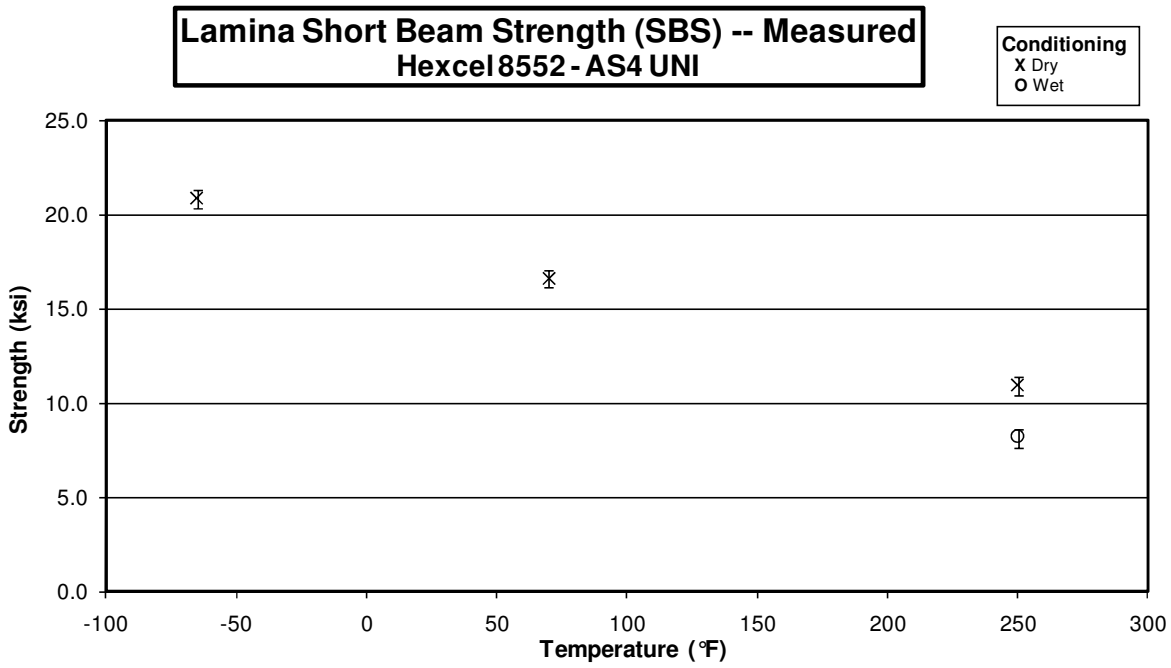


3.6 Unnotched Tension Properties 0

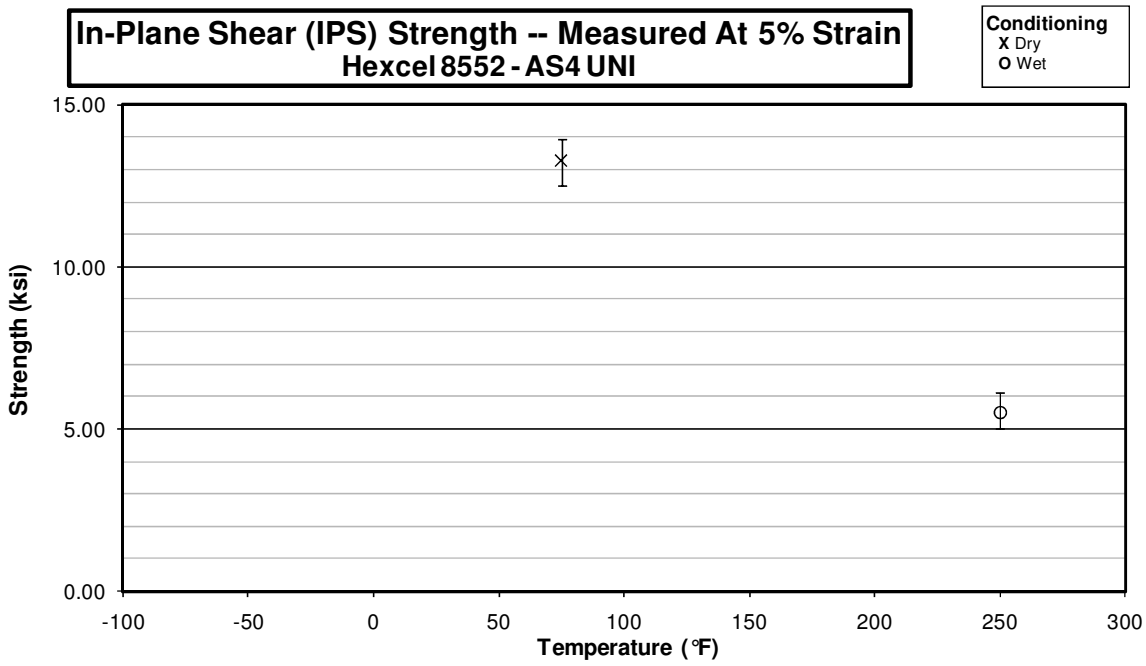


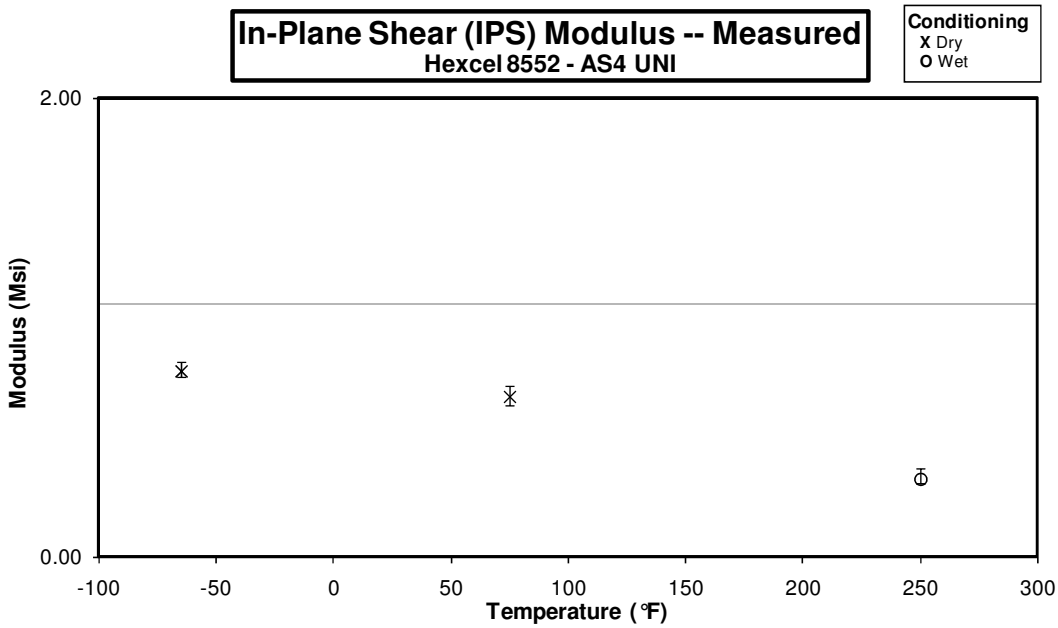


3.7 Lamina Short Beam Strength Properties

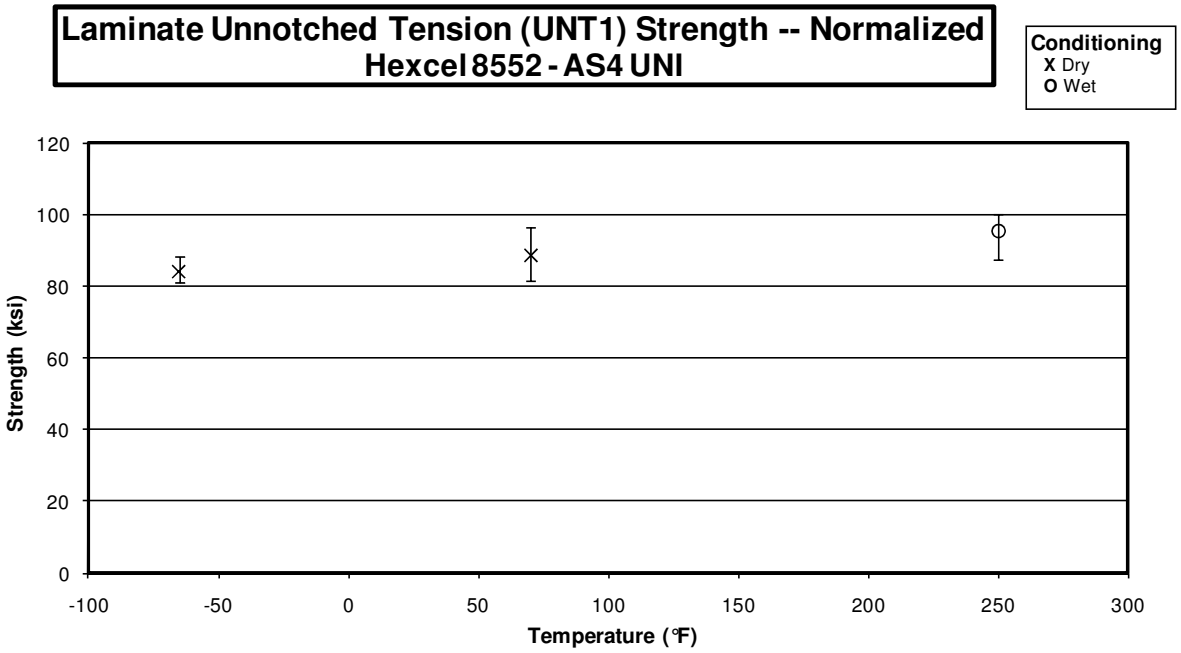


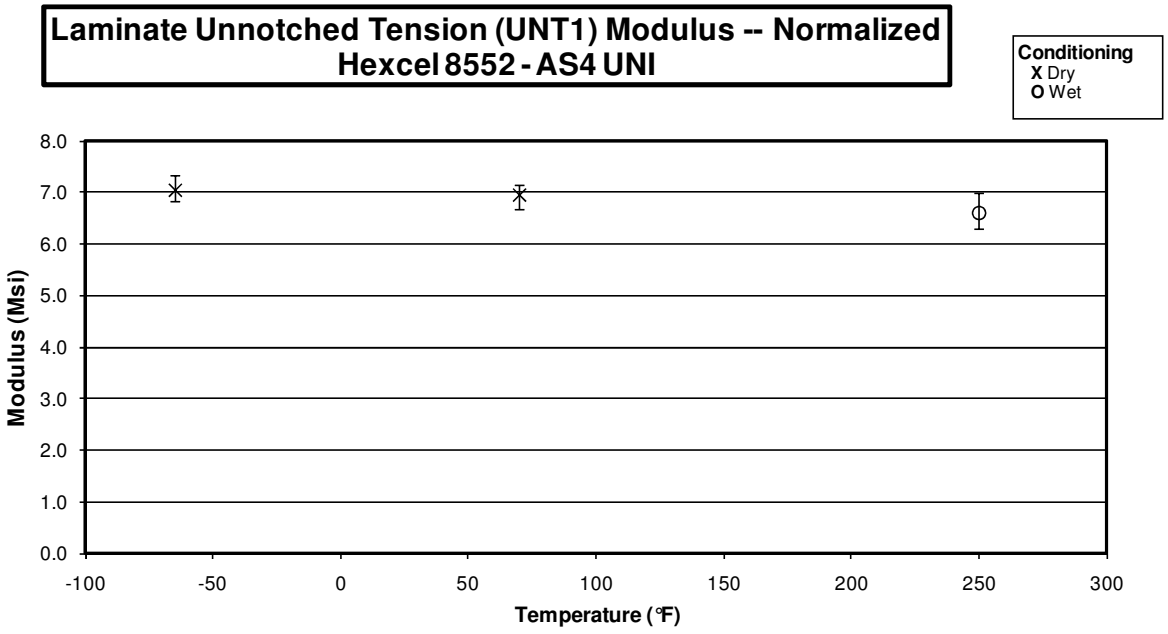
3.8 In-Plane Shear Properties



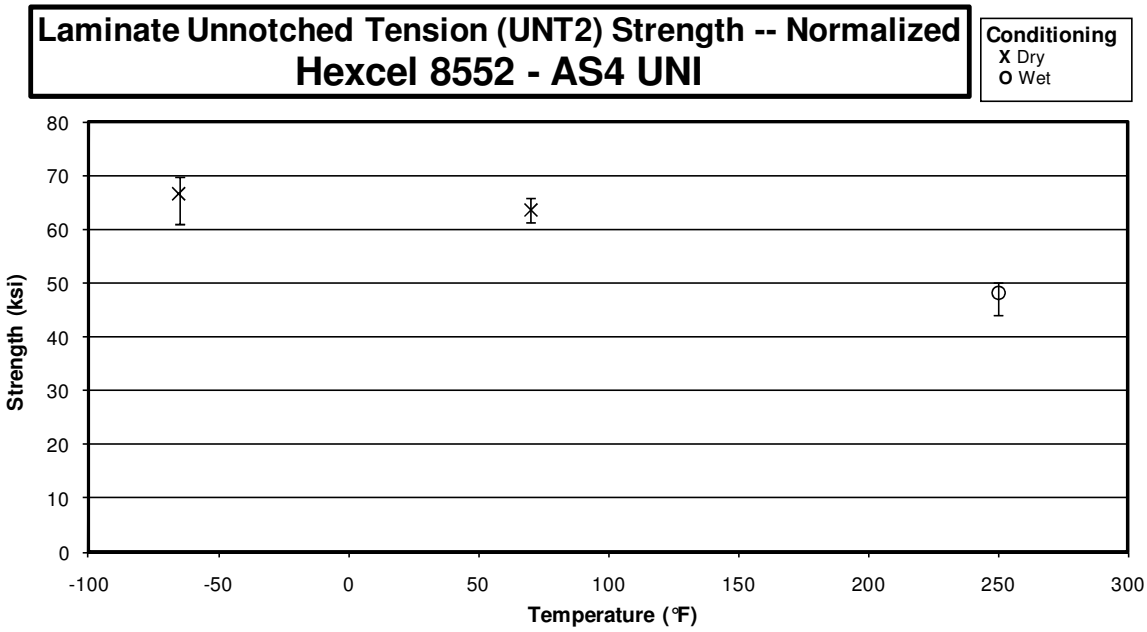


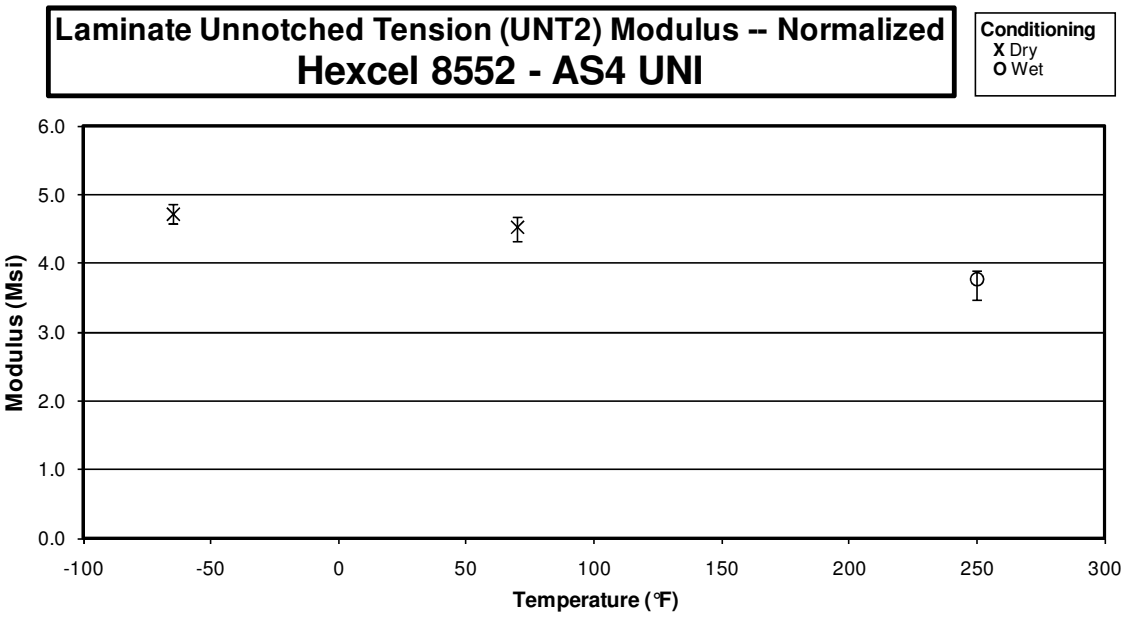
3.9 Unnotched Tension 1 Properties



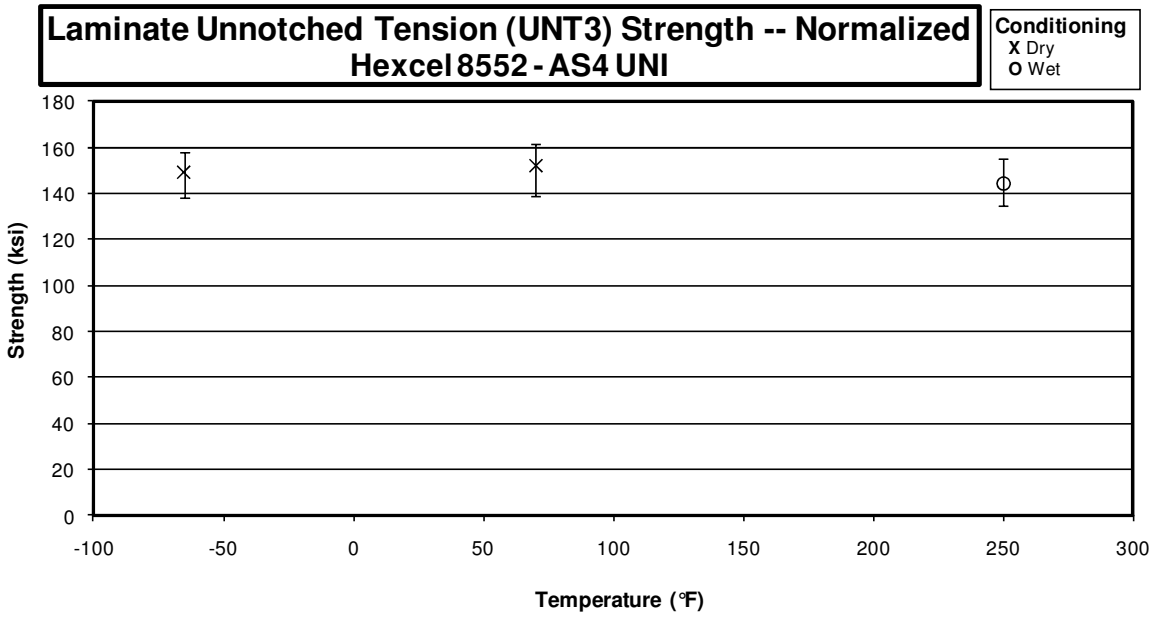


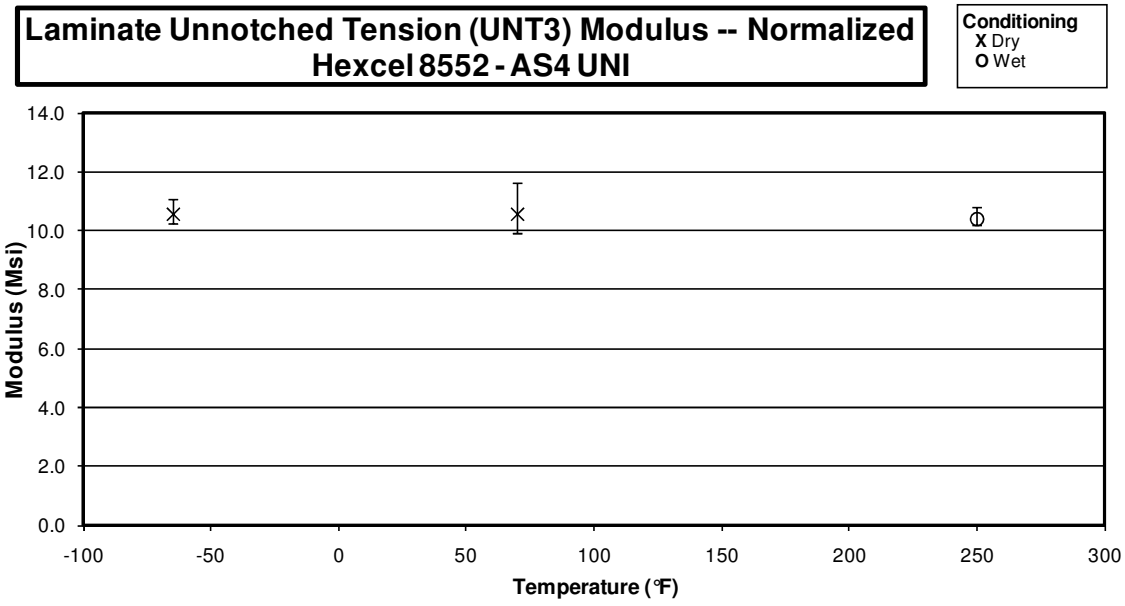
3.10 Unnotched Tension 2 Properties



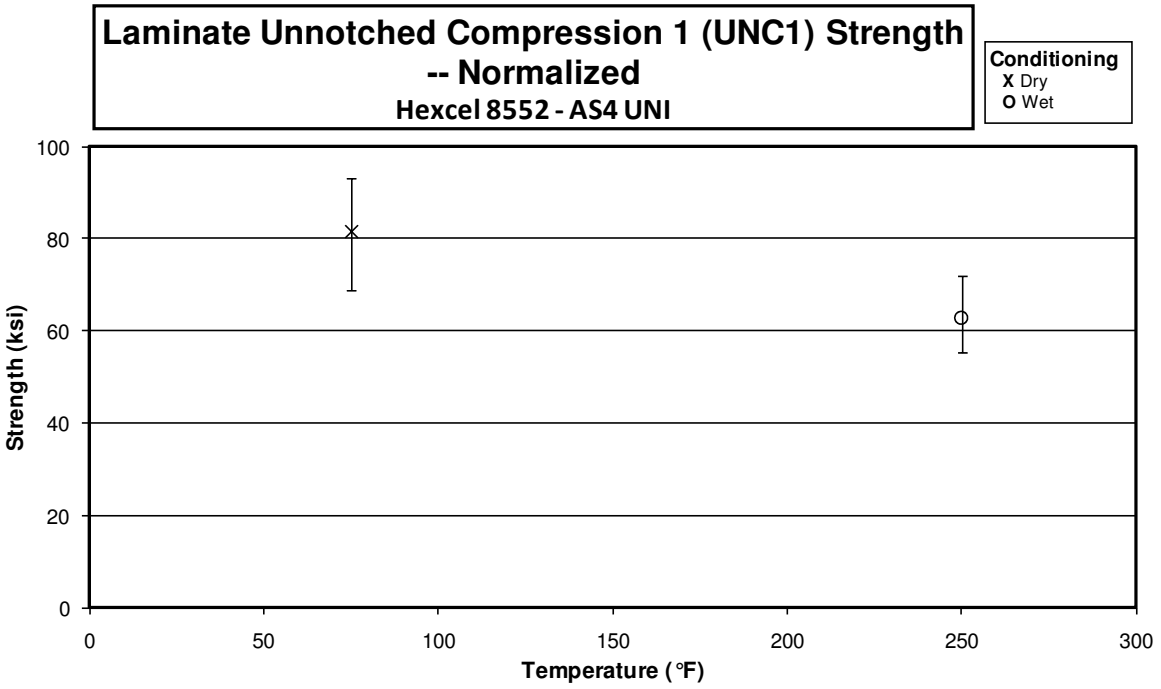


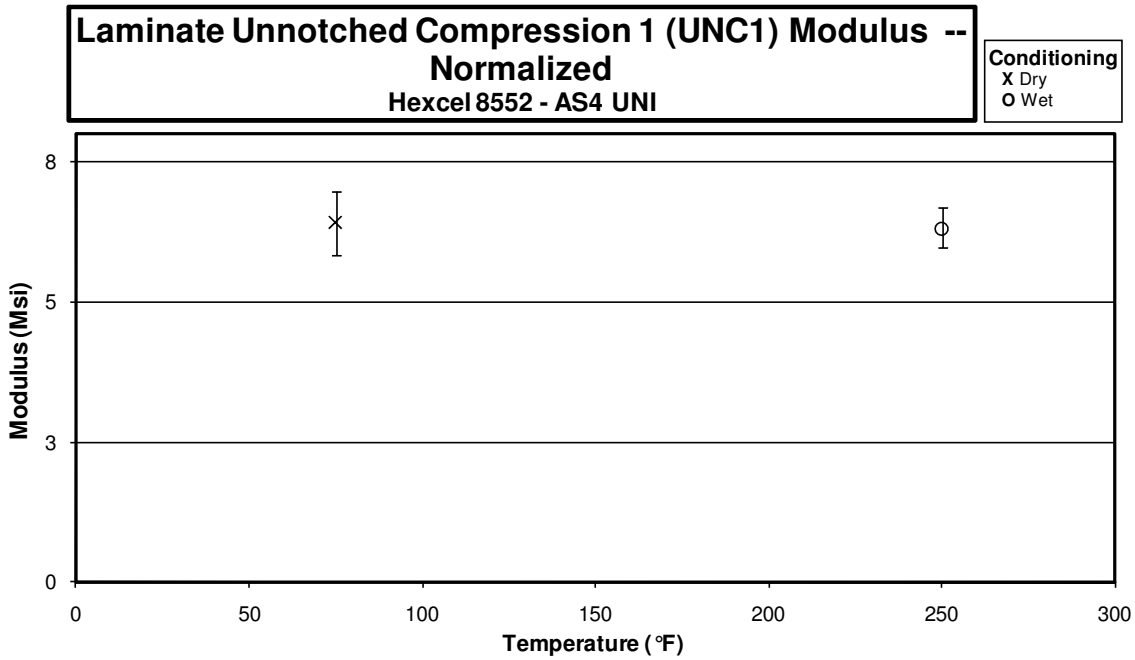
3.11 Unnotched Tension 3 Properties



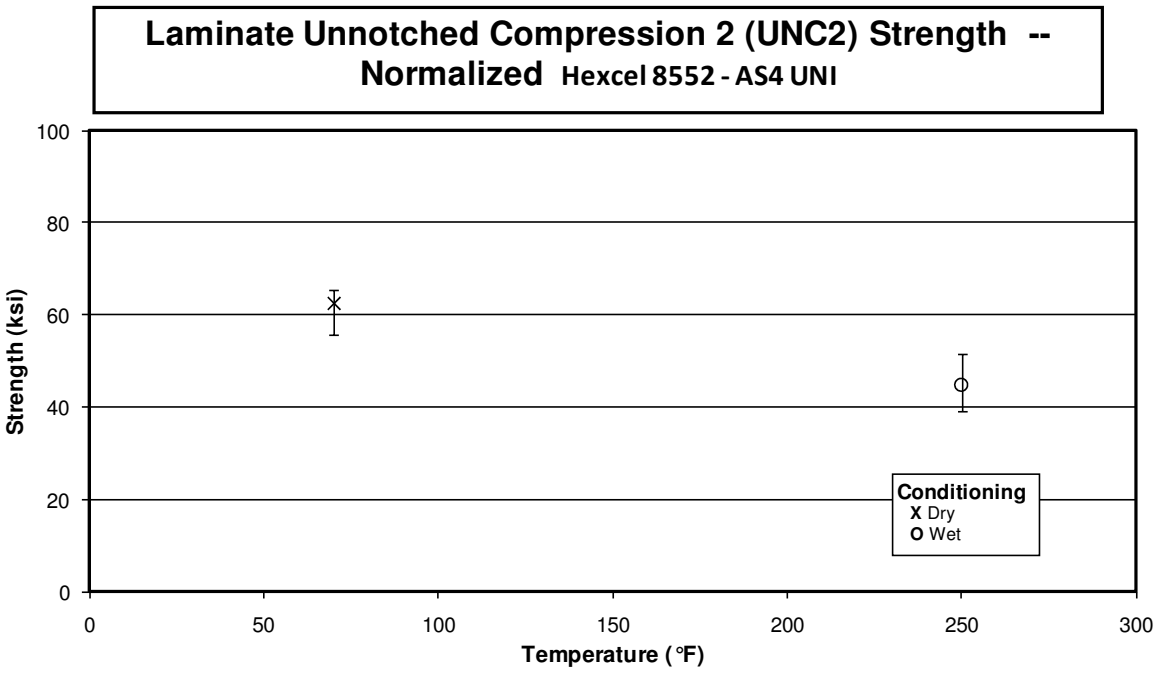


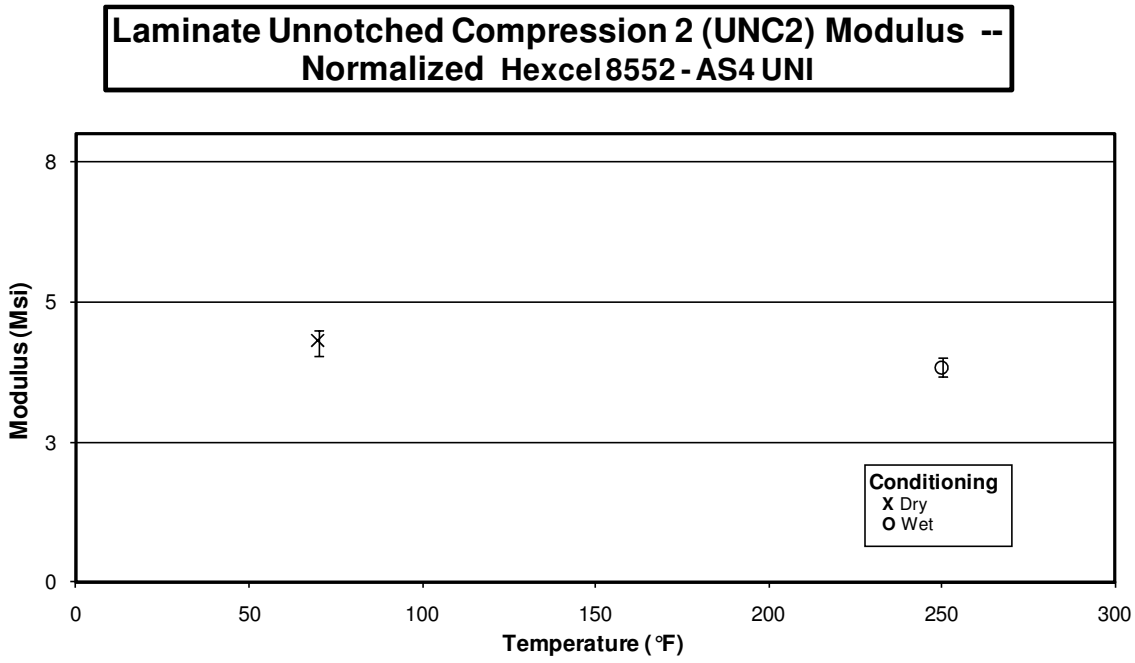
3.12 Unnotched Compression 1 Properties



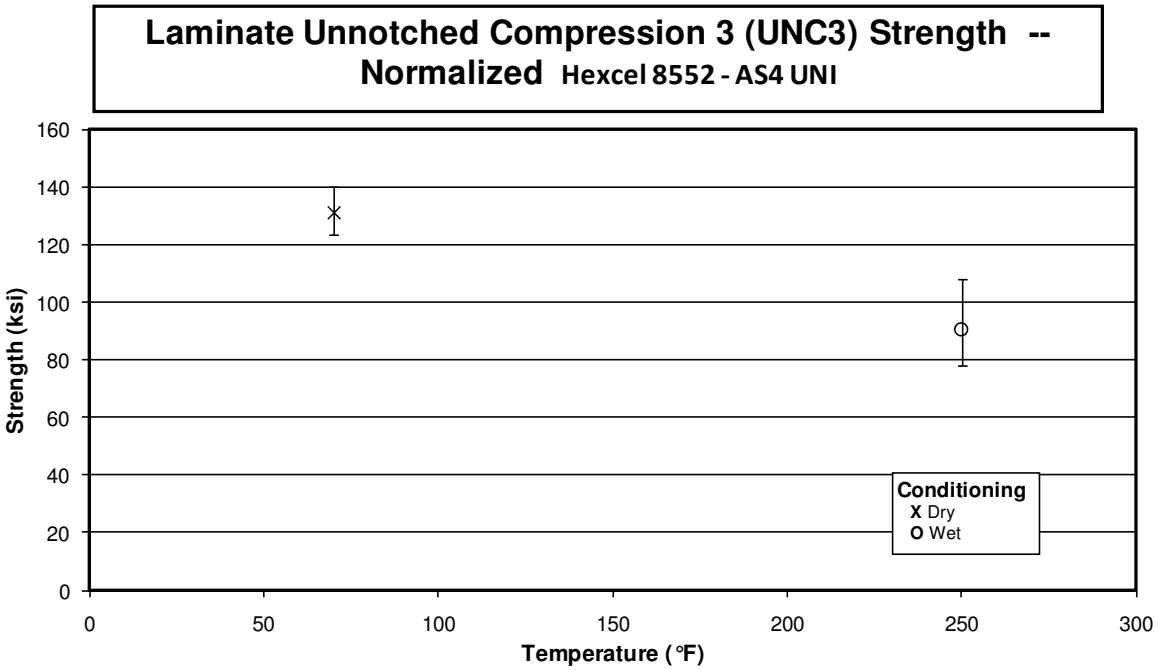


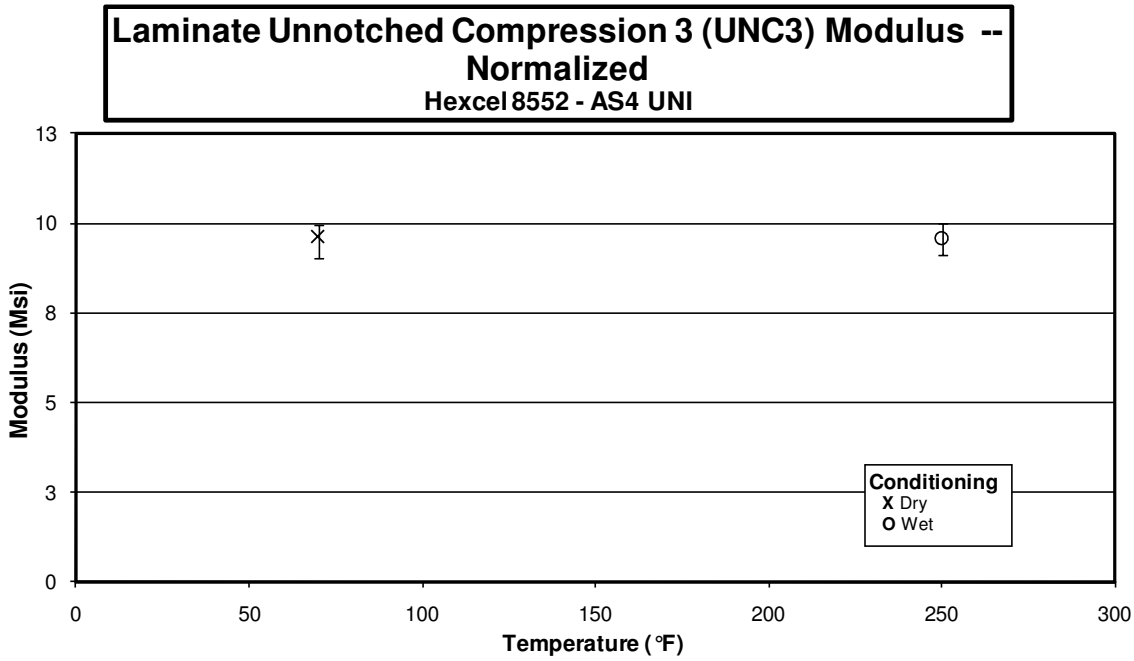
3.13 Unnotched Compression 2 Properties



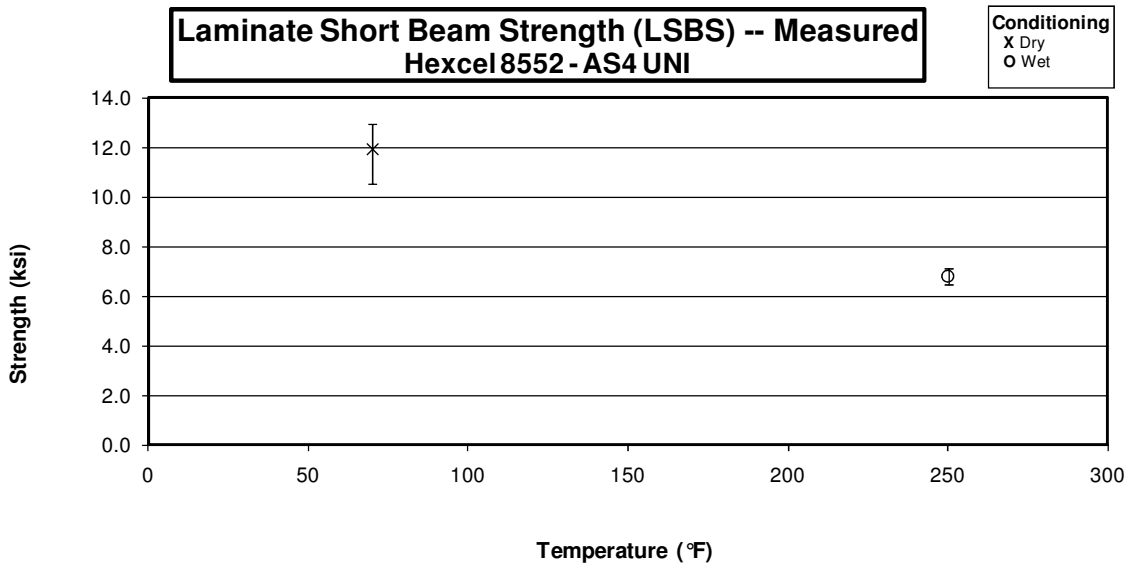


3.14 Unnotched Compression 3 Properties

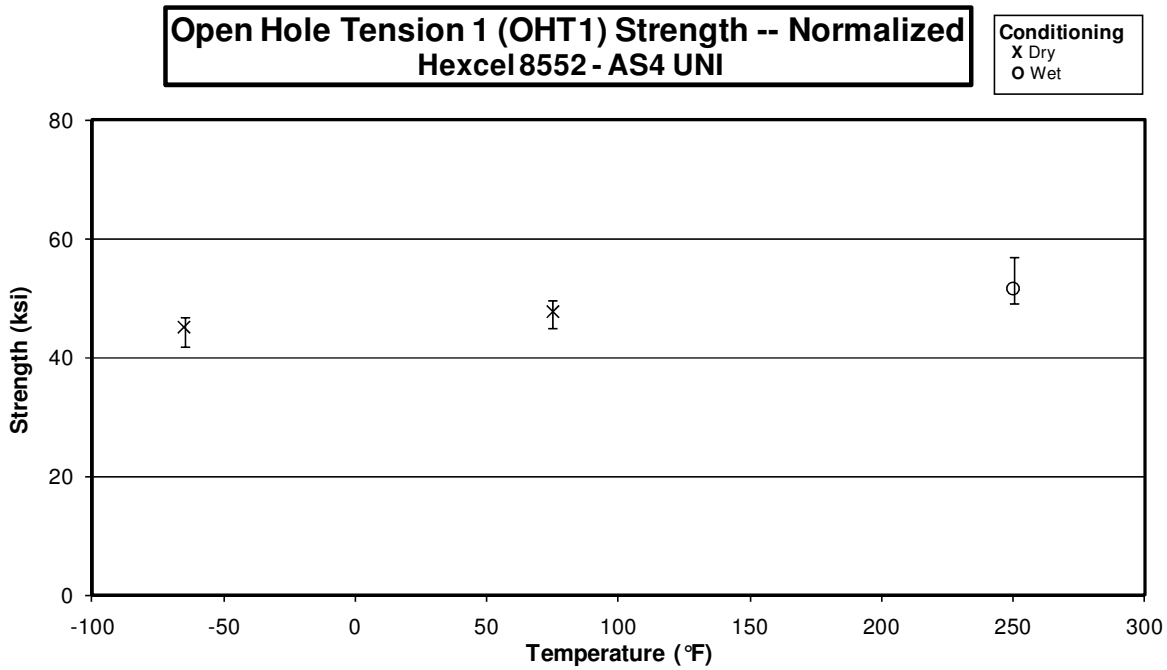




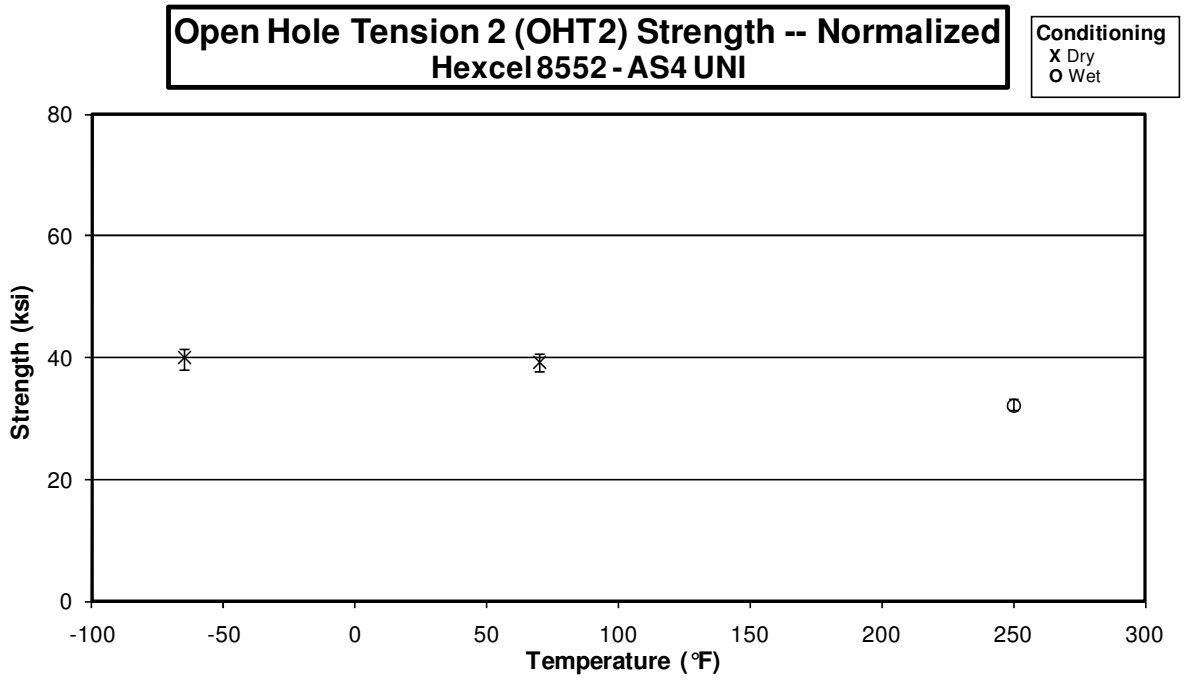
3.15 Laminate Short Beam Strength Properties



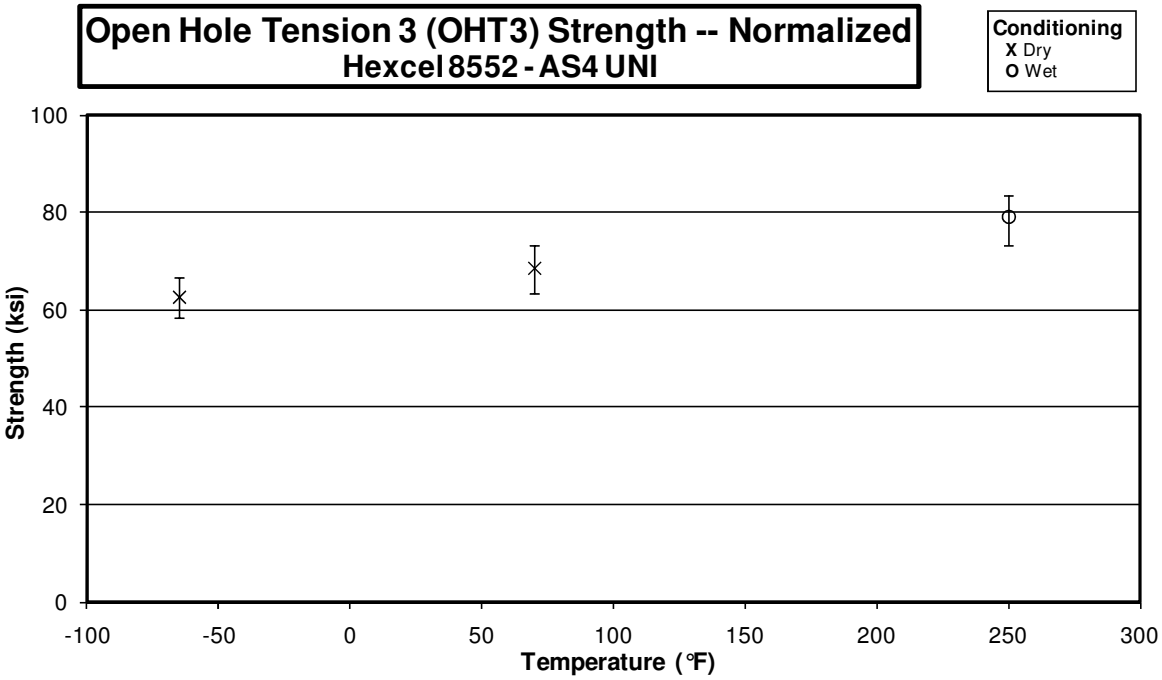
3.16 Open Hole Tension 1 Properties



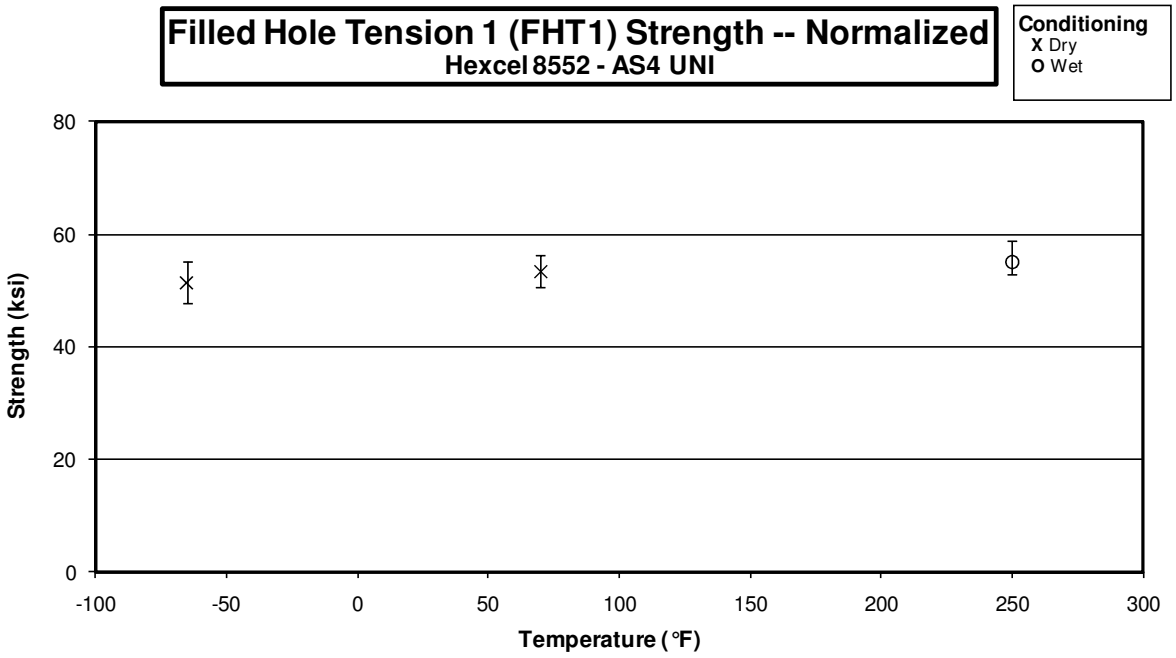
3.17 Open Hole Tension 2 Properties



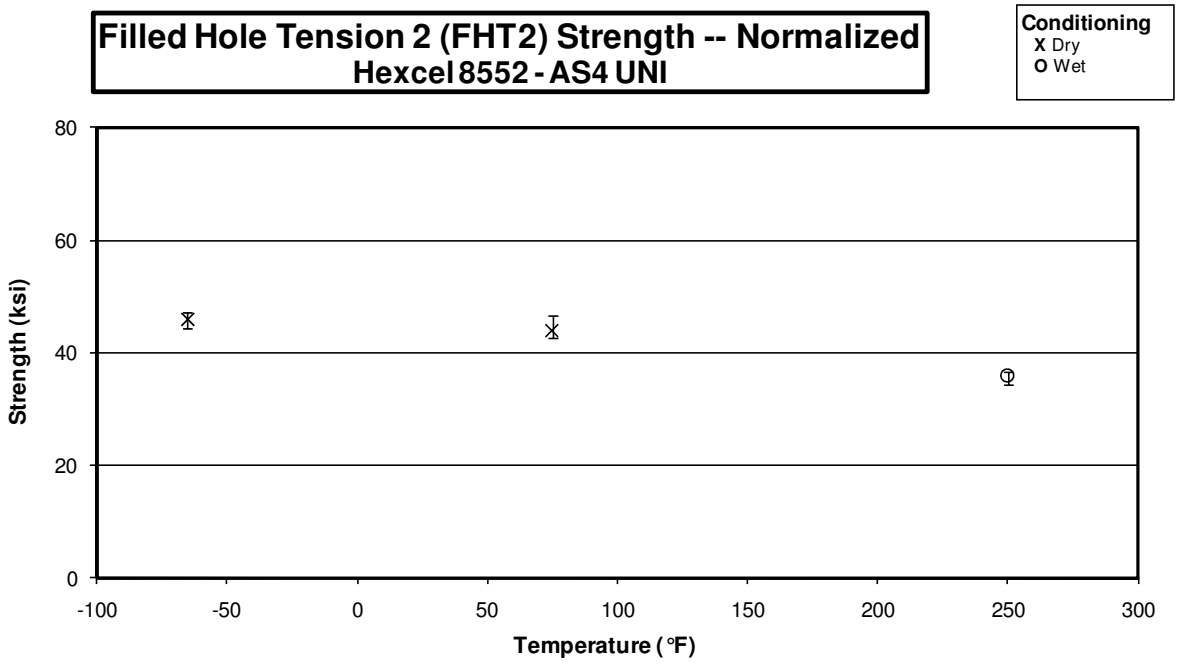
3.18 Open Hole Tension 3 Properties



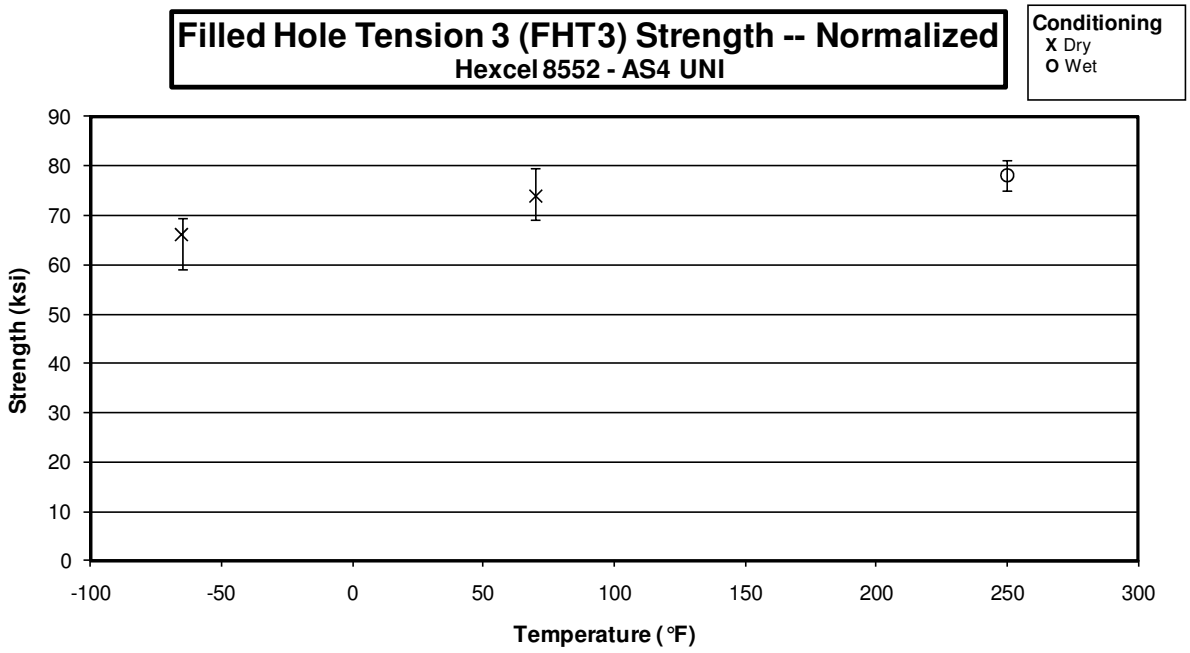
3.19 Filled-Hole Tension 1 Properties



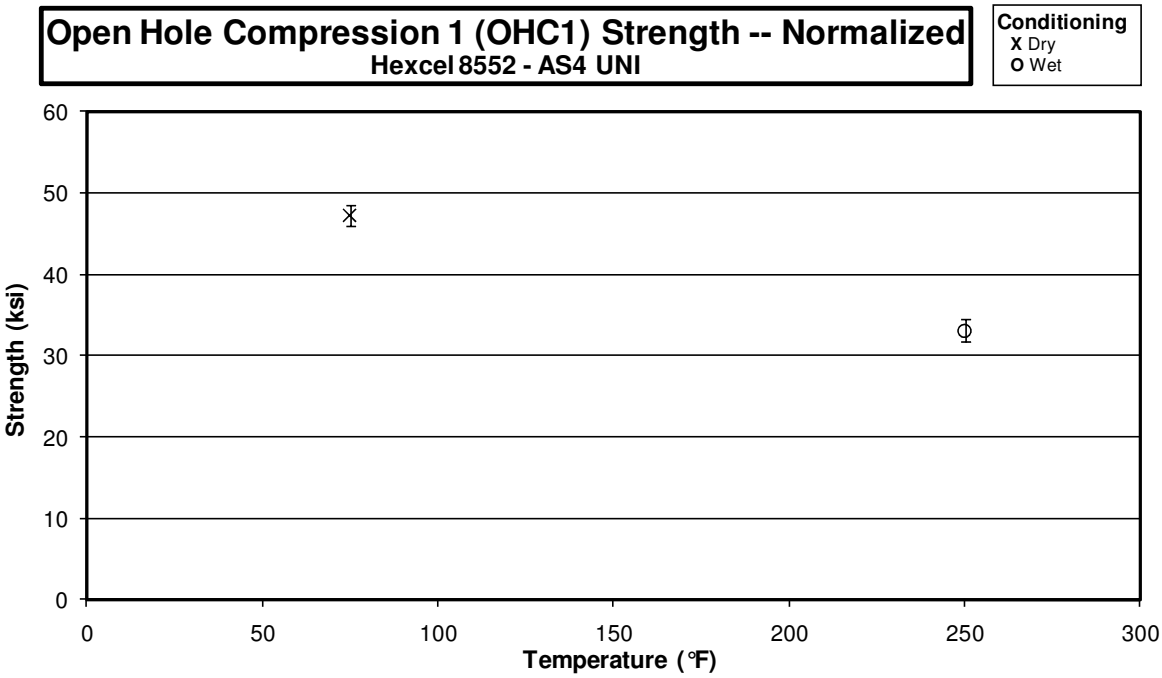
3.20 Filled-Hole Tension 2 Properties



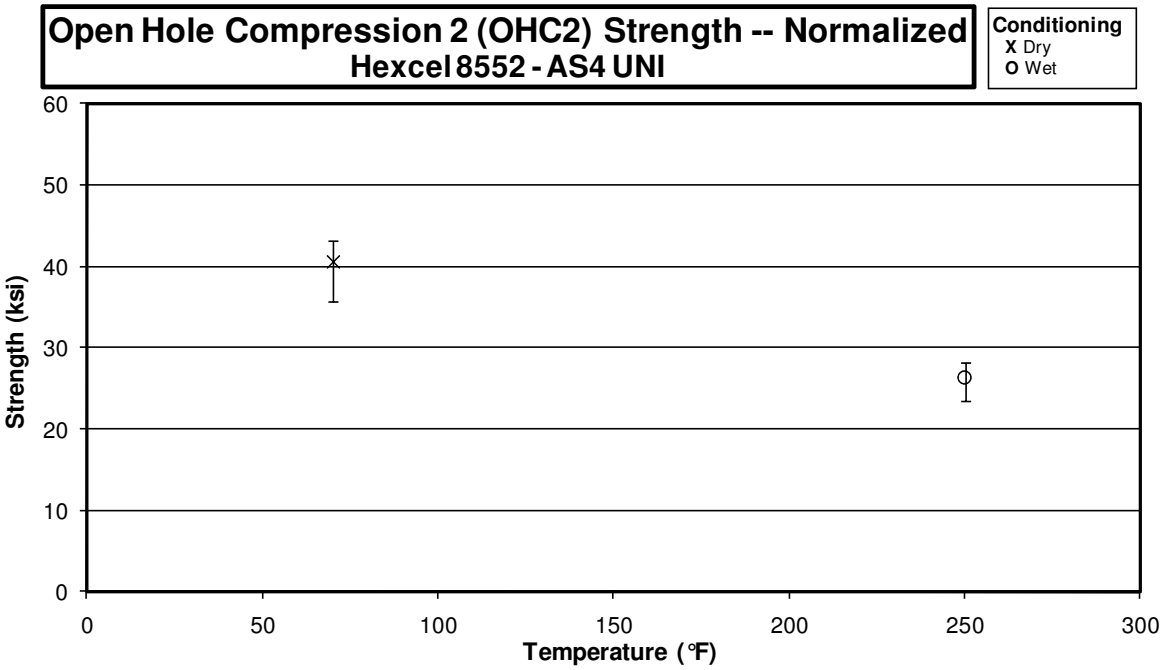
3.21 Filled-Hole Tension 3 Properties



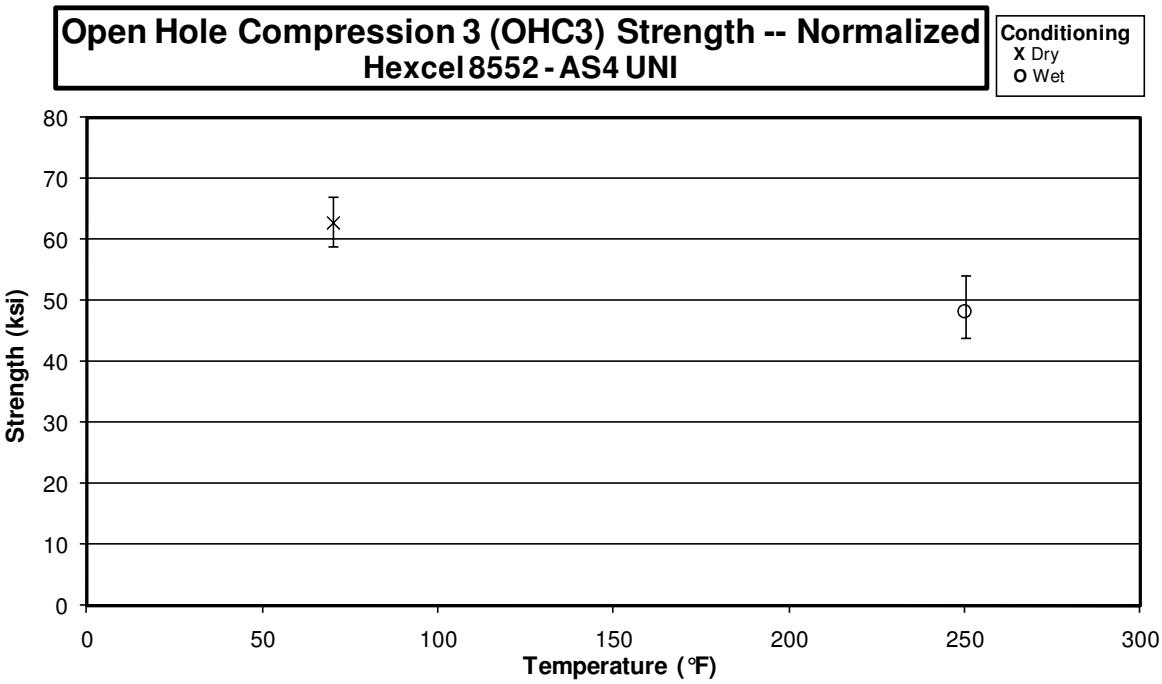
3.22 Open Hole Compression 1 Properties



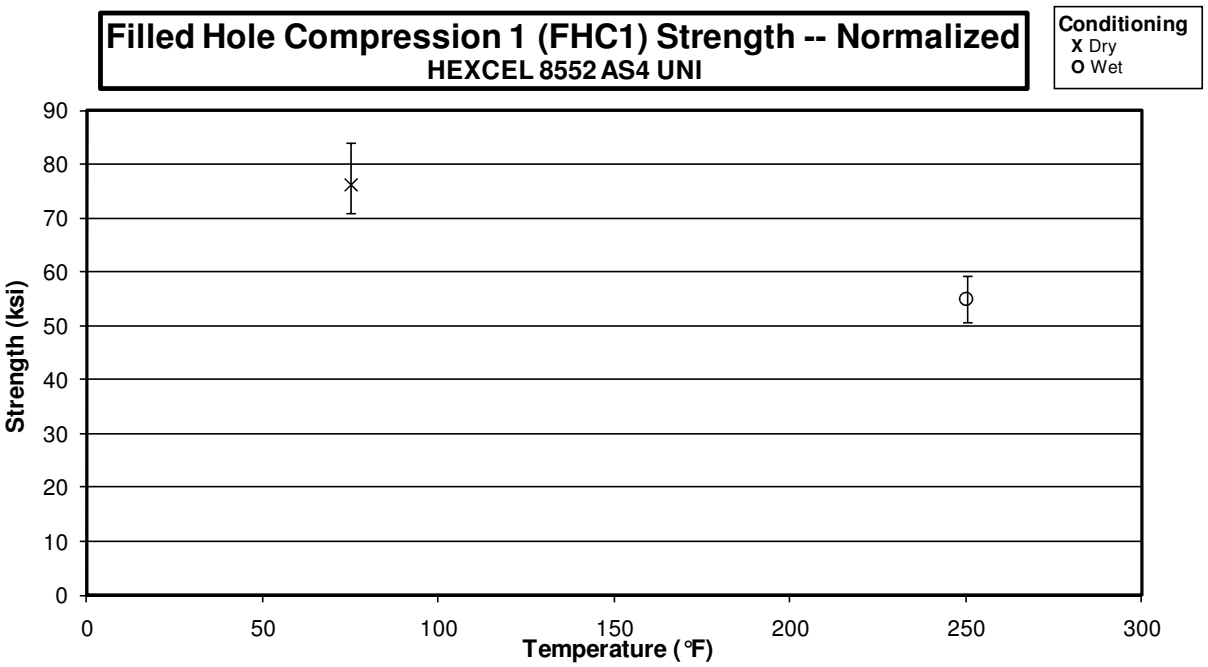
3.23 Open Hole Compression 2 Properties



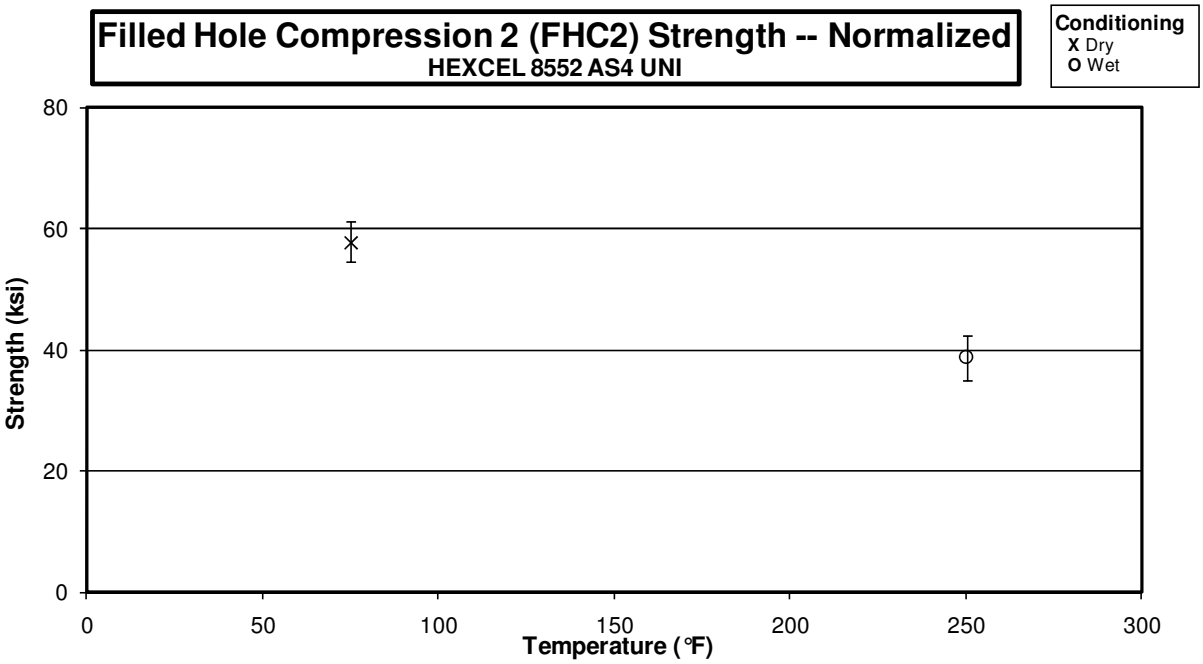
3.24 Open Hole Compression 3 Properties



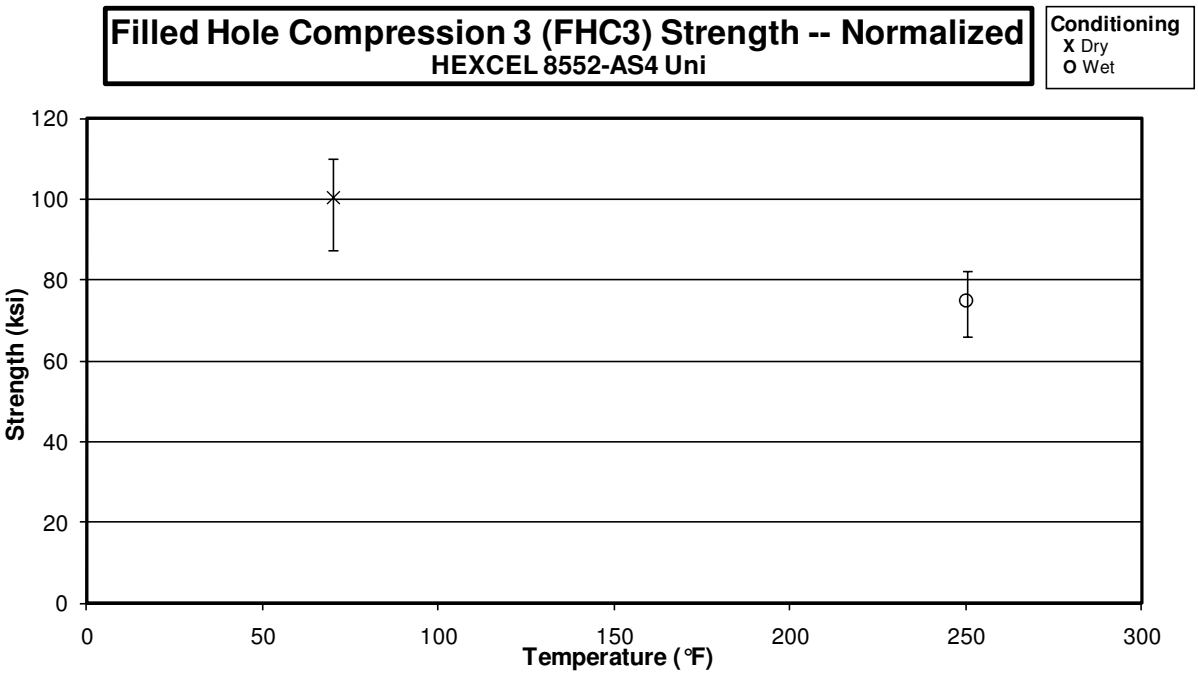
3.25 Filled Hole Compression 1 Properties



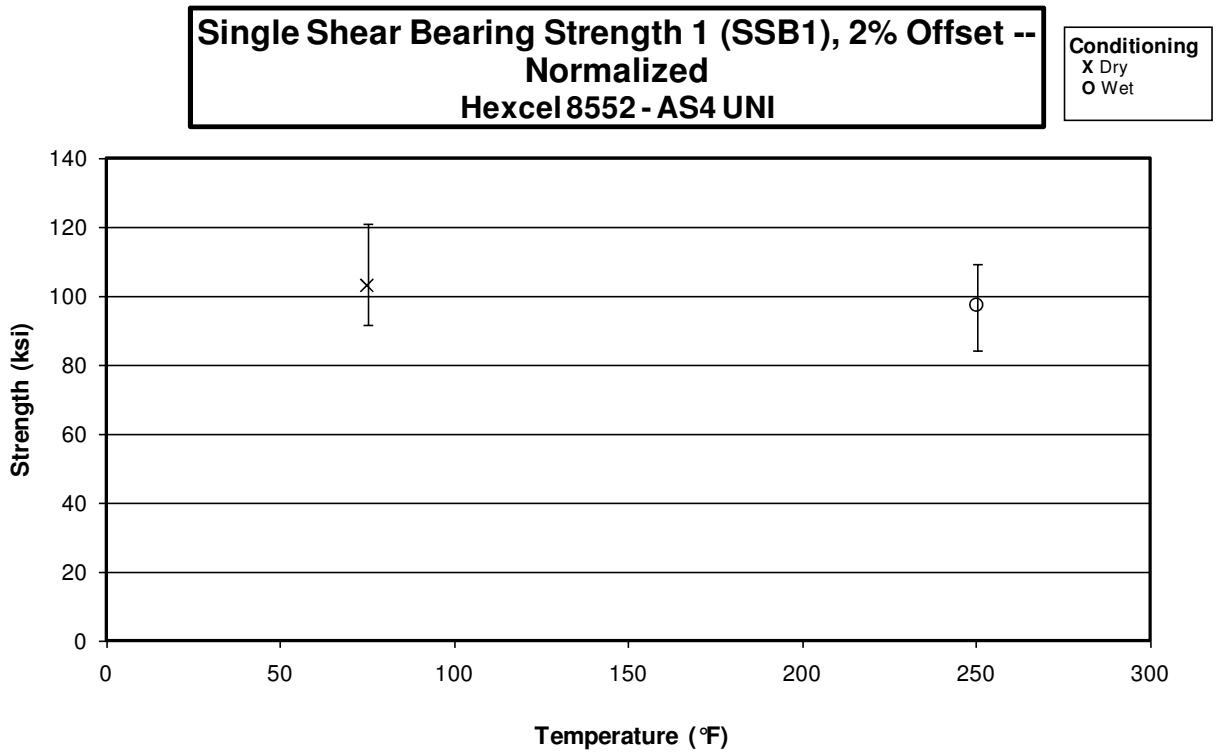
3.26 Filled Hole Compression 2 Properties



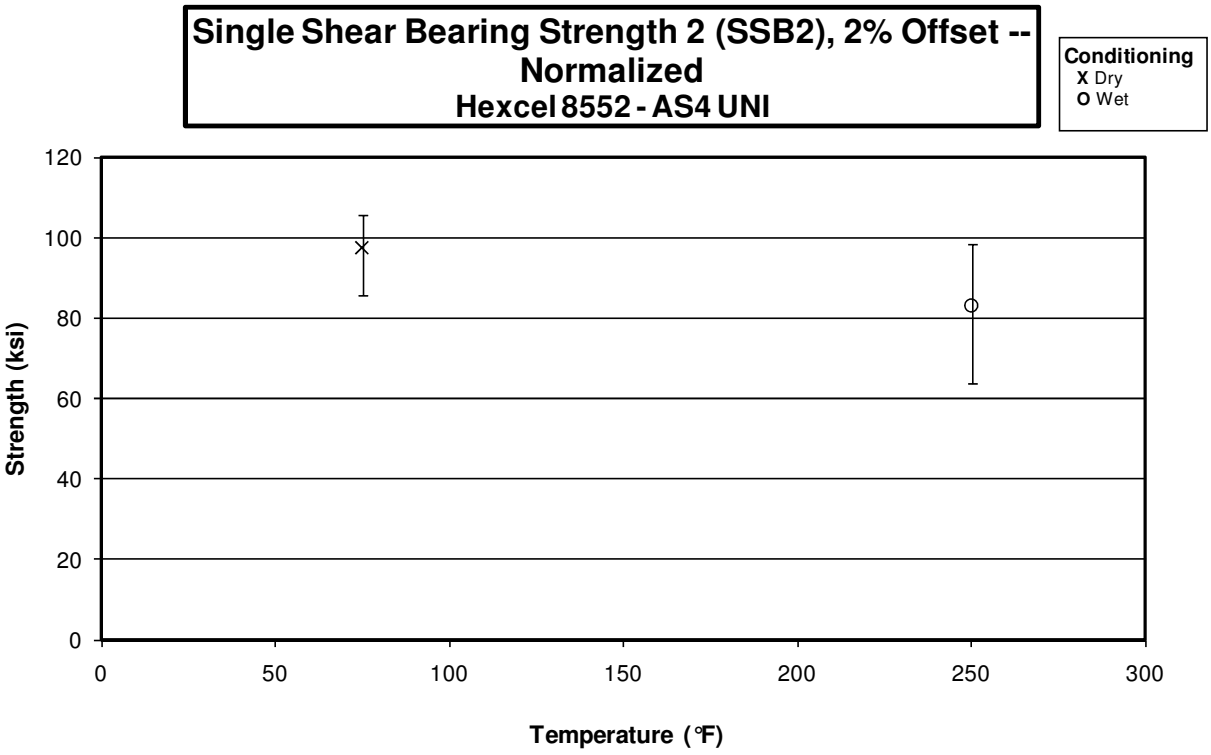
3.27 Filled Hole Compression 3 Properties



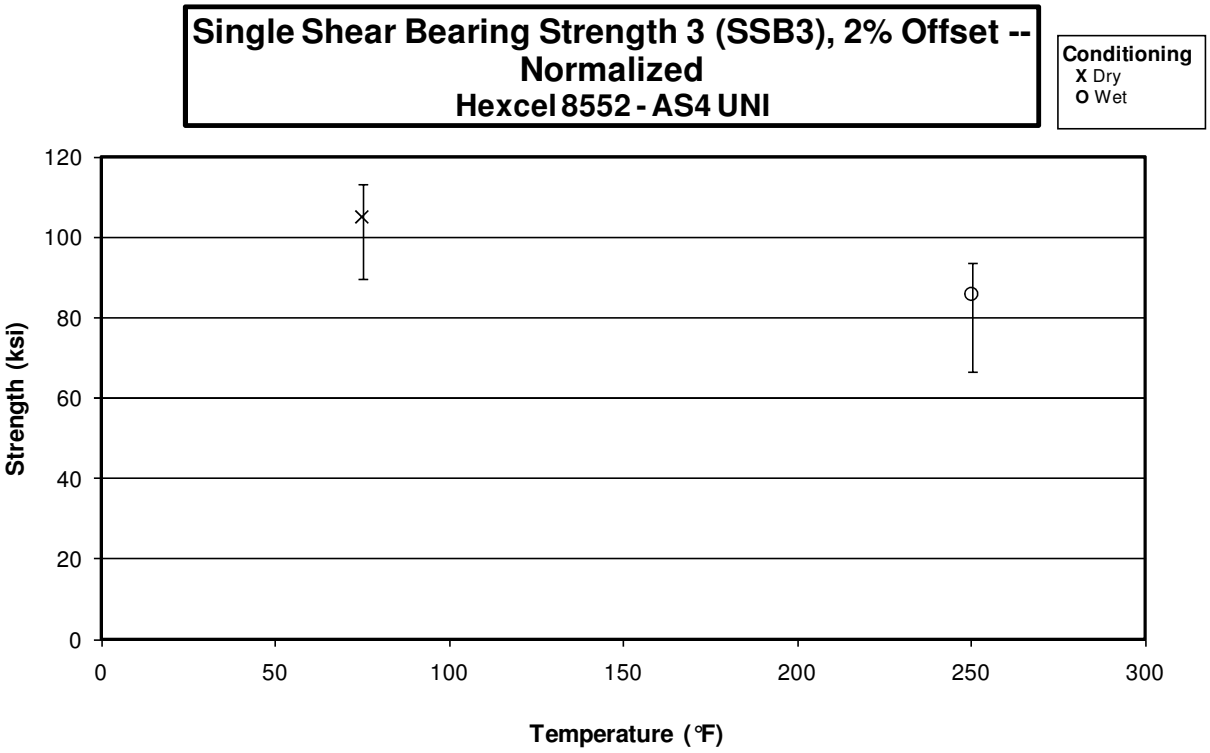
3.28 Single Shear Bearing Strength1 Properties



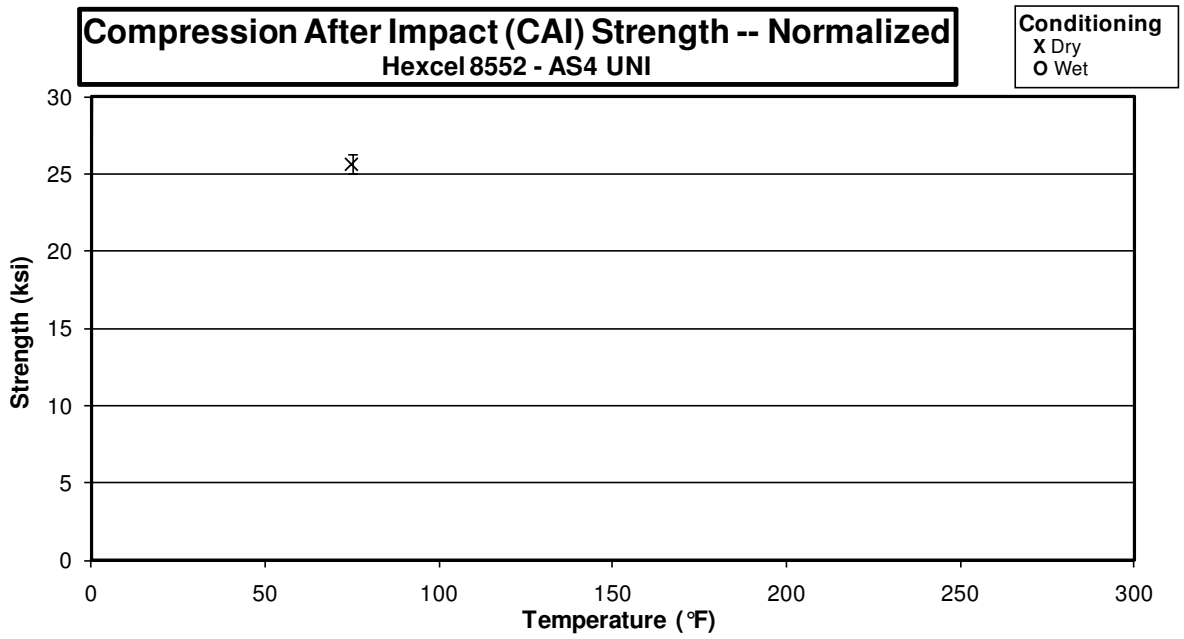
3.29 Single Shear Bearing Strength 2 Properties



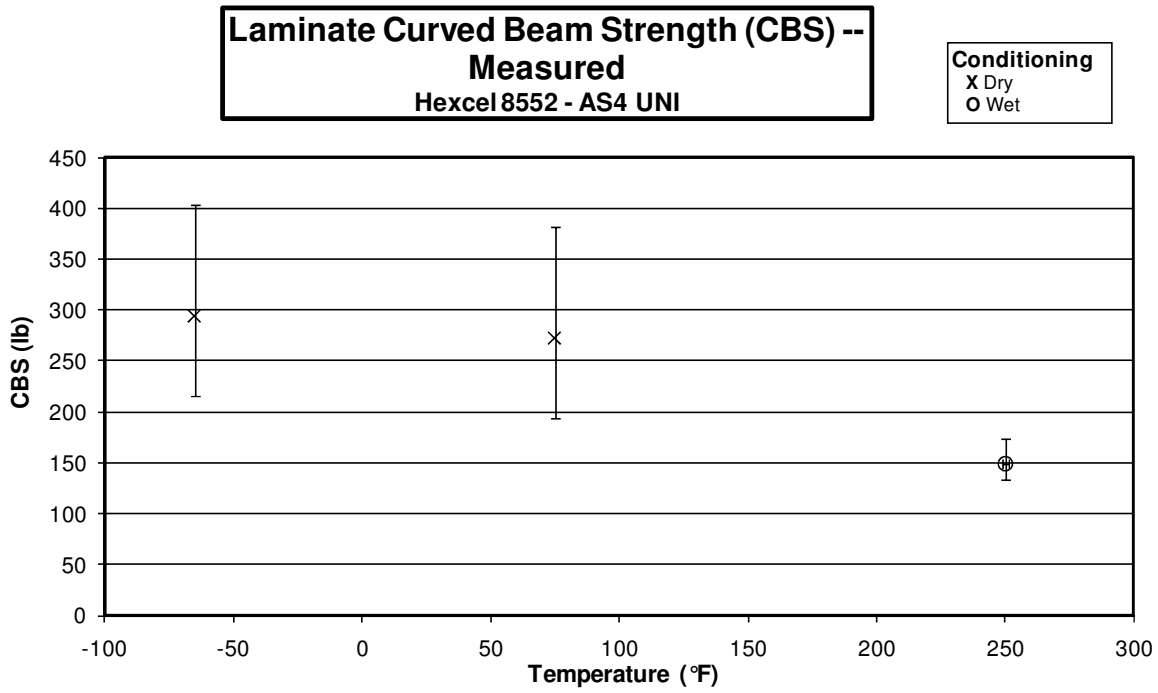
3.30 Single Shear Bearing 3 Properties

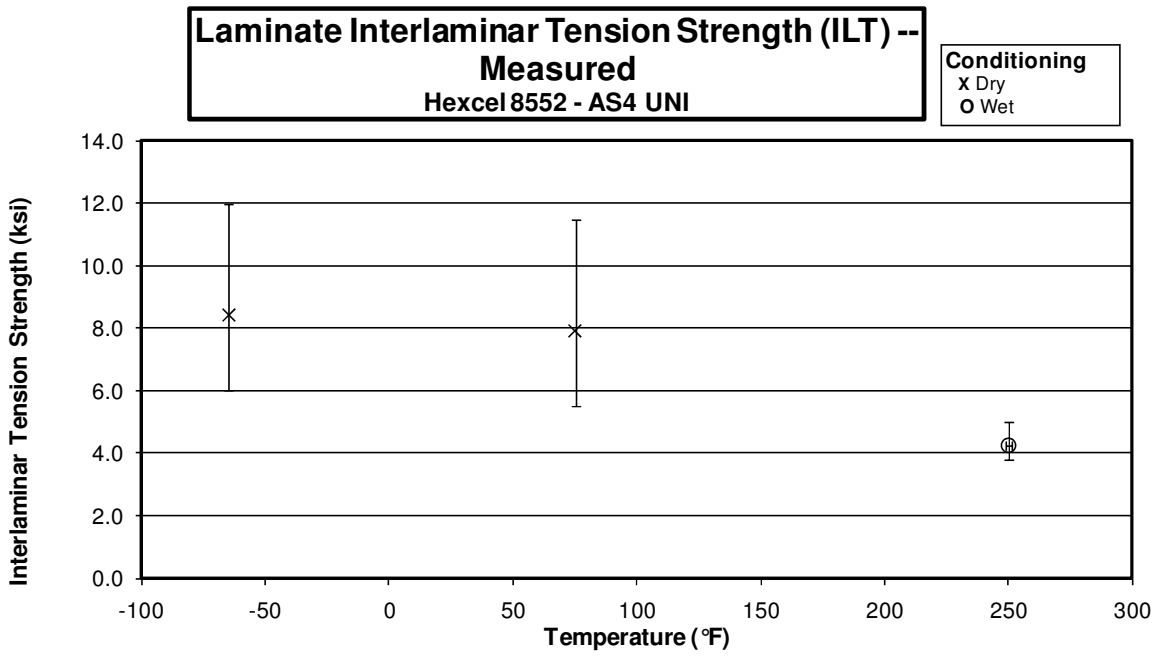


3.31 Compression Strength After Impact Properties



3.32 Interlaminar Tension Properties





4. Raw Data

4.1 Longitudinal Tension Properties

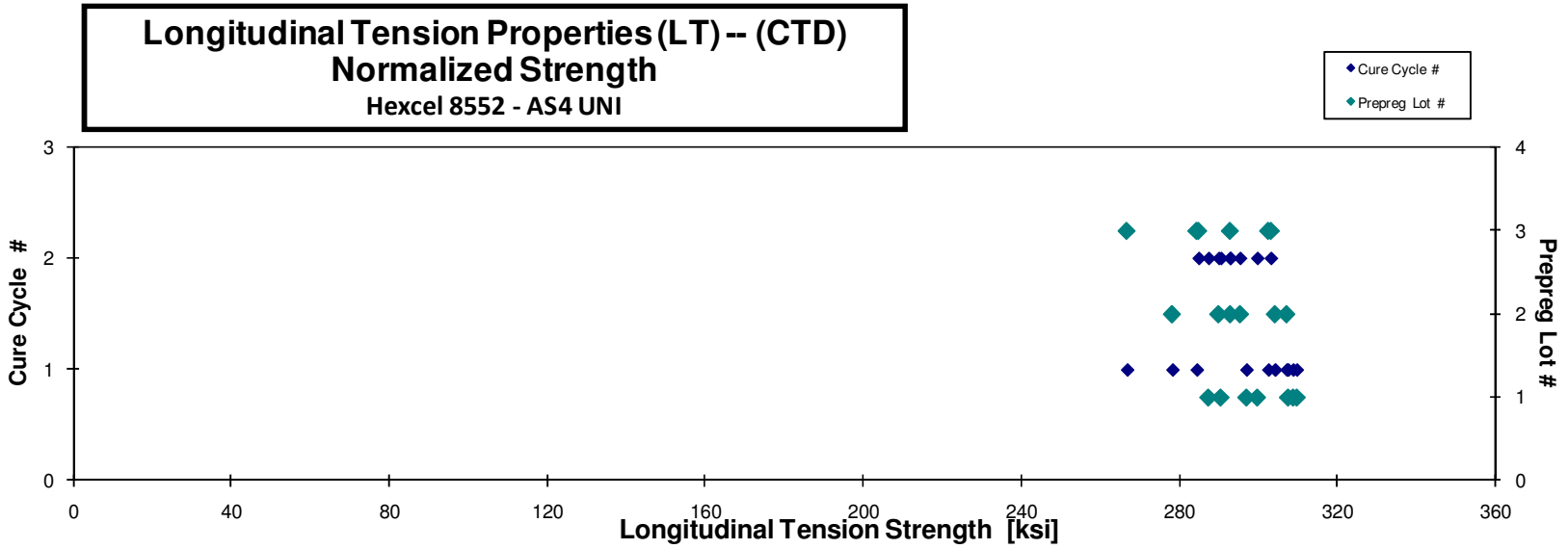
Longitudinal Tension Properties (LT) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

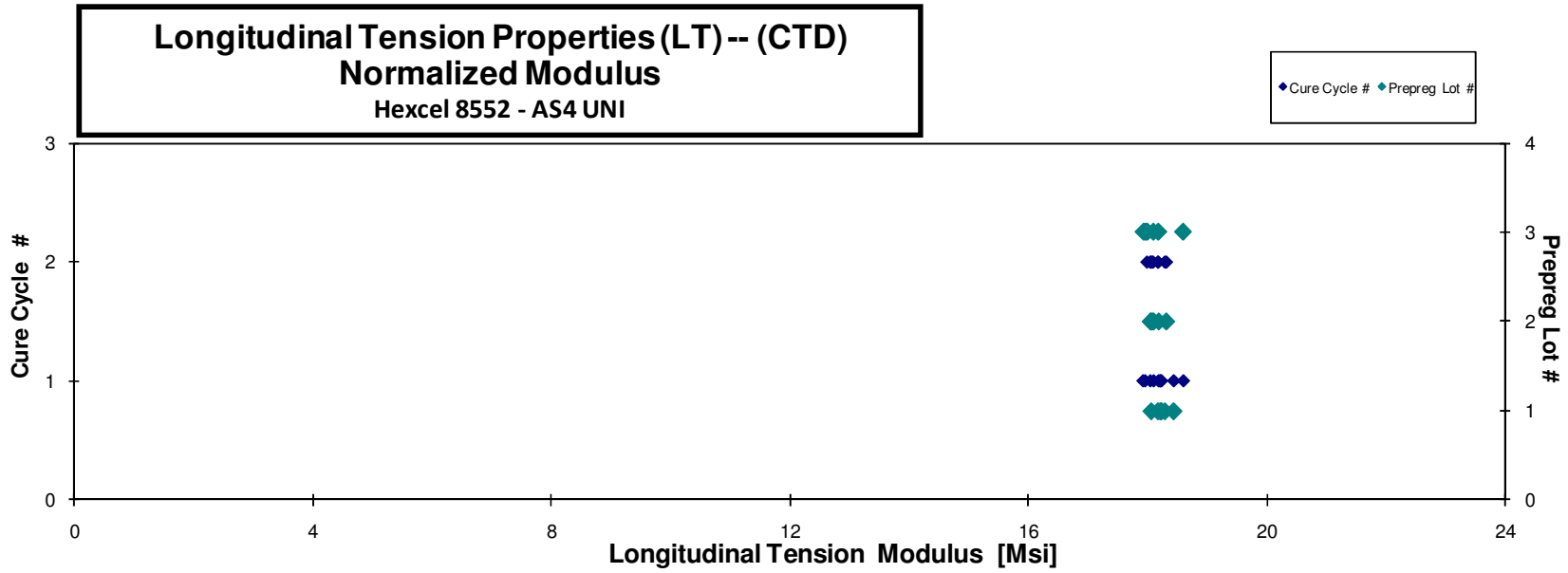
normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUJA116B	A	M1	1	1	312.867	18.528	0.282	0.044	6	SGM	0.0073	307.699	18.222
HFUJA117B	A	M1	1	1	315.504	18.776	0.253	0.044	6	SGM	0.0073	309.938	18.445
HFUJA118B	A	M1	1	1	303.074	18.582	0.243	0.044	6	XGM	0.0073	297.158	18.219
HFUJA119B	A	M1	1	1	314.550	18.568	0.258	0.044	6	XGM	0.0073	309.000	18.241
HFUJA216B	A	M2	1	2	293.620	18.485	0.293	0.044	6	SGM	0.0073	290.644	18.298
HFUJA217B	A	M2	1	2	292.265	18.481	0.282	0.044	6	SGM	0.0073	287.547	18.182
HFUJA218B	A	M2	1	2	305.747	18.420	0.313	0.044	6	XGM	0.0073	299.894	18.067
HFUJB116B	B	M1	2	1	286.647	18.594	0.283	0.043	6	SGM	0.0072	278.361	18.057
HFUJB117B	B	M1	2	1	314.143	18.599	0.268	0.043	6	XGM	0.0072	307.303	18.194
HFUJB118B	B	M1	2	1	309.861	18.436	0.291	0.044	6	XGM	0.0073	304.395	18.110
HFUJB216B	B	M2	2	2	297.159	18.312	0.289	0.044	6	SGM	0.0073	293.032	18.057
HFUJB217B	B	M2	2	2	298.731	18.867	0.282	0.043	6	SGM	0.0072	290.097	18.321
HFUJB218B	B	M2	2	2	299.485	18.326	0.223	0.044	6	XGM	0.0073	295.551	18.085
HFUJC116B	C	M1	3	1	270.953	18.888	0.250	0.044	6	SGM	0.0073	266.885	18.605
HFUJC117B	C	M1	3	1	306.595	18.203	0.280	0.044	6	XGM	0.0073	302.682	17.970
HFUJC118B	C	M1	3	1	288.316	18.176	0.262	0.044	6	XGM	0.0073	284.528	17.937
HFUJC216B	C	M2	3	2	307.289	18.235	0.279	0.044	6	XGM	0.0073	303.367	18.002
HFUJC217B	C	M2	3	2	296.358	18.309	0.293	0.044	6	SGM	0.0073	293.020	18.103
HFUJC218B	C	M2	3	2	285.867	18.241	0.297	0.044	6	XGM	0.0074	285.009	18.186

Average	**299.949**	**18.475**	**0.275**
Standard Dev.	**11.870**	**0.214**	**0.022**
Coeff. of Var. [%]	**3.957**	**1.159**	**7.985**
Min.	**270.953**	**18.176**	**0.223**
Max.	**315.504**	**18.888**	**0.313**
Number of Spec.	**19**	**19**	**19**

$Average_{norm}$	**0.0073**	**295.058**	**18.174**
$Standard\ Dev._{norm}$		**11.453**	**0.165**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.882**	**0.906**
Min.	**0.0072**	**266.885**	**17.937**
Max.	**0.0074**	**309.938**	**18.605**
Number of Spec.		**19**	**19**


Longitudinal Tension Properties (LT) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Strength [ksi]
0
40
80
120
160
200
240
280
320
360
0
1
2
3
4


Longitudinal Tension Properties (LT) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Modulus [Msi]
0
4
8
12
16
20
24
0
1
2
3
4

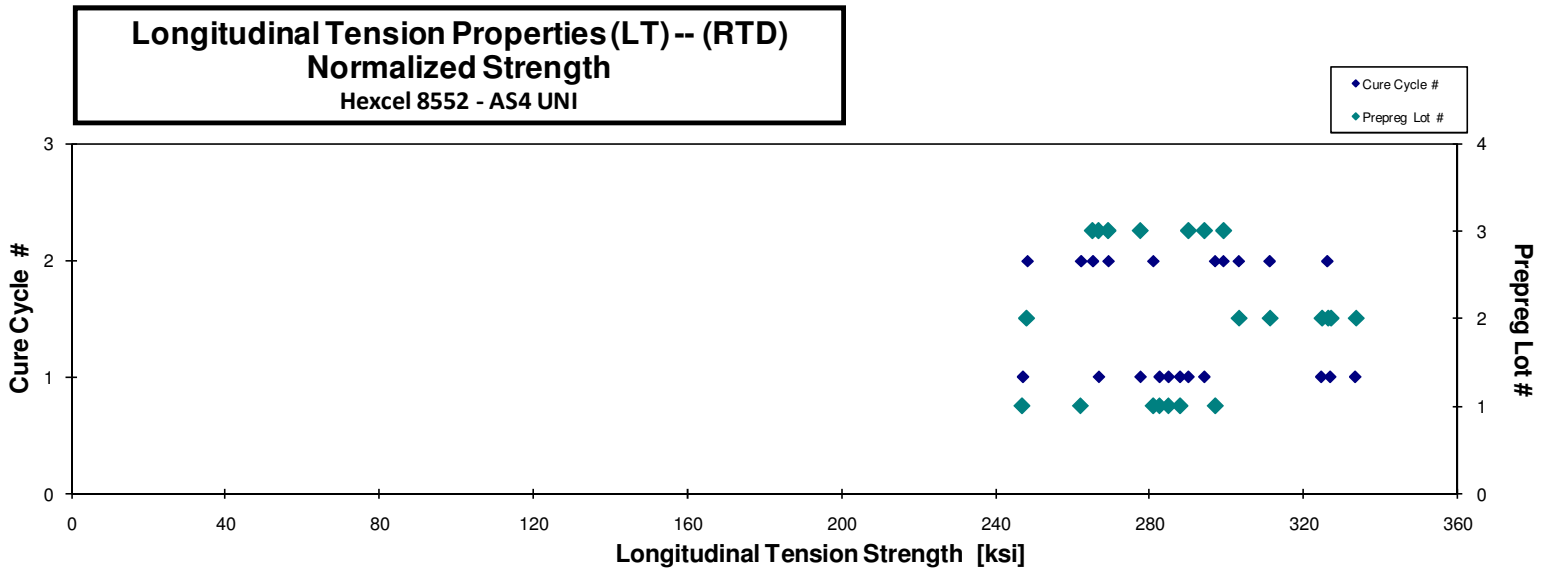
Logitudinal Tension Properties (LT) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

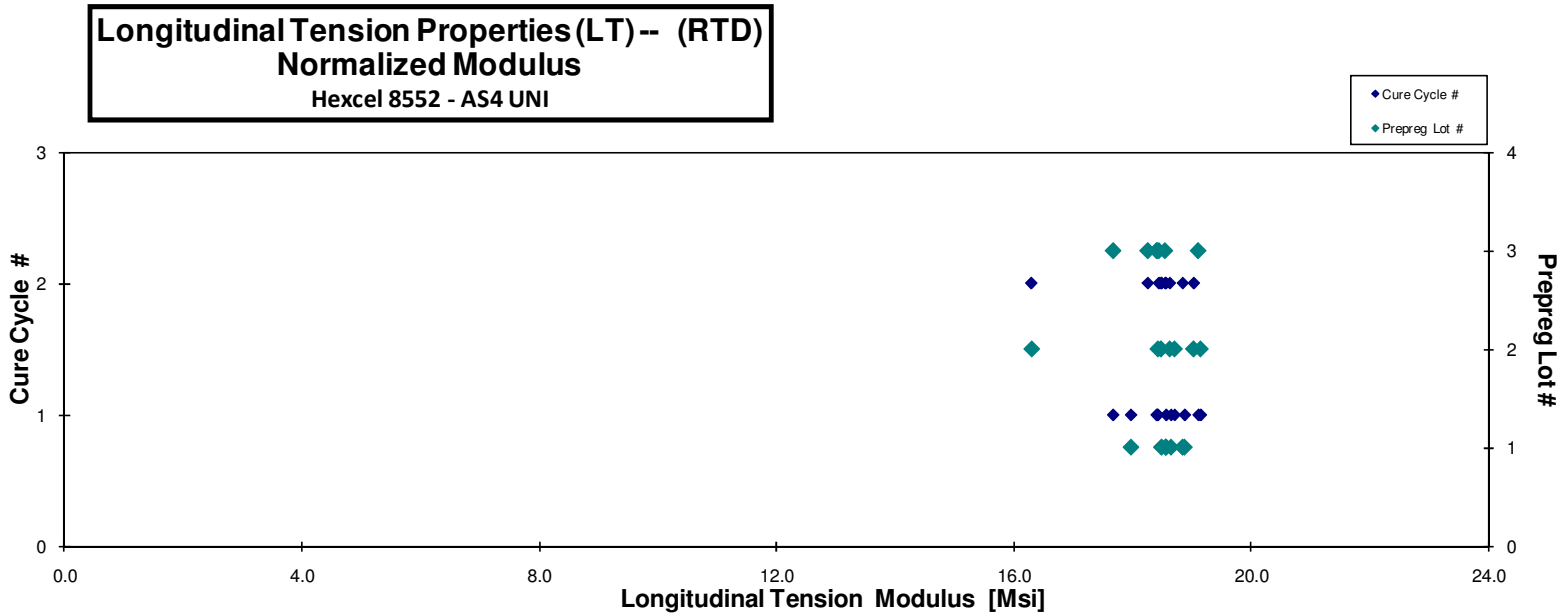
normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUJA111A	A	M1	1	1	268.822	19.568	0.302	0.041	6	SGM	0.0068	246.925	17.974
HFUJA112A	A	M1	1	1	280.775	18.761	0.314	0.045	6	SGM/LGM	0.0074	282.566	18.881
HFUJA113A	A	M1	1	1	288.542	18.695	0.292	0.044	6	XGM	0.0074	287.892	18.653
HFUJA114A	A	M1	1	1	289.328	18.859	0.295	0.044	6	SGM	0.0073	284.875	18.568
HFUJA212A	A	M2	1	2	298.941	18.610	0.312	0.044	6	SGM	0.0074	297.033	18.491
HFUJA213A	A	M2	1	2	264.864	18.760	0.296	0.044	6	SGM	0.0073	262.080	18.563
HFUJA214A	A	M2	1	2	283.916	19.048	0.308	0.044	6	SGM	0.0073	280.932	18.848
HFUJB112A	B	M1	2	1	349.998	20.095	0.304	0.042	6	SGM	0.0071	333.576	19.152
HFUJB113A	B	M1	2	1	331.830	19.122	0.300	0.043	6	XGM	0.0072	324.730	18.713
HFUJB114A	B	M1	2	1	332.284	18.726	0.309	0.044	6	XGM	0.0073	327.045	18.431
HFUJB211A	B	M2	2	2	289.011	18.976	0.296	0.038	6	SGM	0.0064	248.111	16.291
HFUJB212A	B	M2	2	2	335.112	19.133	0.295	0.043	6	SGM/LGM	0.0072	326.306	18.631
HFUJB213A	B	M2	2	2	300.962	18.893	0.287	0.045	6	SGM	0.0075	303.221	19.035
HFUJB214A	B	M2	2	2	315.998	18.764	0.300	0.044	6	XGM	0.0073	311.254	18.482
HFUJC213A	C	M2	3	1	310.193	19.748	0.307	0.040	6	SGM	0.0066	277.591	17.673
HFUJC112A	C	M1	3	1	301.627	19.874	0.337	0.043	6	SGM	0.0071	290.078	19.113
HFUJC113A	C	M1	3	1	271.527	18.739	0.321	0.044	6	SGM	0.0073	266.736	18.409
HFUJC114A	C	M1	3	1	297.126	18.599	0.284	0.044	6	SGM	0.0073	294.226	18.418
HFUJC211A	C	M2	3	2	300.352	20.694	0.316	0.040	6	SGM	0.0066	269.235	18.550
HFUJC212A	C	M2	3	2	306.811	18.915	0.298	0.043	6	LGM/SGM	0.0072	299.210	18.447
HFUJC213A	C	M2	3	2	265.580	18.286	0.280	0.044	6	SGM	0.0074	265.181	18.258

Average	**299.219**	**19.089**	**0.302**
Standard Dev.	**23.865**	**0.585**	**0.013**
Coeff. of Var. [%]	**7.976**	**3.066**	**4.349**
Min.	**264.864**	**18.286**	**0.280**
Max.	**349.998**	**20.694**	**0.337**
Number of Spec.	**21**	**21**	**21**

$Average_{norm}$	**0.0072**	**289.467**	**18.456**
Standard $Dev._{norm}$		**25.366**	**0.606**
Coeff. of Var. $[\%]_{norm}$		**8.763**	**3.281**
Min.	**0.0064**	**246.925**	**16.291**
Max.	**0.0075**	**333.576**	**19.152**
Number of Spec.		**21**	**21**


Longitudinal Tension Properties (LT) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Strength [ksi]
0
40
80
120
160
200
240
280
320
360
0
1
2
3
4


Longitudinal Tension Properties (LT) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Modulus [Msi]
0.0
4.0
8.0
12.0
16.0
20.0
24.0
0
1
2
3
4

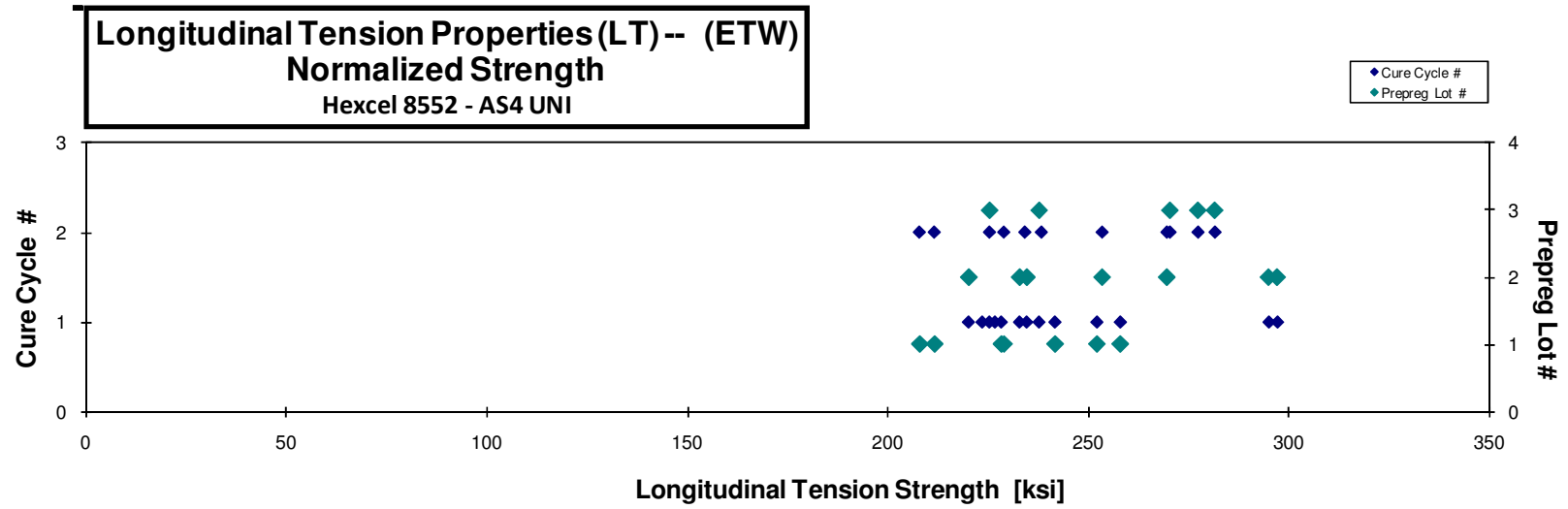
Longitudinal Tension Properties (LT) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 UNI

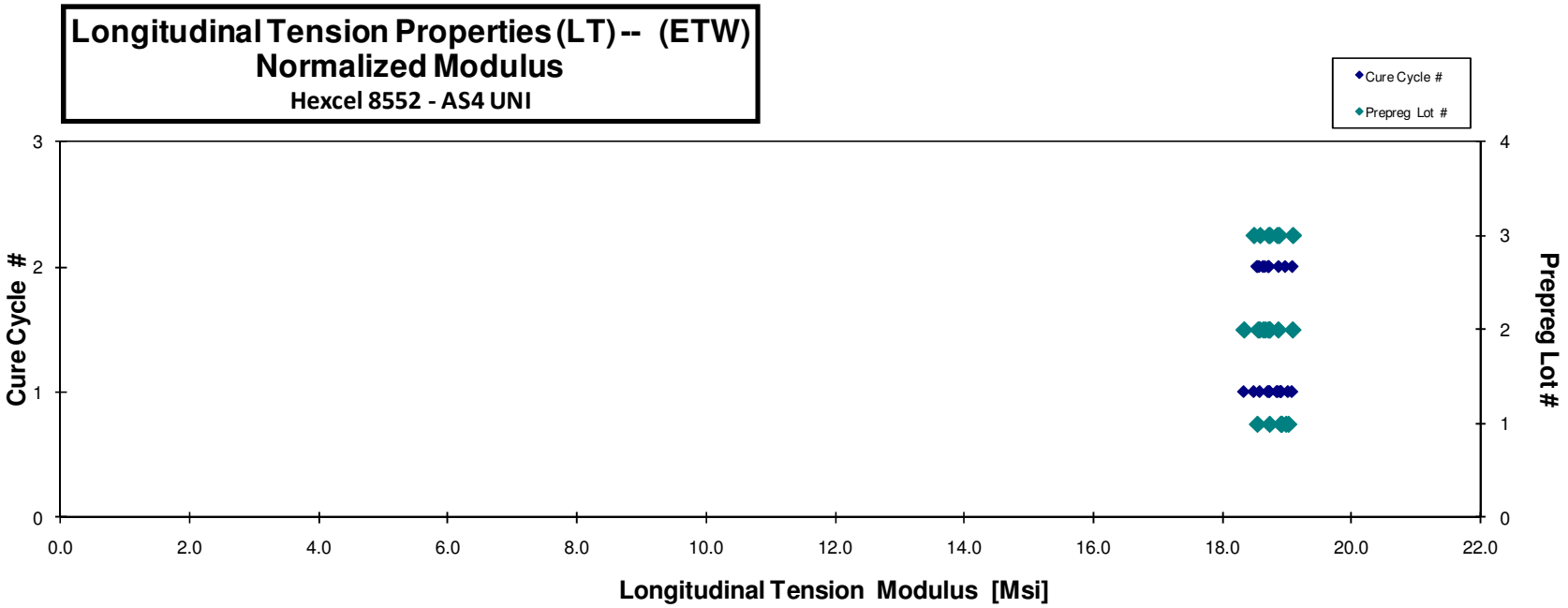
normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUJA11BD	A	M1	1	1	261.601	19.169	0.370	0.044	6	SGM	0.0073	257.968	18.903
HFUJA11CD	A	M1	1	1	230.951	19.132	0.376	0.044	6	SGM	0.0073	228.351	18.917
HFUJA11DD	A	M1	1	1	244.748	19.257	0.343	0.044	6	SGM	0.0073	241.716	19.018
HFUJA11ED	A	M1	1	1	258.159	19.355	0.370	0.043	6	SGM	0.0072	252.151	18.905
HFUJA21BD	A	M2	1	2	213.430	18.697	0.353	0.044	6	SGM	0.0073	211.668	18.543
HFUJA21CD	A	M2	1	2	230.370	18.842	0.370	0.044	6	SGM	0.0074	228.987	18.729
HFUJA21DD	A	M2	1	2	207.751	18.957	0.397	0.044	6	SGM	0.0074	207.985	18.979
HFUJB11BD	B	M1	2	1	237.450	19.074	0.369	0.044	6	SGM	0.0073	232.904	18.709
HFUJB11CD	B	M1	2	1	225.792	19.341	0.384	0.043	6	SGM	0.0072	220.198	18.862
HFUJB11DD	B	M1	2	1	238.782	18.660	0.350	0.044	6	SGM	0.0073	234.659	18.338
HFUJB11ED	B	M1	2	1	296.842	18.853	0.383	0.044	6	SGM	0.0074	294.948	18.733
HFUJB11FD	B	M1	2	1	296.866	19.066	0.353	0.044	6	SGM	0.0074	297.089	19.081
HFUJB21BD	B	M2	2	2	275.893	19.071	0.329	0.043	6	SGM	0.0072	269.575	18.634
HFUJB21CD	B	M2	2	2	262.209	19.218	0.391	0.043	6	SGM	0.0072	253.449	18.576
HFUJB21DD	B	M2	2	2	291.944	19.239	0.336	0.043	6	SGM	0.0071	281.533	18.553
HFUJB21ED	B	M2	2	2	275.516	19.079	0.319	0.044	6	SGM	0.0073	270.345	18.721
HFUJB21FD	B	M2	2	2	279.522	18.814	0.384	0.044	6	SGM	0.0073	277.319	18.666
HFUJC11BD	C	M1	3	1	229.001	18.882	0.390	0.044	6	SGM	0.0073	225.391	18.584
HFUJC11CD	C	M1	3	1	239.181	18.603	0.337	0.044	6	SGM	0.0074	237.745	18.491
HFUJC11DD	C	M1	3	1	223.924	18.874	0.377	0.044	6	SGM	0.0074	223.588	18.846
HFUJC11ED	C	M1	3	1	225.752	18.651	0.383	0.045	6	SGM	0.0074	226.769	18.735
HFUJC21BD	C	M2	3	2	226.192	18.779	0.416	0.044	6	SGM	0.0074	225.428	18.716
HFUJC21CD	C	M2	3	2	236.431	19.268	0.333	0.044	6	SGM	0.0073	234.212	19.087
HFUJC21DD	C	M2	3	2	239.952	19.005	0.361	0.044	6	SGM	0.0074	238.331	18.877

Average	**247.844**	**18.995**	**0.366**
Standard Dev.	**26.397**	**0.228**	**0.024**
Coeff. of Var. [%]	**10.651**	**1.202**	**6.666**
Min.	**207.751**	**18.603**	**0.319**
Max.	**296.866**	**19.355**	**0.416**
Number of Spec.	**24**	**24**	**24**

$Average_{norm}$	**0.0073**	**244.679**	**18.758**
Standard $Dev._{norm}$		**25.356**	**0.193**
Coeff. of Var. $[\%]_{norm}$		**10.363**	**1.031**
Min.	**0.0071**	**207.985**	**18.338**
Max.	**0.0074**	**297.089**	**19.087**
Number of Spec.		**24**	**24**


Longitudinal Tension Properties (LT) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
50
100
150
200
250
300
350
Longitudinal Tension Strength [ksi]


Longitudinal Tension Properties (LT) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 UNI
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
22.0
Longitudinal Tension Modulus [Msi]

4.2 Transverse Tension Properties

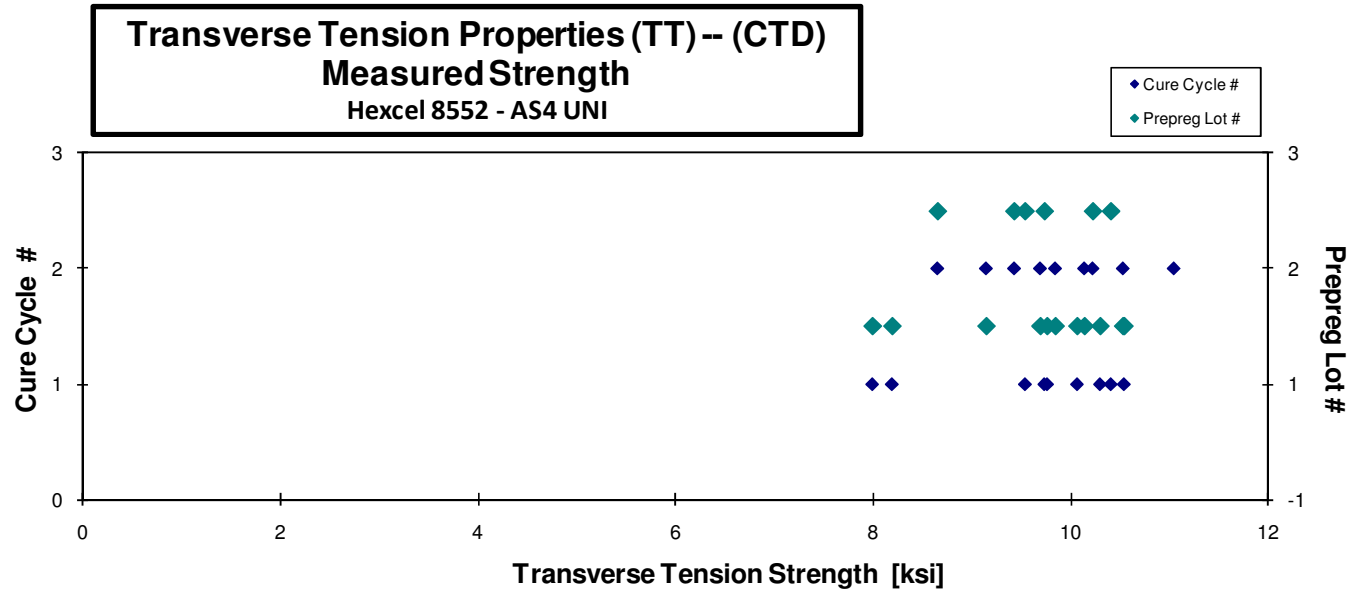
Transverse Tension Properties (TT) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

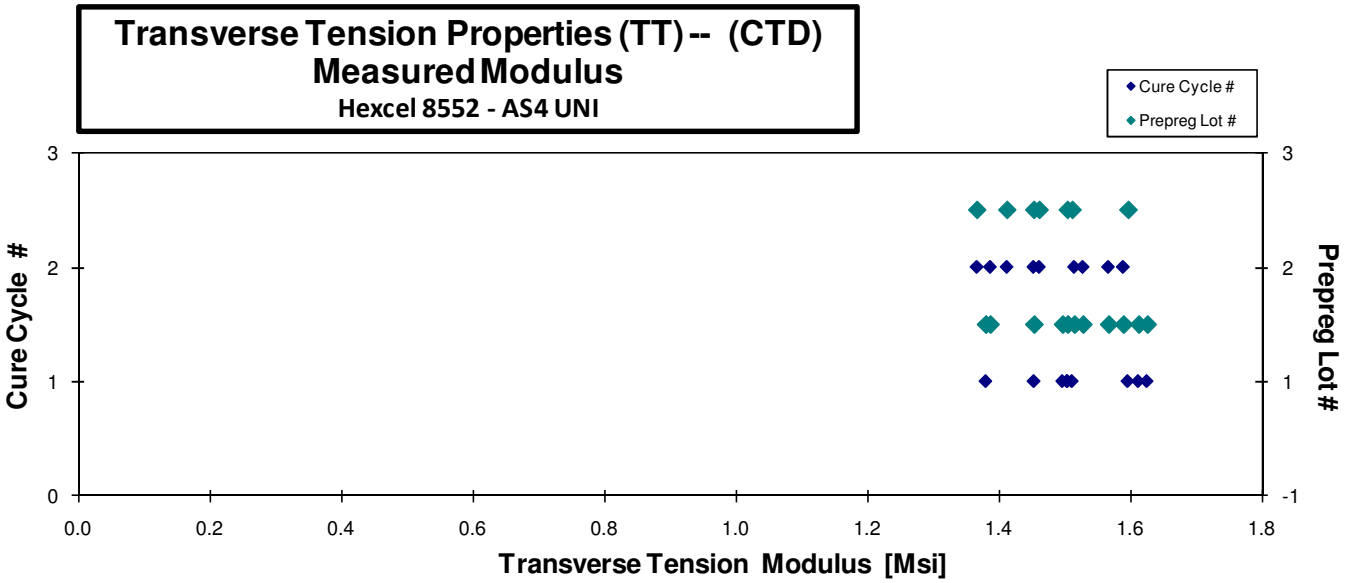
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]
HFUUA116B	A	M1	1	1	10.064	1.626	0.080	11	LAT/LAB	0.0073
HFUUA117B	A	M1	1	1	10.538	1.380	0.080	11	LAT/LAB	0.0073
HFUUA118B	A	M1	1	1	10.296	1.613	0.078	11	LGM	0.0071
HFUUA119B	A	M1	1	1	7.993	1.453	0.081	11	LGM	0.0073
HFUUA11AB	A	M1	1	1	8.192	1.497	0.080	11	LGM	0.0073
HFUUA216B	A	M2	1	2	9.144	1.567	0.081	11	LAB	0.0073
HFUUA217B	A	M2	1	2	9.843	1.387	0.082	11	LAT	0.0074
HFUUA218B	A	M2	1	2	9.690	1.590	0.082	11	LAT	0.0074
HFUUB116B	B	M1	2	1	9.733	1.512	0.080	11	LAT	0.0073
HFUUB117B	B	M1	2	1	9.537	1.597	0.080	11	LAB	0.0073
HFUUB118B	B	M1	2	1	10.404	1.504	0.080	11	LAB	0.0073
HFUUB216B	B	M2	2	2	8.652	1.366	0.080	11	LAT	0.0073
HFUUB217B	B	M2	2	2	10.221	1.412	0.079	11	LAB	0.0072
HFUUB218B	B	M2	2	2	9.427	1.453	0.080	11	LAT	0.0073
HFUUA115A	A	M1	1	1	9.760	1.505	0.081	11	LGM	0.0073
HFUUA214A	A	M2	1	2	10.136	1.528	0.081	11	LAT	0.0073
HFUUA215A	A	M2	1	2	10.527	1.515	0.080	11	LAT	0.0073
HFUUB214A	B	M2	2	2	11.041	1.461	0.080	11	LAB	0.0072

Batch C specimens were removed due to deep scratches on the specimens

* Last four specimens were originally from RTD but were tested as CTD

Average	**9.733**	**1.498**	**0.0073**
Standard Dev.	**0.816**	**0.081**	
Coeff. of Var. [%]	**8.387**	**5.383**	
Min.	**7.993**	**1.366**	**0.0071**
Max.	**11.041**	**1.626**	**0.0074**
Number of Spec.	**18**	**18**	**18**


Transverse Tension Properties (TT) -- (CTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Strength [ksi]
0
2
4
6
8
10
12
-1
0
1
2
3

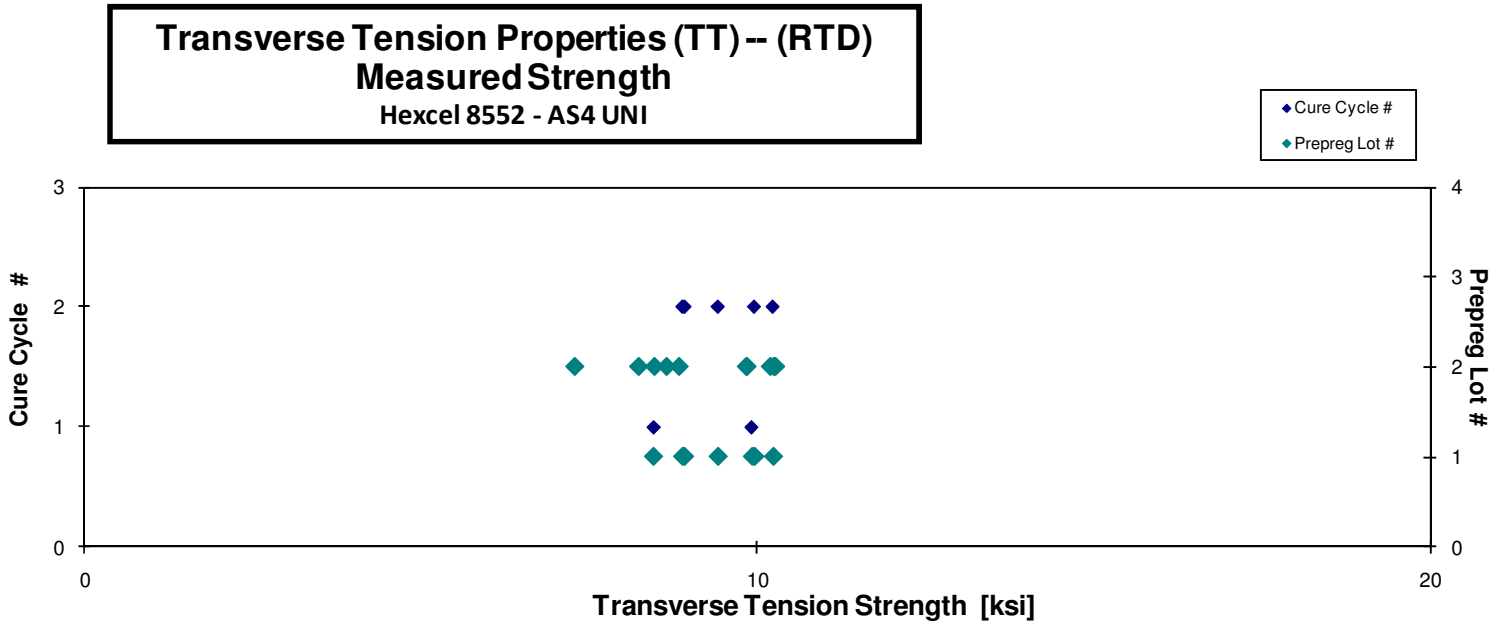

Transverse Tension Properties (TT) -- (CTD)
Measured Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Modulus [Msi]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
-1
0
1
2
3

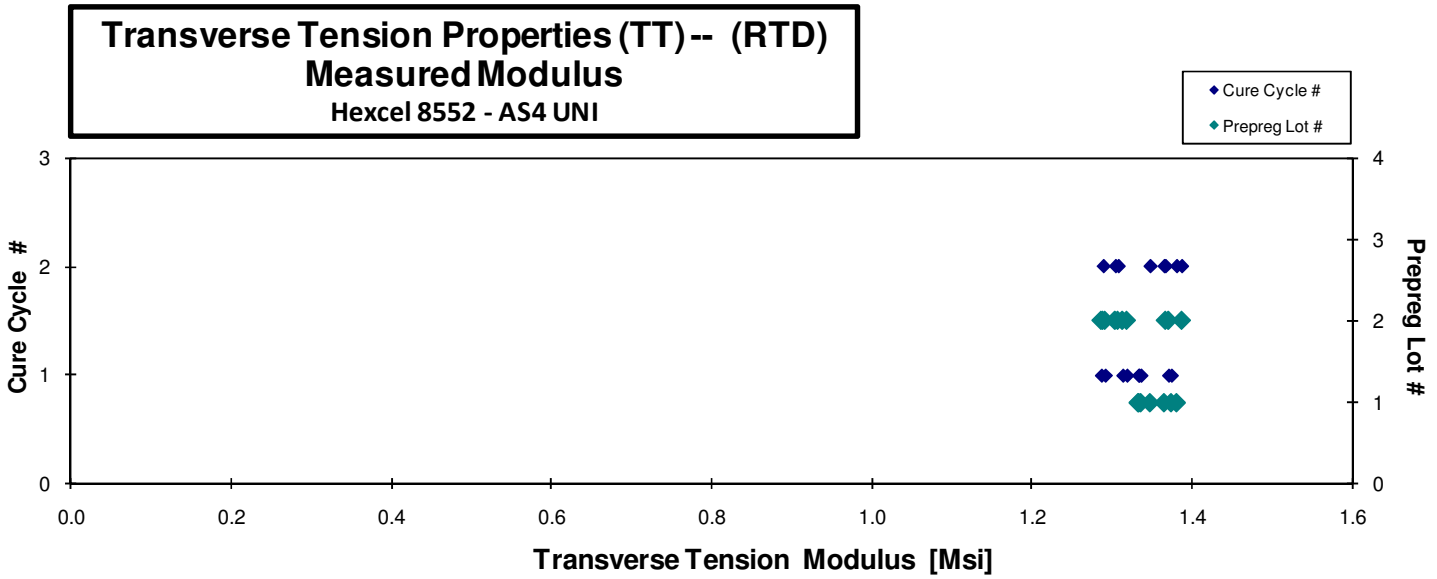
Transverse Tension Properties (TT) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]
HFUUA111A	A	M1	1	1	8.889	1.375	0.078	11	LGM	0.0071
HFUUA112A	A	M1	1	1	8.918	1.334	0.081	11	LGM	0.0073
HFUUA113A	A	M1	1	1	9.955	1.337	0.081	11	LAT	0.0073
HFUUA114A	A	M1	1	1	9.919	1.333	0.080	11	LWB	0.0073
HFUUA211A	A	M2	1	2	8.459	1.381	0.077	11	LWB	0.0070
HFUUA212A	A	M2	1	2	9.415	1.348	0.081	11	LAB	0.0074
HFUUA213A	A	M2	1	2	10.233	1.366	0.081	11	LAB	0.0073
HFUUB111A	B	M1	2	1	8.238	1.371	0.076	11	LGM	0.0069
HFUUB112A	B	M1	2	1	8.472	1.314	0.080	11	LAB	0.0073
HFUUB113A	B	M1	2	1	8.837	1.319	0.080	11	LAB	0.0073
HFUUB211A	B	M2	2	2	7.295	1.367	0.075	11	LGM	0.0068
HFUUB212A	B	M2	2	2	8.652	1.304	0.081	11	LAB	0.0073
HFUUB213A	B	M2	2	2	9.840	1.308	0.081	11	LAB	0.0074
HFUUB114B	B	M1	2	1	10.187	1.292	0.080	11	LGM	0.0073
HFUUB115B	B	M1	2	1	10.263	1.287	0.080	11	LAT	0.0072
HFUUB219B	B	M2	2	2	10.238	1.289	0.080	11	LAB	0.0072
HFUUB21AB	B	M2	2	2	9.832	1.388	0.073	11	LAB	0.0067

Batch C specimens were removed due to deep scratches on the specimens
Last four specimens were originally designated for CTD but were tested in RTD.

Average	**9.273**	**1.336**	**0.0072**
Standard Dev.	**0.878**	**0.034**	
Coeff. of Var. [%]	**9.471**	**2.557**	
Min.	**7.295**	**1.287**	**0.0067**
Max.	**10.263**	**1.388**	**0.0074**
Number of Spec.	**17**	**17**	**17**

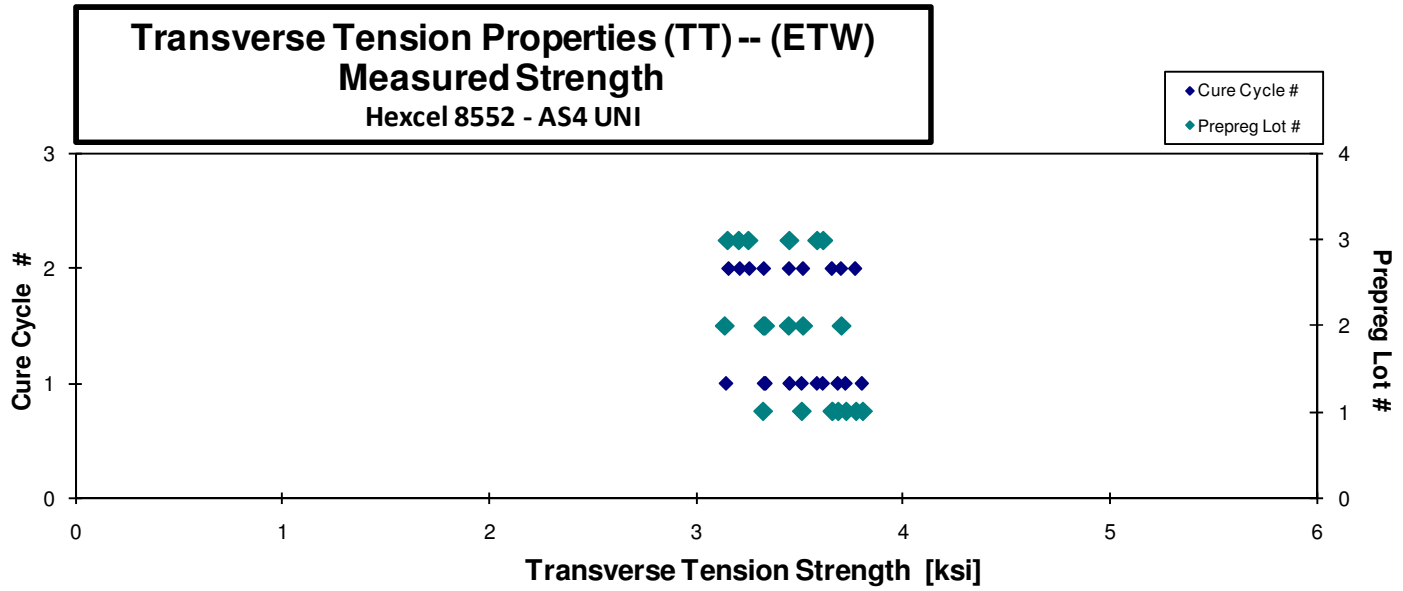

Transverse Tension Properties (TT) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Strength [ksi]
0
10
20
0
1
2
3
0
1
2
3
4

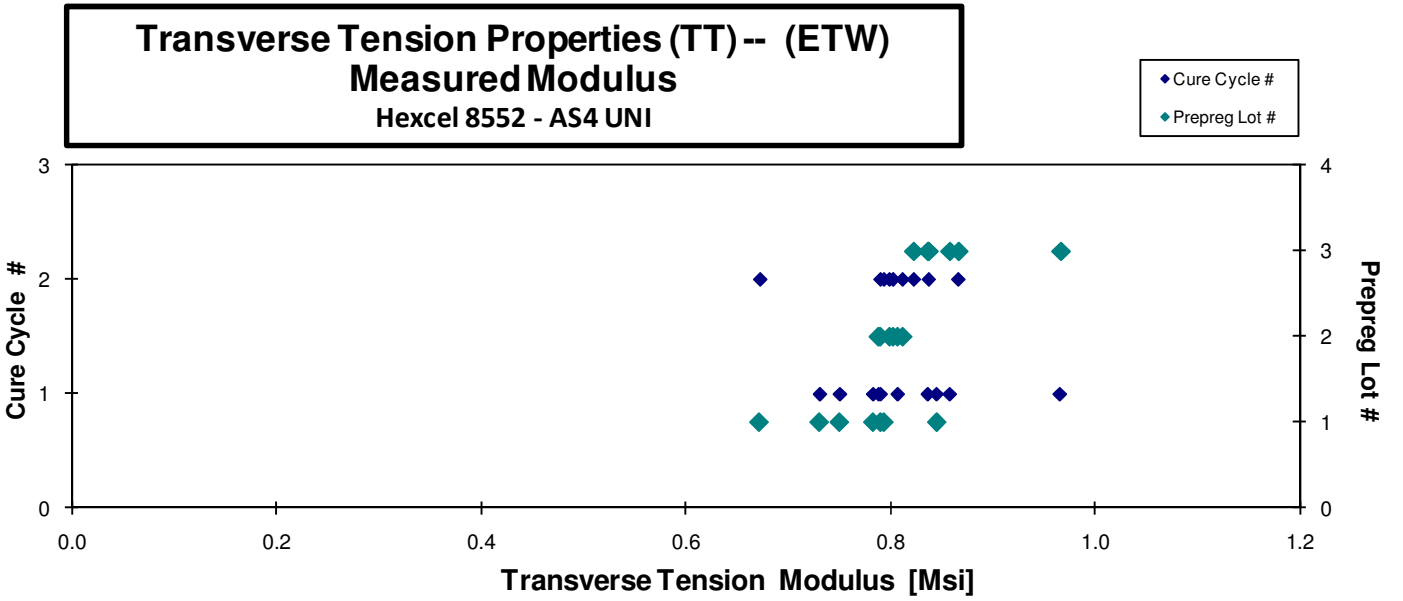

Transverse Tension Properties (TT) -- (RTD)
Measured Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Modulus [Msi]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
0
1
2
3
0
1
2
3
4

Transverse Tension Properties (TT) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]
HFUUA11BD	A	M1	1	1	3.724	0.846	0.080	11	LGM	0.00730
HFUUA11CD	A	M1	1	1	3.511	0.731	0.080	11	LGM	0.00730
HFUUA11DD	A	M1	1	1	3.686	0.751	0.080	11	LGM	0.00729
HFUUA11ED	A	M1	1	1	3.804	0.783	0.080	11	LGM	0.00729
HFUUA21BD	A	M2	1	2	3.326	0.672	0.081	11	LGM	0.00739
HFUUA21CD	A	M2	1	2	3.658	0.791	0.081	11	LGM	0.00738
HFUUA21DD	A	M2	1	2	3.772	0.794	0.081	11	LGM	0.00735
HFUUB11BD	B	M1	2	1	3.142	0.789	0.080	11	LGM	0.00728
HFUUB11CD	B	M1	2	1	3.328	0.790	0.080	11	LGM	0.00729
HFUUB11DD	B	M1	2	1	3.335	0.807	0.080	11	LGM	0.00727
HFUUB21BD	B	M2	2	2	3.702	0.812	0.080	11	LGM	0.00727
HFUUB21CD	B	M2	2	2	3.517	0.799	0.081	11	LGM	0.00736
HFUUB21DD	B	M2	2	2	3.449	0.803	0.079	11	LGM	0.00722
HFUUC11BD	C	M1	3	1	3.452	0.967	0.073	11	LGM	0.00667
HFUUC11CD	C	M1	3	1	3.585	0.859	0.080	11	LGM	0.00728
HFUUC11DD	C	M1	3	1	3.614	0.837	0.081	11	LGM	0.00732
HFUUC21BD	C	M2	3	2	3.155	0.867	0.081	11	LGM	0.00739
HFUUC21CD	C	M2	3	2	3.256	0.823	0.082	11	LGM	0.00748
HFUUC21DD	C	M2	3	2	3.209	0.838	0.081	11	LGM	0.00740

Average	**3.485**	**0.808**	**0.0073**
Standard Dev.	**0.213**	**0.060**	
Coeff. of Var. [%]	**6.115**	**7.385**	
Min.	**3.142**	**0.672**	**0.0067**
Max.	**3.804**	**0.967**	**0.0075**
Number of Spec.	**19**	**19**	**19**


Transverse Tension Properties (TT) -- (ETW)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Tension Strength [ksi]
0
1
2
3
4
5
6


Transverse Tension Properties (TT) -- (ETW)
Measured Modulus
Hexcel 8552 - AS4 UNI
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

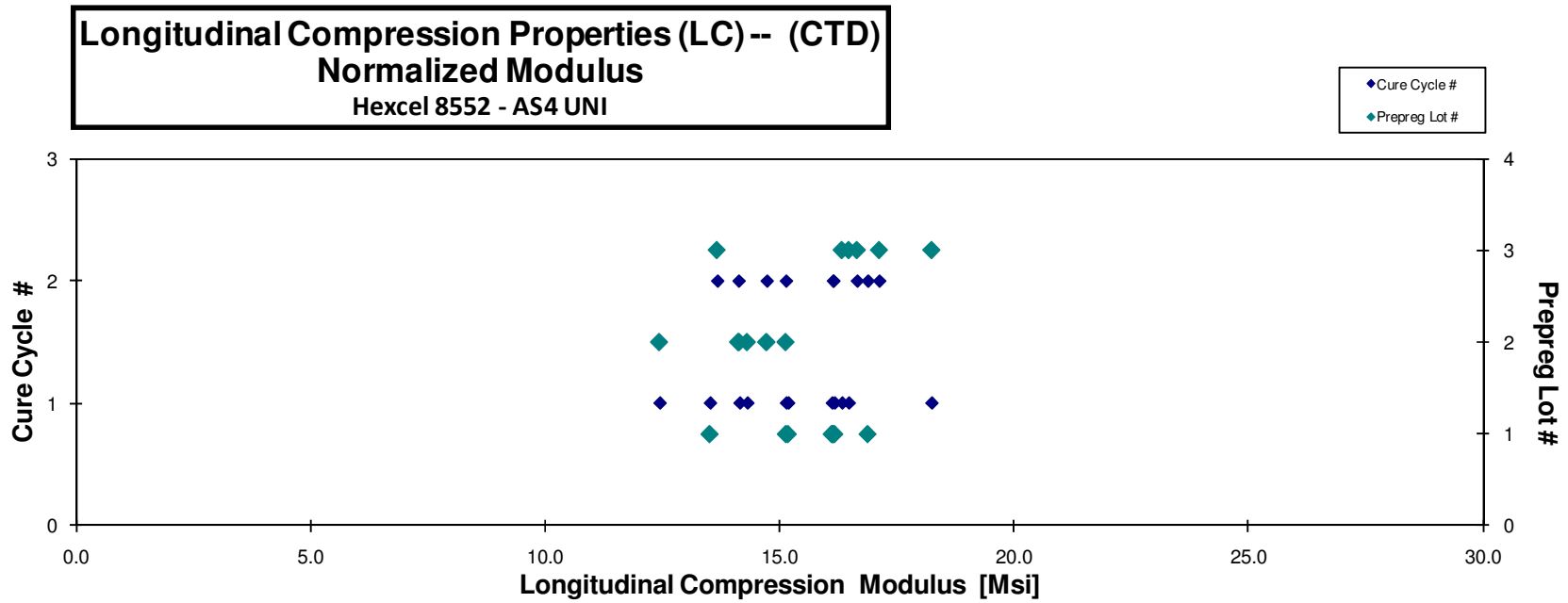
4.3 Longitudinal Compression Properties

Longitudinal Compression Properties (LC) -- (CTD)
Modulus
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
HFULA116B	A	M1	1	1	15.353	0.313	0.102	14	NO FAILURE	0.0073	15.181
HFULA117B	A	M1	1	1	16.365	0.352	0.102	14	NO FAILURE	0.0073	16.171
HFULA118B	A	M1	1	1	16.283	0.379	0.103	14	NO FAILURE	0.0073	16.115
HFULA119B	A	M1	1	1	13.537	0.272	0.103	14	NO FAILURE	0.0074	13.513
HFULA11AB	A	M1	1	1	15.275	0.331	0.103	14	NO FAILURE	0.0073	15.138
HFULA215B	A	M2	1	2	16.909	0.311	0.103	14	NO FAILURE	0.0074	16.882
HFULA216B	A	M2	1	2	16.208	0.375	0.103	14	NO FAILURE	0.0074	16.137
HFULA217B	A	M2	1	2	16.162	0.300	0.103	14	NO FAILURE	0.0074	16.144
HFULB115B	B	M1	2	1	14.488	0.423	0.101	14	NO FAILURE	0.0072	14.144
HFULB116B	B	M1	2	1	14.661	0.289	0.101	14	NO FAILURE	0.0072	14.307
HFULB117B	B	M1	2	1	12.753	0.408	0.101	14	NO FAILURE	0.0072	12.437
HFULB215B	B	M2	2	2	14.821	0.294	0.103	14	NO FAILURE	0.0074	14.723
HFULB216B	B	M2	2	2	14.302	0.343	0.102	14	NO FAILURE	0.0073	14.122
HFULB217B	B	M2	2	2	15.463	0.303	0.101	14	NO FAILURE	0.0072	15.132
HFULC115B	C	M1	3	1	18.215	0.416	0.104	14	NO FAILURE	0.0074	18.242
HFULC116B	C	M1	3	1	16.559	0.276	0.103	14	NO FAILURE	0.0074	16.474
HFULC117B	C	M1	3	1	16.522	0.247	0.102	14	NO FAILURE	0.0073	16.330
HFULC215B	C	M2	3	2	16.532	0.283	0.104	14	NO FAILURE	0.0075	16.652
HFULC216B	C	M2	3	2	17.129	0.432	0.104	14	NO FAILURE	0.0074	17.124
HFULC217B	C	M2	3	2	13.766	0.355	0.103	14	NO FAILURE	0.0073	13.666

Average	**15.565**	**0.335**	**$Average_{norm}$**	**0.0073**	**15.432**
Standard Dev.	**1.368**	**0.055**	**$Standard\ Dev._{norm}$**		**1.440**
Coeff. of Var. [%]	**8.790**	**16.540**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**9.333**
Min.	**12.753**	**0.247**	**Min.**	**0.0072**	**12.437**
Max.	**18.215**	**0.432**	**Max.**	**0.0075**	**18.242**
Number of Spec.	**20**	**20**	**Number of Spec.**		**20**


Longitudinal Compression Properties (LC) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Compression Modulus [Msi]
0.0
5.0
10.0
15.0
20.0
25.0
30.0
0
1
2
3
4

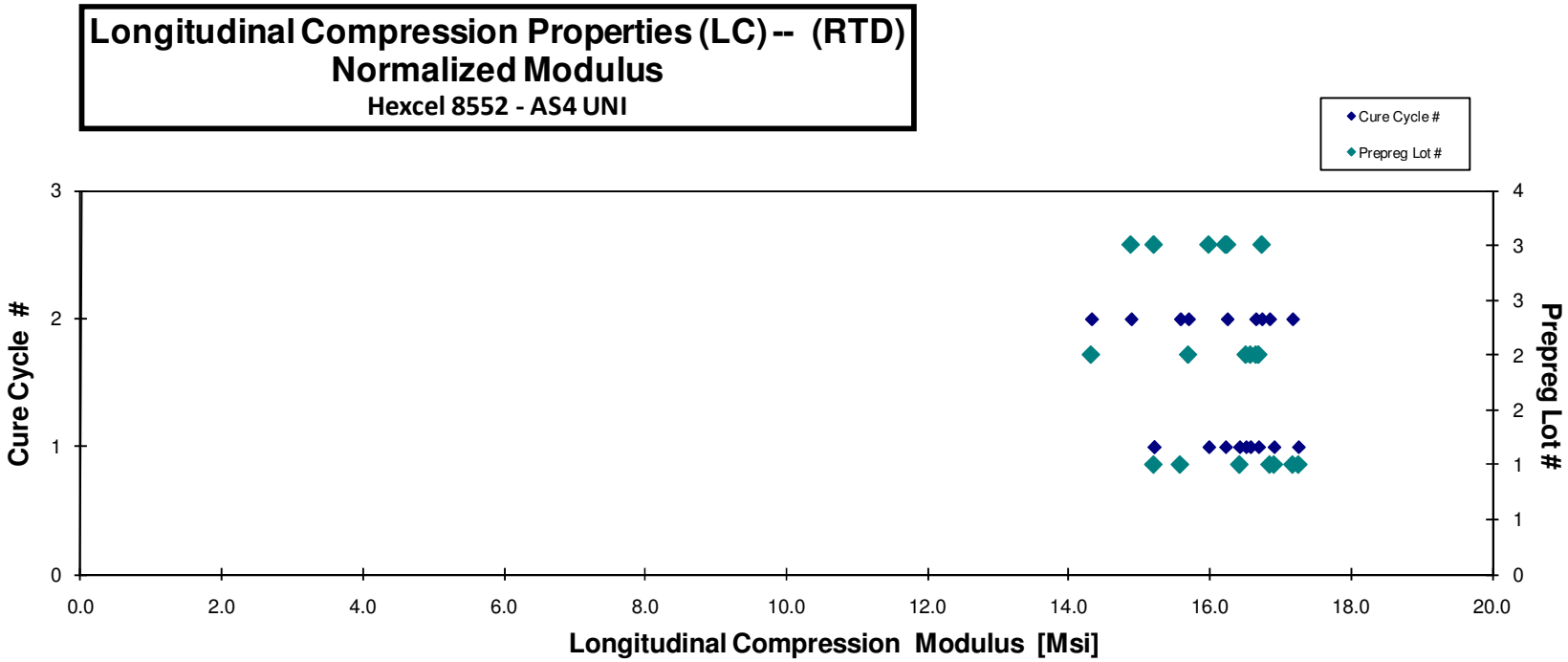
Longitudinal Compression Properties (LC) -- (RTD)
Modulus
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
HFULA112A	A	M1	1	1	16.930	0.363	0.101	14	NO FAILURE	0.0072	16.424
HFULA113A	A	M1	1	1	17.261	0.371	0.104	14	NO FAILURE	0.0074	17.258
HFULA114A	A	M1	1	1	16.978	0.364	0.103	14	NO FAILURE	0.0074	16.913
HFULA115A	A	M1	1	1	15.292	0.337	0.103	14	NO FAILURE	0.0074	15.208
HFULA211A	A	M2	1	2	16.592	0.359	0.097	14	NO FAILURE	0.0070	15.583
HFULA212A	A	M2	1	2	16.993	0.365	0.103	14	NO FAILURE	0.0073	16.851
HFULA213A	A	M2	1	2	17.100	0.439	0.104	14	NO FAILURE	0.0074	17.177
HFULB112A	B	M1	2	1	17.051	0.341	0.100	14	NO FAILURE	0.0072	16.514
HFULB113A	B	M1	2	1	16.988	0.312	0.102	14	NO FAILURE	0.0073	16.693
HFULB114A	B	M1	2	1	16.915	0.282	0.102	14	NO FAILURE	0.0073	16.578
HFULB211A	B	M2	2	2	16.425	0.286	0.090	14	NO FAILURE	0.0065	14.322
HFULB212A	B	M2	2	2	16.623	0.271	0.098	14	NO FAILURE	0.0070	15.698
HFULB213A	B	M2	2	2	17.060	0.361	0.101	14	NO FAILURE	0.0072	16.654
HFULC111A	C	M1	3	1	16.783	0.313	0.094	14	NO FAILURE	0.0067	15.211
HFULC112A	C	M1	3	1	16.640	0.283	0.100	14	NO FAILURE	0.0071	15.987
HFULC113A	C	M1	3	1	16.418	0.317	0.102	14	NO FAILURE	0.0073	16.225
HFULC211A	C	M2	3	2	16.725	0.331	0.092	14	NO FAILURE	0.0066	14.884
HFULC212A	C	M2	3	2	16.853	0.328	0.100	14	NO FAILURE	0.0071	16.249
HFULC213A	C	M2	3	2	16.743	0.332	0.104	14	NO FAILURE	0.0074	16.740

Average	**16.756**	**0.335**
Standard Dev.	**0.422**	**0.041**
Coeff. of Var. [%]	**2.518**	**12.123**
Min.	**15.292**	**0.271**
Max.	**17.261**	**0.439**
Number of Spec.	**19**	**19**

$Average_{norm}$	**0.0071**	**16.167**
Standard $Dev._{norm}$		**0.814**
Coeff. of Var. $[\%]_{norm}$		**5.033**
Min.	**0.0065**	**14.322**
Max.	**0.0074**	**17.258**
Number of Spec.		**19**


Longitudinal Compression Properties (LC) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Compression Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
0
1
2
3
4

Longitudinal Compression Properties (LC) -- (ETD) Modulus

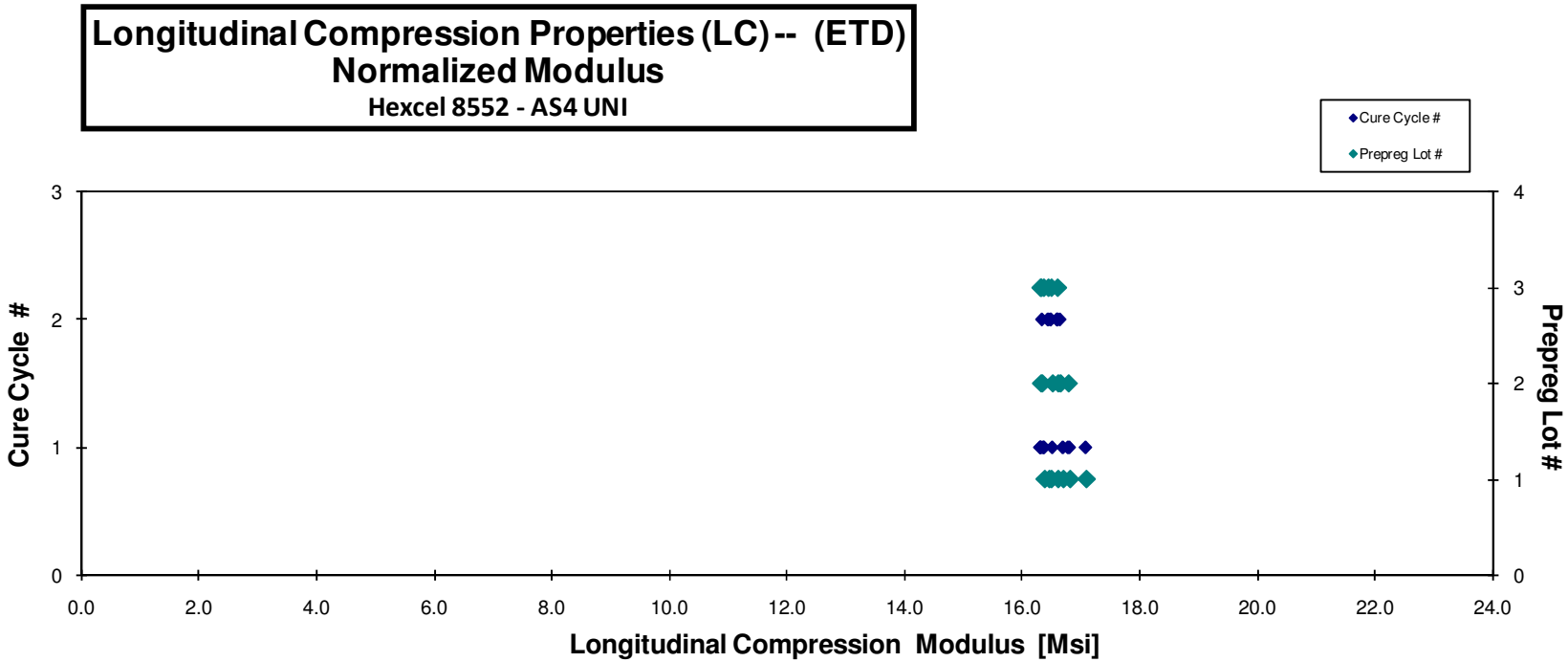
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
HFULA11BC	A	M1	1	1	16.759	0.379	0.103	14	NO FAILURE	0.0074	16.689
HFULA11CC	A	M1	1	1	17.189	0.383	0.103	14	NO FAILURE	0.0074	17.079
HFULA11DC	A	M1	1	1	16.487	0.343	0.103	14	NO FAILURE	0.0073	16.368
HFULA11EC	A	M1	1	1	16.842	0.346	0.103	14	NO FAILURE	0.0074	16.801
HFULA219C	A	M2	1	2	16.435	0.354	0.104	14	NO FAILURE	0.0074	16.483
HFULA21AC	A	M2	1	2	16.434	0.355	0.104	14	NO FAILURE	0.0074	16.447
HFULA21BC	A	M2	1	2	16.550	0.349	0.104	14	NO FAILURE	0.0074	16.598
HFULB119C	B	M1	2	1	17.022	0.345	0.102	14	NO FAILURE	0.0073	16.775
HFULB11AC	B	M1	2	1	16.823	0.362	0.102	14	NO FAILURE	0.0073	16.506
HFULB11BC	B	M1	2	1	16.686	0.331	0.101	14	NO FAILURE	0.0072	16.307
HFULB219C	B	M2	2	2	16.641	0.326	0.102	14	NO FAILURE	0.0073	16.330
HFULB21AC	B	M2	2	2	16.722	0.320	0.103	14	NO FAILURE	0.0073	16.599
HFULB21BC	B	M2	2	2	16.778	0.332	0.103	14	NO FAILURE	0.0073	16.638
HFULC119C	C	M1	3	1	16.627	0.372	0.102	14	NO FAILURE	0.0073	16.311
HFULC11AC	C	M1	3	1	16.629	0.362	0.102	14	NO FAILURE	0.0073	16.297
HFULC11BC	C	M1	3	1	16.651	0.315	0.102	14	NO FAILURE	0.0073	16.353
HFULC219C	C	M2	3	2	16.632	0.347	0.102	14	NO FAILURE	0.0073	16.431
HFULC21AC	C	M2	3	2	16.833	0.344	0.102	14	NO FAILURE	0.0073	16.590
HFULC21BC	C	M2	3	2	16.494	0.339	0.104	14	NO FAILURE	0.0074	16.484

Average	**16.697**	**0.348**
Standard Dev.	**0.194**	**0.019**
Coeff. of Var. [%]	**1.162**	**5.383**
Min.	**16.434**	**0.315**
Max.	**17.189**	**0.383**
Number of Spec.	**19**	**19**

$Average_{norm}$	**0.0073**	**16.531**
$Standard\ Dev._{norm}$		**0.205**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**1.239**
Min.	**0.0072**	**16.297**
Max.	**0.0074**	**17.079**
Number of Spec.		**19**


Longitudinal Compression Properties (LC) -- (ETD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Compression Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
0
1
2
3
4

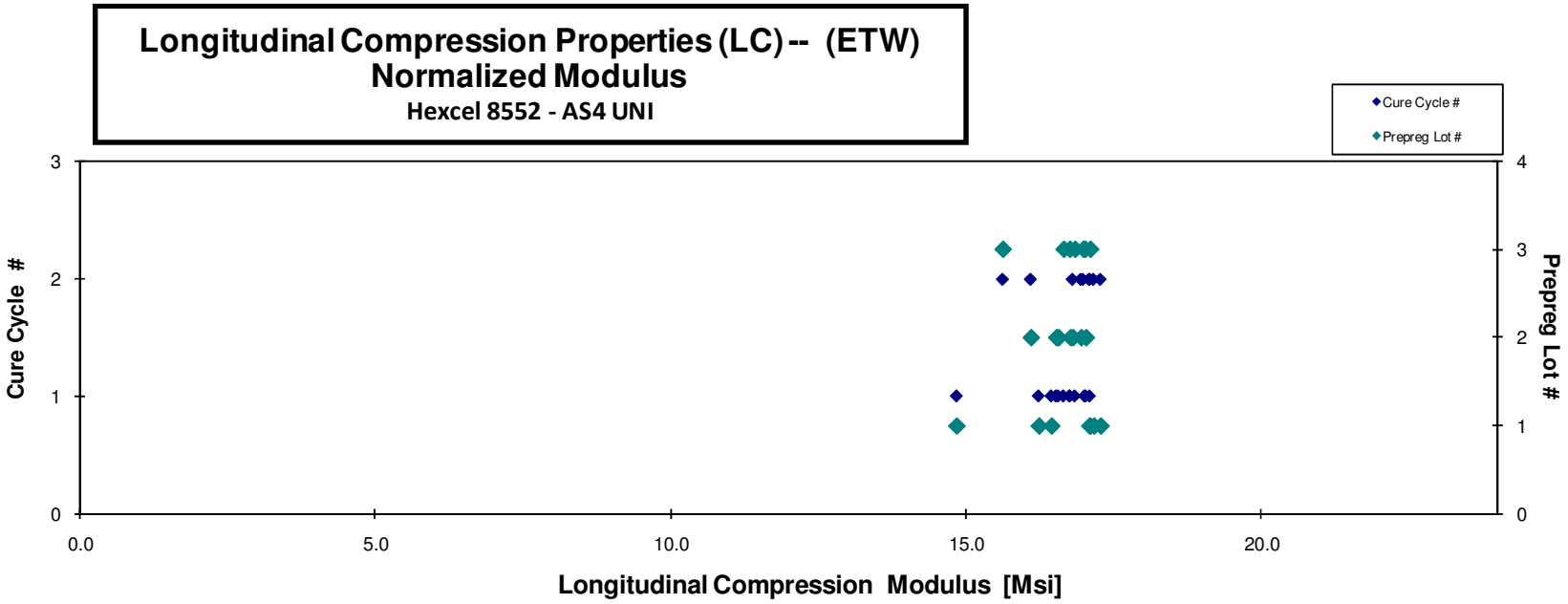
Longitudinal Compression Properties (LC) -- (ETW) Modulus

Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
HFULA11GD	A	M1	1	1	17.223	0.385	0.103	14	NO FAILURE	0.0073	17.093
HFULA11HD	A	M1	1	1	16.902	0.376	0.099	14	NO FAILURE	0.0071	16.227
HFULA11ID	A	M1	1	1	16.217	0.394	0.095	14	NO FAILURE	0.0068	14.837
HFULA11JD	A	M1	1	1	16.753	0.361	0.102	14	NO FAILURE	0.0073	16.443
HFULA21ED	A	M2	1	2	17.169	0.412	0.104	14	NO FAILURE	0.0074	17.158
HFULA21FD	A	M2	1	2	16.986	0.370	0.104	14	NO FAILURE	0.0074	17.085
HFULA21GD	A	M2	1	2	17.214	0.395	0.104	14	NO FAILURE	0.0074	17.275
HFULB11ED	B	M1	2	1	17.314	0.427	0.102	14	NO FAILURE	0.0073	17.027
HFULB11FD	B	M1	2	1	16.968	0.332	0.102	14	NO FAILURE	0.0073	16.760
HFULB11GD	B	M1	2	1	16.691	0.403	0.103	14	NO FAILURE	0.0073	16.562
HFULB11ID	B	M1	2	1	17.039	0.358	0.100	14	NO FAILURE	0.0072	16.524
HFULB21ED	B	M2	2	2	17.020	0.373	0.102	14	NO FAILURE	0.0073	16.804
HFULB21FD	B	M2	2	2	17.267	0.422	0.102	14	NO FAILURE	0.0073	16.942
HFULB21GD	B	M2	2	2	16.925	0.358	0.099	14	NO FAILURE	0.0070	16.094
HFULC11CD	C	M1	3	1	16.985	0.353	0.102	14	NO FAILURE	0.0073	16.649
HFULC11ED	C	M1	3	1	16.961	0.383	0.103	14	NO FAILURE	0.0073	16.841
HFULC11FD	C	M1	3	1	16.845	0.402	0.103	14	NO FAILURE	0.0074	16.753
HFULC11GD	C	M1	3	1	17.421	0.499	0.101	14	NO FAILURE	0.0072	17.009
HFULC21ED	C	M2	3	2	16.932	0.345	0.105	14	NO FAILURE	0.0075	17.096
HFULC21FD	C	M2	3	2	16.844	0.387	0.104	14	NO FAILURE	0.0075	16.980
HFULC21GD	C	M2	3	2	17.355	0.379	0.093	14	NO FAILURE	0.0067	15.619

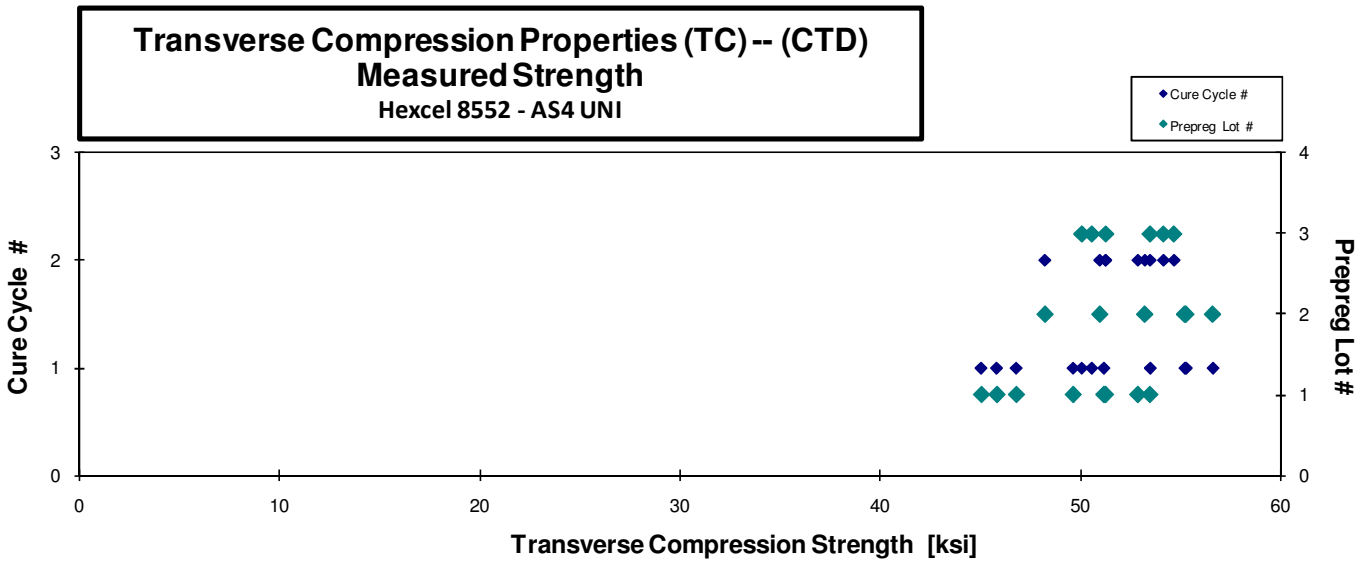
Average	**17.002**	**0.386**	**$Average_{norm}$**	**0.0072**	**16.656**
Standard Dev.	**0.268**	**0.036**	**$Standard\ Dev._{norm}$**		**0.578**
Coeff. of Var. [%]	**1.578**	**9.229**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.471**
Min.	**16.217**	**0.332**	**Min.**	**0.0067**	**14.837**
Max.	**17.421**	**0.499**	**Max.**	**0.0075**	**17.275**
Number of Spec.	**21**	**21**	**Number of Spec.**		**21**

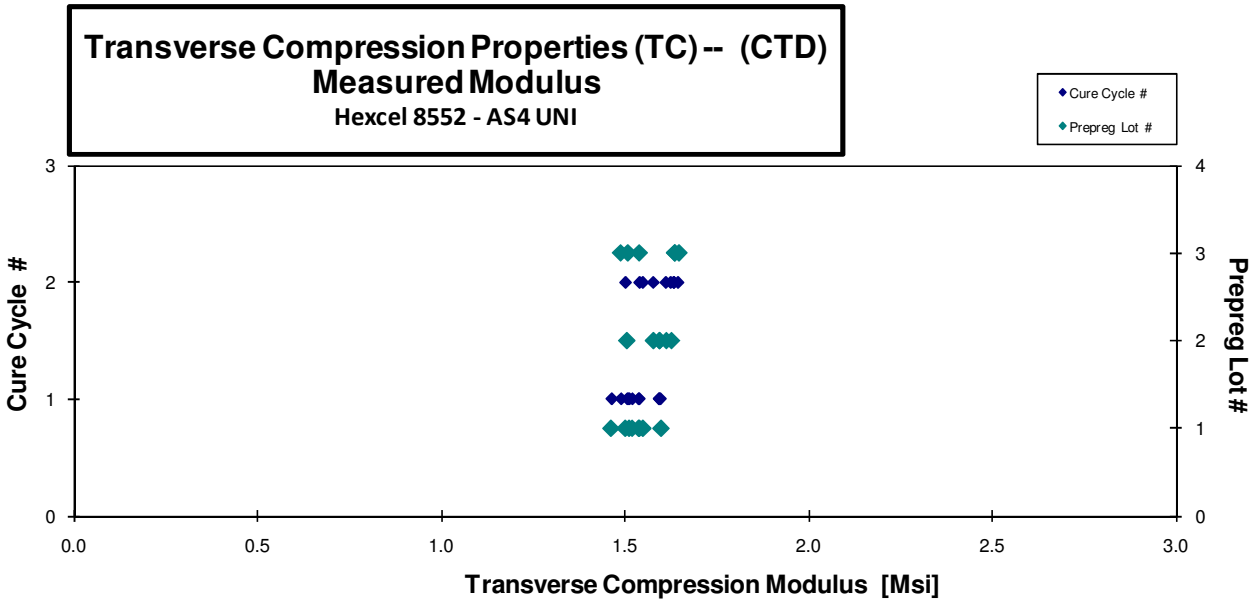

Longitudinal Compression Properties (LC) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
Longitudinal Compression Modulus [Msi]

4.4 Transverse Compression Properties

Transverse Compression Properties (TC) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

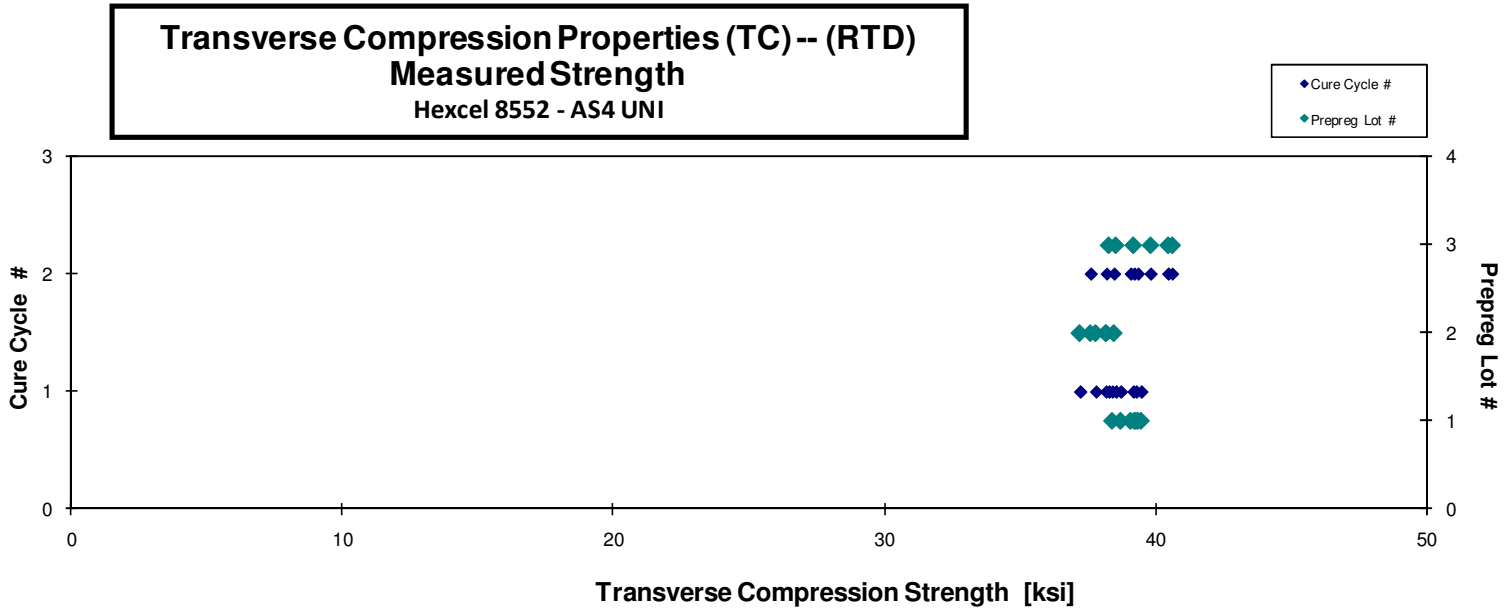
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]
HFUZA116B	A	M1	1	1	46.805	1.520	0.022	0.104	14	HGM	0.0074
HFUZA117B	A	M1	1	1	51.172	1.598	0.035	0.103	14	HGM	0.0074
HFUZA118B	A	M1	1	1	49.640	1.537	0.031	0.104	14	HGM	0.0074
HFUZA119B	A	M1	1	1	45.830	1.463	0.031	0.104	14	HGM	0.0074
HFUZA11AB	A	M1	1	1	45.060	1.512	0.032	0.104	14	HGM	0.0075
HFUZA216B	A	M2	1	2	53.472	1.549	0.045	0.104	14	HGM	0.0074
HFUZA217B	A	M2	1	2	52.867	1.501	0.040	0.104	14	HGM	0.0074
HFUZA218B	A	M2	1	2	51.256	1.540	0.037	0.104	14	HGM	0.0074
HFUZB116B	B	M1	2	1	55.202	1.506	0.029	0.101	14	HGM	0.0072
HFUZB117B	B	M1	2	1	55.270	1.593	0.034	0.101	14	HAT	0.0072
HFUZB118B	B	M1	2	1	56.603	1.594	0.024	0.101	14	HAT	0.0072
HFUZB216B	B	M2	2	2	48.234	1.612	0.037	0.101	14	HAT	0.0072
HFUZB217B	B	M2	2	2	53.212	1.626	0.033	0.101	14	HAT	0.0072
HFUZB218B	B	M2	2	2	50.966	1.577	0.022	0.101	14	HAT	0.0072
HFUZC116B	C	M1	3	1	50.067	1.489	0.028	0.104	14	HGM	0.0074
HFUZC117B	C	M1	3	1	50.565	1.509	0.031	0.103	14	HGM	0.0074
HFUZC118B	C	M1	3	1	53.478	1.539	0.038	0.103	14	HGM	0.0074
HFUZC216B	C	M2	3	2	51.263	1.635	0.038	0.103	14	HGM	0.0073
HFUZC217B	C	M2	3	2	54.141	1.634	0.033	0.102	14	HGM	0.0073
HFUZC218B	C	M2	3	2	54.665	1.646	0.033	0.102	14	HGM	0.0073
				Average	**51.488**	**1.559**	**0.033**				**0.0073**
				Standard Dev.	**3.218**	**0.055**	**0.006**				
				Coeff. of Var. [%]	**6.251**	**3.549**	**17.770**				
				Min.	**45.060**	**1.463**	**0.022**				**0.0072**
				Max.	**56.603**	**1.646**	**0.045**				**0.0075**
				Number of Spec.	**20**	**20**	**20**				**20**

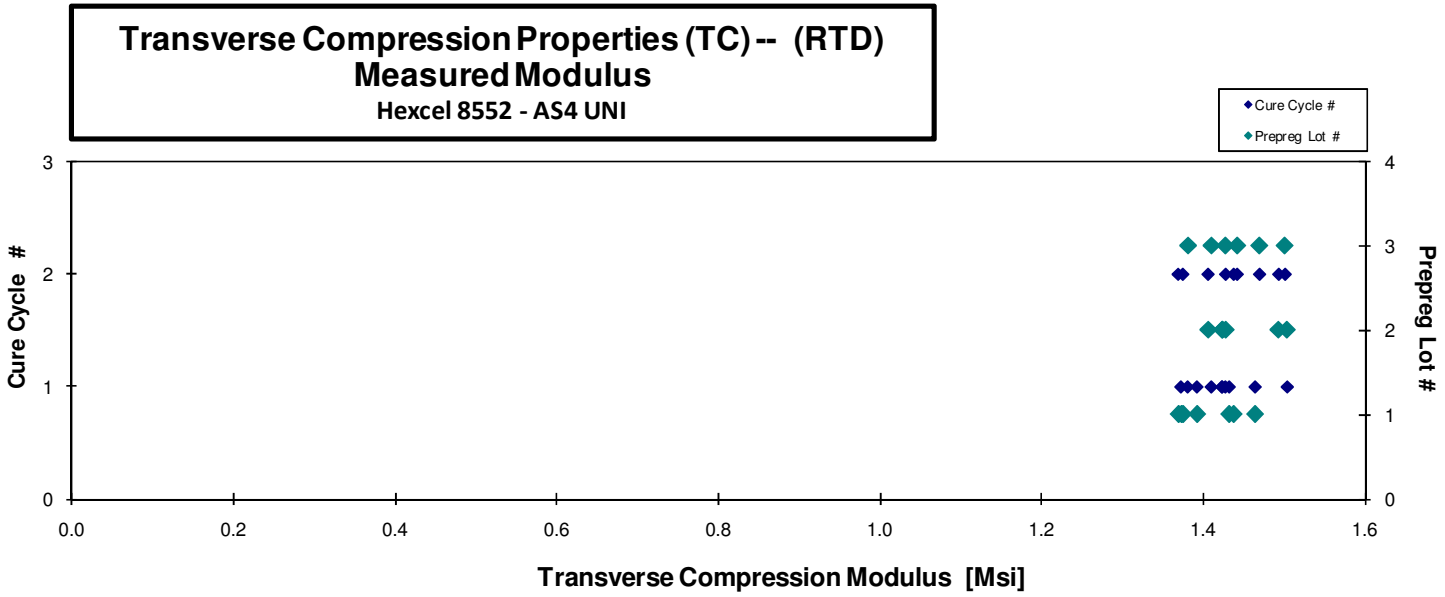

Transverse Compression Properties (TC) -- (CTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
4


Transverse Compression Properties (TC) -- (CTD)
Measured Modulus
Hexcel 8552 - AS4 UNI
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

Transverse Compression Properties (TC) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUZA112A	A	M1	1	1	39.491	1.393	0.028	0.102	14	HGM	0.0073
HFUZA113A	A	M1	1	1	39.302	1.464	0.032	0.104	14	HGM	0.0074
HFUZA114A	A	M1	1	1	38.418	1.432	0.032	0.104	14	HGM	0.0074
HFUZA115A	A	M1	1	1	38.731	1.373	0.029	0.103	14	HGM	0.0074
HFUZA211A	A	M2	1	2	39.370	1.438	0.028	0.098	14	HGM	0.0070
HFUZA212A	A	M2	1	2	39.233	1.375	0.030	0.102	14	HGM	0.0073
HFUZA213A	A	M2	1	2	39.101	1.370	0.030	0.104	14	HGM	0.0074
HFUZB111A	B	M1	2	1	37.221	1.503	0.029	0.095	14	HAB	0.0068
HFUZB112A	B	M1	2	1	38.180	1.423	0.029	0.100	14	HAB	0.0071
HFUZB113A	B	M1	2	1	37.812	1.424	0.030	0.103	14	HAB	0.0073
HFUZB211A	B	M2	2	2	38.205	1.493	0.026	0.094	14	HGM	0.0067
HFUZB212A	B	M2	2	2	38.487	1.428	0.027	0.100	14	HGM	0.0072
HFUZB213A	B	M2	2	2	37.614	1.406	0.029	0.103	14	HGM	0.0073
HFUZC111A	C	M1	3	1	39.201	1.427	0.028	0.095	14	HGM	0.0068
HFUZC112A	C	M1	3	1	38.551	1.410	0.028	0.099	14	HGM	0.0071
HFUZC113A	C	M1	3	1	38.294	1.381	0.028	0.103	14	HGM	0.0073
HFUZC211A	C	M2	3	2	40.641	1.500	0.027	0.096	14	HAB	0.0069
HFUZC212A	C	M2	3	2	40.491	1.469	0.026	0.099	14	HAB	0.0071
HFUZC213A	C	M2	3	2	39.841	1.442	0.028	0.102	14	HAB	0.0073
				Average	**38.852**	**1.429**	**0.029**				**0.0072**
				Standard Dev.	**0.912**	**0.042**	**0.002**				
				Coeff. of Var. [%]	**2.346**	**2.942**	**5.954**				
				Min.	**37.221**	**1.370**	**0.026**				**0.0067**
				Max.	**40.641**	**1.503**	**0.032**				**0.0074**
				Number of Spec.	**19**	**19**	**19**				**19**


Transverse Compression Properties (TC) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Strength [ksi]
0
10
20
30
40
50
0
1
2
3
4

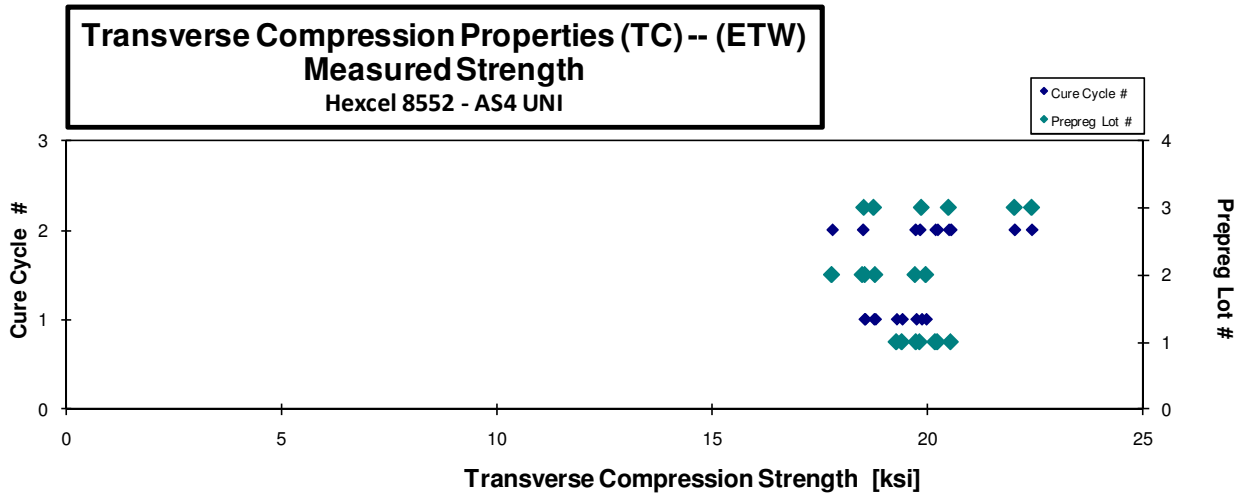

Transverse Compression Properties (TC) -- (RTD)
Measured Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Modulus [Msi]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
0
1
2
3
4

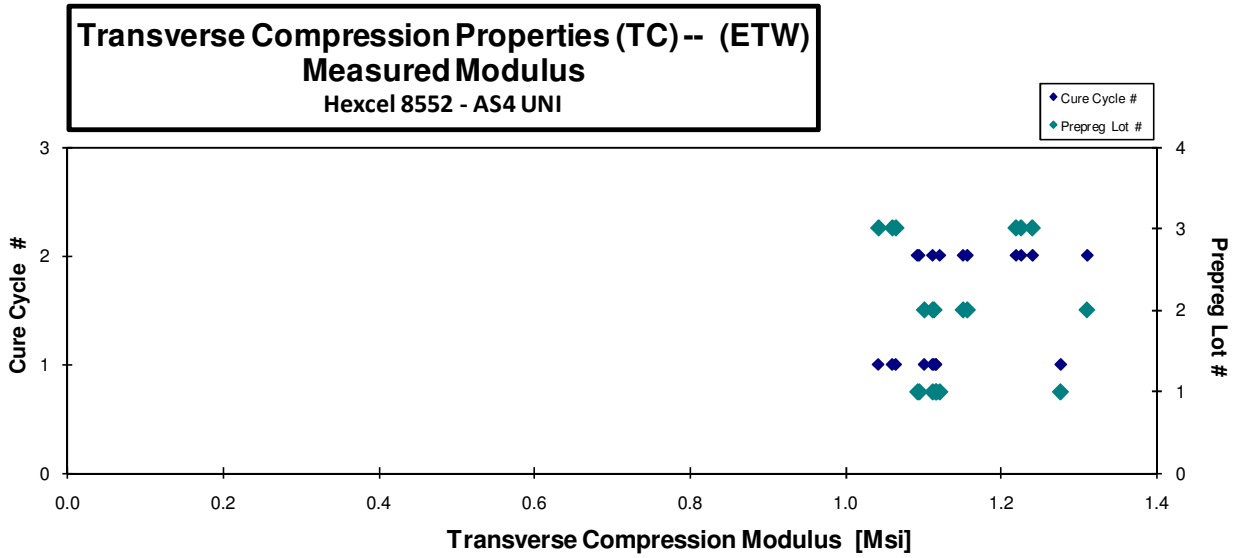
Transverse Compression Properties (TC) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUZA111D*	A	M1	1	1		1.276	0.023	0.098	14	HGM	0.0070
HFUZA11BD*	A	M1	1	1		1.117	0.019	0.103	14	HGM	0.0074
HFUZA11CD*	A	M1	1	1		1.116	0.023	0.103	14	HGM	0.0074
HFUZA11DD	A	M1	1	1	19.274			0.104	14	HGM/HAT	0.0074
HFUZA11ED	A	M1	1	1	19.732			0.104	14	HGM	0.0074
HFUZA11FD	A	M1	1	1	19.402			0.105	14	HAT	0.0075
HFUZA214D	A	M2	1	2	20.175			0.104	14	HGM	0.0074
HFUZA215D	A	M2	1	2	19.815			0.104	14	HAT/HGM	0.0074
HFUZA219D	A	M2	1	2	20.229			0.104	14	HAB/HGM	0.0074
HFUZA21BD*	A	M2	1	2		1.121	0.021	0.103	14	HGM	0.0074
HFUZA21CD*	A	M2	1	2		1.093	0.021	0.103	14	HGM	0.0074
HFUZA21DD*	A	M2	1	2		1.095	0.025	0.104	14	HGM	0.0074
HFUZA21ED*	A	M2	1	2		1.112	0.024	0.104	14	HGM	0.0074
HFUZA21FD	A	M2	1	2	20.536			0.104	14	HGM	0.0074
HFUZB114D	B	M1	2	1	19.962			0.102	14	HGM	0.0073
HFUZB11BD*	B	M1	2	1		1.114	0.020	0.101	14	HGM	0.0072
HFUZB11CD*	B	M1	2	1		1.112	0.019	0.101	14	HGM/HAB	0.0072
HFUZB11DD*	B	M1	2	1		1.102		0.102	14	HGM	0.0073
HFUZB11ED	B	M1	2	1	18.543			0.103	14	HGM/HAT	0.0073
HFUZB11FD	B	M1	2	1	18.780			0.102	14	HGM	0.0073
HFUZB215D	B	M2	2	2	19.710			0.102	14	HGM	0.0073
HFUZB21BD*	B	M2	2	2		1.310	0.027	0.101	14	HGM	0.0072
HFUZB21CD*	B	M2	2	2		1.151	0.024	0.101	14	HGM	0.0072
HFUZB21DD*	B	M2	2	2		1.157	0.023	0.102	14	HGM	0.0073
HFUZB21ED	B	M2	2	2	17.773			0.102	14	HGM	0.0073
HFUZB21FD	B	M2	2	2	18.484			0.102	14	HGM	0.0073
HFUZC114D	C	M1	3	1	19.858			0.104	14	HGM	0.0074
HFUZC11BD*	C	M1	3	1		1.043	0.021	0.103	14	HGM	0.0074
HFUZC11CD*	C	M1	3	1		1.060	0.023	0.104	14	HGM	0.0074
HFUZC11DD*	C	M1	3	1		1.065	0.024	0.104	14	HGM	0.0074
HFUZC11ED	C	M1	3	1	18.522			0.104	14	HGM	0.0074
HFUZC11FD	C	M1	3	1	18.747			0.103	14	HGM	0.0073
HFUZC214D	C	M2	3	2	22.020			0.102	14	HGM	0.0073
HFUZC21BD*	C	M2	3	2		1.240	0.025	0.103	14	HGM	0.0073
HFUZC21CD*	C	M2	3	2		1.226	0.023	0.103	14	HGM	0.0074
HFUZC21DD*	C	M2	3	2		1.219	0.026	0.102	14	HGM	0.0073
HFUZC21ED	C	M2	3	2	22.422			0.103	14	HGM	0.0074
HFUZC21FD	C	M2	3	2	20.490			0.102	14	HGM	0.0073

*Strength removed on ETW data that had protective coating over gage

Average	**19.709**	**1.144**	**0.023**	**0.0073**
Standard Dev.	**1.171**	**0.075**	**0.002**	
Coeff. of Var. [%]	**5.940**	**6.590**	**10.151**	
Min.	**17.773**	**1.043**	**0.019**	**0.0070**
Max.	**22.422**	**1.310**	**0.027**	**0.0075**
Number of Spec.	**19**	**19**	**18**	**38**


Transverse Compression Properties (TC) -- (ETW)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Strength [ksi]
0
5
10
15
20
25
0
1
2
3
4


Transverse Compression Properties (TC) -- (ETW)
Measured Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Modulus [Msi]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
0
1
2
3
4

4.5 Unnotched Compression 0 Properties

Laminate Unnotched Compression Properties (UNC0) -- (CTD)
Strength & Modulus
Hexcel 8552 AS4 Uni

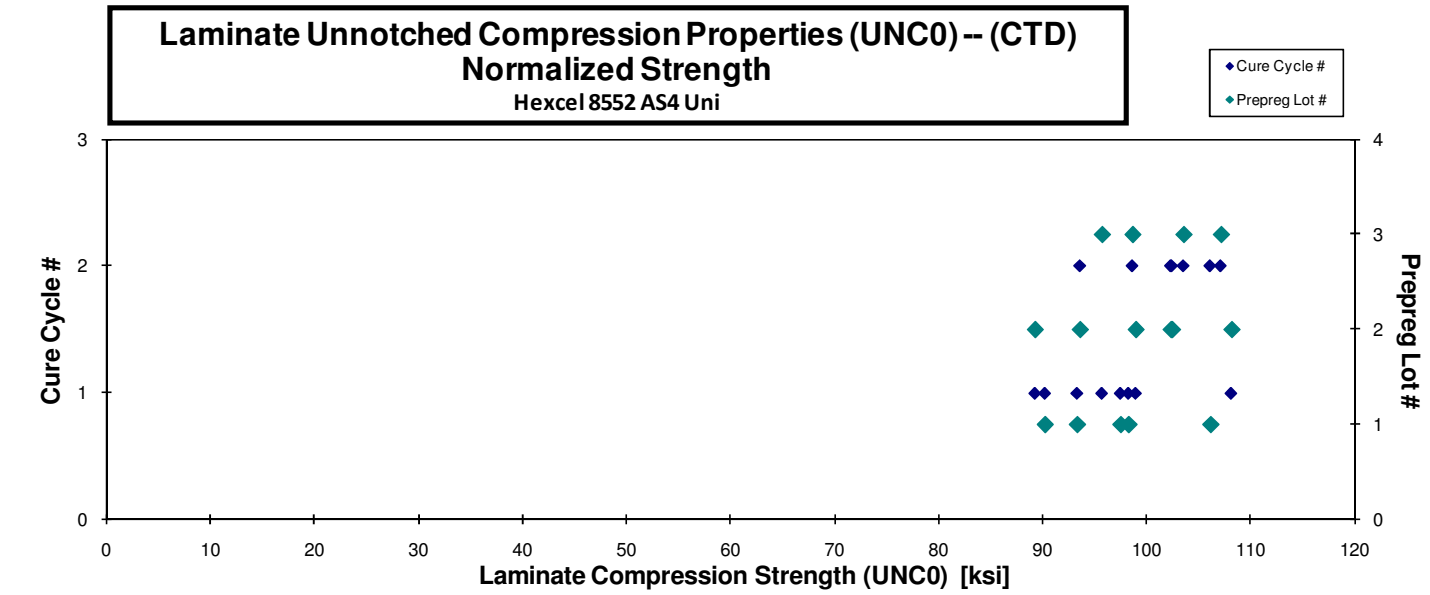
normalizing t_{ply} [in]: 0.0074

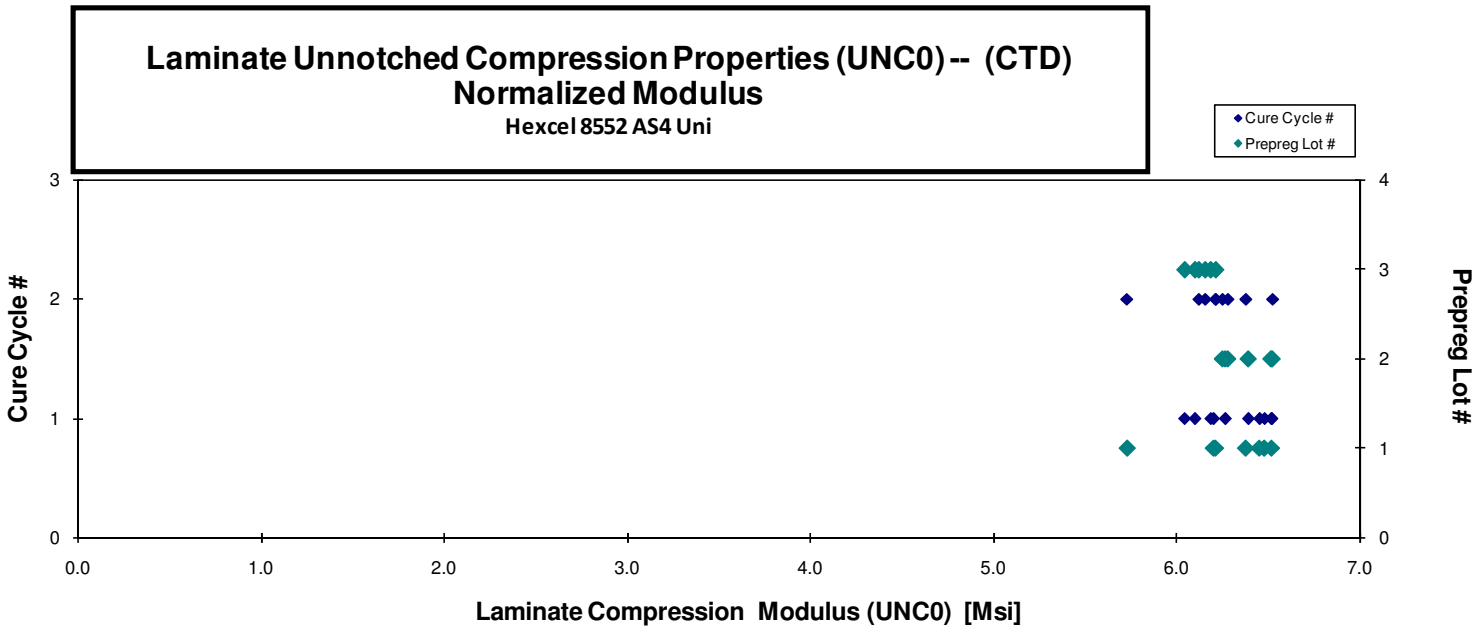
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFURA116B	A	M1	1	1	91.687	6.624	0.052	0.109	15	BAT	0.0073	90.214	6.518
HFURA117B	A	M1	1	1	94.840	6.584	0.041	0.109	15	BGM	0.0073	93.316	6.478
HFURA118B	A	M1	1	1	99.091	6.557	0.037	0.109	15	BAT	0.0073	97.499	6.451
HFURA119B	A	M1	1	1	100.139	6.319	0.034	0.109	15	BGM	0.0073	98.259	6.201
HFURA215B*	A	M2	1	2		6.437	0.040	0.110	15	BGM / CIT	0.0073		6.376
HFURA216B*	A	M2	1	2		6.304	0.035	0.109	15	BGM / CIT	0.0073		6.211
HFURA217B	A	M2	1	2	107.937	5.827	0.042	0.109	15	BGM	0.0073	106.138	5.730
HFURB115B	B	M1	2	1	102.092	6.592	0.044	0.108	15	BGM	0.0072	98.965	6.391
HFURB116B	B	M1	2	1	92.156	6.726	0.048	0.108	15	HAT/BAB	0.0072	89.264	6.515
HFURB117B	B	M1	2	1	112.077	6.491	0.042	0.107	15	BAB	0.0071	108.173	6.265
HFURB215B	B	M2	2	2	94.102	6.557	0.035	0.110	15	BAB	0.0074	93.593	6.522
HFURB216B	B	M2	2	2	103.535	6.316	0.038	0.110	15	BGM	0.0073	102.447	6.250
HFURB217B	B	M2	2	2	103.686	6.362	0.042	0.110	15	BGM/HAT	0.0073	102.332	6.279
HFURC115B*	C	M1	3	1		6.119	0.035	0.111	15	CIT	0.0074		6.101
HFURC116B*	C	M1	3	1		6.107	0.041	0.110	15	CIT	0.0073		6.044
HFURC117B	C	M1	3	1	96.535	6.240	0.037	0.110	15	BAT	0.0073	95.708	6.187
HFURC215B	C	M2	3	2	108.094	6.268	0.035	0.110	15	BAT	0.0073	107.153	6.214
HFURC216B	C	M2	3	2	105.199	6.218	0.052	0.109	15	BGM	0.0073	103.557	6.121
HFURC217B	C	M2	3	2	100.640	6.280	0.044	0.109	15	BGM	0.0073	98.645	6.156

Note : * Strength values were not reported due to bad failure mode

	Strength	Modulus	Poisson's Ratio
Average	100.787	6.365	0.041
Standard Dev.	6.141	0.220	0.005
Coeff. of Var. [%]	6.093	3.455	13.384
Min.	91.687	5.827	0.034
Max.	112.077	6.726	0.052
Number of Spec.	15	19	19

	t_{ply}	$Strength_{norm}$	$Modulus_{norm}$
$Average_{norm}$	0.0073	99.018	6.264
$Standard\ Dev._{norm}$		5.932	0.199
$Coeff.\ of\ Var.\ [\%]_{norm}$		5.991	3.175
Min.	0.0071	89.264	5.730
Max.	0.0074	108.173	6.522
Number of Spec.		15	19


Laminate Unnotched Compression Properties (UNC0) -- (CTD)
Normalized Strength
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC0) [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120

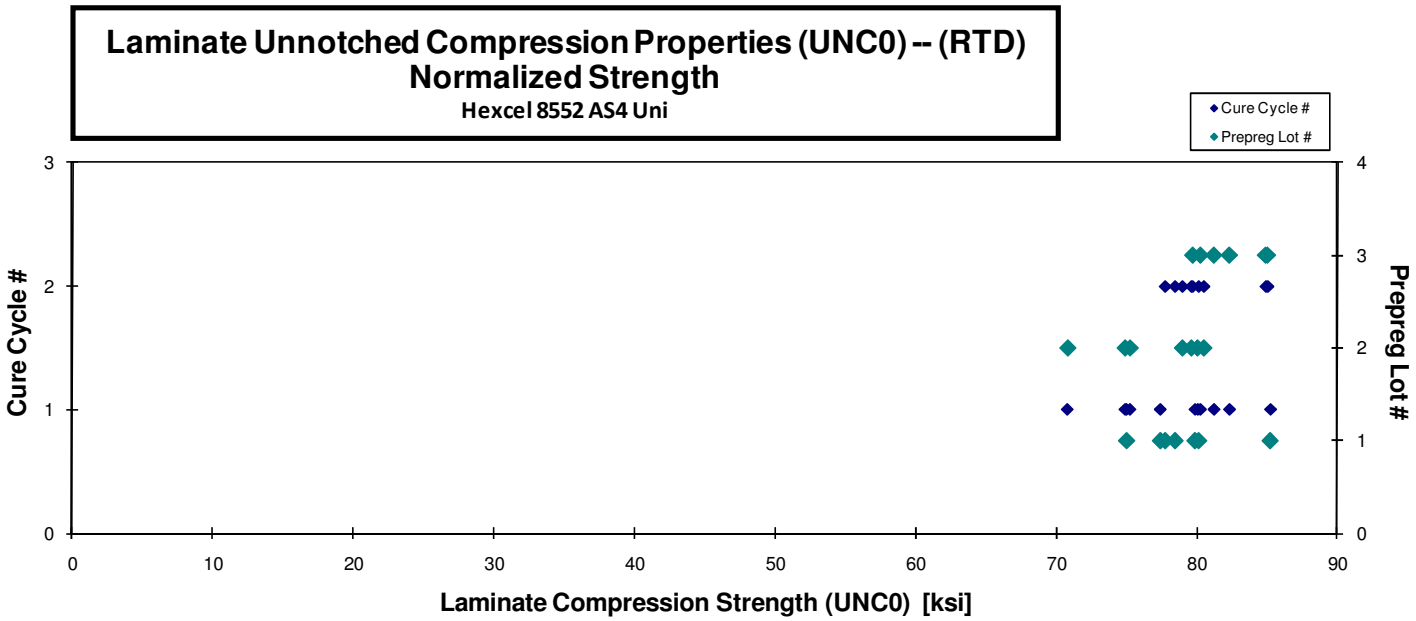

Laminate Unnotched Compression Properties (UNC0) -- (CTD)
Normalized Modulus
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC0) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0

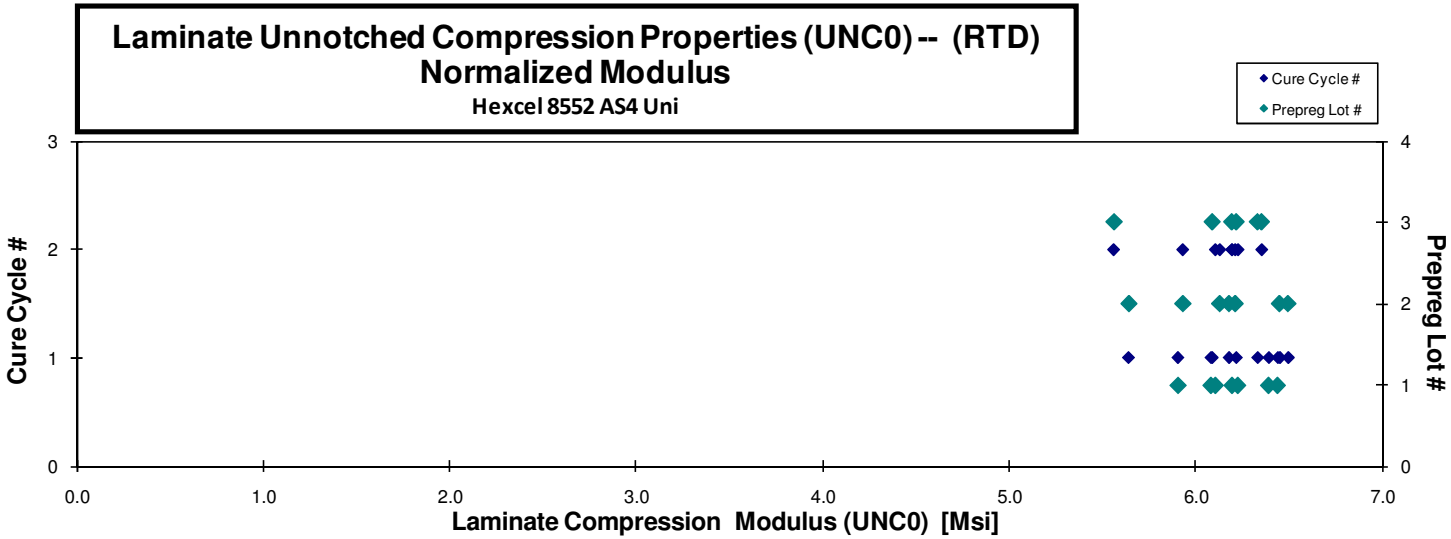
Laminate Unnotched Compression Properties (UNC0) -- (RTD)
Strength & Modulus
Hexcel 8552 AS4 Uni

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFURA111A	A	M1	1	1	94.417	6.739	0.056	0.100	15	BAT	0.0067	85.216	6.082
HFURA112A	A	M1	1	1	84.155	6.735	0.027	0.105	15	BGM	0.0070	79.859	6.391
HFURA113A	A	M1	1	1	79.367	6.056	0.036	0.108	15	BGM	0.0072	77.388	5.905
HFURA114A	A	M1	1	1	75.955	6.523	0.034	0.110	15	BAT	0.0073	74.986	6.439
HFURA211A	A	M2	1	2	86.685	6.746	0.031	0.100	15	BAT	0.0067	78.446	6.105
HFURA212A	A	M2	1	2	84.619	6.576	0.037	0.105	15	BAT	0.0070	80.121	6.226
HFURA213A	A	M2	1	2	79.410	6.328	0.037	0.109	15	BAT	0.0072	77.741	6.195
HFURB111A	B	M1	2	1	79.559	6.340	0.025	0.099	15	BGM	0.0066	70.791	5.642
HFURB112A	B	M1	2	1	80.221	6.926	0.044	0.104	15	BGM	0.0069	75.235	6.495
HFURB113A	B	M1	2	1	83.248	6.708	0.042	0.107	15	BGM	0.0071	80.048	6.450
HFURB114A	B	M1	2	1	76.932	6.347	0.036	0.108	15	BAT	0.0072	74.887	6.179
HFURB211A	B	M2	2	2	87.257	6.501	0.040	0.101	15	HAT	0.0068	79.606	5.931
HFURB212A	B	M2	2	2	84.155	6.408	0.037	0.106	15	BAB	0.0071	80.491	6.129
HFURB213A	B	M2	2	2	80.467	6.330	0.040	0.109	15	BAT	0.0073	78.969	6.212
HFURC111A	C	M1	3	1	88.316	6.702	0.030	0.101	15	BAB	0.0067	80.240	6.089
HFURC112A	C	M1	3	1	85.905	6.608	0.040	0.106	15	BAT	0.0071	82.307	6.332
HFURC113A	C	M1	3	1	82.205	6.294	0.034	0.110	15	BGM	0.0073	81.205	6.217
HFURC211A	C	M2	3	2	89.065	6.215	0.034	0.099	15	BGM	0.0066	79.704	5.562
HFURC212A	C	M2	3	2	88.831	6.637	0.041	0.106	15	BAT	0.0071	85.030	6.353
HFURC213A	C	M2	3	2	86.262	6.294	0.032	0.109	15	BAT	0.0073	84.889	6.193

Average	**83.852**	**6.501**	**0.037**	**$Average_{norm}$**	**0.0070**	**79.358**	**6.156**
Standard Dev.	**4.646**	**0.224**	**0.007**	**$Standard\ Dev._{norm}$**		**3.625**	**0.248**
Coeff. of Var. [%]	**5.541**	**3.447**	**18.136**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**4.568**	**4.024**
Min.	**75.955**	**6.056**	**0.025**	**Min.**	**0.0066**	**70.791**	**5.562**
Max.	**94.417**	**6.926**	**0.056**	**Max.**	**0.0073**	**85.216**	**6.495**
Number of Spec.	**20**	**20**	**20**	**Number of Spec.**		**20**	**20**


Laminate Unnotched Compression Properties (UNC0) -- (RTD)
Normalized Strength
Hexcel 8552 AS4 Uni
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) -- (RTD)
Normalized Modulus
Hexcel 8552 AS4 Uni
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
0
1
2
3
4

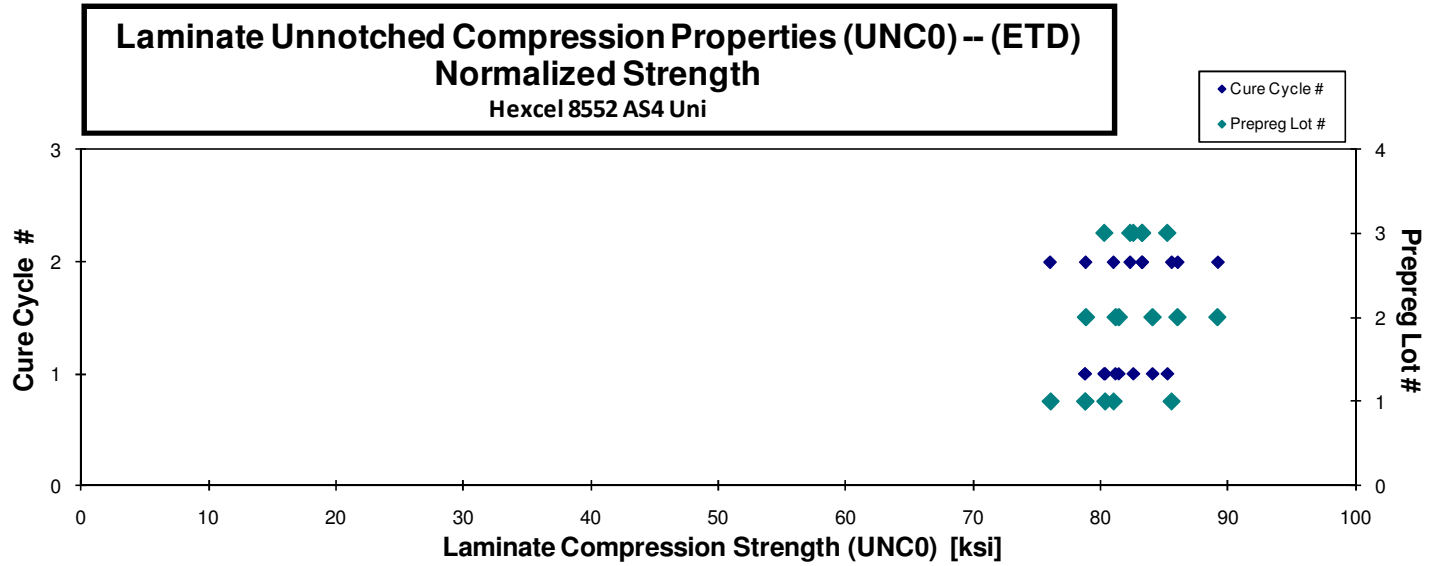
Laminate Unnotched Compression Properties (UNC0) -- (ETD)
Strength & Modulus
Hexcel 8552 AS4 Uni

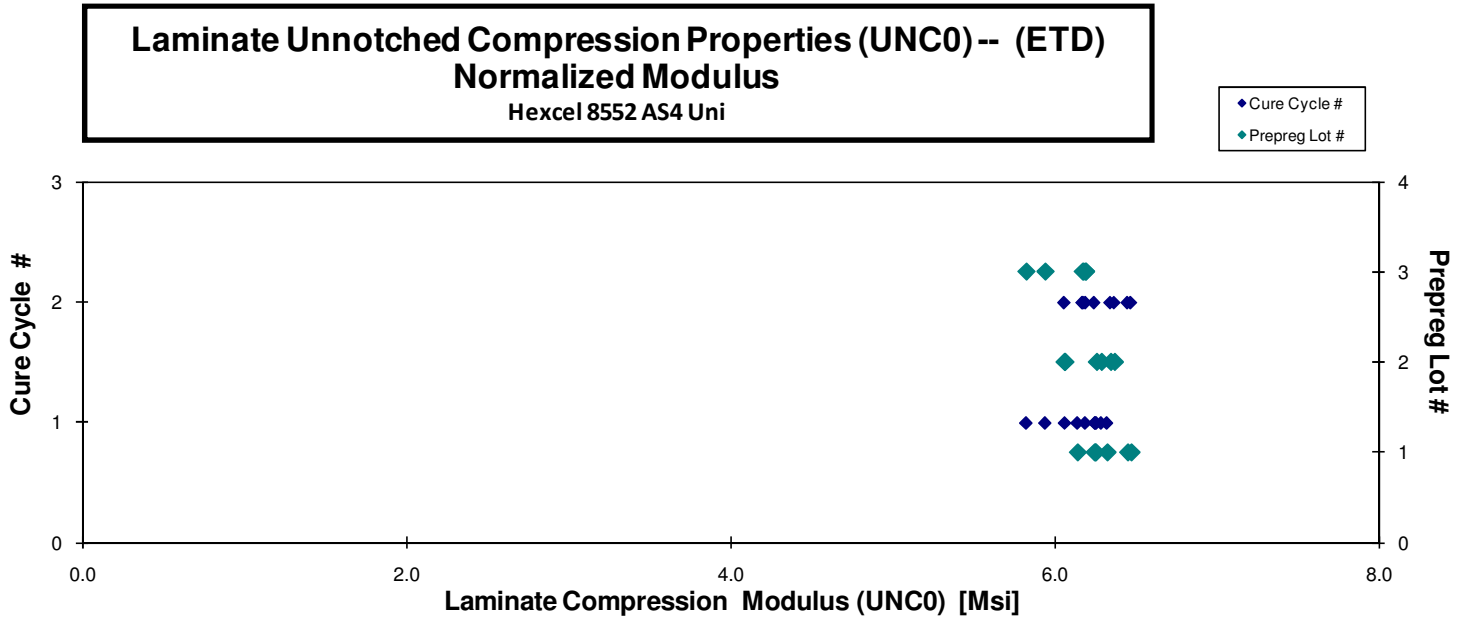
normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFURA11BC	A	M1	1	1	80.239	6.372	0.035	0.109	15	BAT / HAT	0.0073	78.793	6.257
HFURA11CC *	A	M1	1	1		6.460	0.044	0.109	15	ENDCRUSH	0.0072		6.327
HFURA11DC	A	M1	1	1	80.056	6.351	0.034	0.109	15	BAB / HAB	0.0073	78.818	6.253
HFURA11EC	A	M1	1	1	81.849	6.258	0.029	0.109	15	BAB / HAB	0.0073	80.374	6.145
HFURA219C	A	M2	1	2	77.479	6.362	0.024	0.109	15	HAB / HAT	0.0073	76.083	6.247
HFURA21AC	A	M2	1	2	87.108	6.569	0.034	0.109	15	HAT	0.0073	85.578	6.453
HFURA21BC	A	M2	1	2	82.052	6.556	0.029	0.110	15	HAT	0.0073	81.030	6.474
HFURB119C	B	M1	2	1	84.565	6.300	0.034	0.107	15	BGM	0.0071	81.441	6.068
HFURB11AC	B	M1	2	1	84.217	6.496	0.027	0.107	15	BAT / HAT	0.0071	81.183	6.262
HFURB11BC	B	M1	2	1	86.870	6.500	0.033	0.107	15	BGM	0.0072	84.079	6.291
HFURB219C	B	M2	2	2	79.828	6.138	0.032	0.110	15	HAT / BGM	0.0073	78.857	6.063
HFURB21AC	B	M2	2	2	90.368	6.457	0.036	0.110	15	BGM	0.0073	89.174	6.372
HFURB21BC	B	M2	2	2	87.152	6.430	0.032	0.110	15	HAB / BGM	0.0073	86.040	6.348
HFURC119C	C	M1	3	1	81.140	5.890	0.038	0.110	15	BAB	0.0073	80.299	5.829
HFURC11AC	C	M1	3	1	86.193	6.263	0.034	0.110	15	BAT	0.0073	85.236	6.194
HFURC11BC	C	M1	3	1	83.550	6.015	0.040	0.110	15	BGM	0.0073	82.584	5.946
HFURC219C	C	M2	3	2	84.890	6.302	0.037	0.109	15	BGM	0.0073	83.271	6.181
HFURC21AC	C	M2	3	2	83.954	6.297	0.032	0.109	15	BAT	0.0073	82.328	6.175
HFURC21BC	C	M2	3	2	84.890	6.316	0.030	0.109	15	BAT	0.0073	83.258	6.195

*** Strength value was removed due to bad failure mode.**

Average	**83.689**	**6.333**	**0.033**	**$Average_{norm}$**	**0.0073**	**82.135**	**6.215**
Standard Dev.	**3.253**	**0.175**	**0.005**	**$Standard\ Dev._{norm}$**		**3.176**	**0.161**
Coeff. of Var. [%]	**3.886**	**2.767**	**13.815**	**Coeff. of Var. $[\%]_{norm}$**		**3.867**	**2.587**
Min.	**77.479**	**5.890**	**0.024**	**Min.**	**0.0071**	**76.083**	**5.829**
Max.	**90.368**	**6.569**	**0.044**	**Max.**	**0.0073**	**89.174**	**6.474**
Number of Spec.	**18**	**19**	**19**	**Number of Spec.**		**18**	**19**


Laminate Unnotched Compression Properties (UNC0) -- (ETD)
Normalized Strength
Hexcel 8552 AS4 Uni
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) -- (ETD)
Normalized Modulus
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC0) [Msi]
0.0
2.0
4.0
6.0
8.0
0
1
2
3
4

Laminate Unnotched Compression Properties (UNC0) -- (ETW)
Strength & Modulus
Hexcel 8552 AS4 Uni

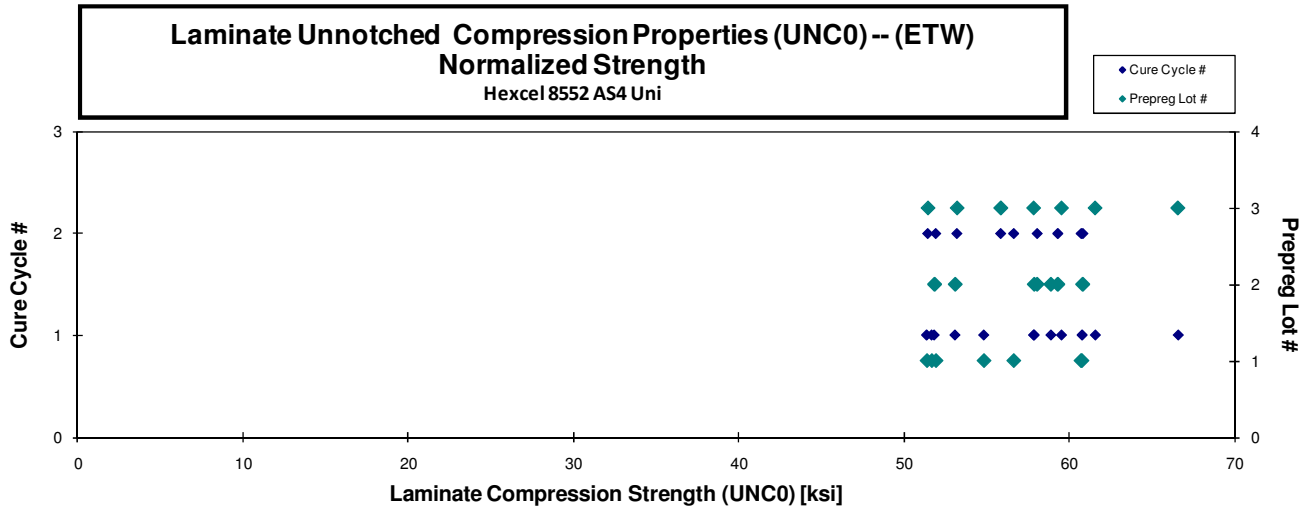
normalizing t_{ply} [in]: 0.0074

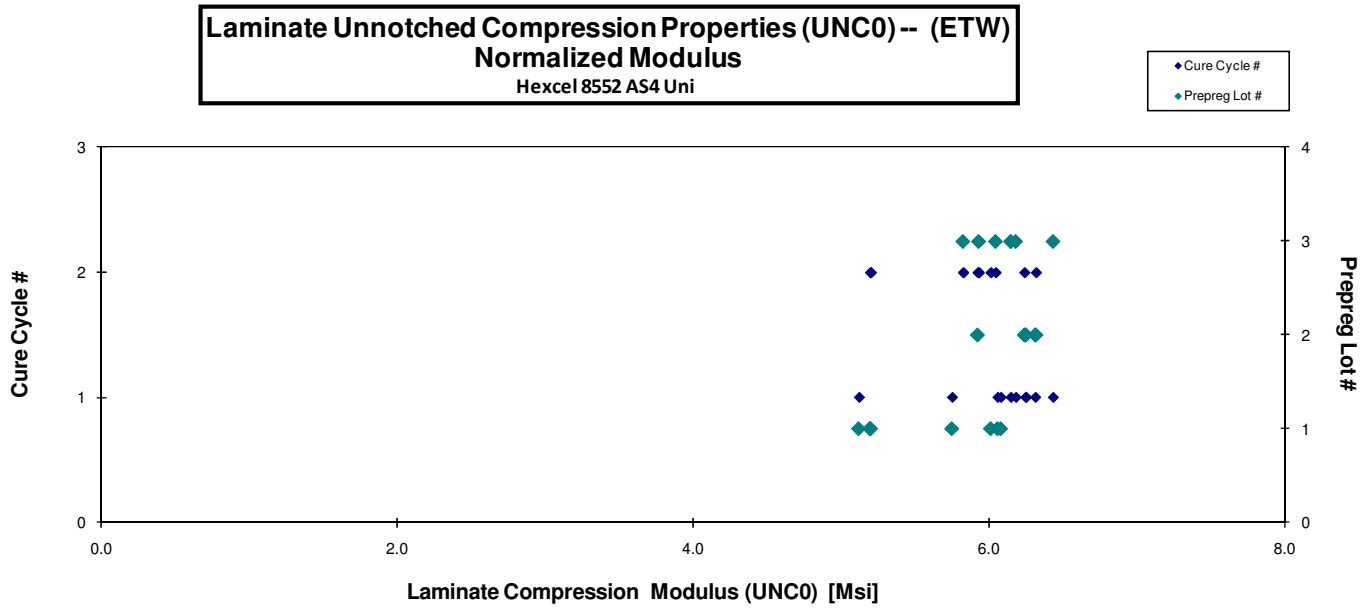
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFURA11GD*	A	M1	1	1		6.215	0.032	0.108	15	BGM	0.0072		6.059
HFURA11HD*	A	M1	1	1		6.065	0.024	0.105	15	BAT	0.0070		5.751
HFURA11ID*	A	M1	1	1		5.700	0.030	0.100	15	BGM	0.0067		5.122
HFURA11JD*	A	M1	1	1		6.404	0.030	0.105	15	BAT	0.0070		6.081
HFURA11KD	A	M1	1	1	62.031			0.109	15	BAT	0.0073	60.783	
HFURA115D	A	M1	1	1	55.518			0.110	15	BAB	0.0073	54.834	
HFURA11AD	A	M1	1	1	52.361			0.109	15	BAB	0.0073	51.379	
HFURA11FD	A	M1	1	1	52.930			0.108	15	BAT	0.0072	51.674	
HFURA21ED*	A	M2	1	2		5.217	0.024	0.111	15	BAT	0.0074		5.198
HFURA21FD*	A	M2	1	2		5.289	0.030	0.109	15	BGM	0.0073		5.203
HFURA21GD	A	M2	1	2	63.232			0.107	15	BAT	0.0071	60.726	
HFURA21HD	A	M2	1	2	56.743			0.102	15	BAT	0.0068	51.929	
HFURA21ID	A	M2	1	2	61.896			0.102	15	BAT	0.0068	56.645	
HFURA21DD	A	M2	1	2		6.067	0.018	0.110	15	BGM	0.0073		6.013
HFURB11ED*	B	M1	2	1		6.413	0.032	0.108	15	BAT	0.0072		6.252
HFURB11FD*	B	M1	2	1		6.910	0.024	0.100	15	BAB/HGM	0.0067		6.248
HFURB11GD	B	M1	2	1	63.504			0.101	15	BAT	0.0067	57.879	
HFURB11HD	B	M1	2	1	61.658			0.106	15	BGM	0.0071	58.899	
HFURB11ID	B	M1	2	1	54.205			0.109	15	BAT	0.0072	53.098	
HFURB118D	B	M1	2	1	53.876			0.107	15	BAB	0.0071	51.837	
HFURB11DD	B	M1	2	1		6.478	0.028	0.108	15	BAT	0.0072		6.314
HFURB21ED*	B	M2	2	2		6.321	0.035	0.111	15	BGM	0.0074		6.319
HFURB21FD*	B	M2	2	2		5.978	0.026	0.110	15	BGM	0.0073		5.924
HFURB21GD	B	M2	2	2	62.846			0.107	15	BGM	0.0072	60.827	
HFURB21HD	B	M2	2	2	65.088			0.101	15	BAT	0.0067	59.312	
HFURB21ID	B	M2	2	2	65.302			0.099	15	BGM	0.0066	58.066	
HFURB21DD	B	M2	2	2		6.271	0.033	0.110	15	BAT/HIT	0.0074		6.241
HFURC11DD*	C	M1	3	1		6.207	0.026	0.111	15	BGM	0.0074		6.182
HFURC11ED*	C	M1	3	1		6.183	0.022	0.110	15	HGM	0.0074		6.149
HFURC11FD*	C	M1	3	1		6.480	0.032	0.110	15	BGM/HIB	0.0073		6.434
HFURC11GD	C	M1	3	1	68.498			0.108	15	BGM	0.0072	66.595	
HFURC11HD	C	M1	3	1	62.150			0.103	15	BAT	0.0069	57.848	
HFURC11ID	C	M1	3	1	68.330			0.100	15	BAT	0.0067	61.579	
HFURC118D	C	M1	3	1	60.043			0.110	15	BGM	0.0073	59.538	
HFURC218D	C	M2	3	2	54.239			0.109	15	BGM	0.0073	53.212	
HFURC21DD	C	M2	3	2	56.535			0.110	15	BAT	0.0073	55.856	
HFURC21ED*	C	M2	3	2		5.974	0.031	0.110	15	BAT	0.0073		5.932
HFURC21FD*	C	M2	3	2		6.099	0.021	0.110	15	BAB	0.0073		6.046
HFURC21GD*	C	M2	3	2		5.971	0.021	0.108	15	BAT	0.0072		5.826
HFURC21ID	C	M2	3	2	57.955			0.099	15	BAT	0.0066	51.446	

HFURB21DD: STRENGTH REMOVED DUE TO AN UNACCEPTABLE FAILURE MODE
HFURC11FD: STRENGTH REMOVED DUE TO AN UNACCEPTABLE FAILURE
*Strength removed on ETW data that had protective coating over gage

Average	**59.950**	**6.118**	**0.027**
Standard Dev.	**5.005**	**0.400**	**0.005**
Coeff. of Var. [%]	**8.349**	**6.543**	**17.601**
Min.	**52.361**	**5.217**	**0.018**
Max.	**68.498**	**6.910**	**0.035**
Number of Spec.	**21**	**19**	**19**

$Average_{norm}$	**0.0071**	**56.855**	**5.963**
Standard $Dev._{norm}$		**4.197**	**0.392**
Coeff. of Var. $[\%]_{norm}$		**7.382**	**6.573**
Min.	**0.0066**	**51.379**	**5.122**
Max.	**0.0074**	**66.595**	**6.434**
Number of Spec.		**21**	**19**


Laminate Unnotched Compression Properties (UNC0) -- (ETW)
Normalized Strength
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC0) [ksi]
0
10
20
30
40
50
60
70
0
1
2
3
0
1
2
3
4


Laminate Unnotched Compression Properties (UNC0) -- (ETW)
Normalized Modulus
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC0) [Msi]
0.0
2.0
4.0
6.0
8.0
0
1
2
3
0
1
2
3
4

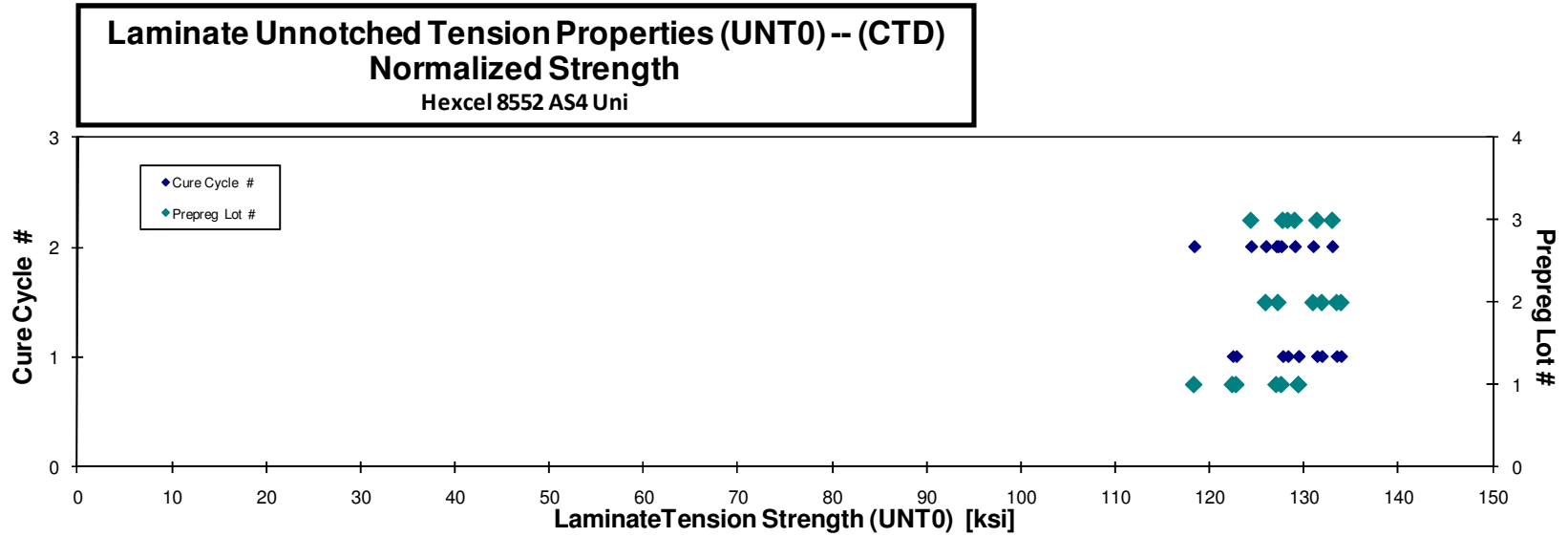
4.6 Unnotched Tension 0 Properties

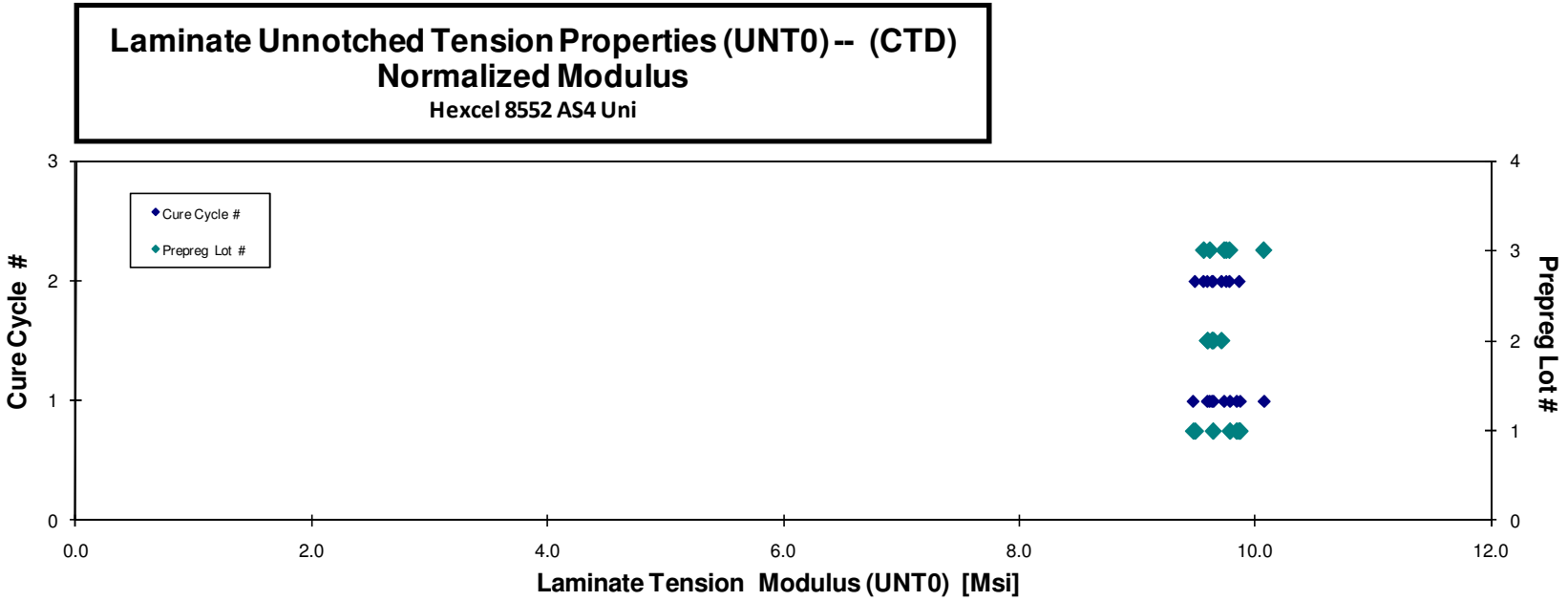
Laminate Unnotched Tension Properties (UNT0) -- (CTD)
Strength & Modulus
Hexcel 8552 AS4 Uni

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUPA116B	A	M1	1	1	125.044	9.674	0.058	8	LGM	0.0072	122.474	9.475
HFUPA117B	A	M1	1	1	131.623	10.041	0.058	8	LWT	0.0073	129.436	9.874
HFUPA118B	A	M1	1	1	123.260	9.822	0.059	8	LGM	0.0074	122.844	9.789
HFUPA119B	A	M1	1	1	129.435	9.845	0.059	8	LGM	0.0074	129.435	9.845
HFUPA216B	A	M2	1	2	128.841	9.960	0.059	8	LGM	0.0073	127.608	9.865
HFUPA217B	A	M2	1	2	120.398	9.651	0.058	8	LGM	0.0073	118.398	9.491
HFUPA218B	A	M2	1	2	128.785	9.774	0.058	8	LGM	0.0073	127.081	9.644
HFUPB116B	B	M1	2	1	133.655	9.725	0.058	8	LGM	0.0073	131.886	9.596
HFUPB117B	B	M1	2	1	137.240	9.875	0.058	8	LGM	0.0072	133.918	9.636
HFUPB118B	B	M1	2	1	133.953	9.683	0.059	8	LWB	0.0074	133.463	9.648
HFUPB216B	B	M2	2	2	127.845	9.759	0.059	8	LGM	0.0074	127.269	9.715
HFUPB217B	B	M2	2	2	132.805	9.771	0.058	8	LGM	0.0073	130.973	9.636
HFUPB218B	B	M2	2	2	125.194	9.537	0.060	8	LGM	0.0074	125.969	9.596
HFUPC116B	C	M1	3	1	130.846	9.931	0.058	8	LGM	0.0073	128.304	9.738
HFUPC117B	C	M1	3	1	130.190	9.797	0.058	8	LGM	0.0073	127.771	9.615
HFUPC118B	C	M1	3	1	133.667	10.252	0.058	8	LGM	0.0073	131.371	10.076
HFUPC216B	C	M2	3	2	126.549	9.727	0.058	8	LGM	0.0073	124.412	9.562
HFUPC217B	C	M2	3	2	133.862	9.819	0.059	8	LGM	0.0074	132.995	9.756
HFUPC218B	C	M2	3	2	130.957	9.929	0.058	8	LGM	0.0073	129.040	9.783

	Strength [ksi]	Modulus [Msi]		$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
Average	129.692	9.819	$Average_{norm}$	128.139	9.702
Standard Dev.	4.250	0.159	$Standard\ Dev._{norm}$	4.068	0.148
Coeff. of Var. [%]	3.277	1.624	$Coeff.\ of\ Var.\ [\%]_{norm}$	3.175	1.527
Min.	120.398	9.537	Min.	118.398	9.475
Max.	137.240	10.252	Max.	133.918	10.076
Number of Spec.	19	19	Number of Spec.	19	19


Laminate Unnotched Tension Properties (UNT0) -- (CTD)
Normalized Strength
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT0) [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150

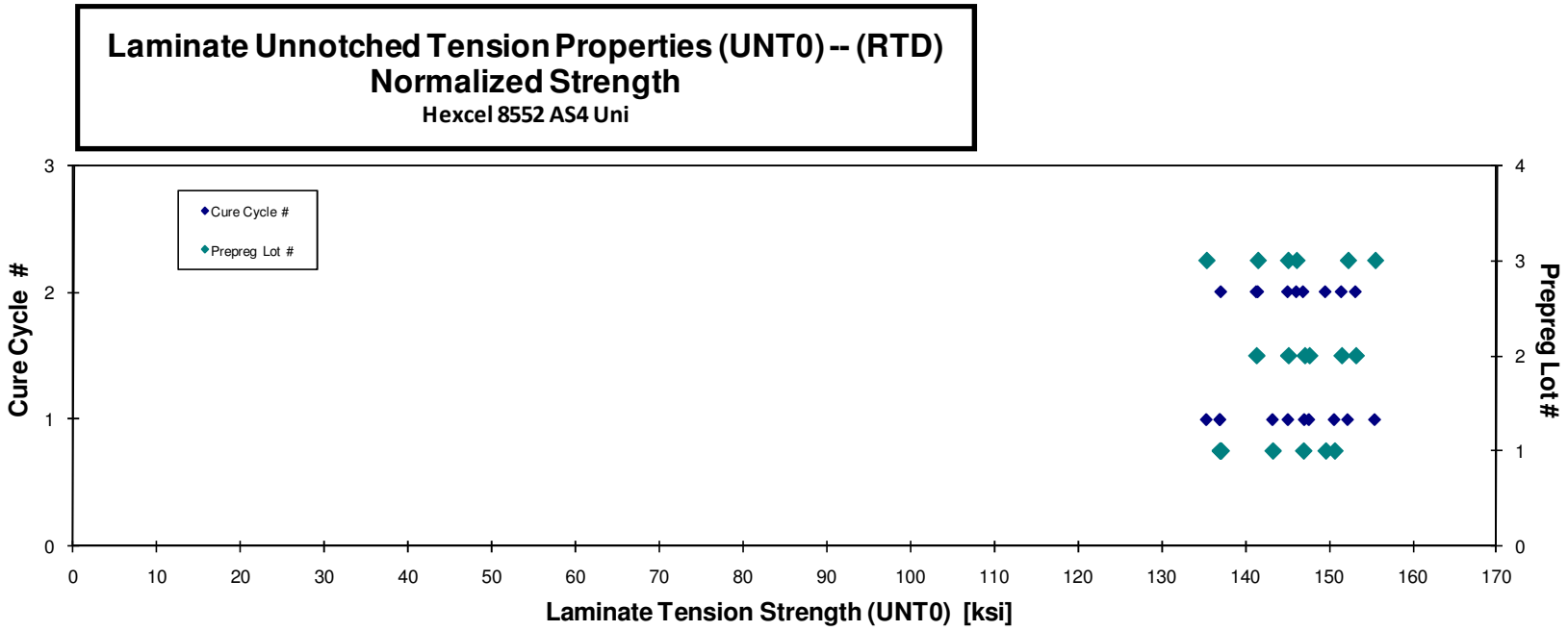

Laminate Unnotched Tension Properties (UNT0) -- (CTD)
Normalized Modulus
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT0) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0

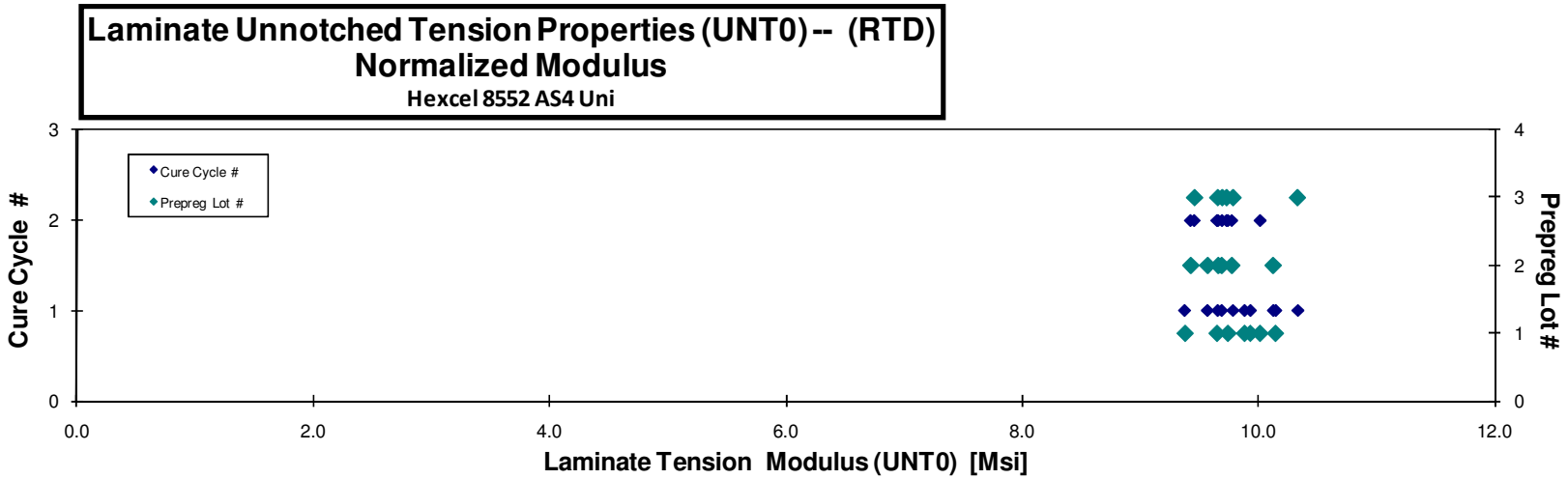
Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Strength & Modulus
Hexcel 8552 AS4 Uni

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUPA111A	A	M1	1	1	148.899	10.192	0.054	8	LAT	0.0068	136.994	9.377
HFUPA112A	A	M1	1	1	136.345	9.834	0.059	8	LWB	0.0074	136.997	9.881
HFUPA113A	A	M1	1	1	151.172	10.178	0.059	8	LAB	0.0074	150.661	10.144
HFUPA114A	A	M1	1	1	145.293	10.069	0.058	8	LWB	0.0073	143.289	9.930
HFUPA211A	A	M2	1	2	144.765	10.188	0.056	8	LGM	0.0070	137.103	9.648
HFUPA212A	A	M2	1	2	148.739	9.860	0.058	8	LAT	0.0073	146.938	9.741
HFUPA213A	A	M2	1	2	150.363	10.064	0.059	8	LAB	0.0074	149.601	10.013
HFUPB111A	B	M1	2	1	164.107	11.295	0.053	8	LWB	0.0066	147.105	10.124
HFUPB112A	B	M1	2	1	143.727	9.594	0.060	8	LGM	0.0075	145.143	9.688
HFUPB113A	B	M1	2	1	147.946	9.587	0.059	8	LAT	0.0074	147.654	9.568
HFUPB211A	B	M2	2	2	154.098	10.276	0.054	8	LGM	0.0068	141.344	9.426
HFUPB212A	B	M2	2	2	150.860	9.625	0.060	8	LWB	0.0075	153.196	9.774
HFUPB213A	B	M2	2	2	152.193	9.703	0.059	8	LGM	0.0074	151.508	9.659
HFUPC111A	C	M1	3	1	158.659	10.194	0.057	8	LGM	0.0071	152.271	9.784
HFUPC112A	C	M1	3	1	136.902	9.762	0.059	8	LGM	0.0073	135.399	9.655
HFUPC113A	C	M1	3	1	157.683	10.475	0.058	8	LGM	0.0073	155.508	10.330
HFUPC211A	C	M2	3	2	152.607	10.199	0.055	8	LAB	0.0069	141.522	9.458
HFUPC212A	C	M2	3	2	148.640	9.896	0.058	8	LAB	0.0073	146.129	9.729
HFUPC213A	C	M2	3	2	147.151	9.827	0.058	8	LAT	0.0073	145.121	9.692

Average	**149.482**	**10.043**	**Average$_{norm}$**	**0.0072**	**145.446**	**9.770**
Standard Dev.	**6.760**	**0.397**	**Standard Dev.$_{norm}$**		**6.009**	**0.252**
Coeff. of Var. [%]	**4.522**	**3.956**	**Coeff. of Var. [%]$_{norm}$**		**4.131**	**2.580**
Min.	**136.345**	**9.587**	**Min.**	**0.0066**	**135.399**	**9.377**
Max.	**164.107**	**11.295**	**Max.**	**0.0075**	**155.508**	**10.330**
Number of Spec.	**19**	**19**	**Number of Spec.**		**19**	**19**


Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Normalized Strength
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Strength (UNT0) [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170

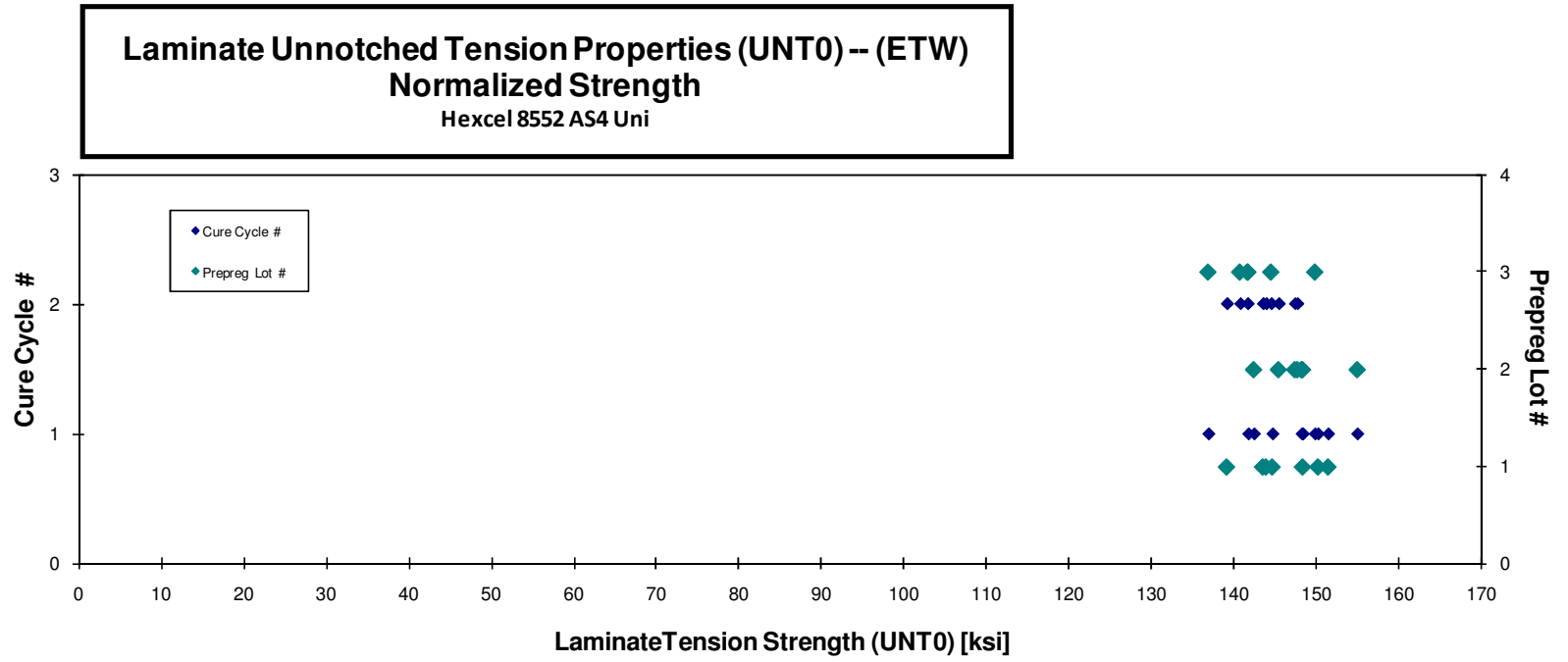

Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Normalized Modulus
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT0) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0

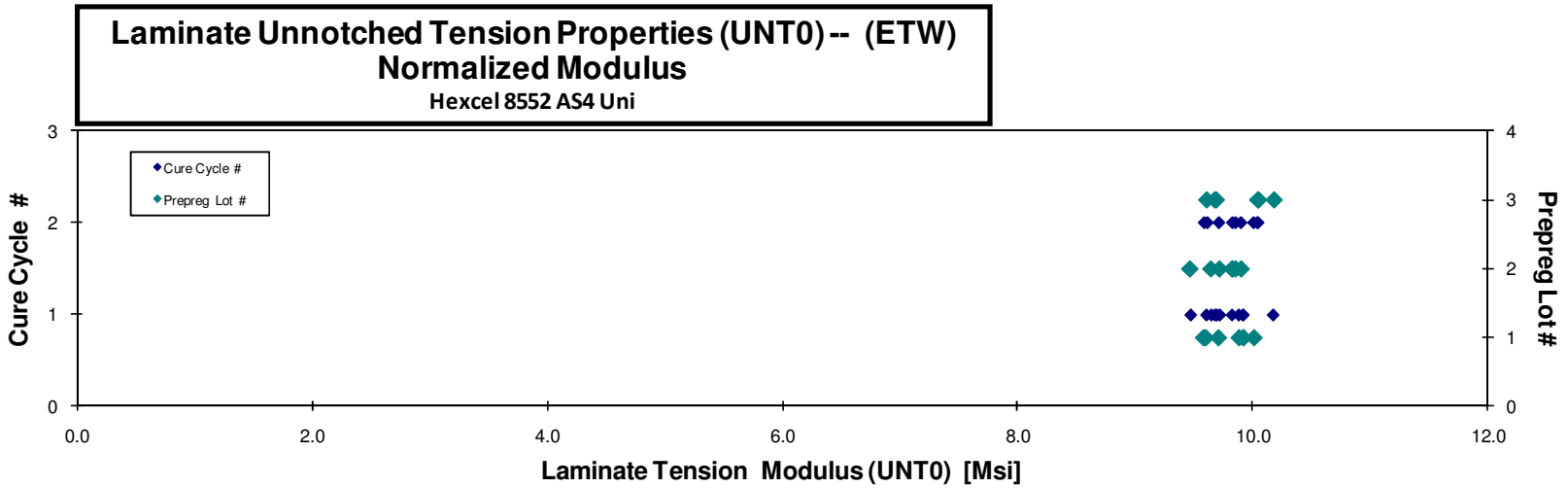
Laminate Unnotched Tension Properties (UNT0) -- (ETW)
Strength & Modulus
Hexcel 8552 AS4 Uni

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUPA11BD	A	M1	1	1	148.245	9.914	0.059	8	LGM/LAB	0.0074	148.328	9.919
HFUPA11CD	A	M1	1	1	152.135	9.929	0.059	8	LWT	0.0074	151.407	9.882
HFUPA11DD	A	M1	1	1	152.626	10.080	0.058	8	LWT/LGM	0.0073	150.176	9.918
HFUPA11ED	A	M1	1	1	147.305	9.780	0.058	8	LWT	0.0073	144.650	9.604
HFUPA21BD	A	M2	1	2	146.829	10.113	0.056	8	LWB	0.0070	139.140	9.584
HFUPA21CD	A	M2	1	2	145.267	9.804	0.059	8	LGM	0.0073	143.877	9.710
HFUPA21DD	A	M2	1	2	144.359	10.068	0.059	8	LGM	0.0074	143.505	10.008
HFUPB11BD	B	M1	2	1	153.670	10.217	0.055	8	LAB	0.0069	142.421	9.469
HFUPB11CD	B	M1	2	1	148.160	9.635	0.059	8	LAT	0.0074	148.327	9.646
HFUPB11DD	B	M1	2	1	150.118	9.845	0.058	8	LIB	0.0073	148.174	9.718
HFUPB11ED	B	M1	2	1	158.968	10.079	0.058	8	LAT/LAB	0.0072	154.940	9.824
HFUPB21CD	B	M2	2	2	148.298	10.021	0.058	8	LGM	0.0073	145.417	9.827
HFUPB21DD	B	M2	2	2	149.139	10.019	0.059	8	LAT/LAB	0.0073	147.376	9.900
HFUPB21ED	B	M2	2	2	149.358	9.966	0.059	8	LAT	0.0073	147.677	9.854
HFUPC11BD	C	M1	3	1	154.857	10.018	0.057	8	LWT	0.0072	149.800	9.691
HFUPC11CD	C	M1	3	1	142.004	9.698	0.059	8	LGM	0.0074	141.724	9.679
HFUPC11DD	C	M1	3	1	137.121	10.194	0.059	8	LWT	0.0074	136.889	10.177
HFUPC21BD	C	M2	3	2	155.632	10.351	0.055	8	LGM	0.0069	144.503	9.611
HFUPC21CD	C	M2	3	2	142.935	10.131	0.059	8	LGM	0.0073	141.647	10.040
HFUPC21DD	C	M2	3	2	141.424	10.095	0.059	8	LGM	0.0074	140.747	10.046

	Strength [ksi]	Modulus [Msi]		t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
Average	148.422	9.998	$Average_{norm}$	0.0073	145.536	9.805
Standard Dev.	5.362	0.180	$Standard\ Dev._{norm}$		4.471	0.185
Coeff. of Var. [%]	3.612	1.798	$Coeff.\ of\ Var.\ [\%]_{norm}$		3.072	1.883
Min.	137.121	9.635	Min.	0.0069	136.889	9.469
Max.	158.968	10.351	Max.	0.0074	154.940	10.177
Number of Spec.	20	20	Number of Spec.		20	20


Laminate Unnotched Tension Properties (UNT0) -- (ETW)
Normalized Strength
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT0) [ksi]


Laminate Unnotched Tension Properties (UNT0) -- (ETW)
Normalized Modulus
Hexcel 8552 AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT0) [Msi]

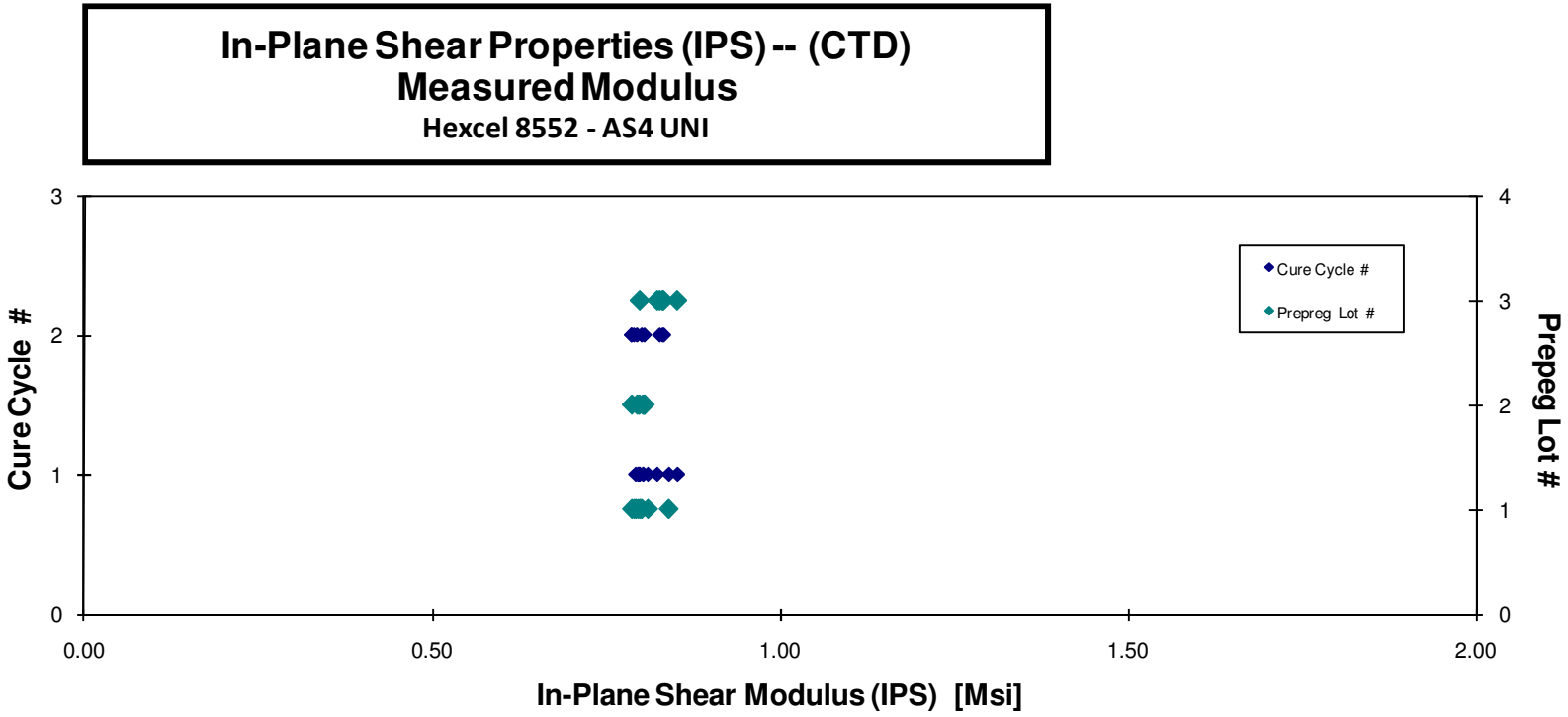
4.7 In-Plane Shear Properties

In-Plane Shear Properties (IPS) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
HFUNA116B	A	M1	1	1	10.541	0.796	0.087	12	0.0073
HFUNA117B	A	M1	1	1	10.612	0.810	0.086	12	0.0072
HFUNA118B	A	M1	1	1	10.489	0.799	0.088	12	0.0073
HFUNA119B	A	M1	1	1	10.409	0.793	0.088	12	0.0073
HFUNA11AB	A	M1	1	1	10.889	0.840	0.081	12	0.0068
HFUNA216B	A	M2	1	2	10.782	0.790	0.087	12	0.0073
HFUNA217B	A	M2	1	2	10.852	0.801	0.087	12	0.0073
HFUNA218B	A	M2	1	2	10.448	0.787	0.088	12	0.0073
HFUNB116B	B	M1	2	1	10.370	0.803	0.087	12	0.0072
HFUNB117B	B	M1	2	1	10.462	0.804	0.087	12	0.0072
HFUNB118B	B	M1	2	1	10.388	0.797	0.087	12	0.0072
HFUNB216B	B	M2	2	2	10.367	0.795	0.087	12	0.0073
HFUNB217B	B	M2	2	2	10.540	0.805	0.087	12	0.0072
HFUNB218B	B	M2	2	2	10.349	0.787	0.088	12	0.0073
HFUNC118B	C	M1	3	1	11.137	0.824	0.088	12	0.0074
HFUNC119B	C	M1	3	1	10.875	0.798	0.089	12	0.0074
HFUNC11AB	C	M1	3	1	11.676	0.853	0.080	12	0.0067
HFUNC216B	C	M2	3	2	11.071	0.831	0.087	12	0.0073
HFUNC217B	C	M2	3	2	11.163	0.833	0.088	12	0.0073
HFUNC219B	C	M2	3	2	11.209	0.827	0.087	12	0.0073

Note: ALL CTD SPECIMENS FAILED BEFORE IT REACHED 5% STRAIN.

Average	**10.732**	**0.809**	**Average**	**0.0072**
Standard Dev.	**0.368**	**0.019**	**Standard Dev.**	
Coeff. of Var. [%]	**3.433**	**2.370**	**Coeff. of Var. [%]**	
Min.	**10.349**	**0.787**	**Min.**	**0.0067**
Max.	**11.676**	**0.853**	**Max.**	**0.0074**
Number of Spec.	**20**	**20**	**Number of Spec.**	**20**

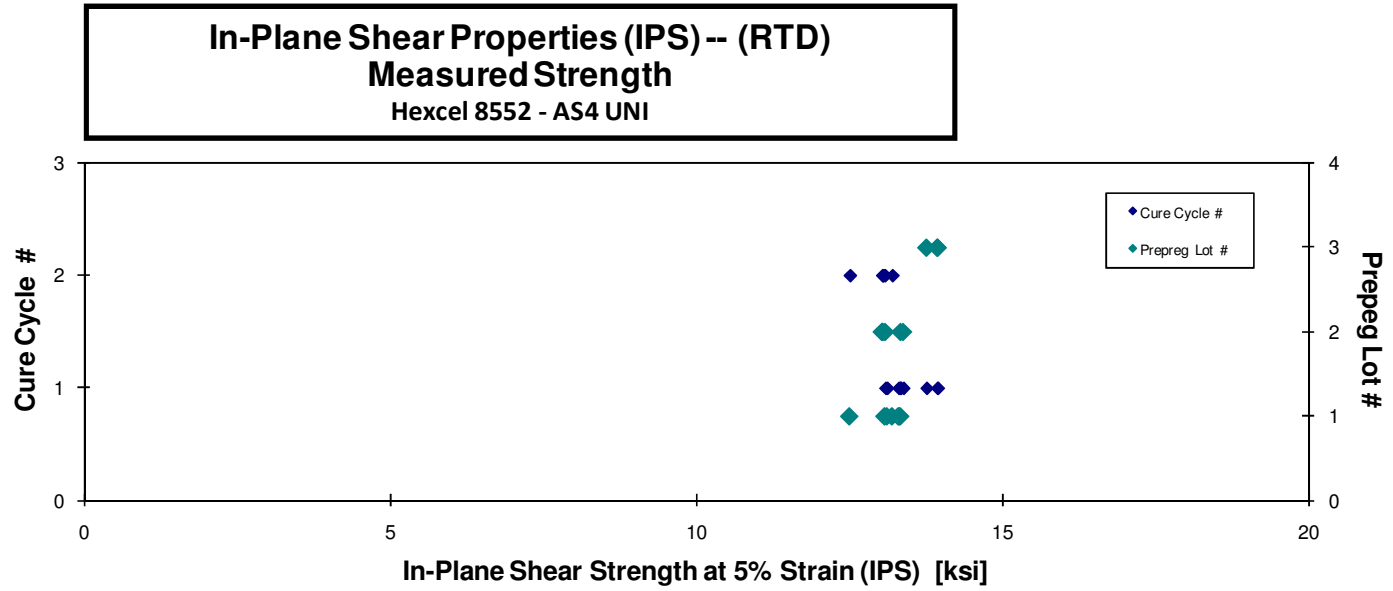

In-Plane Shear Properties (IPS) -- (CTD)
Measured Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
0
1
2
3
4
0.00
0.50
1.00
1.50
2.00
In-Plane Shear Modulus (IPS) [Msi]

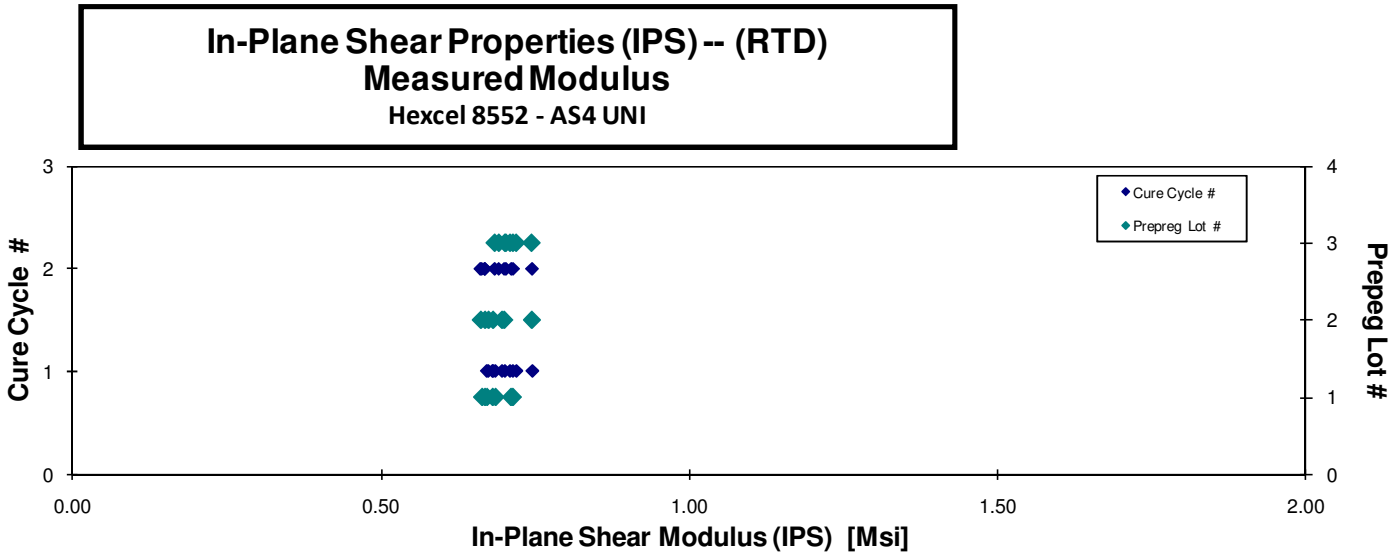
In-Plane Shear Properties (IPS) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUNA111A	A	M1	1	1	13.123	8.000	0.714	0.083	12	0.0069
HFUNA112A	A	M1	1	1	13.325	8.233	0.672	0.088	12	0.0073
HFUNA113A	A	M1	1	1	13.306	7.754	0.681	0.087	12	0.0072
HFUNA114A	A	M1	1	1	13.338	7.965	0.686	0.087	12	0.0072
HFUNA211A	A	M2	1	2	12.515	7.988	0.711	0.081	12	0.0068
HFUNA212A	A	M2	1	2	13.206	7.982	0.669	0.088	12	0.0073
HFUNA213A	A	M2	1	2	13.086	8.183	0.664	0.088	12	0.0074
HFUNB111A	B	M1	2	1	*	7.953	0.697	0.085	12	0.0071
HFUNB112A	B	M1	2	1	13.385	7.740	0.745	0.088	12	0.0073
HFUNB113A	B	M1	2	1	13.093	7.685	0.675	0.087	12	0.0073
HFUNB114A	B	M1	2	1	13.342	7.818	0.682	0.087	12	0.0073
HFUNB211A	B	M2	2	2	13.043	7.872	0.700	0.084	12	0.0070
HFUNB212A	B	M2	2	2	13.058	7.626	0.662	0.088	12	0.0073
HFUNB213A	B	M2	2	2	13.047	7.662	0.669	0.087	12	0.0073
HFUNC115A	C	M1	3	1	13.940	8.110	0.701	0.087	12	0.0073
HFUNC116A	C	M1	3	1	13.946	8.325	0.720	0.088	12	0.0073
HFUNC117A	C	M1	3	1	13.764	8.125	0.710	0.088	12	0.0073
HFUNC211A	C	M2	3	2	*	8.307	0.745	0.080	12	0.0067
HFUNC212A	C	M2	3	2	*	7.882	0.685	0.088	12	0.0073
HFUNC213A	C	M2	3	2	*	8.532	0.691	0.088	12	0.0073
HFUNC214A	C	M2	3	2	*	8.081	0.703	0.087	12	0.0073
HFUNC215A	C	M2	3	2	*	8.204	0.714	0.087	12	0.0073

Note: * SPECIMENS FAILED BEFORE IT REACHED 5% STRAIN.

Average	**13.282**	**8.001**	**0.695**	**Average**	**0.0072**
Standard Dev.	**0.364**	**0.239**	**0.024**	**Standard Dev.**	
Coeff. of Var. [%]	**2.737**	**2.983**	**3.407**	**Coeff. of Var. [%]**	
Min.	**12.515**	**7.626**	**0.662**	**Min.**	**0.0067**
Max.	**13.946**	**8.532**	**0.745**	**Max.**	**0.0074**
Number of Spec.	**16**	**22**	**22**	**Number of Spec.**	**22**

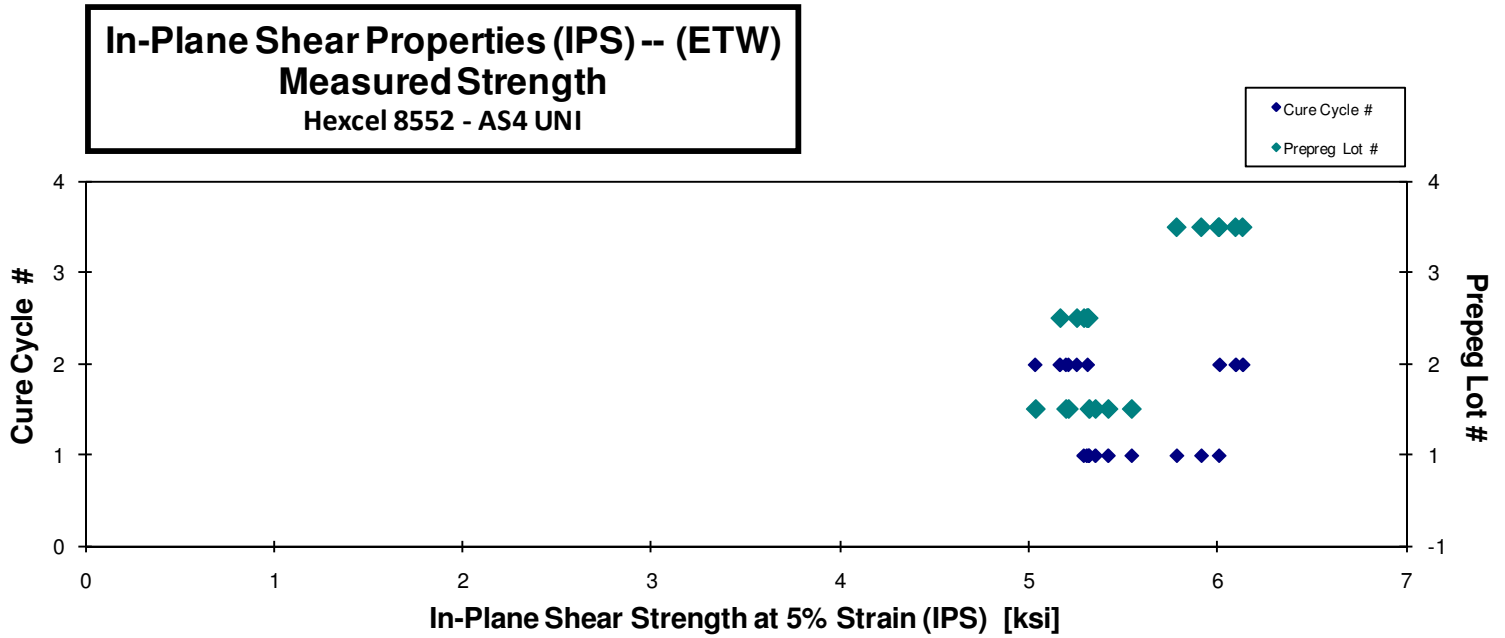

In-Plane Shear Properties (IPS) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Strength at 5% Strain (IPS) [ksi]
0
1
2
3
4
0
5
10
15
20

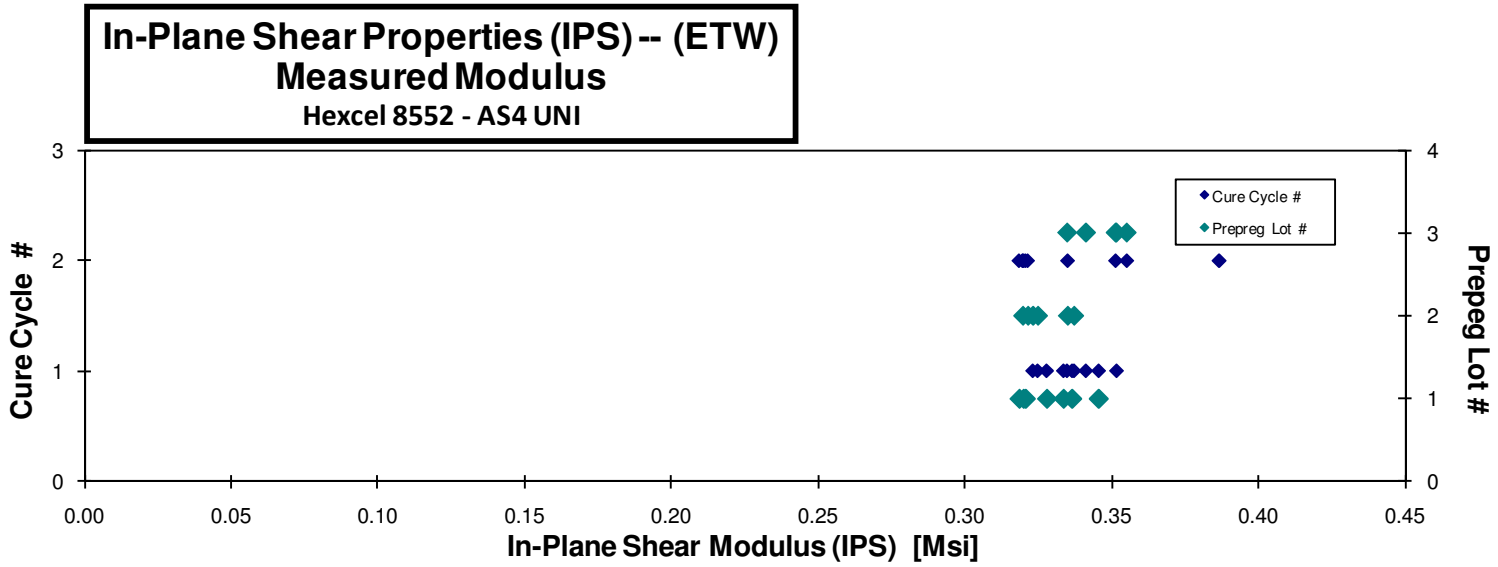

In-Plane Shear Properties (IPS) -- (RTD)
Measured Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Modulus (IPS) [Msi]
0
1
2
3
4
0.00
0.50
1.00
1.50
2.00

In-Plane Shear Properties (IPS) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUNA11BD	A	M1	1	1	5.322	3.371	0.336	0.084	12	0.0070
HFUNA11CD	A	M1	1	1	5.356	3.341	0.328	0.088	12	0.0073
HFUNA11DD	A	M1	1	1	5.423	3.419	0.334	0.087	12	0.0072
HFUNA11ED	A	M1	1	1	5.547	3.473	0.346	0.087	12	0.0072
HFUNA21BD	A	M2	1	2	5.037	3.190	0.320	0.081	12	0.0068
HFUNA21CD	A	M2	1	2	5.213	3.199	0.318	0.088	12	0.0073
HFUNA21DD	A	M2	1	2	5.199	3.237	0.321	0.088	12	0.0073
HFUNB11BD	B	M1	2	1	5.294	3.324	0.337	0.083	12	0.0069
HFUNB11CD	B	M1	2	1	5.309	3.229	0.325	0.087	12	0.0073
HFUNB11DD	B	M1	2	1	5.318	3.235	0.323	0.087	12	0.0072
HFUNB21CD	B	M2	2	2	5.168	3.225	0.320	0.087	12	0.0072
HFUNB21DD	B	M2	2	2	5.257	3.224	0.321	0.086	12	0.0072
HFUNB21ED	B	M2	2	2	5.314	3.299	0.335	0.086	12	0.0072
HFUNC11CD	C	M1	3	1	5.785	3.368	0.335	0.089	12	0.0074
HFUNC11DD	C	M1	3	1	5.915	3.394	0.341	0.088	12	0.0074
HFUNC11ED	C	M1	3	1	6.008	3.471	0.352	0.087	12	0.0073
HFUNC21BD	C	M2	3	2	6.134	3.734	0.386	0.081	12	0.0067
HFUNC21CD	C	M2	3	2	6.097	3.586	0.355	0.088	12	0.0078
HFUNC21DD	C	M2	3	2	6.011	3.573	0.351	0.088	12	0.0074

Average	**5.511**	**3.363**	**0.336**	**Average**	**0.0072**
Standard Dev.	**0.357**	**0.151**	**0.017**	**Standard Dev.**	
Coeff. of Var. [%]	**6.477**	**4.493**	**5.026**	**Coeff. of Var. [%]**	
Min.	**5.037**	**3.190**	**0.318**	**Min.**	**0.0067**
Max.	**6.134**	**3.734**	**0.386**	**Max.**	**0.0078**
Number of Spec.	**19**	**19**	**19**	**Number of Spec.**	**19**


In-Plane Shear Properties (IPS) -- (ETW)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Strength at 5% Strain (IPS) [ksi]

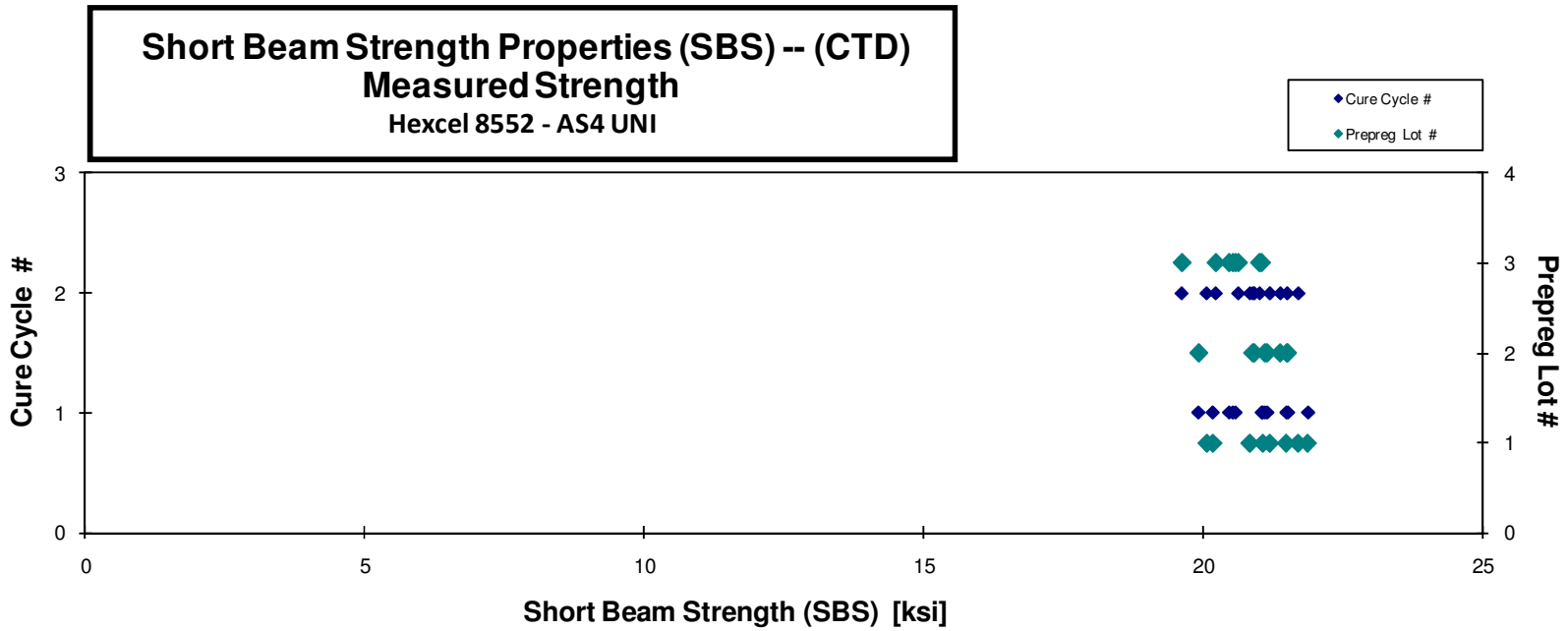

In-Plane Shear Properties (IPS) -- (ETW)
Measured Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Modulus (IPS) [Msi]

4.8 Lamina Short Beam Shear Properties

Short Beam Strength Properties (SBS) -- (CTD) Strength
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFUQA116B	A	M1	1	1	20.168	0.252	34	0.0074	INTERLAMINAR SHEAR
HFUQA117B	A	M1	1	1	21.064	0.250	34	0.0074	INTERLAMINAR SHEAR
HFUQA118B	A	M1	1	1	21.871	0.249	34	0.0073	INTERLAMINAR SHEAR
HFUQA119B	A	M1	1	1	21.486	0.249	34	0.0073	INTERLAMINAR SHEAR
HFUQA216B	A	M2	1	2	20.831	0.250	34	0.0074	INTERLAMINAR SHEAR
HFUQA217B	A	M2	1	2	20.060	0.250	34	0.0074	INTERLAMINAR SHEAR
HFUQA218B	A	M2	1	2	21.699	0.250	34	0.0073	INTERLAMINAR SHEAR
HFUQA219B	A	M2	1	2	21.189	0.249	34	0.0073	INTERLAMINAR SHEAR
HFUQB116B	B	M1	2	1	21.143	0.249	34	0.0073	INTERLAMINAR SHEAR
HFUQB117B	B	M1	2	1	21.103	0.250	34	0.0074	INTERLAMINAR SHEAR
HFUQB118B	B	M1	2	1	21.513	0.250	34	0.0074	INTERLAMINAR SHEAR
HFUQB119B	B	M1	2	1	19.914	0.250	34	0.0073	INTERLAMINAR SHEAR
HFUQB216B	B	M2	2	2	20.884	0.253	34	0.0074	INTERLAMINAR SHEAR
HFUQB217B	B	M2	2	2	20.913	0.254	34	0.0075	INTERLAMINAR SHEAR
HFUQB218B	B	M2	2	2	21.376	0.252	34	0.0074	INTERLAMINAR SHEAR
HFUQB219B	B	M2	2	2	21.498	0.252	34	0.0074	INTERLAMINAR SHEAR
HFUQC116B	C	M1	3	1	20.461	0.254	34	0.0075	INTERLAMINAR SHEAR
HFUQC117B	C	M1	3	1	21.044	0.253	34	0.0074	INTERLAMINAR SHEAR
HFUQC118B	C	M1	3	1	20.574	0.251	34	0.0074	INTERLAMINAR SHEAR
HFUQC119B	C	M1	3	1	20.528	0.250	34	0.0073	INTERLAMINAR SHEAR
HFUQC216B	C	M2	3	2	20.626	0.244	34	0.0072	INTERLAMINAR SHEAR
HFUQC217B	C	M2	3	2	21.007	0.237	34	0.0070	INTERLAMINAR SHEAR
HFUQC218B	C	M2	3	2	20.222	0.221	34	0.0065	INTERLAMINAR SHEAR
HFUQC219B	C	M2	3	2	19.613	0.201	34	0.0059	INTERLAMINAR SHEAR

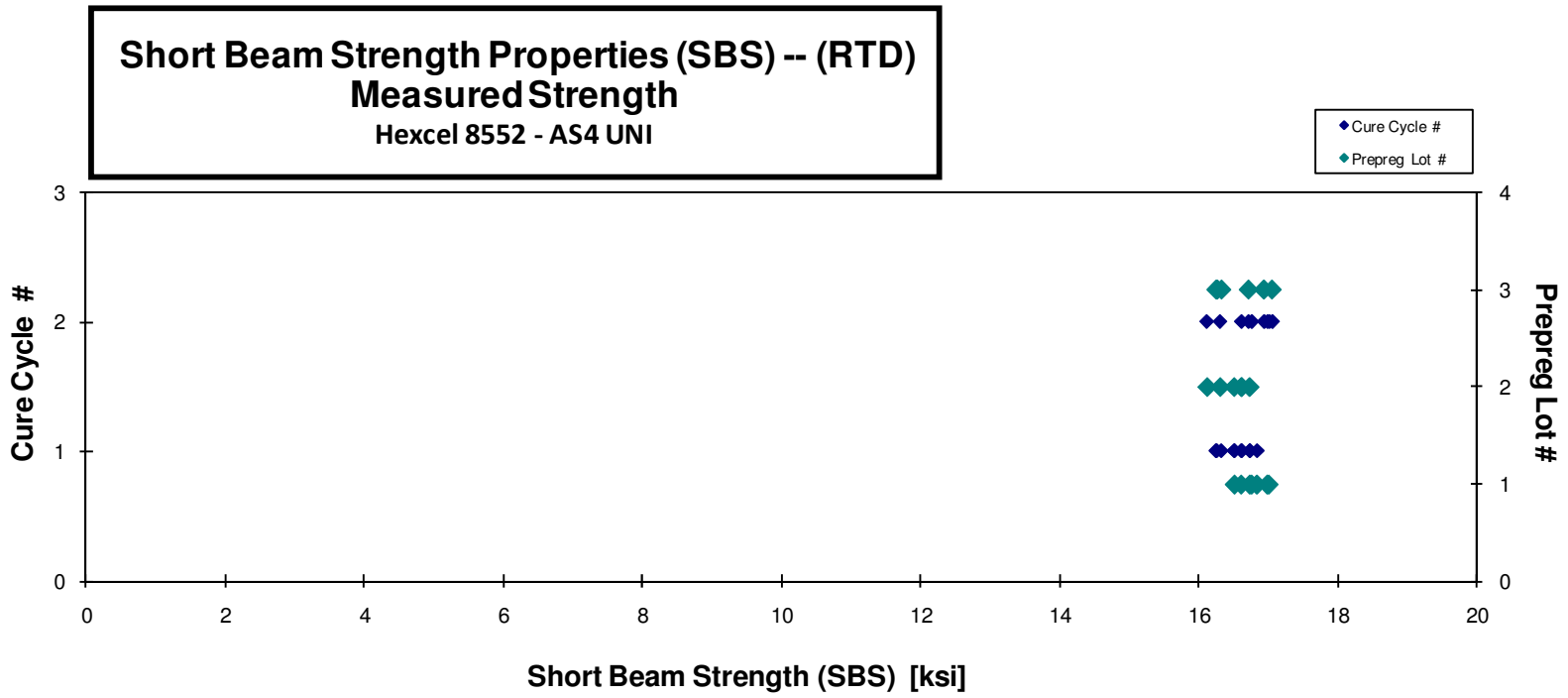
Average	**20.866**	**Average**	**0.0073**
Standard Dev.	**0.588**	**Standard Dev.**	
Coeff. of Var. [%]	**2.817**	**Coeff. of Var. [%]**	
Min.	**19.613**	**Min.**	**0.0059**
Max.	**21.871**	**Max.**	**0.0075**
Number of Spec.	**24**	**Number of Spec.**	**24**


Short Beam Strength Properties (SBS) -- (CTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short Beam Strength (SBS) [ksi]
0
1
2
3
4
0
5
10
15
20
25

Short Beam Strength Properties (SBS) -- (RTD)
Strength
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFUQA112A	A	M1	1	1	16.520	0.243	34	0.0072	COMPRESSION / ILS
HFUQA113A	A	M1	1	1	16.741	0.250	34	0.0074	ILS / COMPRESSION / TENSION
HFUQA114A	A	M1	1	1	16.616	0.252	34	0.0074	COMPRESSION / ILS / TENSION
HFUQA115A	A	M1	1	1	16.844	0.252	34	0.0074	ILS / COMPRESSION / TENSION
HFUQA213A	A	M2	1	2	16.768	0.250	34	0.0074	COMPRESSION / ILS LEFT
HFUQA214A	A	M2	1	2	17.018	0.251	34	0.0074	COMPRESSION / ILS LEFT RIGHT
HFUQA215A	A	M2	1	2	16.994	0.251	34	0.0074	COMPRESSION / ILS RIGHT
HFUQB113A	B	M1	2	1	16.517	0.237	34	0.0070	COMPRESSION / ILS / TENSION
HFUQB114A	B	M1	2	1	16.626	0.244	34	0.0072	COMPRESSION / ILS / TENSION
HFUQB115A	B	M1	2	1	16.739	0.247	34	0.0073	ILS / COMPRESSION / TENSION
HFUQB213A	B	M2	2	2	16.123	0.240	34	0.0071	COMPRESSION / ILS LEFT
HFUQB214A	B	M2	2	2	16.313	0.248	34	0.0073	COMPRESSION / ILS LEFT
HFUQB215A	B	M2	2	2	16.620	0.252	34	0.0074	COMPRESSION / ILS / TENSION
HFUQC113A	C	M1	3	1	16.256	0.251	34	0.0074	COMPRESSION / ILS
HFUQC114A	C	M1	3	1	16.269	0.255	34	0.0075	COMPRESSION / ILS
HFUQC115A	C	M1	3	1	16.331	0.256	34	0.0075	COMPRESSION / ILS
HFUQC213A	C	M2	3	2	16.945	0.241	34	0.0071	COMPRESSION / ILS
HFUQC214A	C	M2	3	2	16.722	0.246	34	0.0072	COMPRESSION / ILS
HFUQC215A	C	M2	3	2	17.063	0.247	34	0.0073	COMPRESSION / ILS

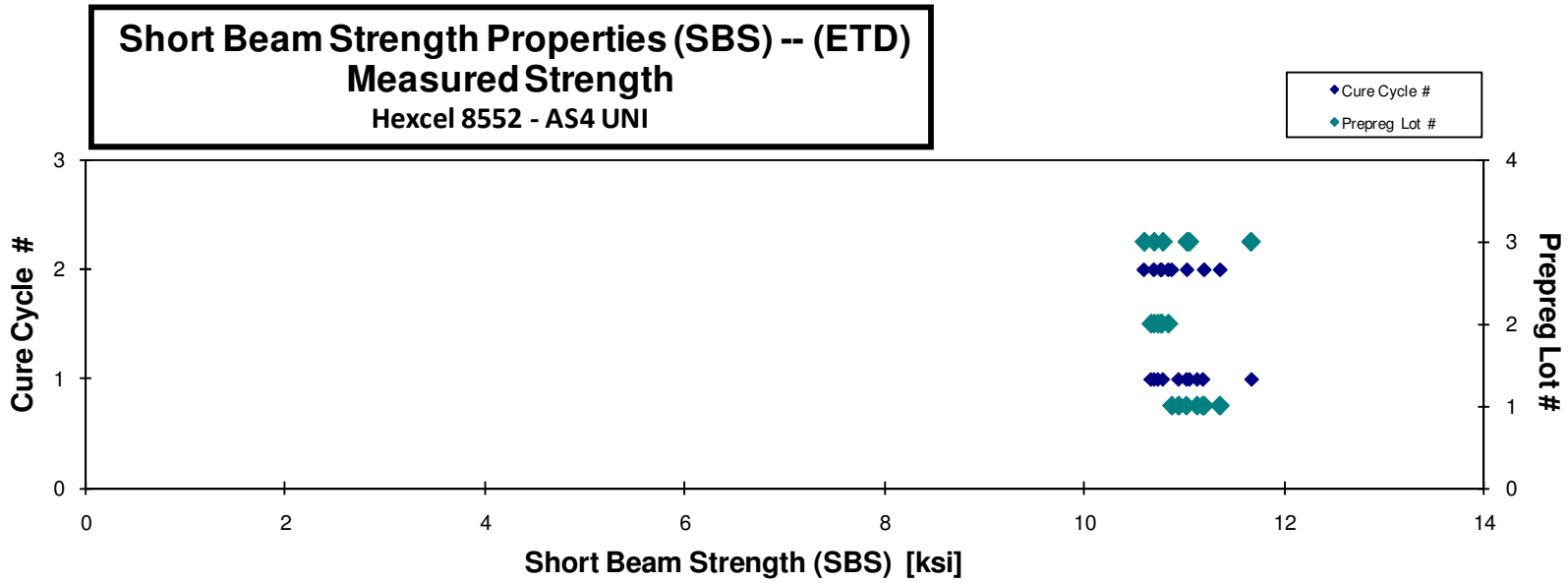
Average	**16.633**	**Average**	**0.0073**
Standard Dev.	**0.280**	**Standard Dev.**	
Coeff. of Var. [%]	**1.682**	**Coeff. of Var. [%]**	
Min.	**16.123**	**Min.**	**0.0070**
Max.	**17.063**	**Max.**	**0.0075**
Number of Spec.	**19**	**Number of Spec.**	**19**


Short Beam Strength Properties (SBS) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 UNI
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)
Strength
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFUQA11AC	A	M1	1	1	11.023	0.249	34	0.0073	ILS
HFUQA11BC	A	M1	1	1	10.945	0.250	34	0.0074	ILS
HFUQA11CC	A	M1	1	1	11.190	0.251	34	0.0074	ILS
HFUQA11DC	A	M1	1	1	11.131	0.252	34	0.0074	ILS
HFUQA21AC	A	M2	1	2	11.361	0.250	34	0.0073	ILS
HFUQA21BC	A	M2	1	2	10.877	0.251	34	0.0074	ILS
HFUQA21CC	A	M2	1	2	11.202	0.252	34	0.0074	ILS
HFUQB11AC	B	M1	2	1	10.739	0.250	34	0.0073	ILS
HFUQB11BC	B	M1	2	1	10.668	0.250	34	0.0074	ILS
HFUQB11CC	B	M1	2	1	10.700	0.251	34	0.0074	ILS
HFUQB21AC	B	M2	2	2	10.774	0.252	34	0.0074	ILS
HFUQB21BC	B	M2	2	2	10.842	0.252	34	0.0074	ILS
HFUQB21CC	B	M2	2	2	10.768	0.251	34	0.0074	ILS
HFUQC11AC	C	M1	3	1	11.676	0.250	34	0.0074	ILS
HFUQC11BC	C	M1	3	1	11.054	0.252	34	0.0074	ILS
HFUQC11CC	C	M1	3	1	10.788	0.254	34	0.0075	ILS
HFUQC21AC	C	M2	3	2	10.699	0.234	34	0.0069	ILS
HFUQC21BC	C	M2	3	2	11.031	0.245	34	0.0072	ILS
HFUQC21DC	C	M2	3	2	10.599	0.258	34	0.0076	ILS

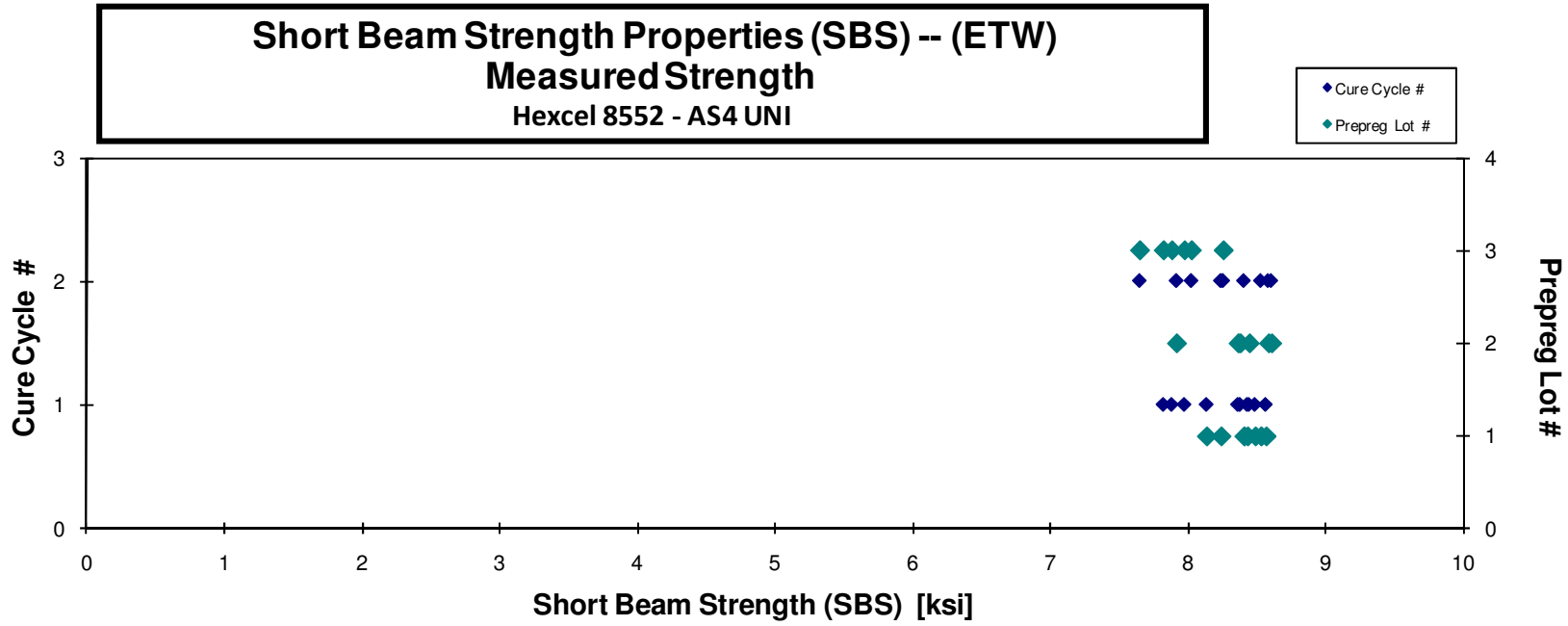
Average	**10.951**	**Average**	**0.0074**
Standard Dev.	**0.274**	**Standard Dev.**	
Coeff. of Var. [%]	**2.504**	**Coeff. of Var. [%]**	
Min.	**10.599**	**Min.**	**0.0069**
Max.	**11.676**	**Max.**	**0.0076**
Number of Spec.	**19**	**Number of Spec.**	**19**


Short Beam Strength Properties (SBS) -- (ETD)
Measured Strength
Hexcel 8552 - AS4 UNI
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

Short Beam Strength Properties (SBS) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFUQA11ED	A	M1	1	1	8.564	0.251	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFUQA11FD	A	M1	1	1	8.485	0.250	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFUQA11GD	A	M1	1	1	8.430	0.247	34	0.0073	COMPRESSION
HFUQA11ID	A	M1	1	1	8.134	0.233	34	0.0069	COMPRESSION
HFUQA21ED	A	M2	1	2	8.405	0.251	34	0.0074	COMPRESSION
HFUQA21FD	A	M2	1	2	8.238	0.248	34	0.0073	COMPRESSION / INTERLAMINAR SHEAR
HFUQA21HD	A	M2	1	2	8.527	0.233	34	0.0068	COMPRESSION / INTERLAMINAR SHEAR
HFUQB11ED	B	M1	2	1	8.443	0.250	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFUQB11FD	B	M1	2	1	8.363	0.249	34	0.0073	COMPRESSION / INTERLAMINAR SHEAR
HFUQB11HD	B	M1	2	1	8.377	0.234	34	0.0069	COMPRESSION / INTERLAMINAR SHEAR
HFUQB21ED	B	M2	2	2	8.604	0.250	34	0.0073	COMPRESSION / INTERLAMINAR SHEAR
HFUQB21GD	B	M2	2	2	8.582	0.241	34	0.0071	COMPRESSION / INTERLAMINAR SHEAR
HFUQB21HD	B	M2	2	2	7.917	0.233	34	0.0069	COMPRESSION / INTERLAMINAR SHEAR
HFUQC11ED	C	M1	3	1	7.822	0.252	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFUQC11FD	C	M1	3	1	7.882	0.247	34	0.0073	COMPRESSION
HFUQC11GD	C	M1	3	1	7.974	0.237	34	0.0070	COMPRESSION / INTERLAMINAR SHEAR
HFUQC21ED	C	M2	3	2	8.254	0.260	34	0.0076	COMPRESSION / INTERLAMINAR SHEAR
HFUQC21FD	C	M2	3	2	7.650	0.258	34	0.0076	COMPRESSION / INTERLAMINAR SHEAR
HFUQC21GD	C	M2	3	2	8.024	0.250	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR

Average	**8.246**	**Average**	**0.0072**
Standard Dev.	**0.290**	**Standard Dev.**	
Coeff. of Var. [%]	**3.522**	**Coeff. of Var. [%]**	
Min.	**7.650**	**Min.**	**0.0068**
Max.	**8.604**	**Max.**	**0.0076**
Number of Spec.	**19**	**Number of Spec.**	**19**


Short Beam Strength Properties (SBS) -- (ETW)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short Beam Strength (SBS) [ksi]
0
1
2
3
4
5
6
7
8
9
10

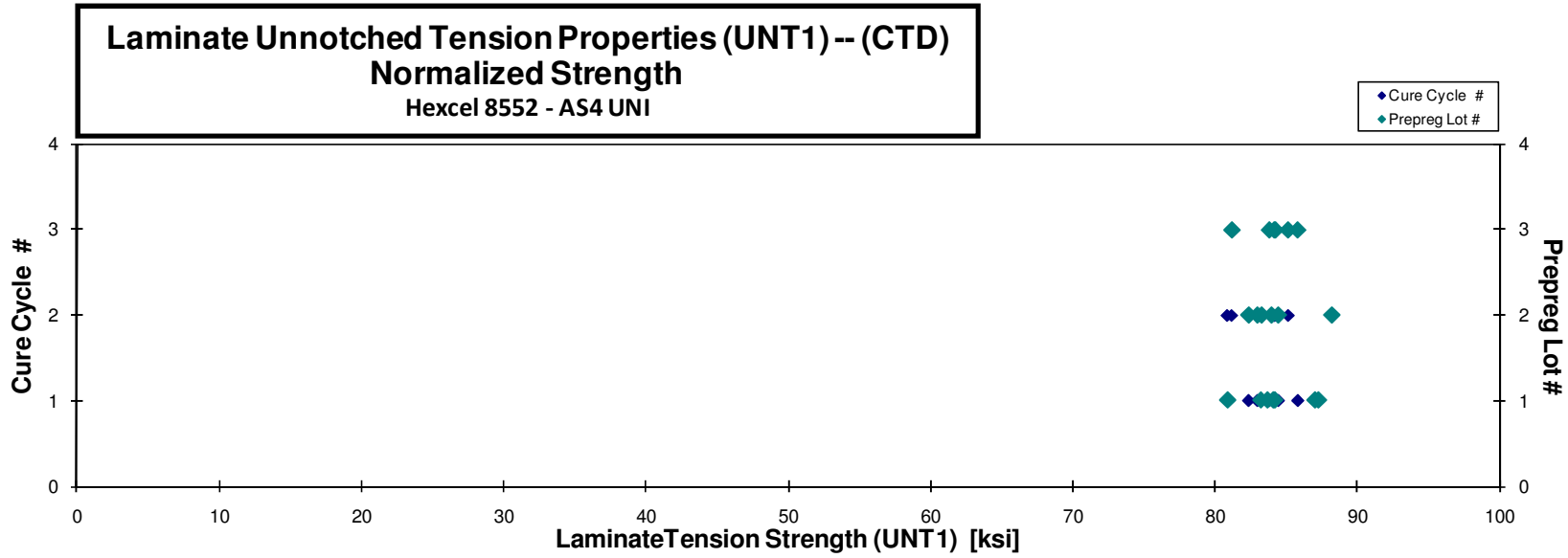
4.9 Unnotched Tension 1 Properties

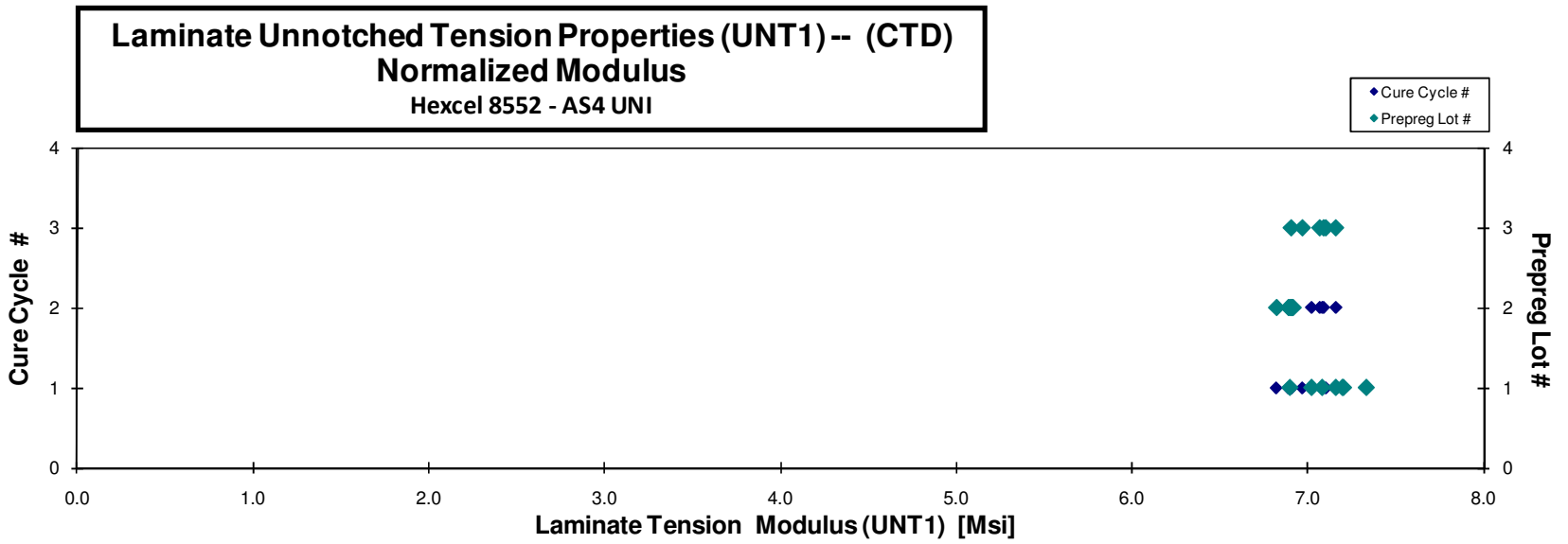
Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUAA116B	A	M1	1	1	84.712	7.428	0.117	16	MGM	0.0073	83.675	7.337
HFUAA117B	A	M1	1	1	85.263	7.301	0.117	16	MGM	0.0073	84.087	7.200
HFUAA118B	A	M1	1	1	87.764	7.267	0.117	16	MWB	0.0073	87.023	7.206
HFUAA119B	A	M1	1	1	89.814	7.372	0.115	16	MWT	0.0072	87.260	7.162
HFUAA216B	A	M2	1	2	85.103	7.160	0.117	16	MGM	0.0073	84.193	7.083
HFUAA217B	A	M2	1	2	81.873	7.108	0.117	16	MGM	0.0073	80.882	7.022
HFUAA218B	A	M2	1	2	83.929	6.956	0.117	16	MGM	0.0073	83.220	6.898
HFUAB116B	B	M1	2	1	83.995	6.993	0.117	16	MGM	0.0073	82.978	6.909
HFUAB117B	B	M1	2	1	85.725	6.924	0.117	16	MGM	0.0073	84.446	6.821
HFUAB118B	B	M1	2	1	83.569	6.991	0.117	16	MGM	0.0073	82.369	6.890
HFUAB216B	B	M2	2	2	88.428	6.915	0.118	16	MGM	0.0074	88.204	6.897
HFUAB217B	B	M2	2	2	84.829	6.976	0.117	16	MGM	0.0073	83.970	6.905
HFUAB218B	B	M2	2	2	84.130	6.988	0.117	16	MGM	0.0073	83.266	6.916
HFUAC116B	C	M1	3	1	84.459	6.958	0.118	16	MGM	0.0073	83.817	6.905
HFUAC117B	C	M1	3	1	85.596	7.082	0.117	16	MGM	0.0073	84.235	6.970
HFUAC118B	C	M1	3	1	86.020	7.122	0.118	16	MWB	0.0074	85.802	7.104
HFUAC216B	C	M2	3	2	85.050	7.143	0.117	16	MWT	0.0073	84.164	7.069
HFUAC217B	C	M2	3	2	81.702	7.207	0.118	16	MWT	0.0074	81.184	7.161
HFUAC218B	C	M2	3	2	85.609	7.132	0.118	16	MGM	0.0074	85.127	7.091

Average	**85.135**	**7.106**	**$Average_{norm}$**	**0.0073**	**84.205**	**7.029**
Standard Dev.	**1.981**	**0.154**	**$Standard\ Dev._{norm}$**		**1.888**	**0.142**
Coeff. of Var. [%]	**2.327**	**2.162**	**Coeff. of Var. $[\%]_{norm}$**		**2.242**	**2.022**
Min.	**81.702**	**6.915**	**Min.**	**0.0072**	**80.882**	**6.821**
Max.	**89.814**	**7.428**	**Max.**	**0.0074**	**88.204**	**7.337**
Number of Spec.	**19**	**19**	**Number of Spec.**		**19**	**19**


Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT1) [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4

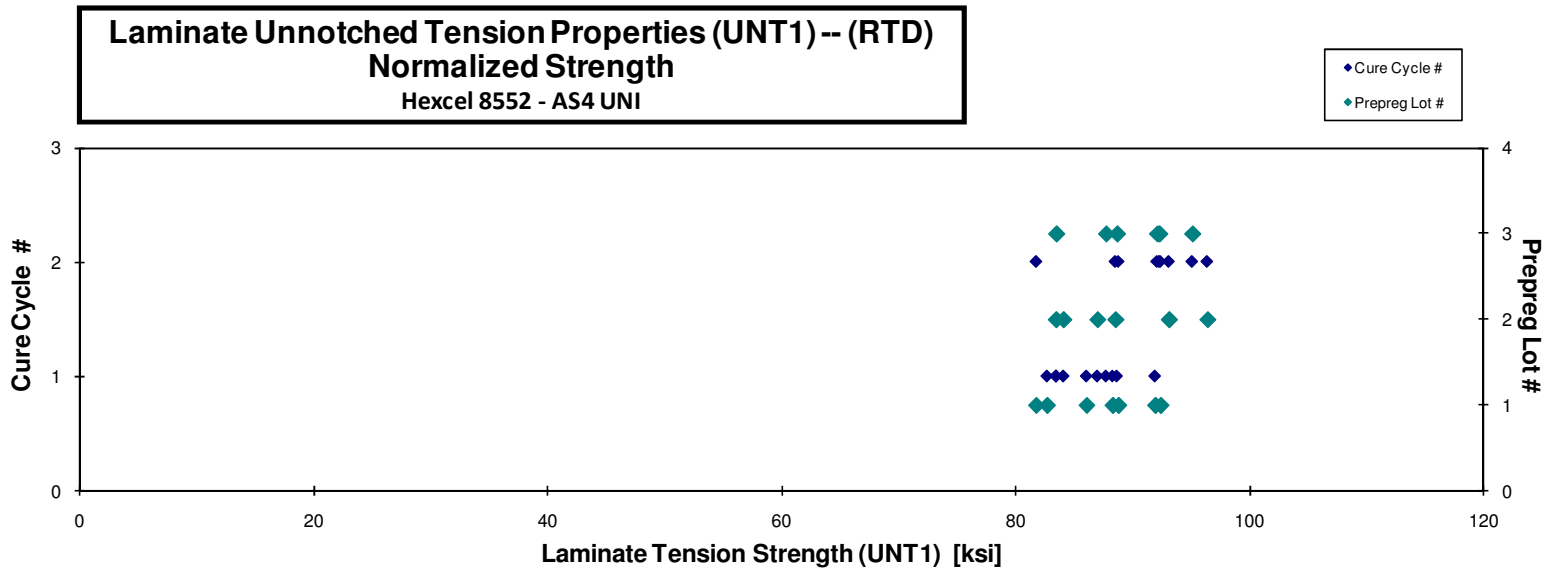

Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT1) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
0
1
2
3
4

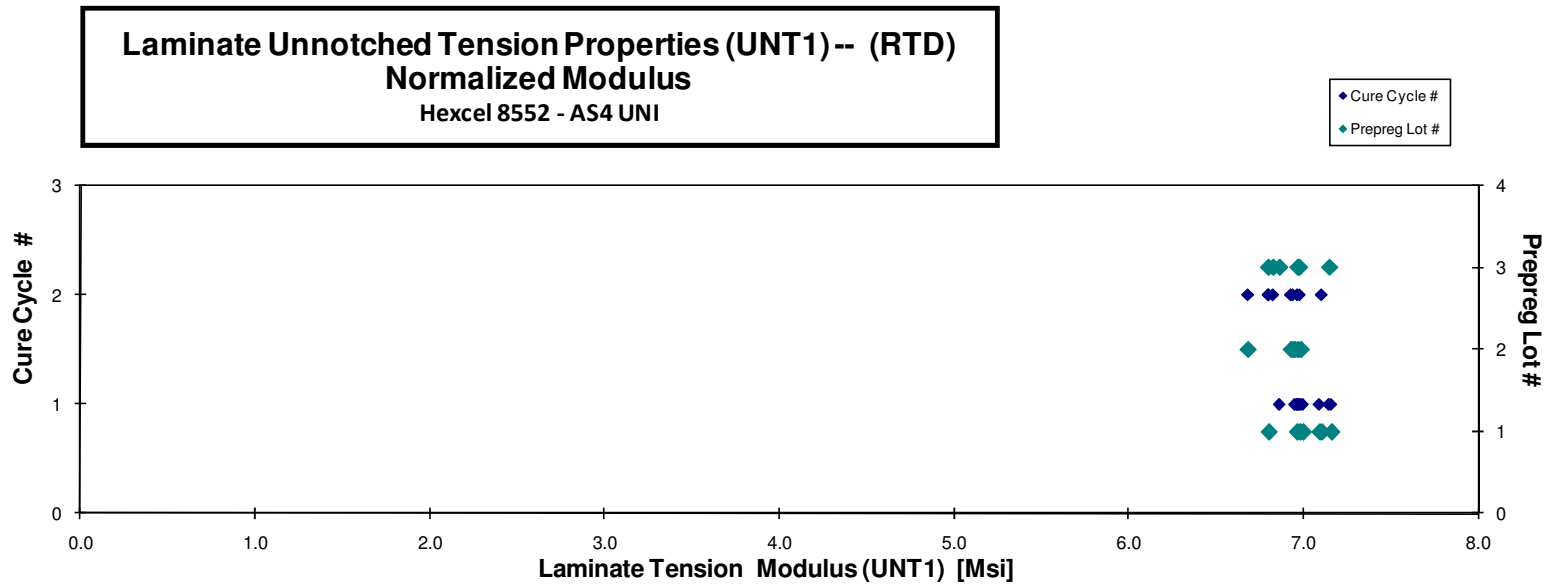
Laminate Unnotched Tension Properties (UNT1) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUAA111A	A	M1	1	1	90.330	7.518	0.113	16	MGM	0.0070	86.045	7.161
HFUAA112A	A	M1	1	1	92.262	7.026	0.118	16	MGM	0.0074	91.911	6.999
HFUAA113A	A	M1	1	1	88.754	7.132	0.118	16	MWB	0.0074	88.279	7.094
HFUAA114A	A	M1	1	1	84.055	7.082	0.116	16	MGM	0.0073	82.670	6.966
HFUAA211A	A	M2	1	2	85.745	7.140	0.113	16	MGM	0.0071	81.726	6.805
HFUAA212A	A	M2	1	2	89.581	7.045	0.117	16	MGM	0.0073	88.774	6.982
HFUAA213A	A	M2	1	2	92.723	7.133	0.118	16	MGM	0.0074	92.383	7.106
HFUAB111A	B	M1	2	1	90.634	7.533	0.110	16	MGM	0.0069	84.064	6.987
HFUAB112A	B	M1	2	1	87.879	7.043	0.117	16	MWT	0.0073	86.976	6.971
HFUAB113A	B	M1	2	1	83.500	6.960	0.118	16	MGM	0.0074	83.430	6.954
HFUAB211A	B	M2	2	2	93.473	7.060	0.112	16	MWT	0.0070	88.512	6.686
HFUAB212A	B	M2	2	2	96.027	6.916	0.119	16	MGM	0.0074	96.392	6.943
HFUAB213A	B	M2	2	2	93.054	6.928	0.118	16	MWB	0.0074	93.093	6.931
HFUAC112A	C	M1	3	1	88.000	7.000	0.118	16	MGM	0.0074	87.715	6.978
HFUAC113A	C	M1	3	1	89.255	7.197	0.118	16	MGM	0.0074	88.652	7.148
HFUAC114A	C	M1	3	1	84.764	6.972	0.117	16	MGM	0.0073	83.464	6.865
HFUAC211A	C	M2	3	2	94.152	6.940	0.116	16	MWB	0.0073	92.270	6.801
HFUAC212A	C	M2	3	2	92.405	6.852	0.118	16	MWT	0.0074	92.092	6.829
HFUAC213A	C	M2	3	2	95.185	6.974	0.118	16	MWB	0.0074	95.105	6.968

	Strength [ksi]	Modulus [Msi]			$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
Average	**90.094**	**7.076**		**$Average_{norm}$**	**88.608**	**6.957**
Standard Dev.	**3.759**	**0.181**		**Standard Dev.$_{norm}$**	**4.348**	**0.122**
Coeff. of Var. [%]	**4.173**	**2.558**		**Coeff. of Var. [%]$_{norm}$**	**4.908**	**1.760**
Min.	**83.500**	**6.852**		**Min.**	**81.726**	**6.686**
Max.	**96.027**	**7.533**		**Max.**	**96.392**	**7.161**
Number of Spec.	**19**	**19**		**Number of Spec.**	**19**	**19**


Laminate Unnotched Tension Properties (UNT1) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Strength (UNT1) [ksi]
0
20
40
60
80
100
120
0
1
2
3
4


Laminate Unnotched Tension Properties (UNT1) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
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
0
1
2
3
4

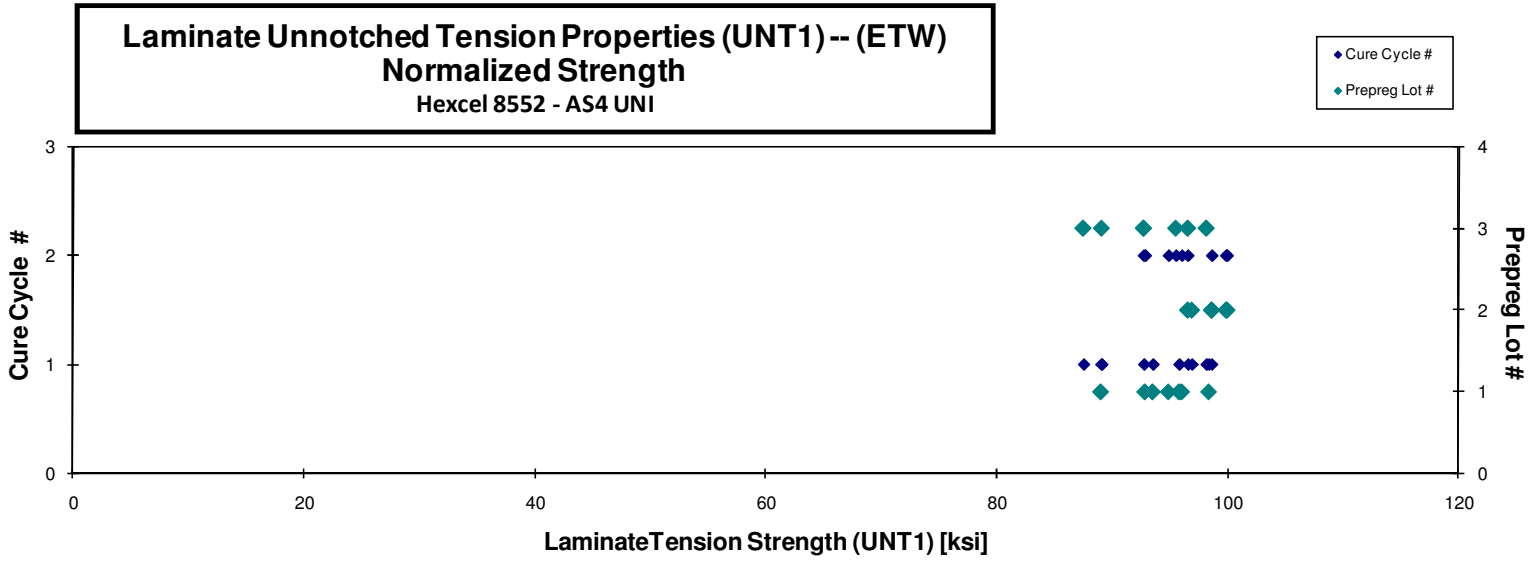
Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 UNI

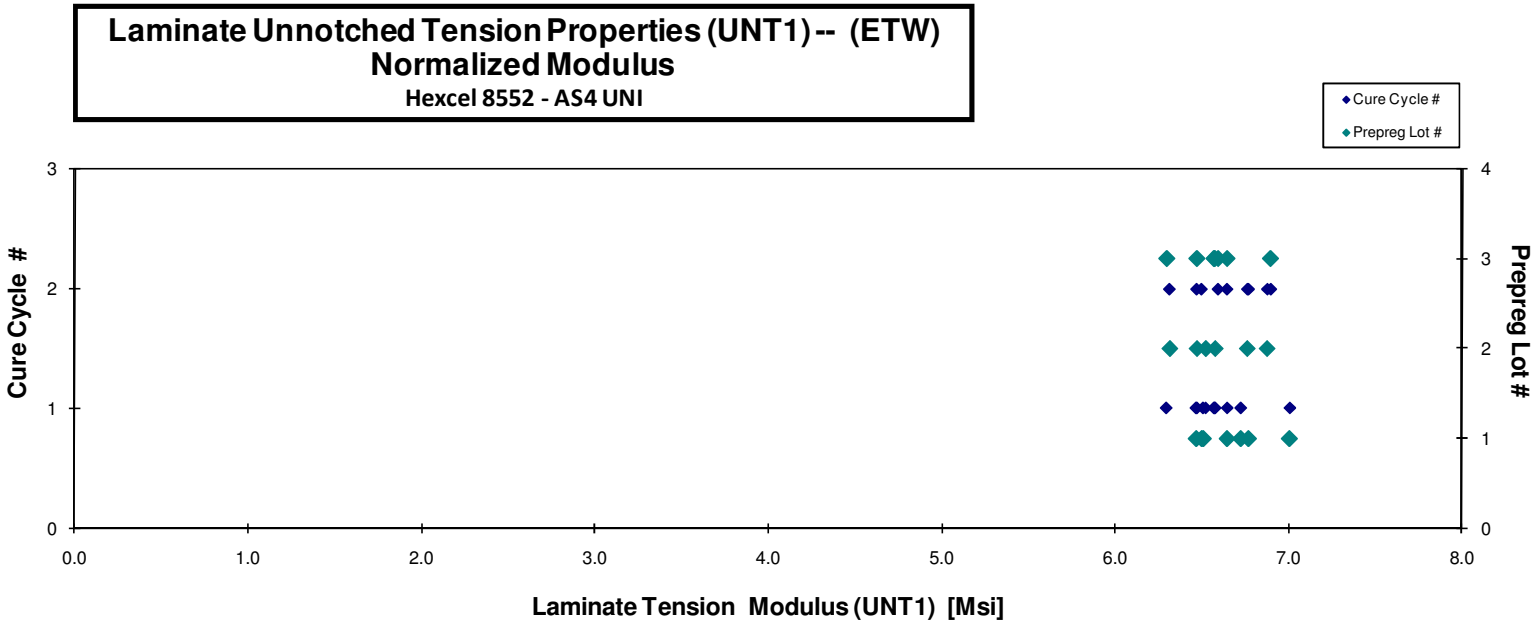
normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUAA11BD	A	M1	1	1	98.139	6.990	0.119	16	MGM	0.0074	98.374	7.007
HFUAA11CD	A	M1	1	1	89.949	6.793	0.117	16	MGM	0.0073	89.050	6.726
HFUAA11DD	A	M1	1	1	94.878	6.603	0.117	16	LWB	0.0073	93.529	6.509
HFUAA11ED	A	M1	1	1	96.999	6.549	0.117	16	MGM	0.0073	95.811	6.469
HFUAA21BD	A	M2	1	2	95.826	6.755	0.119	16	MGM	0.0074	96.042	6.770
HFUAA21CD	A	M2	1	2	93.590	6.699	0.117	16	LGM/AGM	0.0073	92.865	6.647
HFUAA21DD	A	M2	1	2	95.683	6.554	0.117	16	MGM	0.0073	94.889	6.500
HFUAB11BD	B	M1	2	1	96.179	6.552	0.119	16	MGM	0.0074	96.572	6.579
HFUAB11CD	B	M1	2	1	99.880	6.607	0.117	16	LAT	0.0073	98.629	6.524
HFUAB11DD	B	M1	2	1	99.314	6.634	0.116	16	MGM	0.0072	96.910	6.474
HFUAB21BD	B	M2	2	2	99.827	6.875	0.118	16	MGM	0.0074	99.869	6.878
HFUAB21CD	B	M2	2	2	100.759	6.367	0.117	16	MGM	0.0073	99.965	6.317
HFUAB21DD	B	M2	2	2	99.772	6.841	0.117	16	MGM	0.0073	98.634	6.763
HFUAC11BD	C	M1	3	1	98.107	6.644	0.118	16	MGM	0.0074	98.162	6.647
HFUAC11DD	C	M1	3	1	88.212	6.348	0.117	16	MGM	0.0073	87.529	6.299
HFUAC11ED	C	M1	3	1	89.171	6.576	0.118	16	MGM	0.0074	89.109	6.571
HFUAC11FD	C	M1	3	1	93.938	6.660	0.117	16	MGM	0.0073	92.761	6.576
HFUAC21BD	C	M2	3	2	96.025	6.933	0.118	16	MGM	0.0074	95.524	6.897
HFUAC21CD	C	M2	3	2	98.100	6.700	0.117	16	MGM	0.0073	96.567	6.595
HFUAC21DD	C	M2	3	2	93.777	6.545	0.117	16	MGM	0.0073	92.734	6.472

Average	**95.906**	**6.661**	
Standard Dev.	**3.643**	**0.168**	
Coeff. of Var. [%]	**3.798**	**2.527**	
Min.	**88.212**	**6.348**	
Max.	**100.759**	**6.990**	
Number of Spec.	**20**	**20**	

$Average_{norm}$	**0.0073**	**95.176**	**6.611**
Standard $Dev._{norm}$		**3.619**	**0.185**
Coeff. of Var. $[\%]_{norm}$		**3.803**	**2.800**
Min.	**0.0072**	**87.529**	**6.299**
Max.	**0.0074**	**99.965**	**7.007**
Number of Spec.		**20**	**20**


Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
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) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 UNI
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
Laminate Tension Modulus (UNT1) [Msi]

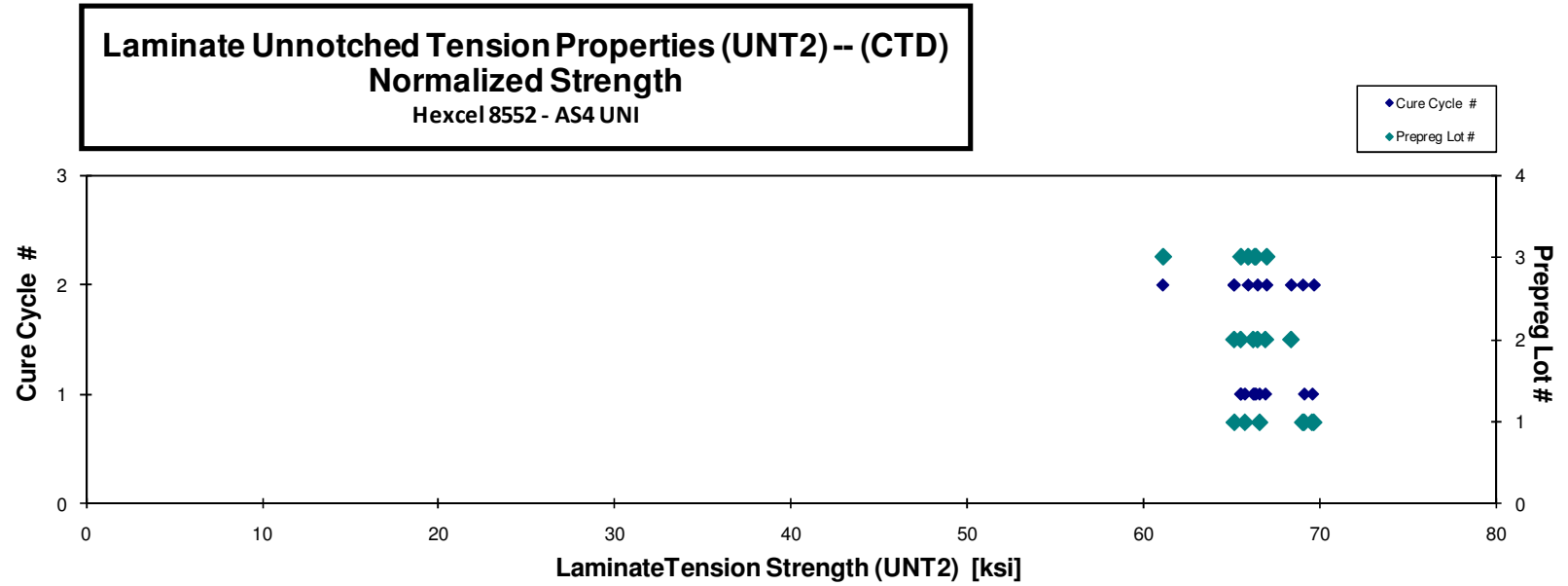
4.10 Unnotched Tension 2 Properties

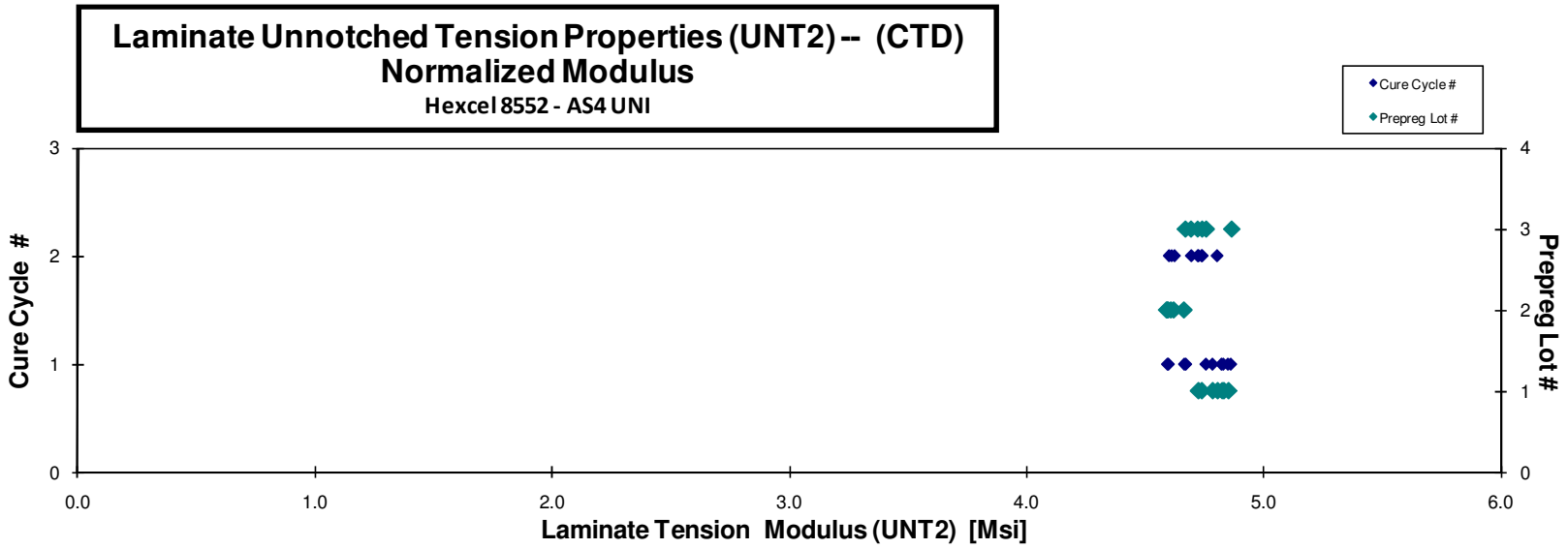
Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUBA116B	A	M1	1	1	65.385	4.798	0.149	20	MGM	0.0074	65.746	4.824
HFUBA117B	A	M1	1	1	68.998	4.843	0.148	20	MWT	0.0074	69.115	4.851
HFUBA118B	A	M1	1	1	69.191	4.760	0.149	20	MWT	0.0074	69.565	4.785
HFUBA119B	A	M1	1	1	67.809	4.921	0.145	20	MGM	0.0073	66.580	4.831
HFUBA217B	A	M2	1	2	69.843	4.752	0.148	20	MGM	0.0074	69.662	4.739
HFUBA218B	A	M2	1	2	68.279	4.753	0.150	20	MGM	0.0075	69.032	4.805
HFUBA219B	A	M2	1	2	66.212	4.803	0.146	20	MGM	0.0073	65.146	4.726
HFUBB116B	B	M1	2	1	66.984	4.646	0.146	20	MWT	0.0073	66.223	4.593
HFUBB117B	B	M1	2	1	65.926	4.694	0.147	20	MGM	0.0074	65.510	4.665
HFUBB118B	B	M1	2	1	66.603	4.575	0.149	20	MWT	0.0074	66.911	4.596
HFUBB216B	B	M2	2	2	69.155	4.676	0.146	20	MGM	0.0073	68.368	4.623
HFUBB217B	B	M2	2	2	66.089	4.678	0.146	20	MWT	0.0073	65.129	4.610
HFUBB218B	B	M2	2	2	67.310	4.658	0.146	20	MGM	0.0073	66.469	4.600
HFUBC116B	C	M1	3	1	67.072	4.721	0.146	20	MWB	0.0073	66.370	4.671
HFUBC117B	C	M1	3	1	66.488	4.828	0.146	20	MWB	0.0073	65.522	4.758
HFUBC118B	C	M1	3	1	67.235	4.932	0.146	20	MGM	0.0073	66.304	4.864
HFUBC216B	C	M2	3	2	68.382	4.840	0.145	20	MGM	0.0072	66.988	4.741
HFUBC217B	C	M2	3	2	62.364	4.819	0.145	20	MGM	0.0073	61.107	4.722
HFUBC218B	C	M2	3	2	67.690	4.819	0.144	20	MGM	0.0072	65.936	4.694

	Strength [ksi]	Modulus [Msi]		$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
Average	67.211	4.764	$Average_{norm}$	66.615	4.721
Standard Dev.	1.710	0.095	$Standard\ Dev._{norm}$	2.001	0.091
Coeff. of Var. [%]	2.544	1.985	Coeff. of Var. $[\%]_{norm}$	3.003	1.925
Min.	62.364	4.575	Min.	61.107	4.593
Max.	69.843	4.932	Max.	69.662	4.864
Number of Spec.	19	19	Number of Spec.	19	19


Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
80
LaminateTension Strength (UNT2) [ksi]


Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
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]

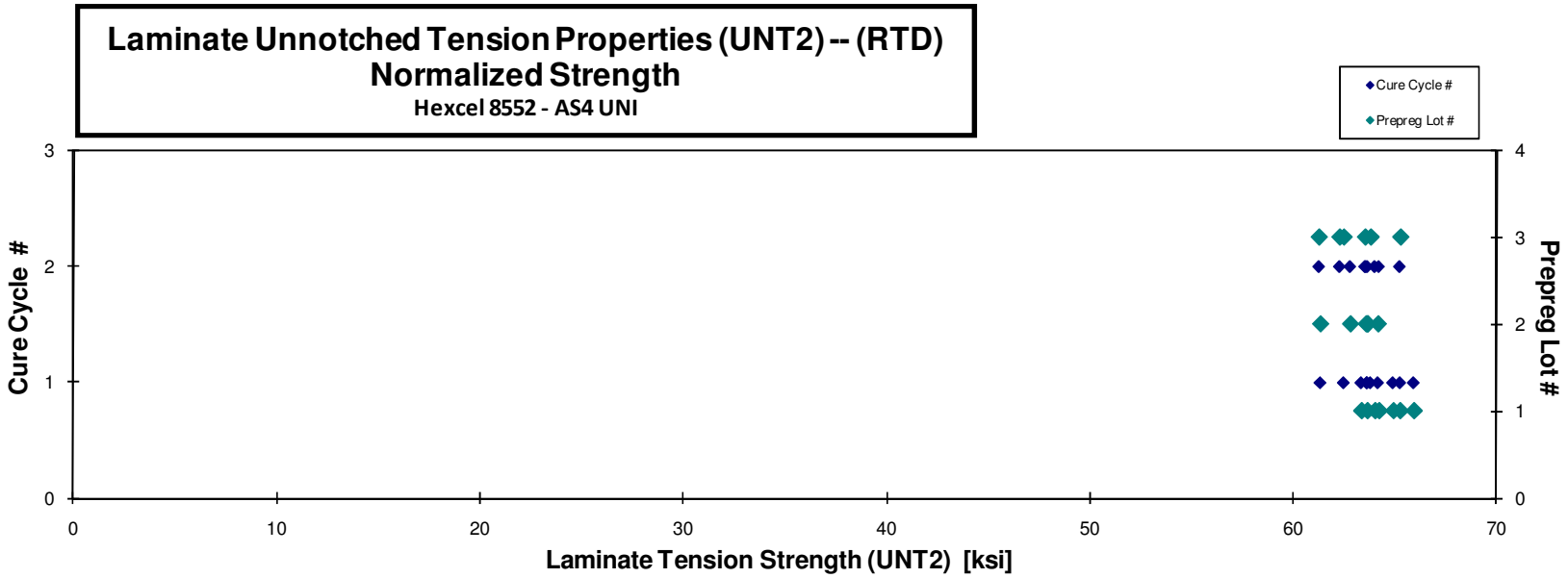
Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

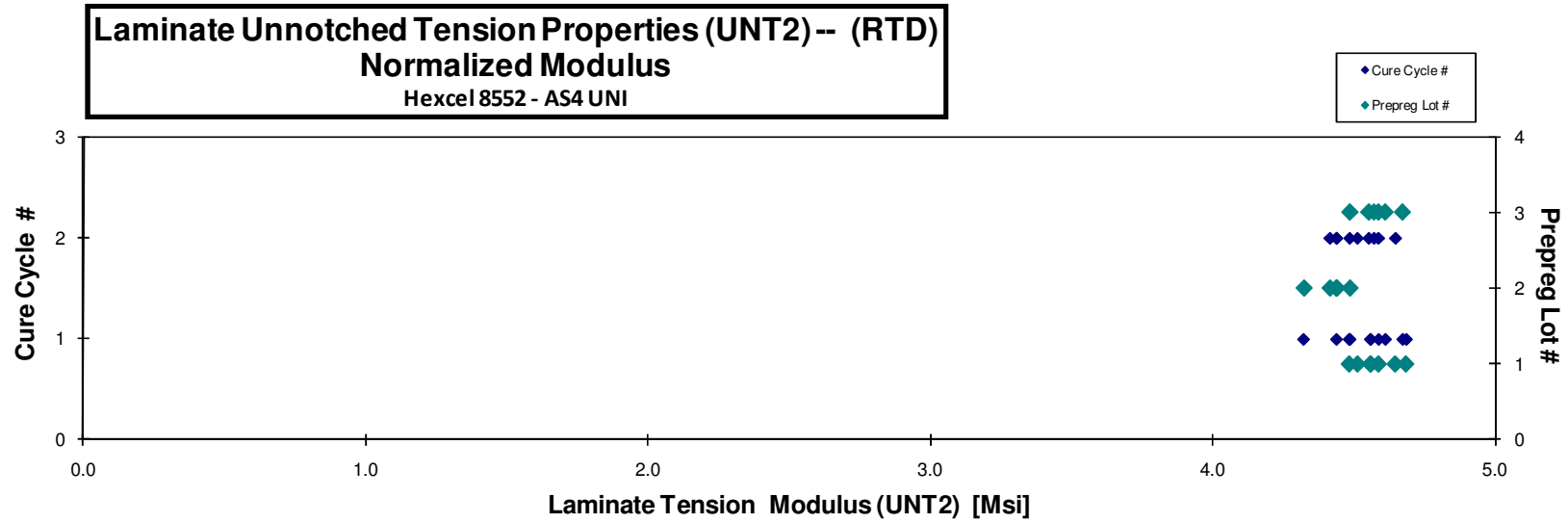
normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUBA112A	A	M1	1	1	62.819	4.523	0.149	20	DWT	0.0075	63.336	4.561
HFUBA113A	A	M1	1	1	64.158	4.432	0.150	20	DGM	0.0075	64.902	4.484
HFUBA114A	A	M1	1	1	65.725	4.673	0.148	20	DWT	0.0074	65.910	4.686
HFUBA115A	A	M1	1	1	63.045	4.518	0.149	20	DGM	0.0075	63.620	4.559
HFUBA212A	A	M2	1	2	63.670	4.536	0.152	20	DGM	0.0076	65.233	4.648
HFUBA213A	A	M2	1	2	63.161	4.513	0.150	20	DGM	0.0075	64.207	4.588
HFUBA214A	A	M2	1	2	64.179	4.526	0.148	20	DGM	0.0074	63.998	4.514
HFUBB111A	B	M1	2	1	64.864	4.573	0.140	20	MGM	0.0070	61.322	4.323
HFUBB112A	B	M1	2	1	63.869	4.456	0.147	20	MGM	0.0074	63.625	4.439
HFUBB113A	B	M1	2	1	64.035	4.479	0.148	20	MGM	0.0074	64.150	4.487
HFUBB211A	B	M2	2	2	66.244	4.628	0.142	20	MGM	0.0071	63.558	4.440
HFUBB212A	B	M2	2	2	64.072	4.446	0.147	20	MGM	0.0074	63.639	4.416
HFUBB213A	B	M2	2	2	63.515	4.490	0.146	20	MGM	0.0073	62.792	4.439
HFUBC112A	C	M1	3	1	62.781	4.611	0.147	20	DGM	0.0074	62.470	4.588
HFUBC113A	C	M1	3	1	65.802	4.713	0.147	20	DGM	0.0073	65.254	4.674
HFUBC114A	C	M1	3	1	64.728	4.679	0.146	20	DGM	0.0073	63.795	4.612
HFUBC211A	C	M2	3	2	64.432	4.719	0.141	20	DGM	0.0070	61.254	4.486
HFUBC212A	C	M2	3	2	64.430	4.619	0.146	20	DGM	0.0073	63.523	4.554
HFUBC213A	C	M2	3	2	63.061	4.630	0.146	20	DGM	0.0073	62.272	4.572

Average	**64.136**	**4.567**	
Standard Dev.	**1.010**	**0.091**	
Coeff. of Var. [%]	**1.574**	**1.992**	
Min.	**62.781**	**4.432**	
Max.	**66.244**	**4.719**	
Number of Spec.	**19**	**19**	

$Average_{norm}$	**0.0073**	**63.624**	**4.530**
Standard $Dev._{norm}$		**1.242**	**0.095**
Coeff. of Var. $[\%]_{norm}$		**1.952**	**2.100**
Min.	**0.0070**	**61.254**	**4.323**
Max.	**0.0076**	**65.910**	**4.686**
Number of Spec.		**19**	**19**


Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Strength (UNT2) [ksi]
0
10
20
30
40
50
60
70
0
1
2
3
0
1
2
3
4


Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT2) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
0
1
2
3
0
1
2
3
4

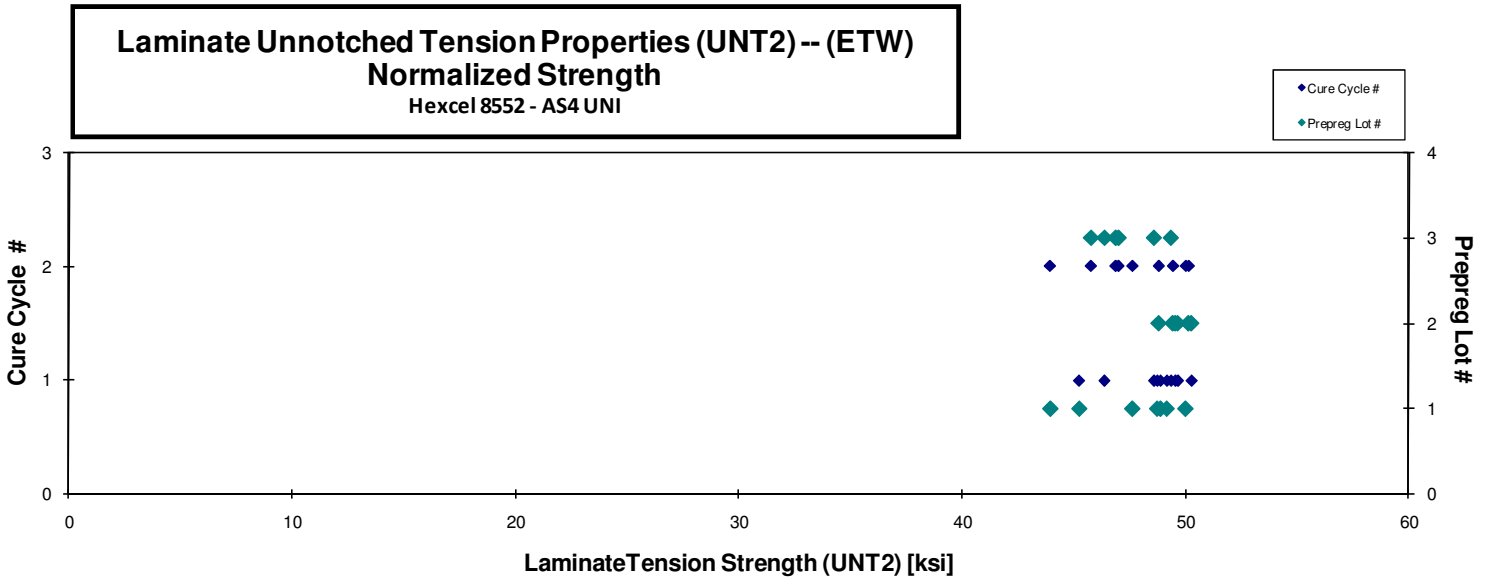
Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 UNI

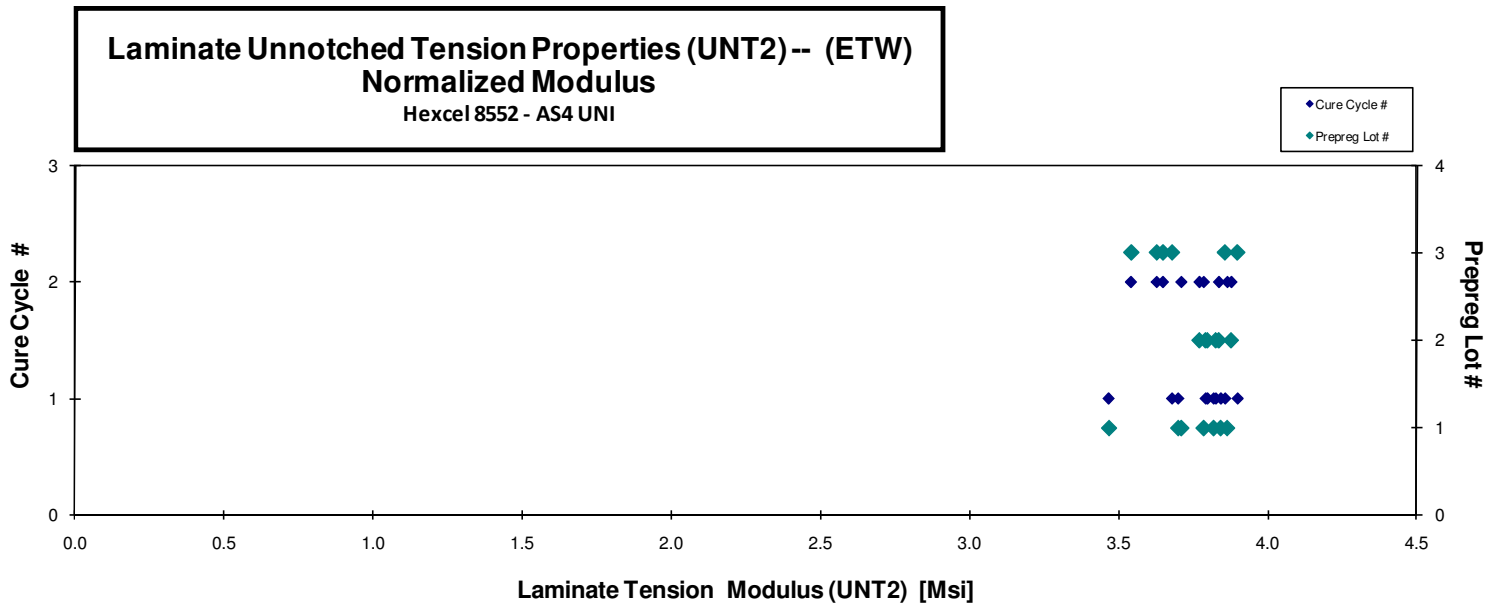
normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUBA11BD	A	M1	1	1	48.662	3.805	0.150	20	MGM	0.0075	49.161	3.844
HFUBA11CD	A	M1	1	1	48.457	3.798	0.149	20	MGM	0.0074	48.730	3.820
HFUBA11DD	A	M1	1	1	48.744	3.691	0.148	20	MGM	0.0074	48.875	3.701
HFUBA11ED	A	M1	1	1	44.932	3.445	0.149	20	MGM	0.0075	45.235	3.469
HFUBA21BD	A	M2	1	2	43.127	3.643	0.151	20	MGM	0.0075	43.934	3.711
HFUBA21CD	A	M2	1	2	49.407	3.741	0.150	20	MGM	0.0075	50.002	3.786
HFUBA21DD	A	M2	1	2	47.396	3.848	0.149	20	MGM	0.0074	47.615	3.865
HFUBB11BD	B	M1	2	1	49.315	3.776	0.149	20	MGM	0.0074	49.537	3.793
HFUBB11CD	B	M1	2	1	50.506	3.846	0.147	20	MGM	0.0074	50.256	3.827
HFUBB11DD	B	M1	2	1	50.142	3.836	0.147	20	MGM	0.0073	49.651	3.799
HFUBB21BD	B	M2	2	2	50.397	3.899	0.147	20	AGM	0.0074	50.130	3.879
HFUBB21CD	B	M2	2	2	49.504	3.827	0.146	20	MGM	0.0073	48.796	3.772
HFUBB21DD	B	M2	2	2	50.051	3.886	0.146	20	MGM	0.0073	49.426	3.837
HFUBC11BD	C	M1	3	1	48.824	3.919	0.147	20	MGM	0.0074	48.582	3.899
HFUBC11CD	C	M1	3	1	49.926	3.903	0.146	20	MGM	0.0073	49.347	3.858
HFUBC11DD	C	M1	3	1	46.811	3.716	0.147	20	MGM	0.0073	46.368	3.681
HFUBC21BD	C	M2	3	2	46.777	3.709	0.145	20	MGM	0.0072	45.765	3.629
HFUBC21CD	C	M2	3	2	48.073	3.635	0.144	20	MGM	0.0072	46.866	3.543
HFUBC21DD	C	M2	3	2	48.040	3.731	0.145	20	MGM	0.0072	46.996	3.650

Average	**48.373**	**3.771**	
Standard Dev.	**1.917**	**0.117**	
Coeff. of Var. [%]	**3.964**	**3.102**	
Min.	**43.127**	**3.445**	
Max.	**50.506**	**3.919**	
Number of Spec.	**19**	**19**	

$Average_{norm}$	**0.0074**	**48.172**	**3.756**
$Standard\ Dev._{norm}$		**1.824**	**0.118**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.787**	**3.147**
Min.	**0.0072**	**43.934**	**3.469**
Max.	**0.0075**	**50.256**	**3.899**
Number of Spec.		**19**	**19**


Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
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) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Laminate Tension Modulus (UNT2) [Msi]

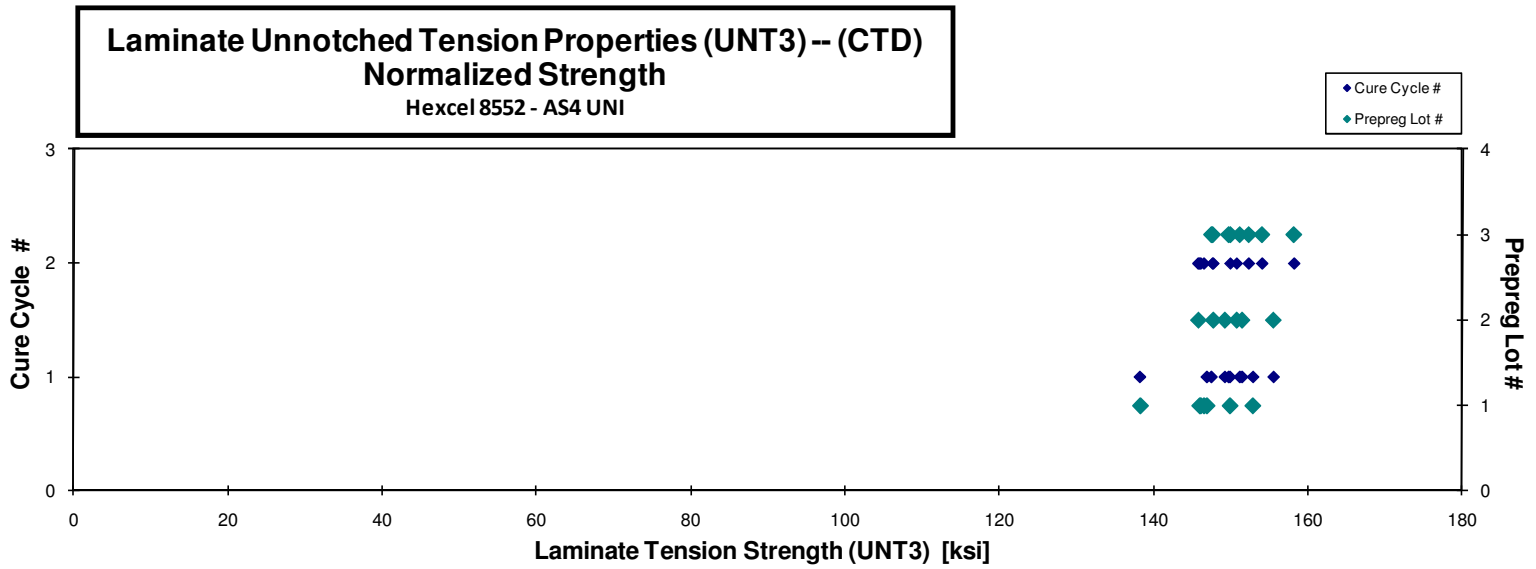
4.11 Unnotched Tension 3 Properties

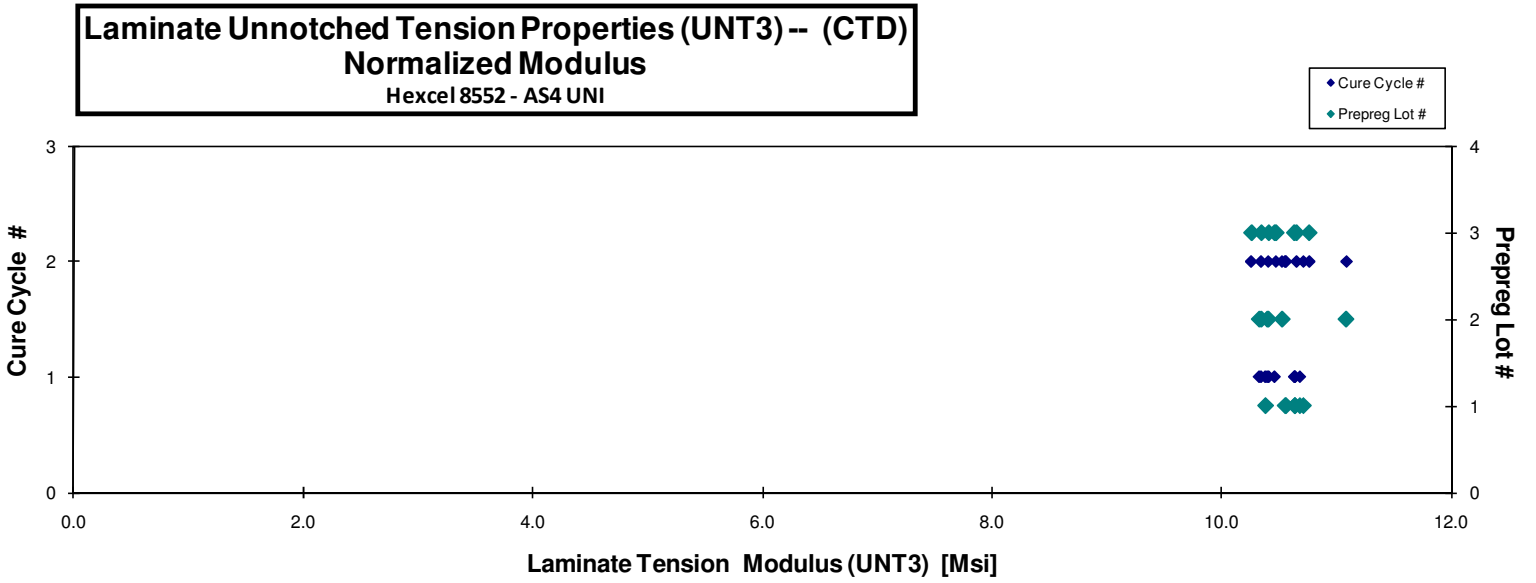
Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUCA116B	A	M1	1	1	150.787	10.702	0.147	20	MWB	0.0074	149.870	10.637
HFUCA117B	A	M1	1	1	147.929	10.757	0.147	20	MWB	0.0073	146.863	10.679
HFUCA118B	A	M1	1	1	153.763	10.700	0.147	20	MAB	0.0074	152.845	10.636
HFUCA119B	A	M1	1	1	144.339	10.838	0.142	20	MAB	0.0071	138.211	10.378
HFUCA216B	A	M2	1	2	148.536	10.705	0.146	20	MAT	0.0073	146.496	10.558
HFUCA217B	A	M2	1	2	147.822	10.838	0.146	20	MAT/MWB	0.0073	146.074	10.710
HFUCA218B	A	M2	1	2	147.334	10.652	0.147	20	MGM	0.0073	145.924	10.550
HFUCB116B	B	M1	2	1	151.350	10.544	0.146	20	MAB	0.0073	149.203	10.394
HFUCB117B	B	M1	2	1	153.457	10.479	0.146	20	MAT/MWB	0.0073	151.435	10.341
HFUCB118B	B	M1	2	1	156.046	10.361	0.147	20	MWT/MAB	0.0074	155.501	10.325
HFUCB216B	B	M2	2	2	150.471	10.386	0.148	20	MWT	0.0074	150.742	10.405
HFUCB217B	B	M2	2	2	150.478	11.293	0.145	20	MAB/MWT	0.0073	147.699	11.084
HFUCB218B	B	M2	2	2	147.406	10.643	0.146	20	MWB	0.0073	145.763	10.524
HFUCC116B	C	M1	3	1	151.524	10.535	0.146	20	MAB	0.0073	149.699	10.408
HFUCC117B	C	M1	3	1	152.676	10.566	0.147	20	MAT	0.0073	151.128	10.458
HFUCC118B	C	M1	3	1	148.490	10.706	0.147	20	MGM	0.0073	147.453	10.631
HFUCC216B	C	M2	3	2	154.371	10.396	0.146	20	MGM	0.0073	152.302	10.257
HFUCC217B	C	M2	3	2	152.146	10.627	0.146	20	MGM	0.0073	149.919	10.471
HFUCC218B	C	M2	3	2	149.081	10.868	0.147	20	MGM	0.0073	147.604	10.760
HFUCC219B	C	M2	3	2	162.748	10.928	0.140	20	MGM	0.0070	154.024	10.343
HFUCC21AB	C	M2	3	2	157.734	10.621	0.148	20	MAB	0.0074	158.161	10.649

Average	**151.357**	**10.673**	**$Average_{norm}$**	**0.0073**	**149.377**	**10.533**
Standard Dev.	**4.139**	**0.212**	**$Standard\ Dev._{norm}$**		**4.192**	**0.191**
Coeff. of Var. [%]	**2.735**	**1.988**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**2.807**	**1.815**
Min.	**144.339**	**10.361**	**Min.**	**0.0070**	**138.211**	**10.257**
Max.	**162.748**	**11.293**	**Max.**	**0.0074**	**158.161**	**11.084**
Number of Spec.	**21**	**21**	**Number of Spec.**		**21**	**21**


Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Strength (UNT3) [ksi]
0
20
40
60
80
100
120
140
160
180
0
1
2
3
4


Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
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
0
1
2
3
4

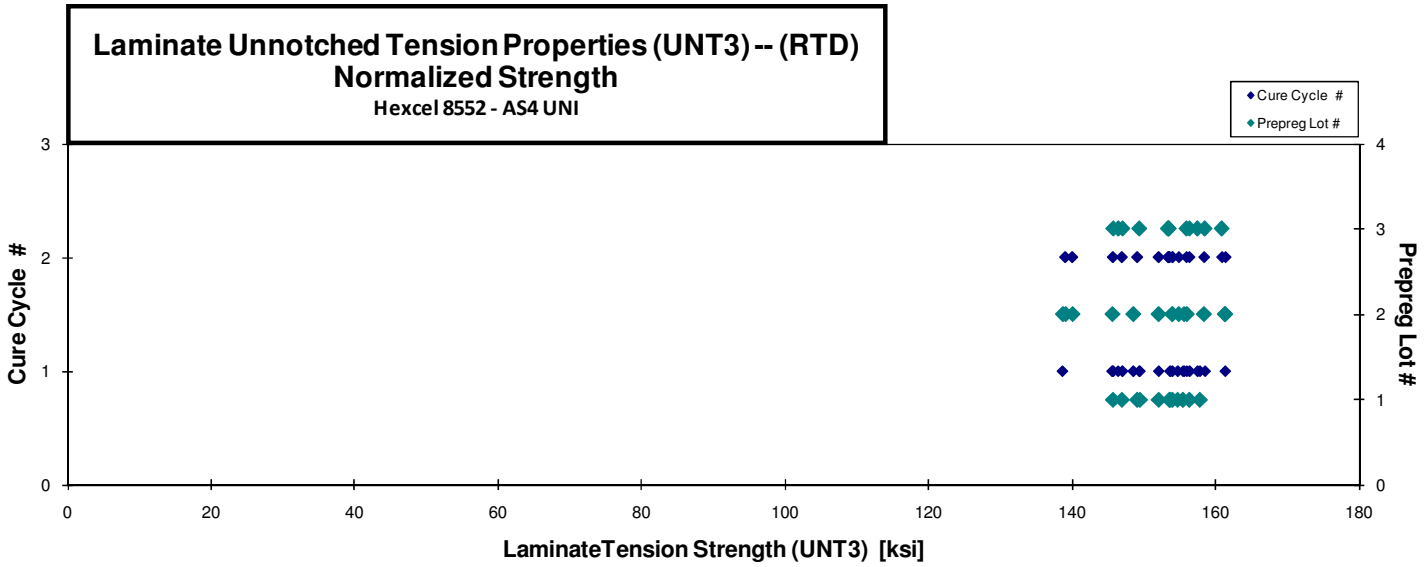
Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

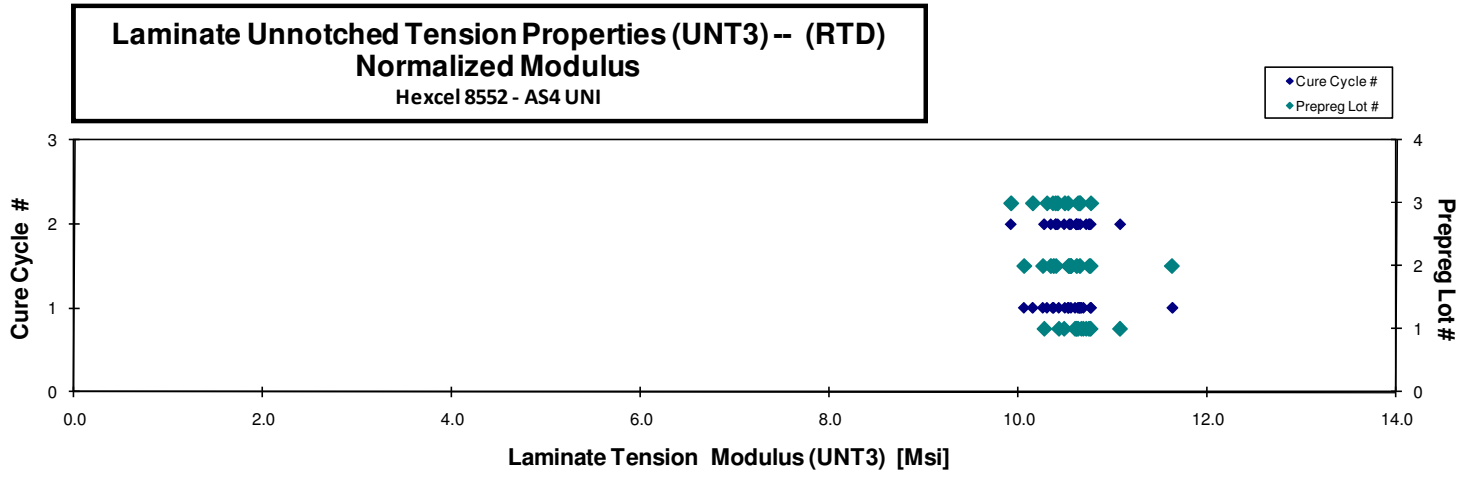
normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUCA111A	A	M1	1	1	161.967	10.909	0.141	20	LAT	0.0071	154.762	10.424
HFUCA112A	A	M1	1	1	149.956	10.627	0.148	20	LAB	0.0074	149.500	10.595
HFUCA113A	A	M1	1	1	152.556	10.790	0.148	20	LAB	0.0074	152.126	10.760
HFUCA114A	A	M1	1	1	154.683	10.696	0.147	20	LAT	0.0074	153.707	10.628
HFUCA115A	A	M1	1	1	156.250	10.713	0.147	20	AWT	0.0074	155.511	10.662
HFUCA11AA	A	M1	1	1	157.737	10.675	0.148	20	LAB	0.0074	157.861	10.684
HFUCA211A	A	M2	1	2	156.001	10.899	0.139	20	LWT, LAB	0.0070	146.989	10.269
HFUCA212A*	A	M2	1	2		10.687	0.147	20	LIB	0.0074		10.614
HFUCA213A	A	M2	1	2	156.085	11.050	0.148	20	LGM	0.0074	156.401	11.073
HFUCA214A	A	M2	1	2	150.115	10.814	0.147	20	LAB	0.0074	149.117	10.743
HFUCA215A	A	M2	1	2	155.496	10.843	0.146	20	MGM	0.0073	153.639	10.714
HFUCA219A	A	M2	1	2	154.919	11.140	0.139	20	LAT	0.0070	145.742	10.480
HFUCA21AA	A	M2	1	2	154.471	10.637	0.148	20	AAT	0.0074	154.037	10.607
HFUCB111A	B	M1	2	1	157.850	12.598	0.137	20	MAT	0.0068	145.655	11.625
HFUCB112A	B	M1	2	1	149.424	10.612	0.147	20	MWT	0.0074	148.582	10.552
HFUCB113A	B	M1	2	1	161.706	10.549	0.148	20	AWB	0.0074	161.360	10.526
HFUCB114A	B	M1	2	1	158.580	10.537	0.146	20	LWT,LIB	0.0073	156.044	10.368
HFUCB115A	B	M1	2	1	158.637	10.450	0.145	20	MAB	0.0073	155.671	10.255
HFUCB119A	B	M1	2	1	146.188	10.594	0.140	20	LWT	0.0070	138.747	10.055
HFUCB11AA	B	M1	2	1	154.932	10.711	0.147	20	LAB	0.0074	154.007	10.647
HFUCB211A	B	M2	2	2	146.318	10.797	0.142	20	MAT	0.0071	140.106	10.339
HFUCB212A	B	M2	2	2	158.511	10.567	0.151	20	MWT	0.0075	161.421	10.761
HFUCB213A	B	M2	2	2	152.641	10.589	0.147	20	MWB	0.0074	152.109	10.552
HFUCB214A	B	M2	2	2	154.515	10.718	0.148	20	LWB, MWT	0.0074	154.933	10.747
HFUCB215A	B	M2	2	2	154.515	10.569	0.148	20	MWB,LWT	0.0074	154.045	10.537
HFUCB219A	B	M2	2	2	140.058	10.464	0.147	20	LAT	0.0074	139.128	10.394
HFUCB21AA	B	M2	2	2	157.323	10.538	0.149	20	MWT	0.0075	158.439	10.613
HFUCC111A	C	M1	3	1	155.516	11.000	0.139	20	MWB,LWT	0.0070	146.479	10.361
HFUCC112A	C	M1	3	1	158.271	10.625	0.148	20	MWT	0.0074	158.556	10.644
HFUCC113A	C	M1	3	1	157.342	10.476	0.148	20	LWT	0.0074	157.519	10.487
HFUCC114A	C	M1	3	1	147.831	10.671	0.146	20	MWB	0.0073	145.783	10.523
HFUCC115A	C	M1	3	1	158.727	10.451	0.146	20	LWT,LWB	0.0073	156.421	10.299
HFUCC119A	C	M1	3	1	153.936	10.621	0.141	20	MGM	0.0071	147.072	10.147
HFUCC11AA	C	M1	3	1	149.829	10.795	0.148	20	MWT	0.0074	149.408	10.765
HFUCC211A	C	M2	3	2	162.995	10.527	0.139	20	MWB	0.0070	153.542	9.916
HFUCC212A	C	M2	3	2	156.740	10.438	0.147	20	LAB	0.0074	155.999	10.389
HFUCC213A	C	M2	3	2	154.112	10.457	0.147	20	LAB	0.0074	153.470	10.413
HFUCC214A	C	M2	3	2	162.528	10.735	0.147	20	MWB	0.0073	160.918	10.628
HFUCC215A	C	M2	3	2	155.537	10.797	0.146	20	MWT/LWB	0.0073	153.418	10.650

*Strength removed due to bad failure mode obtained

Average	**154.863**	**10.727**	**$Average_{norm}$**	**0.0073**	**152.322**	**10.550**
Standard Dev.	**4.820**	**0.351**	**Standard $Dev._{norm}$**		**5.819**	**0.281**
Coeff. of Var. [%]	**3.11**	**3.274**	**Coeff. of Var. $[\%]_{norm}$**		**3.820**	**2.66**
Min.	**140.058**	**10.438**	**Min.**	**0.0068**	**138.747**	**9.916**
Max.	**162.995**	**12.598**	**Max.**	**0.0075**	**161.421**	**11.625**
Number of Spec.	**38**	**39**	**Number of Spec.**		**38**	**39**


Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT3) [ksi]
0
20
40
60
80
100
120
140
160
180
0
1
2
3
4


Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
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
0
1
2
3
4

Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 UNI

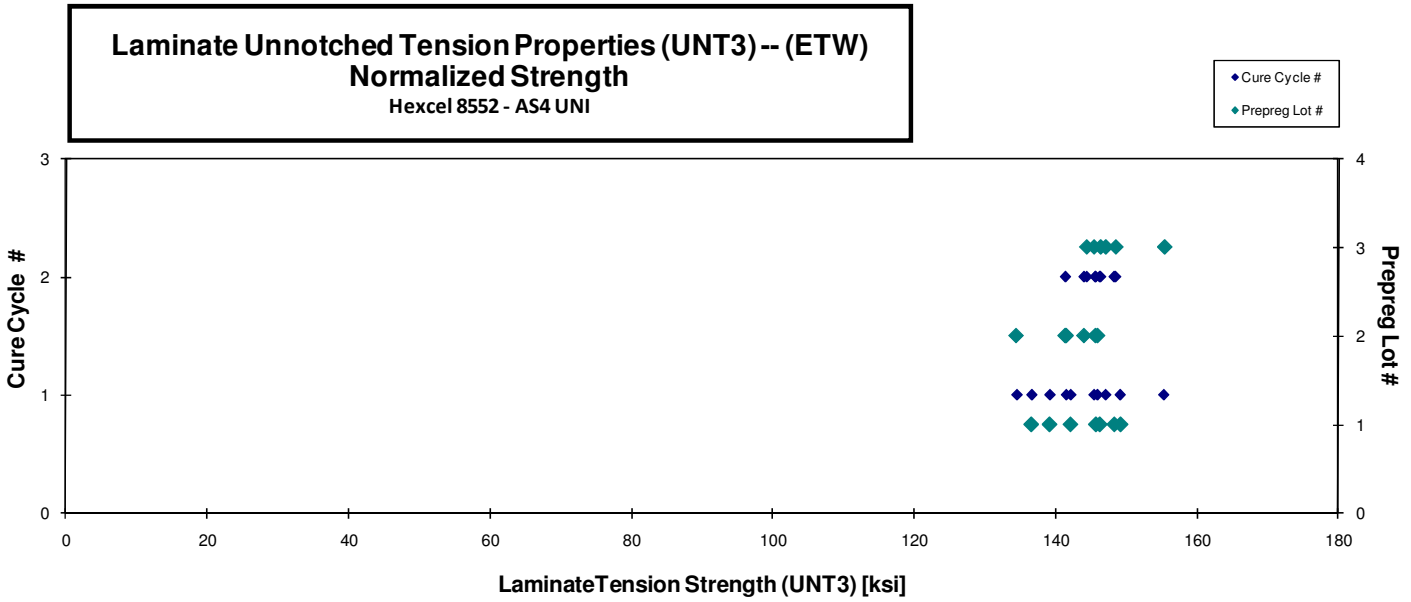
normalizing t_{ply} [in]: 0.0074

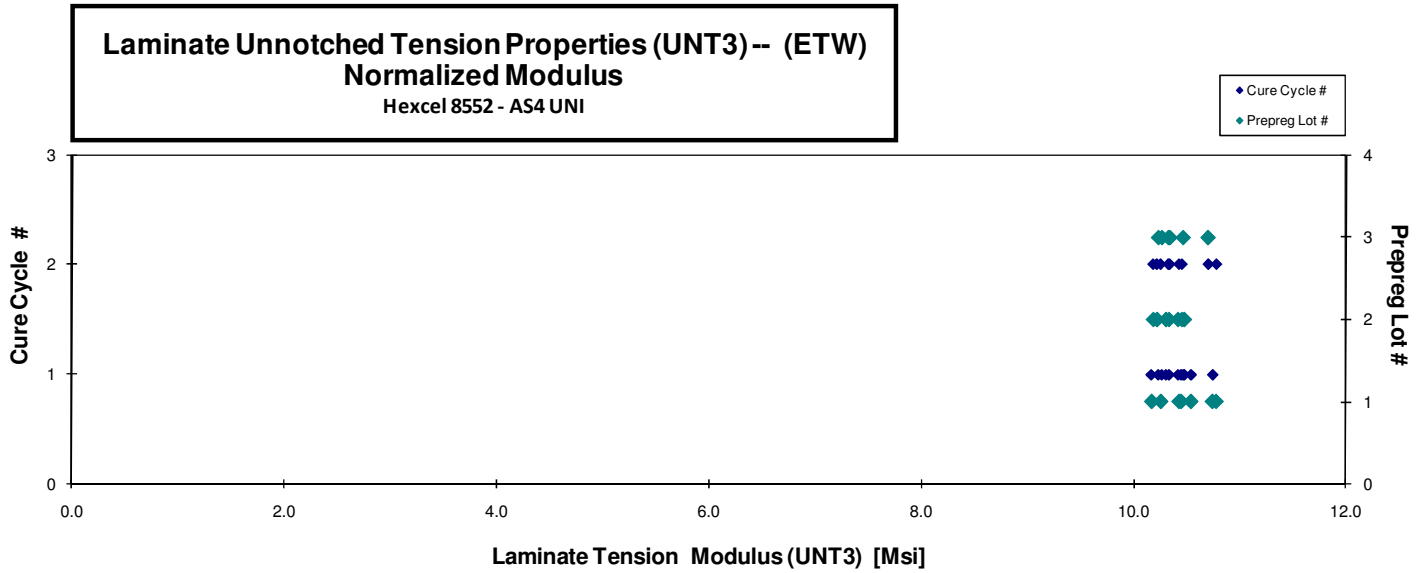
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFUCA11BD	A	M1	1	1	139.206	10.752	0.148	20	MAB	0.0074	139.159	10.748
HFUCA11CD	A	M1	1	1	137.867	10.269	0.147	20	LWT	0.0073	136.579	10.173
HFUCA11DD	A	M1	1	1	150.777	10.565	0.146	20	LAB/LWT	0.0073	149.164	10.452
HFUCA11ED	A	M1	1	1	142.996	10.611	0.147	20	LAB/LWT	0.0074	142.111	10.545
HFUCA21BD	A	M2	1	2	145.040	10.695	0.149	20	MAB	0.0075	146.233	10.783
HFUCA21CD	A	M2	1	2	147.727	10.393	0.149	20	LWB	0.0074	148.293	10.433
HFUCA21DD	A	M2	1	2	146.856	10.343	0.147	20	LWT/LAB/DGM	0.0073	145.682	10.260
HFUCB11BD	B	M1	2	1	134.961	10.463	0.147	20	MWB	0.0074	134.444	10.423
HFUCB11CD*	B	M1	2	1		10.497	0.146	20	LWB/LIT	0.0073		10.338
HFUCB11DD	B	M1	2	1	147.312	10.407	0.147	20	LWT/LAB	0.0073	145.918	10.309
HFUCB11ED	B	M1	2	1	143.331	10.618	0.146	20	MGM	0.0073	141.491	10.482
HFUCB21BD	B	M2	2	2	145.130	10.542	0.147	20	LAB/LWT	0.0073	144.002	10.460
HFUCB21CD	B	M2	2	2	146.396	10.279	0.147	20	LAB/LWT	0.0074	145.605	10.224
HFUCB21DD	B	M2	2	2	142.676	10.285	0.147	20	LAB/LWT	0.0073	141.359	10.190
HFUCC11BD	C	M1	3	1	155.697	10.292	0.148	20	LWT/MAB	0.0074	155.382	10.271
HFUCC11CD	C	M1	3	1	147.522	10.502	0.148	20	MAB	0.0074	147.090	10.472
HFUCC11DD	C	M1	3	1	148.306	10.438	0.145	20	MAB	0.0073	145.450	10.237
HFUCC21BD	C	M2	3	2	144.184	10.330	0.148	20	LAT/LWB	0.0074	144.411	10.346
HFUCC21CD	C	M2	3	2	150.047	10.817	0.146	20	LWT/MAB	0.0073	148.510	10.707
HFUCC21DD	C	M2	3	2	148.222	10.463	0.146	20	MWT	0.0073	146.369	10.332

*Specimen had strength removed due to bad failure during test.

Average	**145.487**	**10.478**
Standard Dev.	**4.789**	**0.162**
Coeff. of Var. [%]	**3.291**	**1.544**
Min.	**134.961**	**10.269**
Max.	**155.697**	**10.817**
Number of Spec.	**19**	**20**

$Average_{norm}$	**0.0074**	**144.592**	**10.409**
Standard $Dev._{norm}$		**4.752**	**0.179**
Coeff. of Var. $[\%]_{norm}$		**3.287**	**1.722**
Min.	**0.0073**	**134.444**	**10.173**
Max.	**0.0075**	**155.382**	**10.783**
Number of Spec.		**19**	**20**


Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
160
180
LaminateTension Strength (UNT3) [ksi]


Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 UNI
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
Laminate Tension Modulus (UNT3) [Msi]

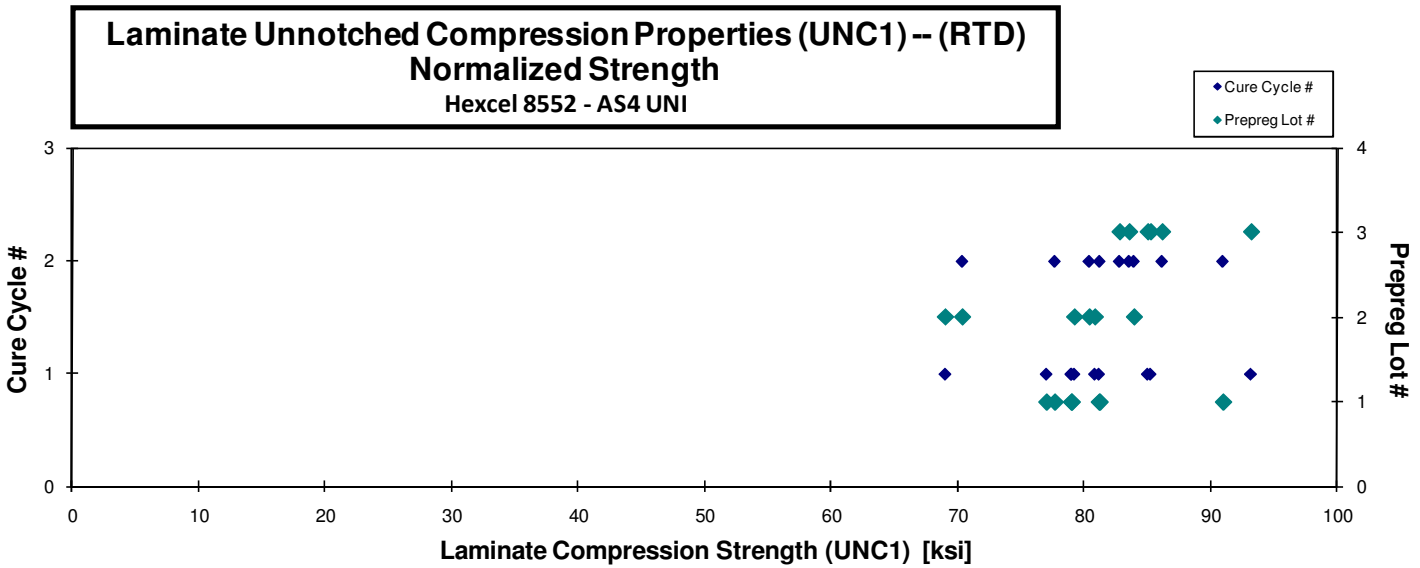
4.12 Unnotched Compression 1 Properties

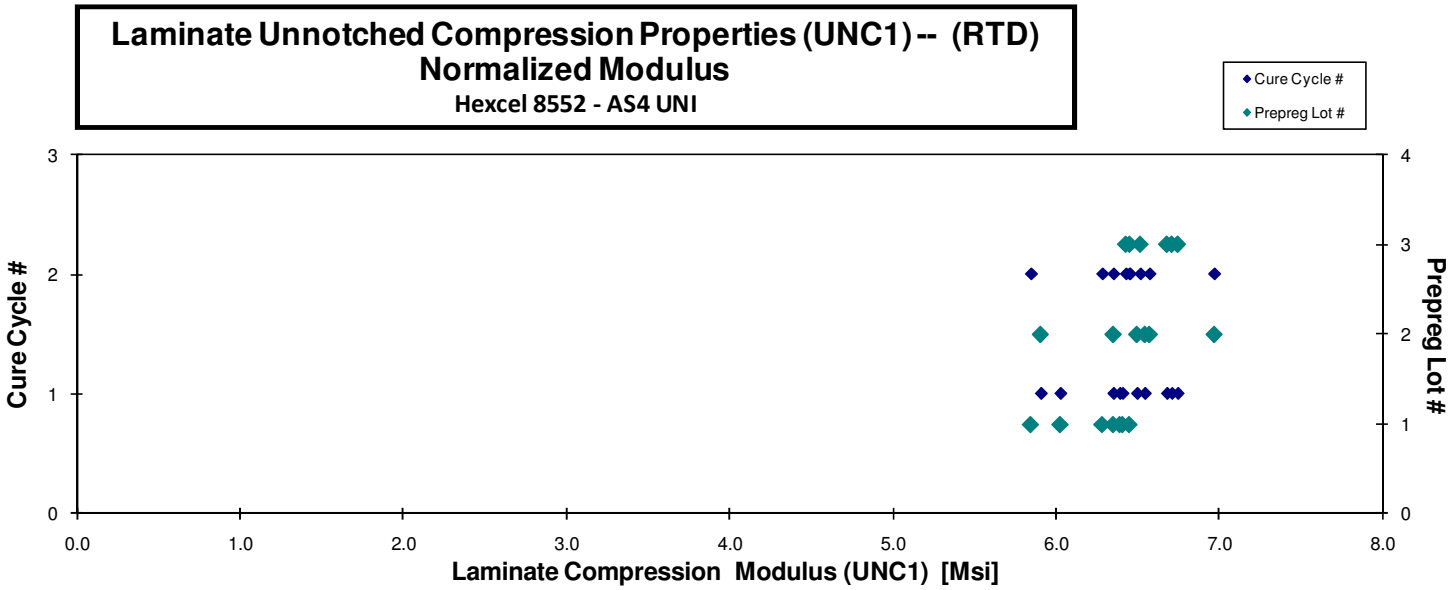
Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUWA111A	A	M1	1	1	81.774	6.403	0.277	0.111	16	BGM	0.0070	76.974	6.027
HFUWA112A	A	M1	1	1	84.282	6.657	0.319	0.114	16	BGM	0.0071	81.126	6.407
HFUWA113A	A	M1	1	1	80.912	6.507	0.302	0.116	16	BGM	0.0072	78.976	6.351
HFUWA114A	A	M1	1	1	80.419	6.511	0.299	0.116	16	BGM	0.0073	78.936	6.391
HFUWA211A	A	M2	1	2	96.408	6.198	0.284	0.112	16	BGM	0.0070	90.939	5.847
HFUWA212A	A	M2	1	2	83.743	6.481	0.295	0.115	16	BGM	0.0072	81.185	6.283
HFUWA213A	A	M2	1	2	78.775	6.544	0.295	0.117	16	BGM	0.0073	77.633	6.449
HFUWB111A	B	M1	2	1	77.383	6.629	0.303	0.106	16	BGM	0.0066	68.963	5.907
HFUWB112A	B	M1	2	1	83.729	6.920	0.310	0.112	16	BGM	0.0070	79.180	6.544
HFUWB113A	B	M1	2	1	83.287	6.696	0.289	0.115	16	BGM/HAT	0.0072	80.802	6.496
HFUWB211A	B	M2	2	2	75.753	6.842	0.286	0.110	16	BGM	0.0069	70.314	6.351
HFUWB212A	B	M2	2	2	84.517	7.328	0.350	0.113	16	BGM	0.0070	80.365	6.968
HFUWB213A	B	M2	2	2	86.078	6.743	0.333	0.115	16	BGM	0.0072	83.897	6.572
HFUWC112A	C	M1	3	1	88.205	6.931	0.343	0.114	16	BGM	0.0071	84.989	6.679
HFUWC113A	C	M1	3	1	92.991	6.733	0.328	0.119	16	BGM	0.0074	93.161	6.745
HFUWC114A	C	M1	3	1	84.365	6.642	0.355	0.120	16	BGM	0.0075	85.209	6.709
HFUWC211A	C	M2	3	2	88.050	6.571	0.140	0.116	16	BGM	0.0072	86.128	6.428
HFUWC212A	C	M2	3	2	84.621	6.596	0.295	0.116	16	BGM	0.0072	82.763	6.451
HFUWC213A	C	M2	3	2	85.756	6.690	0.301	0.115	16	HAT	0.0072	83.523	6.516

Average	**84.266**	**6.664**	**0.300**	**$Average_{norm}$**	**0.0071**	**81.319**	**6.427**
Standard Dev.	**4.960**	**0.238**	**0.045**	**$Standard\ Dev._{norm}$**		**5.875**	**0.277**
Coeff. of Var. [%]	**5.886**	**3.570**	**15.018**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.225**	**4.317**
Min.	**75.753**	**6.198**	**0.140**	**Min.**	**0.0066**	**68.963**	**5.847**
Max.	**96.408**	**7.328**	**0.355**	**Max.**	**0.0075**	**93.161**	**6.968**
Number of Spec.	**19**	**19**	**19**	**Number of Spec.**		**19**	**19**


Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC1) [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4


Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
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
Hexcel 8552 - AS4 UNI

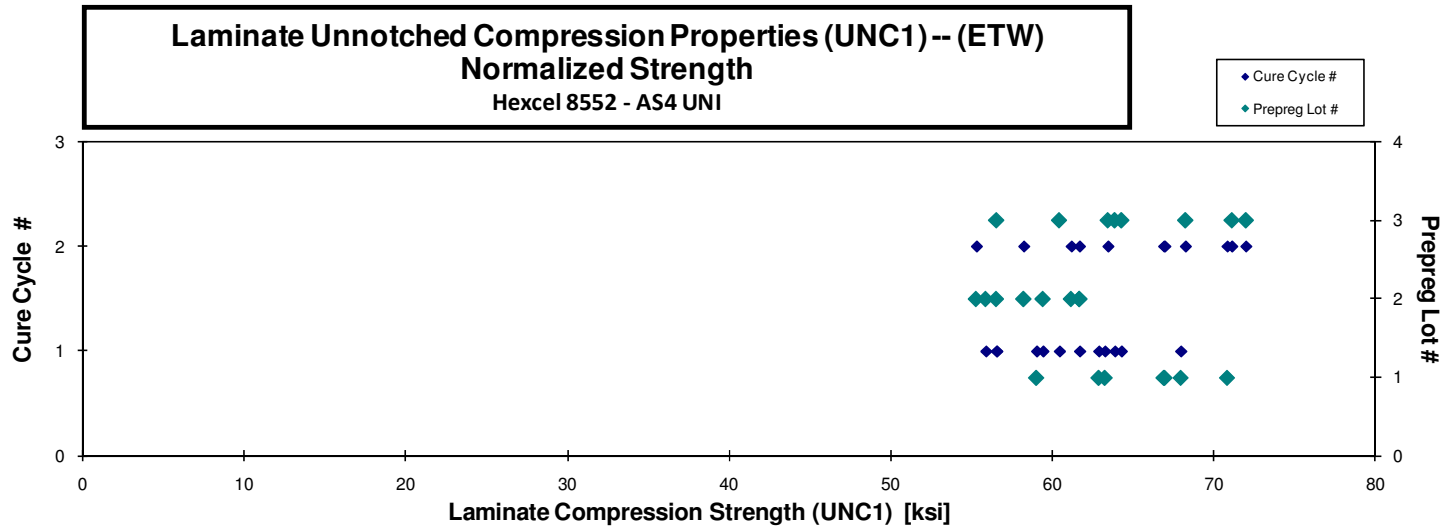
normalizing t_{ply} [in]: 0.0074

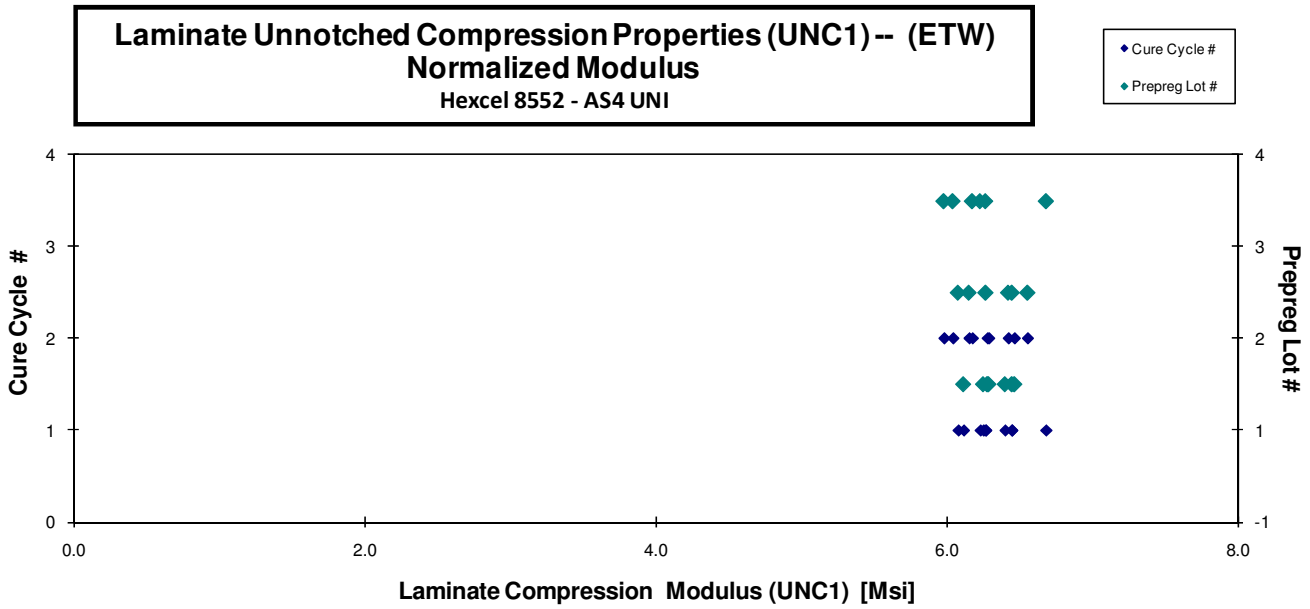
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFUWA117D*	A	M1	1	1		6.543	0.348	0.117	16	BGM	0.0073		6.452
HFUWA118D*	A	M1	1	1		6.510	0.339	0.116	16	BGM	0.0073		6.405
HFUWA119D*	A	M1	1	1		6.222	0.344	0.116	16	BGM	0.0073		6.118
HFUWA11AD*	A	M1	1	1		6.374	0.343	0.116	16	BGM	0.0073		6.255
HFUWA11BD	A	M1	1	1	60.363			0.116	16	HAB	0.0072	59.012	
HFUWA11CD	A	M1	1	1	64.771			0.116	16	HAB / BGM	0.0072	63.239	
HFUWA115D	A	M1	1	1	63.807			0.117	16	BGM	0.0073	62.864	
HFUWA116D	A	M1	1	1	68.799			0.117	16	BGM	0.0073	67.937	
HFUWA216D*	A	M2	1	2		6.289		0.118	16	BGM	0.0074		6.292
HFUWA217D*	A	M2	1	2		6.330	0.324	0.118	16	BGM	0.0073		6.282
HFUWA218D*	A	M2	1	2		6.552	0.318	0.117	16	BGM	0.0073		6.470
HFUWA219D	A	M2	1	2	71.587			0.117	16	BGM	0.0073	70.801	
HFUWA21AD	A	M2	1	2	67.550			0.117	16	BGM	0.0073	66.884	
HFUWA215D	A	M2	1	2	67.200			0.118	16	BGM	0.0074	66.945	
HFUWB116D*	B	M1	2	1		6.217	0.340	0.116	16	BGM	0.0072		6.081
HFUWB117D*	B	M1	2	1		6.492	0.327	0.114	16	BGM	0.0071		6.271
HFUWB118D*	B	M1	2	1		6.615	0.345	0.115	16	BGM	0.0072		6.452
HFUWB119D	B	M1	2	1	63.379			0.115	16	BGM	0.0072	61.675	
HFUWB11AD	B	M1	2	1	58.038			0.115	16	BGM	0.0072	56.535	
HFUWB114D	B	M1	2	1	57.451			0.115	16	BGM	0.0072	55.882	
HFUWB115D	B	M1	2	1	60.951			0.115	16	BGM	0.0072	59.416	
HFUWB216D*	B	M2	2	2		6.253	0.336	0.117	16	BGM	0.0073		6.156
HFUWB217D*	B	M2	2	2		6.531	0.342	0.117	16	BGM	0.0073		6.427
HFUWB218D*	B	M2	2	2		6.669	0.333	0.116	16	BGM	0.0073		6.560
HFUWB219D	B	M2	2	2	59.611			0.116	16	BGM	0.0072	58.219	
HFUWB21AD	B	M2	2	2	56.800			0.115	16	BGM	0.0072	55.289	
HFUWB214D	B	M2	2	2	62.677			0.117	16	BGM	0.0073	61.671	
HFUWB215D	B	M2	2	2	61.593			0.118	16	BGM	0.0073	61.159	
HFUWC111D	C	M1	3	1	63.646			0.105	16	BGM	0.0066	56.550	
HFUWC115D	C	M1	3	1	64.023			0.119	16	BGM	0.0074	64.266	
HFUWC116D*	C	M1	3	1		6.716	0.343	0.118	16	BAT	0.0074		6.688
HFUWC117D*	C	M1	3	1		6.280	0.330	0.118	16	BAB	0.0073		6.233
HFUWC118D*	C	M1	3	1		6.344	0.323	0.117	16	BGM	0.0073		6.270
HFUWC119D	C	M1	3	1	61.045			0.117	16	BAT	0.0073	60.426	
HFUWC11AD	C	M1	3	1	64.384			0.117	16	BGM	0.0073	63.859	
HFUWC214D	C	M2	3	2	74.116			0.115	16	BGM	0.0072	71.956	
HFUWC215D	C	M2	3	2	70.741			0.114	16	BGM	0.0071	68.221	
HFUWC216D*	C	M2	3	2		6.138	0.325	0.115	16	BGM	0.0072		5.983
HFUWC217D*	C	M2	3	2		6.211	0.325	0.115	16	BGM	0.0072		6.045
HFUWC218D*	C	M2	3	2		6.347	0.333	0.115	16	BGM	0.0072		6.179
HFUWC219D	C	M2	3	2	64.830			0.116	16	BGM	0.0072	63.434	
HFUWC21AD	C	M2	3	2	72.552			0.116	16	BGM	0.0073	71.092	

*Strength removed on ETW data that had protective coating over gage

Average	**64.344**	**6.402**	**0.334**
Standard Dev.	**4.824**	**0.171**	**0.009**
Coeff. of Var. [%]	**7.497**	**2.679**	**2.701**
Min.	**56.800**	**6.138**	**0.318**
Max.	**74.116**	**6.716**	**0.348**
Number of Spec.	**23**	**19**	**18**

$Average_{norm}$	**0.0073**	**62.927**	**6.296**
Standard $Dev._{norm}$		**5.000**	**0.184**
Coeff. of $Var._{norm}$ [%]		**7.946**	**2.926**
Min.	**0.0066**	**55.289**	**5.983**
Max.	**0.0074**	**71.956**	**6.688**
Number of Spec.		**23**	**19**


Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC1) [ksi]
0
10
20
30
40
50
60
70
80


Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC1) [Msi]
0.0
2.0
4.0
6.0
8.0

4.13 Unnotched Compression 2 Properties

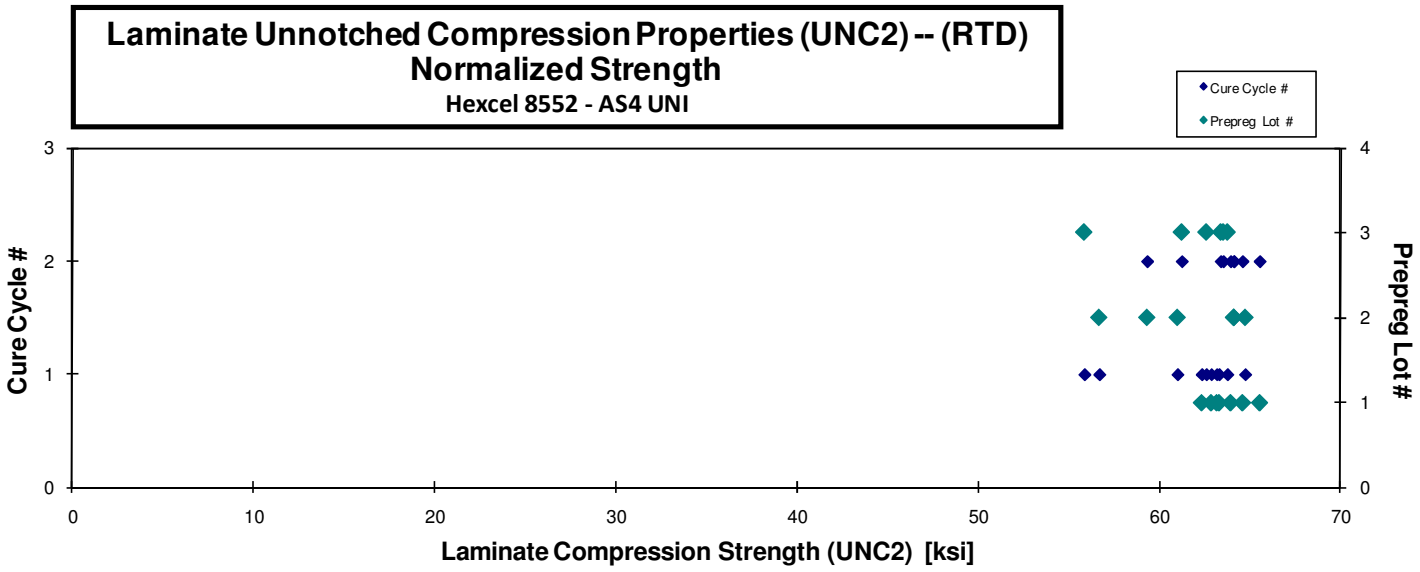
Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

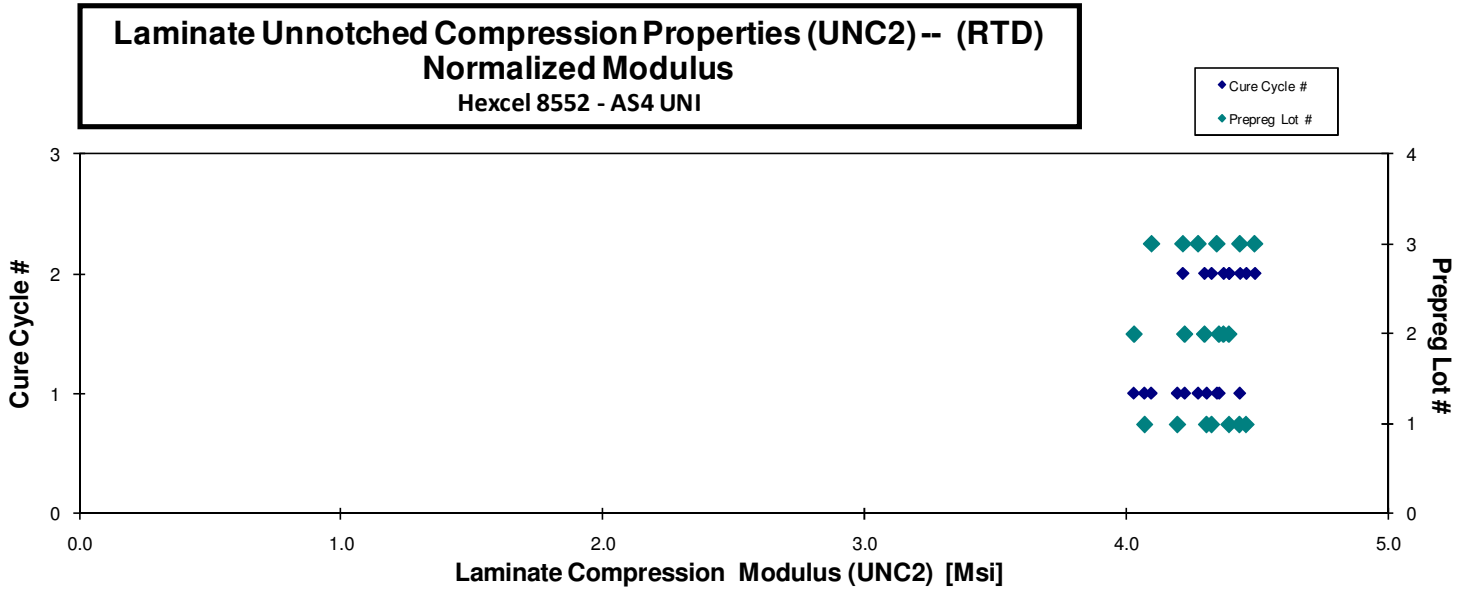
normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUXA111A	A	M1	1	1	68.419	4.546	0.512	0.137	20	BGM	0.0068	63.165	4.197
HFUXA112A	A	M1	1	1	64.743	4.475	0.534	0.143	20	BGM	0.0071	62.337	4.308
HFUXA113A	A	M1	1	1	64.215	4.529	0.543	0.145	20	BGM	0.0072	62.862	4.434
HFUXA114A	A	M1	1	1	64.432	4.145	0.521	0.145	20	BGM	0.0073	63.293	4.072
HFUXA211A	A	M2	1	2	68.423	4.631	0.543	0.138	20	BGM	0.0069	63.931	4.327
HFUXA212A	A	M2	1	2	67.619	4.601	0.483	0.143	20	BGM	0.0072	65.532	4.459
HFUXA213A	A	M2	1	2	65.211	4.437	0.494	0.147	20	BGM	0.0073	64.587	4.394
HFUXB111A	B	M1	2	1	67.780	4.479	0.533	0.133	20	BGM	0.0067	61.002	4.031
HFUXB112A	B	M1	2	1	69.422	4.671	0.553	0.138	20	BGM	0.0069	64.732	4.356
HFUXB113A	B	M1	2	1	59.179	4.410	0.547	0.142	20	BGM	0.0071	56.693	4.224
HFUXB212A	B	M2	2	2	68.706	4.686	0.507	0.138	20	BGM	0.0069	64.118	4.373
HFUXB213A	B	M2	2	2	61.755	4.573	0.562	0.142	20	BGM	0.0071	59.328	4.394
HFUXB214A	B	M2	2	2	65.969	4.425	0.524	0.144	20	BGM	0.0072	64.104	4.300
HFUXC111A	C	M1	3	1	60.400	4.430	0.524	0.137	20	BGM	0.0068	55.870	4.098
HFUXC112A	C	M1	3	1	65.681	4.479	0.526	0.144	20	BGM	0.0072	63.751	4.347
HFUXC113A	C	M1	3	1	62.972	4.302	0.488	0.147	20	BGM	0.0074	62.589	4.276
HFUXC211A	C	M2	3	2	68.319	4.546	0.461	0.137	20	BGM	0.0069	63.387	4.218
HFUXC212A	C	M2	3	2	66.762	4.721	0.585	0.141	20	BGM	0.0070	63.521	4.492
HFUXC213A	C	M2	3	2	62.389	4.519	0.544	0.145	20	BGM	0.0073	61.237	4.436

Average	**65.389**	**4.506**	**0.526**
Standard Dev.	**2.995**	**0.137**	**0.030**
Coeff. of Var. [%]	**4.581**	**3.051**	**5.676**
Min.	**59.179**	**4.145**	**0.461**
Max.	**69.422**	**4.721**	**0.585**
Number of Spec.	**19**	**19**	**19**

$Average_{norm}$	**0.0071**	**62.423**	**4.302**
$Standard\ Dev._{norm}$		**2.602**	**0.133**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.168**	**3.083**
Min.	**0.0067**	**55.870**	**4.031**
Max.	**0.0074**	**65.532**	**4.492**
Number of Spec.		**19**	**19**


Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC2) [ksi]
0
10
20
30
40
50
60
70


Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC2) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0

Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 UNI

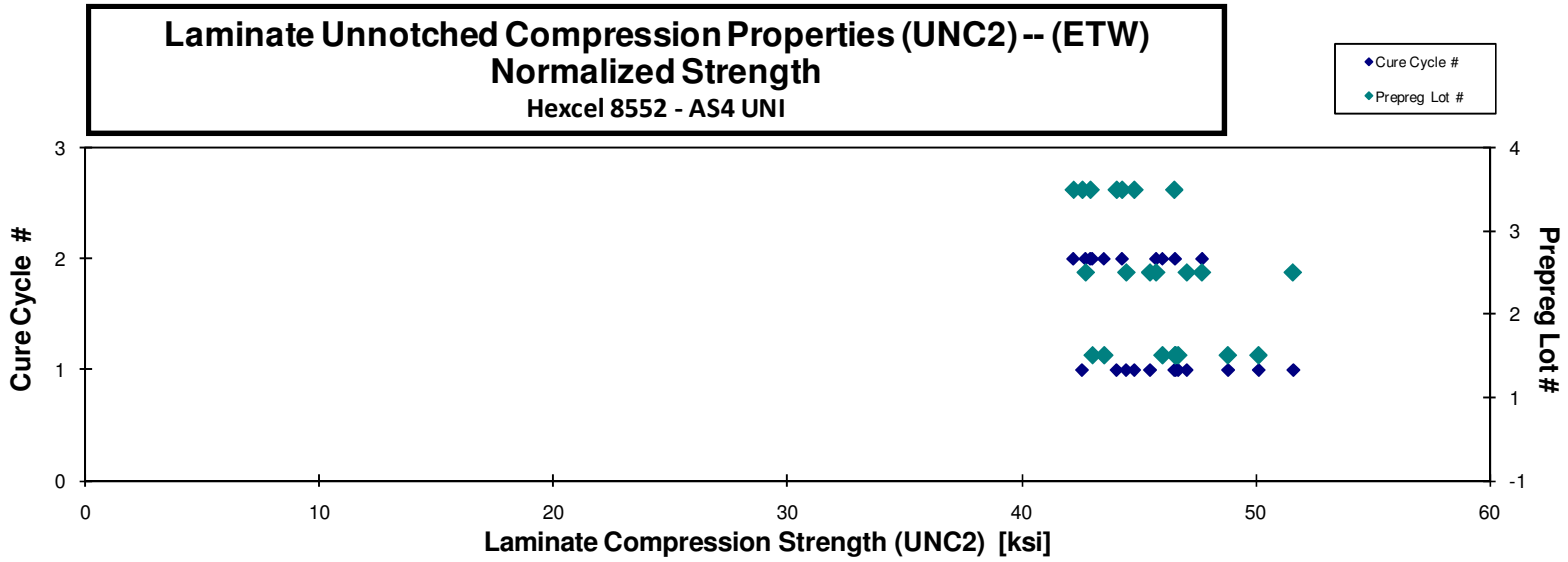
normalizing t_{ply} [in]: 0.0074

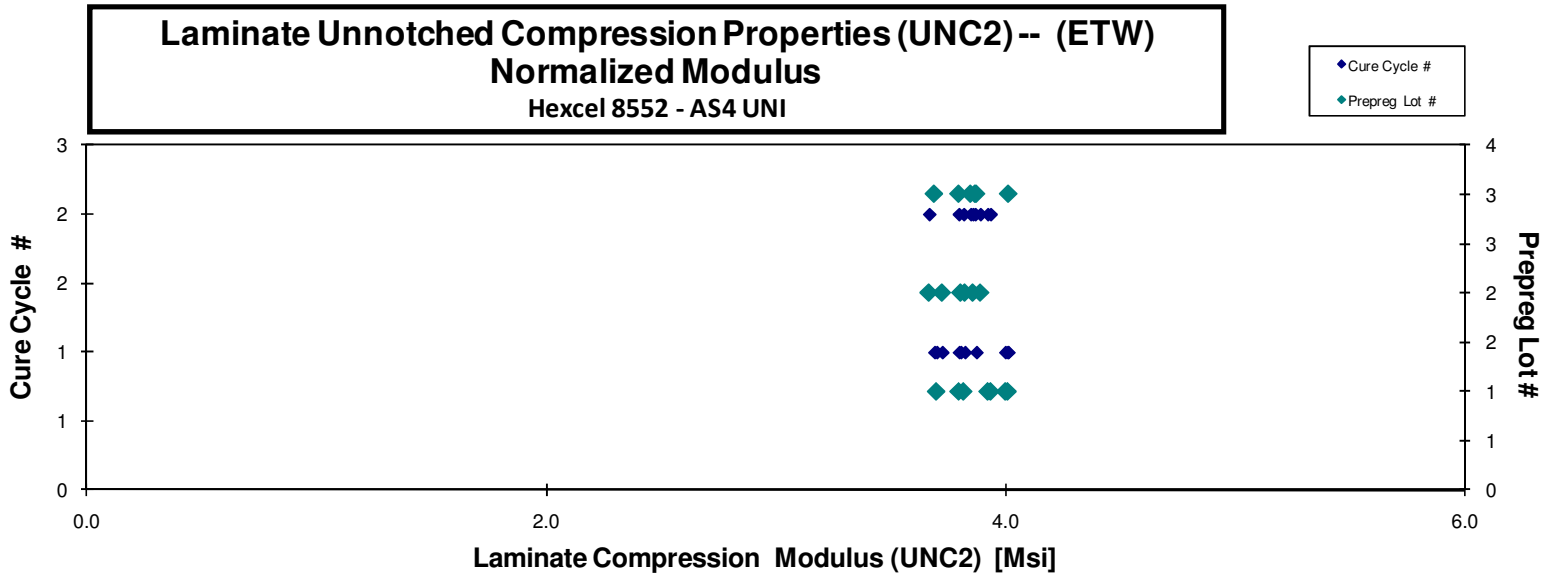
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFUXA117D*	A	M1	1	1		4.109	0.582	0.144	20	BGM	0.0072		4.007
HFUXA118D*	A	M1	1	1		3.905	0.582	0.144	20	BGM	0.0072		3.796
HFUXA119D*	A	M1	1	1		3.785	0.583	0.145	20	BGM / END CRUSHED	0.0072		3.700
HFUXA11AD*	A	M1	1	1		4.099	0.573	0.144	20	BGM	0.0072		3.997
HFUXA11BD	A	M1	1	1	51.243			0.145	20	BGM	0.0072	50.112	
HFUXA11CD	A	M1	1	1	49.808			0.145	20	BGM	0.0073	48.804	
HFUXA115D	A	M1	1	1	47.247			0.146	20	BGM	0.0073	46.571	
HFUXA116D	A	M1	1	1	47.586			0.145	20	BGM	0.0073	46.680	
HFUXA216D*	A	M2	1	2		3.947	0.583	0.147	20	BGM	0.0074		3.933
HFUXA217D*	A	M2	1	2		3.844	0.583	0.147	20	BGM	0.0073		3.817
HFUXA218D*	A	M2	1	2		3.952	0.549	0.147	20	BGM	0.0073		3.921
HFUXA219D	A	M2	1	2	46.943			0.147	20	BGM	0.0073	46.541	
HFUXA21AD	A	M2	1	2	43.463			0.146	20	BGM	0.0073	43.012	
HFUXA215D	A	M2	1	2	46.066			0.148	20	BGM	0.0074	46.004	
HFUXA214D	A	M2	1	2	43.544			0.148	20	BGM	0.0074	43.509	
HFUXB116D*	B	M1	2	1		3.861	0.592	0.143	20	BGM	0.0071		3.724
HFUXB117D*	B	M1	2	1		3.962	0.571	0.143	20	BGM	0.0071		3.822
HFUXB118D*	B	M1	2	1		3.962	0.578	0.142	20	BGM	0.0071		3.804
HFUXB119D	B	M1	2	1	53.576			0.143	20	BGM	0.0071	51.585	
HFUXB11AD	B	M1	2	1	48.840			0.143	20	BGM	0.0071	47.042	
HFUXB114D	B	M1	2	1	46.719			0.144	20	BGM	0.0072	45.477	
HFUXB115D	B	M1	2	1	46.005			0.143	20	BGM	0.0072	44.462	
HFUXB216D*	B	M2	2	2		3.785	0.578	0.143	20	BGM	0.0072		3.667
HFUXB217D*	B	M2	2	2		3.995	0.590	0.143	20	BGM	0.0071		3.857
HFUXB218D*	B	M2	2	2		4.043	0.584	0.142	20	BGM	0.0071		3.889
HFUXB219D	B	M2	2	2	49.497			0.143	20	BGM	0.0071	47.696	
HFUXB21AD	B	M2	2	2	44.332			0.143	20	BGM	0.0071	42.719	
HFUXB215D	B	M2	2	2	46.950			0.144	20	BGM	0.0072	45.734	
HFUXC116D*	C	M1	3	1		4.050	0.584	0.147	20	BGM	0.0073		4.010
HFUXC117D*	C	M1	3	1		3.893	0.570	0.147	20	BGM	0.0074		3.871
HFUXC118D*	C	M1	3	1		3.710	0.573	0.147	20	BGM	0.0074		3.690
HFUXC119D	C	M1	3	1	47.205			0.146	20	BGM	0.0073	46.508	
HFUXC11AD	C	M1	3	1	44.689			0.146	20	BGM	0.0073	44.050	
HFUXC114D	C	M1	3	1	42.756			0.147	20	BGM	0.0074	42.578	
HFUXC115D	C	M1	3	1	45.176			0.147	20	BGM	0.0073	44.805	
HFUXC216D*	C	M2	3	2		3.963	0.596	0.144	20	BGM	0.0072		3.866
HFUXC217D*	C	M2	3	2		3.905	0.594	0.144	20	BGM	0.0072		3.796
HFUXC218D*	C	M2	3	2		3.956	0.587	0.144	20	BGM	0.0072		3.847
HFUXC219D	C	M2	3	2	45.329			0.145	20	BGM	0.0072	44.283	
HFUXC21AD	C	M2	3	2	44.266			0.144	20	BGM	0.0072	42.930	
HFUXC215D	C	M2	3	2	42.865			0.146	20	BGM	0.0073	42.204	

*Strength removed on ETW data that had protective coating over gage

	Strength	Modulus	Poisson's Ratio
Average	**46.550**	**3.933**	**0.581**
Standard Dev.	**2.780**	**0.106**	**0.011**
Coeff. of Var. [%]	**5.972**	**2.690**	**1.835**
Min.	**42.756**	**3.710**	**0.549**
Max.	**53.576**	**4.109**	**0.596**
Number of Spec.	**22**	**19**	**19**

	t_{ply}	$Strength_{norm}$	$Modulus_{norm}$
$Average_{norm}$	**0.0072**	**45.605**	**3.843**
Standard $Dev._{norm}$		**2.490**	**0.103**
Coeff. of Var. $[\%]_{norm}$		**5.459**	**2.691**
Min.	**0.0071**	**42.204**	**3.667**
Max.	**0.0074**	**51.585**	**4.010**
Number of Spec.		**22**	**19**


Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC2) [ksi]
0
10
20
30
40
50
60
0
1
2
3
-1
1
2
3
4


Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC2) [Msi]
0.0
2.0
4.0
6.0
0
1
2
3
0
1
1
2
2
3
3
4

4.14 Unnotched Compression 3 Properties

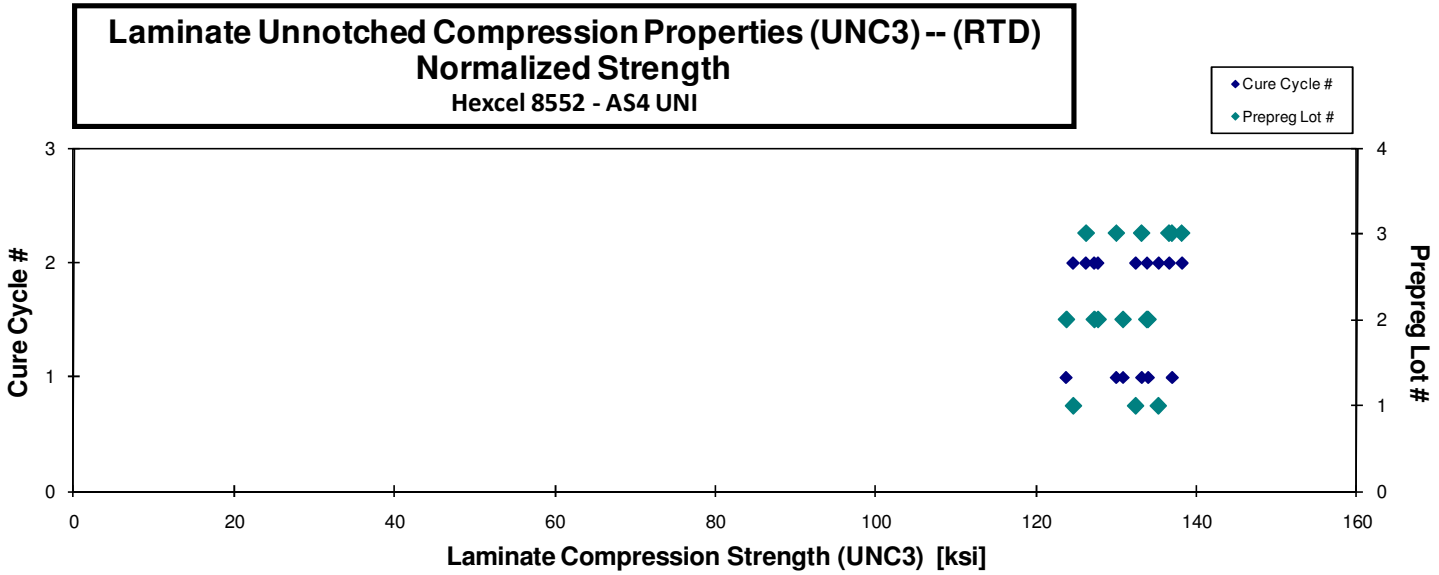
Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

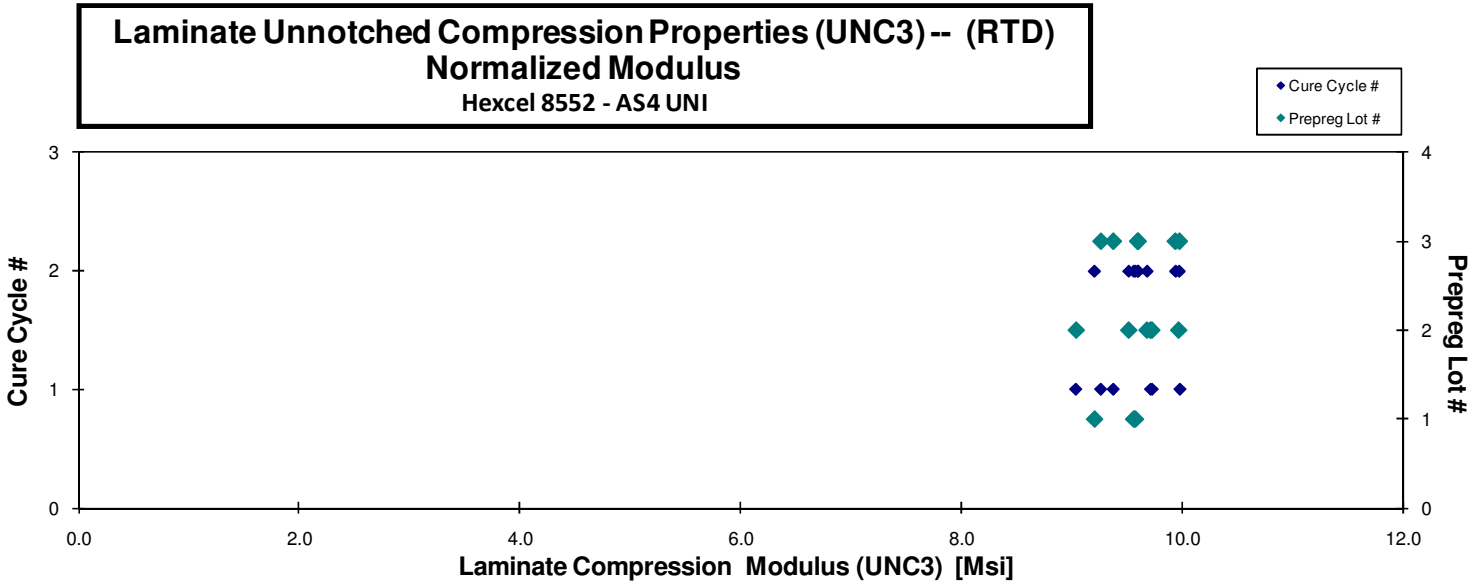
normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUYA111A	A	M1	1	1	136.567	9.875	0.387	0.145	20	BGM	0.0073	133.845	9.678
HFUYA112A	A	M1	1	1	141.683	9.850	0.386	0.147	20	BGM	0.0073	140.279	9.753
HFUYA113A	A	M1	1	1	124.109	9.975	0.392	0.147	20	BGM	0.0074	123.676	9.940
HFUYA114A	A	M1	1	1	128.852	9.797	0.395	0.148	20	BGM	0.0074	128.445	9.766
HFUYA211A	A	M2	1	2	132.259	9.779	0.406	0.139	20	BGM	0.0070	124.588	9.212
HFUYA212A	A	M2	1	2	136.536	9.868	0.393	0.144	20	BGM	0.0072	132.385	9.568
HFUYA213A*	A	M2	1	2		9.740	0.406	0.146	20	BGM / HIB	0.0073		9.583
HFUYA214A	A	M2	1	2	129.846			0.147	20	BGM	0.0073	128.705	
HFUYB111A	B	M1	2	1	133.513	9.760	0.399	0.137	20	BGM	0.0069	123.725	9.044
HFUYB112A	B	M1	2	1	136.513	10.142	0.420	0.142	20	BGM	0.0071	130.809	9.719
HFUYB113A	B	M1	2	1	137.295	9.977	0.407	0.144	20	BGM	0.0072	133.940	9.733
HFUYB211A	B	M2	2	2	128.860	9.645	0.407	0.146	20	BGM	0.0073	127.220	9.522
HFUYB212A	B	M2	2	2	127.493	9.674	0.409	0.148	20	BGM	0.0074	127.679	9.688
HFUYB213A	B	M2	2	2	134.091	9.999	0.999	0.148	20	BGM	0.0074	133.789	9.976
HFUYC111A	C	M1	3	1	142.381	10.154	0.383	0.135	20	BGM	0.0068	129.971	9.269
HFUYC112A	C	M1	3	1	143.208	9.813	0.388	0.142	20	BAT	0.0071	136.918	9.382
HFUYC113A	C	M1	3	1	135.491	10.161	0.439	0.145	20	HAT	0.0073	133.126	9.983
HFUYC211A	C	M2	3	2	146.127	10.520	0.386	0.140	20	BGM	0.0070	138.146	9.945
HFUYC212A	C	M2	3	2	137.253	9.652	0.381	0.147	20	BGM	0.0074	136.558	9.603
HFUYC213A	C	M2	3	2	126.067	9.600	0.394	0.148	20	BGM	0.0074	126.180	9.608

* Strength not reported due to improper failure mode

Average	**134.639**	**9.894**	**0.430**	**$Average_{norm}$**	**0.0072**	**131.0519**	**9.6302**
Standard Dev.	**6.114**	**0.229**	**0.138**	**Standard $Dev._{norm}$**		**4.961**	**0.261**
Coeff. of Var. [%]	**4.541**	**2.318**	**32.165**	**Coeff. of Var. $[\%]_{norm}$**		**3.786**	**2.711**
Min.	**124.109**	**9.600**	**0.381**	**Min.**	**0.0068**	**123.6762**	**9.0443**
Max.	**146.127**	**10.520**	**0.999**	**Max.**	**0.0074**	**140.2789**	**9.9832**
Number of Spec.	**19**	**19**	**19**	**Number of Spec.**		**19**	**19**


Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC3) [ksi]
0
20
40
60
80
100
120
140
160


Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 UNI
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

Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 UNI

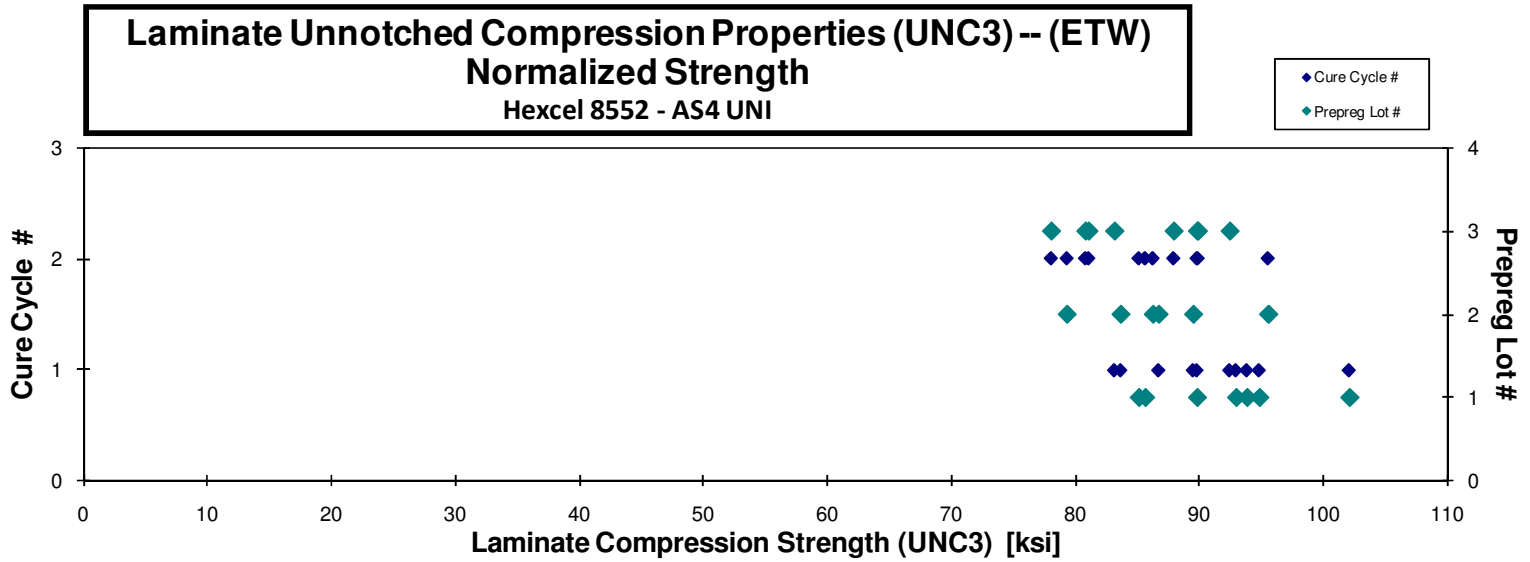
normalizing t_{ply} [in]: 0.0074

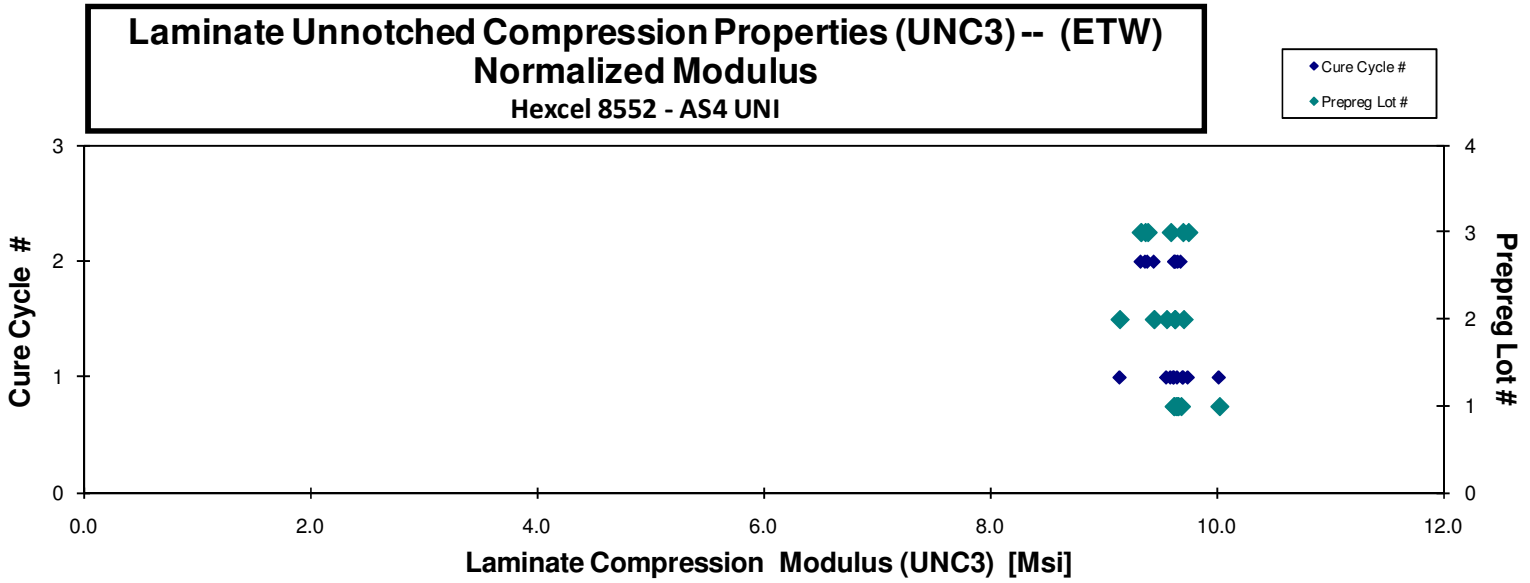
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFUYA118D*	A	M1	1	1		9.561	0.406	0.149	20		0.0074		9.624
HFUYA119D*	A	M1	1	1		9.530	0.411	0.149	20		0.0075		9.619
HFUYA11AD	A	M1	1	1	101.712			0.149	20	BAT	0.0074	102.090	
HFUYA11BD	A	M1	1	1	92.870			0.148	20	BAB	0.0074	92.944	
HFUYA11CD	A	M1	1	1	94.260			0.147	20	BGM	0.0074	93.825	
HFUYA11DD	A	M1	1	1	95.510			0.147	20	BAT	0.0073	94.822	
HFUYA115A*	A	M1	1	1		10.034	0.435	0.148	20		0.0074		10.025
HFUYA117D*	A	M1	1	1		9.619	0.414	0.149	20	BAT	0.0074		9.653
HFUYA216D	A	M2	1	2		9.726	0.422	0.147	20		0.0073		9.640
HFUYA217D	A	M2	1	2		9.763	0.407	0.146	20		0.0073		9.659
HFUYA218D	A	M2	1	2		9.811	0.413	0.146	20		0.0073		9.685
HFUYA21AD	A	M2	1	2	91.006			0.146	20	BAT	0.0073	89.797	
HFUYA21BD	A	M2	1	2	87.235			0.145	20	BAT	0.0073	85.624	
HFUYA21CD	A	M2	1	2	85.935			0.147	20	BAB	0.0073	85.112	
HFUYB117D	B	M1	2	1		9.791	0.396	0.144	20		0.0072		9.555
HFUYB119D	B	M1	2	1	85.818			0.144	20	BAB	0.0072	83.643	
HFUYB11BD	B	M1	2	1	89.020			0.144	20	BGM	0.0072	86.705	
HFUYB11CD	B	M1	2	1	92.174			0.144	20	BGM	0.0072	89.496	
HFUYB115D	B	M1	2	1		9.308	0.391	0.145	20		0.0073		9.140
HFUYB116D	B	M1	2	1		9.871	0.417	0.146	20		0.0073		9.708
HFUYB215D	B	M2	2	2		9.582	0.410	0.146	20		0.0073		9.444
HFUYB216D	B	M2	2	2		9.740	0.401	0.146	20		0.0073		9.629
HFUYB217D*	B	M2	2	2		9.643	0.408	0.148	20		0.0074		9.628
HFUYB218D	B	M2	2	2	78.809			0.149	20	BAT	0.0074	79.306	
HFUYB219D	B	M2	2	2	95.327			0.148	20	BGM	0.0074	95.542	
HFUYB21CD	B	M2	2	2	88.230			0.145	20	BAB	0.0072	86.243	
HFUYC117D	C	M1	3	1		9.922	0.424	0.145	20		0.0073		9.748
HFUYC118D	C	M1	3	1	92.791			0.147	20	BAB	0.0074	92.436	
HFUYC11BD	C	M1	3	1	85.344			0.144	20	BGM	0.0072	83.133	
HFUYC11CD	C	M1	3	1	92.401			0.144	20	BGM	0.0072	89.799	
HFUYC115D*	C	M1	3	1		9.744	0.410	0.146	20		0.0073		9.593
HFUYC116D	C	M1	3	1		9.886	0.420	0.145	20		0.0073		9.701
HFUYC217D	C	M2	3	2		9.530	0.440	0.146	20		0.0073		9.388
HFUYC218D	C	M2	3	2		9.486	0.437	0.146	20		0.0073		9.328
HFUYC219D*	C	M2	3	2		9.510	0.425	0.146	20		0.0073		9.367
HFUYC21AD	C	M2	3	2	91.238			0.146	20	BAT	0.0073	89.882	
HFUYC21BD	C	M2	3	2	89.195			0.146	20	BAT	0.0073	87.919	
HFUYC21CD	C	M2	3	2	79.064			0.146	20	BAB	0.0073	78.031	
HFUYC215D	C	M2	3	2	81.956			0.146	20	BAT	0.0073	81.061	
HFUYC216D	C	M2	3	2	82.476			0.145	20	BAB	0.0072	80.795	

*Strength removed on ETW data that had protective coating over gage

Average	**89.161**	**9.687**	**0.415**
Standard Dev.	**5.756**	**0.181**	**0.013**
Coeff. of Var. [%]	**6.455**	**1.864**	**3.191**
Min.	**78.809**	**9.308**	**0.391**
Max.	**101.712**	**10.034**	**0.440**
Number of Spec.	**21**	**19**	**19**

$Average_{norm}$	**0.0073**	**88.010**	**9.586**
Standard $Dev._{norm}$		**6.036**	**0.190**
Coeff. of Var. $[\%]_{norm}$		**6.858**	**1.981**
Min.	**0.0072**	**78.031**	**9.140**
Max.	**0.0075**	**102.090**	**10.025**
Number of Spec.		**21**	**19**


Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC3) [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
0
1
2
3
4

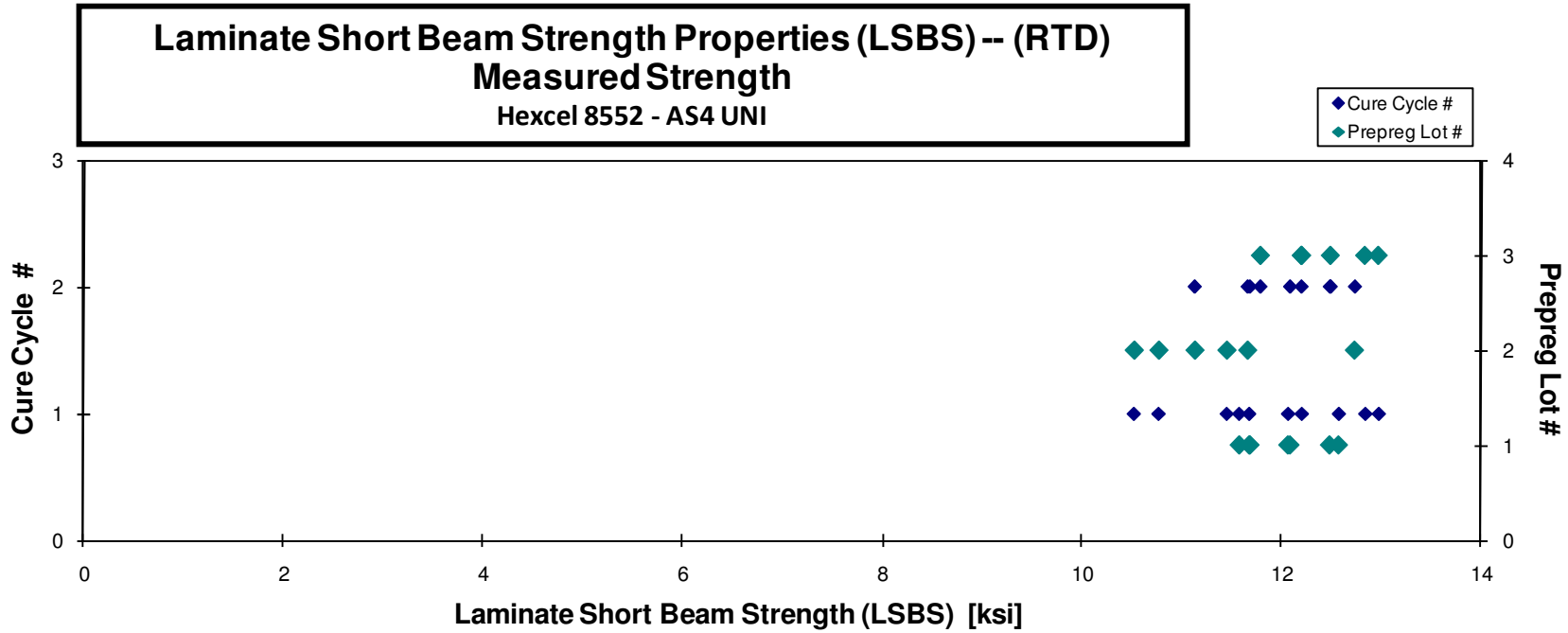

Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC3) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
0
1
2
3
4

4.15 Laminate Short Beam Strength Properties

Laminate Short Beam Strength Properties (LSBS) -- (RTD) Strength
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFUqA171A	A	M1	1	1	11.676	0.163	24	0.0068	ILS
HFUqA172A	A	M1	1	1	12.064	0.173	24	0.0072	ILS
HFUqA173A	A	M1	1	1	11.576	0.179	24	0.0074	ILS
HFUqA174A	A	M1	1	1	12.572	0.180	24	0.0075	ILS
HFUqA271A	A	M2	1	2	11.683	0.175	24	0.0073	ILS
HFUqA272A	A	M2	1	2	12.085	0.180	24	0.0075	ILS
HFUqA273A	A	M2	1	2	12.482	0.181	24	0.0075	ILS
HFUqB172A	B	M1	2	1	10.770	0.170	24	0.0071	ILS
HFUqB173A	B	M1	2	1	11.452	0.175	24	0.0073	ILS
HFUqB174A	B	M1	2	1	10.523	0.177	24	0.0074	ILS
HFUqB272A	B	M2	2	2	11.661	0.167	24	0.0070	ILS
HFUqB273A	B	M2	2	2	12.733	0.176	24	0.0073	ILS
HFUqB274A	B	M2	2	2	11.132	0.179	24	0.0075	ILS
HFUqC172A	C	M1	3	1	12.971	0.174	24	0.0072	ILS LEFT
HFUqC173A	C	M1	3	1	12.202	0.174	24	0.0072	ILS LEFT
HFUqC174A	C	M1	3	1	12.836	0.174	24	0.0072	ILS LEFT, CENTER
HFUqC272A	C	M2	3	2	11.789	0.169	24	0.0070	ILS LEFT
HFUqC273A	C	M2	3	2	12.199	0.175	24	0.0073	ILS LEFT
HFUqC274A	C	M2	3	2	12.490	0.177	24	0.0074	ILS RIGHT

Average	**11.942**	**Average**	**0.0073**
Standard Dev.	**0.679**	**Standard Dev.**	
Coeff. of Var. [%]	**5.687**	**Coeff. of Var. [%]**	
Min.	**10.523**	**Min.**	**0.0068**
Max.	**12.971**	**Max.**	**0.0075**
Number of Spec.	**19**	**Number of Spec.**	**19**

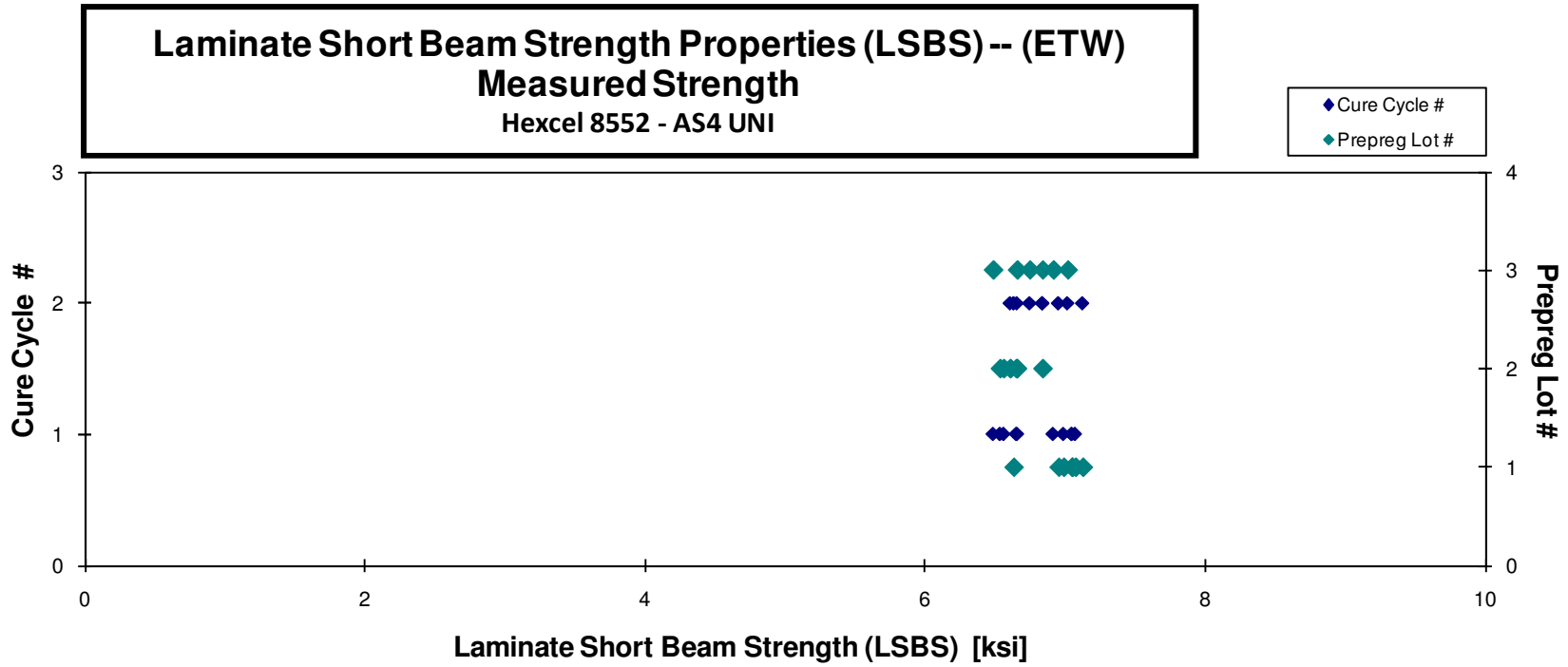

Laminate Short Beam Strength Properties (LSBS) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Short Beam Strength (LSBS) [ksi]
0
1
2
3
4
0
2
4
6
8
10
12
14

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

Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFUqA177D	A	M1	1	1	7.050	0.178	24	0.0074	ILS
HFUqA178D	A	M1	1	1	6.989	0.178	24	0.0074	ILS
HFUqA179D	A	M1	1	1	7.073	0.177	24	0.0074	ILS
HFUqA17AD	A	M1	1	1	7.047	0.177	24	0.0074	ILS
HFUqA276D	A	M2	1	2	7.126	0.178	24	0.0074	ILS
HFUqA277D	A	M2	1	2	6.953	0.178	24	0.0074	ILS
HFUqA279D	A	M2	1	2	6.633	0.178	24	0.0074	ILS
HFUqB176D	B	M1	2	1	6.652	0.177	24	0.0074	ILS
HFUqB177D	B	M1	2	1	6.535	0.176	24	0.0074	ILS
HFUqB178D	B	M1	2	1	6.561	0.176	24	0.0074	ILS
HFUqB276D	B	M2	2	2	6.839	0.178	24	0.0074	ILS
HFUqB277D	B	M2	2	2	6.608	0.177	24	0.0074	ILS
HFUqB278D	B	M2	2	2	6.656	0.176	24	0.0073	ILS
HFUqC176D	C	M1	3	1	6.487	0.174	24	0.0073	ILS
HFUqC177D	C	M1	3	1	6.915	0.175	24	0.0073	ILS
HFUqC178D	C	M1	3	1	6.658	0.174	24	0.0073	ILS
HFUqC278D	C	M2	3	2	7.018	0.176	24	0.0074	ILS
HFUqC279D	C	M2	3	2	6.748	0.176	24	0.0073	ILS
HFUqC27AD	C	M2	3	2	6.839	0.176	24	0.0073	ILS

Average	**6.810**	**Average**	**0.0074**
Standard Dev.	**0.208**	**Standard Dev.**	
Coeff. of Var. [%]	**3.058**	**Coeff. of Var. [%]**	
Min.	**6.487**	**Min.**	**0.0073**
Max.	**7.126**	**Max.**	**0.0074**
Number of Spec.	**19**	**Number of Spec.**	**19**


Laminate Short Beam Strength Properties (LSBS) -- (ETW)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Short Beam Strength (LSBS) [ksi]
0
1
2
3
4
0
2
4
6
8
10

4.16 Open Hole Tension 1 Properties

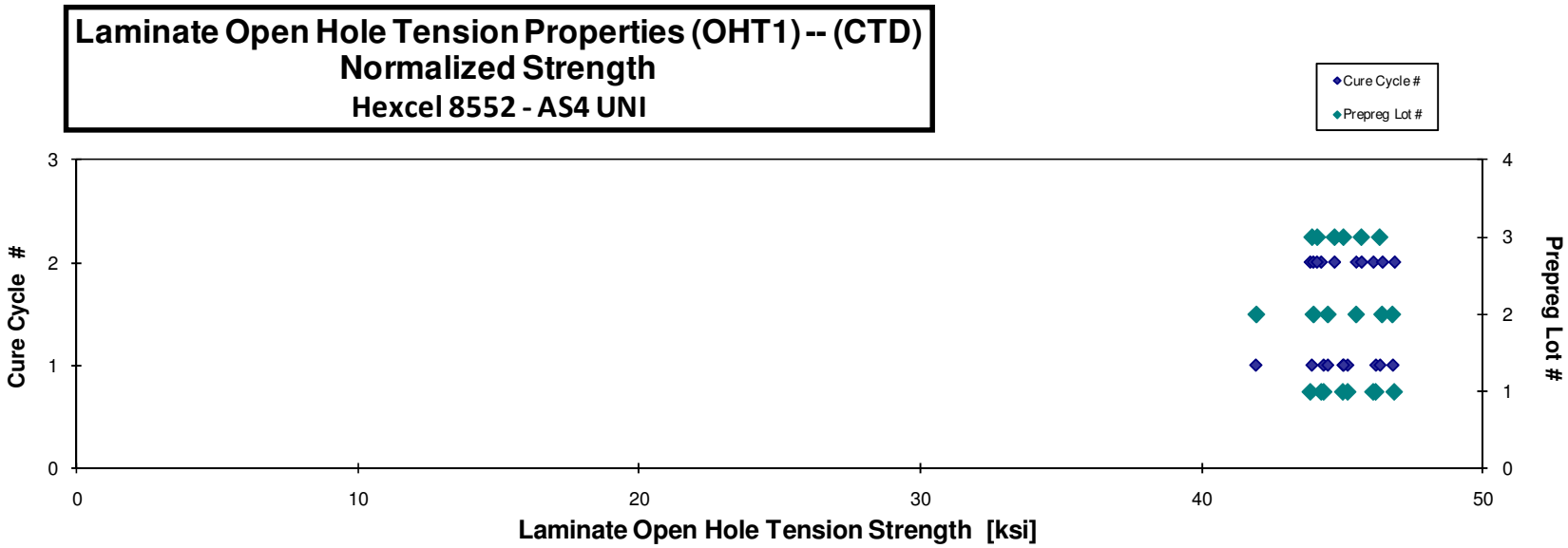
Laminate Open Hole Tension Properties (OHT1) -- (CTD)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUDA116B	A	M1	1	1	45.142	0.118	16	LGM/AGM	0.0074	45.041
HFUDA117B	A	M1	1	1	43.900	0.120	16	LGM/AGM	0.0075	44.351
HFUDA118B	A	M1	1	1	45.198	0.118	16	LGM/AGM	0.0074	45.210
HFUDA119B	A	M1	1	1	46.345	0.118	16	LGM/AGM	0.0074	46.208
HFUDA215B	A	M2	1	2	46.126	0.118	16	LGM/AGM	0.0074	46.119
HFUDA216B	A	M2	1	2	46.532	0.119	16	LGM/AGM	0.0075	46.872
HFUDA217B	A	M2	1	2	43.400	0.120	16	LGM/AGM	0.0075	43.883
HFUDA219B	A	M2	1	2	43.341	0.121	16	LGM/AGM	0.0076	44.269
HFUDB116B	B	M1	2	1	45.341	0.122	16	LGM/AGM	0.0076	46.809
HFUDB117B	B	M1	2	1	44.247	0.119	16	LGM/AGM	0.0074	44.503
HFUDB118B	B	M1	2	1	43.688	0.114	16	LGM/AGM	0.0071	41.953
HFUDB216B	B	M2	2	2	46.600	0.118	16	LGM/AGM	0.0074	46.442
HFUDB217B	B	M2	2	2	44.167	0.118	16	LGM/AGM	0.0074	43.993
HFUDB218B	B	M2	2	2	46.143	0.117	16	LGM/AGM	0.0073	45.513
HFUDC116B	C	M1	3	1	47.286	0.116	16	LGM/AGM	0.0073	46.354
HFUDC117B	C	M1	3	1	44.441	0.117	16	LGM/AGM	0.0073	43.940
HFUDC118B	C	M1	3	1	46.361	0.115	16	LGM/AGM	0.0072	45.062
HFUDC216B	C	M2	3	2	45.503	0.116	16	LGM/AGM	0.0073	44.741
HFUDC217B	C	M2	3	2	44.487	0.117	16	LGM/AGM	0.0073	44.124
HFUDC218B	C	M2	3	2	47.072	0.115	16	LGM/AGM	0.0072	45.700

Average	**45.266**	
Standard Dev.	**1.251**	
Coeff. of Var. [%]	**2.765**	
Min.	**43.341**	
Max.	**47.286**	
Number of Spec.	**20**	

$Average_{norm}$	**0.0074**	**45.054**
$Standard\ Dev._{norm}$		**1.232**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.735**
Min.	**0.0071**	**41.953**
Max.	**0.0076**	**46.872**
Number of Spec.	**20**	**20**


Laminate Open Hole Tension Properties (OHT1) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
10
20
30
40
50
0
1
2
3
4

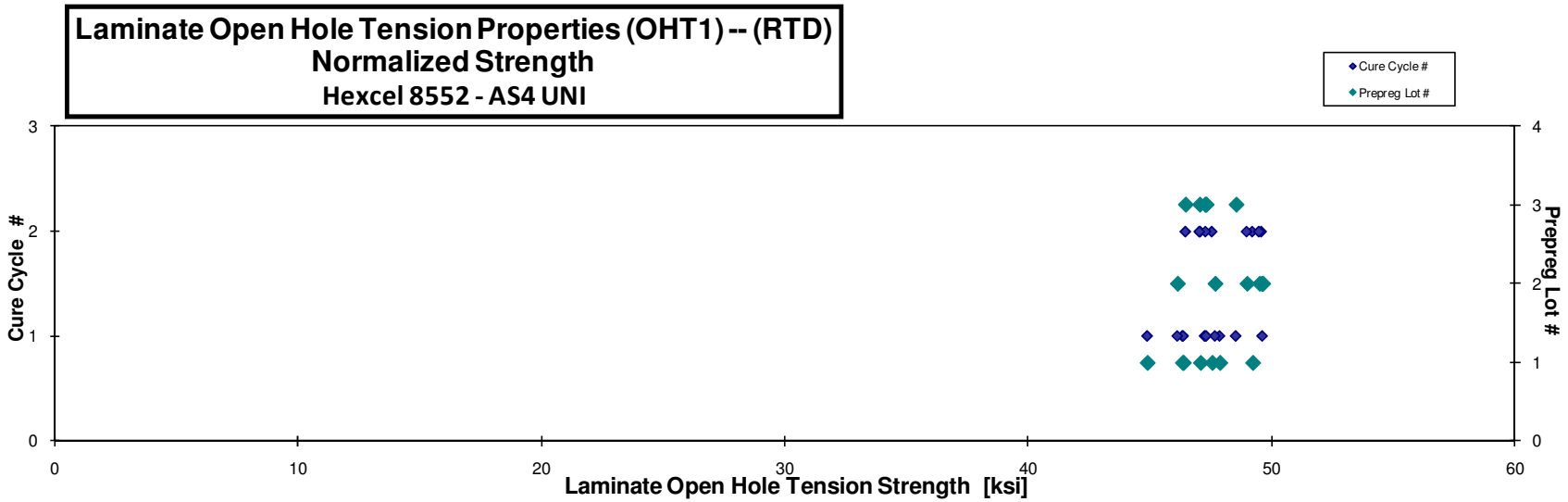
Laminate Open Hole Tension Properties (OHT1) -- (RTD) Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUDA112A	A	M1	1	1	45.319	0.117	16	MGM	0.0073	44.911
HFUDA113A	A	M1	1	1	46.719	0.117	16	MGM	0.0073	46.357
HFUDA114A	A	M1	1	1	46.527	0.118	16	MGM	0.0074	46.389
HFUDA115A	A	M1	1	1	47.878	0.118	16	MGM	0.0074	47.884
HFUDA211A	A	M2	1	2	48.465	0.116	16	MGM	0.0073	47.565
HFUDA212A	A	M2	1	2	48.691	0.120	16	MGM	0.0075	49.225
HFUDA213A	A	M2	1	2	45.906	0.121	16	MGM	0.0076	47.089
HFUDB111A	B	M1	2	1	48.455	0.117	16	MGM	0.0073	47.691
HFUDB112A	B	M1	2	1	49.625	0.118	16	MGM	0.0074	49.639
HFUDB113A	B	M1	2	1	44.864	0.122	16	MGM	0.0076	46.146
HFUDB211A	B	M2	2	2	49.854	0.118	16	MGM	0.0074	49.594
HFUDB212A	B	M2	2	2	49.530	0.118	16	MGM	0.0074	49.502
HFUDB213A	B	M2	2	2	49.334	0.118	16	MGM	0.0073	48.994
HFUDC112A	C	M1	3	1	47.361	0.118	16	MGM	0.0074	47.274
HFUDC113A	C	M1	3	1	47.923	0.117	16	MGM	0.0073	47.329
HFUDC114A	C	M1	3	1	49.197	0.117	16	MGM	0.0073	48.546
HFUDC212A	C	M2	3	2	47.808	0.117	16	MGM	0.0073	47.303
HFUDC213A	C	M2	3	2	47.392	0.116	16	MGM	0.0073	46.478
HFUDC214A	C	M2	3	2	48.049	0.116	16	MGM	0.0072	47.055

Average	47.837	
Standard Dev.	1.454	
Coeff. of Var. [%]	3.041	
Min.	44.864	
Max.	49.854	
Number of Spec.	19	

$Average_{norm}$	0.00737	47.630
$Standard\ Dev._{norm}$		1.328
$Coeff.\ of\ Var.\ [\%]_{norm}$		2.788
Min.	0.0072	44.911
Max.	0.0076	49.639
Number of Spec.		19

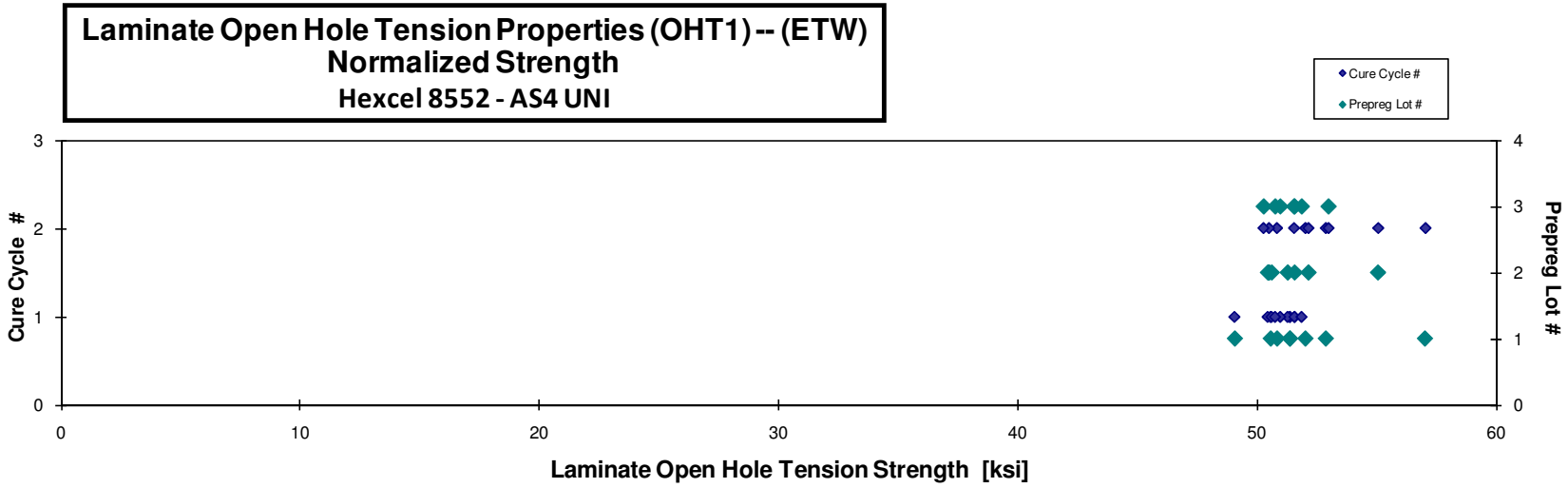

Laminate Open Hole Tension Properties (OHT1) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
4

Laminate Open Hole Tension Properties (OHT1) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUDA11AD	A	M1	1	1	51.130	0.117	16	LGM	0.0073	50.583
HFUDA11BD	A	M1	1	1	48.621	0.120	16	LGM	0.0075	49.086
HFUDA11CD	A	M1	1	1	51.848	0.117	16	LGM	0.0073	51.388
HFUDA11DD	A	M1	1	1	50.743	0.120	16	LGM	0.0075	51.386
HFUDA21AD	A	M2	1	2	50.977	0.121	16	LGM	0.0076	52.032
HFUDA21BD	A	M2	1	2	48.825	0.123	16	LGM	0.0077	50.853
HFUDA21CD	A	M2	1	2	56.810	0.119	16	LGM	0.0074	57.018
HFUDA21DD	A	M2	1	2	53.255	0.118	16	LGM	0.0073	52.880
HFUDB11AD	B	M1	2	1	50.895	0.117	16	LGM	0.0073	50.466
HFUDB11BD	B	M1	2	1	50.833	0.118	16	LGM	0.0074	50.625
HFUDB11CD	B	M1	2	1	51.683	0.118	16	LGM	0.0074	51.581
HFUDB11DD	B	M1	2	1	51.297	0.118	16	LGM	0.0074	51.290
HFUDB21AD	B	M2	2	2	55.135	0.118	16	LGM	0.0074	55.058
HFUDB21BD	B	M2	2	2	52.256	0.118	16	LGM	0.0074	52.160
HFUDB21CD	B	M2	2	2	50.498	0.118	16	LGM	0.0074	50.520
HFUDC11AD	C	M1	3	1	52.293	0.117	16	LGM	0.0073	51.579
HFUDC11BD	C	M1	3	1	51.677	0.119	16	LGM	0.0074	51.874
HFUDC11CD	C	M1	3	1	51.733	0.117	16	LGM	0.0073	50.983
HFUDC11DD	C	M1	3	1	51.739	0.116	16	LGM	0.0073	50.771
HFUDC21AD	C	M2	3	2	52.336	0.117	16	LGM	0.0073	51.562
HFUDC21BD	C	M2	3	2	53.723	0.117	16	LGM	0.0073	52.997
HFUDC21CD	C	M2	3	2	51.017	0.117	16	LGM	0.0073	50.292

Average	51.788	Average	$Average_{norm}$	0.00739	51.681
Standard Dev.	1.804		$Standard\ Dev._{norm}$		1.685
Coeff. of Var. [%]	3.483		$Coeff.\ of\ Var.\ [\%]_{norm}$		3.260
Min.	48.621	Min.	Min.	0.0073	49.086
Max.	56.810	Max.	Max.	0.0077	57.018
Number of Spec.	22		Number of Spec.		22


Laminate Open Hole Tension Properties (OHT1) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
4

4.17 Open Hole Tension 2 Properties

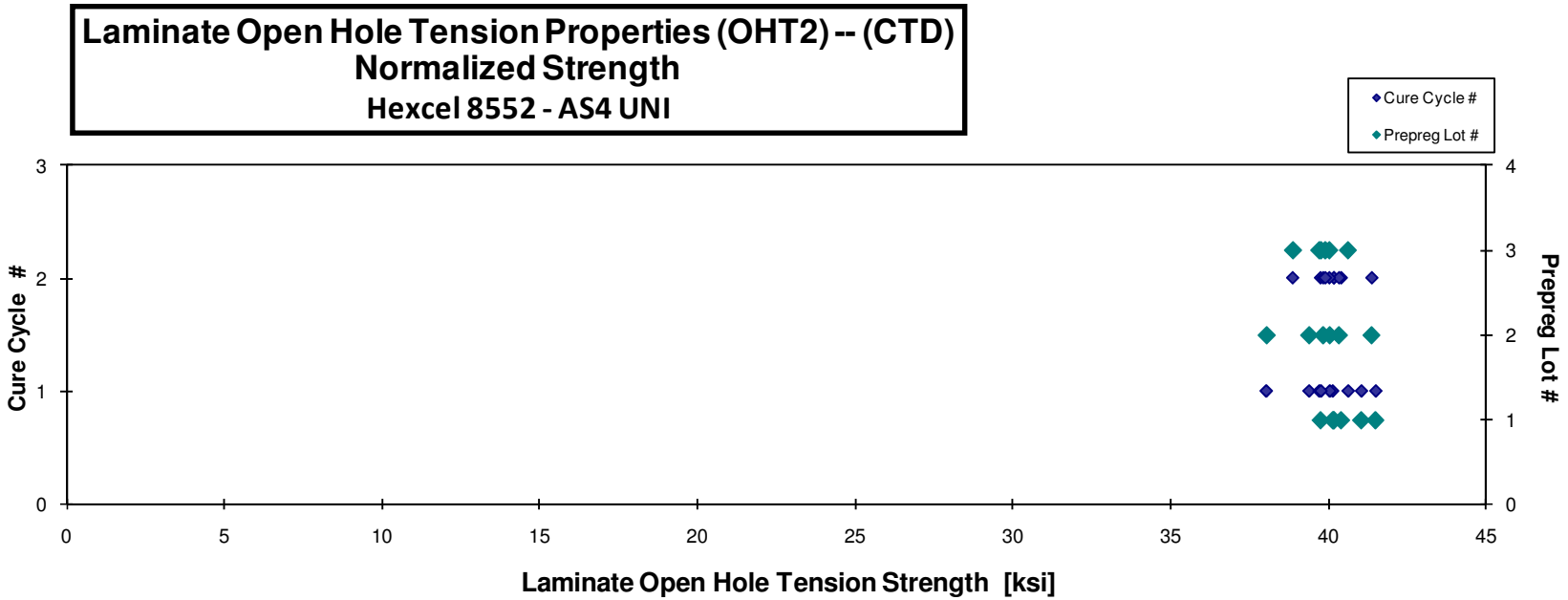
Laminate Open Hole Tension Properties (OHT2) -- (CTD)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUEA116B	A	M1	1	1	40.747	0.146	20	AGM	0.0073	40.137
HFUEA117B	A	M1	1	1	41.412	0.148	20	AGM / LGM	0.0074	41.506
HFUEA118B	A	M1	1	1	42.451	0.143	20	AGM	0.0072	41.050
HFUEA216B	A	M2	1	2	40.995	0.146	20	AGM / LGM	0.0073	40.404
HFUEA217B	A	M2	1	2	40.737	0.146	20	AGM	0.0073	40.172
HFUEA218B	A	M2	1	2	40.780	0.144	20	AGM / LGM	0.0072	39.751
HFUEA219B	A	M2	1	2	41.796	0.142	20	AGM / LGM	0.0071	40.177
HFUEB116B	B	M1	2	1	40.416	0.144	20	AGM	0.0072	39.387
HFUEB117B	B	M1	2	1	40.738	0.145	20	MGM	0.0073	40.045
HFUEB118B	B	M1	2	1	41.192	0.137	20	LGM	0.0068	38.029
HFUEB216B	B	M2	2	2	42.211	0.145	20	LGM	0.0073	41.379
HFUEB217B	B	M2	2	2	41.096	0.143	20	LGM	0.0072	39.833
HFUEB218B	B	M2	2	2	42.210	0.141	20	AGM	0.0071	40.337
HFUEC116B	C	M1	3	1	40.721	0.144	20	AGM / LGM	0.0072	39.707
HFUEC117B	C	M1	3	1	41.363	0.145	20	AGM	0.0073	40.627
HFUEC118B	C	M1	3	1	42.395	0.139	20	AGM	0.0069	39.764
HFUEC216B	C	M2	3	2	40.598	0.146	20	AGM	0.0073	40.031
HFUEC217B	C	M2	3	2	40.295	0.147	20	MGM	0.0073	39.901
HFUEC218B	C	M2	3	2	40.750	0.141	20	AGM / MGM	0.0071	38.868

Average	**41.205**	
Standard Dev.	**0.689**	
Coeff. of Var. [%]	**1.673**	
Min.	**40.295**	
Max.	**42.451**	
Number of Spec.	**19**	

$Average_{norm}$	**0.0072**	**40.058**
$Standard\ Dev._{norm}$		**0.808**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.016**
Min.	**0.0068**	**38.029**
Max.	**0.0074**	**41.506**
Number of Spec.		**19**


Laminate Open Hole Tension Properties (OHT2) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
5
10
15
20
25
30
35
40
45
0
1
2
3
4

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

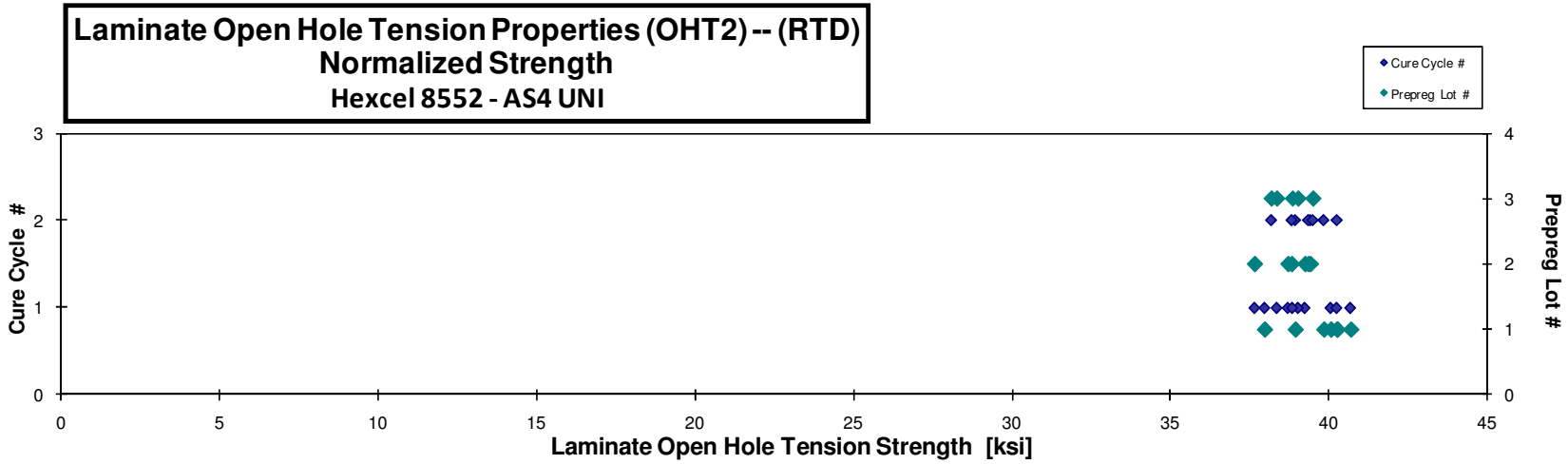
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUEA111A	A	M1	1	1	39.885	0.141	20	MGM	0.0070	37.958
HFUEA112A	A	M1	1	1	39.850	0.149	20	LGM	0.0074	40.061
HFUEA113A	A	M1	1	1	40.968	0.147	20	LGM	0.0074	40.692
HFUEA114A	A	M1	1	1	40.689	0.146	20	LGM	0.0073	40.254
HFUEA211A	A	M2	1	2	40.256	0.143	20	LGM	0.0072	38.933
HFUEA212A	A	M2	1	2	40.396	0.146	20	LGM	0.0073	39.841
HFUEA213A	A	M2	1	2	41.003	0.145	20	LGM	0.0073	40.260
HFUEB111A	B	M1	2	1	39.987	0.139	20	LGM	0.0070	37.641
HFUEB112A	B	M1	2	1	39.199	0.146	20	LGM	0.0073	38.700
HFUEB113A	B	M1	2	1	40.295	0.144	20	LGM	0.0072	39.242
HFUEB211A	B	M2	2	2	40.310	0.143	20	LGM	0.0071	38.821
HFUEB212A	B	M2	2	2	40.061	0.146	20	LGM	0.0073	39.412
HFUEB213A	B	M2	2	2	40.182	0.145	20	LGM	0.0072	39.350
HFUEC111A	C	M1	3	1	40.838	0.139	20	LGM	0.0069	38.345
HFUEC112A	C	M1	3	1	40.066	0.144	20	LGM	0.0072	39.024
HFUEC113A	C	M1	3	1	39.821	0.144	20	LGM	0.0072	38.843
HFUEC211A*	C	M2	3	2						
HFUEC212A	C	M2	3	2	39.973	0.146	20	LGM	0.0073	39.495
HFUEC213A	C	M2	3	2	38.570	0.146	20	LGM	0.0073	38.171

*Specimen has uneven grip marks due to thickness taper

	Strength	$Strength_{norm}$	Avg. t_{ply} [in]
Average	40.131	39.169	0.00722
Standard Dev.	0.595	0.845	
Coeff. of Var. [%]	1.482	2.157	
Min.	38.570	37.641	0.0069
Max.	41.003	40.692	0.0074
Number of Spec.	18	18	


Laminate Open Hole Tension Properties (OHT2) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
1
2
3
4
5
10
15
20
25
30
35
40
45

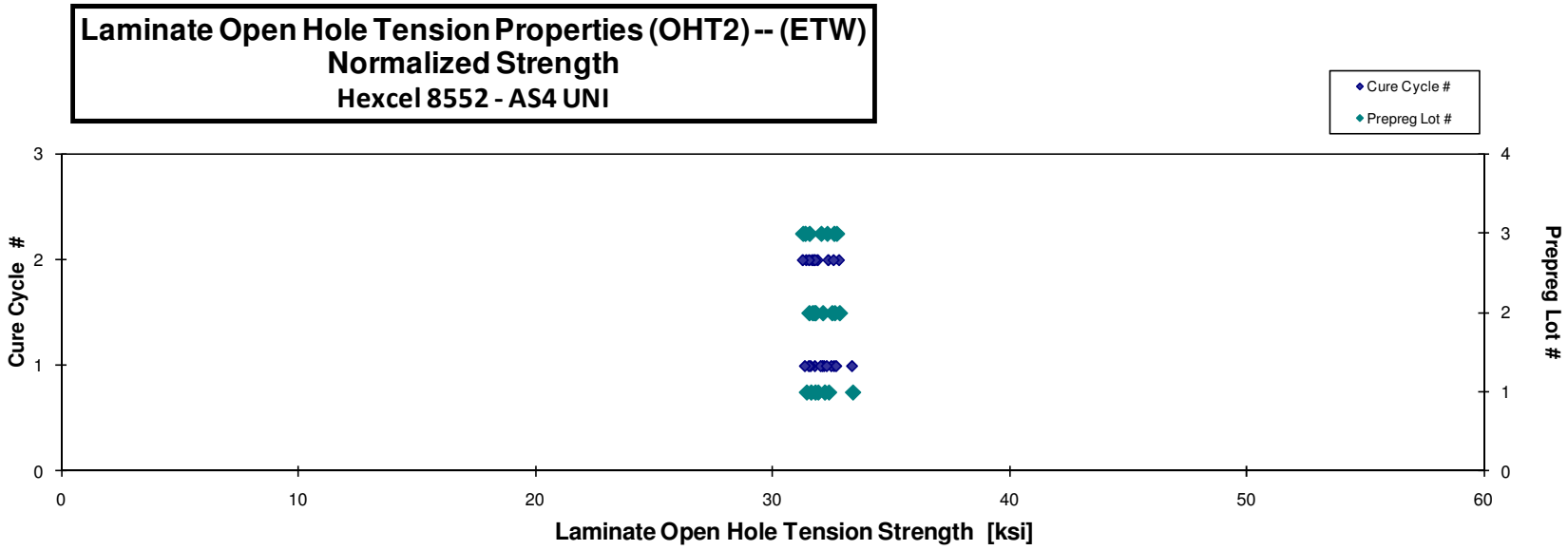
Laminate Open Hole Tension Properties (OHT2) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUEA11AD	A	M1	1	1	32.202	0.146	20	DGM	0.0073	31.814
HFUEA11BD	A	M1	1	1	32.659	0.146	20	DGM	0.0073	32.203
HFUEA11CD	A	M1	1	1	33.608	0.147	20	DGM	0.0074	33.384
HFUEA11DD	A	M1	1	1	31.947	0.147	20	DGM	0.0073	31.630
HFUEA21AD	A	M2	1	2	31.554	0.148	20	DGM	0.0074	31.447
HFUEA21BD	A	M2	1	2	32.627	0.147	20	DGM	0.0073	32.377
HFUEA21CD	A	M2	1	2	32.301	0.146	20	DGM	0.0073	31.933
HFUEB11AD	B	M1	2	1	33.063	0.146	20	DGM	0.0073	32.623
HFUEB11BD	B	M1	2	1	32.193	0.145	20	MGM	0.0073	31.558
HFUEB11CD	B	M1	2	1	32.777	0.145	20	DGM	0.0073	32.127
HFUEB11DD	B	M1	2	1	33.139	0.145	20	DGM	0.0073	32.509
HFUEB21AD	B	M2	2	2	31.983	0.147	20	AGM	0.0073	31.698
HFUEB21BD	B	M2	2	2	32.271	0.146	20	DGM	0.0073	31.773
HFUEB21CD	B	M2	2	2	32.045	0.147	20	DGM	0.0073	31.821
HFUEB21DD	B	M2	2	2	33.383	0.146	20	MGM	0.0073	32.834
HFUEC11AD	C	M1	3	1	32.025	0.145	20	DGM	0.0073	31.390
HFUEC11BD	C	M1	3	1	33.479	0.145	20	DGM	0.0072	32.710
HFUEC11CD	C	M1	3	1	32.814	0.145	20	DGM	0.0072	32.060
HFUEC11DD	C	M1	3	1	33.076	0.145	20	DGM	0.0072	32.312
HFUEC21AD	C	M2	3	2	32.130	0.145	20	DGM	0.0073	31.569
HFUEC21BD	C	M2	3	2	31.776	0.146	20	DGM	0.0073	31.296
HFUEC21CD	C	M2	3	2	33.006	0.146	20	DGM	0.0073	32.604

Average	**32.548**	
Standard Dev.	**0.589**	
Coeff. of Var. [%]	**1.809**	
Min.	**31.554**	
Max.	**33.608**	
Number of Spec.	**22**	

$Average_{norm}$	**0.00729**	**32.076**
$Standard\ Dev._{norm}$		**0.544**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**1.695**
Min.	**0.0072**	**31.296**
Max.	**0.0074**	**33.384**
Number of Spec.		**22**


Laminate Open Hole Tension Properties (OHT2) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
0
1
2
3
4

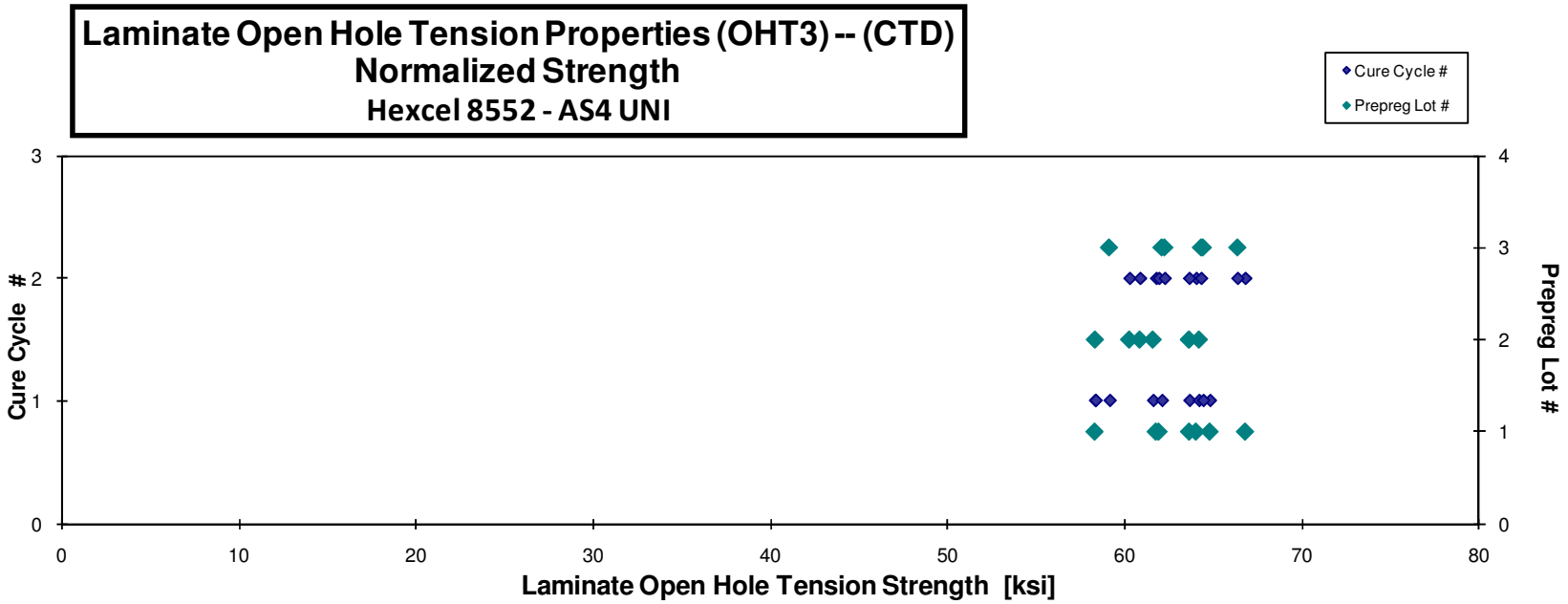
4.18 Open Hole Tension 3 Properties

Laminate Open Hole Tension Properties (OHT3) -- (CTD)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUFA116B	A	M1	1	1	65.519	0.146	20	LGM	0.0073	64.789
HFUFA117B	A	M1	1	1	63.935	0.147	20	LGM	0.0074	63.640
HFUFA118B	A	M1	1	1	60.032	0.144	20	LGM	0.0072	58.329
HFUFA216B	A	M2	1	2	62.679	0.146	20	LGM	0.0073	61.768
HFUFA217B	A	M2	1	2	64.160	0.148	20	LGM	0.0074	64.016
HFUFA218B	A	M2	1	2	66.253	0.138	20	LGM	0.0069	61.925
HFUFA219B	A	M2	1	2	67.012	0.147	20	LGM	0.0074	66.778
HFUFB116B	B	M1	2	1	65.537	0.145	20	LGM	0.0072	64.179
HFUFB117B	B	M1	2	1	62.645	0.146	20	LGM	0.0073	61.601
HFUFB118B	B	M1	2	1	60.538	0.143	20	LGM	0.0071	58.357
HFUFB216B	B	M2	2	2	65.070	0.145	20	LGM	0.0072	63.626
HFUFB217B	B	M2	2	2	60.915	0.146	20	LGM	0.0073	60.270
HFUFB218B	B	M2	2	2	62.913	0.143	20	LGM	0.0072	60.858
HFUFC116B	C	M1	3	1	65.721	0.145	20	LGM	0.0073	64.411
HFUFC117B	C	M1	3	1	59.599	0.147	20	LGM	0.0073	59.149
HFUFC118B	C	M1	3	1	67.124	0.137	20	LGM	0.0068	62.089
HFUFC216B	C	M2	3	2	67.206	0.146	20	LGM	0.0073	66.343
HFUFC217B	C	M2	3	2	62.414	0.148	20	LGM	0.0074	62.245
HFUFC218B	C	M2	3	2	65.817	0.145	20	LGM	0.0072	64.297

Average	**63.952**		**Average**	**0.0072**	**62.562**
Standard Dev.	**2.474**				**2.451**
Coeff. of Var. [%]	**3.868**				**3.919**
Min.	**59.599**		**Min.**	**0.0068**	**58.329**
Max.	**67.206**		**Max.**	**0.0074**	**66.778**
Number of Spec.	**19**				**19**

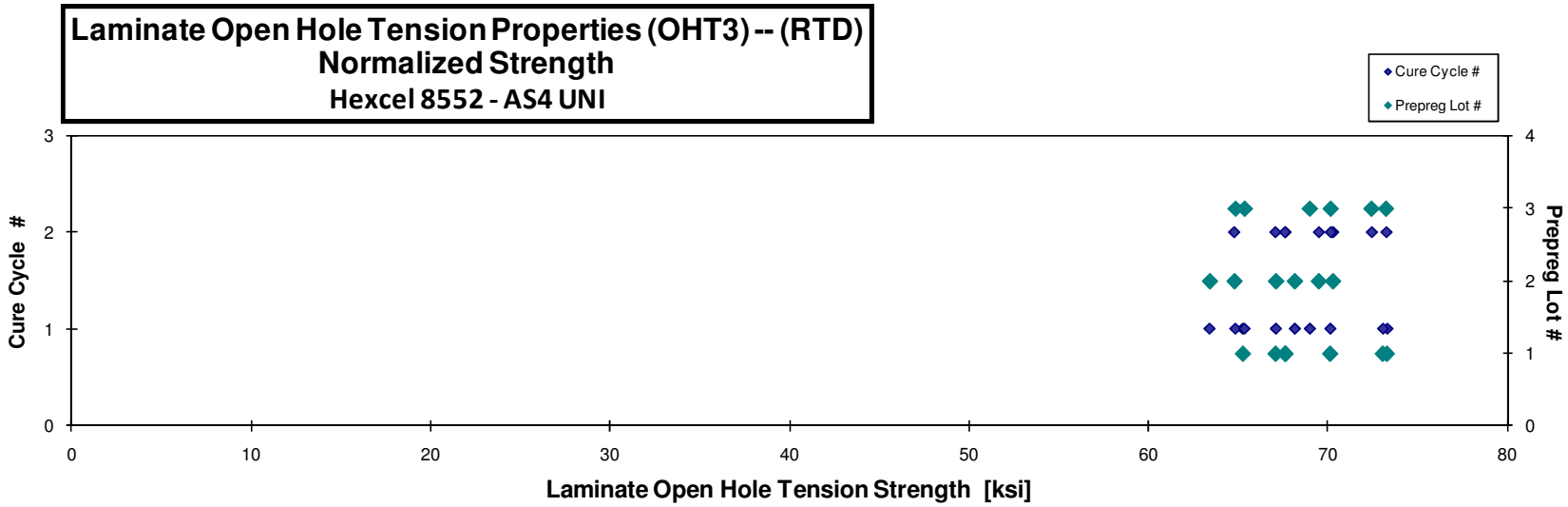

Laminate Open Hole Tension Properties (OHT3) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
0
1
2
3
4

Laminate Open Hole Tension Properties (OHT3) -- (RTD)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUFA111A	A	M1	1	1	70.449	0.137	20	LGM	0.0069	65.260
HFUFA112A	A	M1	1	1	69.715	0.149	20	LGM	0.0074	70.139
HFUFA113A	A	M1	1	1	74.488	0.146	20	LGM	0.0073	73.313
HFUFA114A	A	M1	1	1	73.892	0.146	20	LGM	0.0073	73.076
HFUFA211A	A	M2	1	2	72.311	0.138	20	LGM	0.0069	67.645
HFUFA212A	A	M2	1	2	68.158	0.147	20	LGM	0.0073	67.613
HFUFA213A	A	M2	1	2	68.402	0.145	20	LGM	0.0073	67.085
HFUFB111A	B	M1	2	1	67.075	0.140	20	LGM	0.0070	63.420
HFUFB112A	B	M1	2	1	68.863	0.147	20	LGM	0.0073	68.165
HFUFB113A	B	M1	2	1	68.163	0.146	20	LGM	0.0073	67.112
HFUFB211A	B	M2	2	2	68.024	0.141	20	LGM	0.0070	64.791
HFUFB212A	B	M2	2	2	71.122	0.146	20	LGM	0.0073	70.298
HFUFB213A	B	M2	2	2	71.190	0.145	20	LGM	0.0072	69.507
HFUFC112A	C	M1	3	1	69.426	0.147	20	LGM	0.0074	69.004
HFUFC113A	C	M1	3	1	66.036	0.145	20	LGM	0.0073	64.854
HFUFC114A	C	M1	3	1	66.636	0.145	20	LGM	0.0073	65.361
HFUFC211A	C	M2	3	2	76.527	0.140	20	LGM	0.0070	72.451
HFUFC212A	C	M2	3	2	73.428	0.148	20	LGM	0.0074	73.263
HFUFC213A	C	M2	3	2	71.334	0.146	20	LGM	0.0073	70.169

Average	**70.276**	**0.144**		**Average**	$Average_{norm}$	**0.00722**	**68.554**
Standard Dev.	**2.874**	**0.003**			$Standard\ Dev._{norm}$		**3.083**
Coeff. of Var. [%]	**4.090**	**2.317**			$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.497**
Min.	**66.036**	**0.137**		**Min.**	**Min.**	**0.0069**	**63.420**
Max.	**76.527**	**0.149**		**Max.**	**Max.**	**0.0074**	**73.313**
Number of Spec.	**19**	**19**			**Number of Spec.**		**19**

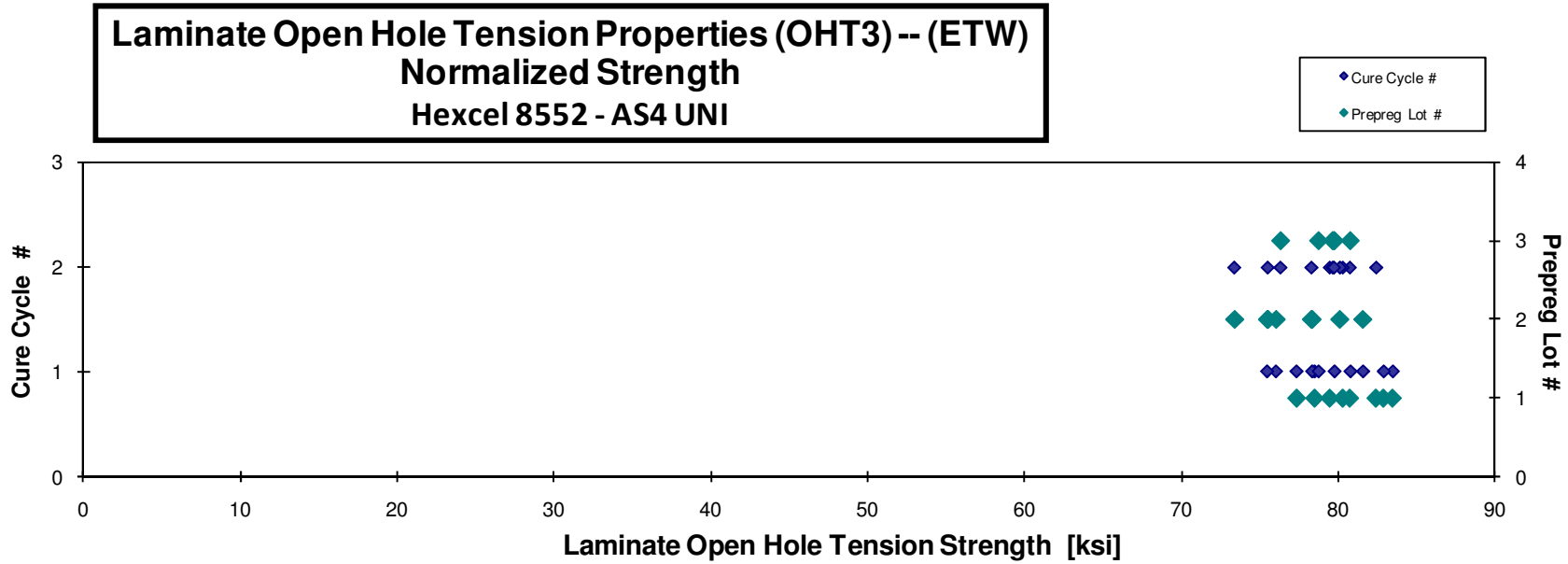

Laminate Open Hole Tension Properties (OHT3) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
0
1
2
3
4

Laminate Open Hole Tension Properties (OHT3) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUFA11AD	A	M1	1	1	83.520	0.148	20	LGM	0.0074	83.510
HFUFA11BD	A	M1	1	1	84.432	0.145	20	LGM	0.0073	82.929
HFUFA11CD	A	M1	1	1	78.680	0.146	20	LGM	0.0073	77.377
HFUFA11DD	A	M1	1	1	79.467	0.146	20	LGM	0.0073	78.528
HFUFA21AD	A	M2	1	2	82.293	0.145	20	LGM	0.0073	80.773
HFUFA21BD	A	M2	1	2	81.912	0.145	20	LGM	0.0073	80.325
HFUFA21CD	A	M2	1	2	80.646	0.146	20	LGM	0.0073	79.492
HFUFA21DD	A	M2	1	2	83.869	0.146	20	LGM	0.0073	82.453
HFUFB11AD	B	M1	2	1	82.507	0.146	20	LGM	0.0073	81.615
HFUFB11BD	B	M1	2	1	77.443	0.145	20	LGM	0.0073	76.074
HFUFB11CD	B	M1	2	1	76.971	0.145	20	LGM	0.0073	75.506
HFUFB11DD	B	M1	2	1	79.914	0.145	20	LGM	0.0073	78.376
HFUFB21AD	B	M2	2	2	80.535	0.147	20	LGM	0.0074	80.145
HFUFB21BD	B	M2	2	2	80.013	0.145	20	LGM	0.0072	78.328
HFUFB21CD	B	M2	2	2	77.260	0.145	20	LGM	0.0072	75.546
HFUFB21DD	B	M2	2	2	75.003	0.145	20	LGM	0.0072	73.415
HFUFC11AD	C	M1	3	1	80.246	0.145	20	LGM	0.0073	78.791
HFUFC11BD	C	M1	3	1	81.217	0.145	20	LGM	0.0073	79.799
HFUFC11CD	C	M1	3	1	82.793	0.144	20	LGM	0.0072	80.817
HFUFC21AD	C	M2	3	2	81.198	0.145	20	LGM	0.0073	79.681
HFUFC21BD	C	M2	3	2	77.685	0.145	20	LGM	0.0073	76.355
HFUFC21CD	C	M2	3	2	80.785	0.146	20	LGM	0.0073	79.766

Average	80.381	Average	$Average_{norm}$	0.00728	79.073
Standard Dev.	2.456		$Standard\ Dev._{norm}$		2.587
Coeff. of Var. [%]	3.056		$Coeff.\ of\ Var.\ [\%]_{norm}$		3.271
Min.	75.003	Min.	Min.	0.0072	73.415
Max.	84.432	Max.	Max.	0.0074	83.510
Number of Spec.	22		Number of Spec.		22


Laminate Open Hole Tension Properties (OHT3) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4

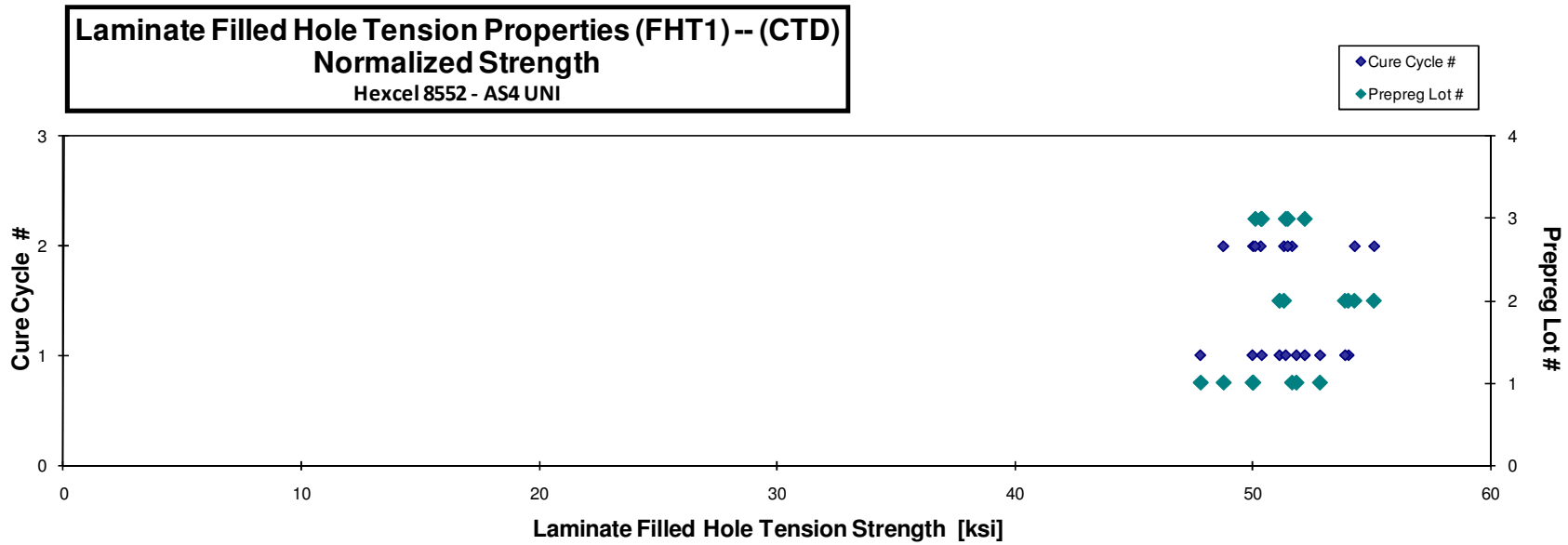
4.19 Filled-Hole Tension 1 Properties

Laminate Filled Hole Tension Properties (FHT1) -- (CTD) Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	HEXCEL Batch #	HEXCEL Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU4A115B	A	M1	1	1	53.369	0.117	16	LGM	0.0073	52.851
HFU4A116B	A	M1	1	1	52.299	0.117	16	LGM	0.0073	51.857
HFU4A117B	A	M1	1	1	50.268	0.118	16	LGM	0.0074	50.013
HFU4A119B	A	M1	1	1	50.748	0.112	16	LGM	0.0070	47.826
HFU4A215B	A	M2	1	2	50.691	0.117	16	LGM	0.0073	50.042
HFU4A216B	A	M2	1	2	49.503	0.117	16	LGM	0.0073	48.792
HFU4A217B	A	M2	1	2	52.207	0.117	16	LGM	0.0073	51.678
HFU4B117B	B	M1	2	1	54.544	0.117	16	LGM	0.0073	54.045
HFU4B118B	B	M1	2	1	56.617	0.113	16	LGM	0.0070	53.900
HFU4B119B	B	M1	2	1	54.104	0.112	16	LGM	0.0070	51.149
HFU4B217B	B	M2	2	2	55.462	0.118	16	LGM	0.0074	55.119
HFU4B218B	B	M2	2	2	56.553	0.114	16	LGM	0.0071	54.300
HFU4B219B	B	M2	2	2	54.660	0.111	16	LGM	0.0070	51.336
HFU4C115B	C	M1	3	1	52.835	0.117	16	LGM	0.0073	52.210
HFU4C116B	C	M1	3	1	51.723	0.115	16	LGM/MGM	0.0072	50.405
HFU4C117B	C	M1	3	1	52.421	0.116	16	LGM	0.0073	51.410
HFU4C215B	C	M2	3	2	51.140	0.117	16	LGM	0.0073	50.363
HFU4C216B	C	M2	3	2	50.996	0.116	16	LGM	0.0073	50.127
HFU4C217B	C	M2	3	2	52.027	0.117	16	LGM/MGM	0.0073	51.493

Average	**52.746**		**Average**	**$Average_{norm}$**	**0.0072**	**51.522**
Standard Dev.	**2.091**			**$Standard\ Dev._{norm}$**		**1.905**
Coeff. of Var. [%]	**3.964**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.698**
Min.	**49.503**		**Min.**	**Min.**	**0.0070**	**47.826**
Max.	**56.617**		**Max.**	**Max.**	**0.0074**	**55.119**
Number of Spec.	**19**			**Number of Spec.**		**19**


Laminate Filled Hole Tension Properties (FHT1) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
4

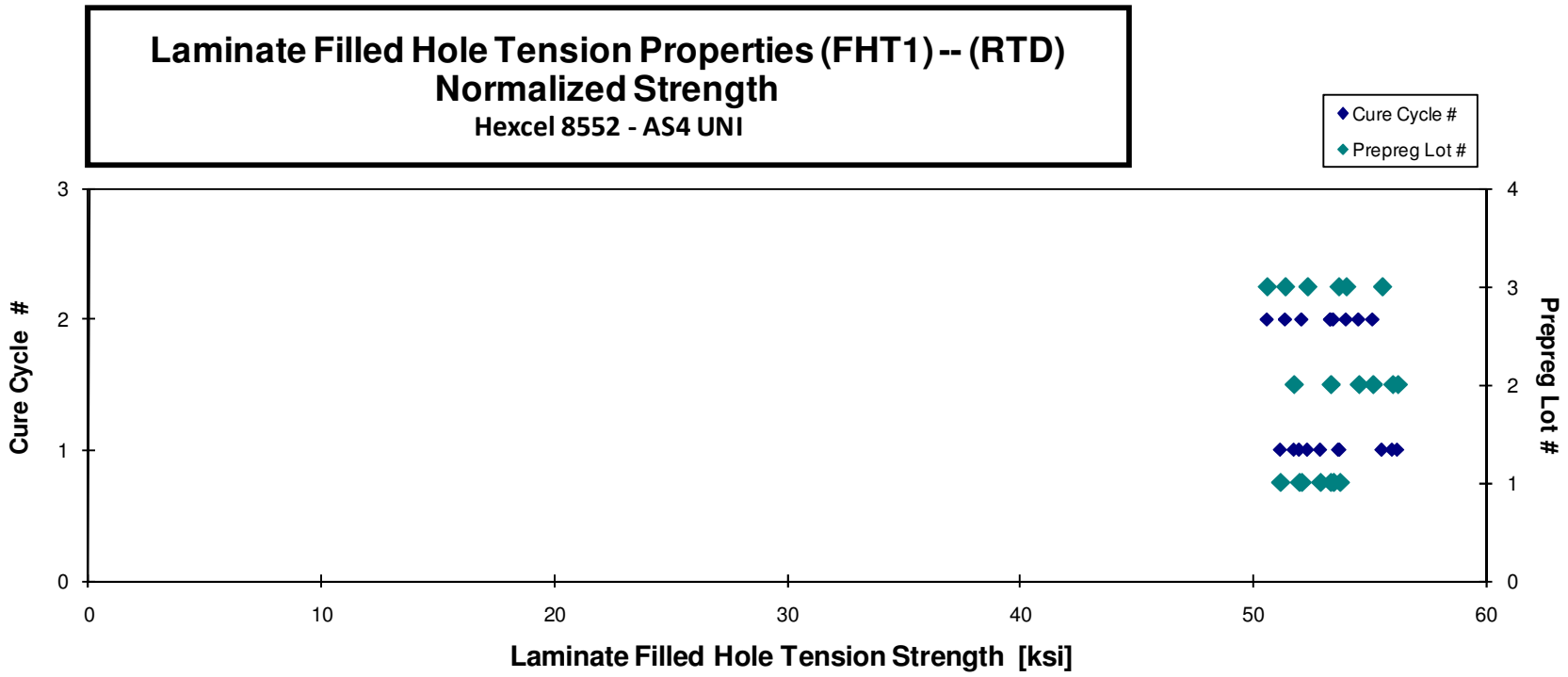
Laminate Filled Hole Tension Properties (FHT1) -- (RTD) Strength

Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	HEXCEL Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU4A111A	A	M1	1	1	54.582	0.113	16	LGM	0.0071	52.008
HFU4A112A	A	M1	1	1	53.019	0.118	16	LGM	0.0074	52.914
HFU4A113A	A	M1	1	1	54.270	0.117	16	LGM	0.0073	53.751
HFU4A114A	A	M1	1	1	51.727	0.117	16	LGM	0.0073	51.195
HFU4A211A	A	M2	1	2	53.987	0.114	16	LGM	0.0071	52.110
HFU4A212A	A	M2	1	2	53.769	0.118	16	LGM	0.0074	53.474
HFU4A213A	A	M2	1	2	54.031	0.117	16	LGM	0.0073	53.347
HFU4B111A	B	M1	2	1	55.580	0.110	16	LGM	0.0069	51.777
HFU4B112A	B	M1	2	1	57.044	0.117	16	LGM	0.0073	56.233
HFU4B113A	B	M1	2	1	57.498	0.115	16	LGM	0.0072	56.008
HFU4B211A	B	M2	2	2	55.669	0.113	16	LGM	0.0071	53.357
HFU4B212A	B	M2	2	2	55.050	0.119	16	LGM	0.0074	55.166
HFU4B213A	B	M2	2	2	55.494	0.116	16	LGM	0.0073	54.564
HFU4C111A	C	M1	3	1	55.525	0.112	16	LGM	0.0070	52.360
HFU4C112A	C	M1	3	1	54.469	0.117	16	LGM	0.0073	53.694
HFU4C113A	C	M1	3	1	56.745	0.116	16	LGM	0.0072	55.563
HFU4C211A	C	M2	3	2	53.149	0.115	16	LGM	0.0072	51.406
HFU4C212A	C	M2	3	2	51.223	0.117	16	LGM	0.0073	50.624
HFU4C213A	C	M2	3	2	54.961	0.116	16	LGM	0.0073	54.025

Average	**54.621**		**Average**	**0.0072**	**53.346**
Standard Dev.	**1.647**				**1.644**
Coeff. of Var. [%]	**3.016**				**3.081**
Min.	**51.223**		**Min.**	**0.0069**	**50.624**
Max.	**57.498**		**Max.**	**0.0074**	**56.233**
Number of Spec.	**19**				**19**

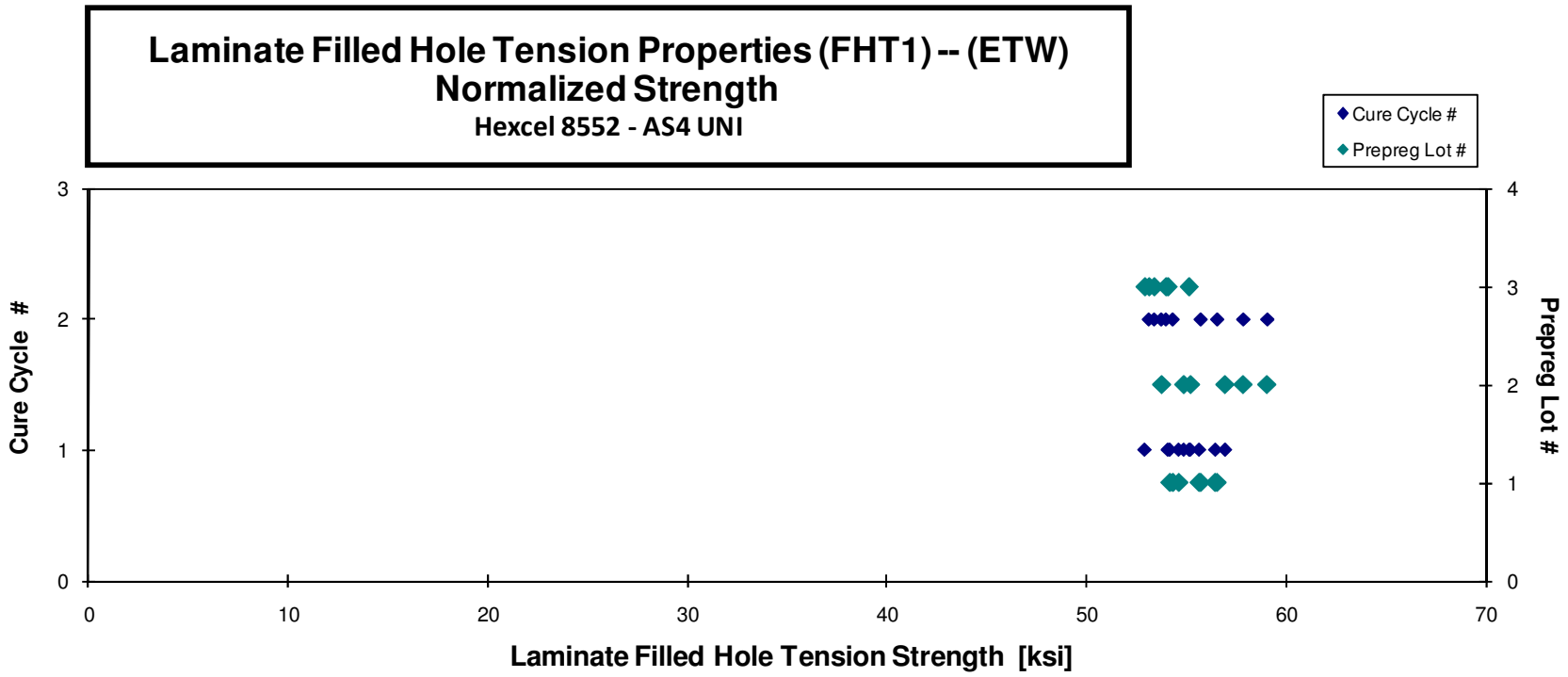

Laminate Filled Hole Tension Properties (FHT1) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
4

Laminate Filled Hole Tension Properties (FHT1) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	HEXCEL Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU4A11AD	A	M1	1	1	53.833	0.119	16	MGM	0.0074	54.159
HFU4A11BD	A	M1	1	1	55.988	0.118	16	MGM	0.0074	55.625
HFU4A11CD	A	M1	1	1	54.960	0.118	16	MGM	0.0074	54.604
HFU4A11ED	A	M1	1	1	56.925	0.117	16	MGM	0.0073	56.428
HFU4A21AD	A	M2	1	2	55.592	0.119	16	MGM	0.0074	55.702
HFU4A21BD	A	M2	1	2	54.938	0.117	16	MGM	0.0073	54.312
HFU4A21ED	A	M2	1	2	57.128	0.117	16	MGM	0.0073	56.525
HFU4B11AD	B	M1	2	1	55.724	0.117	16	MGM	0.0073	55.190
HFU4B11BD	B	M1	2	1	58.262	0.116	16	MGM	0.0072	56.917
HFU4B11CD	B	M1	2	1	55.620	0.117	16	MGM	0.0073	54.852
HFU4B21AD	B	M2	2	2	57.923	0.118	16	MGM	0.0074	57.825
HFU4B21BD	B	M2	2	2	60.376	0.116	16	MGM	0.0072	59.017
HFU4B21CD	B	M2	2	2	54.864	0.116	16	MGM	0.0072	53.744
HFU4C11AD	C	M1	3	1	54.668	0.117	16	MGM	0.0073	54.068
HFU4C11CD	C	M1	3	1	55.670	0.117	16	MGM	0.0073	55.129
HFU4C11DD	C	M1	3	1	53.854	0.116	16	MGM	0.0073	52.914
HFU4C21AD	C	M2	3	2	54.256	0.118	16	MGM	0.0074	53.974
HFU4C21BD	C	M2	3	2	54.101	0.117	16	MGM	0.0073	53.385
HFU4C21CD	C	M2	3	2	54.107	0.116	16	MGM	0.0073	53.125

Average	**55.726**	**Average**	**$Average_{norm}$**	**0.0073**	**55.131**
Standard Dev.	**1.732**		**$Standard\ Dev._{norm}$**		**1.635**
Coeff. of Var. [%]	**3.107**		**Coeff. of Var. $[\%]_{norm}$**		**2.965**
Min.	**53.833**	**Min.**	**Min.**	**0.0072**	**52.914**
Max.	**60.376**	**Max.**	**Max.**	**0.0074**	**59.017**
Number of Spec.	**19**		**Number of Spec.**		**19**


Laminate Filled Hole Tension Properties (FHT1) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
0
1
2
3
4

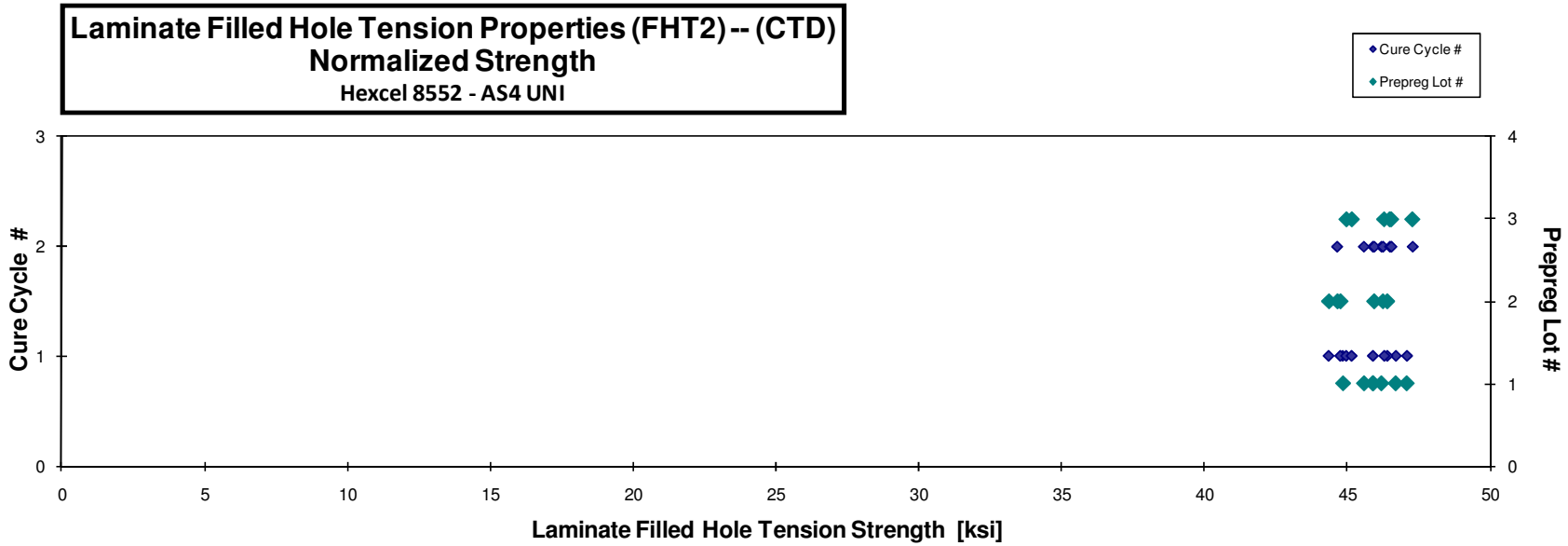
4.20 Filled-Hole Tension 2 Properties

Laminate Filled Hole Tension Properties (FHT2) -- (CTD)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	HEXCEL Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU5A115B	A	M1	1	1	47.488	0.147	20	LGM	0.0073	47.081
HFU5A116B	A	M1	1	1	46.524	0.146	20	AGM/LGM	0.0073	45.895
HFU5A117B	A	M1	1	1	46.961	0.147	20	MGM	0.0074	46.696
HFU5A118B	A	M1	1	1	46.848	0.142	20	MGM	0.0071	44.848
HFU5A215B	A	M2	1	2	45.913	0.149	20	LGM	0.0074	46.192
HFU5A216B	A	M2	1	2	46.151	0.147	20	LGM	0.0074	45.896
HFU5A219B	A	M2	1	2	46.778	0.144	20	LGM	0.0072	45.582
HFU5B115B	B	M1	2	1	45.439	0.144	20	LGM	0.0072	44.354
HFU5B116B	B	M1	2	1	45.845	0.145	20	LGM	0.0072	44.761
HFU5B119B	B	M1	2	1	46.782	0.147	20	LGM	0.0073	46.398
HFU5B215B	B	M2	2	2	47.258	0.144	20	LGM	0.0072	45.943
HFU5B216B	B	M2	2	2	46.107	0.143	20	LGM	0.0072	44.653
HFU5B217B	B	M2	2	2	47.239	0.145	20	LGM	0.0072	46.250
HFU5C115B	C	M1	3	1	47.166	0.145	20	LGM	0.0073	46.290
HFU5C116B	C	M1	3	1	45.939	0.145	20	LGM	0.0072	44.967
HFU5C119B	C	M1	3	1	47.046	0.142	20	LGM	0.0071	45.155
HFU5C215B	C	M2	3	2	47.076	0.146	20	LGM	0.0073	46.487
HFU5C216B	C	M2	3	2	47.960	0.146	20	LGM	0.0073	47.280
HFU5C217B	C	M2	3	2	47.192	0.146	20	LGM	0.0073	46.538

Average	**46.722**		**Average**	**0.0073**	**45.856**
Standard Dev.	**0.659**				**0.854**
Coeff. of Var. [%]	**1.411**				**1.863**
Min.	**45.439**		**Min.**	**0.0071**	**44.354**
Max.	**47.960**		**Max.**	**0.0074**	**47.280**
Number of Spec.	**19**		**Number of Spec.**		**19**


Laminate Filled Hole Tension Properties (FHT2) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
5
10
15
20
25
30
35
40
45
50
0
1
2
3
4

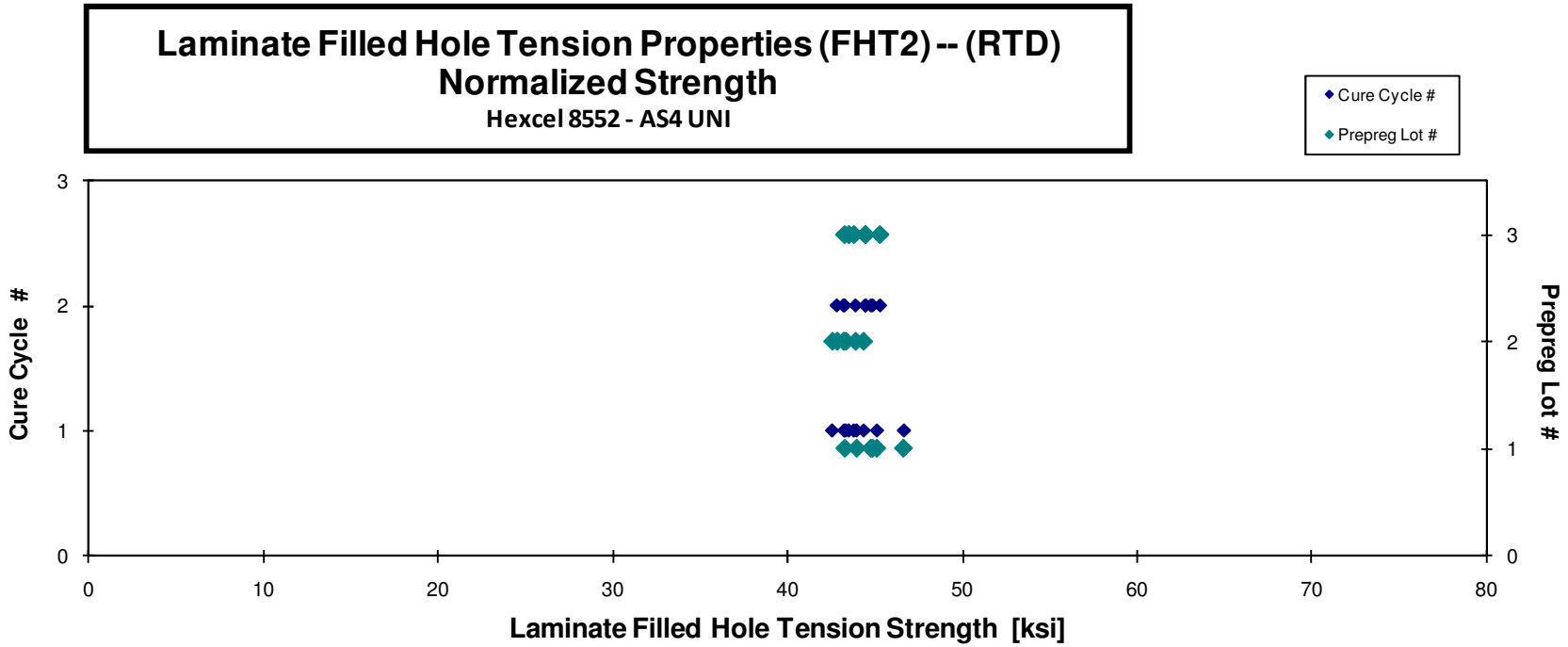
Laminate Filled Hole Tension Properties (FHT2) -- (RTD) Strength

Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	HEXCEL Batch #	HEXCEL Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU5A112A	A	M1	1	1	43.920	0.148	20	AGM	0.0074	43.950
HFU5A113A	A	M1	1	1	45.448	0.147	20	AGM	0.0073	45.100
HFU5A114A	A	M1	1	1	46.696	0.148	20	AGM	0.0074	46.622
HFU5A212A	A	M2	1	2	43.408	0.148	20	AGM	0.0074	43.276
HFU5A213A	A	M2	1	2	45.193	0.147	20	AGM	0.0073	44.857
HFU5A214A	A	M2	1	2	44.703	0.148	20	AGM	0.0074	44.763
HFU5B111A	B	M1	2	1	43.426	0.145	20	AGM	0.0073	42.575
HFU5B112A	B	M1	2	1	44.275	0.145	20	AGM	0.0072	43.337
HFU5B113A	B	M1	2	1	45.598	0.144	20	AGM	0.0072	44.345
HFU5B212A	B	M2	2	2	44.617	0.146	20	AGM	0.0073	43.894
HFU5B213A	B	M2	2	2	44.536	0.144	20	AGM	0.0072	43.217
HFU5B214A	B	M2	2	2	44.127	0.144	20	AGM	0.0072	42.835
HFU5C112A	C	M1	3	1	43.967	0.146	20	AGM	0.0073	43.507
HFU5C113A	C	M1	3	1	44.042	0.145	20	AGM	0.0073	43.254
HFU5C114A	C	M1	3	1	44.300	0.146	20	AGM	0.0073	43.796
HFU5C212A	C	M2	3	2	44.790	0.147	20	AGM	0.0073	44.447
HFU5C213A	C	M2	3	2	45.814	0.146	20	AGM	0.0073	45.277
HFU5C214A	C	M2	3	2	44.926	0.146	20	AGM	0.0073	44.461

Average	**44.655**		**Average**	**$Average_{norm}$**	**0.0073**	**44.084**
Standard Dev.	**0.855**			**$Standard\ Dev._{norm}$**		**1.008**
Coeff. of Var. [%]	**1.915**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**2.286**
Min.	**43.408**		**Min.**	**Min.**	**0.0072**	**42.575**
Max.	**46.696**		**Max.**	**Max.**	**0.0074**	**46.622**
Number of Spec.	**18**			**Number of Spec.**		**18**

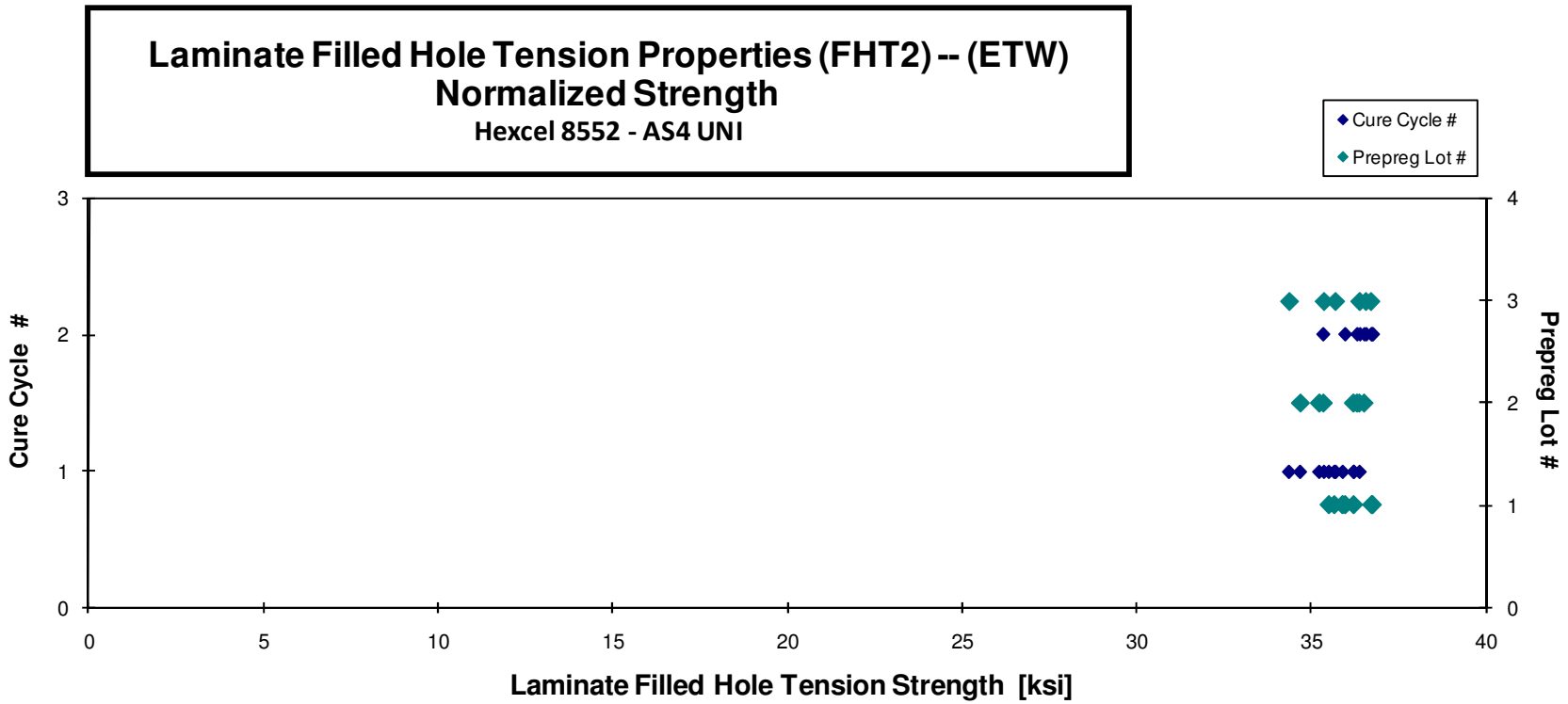

Laminate Filled Hole Tension Properties (FHT2) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
10
20
30
40
50
60
70
80
Laminate Filled Hole Tension Strength [ksi]

Laminate Filled Hole Tension Properties (FHT2) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	HEXCEL Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU5A11AD	A	M1	1	1	35.748	0.149	20	MGM/	0.0074	35.905
HFU5A11BD	A	M1	1	1	35.815	0.147	20	MGM	0.0073	35.509
HFU5A11CD	A	M1	1	1	36.612	0.146	20	MGM	0.0073	36.224
HFU5A11DD	A	M1	1	1	36.007	0.147	20	MGM	0.0073	35.666
HFU5A21AD	A	M2	1	2	36.557	0.149	20	MGM	0.0074	36.771
HFU5A21BD	A	M2	1	2	36.930	0.147	20	MGM	0.0074	36.747
HFU5A21ED	A	M2	1	2	36.159	0.147	20	MGM	0.0074	35.979
HFU5B11AD	B	M1	2	1	37.053	0.145	20	MGM	0.0072	36.219
HFU5B11BD	B	M1	2	1	36.290	0.144	20	MGM	0.0072	35.232
HFU5B11CD	B	M1	2	1	35.589	0.144	20	MGM	0.0072	34.683
HFU5B11DD	B	M1	2	1	37.271	0.145	20	MGM	0.0072	36.390
HFU5B21AD	B	M2	2	2	36.774	0.146	20	MGM	0.0073	36.323
HFU5B21BD	B	M2	2	2	37.408	0.145	20	MGM	0.0072	36.528
HFU5B21CD	B	M2	2	2	36.389	0.144	20	MGM	0.0072	35.348
HFU5C11AD	C	M1	3	1	35.632	0.147	20	MGM	0.0073	35.368
HFU5C11BD	C	M1	3	1	36.256	0.146	20	MGM	0.0073	35.701
HFU5C11CD	C	M1	3	1	34.983	0.145	20	MGM	0.0073	34.365
HFU5C21AD	C	M2	3	2	37.084	0.145	20	MGM	0.0073	36.403
HFU5C21BD	C	M2	3	2	37.432	0.145	20	MGM	0.0073	36.729
HFU5C21CD	C	M2	3	2	37.162	0.146	20	MGM	0.0073	36.584

Average	**36.458**	**Average**	**$Average_{norm}$**	**0.0073**	**35.934**
Standard Dev.	**0.689**		**Standard $Dev._{norm}$**		**0.689**
Coeff. of Var. [%]	**1.889**		**Coeff. of Var. $[\%]_{norm}$**		**1.916**
Min.	**34.983**	**Min.**	**Min.**	**0.0072**	**34.365**
Max.	**37.432**	**Max.**	**Max.**	**0.0074**	**36.771**
Number of Spec.	**20**		**Number of Spec.**		**20**


Laminate Filled Hole Tension Properties (FHT2) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40

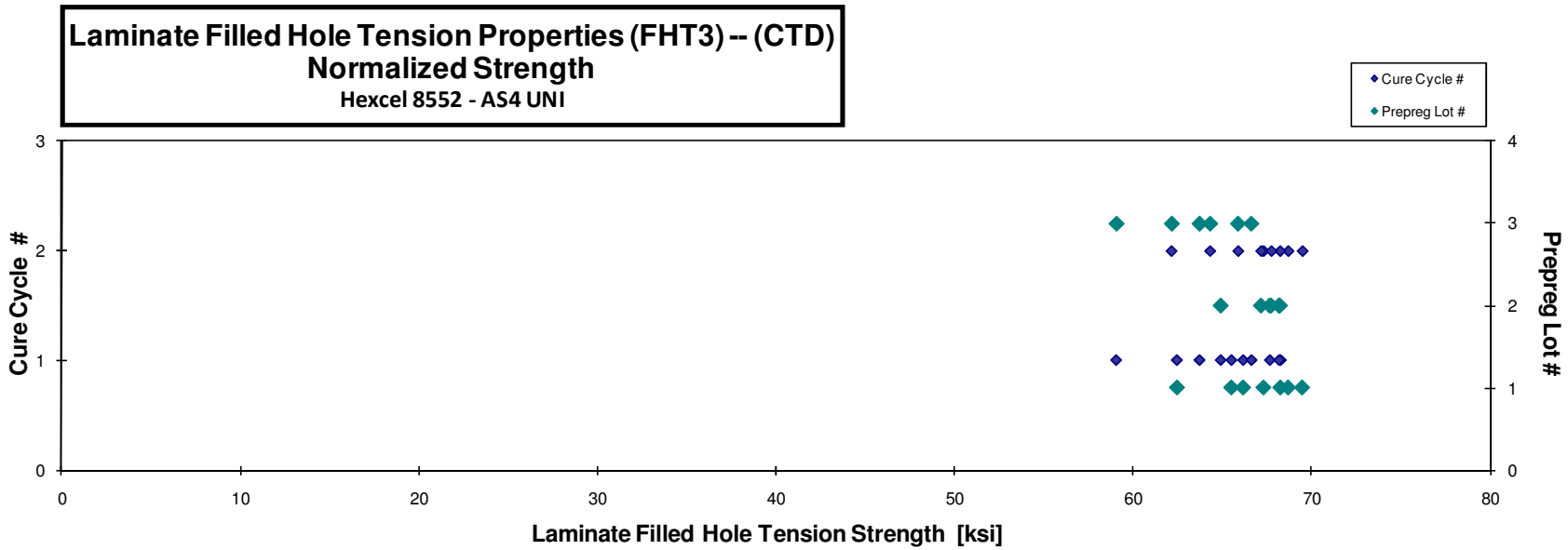
4.21 Filled-Hole Tension 3 Properties

Laminate Filled Hole Tension Properties (FHT3) -- (CTD) Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU6A116B	A	M1	1	1	66.882	0.145	20	LGM/AGM	0.0072	65.496
HFU6A117B	A	M1	1	1	66.443	0.147	20	LGM	0.0074	66.151
HFU6A118B	A	M1	1	1	70.805	0.143	20	LGM	0.0071	68.246
HFU6A119B	A	M1	1	1	64.446	0.143	20	LGM/AGM	0.0072	62.457
HFU6A217B	A	M2	1	2	67.531	0.147	20	LGM	0.0074	67.295
HFU6A218B	A	M2	1	2	71.401	0.144	20	LGM	0.0072	69.464
HFU6A219B	A	M2	1	2	70.843	0.143	20	LGM	0.0072	68.673
HFU6B115B	B	M1	2	1	69.133	0.145	20	LGM	0.0072	67.638
HFU6B116B	B	M1	2	1	66.647	0.144	20	LGM	0.0072	64.899
HFU6B117B	B	M1	2	1	68.992	0.146	20	LGM	0.0073	68.153
HFU6B215B	B	M2	2	2	69.627	0.145	20	LGM	0.0073	68.215
HFU6B217B	B	M2	2	2	68.130	0.147	20	LGM	0.0074	67.731
HFU6B218B	B	M2	2	2	72.050	0.138	20	LGM	0.0069	67.158
HFU6C117B	C	M1	3	1	66.131	0.149	20	LGM	0.0075	66.615
HFU6C118B	C	M1	3	1	62.204	0.141	20	LGM	0.0070	59.073
HFU6C119B	C	M1	3	1	66.779	0.141	20	LGM	0.0071	63.719
HFU6C215B	C	M2	3	2	67.363	0.145	20	LGM	0.0072	65.876
HFU6C216B	C	M2	3	2	65.741	0.145	20	LGM	0.0072	64.312
HFU6C218B	C	M2	3	2	66.643	0.138	20	LGM	0.0069	62.163

Average	**67.779**	**Average**	**$Average_{norm}$**	**0.0072**	**65.965**
Standard Dev.	**2.497**		**$Standard\ Dev._{norm}$**		**2.662**
Coeff. of Var. [%]	**3.684**		**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**4.036**
Min.	**62.204**	**Min.**	**Min.**	**0.0069**	**59.073**
Max.	**72.050**	**Max.**	**Max.**	**0.0075**	**69.464**
Number of Spec.	**19**		**Number of Spec.**		**19**


Laminate Filled Hole Tension Properties (FHT3) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
0
1
2
3
4

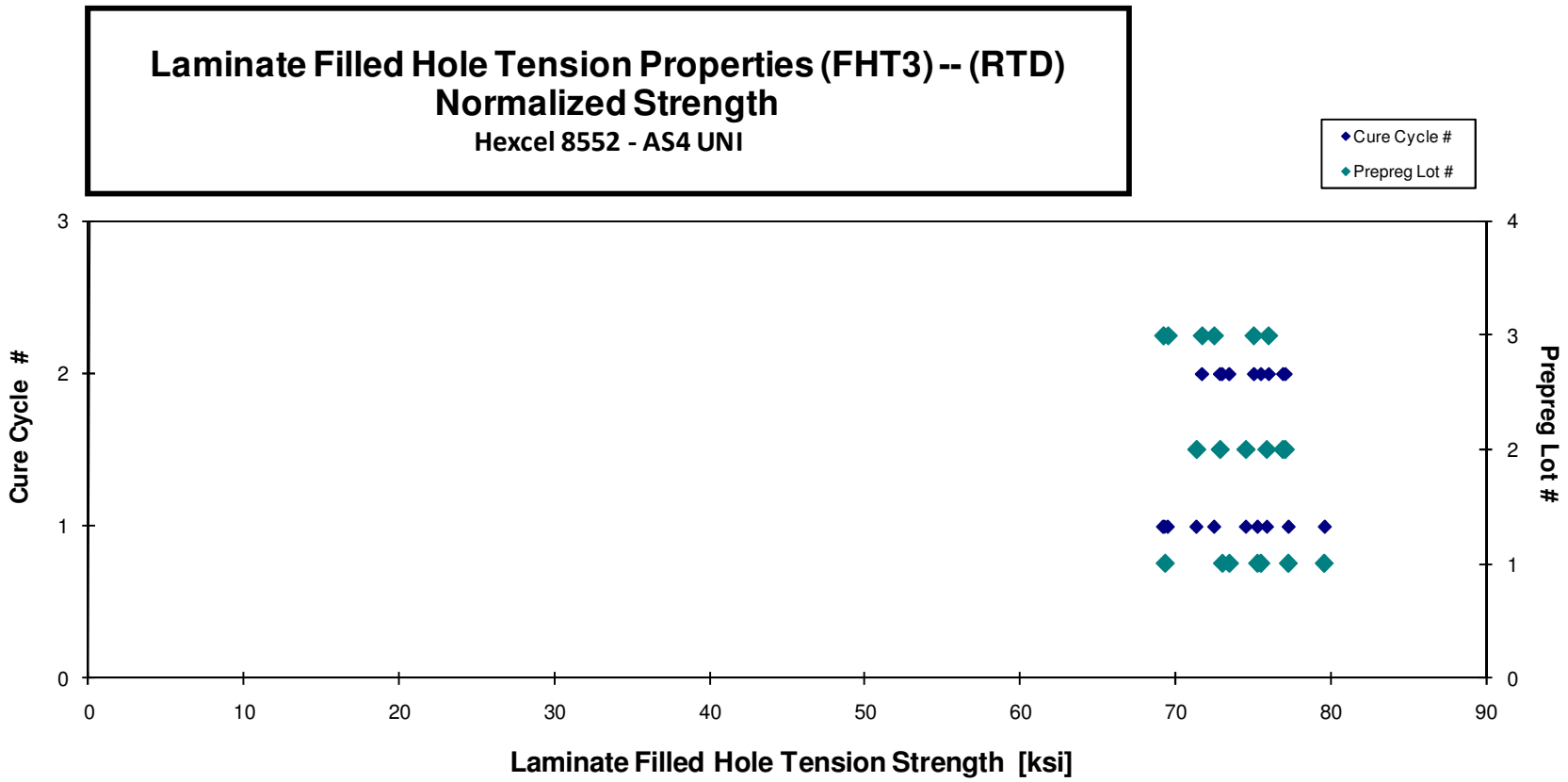
Laminate Filled Hole Tension Properties (FHT3) -- (RTD) Strength

Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU6A111A	A	M1	1	1	75.694	0.136	20	AGM	0.0068	69.318
HFU6A112A	A	M1	1	1	79.831	0.148	20	AGM	0.0074	79.633
HFU6A113A	A	M1	1	1	78.747	0.145	20	AGM	0.0073	77.301
HFU6A114A	A	M1	1	1	76.740	0.145	20	AGM	0.0073	75.305
HFU6A212A	A	M2	1	2	74.298	0.146	20	AGM	0.0073	73.478
HFU6A213A	A	M2	1	2	76.815	0.146	20	AGM	0.0073	75.526
HFU6A214A	A	M2	1	2	74.247	0.146	20	AGM	0.0073	73.026
HFU6B112A	B	M1	2	1	74.545	0.148	20	AGM	0.0074	74.554
HFU6B113A	B	M1	2	1	77.187	0.146	20	AGM	0.0073	75.910
HFU6B114A	B	M1	2	1	72.848	0.145	20	AGM	0.0072	71.363
HFU6B212A	B	M2	2	2	77.114	0.148	20	AGM	0.0074	77.105
HFU6B213A	B	M2	2	2	78.406	0.145	20	AGM	0.0073	76.949
HFU6B214A	B	M2	2	2	74.482	0.145	20	AGM	0.0072	72.888
HFU6C112A	C	M1	3	1	69.814	0.147	20	AGM	0.0074	69.516
HFU6C113A	C	M1	3	1	70.107	0.146	20	AGM	0.0073	69.207
HFU6C114A	C	M1	3	1	73.433	0.146	20	AGM	0.0073	72.507
HFU6C212A	C	M2	3	2	76.378	0.147	20	AGM	0.0074	76.025
HFU6C213A	C	M2	3	2	73.228	0.145	20	AGM	0.0072	71.719
HFU6C214A	C	M2	3	2	76.675	0.145	20	AGM	0.0072	75.068

Average	**75.294**	**Average**	**$Average_{norm}$**	**0.0073**	**74.021**
Standard Dev.	**2.694**		**$Standard\ Dev._{norm}$**		**2.944**
Coeff. of Var. [%]	**3.579**		**Coeff. of Var. $[\%]_{norm}$**		**3.978**
Min.	**69.814**	**Min.**	**Min.**	**0.0068**	**69.207**
Max.	**79.831**	**Max.**	**Max.**	**0.0074**	**79.633**
Number of Spec.	**19**		**Number of Spec.**		**19**

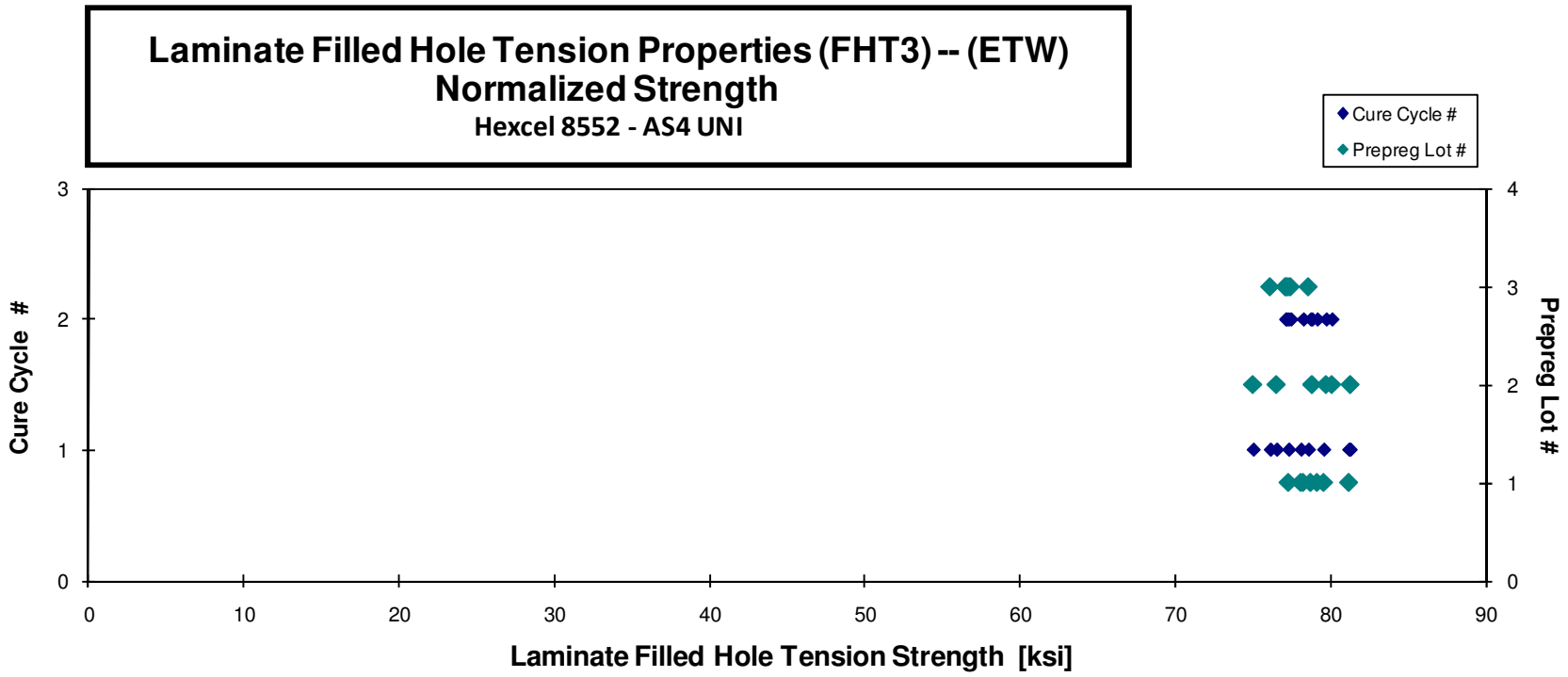

Laminate Filled Hole Tension Properties (FHT3) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
Laminate Filled Hole Tension Strength [ksi]

Laminate Filled Hole Tension Properties (FHT3) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	HEXCEL Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU6A11AD	A	M1	1	1	80.218	0.147	20	LGM	0.0073	79.586
HFU6A11BD	A	M1	1	1	82.706	0.145	20	LGM	0.0073	81.207
HFU6A11CD	A	M1	1	1	79.201	0.146	20	LGM	0.0073	78.113
HFU6A21AD	A	M2	1	2	79.866	0.147	20	LGM	0.0073	79.164
HFU6A21BD	A	M2	1	2	78.764	0.145	20	LGM	0.0073	77.309
HFU6A21CD	A	M2	1	2	79.282	0.146	20	LGM	0.0073	78.264
HFU6A21DD	A	M2	1	2	79.948	0.146	20	LGM	0.0073	78.742
HFU6B11AD	B	M1	2	1	81.421	0.148	20	LGM	0.0074	81.302
HFU6B11BD	B	M1	2	1	75.927	0.146	20	LGM	0.0073	75.020
HFU6B11CD	B	M1	2	1	78.085	0.145	20	LGM	0.0073	76.538
HFU6B21AD	B	M2	2	2	81.895	0.145	20	LGM	0.0072	80.115
HFU6B21BD	B	M2	2	2	81.143	0.145	20	LGM	0.0073	79.745
HFU6B21CD	B	M2	2	2	80.125	0.146	20	LGM	0.0073	78.835
HFU6C11AD	C	M1	3	1	77.050	0.146	20	LGM	0.0073	76.130
HFU6C11BD	C	M1	3	1	80.064	0.145	20	LGM	0.0073	78.595
HFU6C11CD	C	M1	3	1	78.839	0.145	20	LGM	0.0073	77.321
HFU6C219D	C	M2	3	2	77.418	0.148	20	LGM	0.0074	77.453
HFU6C21AD	C	M2	3	2	78.065	0.146	20	LGM	0.0073	77.125
HFU6C21CD	C	M2	3	2	78.003	0.146	20	LGM	0.0073	77.195

Average	**79.370**	**Average**	**$Average_{norm}$**	**0.0073**	**78.303**
Standard Dev.	**1.735**		**$Standard\ Dev._{norm}$**		**1.661**
Coeff. of Var. [%]	**2.186**		**Coeff. of Var. $[\%]_{norm}$**		**2.122**
Min.	**75.927**	**Min.**	**Min.**	**0.0072**	**75.020**
Max.	**82.706**	**Max.**	**Max.**	**0.0074**	**81.302**
Number of Spec.	**19**		**Number of Spec.**		**19**


Laminate Filled Hole Tension Properties (FHT3) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
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

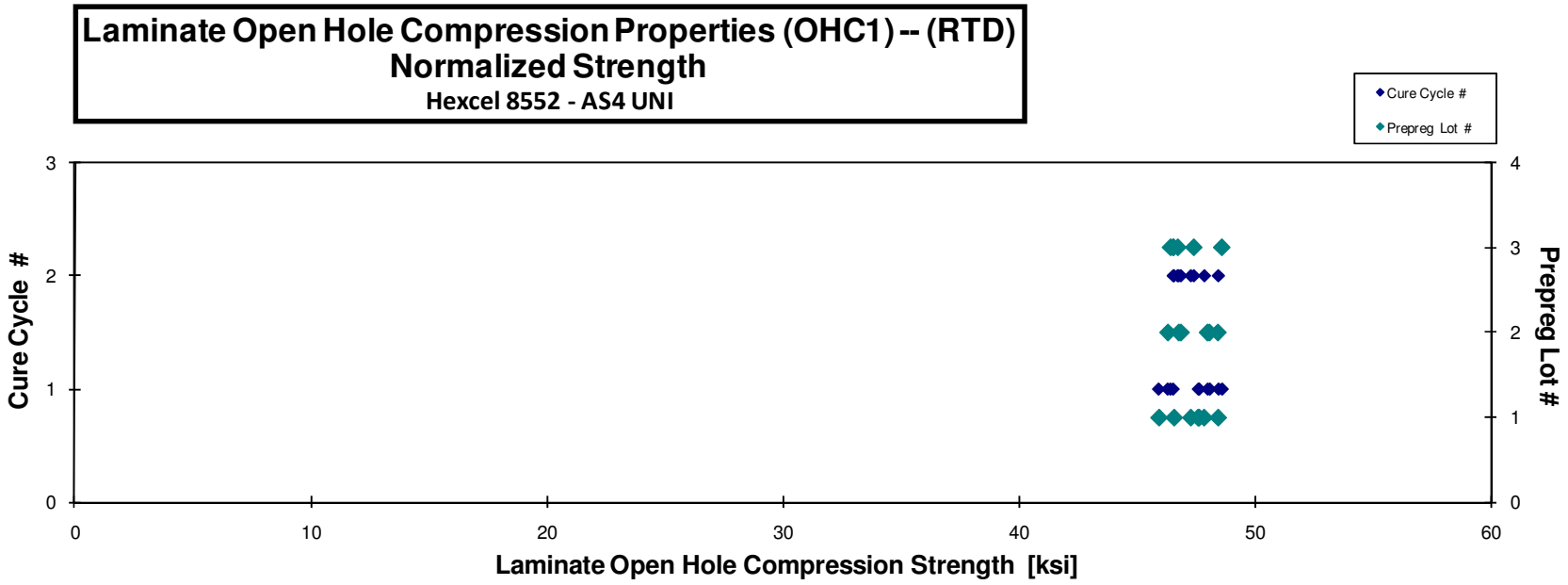
4.22 Open Hole Compression 1 Properties

Laminate Open Hole Compression Properties (OHC1) -- (RTD) Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUGA111A	A	M1	1	1	47.587	0.172	24	LGM	0.0071	45.952
HFUGA112A	A	M1	1	1	47.450	0.178	24	LGM	0.0074	47.610
HFUGA113A	A	M1	1	1	48.395	0.178	24	LGM	0.0074	48.459
HFUGA114A	A	M1	1	1	47.692	0.177	24	LGM	0.0074	47.652
HFUGA211A	A	M2	1	2	46.629	0.180	24	LGM	0.0075	47.303
HFUGA212A	A	M2	1	2	47.674	0.178	24	LGM	0.0074	47.862
HFUGA213A	A	M2	1	2	46.645	0.177	24	LGM	0.0074	46.592
HFUGB111A	B	M1	2	1	49.684	0.172	24	LGM	0.0072	48.006
HFUGB113A	B	M1	2	1	47.378	0.174	24	LGM	0.0072	46.333
HFUGB114A	B	M1	2	1	49.194	0.174	24	LGM	0.0072	48.086
HFUGB212A	B	M2	2	2	49.086	0.175	24	LGM	0.0073	48.446
HFUGB213A	B	M2	2	2	47.717	0.174	24	LGM	0.0073	46.790
HFUGB214A	B	M2	2	2	47.779	0.174	24	LGM	0.0073	46.878
HFUGC111A	C	M1	3	1	47.446	0.174	24	LGM	0.0072	46.440
HFUGC112A	C	M1	3	1	46.783	0.177	24	LGM	0.0074	46.555
HFUGC114A	C	M1	3	1	49.723	0.174	24	LGM	0.0072	48.607
HFUGC212A	C	M2	3	2	47.379	0.178	24	LGM	0.0074	47.424
HFUGC213A	C	M2	3	2	47.288	0.176	24	LGM	0.0073	46.747
HFUGC214A	C	M2	3	2	47.027	0.176	24	LGM	0.0073	46.563

Average	47.819	Average	$Average_{norm}$	0.0073	47.279
Standard Dev.	0.957		$Standard\ Dev._{norm}$		0.812
Coeff. of Var. [%]	2.001		$Coeff.\ of\ Var.\ [\%]_{norm}$		1.717
Min.	46.629	Min.	Min.	0.0071	45.952
Max.	49.723	Max.	Max.	0.0075	48.607
Number of Spec.	19		Number of Spec.		19

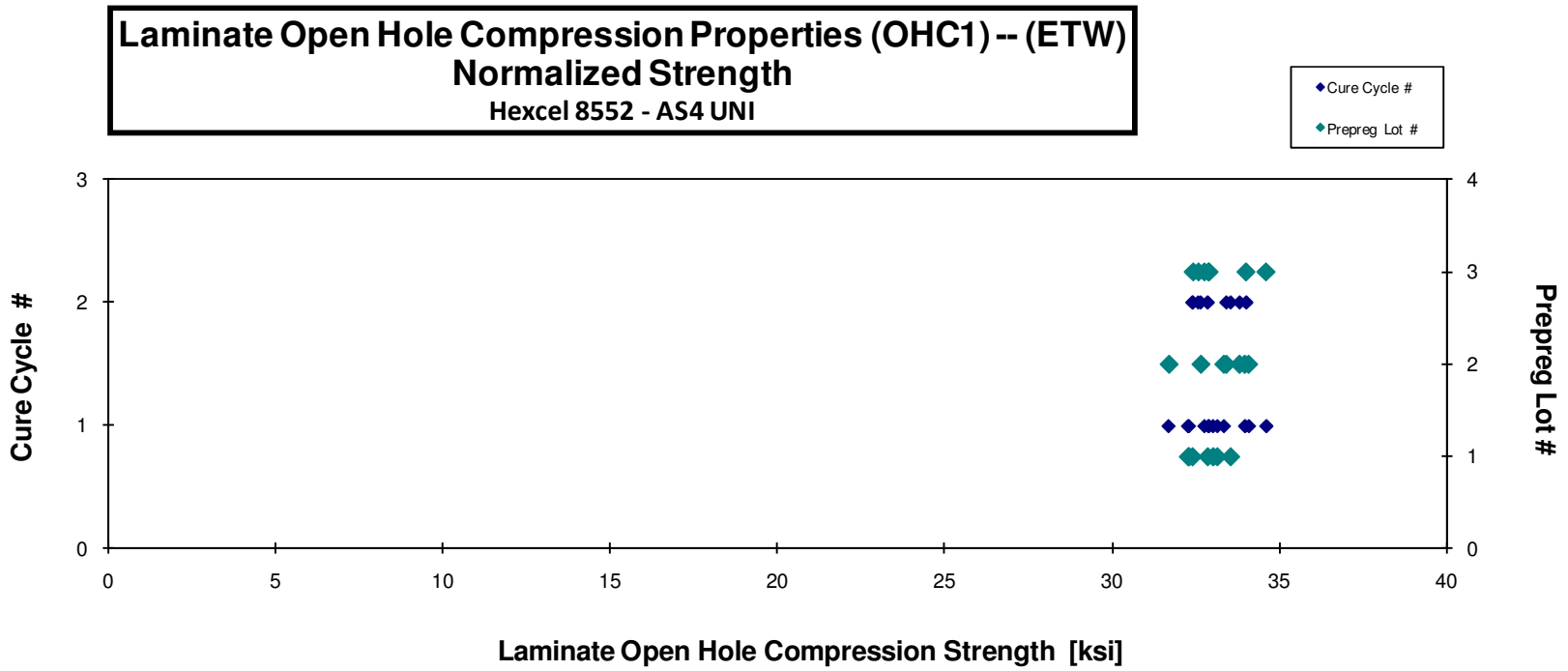

Laminate Open Hole Compression Properties (OHC1) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60

Laminate Open Hole Compression Properties (OHC1) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUGA117D	A	M1	1	1	33.385	0.176	24	LGM	0.0073	33.034
HFUGA118D	A	M1	1	1	32.435	0.177	24	LGM	0.0074	32.292
HFUGA119D	A	M1	1	1	32.213	0.178	24	LGM	0.0074	32.316
HFUGA11AD	A	M1	1	1	33.002	0.178	24	LGM	0.0074	33.160
HFUGA217D	A	M2	1	2	32.722	0.176	24	LGM	0.0073	32.421
HFUGA218D	A	M2	1	2	32.599	0.179	24	LGM	0.0075	32.871
HFUGA219D	A	M2	1	2	33.220	0.179	24	LGM	0.0075	33.553
HFUGB116D	B	M1	2	1	35.162	0.172	24	LGM	0.0072	34.093
HFUGB117D	B	M1	2	1	34.518	0.175	24	LGM	0.0073	33.977
HFUGB118D	B	M1	2	1	34.200	0.173	24	LGM	0.0072	33.350
HFUGB11AD	B	M1	2	1	32.446	0.174	24	LGM	0.0072	31.718
HFUGB216D	B	M2	2	2	34.368	0.175	24	LGM	0.0073	33.820
HFUGB217D	B	M2	2	2	33.055	0.176	24	LGM	0.0073	32.667
HFUGB218D	B	M2	2	2	34.085	0.174	24	LGM	0.0073	33.426
HFUGC116D	C	M1	3	1	35.517	0.173	24	LGM	0.0072	34.607
HFUGC117D	C	M1	3	1	33.495	0.174	24	LGM	0.0073	32.895
HFUGC118D	C	M1	3	1	33.512	0.174	24	LGM	0.0072	32.773
HFUGC119D	C	M1	3	1	33.541	0.174	24	LGM	0.0073	32.908
HFUGC216D	C	M2	3	2	34.413	0.176	24	LGM	0.0073	34.013
HFUGC217D	C	M2	3	2	32.641	0.177	24	LGM	0.0074	32.592
HFUGC218D	C	M2	3	2	32.054	0.180	24	LGM	0.0075	32.436

Average	**33.456**		**Average**	**$Average_{norm}$**	**0.0073**	**33.091**
Standard Dev.	**0.973**			**$Standard\ Dev._{norm}$**		**0.725**
Coeff. of Var. [%]	**2.908**			**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**2.192**
Min.	**32.054**		**Min.**	**Min.**	**0.0072**	**31.718**
Max.	**35.517**		**Max.**	**Max.**	**0.0075**	**34.607**
Number of Spec.	**21**			**Number of Spec.**		**21**


Laminate Open Hole Compression Properties (OHC1) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
1
2
3
0
5
10
15
20
25
30
35
40

4.23 Open Hole Compression 2 Properties

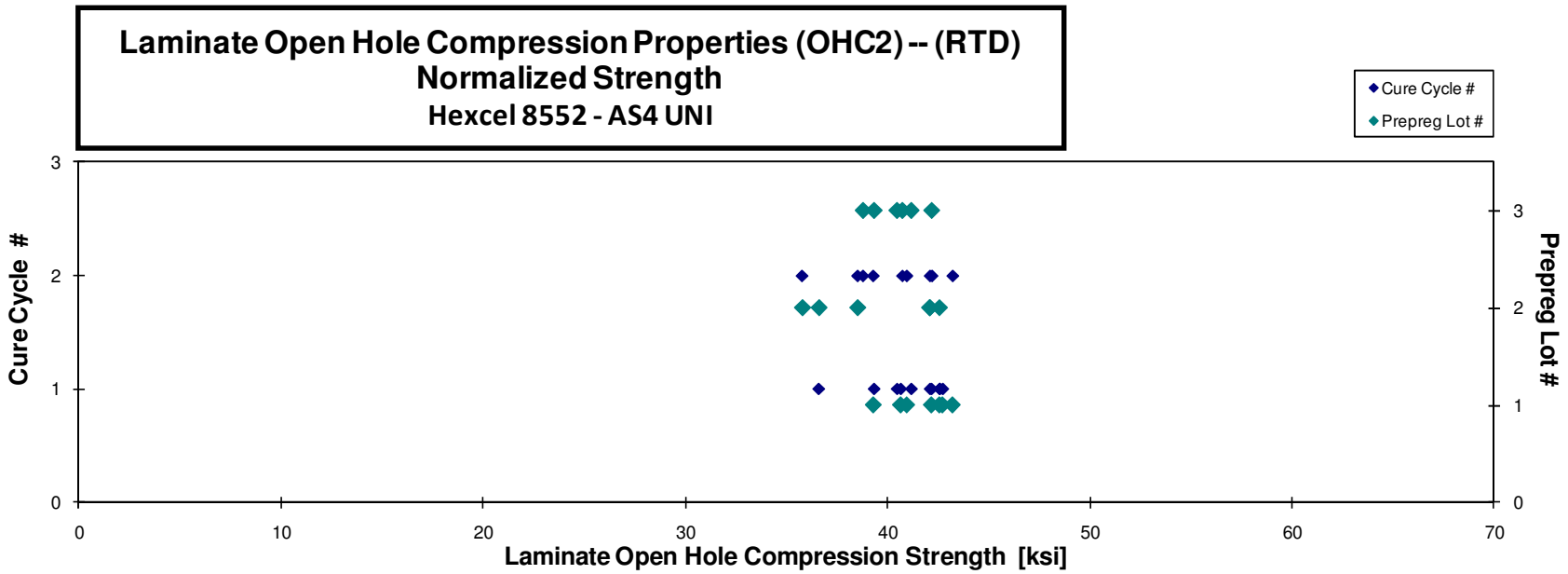
Laminate Open Hole Compression Properties (OHC2) -- (RTD)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUHA111A	A	M1	1	1	43.022	0.140	20	MGM	0.0070	40.653
HFUHA112A	A	M1	1	1	42.578	0.148	20	MGM	0.0074	42.573
HFUHA113A	A	M1	1	1	42.575	0.147	20	MGM	0.0073	42.182
HFUHA114A	A	M1	1	1	43.094	0.147	20	MGM	0.0073	42.730
HFUHA211A	A	M2	1	2	41.656	0.140	20	LGM	0.0070	39.296
HFUHA212A	A	M2	1	2	41.062	0.148	20	LGM	0.0074	40.956
HFUHA213A	A	M2	1	2	43.668	0.147	20	LGM	0.0073	43.225
HFUHB111A	B	M1	2	1	39.073	0.139	20	LGM	0.0069	36.604
HFUHB112A	B	M1	2	1	43.302	0.146	20	LGM	0.0073	42.585
HFUHB113A	B	M1	2	1	43.272	0.144	20	LGM	0.0072	42.108
HFUHB211A	B	M2	2	2	39.026	0.136	20	LGM	0.0068	35.778
HFUHB212A	B	M2	2	2	39.091	0.146	20	LGM	0.0073	38.523
HFUHB213A	B	M2	2	2	43.339	0.144	20	LGM	0.0072	42.104
HFUHC111A	C	M1	3	1	42.265	0.142	20	LGM	0.0071	40.475
HFUHC113A	C	M1	3	1	40.215	0.145	20	LGM	0.0072	39.337
HFUHC114A	C	M1	3	1	42.174	0.145	20	LGM	0.0072	41.181
HFUHC211A	C	M2	3	2	40.832	0.141	20	LGM	0.0070	38.790
HFUHC212A	C	M2	3	2	40.902	0.147	20	LGM	0.0074	40.741
HFUHC213A	C	M2	3	2	42.671	0.146	20	LGM	0.0073	42.200

Average	41.780	
Standard Dev.	1.547	
Coeff. of Var. [%]	3.702	
Min.	39.026	
Max.	43.668	
Number of Spec.	19	

$Average_{norm}$	0.0072	40.634
$Standard\ Dev._{norm}$		2.101
$Coeff.\ of\ Var.\ [\%]_{norm}$		5.170
Min.	0.0068	35.778
Max.	0.0074	43.225
Number of Spec.		19

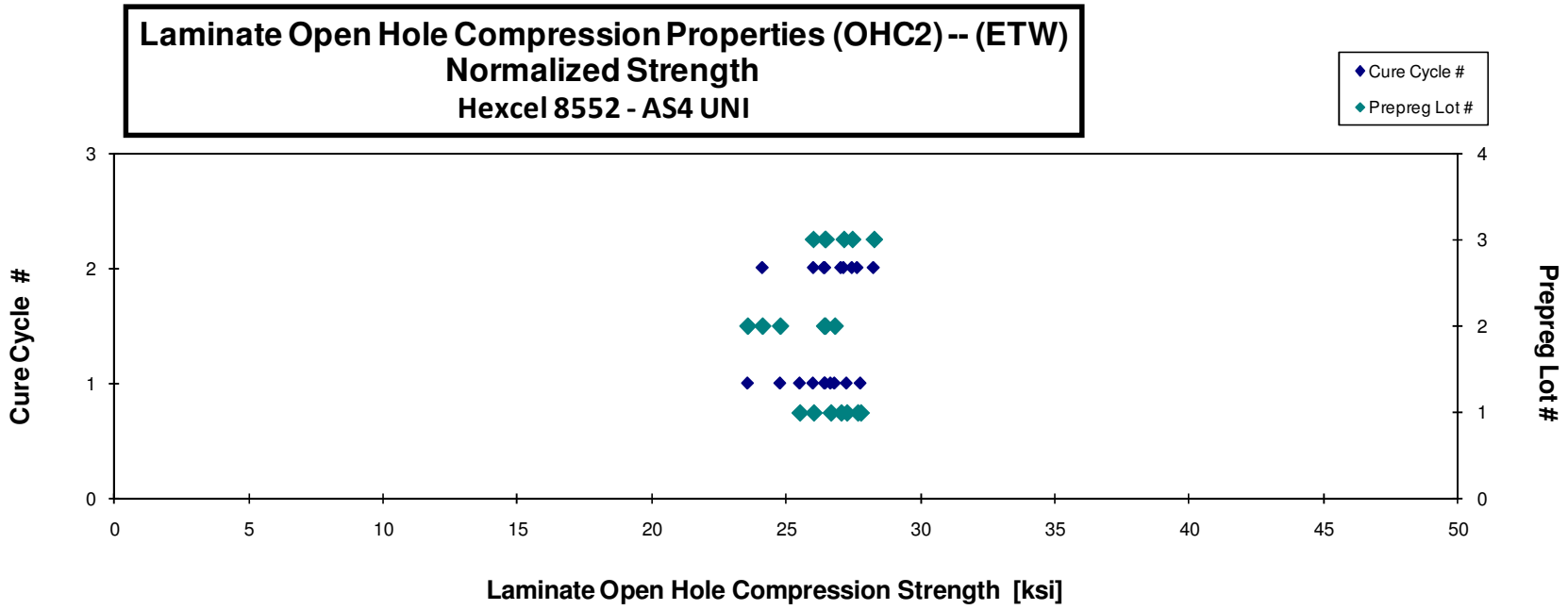

Laminate Open Hole Compression Properties (OHC2) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
10
20
30
40
50
60
70
Laminate Open Hole Compression Strength [ksi]

Laminate Open Hole Compression Properties (OHC2) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUHA117D	A	M1	1	1	27.168	0.148	20	LGM	0.0074	27.250
HFUHA118D	A	M1	1	1	26.853	0.141	20	LGM	0.0070	25.504
HFUHA119D	A	M1	1	1	26.697	0.148	20	LGM	0.0074	26.655
HFUHA11AD	A	M1	1	1	28.083	0.146	20	LGM	0.0073	27.769
HFUHA216D	A	M2	1	2	27.591	0.148	20	LGM	0.0074	27.654
HFUHA217D	A	M2	1	2	26.936	0.149	20	MGM	0.0074	27.042
HFUHA218D	A	M2	1	2	26.839	0.143	20	MGM	0.0072	26.020
HFUHB116D	B	M1	2	1	27.252	0.146	20	LGM	0.0073	26.804
HFUHB117D	B	M1	2	1	25.255	0.145	20	LGM	0.0073	24.771
HFUHB118D	B	M1	2	1	25.107	0.139	20	MGM	0.0069	23.563
HFUHB217D	B	M2	2	2	26.943	0.145	20	LGM	0.0073	26.445
HFUHB218D	B	M2	2	2	26.132	0.137	20	LGM	0.0068	24.111
HFUHB219D	B	M2	2	2	26.617	0.147	20	LGM	0.0073	26.407
HFUHC116D	C	M1	3	1	27.091	0.145	20	LGM	0.0072	26.459
HFUHC117D	C	M1	3	1	26.526	0.145	20	LGM	0.0073	26.000
HFUHC118D	C	M1	3	1	27.237	0.144	20	LGM	0.0072	26.437
HFUHC216D	C	M2	3	2	27.946	0.145	20	LGM	0.0073	27.452
HFUHC217D	C	M2	3	2	28.494	0.147	20	LGM	0.0073	28.257
HFUHC218D	C	M2	3	2	28.674	0.140	20	LGM	0.0070	27.137

	Strength [ksi]		$Strength_{norm}$ [ksi]
Average	27.023	$Average_{norm}$	26.407
Standard Dev.	0.928	$Standard\ Dev._{norm}$	1.224
Coeff. of Var. [%]	3.434	$Coeff.\ of\ Var.\ [\%]_{norm}$	4.635
Min.	25.107	Min.	23.563
Max.	28.674	Max.	28.257
Number of Spec.	19	Number of Spec.	19


Laminate Open Hole Compression Properties (OHC2) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
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

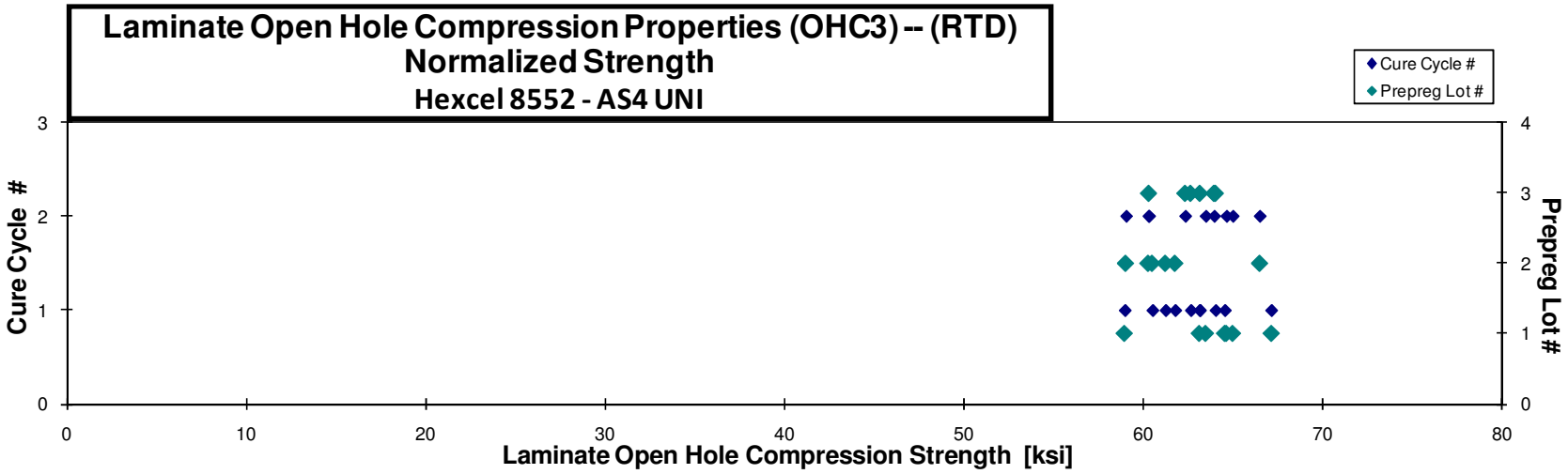
4.24 Open Hole Compression 3 Properties

Laminate Open Hole Compression Properties (OHC3) -- (RTD)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUIA111A	A	M1	1	1	60.998	0.143	20	AGM	0.0072	58.951
HFUIA112A	A	M1	1	1	62.851	0.149	20	AGM	0.0074	63.141
HFUIA113A	A	M1	1	1	65.213	0.147	20	AGM	0.0073	64.560
HFUIA114A	A	M1	1	1	67.569	0.147	20	LGM	0.0074	67.166
HFUIA211A	A	M2	1	2	66.521	0.141	20	LGM	0.0071	63.487
HFUIA212A	A	M2	1	2	65.210	0.148	20	LGM	0.0074	65.005
HFUIA213A	A	M2	1	2	65.502	0.146	20	LGM	0.0073	64.653
HFUIB111A	B	M1	2	1	64.695	0.140	20	LGM	0.0070	61.234
HFUIB112A	B	M1	2	1	62.445	0.146	20	LGM	0.0073	61.777
HFUIB113A	B	M1	2	1	61.371	0.146	20	LGM	0.0073	60.500
HFUIB211A	B	M2	2	2	61.165	0.143	20	LGM	0.0071	59.022
HFUIB212A	B	M2	2	2	60.882	0.147	20	LGM	0.0073	60.271
HFUIB213A	B	M2	2	2	67.382	0.146	20	LGM	0.0073	66.517
HFUIC111A	C	M1	3	1	66.420	0.140	20	LGM	0.0070	62.650
HFUIC112A	C	M1	3	1	63.890	0.146	20	LGM	0.0073	63.170
HFUIC113A	C	M1	3	1	65.448	0.145	20	LGM	0.0072	64.040
HFUIC211A	C	M2	3	2	65.560	0.144	20	LGM	0.0072	63.958
HFUIC212A	C	M2	3	2	63.201	0.146	20	LGM	0.0073	62.340
HFUIC213A	C	M2	3	2	61.441	0.145	20	LGM	0.0073	60.306

	Strength [ksi]		$Strength_{norm}$ [ksi]
Average	64.093	$Average_{norm}$	62.776
Standard Dev.	2.249	$Standard\ Dev._{norm}$	2.340
Coeff. of Var. [%]	3.509	$Coeff.\ of\ Var.\ [\%]_{norm}$	3.728
Min.	60.882	Min.	58.951
Max.	67.569	Max.	67.166
Number of Spec.	19	Number of Spec.	19


Laminate Open Hole Compression Properties (OHC3) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
0
1
2
3
4

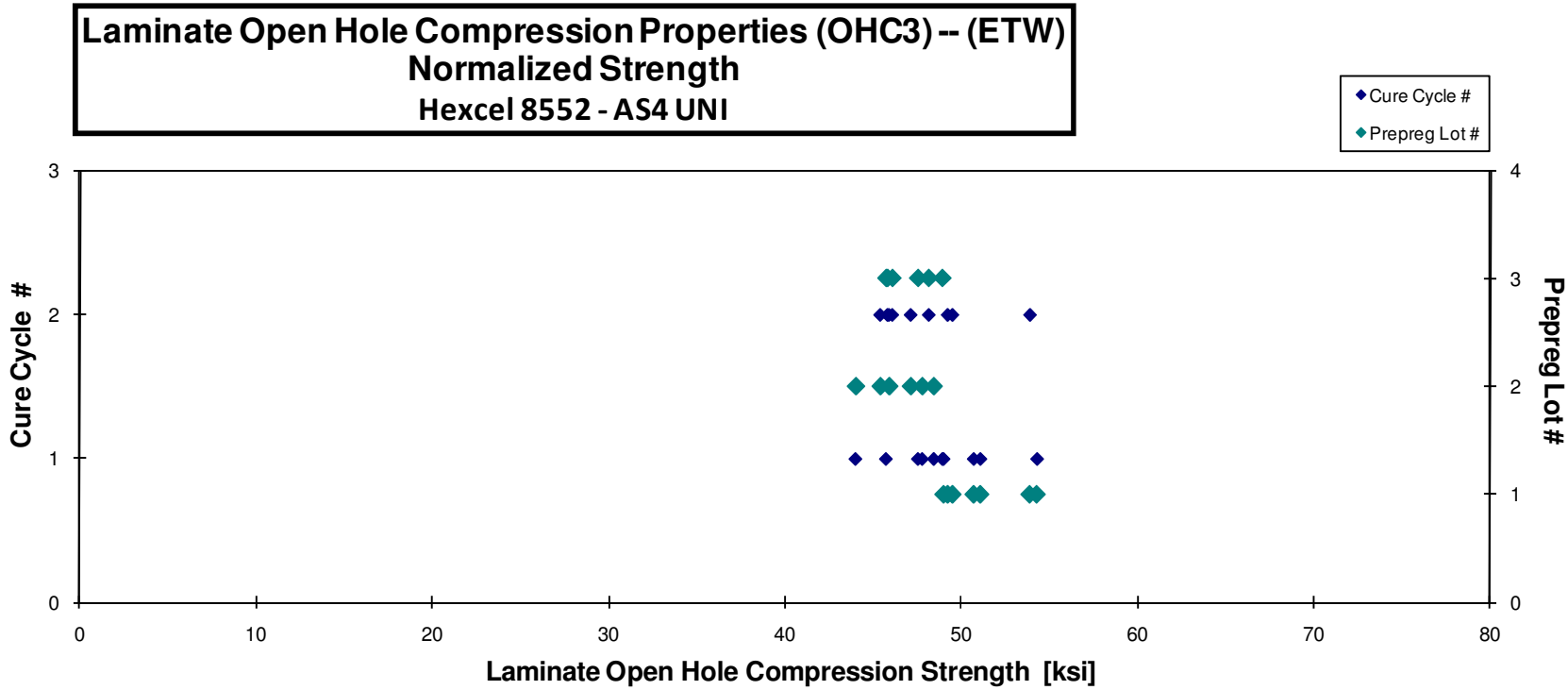
Laminate Open Hole Compression Properties (OHC3) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFUIA117D	A	M1	1	1	54.051	0.149	20	LGM	0.0074	54.313
HFUIA118D	A	M1	1	1	52.396	0.143	20	LGM	0.0072	50.721
HFUIA11AD	A	M1	1	1	50.628	0.149	20	LGM	0.0075	51.101
HFUIA11BD	A	M1	1	1	49.361	0.147	20	LGM	0.0073	49.005
HFUIA216D	A	M2	1	2	54.109	0.147	20	LGM	0.0074	53.914
HFUIA217D	A	M2	1	2	52.101	0.141	20	LGM	0.0070	49.513
HFUIA218D	A	M2	1	2	50.501	0.144	20	LGM	0.0072	49.238
HFUIB116D	B	M1	2	1	49.158	0.146	20	LGM	0.0073	48.449
HFUIB117D	B	M1	2	1	48.251	0.147	20	LGM	0.0073	47.795
HFUIB118D	B	M1	2	1	47.086	0.138	20	LGM	0.0069	44.011
HFUIB216D	B	M2	2	2	47.698	0.146	20	LGM	0.0073	47.139
HFUIB217D	B	M2	2	2	45.735	0.147	20	LGM	0.0073	45.411
HFUIB218D	B	M2	2	2	48.032	0.141	20	LGM	0.0071	45.912
HFUIC116D	C	M1	3	1	48.629	0.145	20	LGM	0.0072	47.556
HFUIC117D	C	M1	3	1	49.416	0.147	20	LGM	0.0073	48.943
HFUIC118D	C	M1	3	1	47.895	0.141	20	LGM	0.0071	45.738
HFUIC216D	C	M2	3	2	48.943	0.146	20	LGM	0.0073	48.166
HFUIC217D	C	M2	3	2	45.772	0.149	20	LGM	0.0075	46.091
HFUIC218D	C	M2	3	2	47.339	0.143	20	LGM	0.0072	45.819

Average	49.321	
Standard Dev.	2.451	
Coeff. of Var. [%]	4.969	
Min.	45.735	
Max.	54.109	
Number of Spec.	19	

$Average_{norm}$	0.0073	48.360
$Standard\ Dev._{norm}$		2.757
$Coeff.\ of\ Var.\ [\%]_{norm}$		5.701
Min.	0.0069	44.011
Max.	0.0075	54.313
Number of Spec.		19


Laminate Open Hole Compression Properties (OHC3) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
0
1
2
3
4

4.25 Filled-Hole Compression 1 Properties

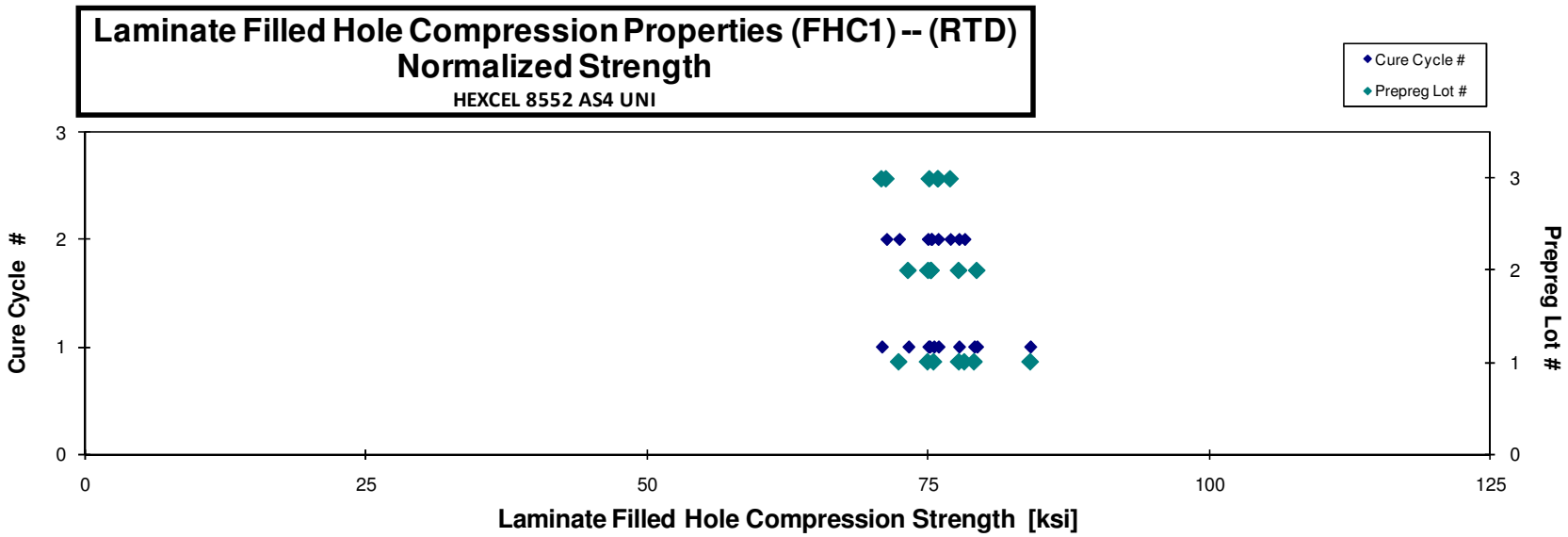
Laminate Filled Hole Compression Properties (FHC1) -- (RTD) Strength
HEXCEL 8552 AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	HEXCEL Batch #	HEXCEL Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU7A111A	A	M1	1	1	78.090	0.172	24	MGM	0.0072	75.525
HFU7A112A	A	M1	1	1	77.199	0.179	24	MGM	0.0075	77.764
HFU7A113A	A	M1	1	1	84.800	0.176	24	MGM	0.0073	84.084
HFU7A114A	A	M1	1	1	79.704	0.176	24	MGM	0.0073	79.113
HFU7A211A	A	M2	1	2	80.424	0.173	24	MGM	0.0072	78.250
HFU7A212A	A	M2	1	2	72.450	0.178	24	MGM	0.0074	72.443
HFU7A214A	A	M2	1	2	75.475	0.176	24	MGM	0.0074	75.001
HFU7B111A	B	M1	2	1	79.428	0.164	24	MGM	0.0068	73.271
HFU7B112A	B	M1	2	1	76.682	0.174	24	MGM	0.0072	75.041
HFU7B113A	B	M1	2	1	81.880	0.172	24	MGM	0.0072	79.360
HFU7B211A	B	M2	2	2	81.133	0.165	24	MGM	0.0069	75.293
HFU7B212A	B	M2	2	2	78.509	0.176	24	MGM	0.0073	77.750
HFU7B215A	B	M2	2	2	77.265	0.173	24	MGM	0.0072	75.322
HFU7C111A	C	M1	3	1	80.396	0.168	24	LGF	0.0070	75.944
HFU7C113A	C	M1	3	1	72.193	0.174	24	MGM	0.0073	70.912
HFU7C115A	C	M1	3	1	75.939	0.176	24	MGM	0.0073	75.170
HFU7C211A	C	M2	3	2	76.447	0.166	24	MGM	0.0069	71.318
HFU7C212A	C	M2	3	2	77.956	0.175	24	MGM	0.0073	76.990
HFU7C213A	C	M2	3	2	77.607	0.174	24	MGM	0.0072	75.910

Average	78.083	
Standard Dev.	3.059	
Coeff. of Var. [%]	3.918	
Min.	72.193	
Max.	84.800	
Number of Spec.	19	

$Average_{norm}$	0.0072	76.024
$Standard\ Dev._{norm}$		3.075
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.045
Min.	0.0068	70.912
Max.	0.0075	84.084
Number of Spec.		19


Laminate Filled Hole Compression Properties (FHC1) -- (RTD)
Normalized Strength
HEXCEL 8552 AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
25
50
75
100
125
Laminate Filled Hole Compression Strength [ksi]

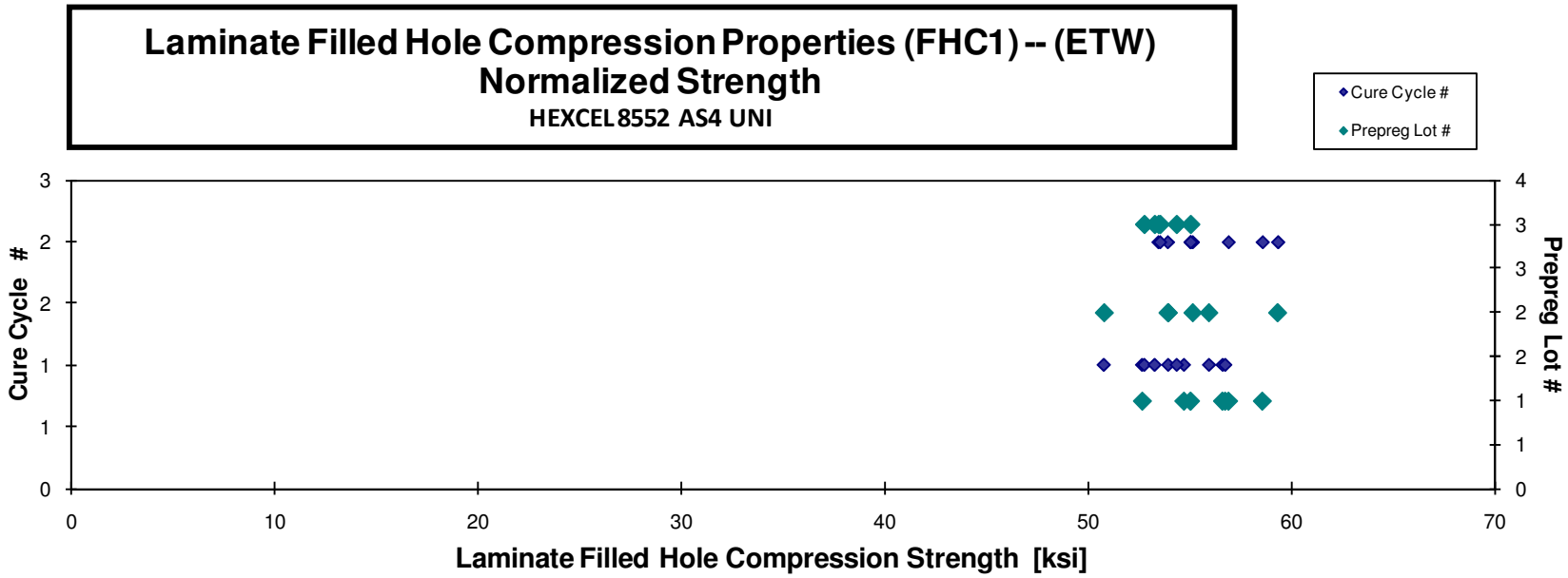
Laminate Filled Hole Compression Properties (FHC1) -- (ETW)
Strength
HEXCEL 8552 AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	HEXCEL Batch #	HEXCEL Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU7A117D	A	M1	1	1	56.592	0.178	24	LGF	0.0074	56.597
HFU7A118D	A	M1	1	1	55.981	0.167	24	LGF	0.0070	52.639
HFU7A119D	A	M1	1	1	56.120	0.180	24	LGF	0.0075	56.726
HFU7A11AD	A	M1	1	1	54.943	0.177	24	MGF	0.0074	54.695
HFU7A216D	A	M2	1	2	58.807	0.177	24	LGF	0.0074	58.569
HFU7A217D	A	M2	1	2	54.883	0.178	24	LGF	0.0074	55.023
HFU7A21AD	A	M2	1	2	56.449	0.179	24	LGF	0.0075	56.899
HFU7B116D	B	M1	2	1	55.519	0.173	24	MGF	0.0072	53.925
HFU7B117D	B	M1	2	1	56.936	0.174	24	LGF	0.0073	55.931
HFU7B118D	B	M1	2	1	54.019	0.167	24	LGF	0.0070	50.759
HFU7B216D	B	M2	2	2	60.793	0.173	24	LGF	0.0072	59.327
HFU7B217D	B	M2	2	2	55.689	0.176	24	LGF	0.0073	55.135
HFU7B218D	B	M2	2	2	57.283	0.167	24	LGF	0.0070	53.912
HFU7C116D	C	M1	3	1	53.807	0.174	24	MGF	0.0073	52.747
HFU7C117D	C	M1	3	1	54.200	0.175	24	LGM	0.0073	53.259
HFU7C118D	C	M1	3	1	55.968	0.172	24	MGF	0.0072	54.345
HFU7C216D	C	M2	3	2	54.543	0.174	24	LGM	0.0073	53.448
HFU7C217D	C	M2	3	2	54.171	0.176	24	LGF	0.0073	53.530
HFU7C218D	C	M2	3	2	58.086	0.168	24	LGF	0.0070	55.038

Average	56.041	
Standard Dev.	1.801	
Coeff. of Var. [%]	3.214	
Min.	53.807	
Max.	60.793	
Number of Spec.	19	

$Average_{norm}$	0.0072	54.869
$Standard\ Dev._{norm}$		2.112
$Coeff.\ of\ Var.\ [\%]_{norm}$		3.848
Min.	0.0070	50.759
Max.	0.0075	59.327
Number of Spec.		19


Laminate Filled Hole Compression Properties (FHC1) -- (ETW)
Normalized Strength
HEXCEL 8552 AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
1
2
3
4
0
10
20
30
40
50
60
70
Laminate Filled Hole Compression Strength [ksi]

4.26 Filled-Hole Compression 2 Properties

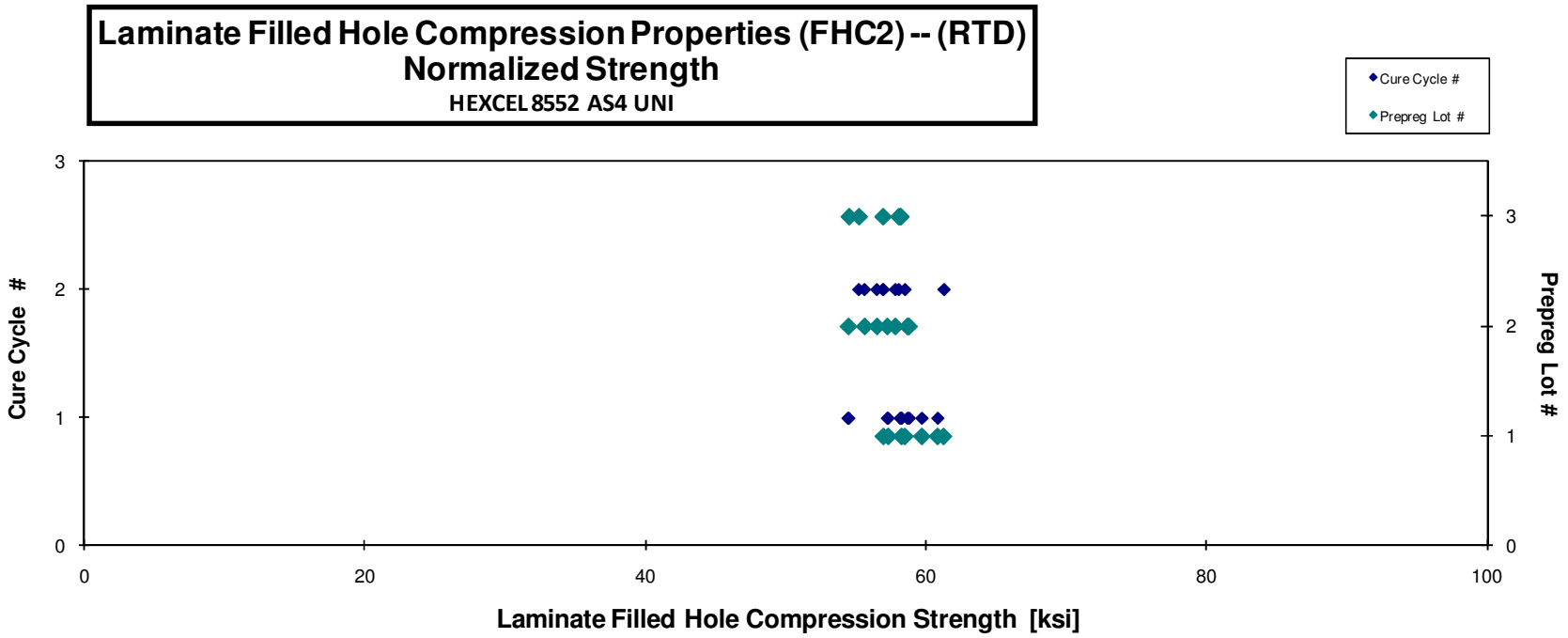
Laminate Filled Hole Compression Properties (FHC2) -- (RTD) Strength
HEXCEL 8552 AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	HEXCEL Batch #	HEXCEL Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU8A111A	A	M1	1	1	64.331	0.137	20	MGF	0.0069	59.694
HFU8A112A	A	M1	1	1	57.253	0.148	20	MGF	0.0074	57.311
HFU8A113A	A	M1	1	1	59.241	0.146	20	MGF	0.0073	58.260
HFU8A116A	A	M1	1	1	61.887	0.145	20	MGF	0.0073	60.806
HFU8A213A	A	M2	1	2	62.079	0.146	20	LGO	0.0073	61.240
HFU8A214A	A	M2	1	2	59.092	0.147	20	LGO	0.0073	58.493
HFU8A215A	A	M2	1	2	57.197	0.147	20	LGO	0.0074	56.965
HFU8B111A	B	M1	2	1	58.395	0.138	20	LGO	0.0069	54.483
HFU8B112A	B	M1	2	1	59.272	0.147	20	LGO	0.0073	58.671
HFU8B113A	B	M1	2	1	60.277	0.144	20	MGO	0.0072	58.790
HFU8B114A	B	M1	2	1	58.650	0.144	20	LGO	0.0072	57.256
HFU8B211A	B	M2	2	2	58.656	0.143	20	MGO	0.0071	56.516
HFU8B212A	B	M2	2	2	58.293	0.147	20	MGO	0.0073	57.813
HFU8B213A	B	M2	2	2	56.785	0.145	20	LGO	0.0073	55.640
HFU8C111A	C	M1	3	1	60.822	0.142	20	LGO	0.0071	58.158
HFU8C112A	C	M1	3	1	55.593	0.145	20	LGO	0.0073	54.535
HFU8C113A	C	M1	3	1	59.452	0.145	20	LGO	0.0072	58.207
HFU8C211A	C	M2	3	2	58.729	0.139	20	LGO	0.0070	55.237
HFU8C212A	C	M2	3	2	58.890	0.146	20	LGO	0.0073	58.061
HFU8C213A	C	M2	3	2	58.413	0.144	20	LGO	0.0072	56.946

Average	59.165	
Standard Dev.	1.991	
Coeff. of Var. [%]	3.365	
Min.	55.593	
Max.	64.331	
Number of Spec.	20	

$Average_{norm}$	0.0072	57.654
$Standard\ Dev._{norm}$		1.826
$Coeff.\ of\ Var.\ [\%]_{norm}$		3.167
Min.	0.0069	54.483
Max.	0.0074	61.240
Number of Spec.		20


Laminate Filled Hole Compression Properties (FHC2) -- (RTD)
Normalized Strength
HEXCEL 8552 AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
20
40
60
80
100
Laminate Filled Hole Compression Strength [ksi]

Laminate Filled Hole Compression Properties (FHC2) -- (ETW)
Strength
HEXCEL 8552 AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	HEXCEL Batch #	HEXCEL Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU8A117D	A	M1	1	1	41.777	0.147	20	LGF	0.0074	41.608
HFU8A118D	A	M1	1	1	41.733	0.142	20	LGF	0.0071	40.149
HFU8A119D	A	M1	1	1	43.530	0.136	20	LGF	0.0068	40.035
HFU8A11BD	A	M1	1	1	39.460	0.146	20	LGF	0.0073	38.847
HFU8A216D	A	M2	1	2	38.228	0.149	20	LGF	0.0074	38.361
HFU8A217D	A	M2	1	2	38.446	0.148	20	LGF	0.0074	38.516
HFU8A219D	A	M2	1	2	39.671	0.141	20	LGF	0.0070	37.719
HFU8B116D	B	M1	2	1	41.238	0.144	20	LGF	0.0072	40.100
HFU8B117D	B	M1	2	1	42.443	0.145	20	LGF	0.0073	41.678
HFU8B118D	B	M1	2	1	44.187	0.142	20	LGF	0.0071	42.445
HFU8B216D	B	M2	2	2	39.670	0.146	20	LGF	0.0073	39.116
HFU8B217D	B	M2	2	2	39.380	0.147	20	LGF	0.0074	39.172
HFU8B218D	B	M2	2	2	37.176	0.139	20	MGF	0.0069	34.865
HFU8C116D	C	M1	3	1	35.943	0.146	20	LGF	0.0073	35.336
HFU8C117D	C	M1	3	1	39.801	0.147	20	MGF	0.0073	39.452
HFU8C118D	C	M1	3	1	41.735	0.138	20	LGF	0.0069	38.868
HFU8C216D	C	M2	3	2	38.522	0.144	20	LGF	0.0072	37.559
HFU8C217D	C	M2	3	2	37.090	0.145	20	LGF	0.0073	36.426
HFU8C218D	C	M2	3	2	38.824	0.140	20	LGF	0.0070	36.786

	Strength [ksi]
Average	39.940
Standard Dev.	2.231
Coeff. of Var. [%]	5.585
Min.	35.943
Max.	44.187
Number of Spec.	19

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
Average	0.0072	38.791
Standard Dev.		2.046
Coeff. of Var. [%]		5.273
Min.	0.0068	34.865
Max.	0.0074	42.445
Number of Spec.		19

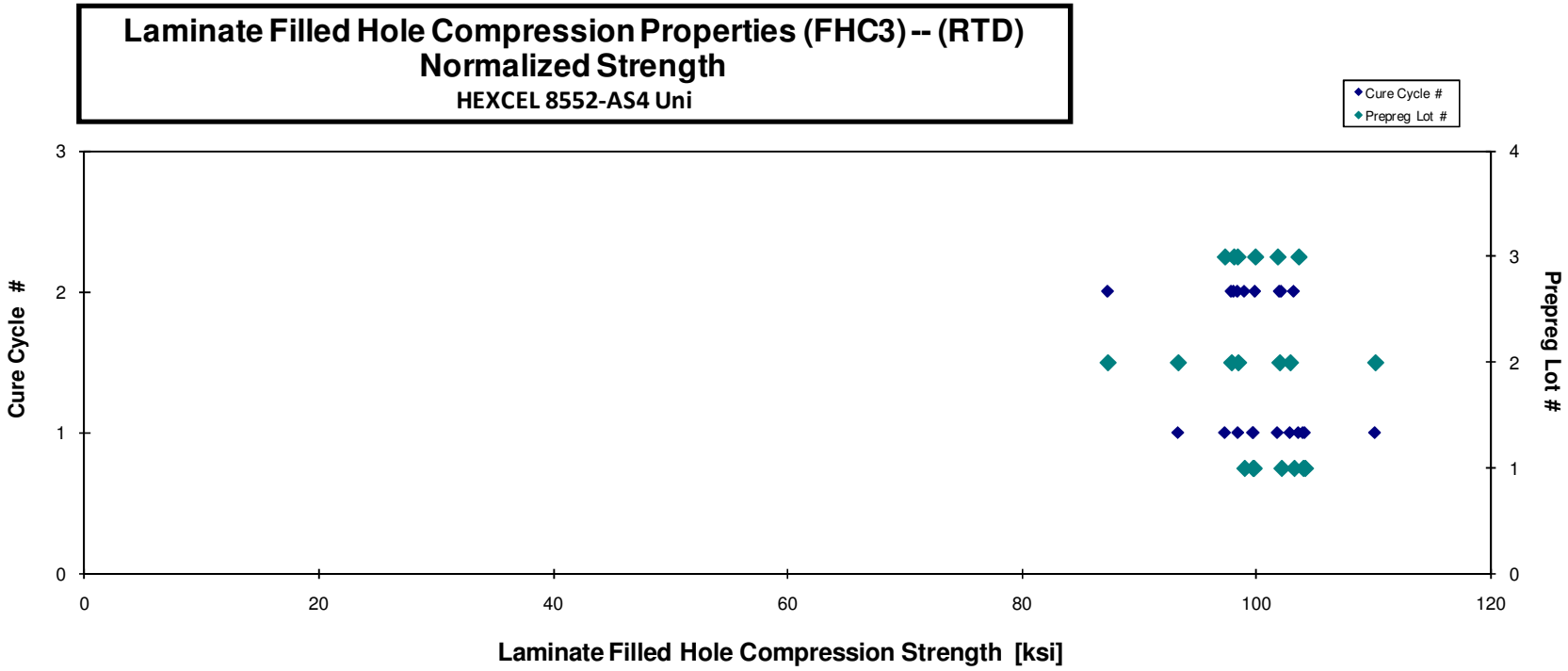
4.27 Filled-Hole Compression 3 Properties

Laminate Filled Hole Compression Properties (FHC3) -- (RTD)
Strength
HEXCEL 8552-AS4 Uni

normalizing t_{ply} [in]: 0.0074

Specimen Number	HEXCEL Batch #	HEXCEL Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU9A111A	A	M1	1	1	105.310	0.140	20	MGM	0.0070	99.772
HFU9A112A	A	M1	1	1	99.659	0.148	20	MGM	0.0074	99.704
HFU9A115A	A	M1	1	1	105.502	0.146	20	AGM	0.0073	103.981
HFU9A116A	A	M1	1	1	106.091	0.145	20	AGM	0.0073	104.144
HFU9A213A	A	M2	1	2	101.216	0.145	20	LGM,AGM	0.0072	98.982
HFU9A214A	A	M2	1	2	103.608	0.146	20	LGF,LGM	0.0073	102.138
HFU9A215A	A	M2	1	2	104.118	0.147	20	AGM	0.0073	103.204
HFU9B111A	B	M1	2	1	98.498	0.140	20	LGM,AGM	0.0070	93.318
HFU9B113A	B	M1	2	1	111.662	0.146	20	LGM	0.0073	110.128
HFU9B114A	B	M1	2	1	100.061	0.146	20	LGM	0.0073	98.438
HFU9B115A	B	M1	2	1	104.500	0.146	20	LGM,AGM	0.0073	102.876
HFU9B213A	B	M2	2	2	100.354	0.144	20	LGM,LGF	0.0072	97.868
HFU9B214A	B	M2	2	2	103.704	0.146	20	LGM	0.0073	101.976
HFU9B215A	B	M2	2	2	88.211	0.147	20	LGM	0.0073	87.317
HFU9C113A	C	M1	3	1	103.369	0.146	20	LGM	0.0073	101.809
HFU9C114A	C	M1	3	1	105.345	0.146	20	LGM,LGF	0.0073	103.601
HFU9C115A	C	M1	3	1	99.152	0.145	20	LGM,LGF	0.0073	97.310
HFU9C211A	C	M2	3	2	103.583	0.143	20	LGF	0.0071	99.897
HFU9C212A	C	M2	3	2	98.714	0.148	20	LGM,LGF	0.0074	98.392
HFU9C213A	C	M2	3	2	99.284	0.146	20	LGM,LGF	0.0073	98.065

	Strength [ksi]	$Strength_{norm}$ [ksi]
Average	102.097	$Average_{norm}$ 100.146
Standard Dev.	4.624	$Standard\ Dev._{norm}$ 4.621
Coeff. of Var. [%]	4.529	Coeff. of Var. $[\%]_{norm}$ 4.614
Min.	88.211	Min. 87.317
Max.	111.662	Max. 110.128
Number of Spec.	20	Number of Spec. 20


Laminate Filled Hole Compression Properties (FHC3) -- (RTD)
Normalized Strength
HEXCEL 8552-AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Compression Strength [ksi]
0
20
40
60
80
100
120
0
1
2
3
4

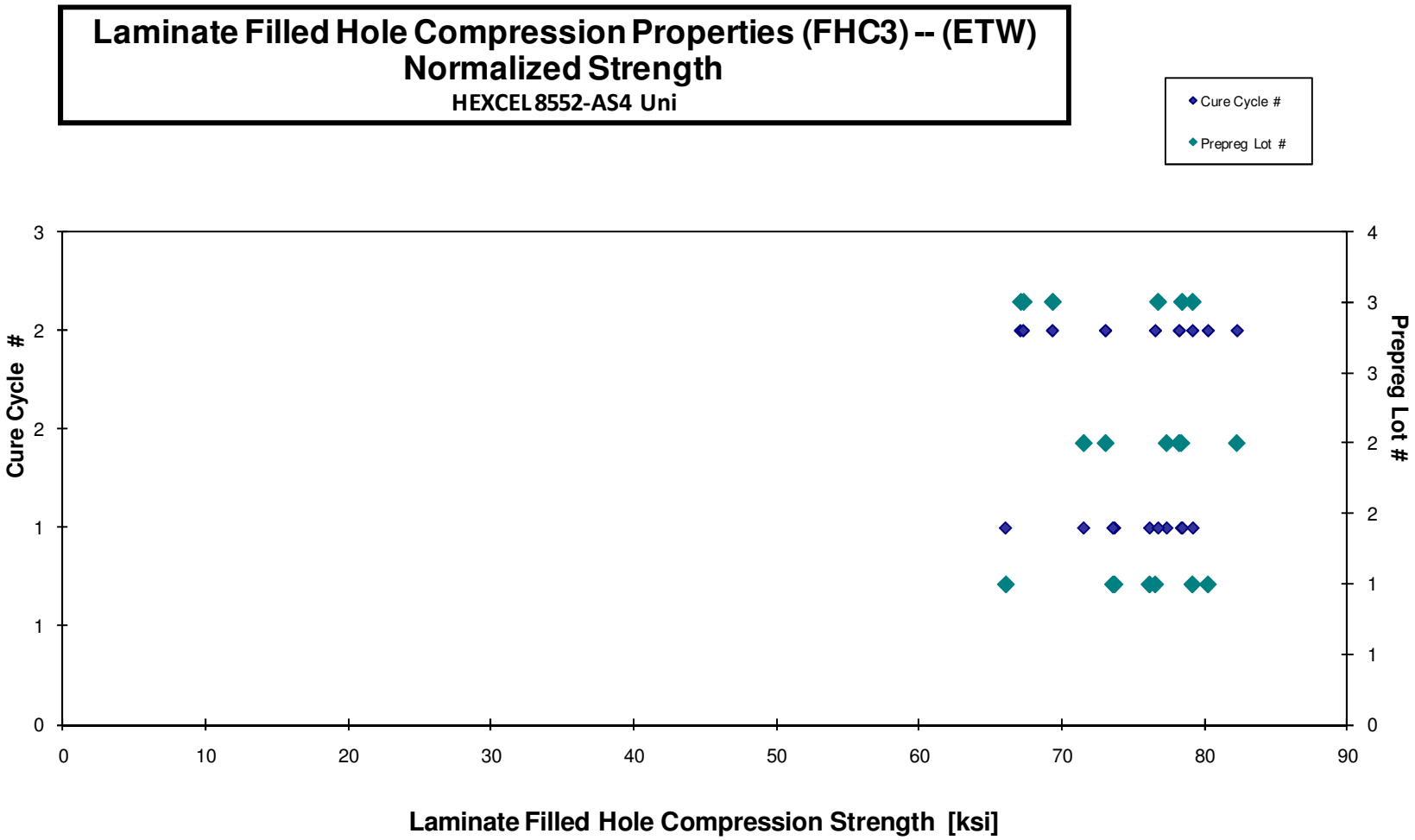
Laminate Filled Hole Compression Properties (FHC3) -- (ETW)
Strength
HEXCEL 8552-AS4 Uni

normalizing t_{ply} [in]: 0.0074

Specimen Number	HEXCEL Batch #	HEXCEL Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFU9A117D	A	M1	1	1	73.964	0.147	20	LGF	0.0074	73.689
HFU9A118D	A	M1	1	1	77.269	0.141	20	LGO	0.0070	73.580
HFU9A11AD	A	M1	1	1	76.388	0.148	20	LGF	0.0074	76.138
HFU9A11CD	A	M1	1	1	67.100	0.146	20	LGO	0.0073	66.065
HFU9A216D	A	M2	1	2	79.727	0.147	20	LGF	0.0073	79.144
HFU9A217D	A	M2	1	2	80.878	0.147	20	LGF	0.0073	80.232
HFU9A219D	A	M2	1	2	76.289	0.148	20	LGF	0.0074	76.538
HFU9B116D	B	M1	2	1	78.446	0.146	20	MGF	0.0073	77.333
HFU9B117D	B	M1	2	1	78.521	0.148	20	MGF	0.0074	78.362
HFU9B119D	B	M1	2	1	75.311	0.141	20	MGF	0.0070	71.529
HFU9B216D	B	M2	2	2	83.516	0.146	20	LGF	0.0073	82.255
HFU9B217D	B	M2	2	2	79.156	0.146	20	LGF	0.0073	78.211
HFU9B218D	B	M2	2	2	75.281	0.144	20	LGF	0.0072	73.060
HFU9C116D	C	M1	3	1	77.384	0.147	20	LGO	0.0073	76.739
HFU9C117D	C	M1	3	1	80.347	0.146	20	LGF	0.0073	79.161
HFU9C118D	C	M1	3	1	80.266	0.145	20	LGF	0.0072	78.422
HFU9C216D	C	M2	3	2	68.058	0.146	20	LGO	0.0073	67.115
HFU9C217D	C	M2	3	2	68.484	0.145	20	LGO	0.0073	67.311
HFU9C218D	C	M2	3	2	70.073	0.146	20	LGF	0.0073	69.355

	Strength [ksi]
Average	76.129
Standard Dev.	4.691
Coeff. of Var. [%]	6.162
Min.	67.100
Max.	83.516
Number of Spec.	19

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
Average	0.0073	74.960
Standard Dev.		4.787
Coeff. of Var. [%]		6.386
Min.	0.0070	66.065
Max.	0.0074	82.255
Number of Spec.		19

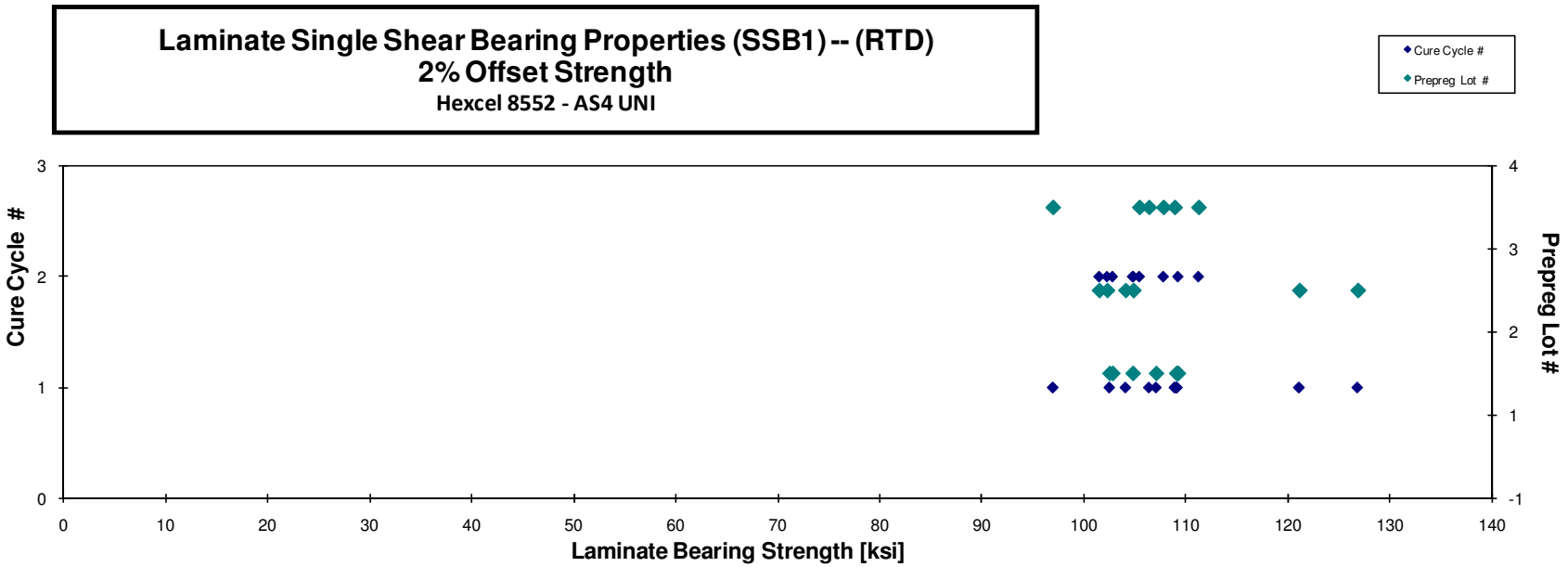

Laminate Filled Hole Compression Properties (FHC3) -- (ETW)
Normalized Strength
HEXCEL 8552-AS4 Uni
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
1
2
2
3
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
Laminate Filled Hole Compression Strength [ksi]

4.28 Single Shear Bearing 1 Properties

Laminate Single Shear Bearing Properties (SSB1) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]
0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Bearing Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Bearing Strength$_{norm}$ [ksi]
HFU1A111A	A	M1	1	1	102.519	143.499	0.115	16	B1I / 2% OFFSET FOR UBS*	0.0072	99.979	139.944
HFU1A112A	A	M1	1	1	109.071	141.443	0.120	16	B1I / 2% OFFSET FOR UBS*	0.0075	110.499	143.294
HFU1A113A	A	M1	1	1	107.095	142.098	0.118	16	B1I / 2% OFFSET FOR UBS*	0.0074	106.763	141.658
HFU1A114A	A	M1	1	1	109.150	147.164	0.119	16	B1I / 2% OFFSET FOR UBS*	0.0074	109.641	147.827
HFU1A211A	A	M2	1	2	104.806	146.239	0.110	16	B1I / 2% OFFSET FOR UBS*	0.0069	97.208	135.637
HFU1A212A	A	M2	1	2	109.247	131.448	0.112	16	B1I / 2% OFFSET FOR UBS*	0.0070	103.342	124.343
HFU1A213A	A	M2	1	2	102.823	138.088	0.110	16	B1I / 2% OFFSET FOR UBS*	0.0069	95.427	128.156
HFU1B111A	B	M1	2	1	104.096	142.868	0.106	16	B1I / 2% OFFSET FOR UBS*	0.0066	93.399	128.187
HFU1B112A	B	M1	2	1	126.847	148.763	0.113	16	B1I / 2% OFFSET FOR UBS*	0.0071	121.009	141.915
HFU1B113A	B	M1	2	1	121.127	148.633	0.112	16	B1I / 2% OFFSET FOR UBS*	0.0070	114.120	140.034
HFU1B211A	B	M2	2	2	104.864	143.639	0.112	16	B1I / 2% OFFSET FOR UBS*	0.0070	99.299	136.016
HFU1B212A	B	M2	2	2	102.293	142.744	0.117	16	B1I / 2% OFFSET FOR UBS*	0.0073	100.910	140.815
HFU1B213A	B	M2	2	2	101.516	137.042	0.117	16	B1I / 2% OFFSET FOR UBS*	0.0073	99.987	134.978
HFU1C111A	C	M1	3	1	108.913	131.574	0.112	16	B1I / 2% OFFSET FOR UBS*	0.0070	103.133	124.592
HFU1C112A	C	M1	3	1	106.393	147.865	0.112	16	B1I / 2% OFFSET FOR UBS*	0.0070	100.702	139.956
HFU1C113A	C	M1	3	1	96.980	136.976	0.112	16	B1I / 2% OFFSET FOR UBS*	0.0070	91.819	129.688
HFU1C211A	C	M2	3	2	105.449	141.952	0.108	16	B1I / 2% OFFSET FOR UBS*	0.0068	96.202	129.503
HFU1C212A	C	M2	3	2	107.807	133.007	0.118	16	B1I / 2% OFFSET FOR UBS*	0.0074	107.655	132.819
HFU1C213A	C	M2	3	2	111.257	137.078	0.117	16	B1I / 2% OFFSET FOR UBS*	0.0073	110.396	136.017
									Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)			
				Average	**107.49**	**141.16**				**Average**	**0.0071**	**103.24**	**135.55**
				Standard Dev.	**6.82**	**5.54**				**Standard Dev.**		**7.58**	**6.70**
				Coeff. of Var. [%]	**6.34**	**3.92**				**Coeff. of Var. [%]**		**7.34**	**4.95**
				Min.	**96.98**	**131.45**				**Min.**	**0.0066**	**91.82**	**124.34**
				Max.	**126.85**	**148.76**				**Max.**	**0.0075**	**121.01**	**147.83**
				Number of Spec.	**19**	**19**				**Number of Spec.**	**19**	**19**	**19**


Laminate Single Shear Bearing Properties (SSB1) -- (RTD)
2% Offset Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
1
2
3
-1
4
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140

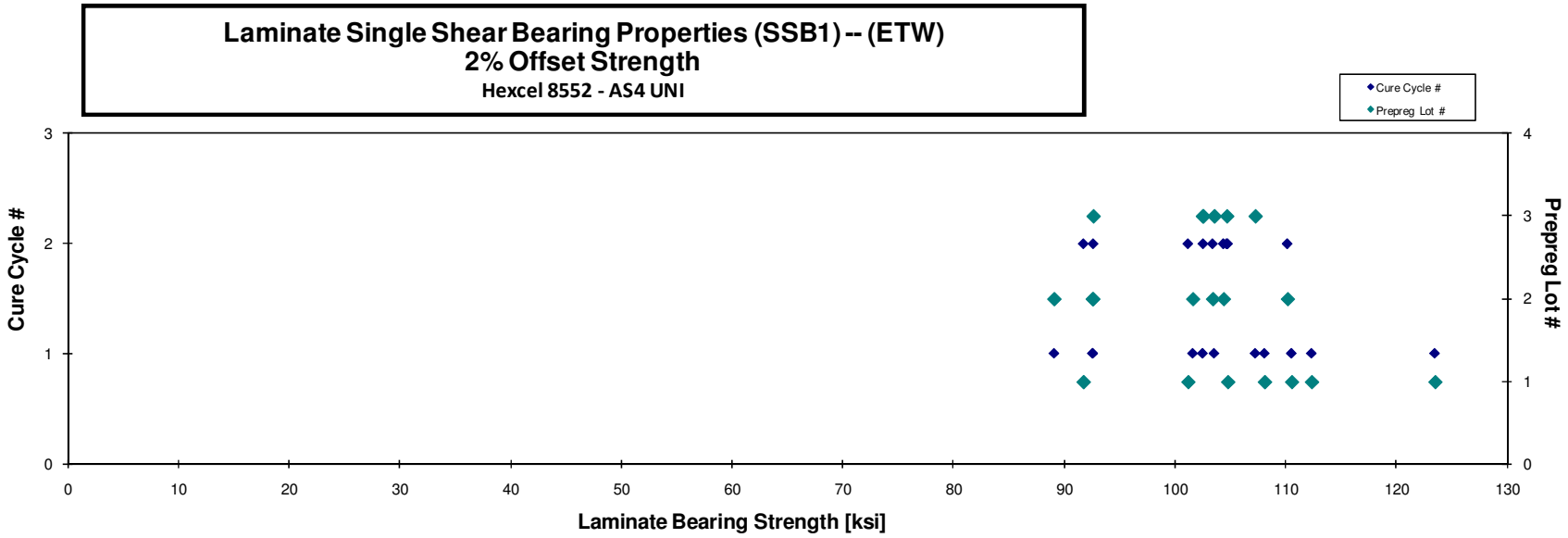
Laminate Single Shear Bearing Properties (SSB1) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Bearing Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Bearing Strength$_{norm}$ [ksi]
HFU1A116D	A	M1	1	1	108.099	119.231	0.119	16	B1I / 2% OFFSET FOR UBS*	0.0075	108.905	120.121
HFU1A117D	A	M1	1	1	110.542	120.369	0.114	16	B1I / 2% OFFSET FOR UBS*	0.0071	106.030	115.456
HFU1A118D	A	M1	1	1	123.458	123.770	0.105	16	B1I / 2% OFFSET FOR UBS*	0.0066	109.468	109.745
HFU1A119D	A	M1	1	1	112.341	116.482	0.110	16	B1I / 2% OFFSET FOR UBS*	0.0069	104.149	107.989
HFU1A216D	A	M2	1	2	91.767	106.389	0.110	16	B1I / 2% OFFSET FOR UBS*	0.0069	85.567	99.200
HFU1A217D	A	M2	1	2	104.787	112.441	0.113	16	B1I / 2% OFFSET FOR UBS*	0.0070	99.624	106.902
HFU1A218D	A	M2	1	2	101.203	107.407	0.115	16	B1I / 2% OFFSET FOR UBS*	0.0072	98.696	104.746
HFU1B116D	B	M1	2	1	92.597	110.941	0.112	16	B1I / 2% OFFSET FOR UBS*	0.0070	87.422	104.741
HFU1B117D	B	M1	2	1	92.623	112.184	0.107	16	B1I / 2% OFFSET FOR UBS*	0.0067	84.044	101.793
HFU1B118D	B	M1	2	1	101.633	105.976	0.111	16	B1I / 2% OFFSET FOR UBS*	0.0070	95.667	99.755
HFU1B119D	B	M1	2	1	89.123	101.482	0.116	16	B1I / 2% OFFSET FOR UBS*	0.0073	87.542	99.682
HFU1B216D	B	M2	2	2	104.402	113.748	0.116	16	B1I / 2% OFFSET FOR UBS*	0.0073	102.462	111.635
HFU1B217D	B	M2	2	2	103.431	111.119	0.111	16	B1I / 2% OFFSET FOR UBS*	0.0069	96.777	103.970
HFU1B218D	B	M2	2	2	110.169	123.078	0.110	16	B1I / 2% OFFSET FOR UBS*	0.0069	102.539	114.554
HFU1C116D	C	M1	3	1	103.566	109.329	0.113	16	B1I / 2% OFFSET FOR UBS*	0.0071	98.726	104.219
HFU1C117D	C	M1	3	1	107.265	109.572	0.114	16	B1I / 2% OFFSET FOR UBS*	0.0071	102.917	105.130
HFU1C118D	C	M1	3	1	102.525	108.024	0.116	16	B1I / 2% OFFSET FOR UBS*	0.0073	100.620	106.016
HFU1C216D	C	M2	3	2	92.661	109.273	0.113	16	B1I / 2% OFFSET FOR UBS*	0.0071	88.461	104.320
HFU1C217D	C	M2	3	2	104.694	109.109	0.108	16	B1I / 2% OFFSET FOR UBS*	0.0067	95.365	99.387
HFU1C218D	C	M2	3	2	102.563	109.371	0.111	16	B1I / 2% OFFSET FOR UBS*	0.0070	96.558	102.967

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

Average	**102.97**	**111.96**	**Average**	**0.0070**	**97.58**	**106.12**
Standard Dev.	**8.32**	**5.89**	**Standard Dev.**		**7.62**	**5.72**
Coeff. of Var. [%]	**8.08**	**5.26**	**Coeff. of Var. [%]**		**7.80**	**5.39**
Min.	**89.12**	**101.48**	**Min.**	**0.0066**	**84.04**	**99.20**
Max.	**123.46**	**123.77**	**Max.**	**0.0075**	**109.47**	**120.12**
Number of Spec.	**20**	**20**	**Number of Spec.**	**20**	**20**	**20**


Laminate Single Shear Bearing Properties (SSB1) -- (ETW)
2% Offset Strength
Hexcel 8552 - AS4 UNI
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
0
1
2
3
4

4.29 Single Shear Bearing 2 Properties

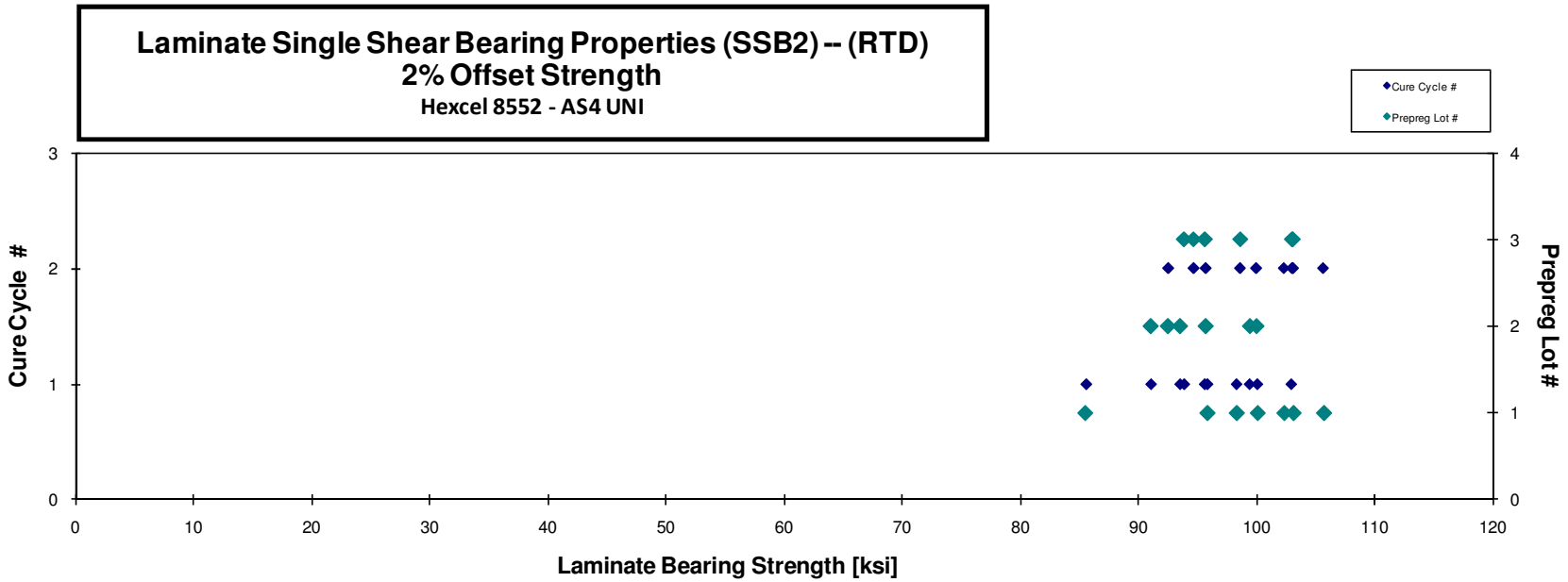
Laminate Single Shear Bearing Properties (SSB2) -- (RTD) Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Bearing Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Bearing Strength$_{norm}$ [ksi]
HFU2A111A	A	M1	1	1	93.761	147.998	0.135	20	B1I / 2% OFFSET FOR UBS*	0.0068	85.536	135.014
HFU2A112A	A	M1	1	1	100.953	145.815	0.141	20	B1I / 2% OFFSET FOR UBS*	0.0070	95.837	138.426
HFU2A113A	A	M1	1	1	103.776	148.099	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	98.307	140.294
HFU2A114A	A	M1	1	1	105.313	146.419	0.141	20	B1I / 2% OFFSET FOR UBS*	0.0070	100.071	139.131
HFU2A211A	A	M2	1	2	108.137	153.636	0.141	20	B1I / 2% OFFSET FOR UBS*	0.0071	103.096	146.474
HFU2A212A	A	M2	1	2	102.744	148.193	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0074	102.316	147.575
HFU2A213A	A	M2	1	2	108.202	142.688	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	105.655	139.330
HFU2B111A	B	M1	2	1	102.331	144.474	0.135	20	B1I / 2% OFFSET FOR UBS*	0.0068	93.515	132.028
HFU2B112A	B	M1	2	1	96.270	141.655	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	91.044	133.966
HFU2B113A	B	M1	2	1	105.181	146.676	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	99.413	138.632
HFU2B211A	B	M2	2	2	106.825	153.528	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0069	99.968	143.673
HFU2B212A	B	M2	2	2	96.973	142.233	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	95.684	140.343
HFU2B213A	B	M2	2	2	94.811	130.186	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	92.504	127.019
HFU2C111A	C	M1	3	1	107.309	146.287	0.132	20	B1I / 2% OFFSET FOR UBS*	0.0066	95.611	130.340
HFU2C112A	C	M1	3	1	102.651	146.666	0.135	20	B1I / 2% OFFSET FOR UBS*	0.0068	93.854	134.097
HFU2C113A	C	M1	3	1	103.714	143.334	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0073	102.955	142.285
HFU2C211A	C	M2	3	2	99.858	144.564	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	94.651	137.026
HFU2C212A	C	M2	3	2	99.225	139.974	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0074	98.599	139.092
HFU2C213A	C	M2	3	2	104.401	136.567	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	103.026	134.767
									Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)			

Average	**102.233**	**144.684**	
Standard Dev.	**4.420**	**5.413**	
Coeff. of Var. [%]	**4.323**	**3.741**	
Min.	**93.761**	**130.186**	
Max.	**108.202**	**153.636**	
Number of Spec.	**19**	**19**	

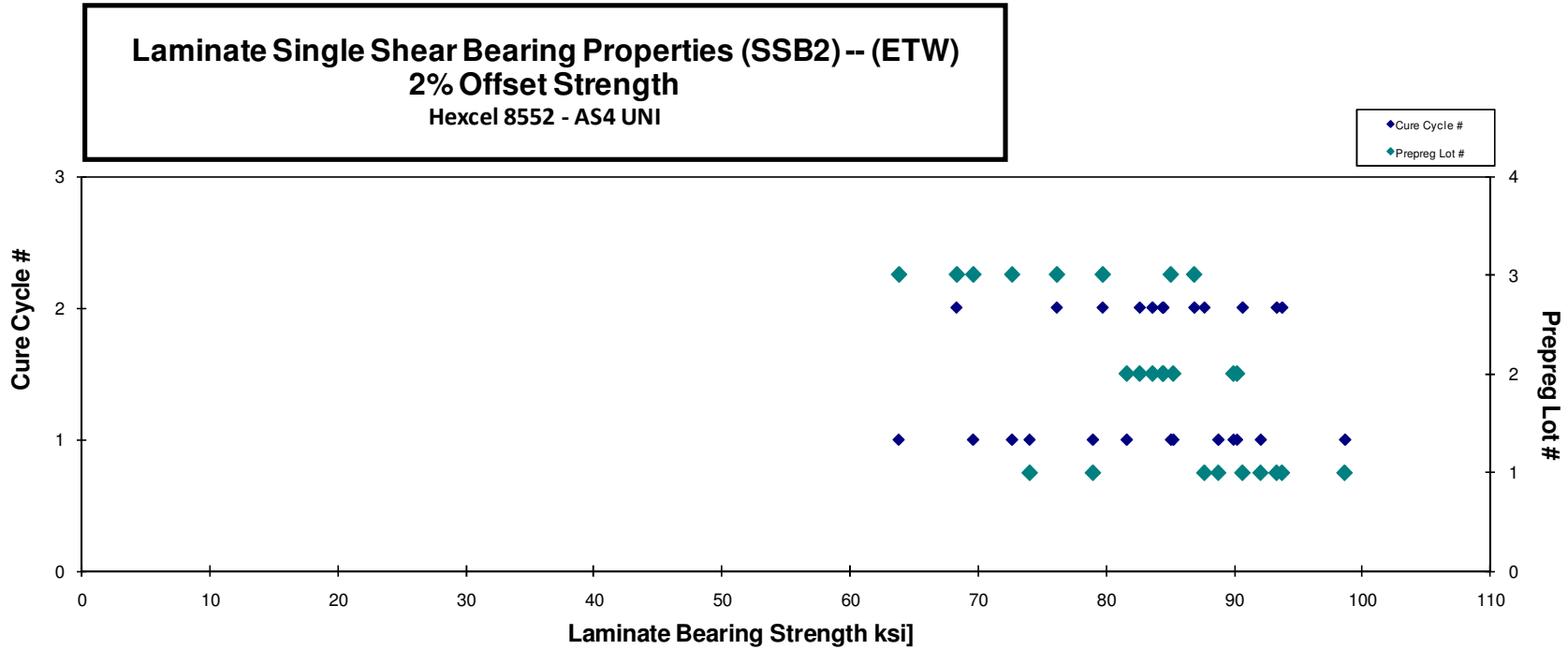
Average	**0.0071**	**97.455**	**137.869**
Standard Dev.		**5.034**	**5.249**
Coeff. of Var. [%]		**5.166**	**3.808**
Min.	**0.0066**	**85.536**	**127.019**
Max.	**0.0074**	**105.655**	**147.575**
Number of Spec.	**19**	**19**	**19**


Laminate Single Shear Bearing Properties (SSB2) -- (RTD)
2% Offset Strength
Hexcel 8552 - AS4 UNI
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 (SSB2) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Bearing Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Bearing Strength$_{norm}$ [ksi]
HFU2A116D	A	M1	1	1	103.451	118.301	0.141	20	B1I / 2% OFFSET FOR UBS*	0.0071	98.605	112.759
HFU2A117D	A	M1	1	1	83.820	112.859	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0070	78.949	106.301
HFU2A118D	A	M1	1	1	88.999	112.075	0.148	20	B1I / 2% OFFSET FOR UBS*	0.0074	88.739	111.747
HFU2A119D	A	M1	1	1	74.772	113.450	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0073	74.014	112.300
HFU2A11AD	A	M1	1	1	93.308	112.736	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	92.037	111.200
HFU2A216D	A	M2	1	2	93.632	112.567	0.148	20	B1I / 2% OFFSET FOR UBS*	0.0074	93.705	112.655
HFU2A217D	A	M2	1	2	98.638	115.295	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	93.284	109.037
HFU2A218D	A	M2	1	2	94.150	110.528	0.142	20	B1I / 2% OFFSET FOR UBS*	0.0071	90.620	106.384
HFU2A21AD	A	M2	1	2	92.581	115.742	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	87.649	109.576
HFU2B116D	B	M1	2	1	94.825	115.293	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	89.913	109.321
HFU2B117D	B	M1	2	1	91.129	122.500	0.133	20	B1I / 2% OFFSET FOR UBS*	0.0066	81.595	109.684
HFU2B118D	B	M1	2	1	90.439	110.737	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0070	85.224	104.352
HFU2B119D	B	M1	2	1	92.261	112.455	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	90.194	109.935
HFU2B216D	B	M2	2	2	90.559	119.974	0.135	20	B1I / 2% OFFSET FOR UBS*	0.0068	82.605	109.436
HFU2B217D	B	M2	2	2	90.246	114.847	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0069	84.453	107.475
HFU2B218D	B	M2	2	2	84.817	102.636	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	83.594	101.157
HFU2B219D	B	M2	2	2	88.636	108.078	0.141	20	B1I / 2% OFFSET FOR UBS*	0.0070	84.394	102.905
HFU2C116D	C	M1	3	1	75.498	105.488	0.136	20	B1I / 2% OFFSET FOR UBS*	0.0068	69.614	97.268
HFU2C117D	C	M1	3	1	78.361	105.013	0.137	20	B1I / 2% OFFSET FOR UBS*	0.0069	72.642	97.350
HFU2C118D	C	M1	3	1	68.501	106.235	0.138	20	B1I / 2% OFFSET FOR UBS*	0.0069	63.811	98.961
HFU2C119D	C	M1	3	1	85.810	107.503	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0073	85.037	106.535
HFU2C216D	C	M2	3	2	80.887	103.394	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	79.712	101.892
HFU2C217D	C	M2	3	2	72.448	114.630	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	68.320	108.098
HFU2C218D	C	M2	3	2	78.135	103.982	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	76.138	101.324
HFU2C219D	C	M2	3	2	90.787	110.136	0.142	20	B1I / 2% OFFSET FOR UBS*	0.0071	86.861	105.374
									Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)			
				Average	**87.068**	**111.458**				**Average**	**0.0071**	**83.268**	**106.521**
				Standard Dev.	**8.604**	**5.221**				**Standard Dev.**		**8.688**	**4.741**
				Coeff. of Var. [%]	**9.882**	**4.684**				**Coeff. of Var. [%]**		**10.434**	**4.451**
				Min.	**68.501**	**102.636**				**Min.**	**0.0066**	**63.811**	**97.268**
				Max.	**103.451**	**122.500**				**Max.**	**0.0074**	**98.605**	**112.759**
				Number of Spec.	**25**	**25**				**Number of Spec.**	**25**	**25**	**25**

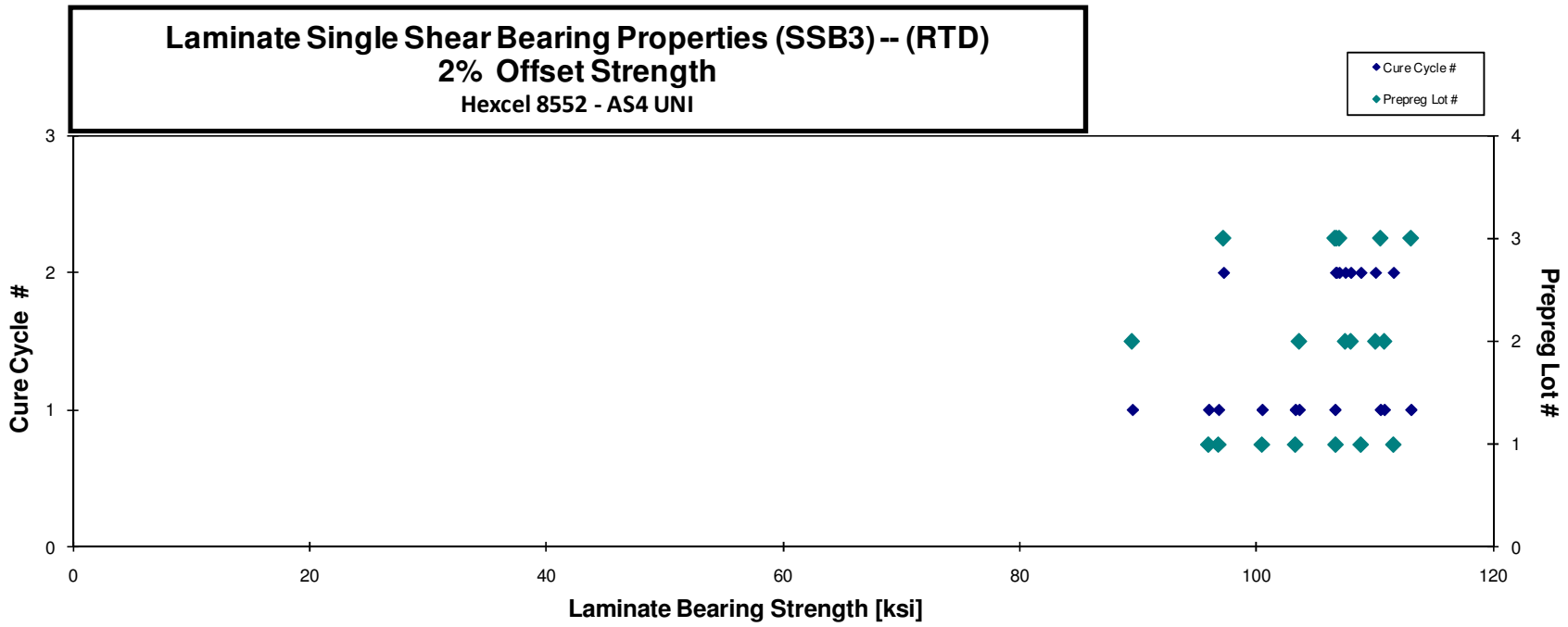

Laminate Single Shear Bearing Properties (SSB2) -- (ETW)
2% Offset Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength ksi]
0
10
20
30
40
50
60
70
80
90
100
110
0
1
2
3
4

4.30 Single Shear Bearing 3 Properties

Laminate Single Shear Bearing Properties (SSB3) -- (RTD) Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Bearing Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Bearing Strength$_{norm}$ [ksi]
HFU3A111A	A	M1	1	1	104.798	142.200	0.142	20	B1I / 2% OFFSET FOR UBS*	0.0071	100.491	136.356
HFU3A112A	A	M1	1	1	98.379	143.001	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	95.975	139.507
HFU3A113A	A	M1	1	1	98.430	137.638	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	96.811	135.375
HFU3A114A	A	M1	1	1	105.786	137.193	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	103.297	133.964
HFU3A211A	A	M2	1	2	108.533	142.920	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	106.699	140.506
HFU3A212A	A	M2	1	2	110.833	142.340	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0073	108.823	139.759
HFU3A213A	A	M2	1	2	112.837	119.977	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	111.579	118.639
HFU3B112A	B	M1	2	1	106.595	138.537	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	103.618	134.668
HFU3B113A	B	M1	2	1	91.344	134.136	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0073	89.524	131.462
HFU3B114A	B	M1	2	1	113.283	128.762	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	110.808	125.949
HFU3B211A	B	M2	2	2	117.556	146.840	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0069	110.063	137.480
HFU3B212A	B	M2	2	2	110.242	139.296	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	107.510	135.845
HFU3B213A	B	M2	2	2	110.254	132.488	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	107.970	129.743
HFU3C112A	C	M1	3	1	113.487	117.484	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	110.483	114.375
HFU3C113A	C	M1	3	1	116.417	139.969	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	113.048	135.918
HFU3C114A	C	M1	3	1	110.300	139.564	0.143	20	B1I / 2% OFFSET FOR UBS*	0.0072	106.636	134.928
HFU3C212A	C	M2	3	2	111.039	144.709	0.142	20	B1I / 2% OFFSET FOR UBS*	0.0071	106.775	139.152
HFU3C213A	C	M2	3	2	112.703	144.693	0.141	20	B1I / 2% OFFSET FOR UBS*	0.0070	107.005	137.377
HFU3C214A	C	M2	3	2	102.528	139.723	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	97.216	132.485
									Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)			
				Average	**108.176**	**137.446**				**Average**	**0.0072**	**104.965**	**133.342**
				Standard Dev.	**6.69**	**7.95**				**Standard Dev.**		**6.30**	**6.98**
				Coeff. of Var. [%]	**6.19**	**5.78**				**Coeff. of Var. [%]**		**6.00**	**5.23**
				Min.	**91.34**	**117.48**				**Min.**	**0.0069**	**89.52**	**114.38**
				Max.	**117.56**	**146.84**				**Max.**	**0.0073**	**113.05**	**140.51**
				Number of Spec.	**19**	**19**				**Number of Spec.**	**19**	**19**	**19**


Laminate Single Shear Bearing Properties (SSB3) -- (RTD)
2% Offset Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
20
40
60
80
100
120
0
1
2
3
4

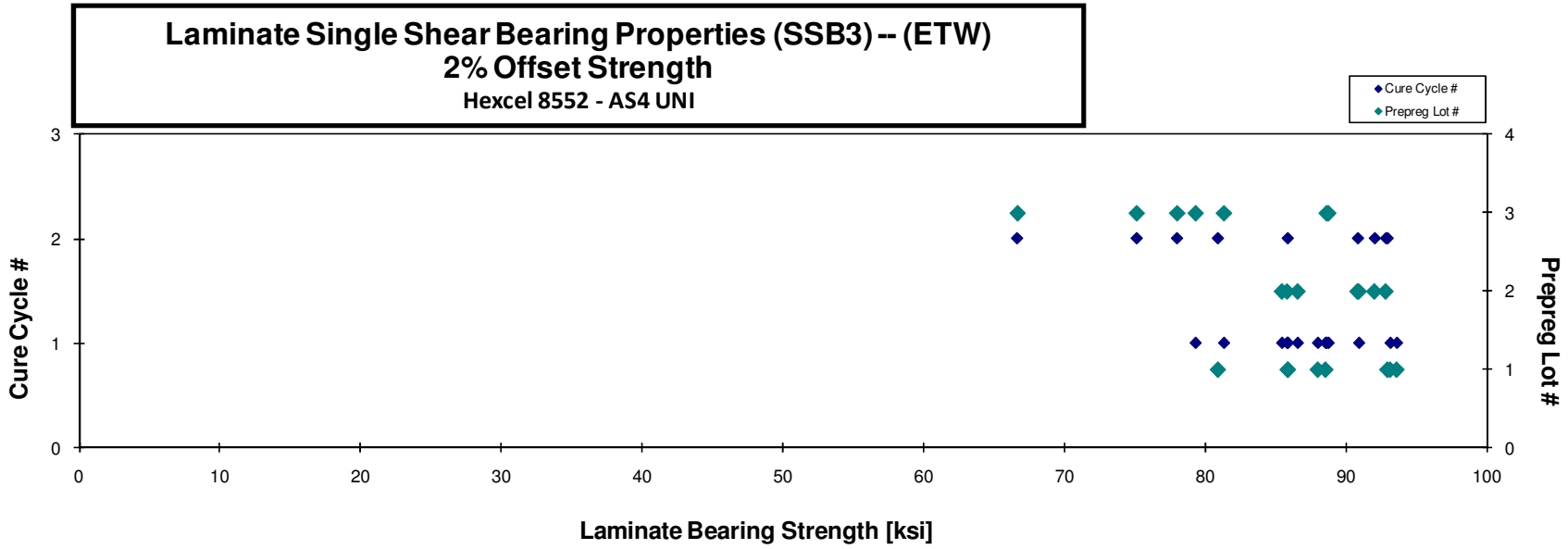
Laminate Single Shear Bearing Properties (SSB3) -- (ETW)
Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Bearing Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]	Ultimate Bearing Strength$_{norm}$ [ksi]
HFU3A116D	A	M1	1	1	95.990	115.399	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	93.590	112.514
HFU3A117D	A	M1	1	1	92.838	106.545	0.148	20	B1I / 2% OFFSET FOR UBS*	0.0074	93.121	106.869
HFU3A118D	A	M1	1	1	88.095	105.194	0.148	20	B1I / 2% OFFSET FOR UBS*	0.0074	87.966	105.040
HFU3A119D	A	M1	1	1	85.793	104.746	0.148	20	B1I / 2% OFFSET FOR UBS*	0.0074	85.841	104.805
HFU3A11AD	A	M1	1	1	88.673	111.954	0.148	20	B1I / 2% OFFSET FOR UBS*	0.0074	88.513	111.753
HFU3A216D	A	M2	1	2	94.933	118.001	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	92.923	115.503
HFU3A217D	A	M2	1	2	85.276	112.552	0.149	20	B1I / 2% OFFSET FOR UBS*	0.0074	85.833	113.287
HFU3A218D	A	M2	1	2	80.163	104.162	0.149	20	B1I / 2% OFFSET FOR UBS*	0.0075	80.858	105.065
HFU3B116D	B	M1	2	1	93.572	107.986	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	90.895	104.897
HFU3B117D	B	M1	2	1	87.704	102.935	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	86.539	101.567
HFU3B118D	B	M1	2	1	87.142	103.413	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	85.788	101.805
HFU3B119D	B	M1	2	1	85.747	99.806	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0074	85.418	99.424
HFU3B217D	B	M2	2	2	91.487	102.688	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0073	90.807	101.924
HFU3B218D	B	M2	2	2	92.789	107.757	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0073	92.005	106.847
HFU3B219D	B	M2	2	2	93.232	117.376	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0074	92.802	116.834
HFU3C116D	C	M1	3	1	83.745	105.337	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	81.293	102.253
HFU3C117D	C	M1	3	1	80.450	105.811	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	79.281	104.274
HFU3C118D	C	M1	3	1	90.593	109.548	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	88.726	107.290
HFU3C119D	C	M1	3	1	90.483	108.642	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	88.608	106.391
HFU3C216D	C	M2	3	2	79.331	109.297	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	75.087	103.451
HFU3C217D	C	M2	3	2	67.204	102.183	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0073	66.591	101.251
HFU3C218D	C	M2	3	2	79.037	106.598	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	77.960	105.145

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

Average	**87.013**	**107.633**	**Average**	**0.0073**	**85.93**	**106.28**
Standard Dev.	**6.77**	**4.91**	**Standard Dev.**		**6.78**	**4.81**
Coeff. of Var. [%]	**7.78**	**4.56**	**Coeff. of Var. [%]**		**7.89**	**4.53**
Min.	**67.20**	**99.81**	**Min.**	**0.0070**	**66.59**	**99.42**
Max.	**95.99**	**118.00**	**Max.**	**0.0075**	**93.59**	**116.83**
Number of Spec.	**22**	**22**	**Number of Spec.**	**22**	**22**	**22**


Laminate Single Shear Bearing Properties (SSB3) -- (ETW)
2% Offset Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4

4.31 Compression Strength After Impact 1 Properties

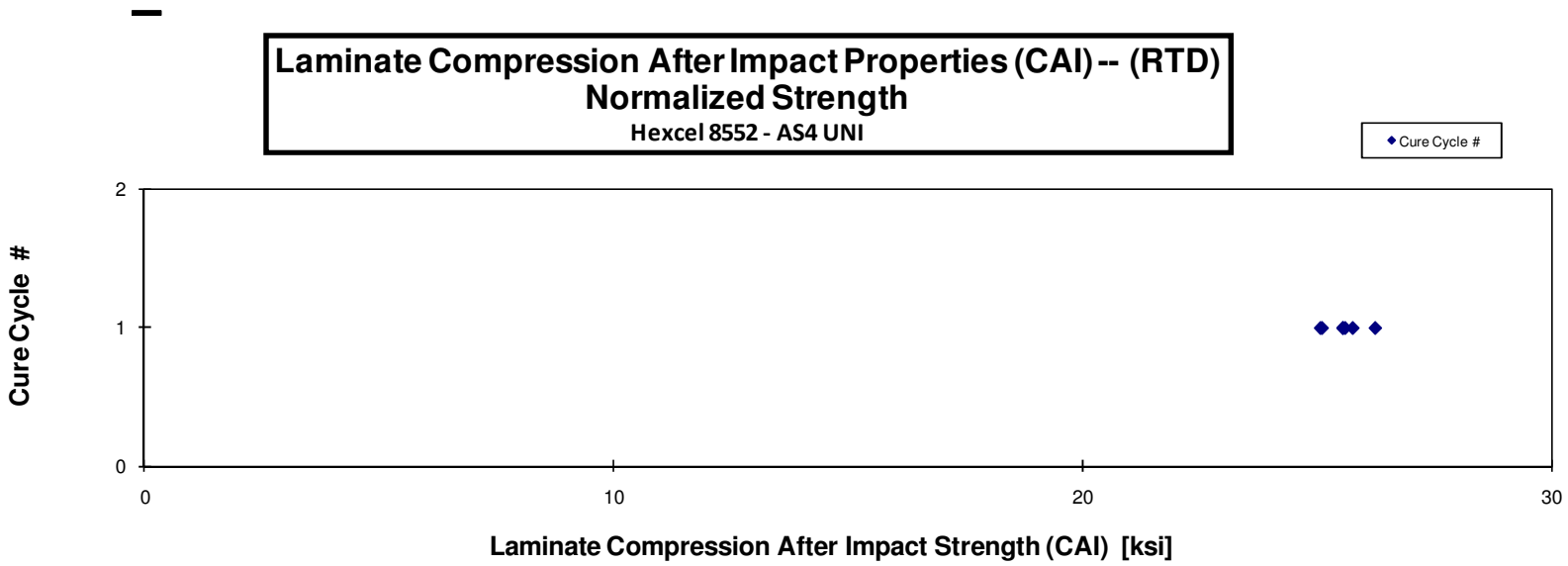
Laminate Compression After Impact Properties (CAI) -- (RTD) Strength
Hexcel 8552 - AS4 UNI

normalizing t_{ply} [in]: 0.0074

Specimen Number	Hexcel Batch #	Hexcel 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]
HFUKA111A	A	M1	1	1	264.88	25.766	0.176	24	LDM	0.0073	25.568
HFUKA112A	A	M1	1	1	266.30	26.386	0.177	24	LDM	0.0074	26.260
HFUKA113A	A	M1	1	1	264.50	25.594	0.177	24	LDM	0.0074	25.565
HFUKA114A	A	M1	1	1	268.33	25.391	0.179	24	LDM	0.0075	25.615
HFUKA115A	A	M1	1	1	264.40	25.062	0.178	24	LDM	0.0074	25.118
HFUKA116A	A	M1	1	1	265.93	25.887	0.177	24	LDM	0.0074	25.777
HFUKA117A	A	M1	1	1	268.50	24.828	0.179	24	LDM	0.0075	25.084

Average	25.559	
Standard Dev.	0.524	
Coeff. of Var. [%]	2.049	
Min.	24.828	
Max.	26.386	
Number of Spec.	7	

$Average_{norm}$	0.00740	25.570
$Standard\ Dev._{norm}$		0.400
$Coeff.\ of\ Var.\ [\%]_{norm}$		1.565
Min.	0.0073	25.084
Max.	0.0075	26.260
Number of Spec.		7

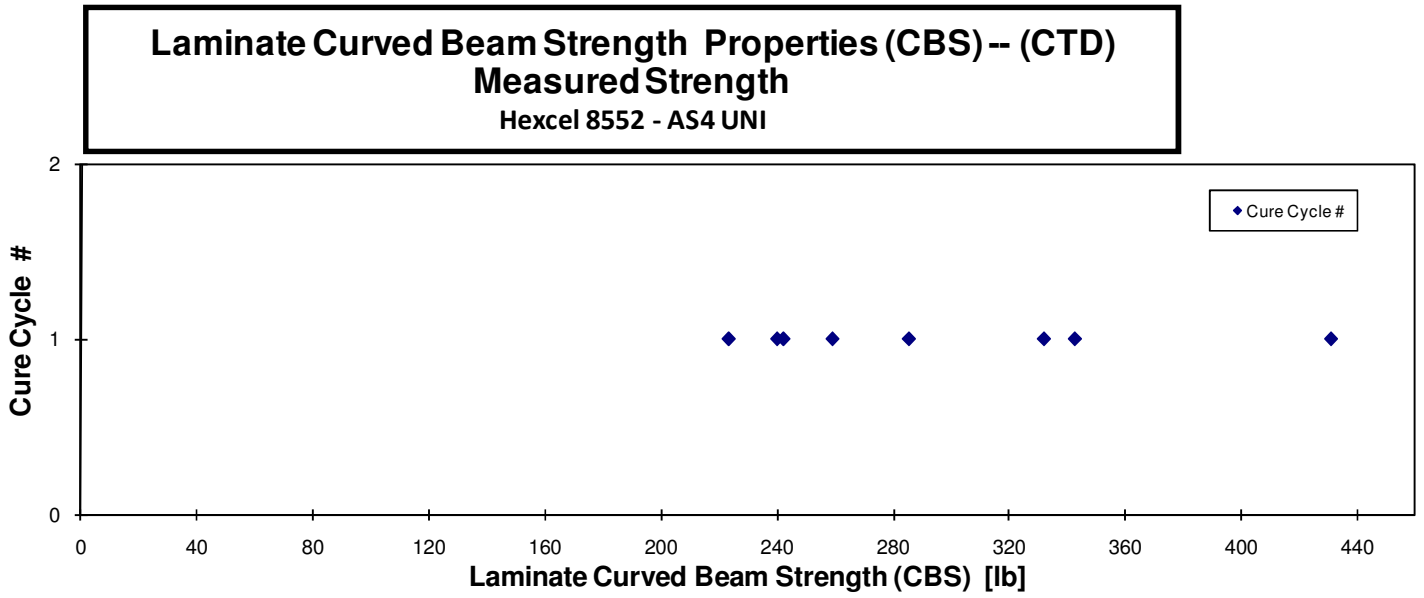

Laminate Compression After Impact Properties (CAI) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Cure Cycle #
2
1
0
0
10
20
30
Laminate Compression After Impact Strength (CAI) [ksi]

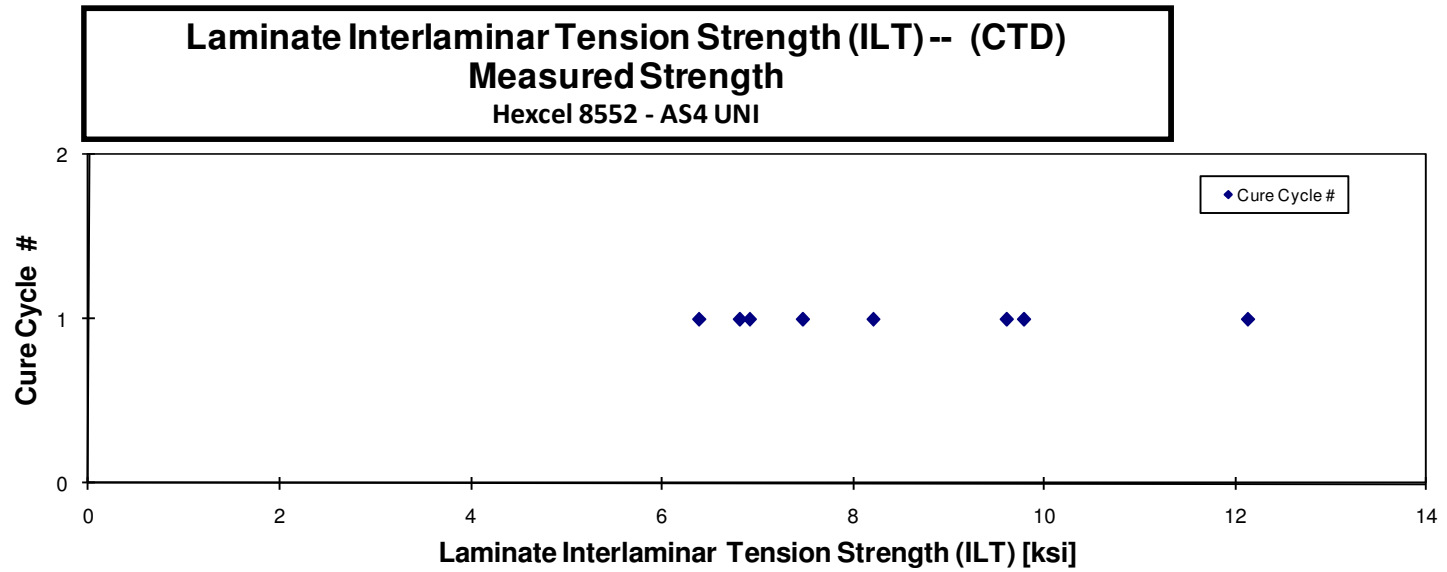
4.32 Interlaminar Tension Properties

Laminate Interlaminar Tension Strength Properties (ILT) -- (CTD) Strength
Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
HFUMA119B	A	M1	1	1	285.152	8.210	0.162	22
HFUMA11AB	A	M1	1	1	223.034	6.384	0.163	22
HFUMA11BB	A	M1	1	1	258.827	7.471	0.162	22
HFUMA11CB	A	M1	1	1	239.741	6.917	0.162	22
HFUMA11DB	A	M1	1	1	342.351	9.788	0.163	22
HFUMA11EB	A	M1	1	1	241.893	6.811	0.165	22
HFUMA11FB	A	M1	1	1	430.661	12.135	0.165	22
HFUMA11GB	A	M1	1	1	331.709	9.607	0.161	22

Average	**294.171**	**8.416**
Standard Dev.	**70.150**	**1.965**
Coeff. of Var. [%]	**23.847**	**23.347**
Min.	**223.034**	**6.384**
Max.	**430.661**	**12.135**
Number of Spec.	**8**	**8**


Laminate Curved Beam Strength Properties (CBS) -- (CTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Cure Cycle #
Laminate Curved Beam Strength (CBS) [lb]
0
1
2
0
40
80
120
160
200
240
280
320
360
400
440

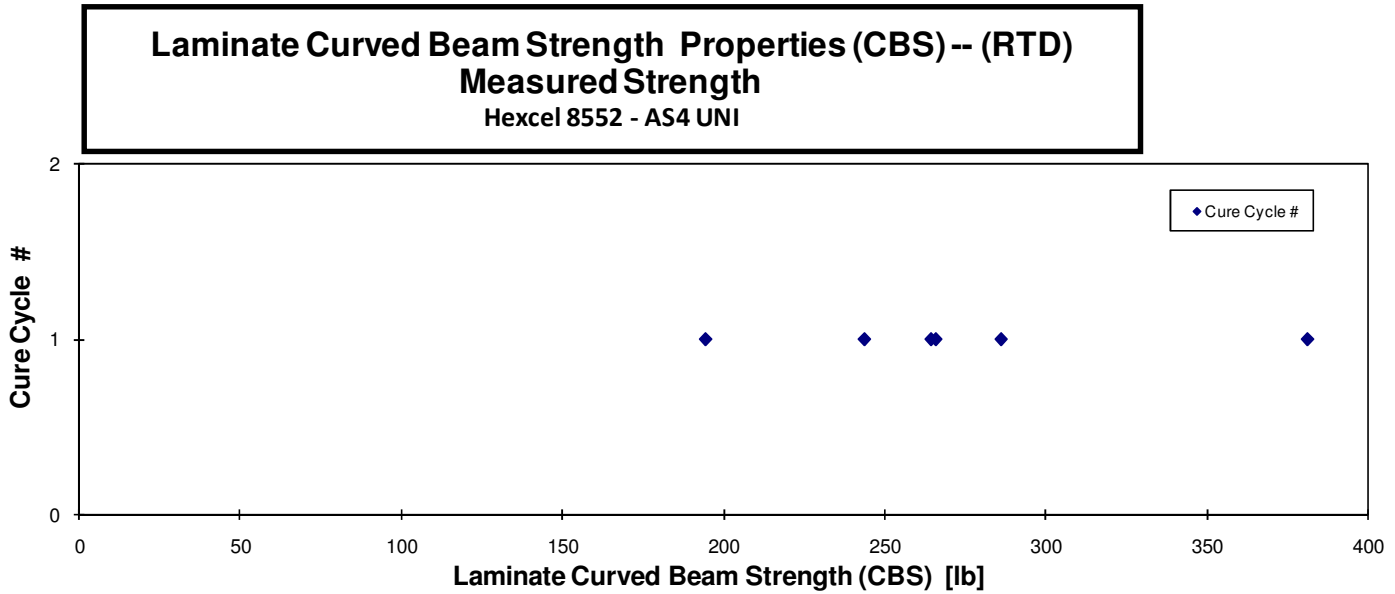

Laminate Interlaminar Tension Strength (ILT) -- (CTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Cure Cycle #
Laminate Interlaminar Tension Strength (ILT) [ksi]
0
1
2
0
2
4
6
8
10
12
14

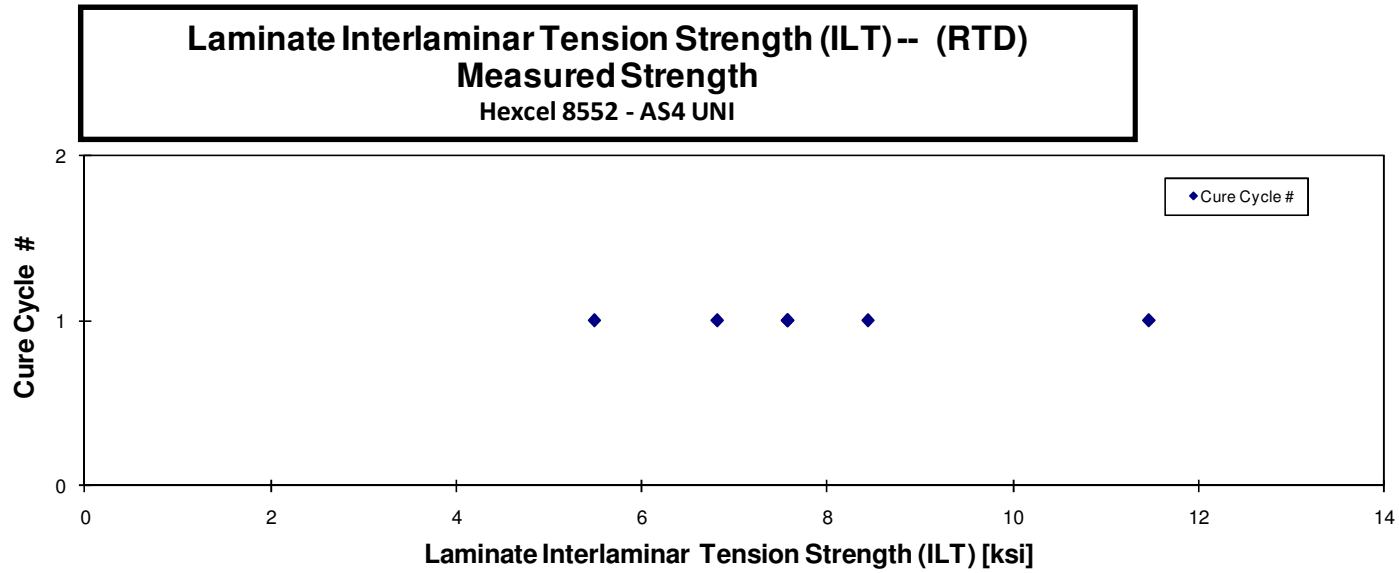
Laminate Interlaminar Tension Strength Properties (ILT) -- (RTD) Strength

Hexcel 8552 - AS4 UNI

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
HFUMA111A	A	M1	1	1	381.270	11.474	0.156	22
HFUMA112A	A	M1	1	1	286.203	8.444	0.159	22
HFUMA113A	A	M1	1	1	265.912	7.576	0.164	22
HFUMA114A	A	M1	1	1	243.757	6.817	0.166	22
HFUMA115A	A	M1	1	1	194.443	5.491	0.165	22
HFUMA116A	A	M1	1	1	264.439	7.575	0.163	22

Average	**272.671**	**7.896**
Standard Dev.	**61.719**	**2.013**
Coeff. of Var. [%]	**22.635**	**25.492**
Min.	**194.443**	**5.491**
Max.	**381.270**	**11.474**
Number of Spec.	**6**	**6**


Laminate Curved Beam Strength Properties (CBS) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Cure Cycle #
0
1
2
0
50
100
150
200
250
300
350
400
Laminate Curved Beam Strength (CBS) [lb]

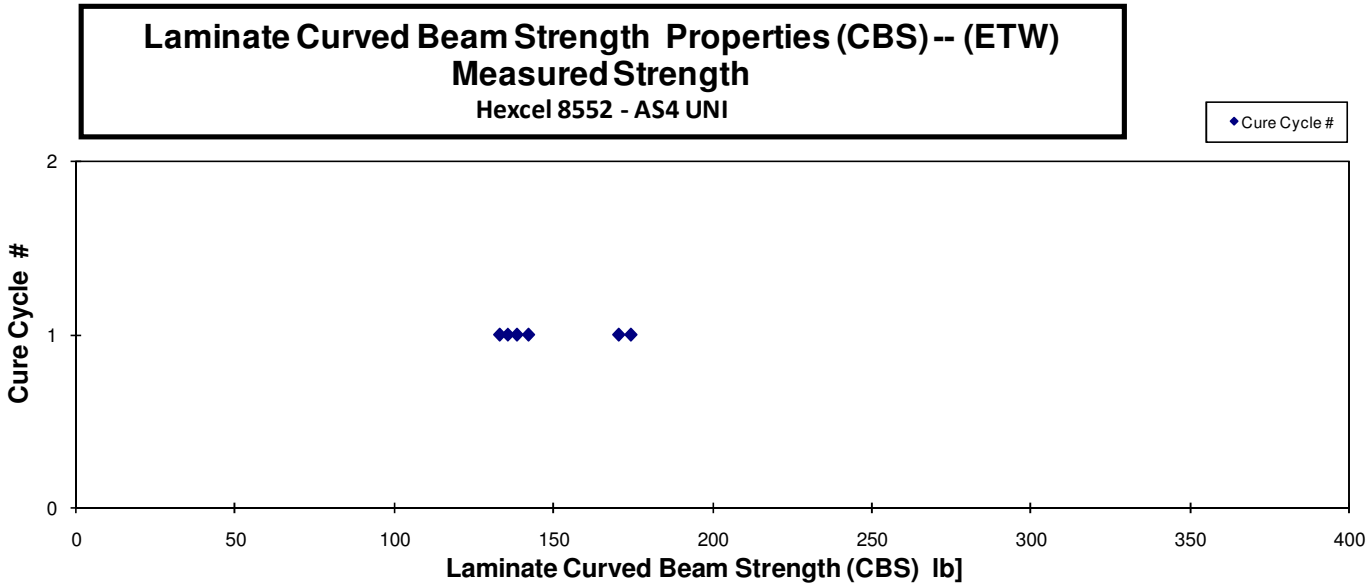

Laminate Interlaminar Tension Strength (ILT) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Cure Cycle #
0
1
2
0
2
4
6
8
10
12
14
Laminate Interlaminar Tension Strength (ILT) [ksi]

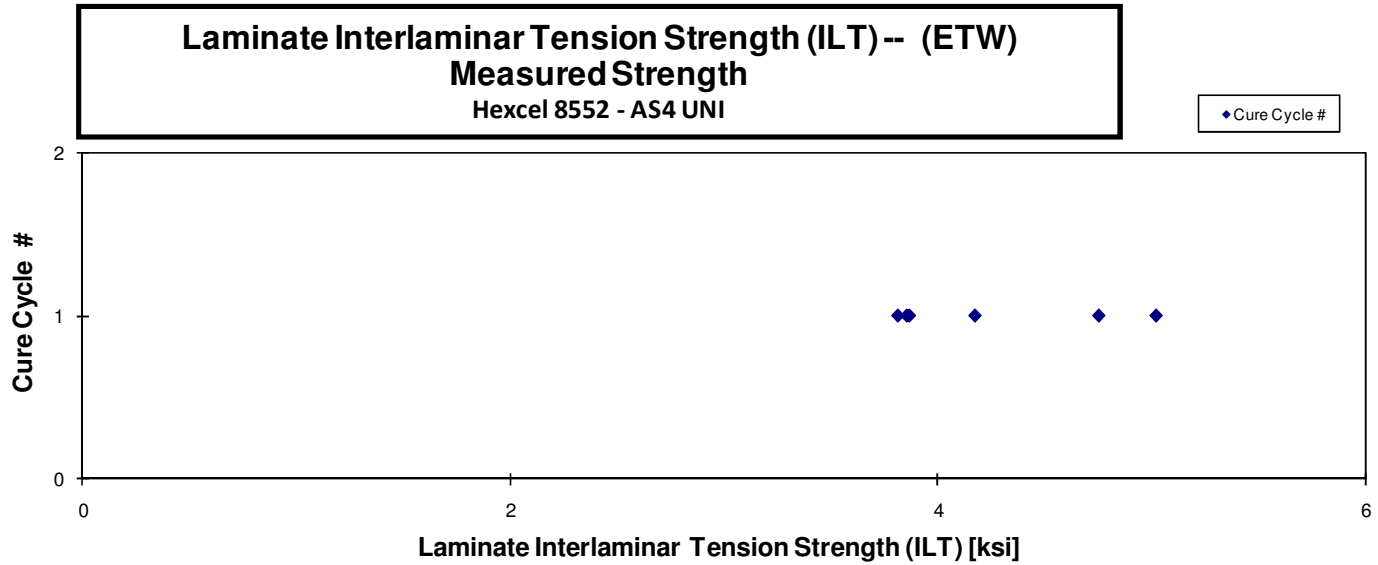
Laminate Interlaminar Tension Strength Properties (ILT) -- (ETW) Strength

Hexcel 8552 - AS4 UNI

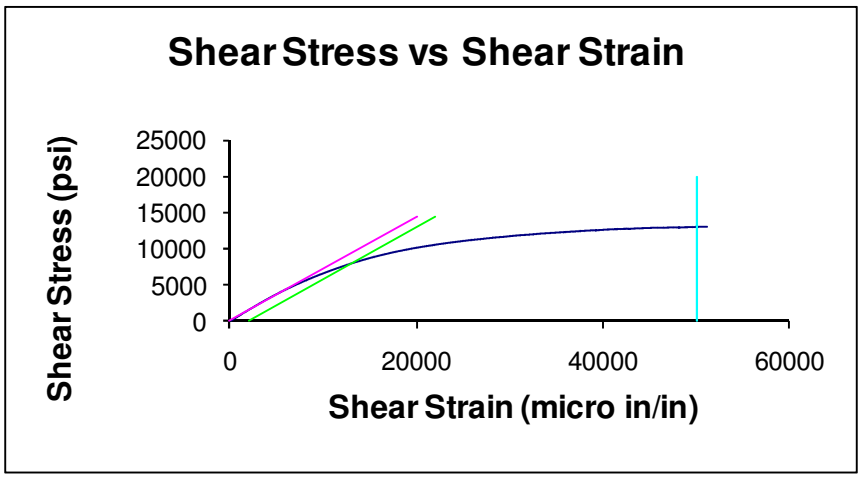
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
HFUMA11HD	A	M1	1	1	138.471	3.813	0.168	22
HFUMA11ID	A	M1	1	1	142.107	4.175	0.160	22
HFUMA11JD	A	M1	1	1	133.071	3.855	0.161	22
HFUMA11KD	A	M1	1	1	174.118	5.021	0.162	22
HFUMA11LD	A	M1	1	1	170.324	4.753	0.167	22
HFUMA11MD	A	M1	1	1	135.619	3.868	0.164	22

Average	**148.952**	**4.247**
Standard Dev.	**18.313**	**0.519**
Coeff. of Var. [%]	**12.294**	**12.214**
Min.	**133.071**	**3.813**
Max.	**174.118**	**5.021**
Number of Spec.	**6**	**6**


Laminate Curved Beam Strength Properties (CBS) -- (ETW)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Cure Cycle #
0
1
2
0
50
100
150
200
250
300
350
400
Laminate Curved Beam Strength (CBS) lb]


Laminate Interlaminar Tension Strength (ILT) -- (ETW)
Measured Strength
Hexcel 8552 - AS4 UNI
Cure Cycle #
Cure Cycle #
0
1
2
0
2
4
6
Laminate Interlaminar Tension Strength (ILT) [ksi]

5. Shear Stress vs. Shear Strain, RTD

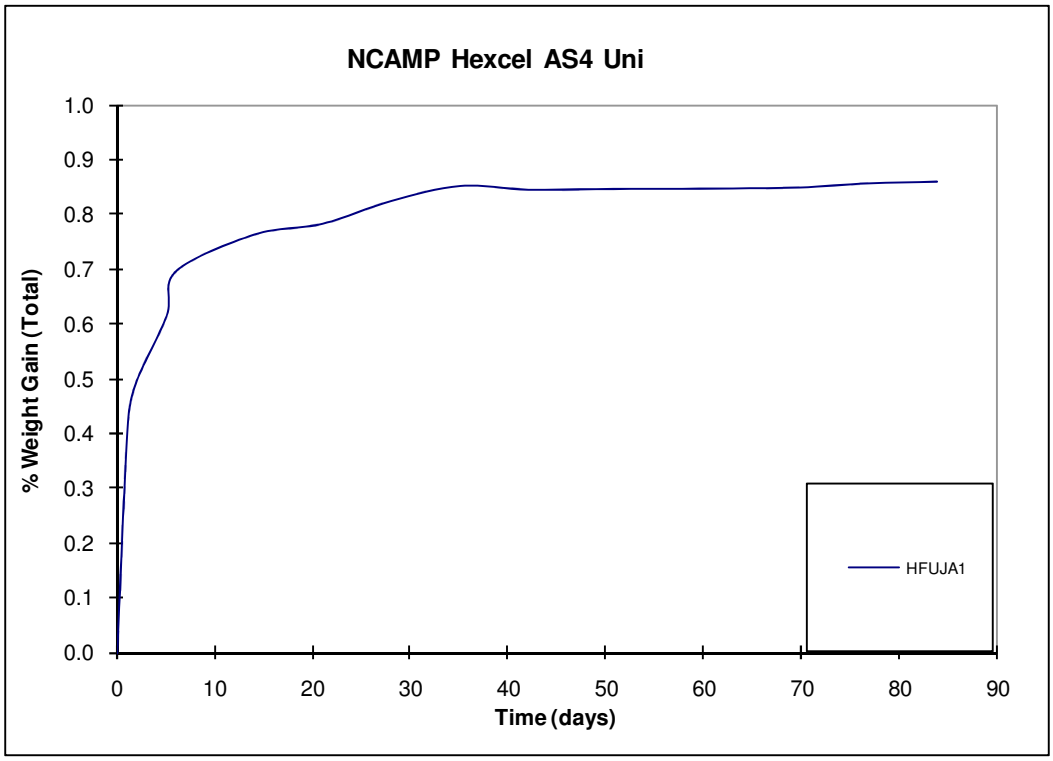


6. FLUID SENSITIVITY COMPARISON

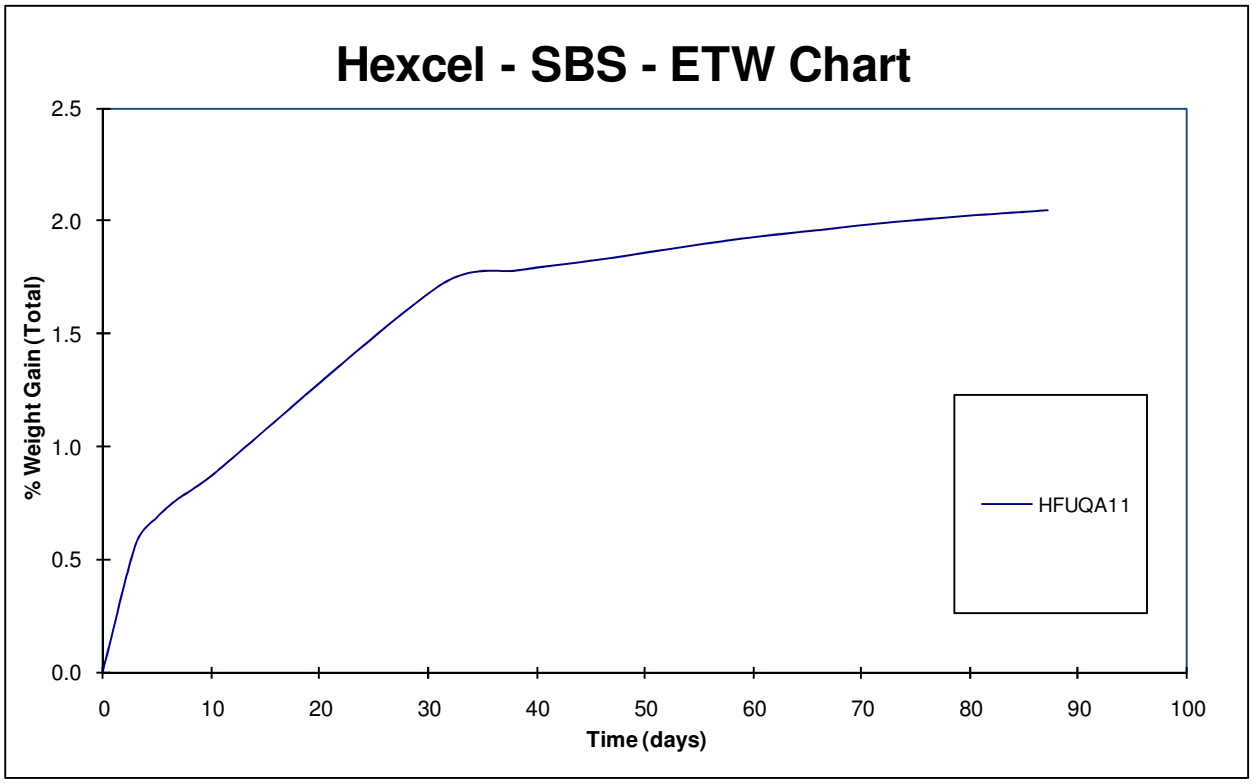
Fluid Sensitivity was not performed on this reinforcement. It was performed on Hexcel 8552 IM7 and AS4 Plain Weave.

7. MOISTURE CONDITIONING CHARTS

7.1 Longitudinal Tension– Thinnest Panel



7.2 Short Beam Strength- Thickest Panel



The chart above is missing two readings due to a chamber malfunction, but specimens remained in the chamber and were conditioned to equilibrium.

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

8. DMA Results

DMA Results Summary				
Hexcel / Cessna HXUDX XX Wet				
Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	Average		Average	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
HFUDA 1W	163.69	326.64	178.14	352.65
HFUDA 2W	161.49	322.68	175.73	348.31
HFUDA 1X	159.68	319.42	178.45	353.21
HFUDA 2X	159.27	318.68	177.75	351.94
HFUDB 1W	161.33	322.39	176.32	349.37
HFUDB 2W	161.80	323.23	177.18	350.92
HFUDB 1X	159.14	318.44	180.57	357.03
HFUDB 2X	158.62	317.51	173.41	344.13
HFUDC 1W	161.49	322.67	176.59	349.86
HFUDC 2W	162.67	324.81	176.65	349.96
HFUDC 1X	158.47	317.25	179.04	354.26
HFUDC 2X	159.34	318.80	178.79	353.82
Average		321.04		

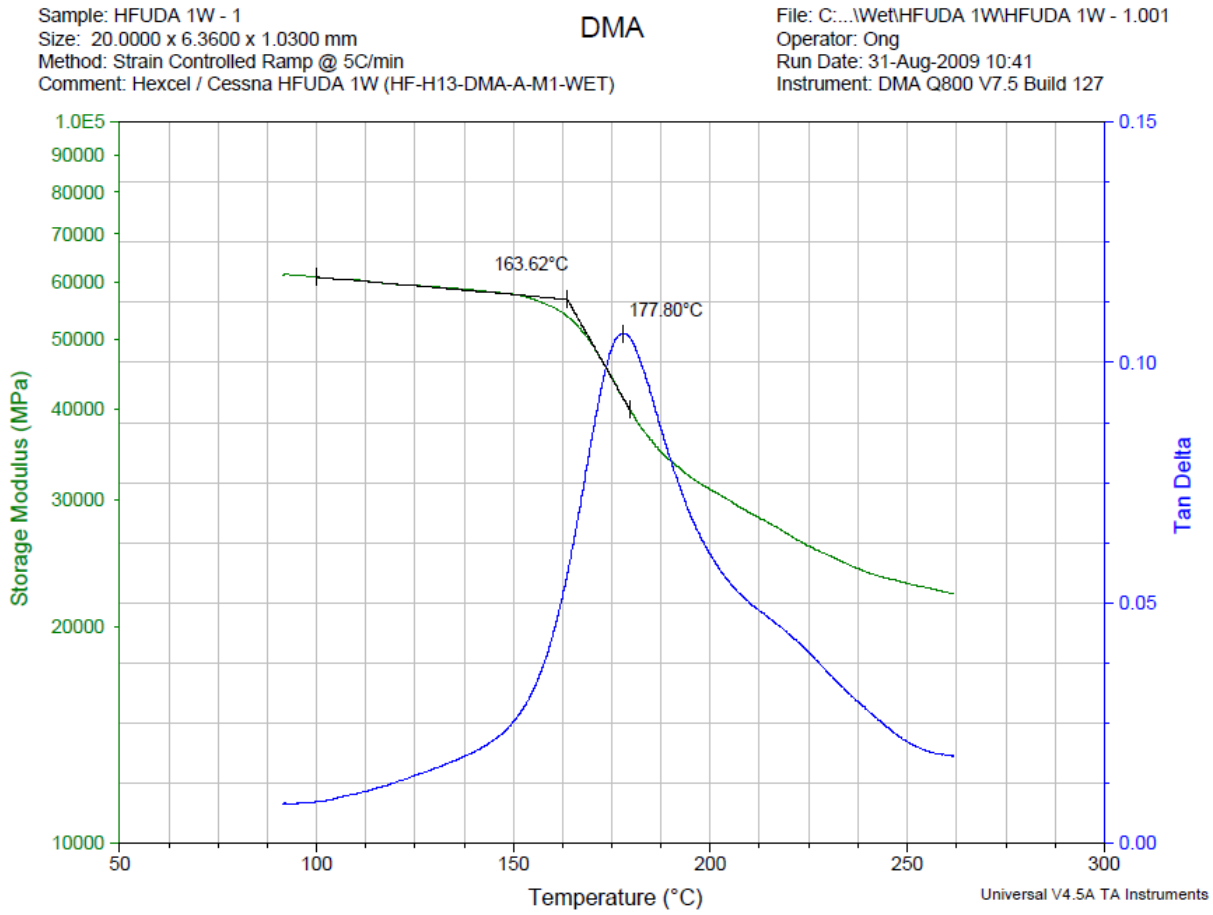
Table 8-1: DMA Wet Results

DMA Results Summary				
Hexcel / Cessna HXUDX XX Dry				
Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	Average		Average	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
HFUDA 1W	202.95	397.31	229.01	444.22
HFUDA 2W	203.73	398.71	230.22	446.39
HFUDA 1X	205.61	402.10	230.19	446.34
HFUDA 2X	205.52	401.94	230.52	446.93
HFUDB 1W	202.25	396.04	229.63	445.33
HFUDB 2W	204.64	400.35	231.17	448.10
HFUDB 1X	203.50	398.30	229.76	445.56
HFUDB 2X	206.58	403.84	233.79	452.82
HFUDC 1W	206.19	403.13	230.85	447.52
HFUDC 2W	200.87	393.57	225.39	437.69
HFUDC 1X	206.73	404.11	230.21	446.38
HFUDC 2X	206.57	403.83	229.71	445.47
Average		400.27		

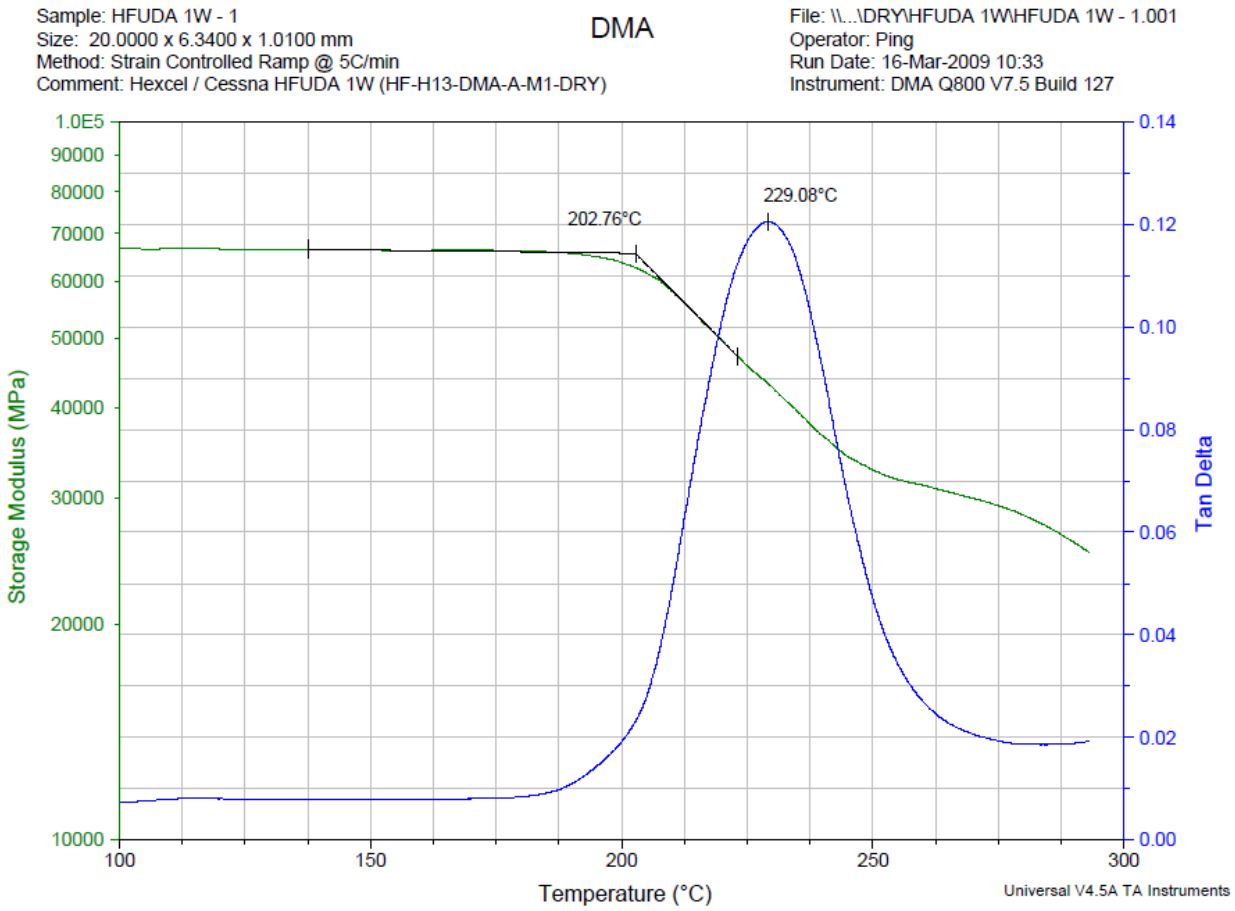
Table 8-2: DMA Dry Results

8.1 DMA Wet 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 Batch A



9. TMA Results

The TMA results were tested at Hexcel. Specimens were taken from the same panels as DMA and wet and dry testing was tested concurrently. NCAMP and Hexcel investigated the close numbers between the dry and wet TMA but no determination was made as to the cause. Below is the discussion that took place at Hexcel. NCAMP is open to further discussion.

From Bill Gillam:

I do know that drying will occur to some degree during testing and would be dependent on thickness; however in my experience even TMA specimens should still show a knock-down in Tg for wet conditioning. Typically a requirement for the wet conditioned specimens is to keep them submerged in solution right up until the time of sample prep/testing. [NCAMP: Specimens were conditioned and then sent overnight to Hexcel in a sealed plastic bag with a moist towel]. Obviously a thick DMA specimen would retain moisture in the matrix to a higher degree during testing than a thin TMA sliver. I would expect the delta between wet and dry to be greater with DMA than TMA however I would always expect the wet knock-down, even with TMA.

Regards, Bill

From: Bolke, Robert
Sent: Tuesday, June 08, 2010 10:13 AM
To: Kristin (Strole) Marlett; Gleason, Michael; Lallas, George
Cc: Wu, Joy; Gillam, William R.
Subject: RE: Dry TMA results

Kristin- I put together the TMA scans from March 2009 when we tested the Dry specimens and October 2009 when we tested the Wet specimens. I agree that it is surprising that the TG for the Wet specimens is higher than for the Dry specimens. I am trying to think of anything that may have caused this. Do you know if the only difference between the samples that were sent to Salt Lake is the Wet conditioning? [Yes that is the only difference]. Do you know if the Wet samples were dried with the Dry samples before they were conditioned? [I am not sure of this but they were dried under the same parameters per the test plan].

Additionally I wonder if the size of sample may have an effect on the difference between the DMA and TMA results. When we do TMA the sample is only a small sliver. It may be possible that the samples was dried during testing while the oven ramped to temperature. The DMA samples are also a lot bigger than the TMA sample and may possibly hold in the moisture better.

Rob Bolke
Hexcel Corp.
robert.bolke@hexcel.com
office: 801-508-8198

HEXCEL

1/21/2008

Summary of NCAMP Supplied Tg (TMA) Specimens

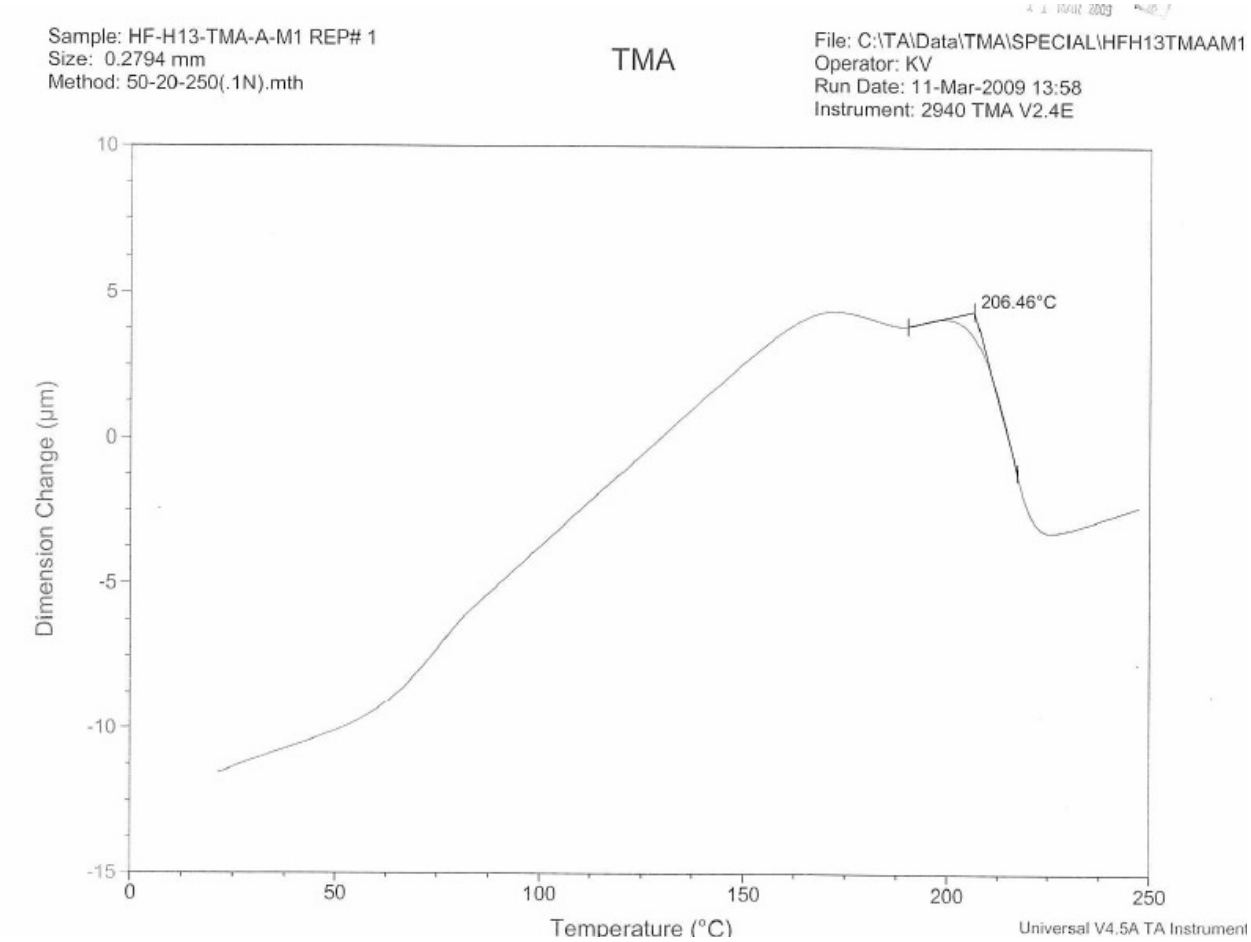
Specimen ID	Rep	Tg	Avg °C	Test Date	Time	Operator	Avg °F
HF-H13-TMA-A-M1	1	206.46	208.88	3/11/2009	13:58	KV	403.63
	2	211.30		3/11/2009	14:15	KV	412.34
HF-H13-TMA-A-M1 (FHT2)	1	208.63	211.05	3/11/2009	15:11	KV	407.53
	2	213.46		3/11/2009	14:54	KV	416.23
HF-H13-TMA-A-M2	1	212.98	205.82	3/11/2009	21:51	AJK	415.36
	2	198.65		3/11/2009	22:09	AJK	389.57
HF-H13-TMA-A-M2 (FHT2)	1	214.57	213.31	3/11/2009	22:34	AJK	418.23
	2	212.04		3/11/2009	22:50	AJK	413.67
HF-H13-TMA-B-M1	1	208.69	210.75	3/11/2009	23:57	AJK	407.64
	2	212.80		3/12/2009	0:16	AJK	415.04
HF-H13-TMA-B-M1 (FHT2)	1	215.61	214.99	3/12/2009	0:40	AJK	420.10
	2	214.37		3/12/2009	1:02	AJK	417.87
HF-H13-TMA-B-M2	1	207.39	211.44	3/12/2009	1:30	AJK	405.30
	2	215.48		3/12/2009	1:50	AJK	419.86
HF-H13-TMA-B-M2 (FHT2)	1	209.52	209.68	3/12/2009	3:43	AJK	409.14
	2	209.83		3/12/2009	4:30	AJK	409.69
HF-H13-TMA-C-M1	1	216.59	216.82	3/12/2009	6:19	EBG	421.86
	2	217.05		3/12/2009	6:49	EBG	422.69
HF-H13-TMA-C-M1 (FHT2)	1	219.76	218.83	3/12/2009	7:24	EBG	427.57
	2	217.89		3/12/2009	7:47	EBG	424.20
HF-H13-TMA-C-M2	1	222.46	220.40	3/12/2009	8:55	EBG	432.43
	2	218.34		3/12/2009	11:02	EBG	425.01
HF-H13-TMA-C-M2 (FHT2)	1	217.05	216.73	3/12/2009	12:03	EBG	422.69
	2	216.41		3/12/2009	13:56	EBG	421.54
						AVG	415.80

Table 9-1: Dry TMA Results

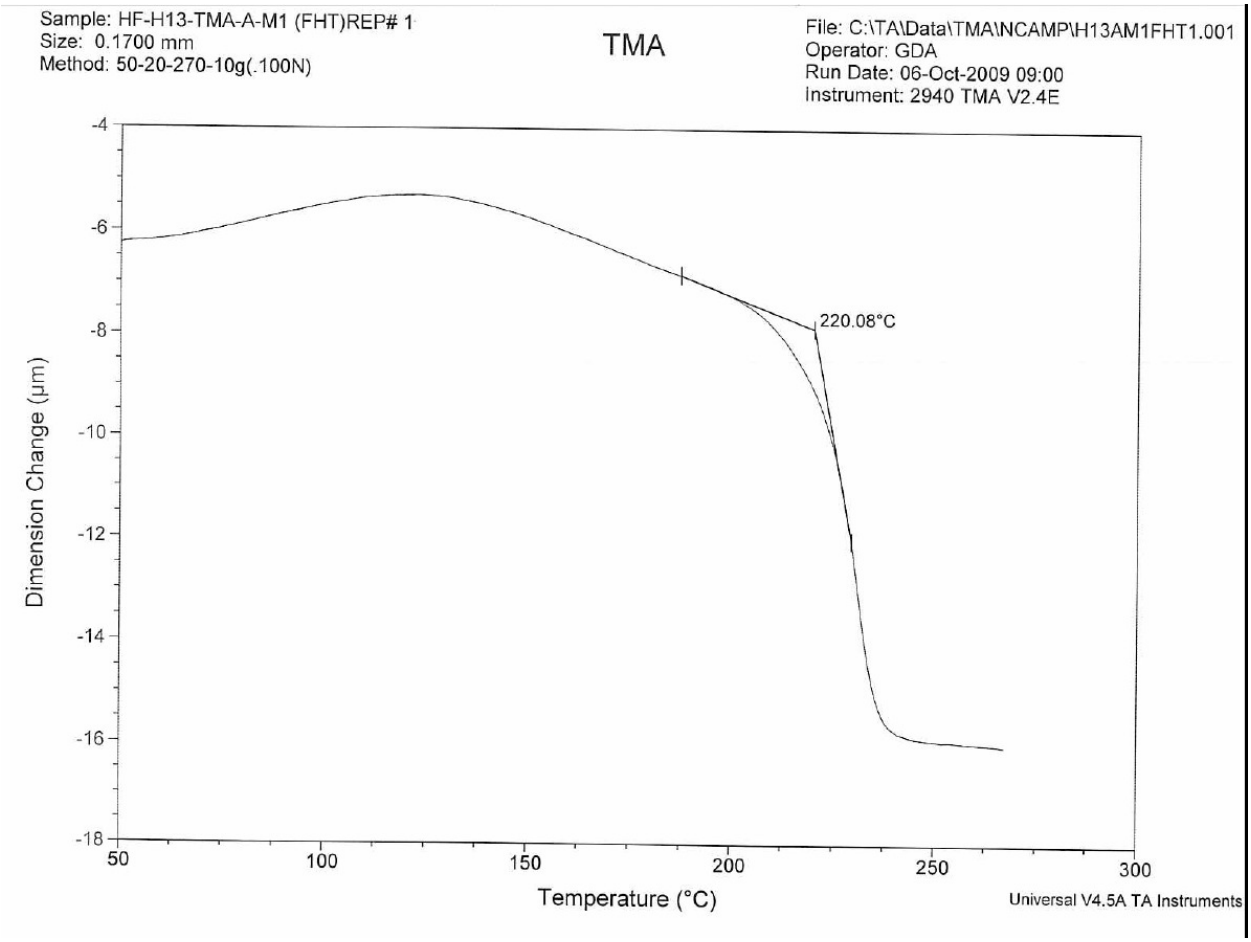
NCAMP TMA results					
Hexcel 8552 AS4 Uni					
12-Oct-09					
	Rep 1	Rep 2	Avg °C		Avg °F
HF-H13-TMA-A-M1 (FHT1)	220.08	215.40	217.74		**423.93**
HF-H13-TMA-A-M1 (FHT2)	215.19	213.56	214.38		**417.88**
HF-H13-TMA-A-M2 (FHT1)	216.74	219.05	217.90		**424.21**
HF-H13-TMA-A-M2 (FHT2)	210.21	212.81	211.51		**412.72**
HF-H13-TMA-B-M1 (FHT1)	198.73	225.04	211.89		**413.39**
HF-H13-TMA-B-M1 (FHT2)	229.38	224.16	226.77		**440.19**
HF-H13-TMA-B-M2 (FHT1)	218.23	214.51	216.37		**421.47**
HF-H13-TMA-B-M2 (FHT2)	216.76	217.86	217.31		**423.16**
HF-H13-TMA-C-M1 (FHT1)	222.69	226.06	224.38		**435.88**
HF-H13-TMA-C-M1 (FHT2)	225.09	211.85	218.47		**425.25**
HF-H13-TMA-C-M2 (FHT1)	212.94	227.00	219.97		**427.95**
HF-H13-TMA-C-M2 (FHT2)	224.12	226.96	225.54		**437.97**
HF-H11-TMA-A-M1-WET (WC)	214.89	211.24	213.07		**415.52**
HF-H11-TMA-A-M2-WET (WC)	215.75	213.90	214.83		**418.69**
HF-H11-TMA-B-M1-WET (WC)	215.86	210.14	213.00		**415.40**
HF-H11-TMA-B-M2-WET (WC)	214.37	213.34	213.86		**416.94**
HF-H11-TMA-C-M1-WET (WC)	221.60	203.61	212.61		**414.69**
HF-H11-TMA-C-M2-WET (WC)	214.54	212.29	213.42		**416.15**
AVERAGE					**422.30**

Table 9-2: Wet TMA Results

9.1 TMA Dry Batch A Results



9.2 TMA Wet Batch A Results



10. Physical Test Results

The prepreg physical test results were obtained at Hexcel. All physical testing values can be obtained from CD accompanying this report. NCAMP Physical testing values on cured prepreg can be found on the individual test summary charts in section 2.

11. Deviations

1. For fluid sensitivity testing, the 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.

2. For the ETW testing, it was discovered that the original adhesive used to bond the strain gauges was not rated for the 250 degree F testing. Therefore, specimens were refabricated and retested for modulus. This caused a delay in the program due the time required to recondition and retest the specimens. Below is a summary of what decisions were made affecting this Hexcel 8552 program.

    - CLC's – Gauge bonded with M Bond 600, cured for 1 hour 30 minutes at 300F
    - Gauges were applied before drying and then moisture conditioned on ETW coupons.
    - Previously Tested CLC specimens - Hot Dry 250F : NCAMP looked for scraps for modulus specimens – more specimens were found and retested
    - ALL CLC specimens with Hot Wet 250F testing required 6 specimens per panel; 3 for modulus (gauged) and 3 for strength (not gauged). The number of specimens were 'doubled' because the protective coating applied on the gage might prevent (or slow down) moisture absorption rate in the gauged section.