Hexcel 8552S AS4 Plain Weave Fabric Prepreg 193 gsm & 38% RC Qualification Material Property Data Report

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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 8552S AS4 Plain Weave Qualification Statistical Analysis Report NCP-RP-2010-011 N/C. The qualification material was procured to NCAMP Material Specification NMS 128/3 Rev Initial Release dated June 7, 2007. The qualification test panels were cured in accordance with NCAMP Process Specification 81228 Cure “M,” June 7, 2007. The panels were fabricated by Cessna Aircraft Company, 5800 E. Pawnee, Wichita, KS 67218. The NCAMP Test Plan NTP 1628Q1 Rev. B was used for this qualification program.

Part fabricators that wish to utilize the material property data, allowables, and specifications may be able to do so by demonstrating the capability to reproduce the original material properties; a process known as equivalency. More information about this equivalency process including the test statistics and its limitations can be found in Section 6 of

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

Aircraft companies should not use the data published in this report without specifying NCAMP Material Specification NMS 128/3. NMS 128/3 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 128/3.* NMS 128/3 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, longitudinal / warp direction
E_1^{t}	tensile modulus, longitudinal / warp direction
E_2^{c}	compressive modulus, transverse / fill direction
E_2^{t}	tensile modulus, transverse / fill direction
F_1^{cu}	ultimate compressive strength, longitudinal / warp direction
F_1^{tu}	ultimate tensile strength, longitudinal / warp direction
F_2^{cu}	ultimate compressive strength, transverse / fill direction
F_2^{tu}	ultimate tensile strength, transverse / fill direction
SBS	short beam strength
ν_{12}^{c}	major Poisson's Ratio, compression
ν_{21}^{c}	minor Poisson's Ratio, compression
$F_{12}^{s5\% \text{ strain}}$	in-plane shear strength at 5% strain

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

Superscripts

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

Subscripts

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

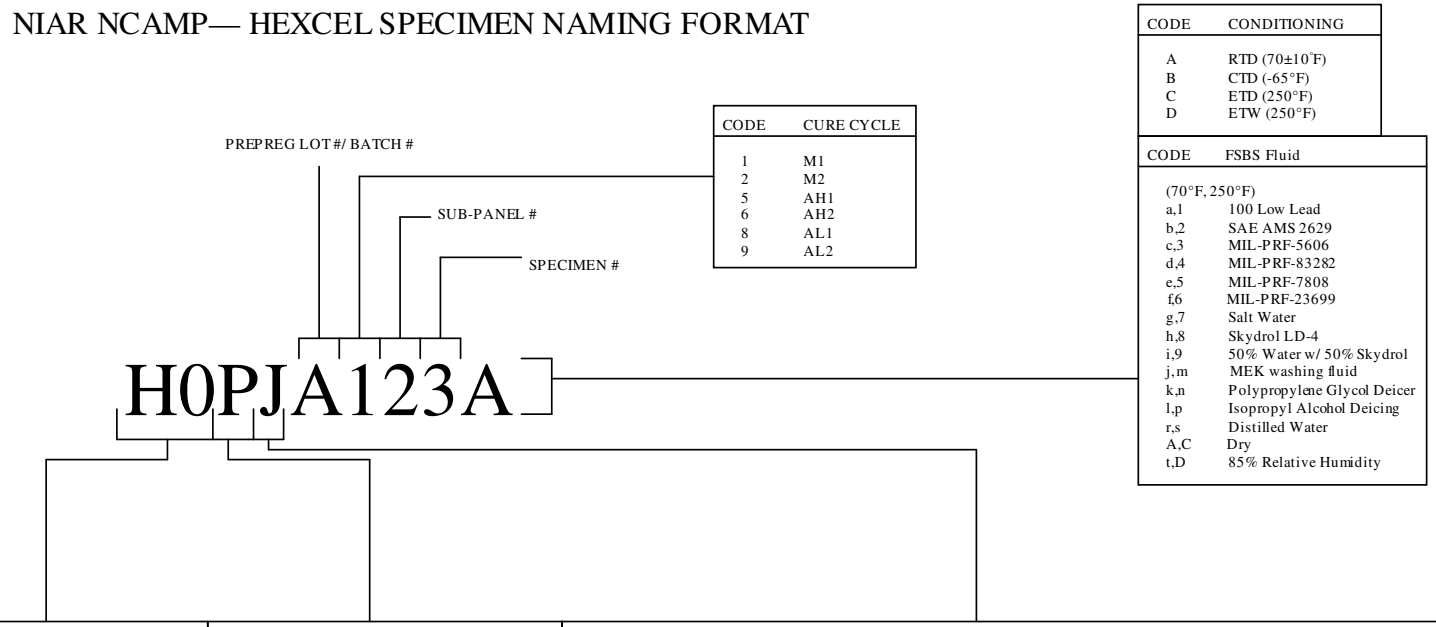
Acronyms and Definitions

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

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

1.3 NIAR– 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.

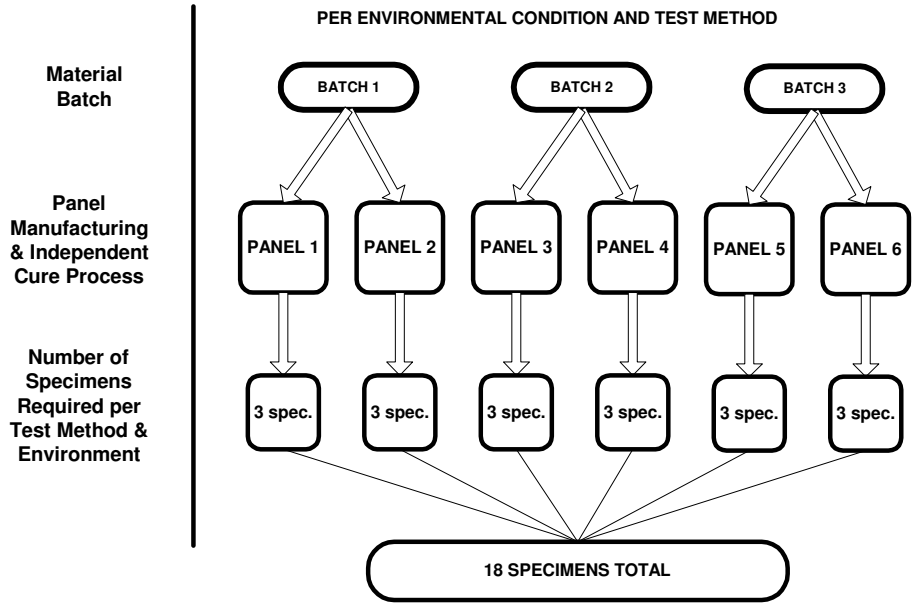


Figure 1-1: Specimen Selection Methodology

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.

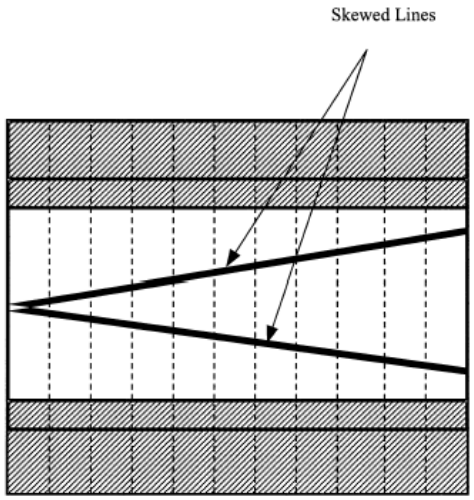


Figure 1-2: Specimen Traceability Line

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.

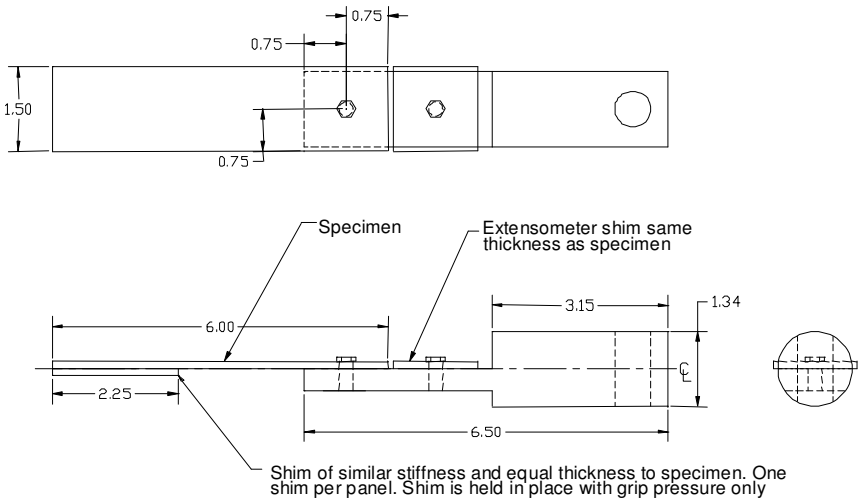


Figure 1-3: Modified ASTM D5961 (Single Shear Bearing) Specimen and Loading Arrangement

1.5.2 Specimen & Testing Details

1.5.2.1 Tabbing

Tabs were used on all Longitudinal Tension specimens.

1.5.2.2 Specimen Dimensions & Test Configuration

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

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

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

1) NASM 21297-04003 bolts with 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 (warp direction)	Test Type and Direction	Property	Number of Batches x Number of Panels x Number of Test Specimens			
			Test Temperature/Moisture Condition			
			CTD	RTD	ETD	ETW
$[0]_{15}$	ASTM D3039 Warp Tension	Strength, Modulus, and Poisson's Ratio	3x2x3	3x2x3		3x2x3
$[0]_{15}$	ASTM D6641 Warp Compression (Note 1)	Strength and Modulus	3x2x3	3x2x3	3x2x3	3x2x3
$[90]_{15}$	ASTM D3039 Fill Tension	Strength and Modulus	3x2x3	3x2x3		3x2x3
$[90]_{15}$	ASTM D6641 Fill Compression (Note 1)	Strength and Modulus	3x2x3	3x2x3	3x2x3	3x2x3
$[45/-45]_{2S}$	ASTM D3518 In-Plane Shear	Strength and Modulus	3x2x3	3x2x3		3x2x3
$[0]_{32}$	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.

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.

(%0°/%±45°/%90°) 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/-45/45/-45/90/45/-45]S	Strength & modulus	3x2x3	3x2x3	3x2x3
(40/20/40) UNT3	ASTM D3039 Un-notched Tension [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0]	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/-45/45/-45/90/45/-45]S	Strength & modulus		3x2x3	3x2x3
(40/20/40) UNC3	ASTM D6641 Un-notched Compression (4) [0/90/45/0/90/0/90/-45/0/90]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/-45/45/-45/90/45/-45]S	Strength	3x2x3	3x2x3	3x2x3
(40/20/40) OHT3	ASTM D5766 Open Hole Tension (1) [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0]	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/-45/45/-45/90/45/-45]S	Strength	3x2x3	3x2x3	3x2x3
(40/20/40) FHT3	ASTM D6742 Filled Hole Tension (2) [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0]	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) OHC1	ASTM D6484 Open Hole Compression (1)(4) [45/0/-45/90/45/0/-45/90/-45/90]S	Strength		3x2x3	3x2x3
(10/80/10) OHC2	ASTM D6484 Open Hole Compression (1)(4) [45/-45/0/45/-45/45/-45/90/45/-45]S	Strength		3x2x3	3x2x3
(40/20/40) OHC3	ASTM D6484 Open Hole Compression (1)(4) [0/90/45/90/0/0/90/-45/90/0]S	Strength		3x2x3	3x2x3
(25/50/25 - QI) FHC1	ASTM D6484 Filled Hole Compression (2) [45/0/-45/90/45/0/-45/90/-45/90]S	Strength		3x2x3	3x2x3
(10/80/10) FHC2	ASTM D6484 Filled Hole Compression (2) [45/-45/0/45/-45/45/-45/90/45/-45]S	Strength		3x2x3	3x2x3
(40/20/40) FHC3	ASTM D6484 Filled Hole Compression (2) [0/90/45/90/0/0/90/-45/90/0]S	Strength		3x2x3	3x2x3
(25/50/25 - QI) SSB1	ASTM D5961 Single Shear Bearing (3) (6) [45/0/-45/90]S	Strength & Deformation		3x2x3	3x2x3
(10/80/10) SSB2	ASTM D5961 Single Shear Bearing (3) (6) [45/-45/90/45/-45]S	Strength & Deformation		3x2x3	3x2x3
(40/20/40) SSB3	ASTM D5961 Single Shear Bearing (3) (6) [0/90/45/0/90]S	Strength & Deformation		3x2x3	3x2x3
(50/0/50) ILT	ASTM D6415 Interlaminar Tension [0]21	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, 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

Note that the layup numbers 1, 2 and 3 correspond to those designated as "quasi isotropic," "soft" and "hard" respectively.

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	Dry and Wet – SACMA SRM 18R-94	1 Dry, 1 Wet (Note 4)
Glass Transition Temperature, Tg by TMA	Dry and Wet - HSP-T2 Rev 1 (by TMA)(Note 5)	1 Dry, 1 Wet (Note 4)

Notes 1: Where the applicable standard allows variations in specimen form or test method, the specific parameters to be used will be specified in the test work instructions and reported in the final test report.
2: Method II, except for laminates of materials where actual fiber weight is not accurately known 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 shall be tested by Method I, Procedure B.
3: Five MHz is preferred for solid laminates. Panels with anomaly should be segregated. Microscopy images may be taken from questionable areas. NCAMP must be involved in the review of all C-scans.
4: Minimum total of 24 dry and 24 wet for each material system.
5: HSP-T2 Revision 1 is a Hexcel non-proprietary test method standard which may be obtained from NCAMP. HSP-T2 is similar but not equivalent to ASTM E2092.

Table 1-3: Physical Testing Matrix

1.5.5 Environmental Conditioning

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

Test environments are defined as:
CTD = -65±5°F, dry
RTD = 70±10°F, room temperature dry
ETD = 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 Fluid Sensitivity Screening

Table 1-4 lists the requirements for fluid sensitivity screening, which requires ASTM D2344 Short Beam Strength testing on $[0°]_{34}$ lamina level specimens dried at 160°F±5°F for 120 to 130 hours before being subjected to the conditions indicated, five replicates per fluid and one cure cycle. Specimens were cleaned with a dry towel prior to the tests. In addition to short beam strength, load versus displacement curves were plotted to aid in the identification of matrix/resin softening. Since load versus displacement curves are influenced by test machine and fixture compliance, all the tests were performed with the identical machine and fixture, through a single setup. Experience suggests that for the vast majority of epoxy resins, water is the fluid with the most deleterious effect on properties. Should screening tests for fluid sensitivity indicate this to be the case, further testing of this type might be unnecessary since exposure to water moisture to equilibrium level is an inherent part of the multi batch allowables test program. However, users must evaluate the applicability of the exposure conditions and time on case-by-case basis. For example, the exposure condition for jet fuel may not fully represent the condition of integral fuel tanks.

Extended Contact:	Exposure	Test Condition	Code
100 Low Lead Aviation Fuel (ASTM D910)	90 days min. @ 70°F±10°F	70°F	FS11RT
	90 days min. @ 70°F±10°F	250°F*	FS11ET
SAE AMS 2629 Jet Reference Fluid	90 days min. @ 70°F±10°F	70°F	FS12RT
	90 days min. @ 70°F±10°F	250°F*	FS12ET
MIL-PRF-5606 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS13RT
	90 days min. @ 70°F±10°F	250°F*	FS13ET
MIL-PRF-83282 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS14RT
	90 days min. @ 70°F±10°F	250°F*	FS14ET
MIL-PRF-7808 Engine Oil	90 days min. @ 70°F±10°F	70°F	FS15RT
	90 days min. @ 70°F±10°F	250°F*	FS15ET
MIL-PRF-23699, Class STD Engine Oil	90 days min. @ 70°F±10°F	70°F	FS16RT
	90 days min. @ 70°F±10°F	250°F*	FS16ET
Salt Water (ASTM D1141 or equiv.)	90 days min. @ 70°F±10°F	70°F	FS17RT
	90 days min. @ 70°F±10°F	250°F*	FS17ET
Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS18RT
	90 days min. @ 70°F±10°F	250°F*	FS18ET
50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS19RT
	90 days min. @ 70°F±10°F	250°F*	FS19ET
Short Duration Contact:			
MEK washing fluid. ASTM D740	90 minutes min. @ 70°F±10°F	70°F	FS21RT
	90 minutes min. @ 70°F±10°F	250°F*	FS21ET
Polypropylene Glycol Deicer (Type I) Mil-A-824 3	90 minutes min. @ 70°F±10°F	70°F	FS22RT
	90 minutes min. @ 70°F±10°F	250°F*	FS22ET
Isopropyl Alcohol Deicing Agent (TT-I-735)	48±4 hours @70°F±10°F	70°F	FS23RT
	48±4 hours @70°F±10°F	250°F*	FS23ET
Control Tests:			
Distilled Water	90 days min. at 70°F±10°F	70°F	FS31RT
	90 days min. at 70°F±10°F	250°F*	FS31ET
Dry	Dry per section 6.1	70°F	FS32RT
	Dry per section 6.1	250°F*	FS32ET
85% Relative Humidity	Per section 6.1	70°F	FS33RT
	Per section 6.1	250°F*	FS33ET

Table 1-4: Fluid Sensitivity Matrix

1.5.8 Normalization Procedures

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

The average cured ply thickness of 0.0078 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.

Prior to beginning the qualification program, it was predicted that the cured ply thickness value to be 0.00795 inch. However, the as-measured cured ply thickness of the qualification and the equivalency panels are 0.00776 inch and 0.00767 inch, respectively. The overall average of all qualification and equivalency panel thickness is 0.00769 inch. A vote was taken among the material users, and six out of six companies agreed that 0.0078 was an acceptable CPT. Three companies did not cast votes.

1.5.9 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.

1.5.10 Material Pedigree Information

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

2. Test Results

2.1 Lamina Level Test Summary

Prepreg Material:	Hexcel 8552S AS4 3k Plain Weave NMS 128/3 Material Specification				**Hexcel 8552 AS4 3K PW Lamina Properties Summary**
Fiber:	3K Plain Weave AS4	**Resin:**	Hexcel 8552		
Tg(dry):	396.75 °F	**Tg(wet):**	332.02°F	**Tg METHOD:**	DMA (SRM 18-94)
PROCESSING:	NPS 81228 "M" Cure Cycle				

	A	B	C		
Date of fiber manufacture	11/6/2007	11/21/2006	10/20/2006	**Date of testing**	4/30/09 to 8/16/10
Date of resin manufacture	1/23/2007	2/9/2007	2/11/2007	**Date of data submittal**	9/1/2010
Date of prepreg manufacture	1/23/2007	2/9/2007	2/11/2007		
Date of composite manufacture	11/1/2008 to 1/1/2009				

LAMINA MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT= .0078 inch)

	CTD Mean		RTD Mean		ETD Mean		ETW Mean	
	Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_1^{tu} (ksi)	95.97	96.17	109.02	111.52	---	---	130.29	132.15
E_1^t (Msi)	9.28	9.30	9.36	9.58	---	---	9.33	9.47
ν_{12}^t	---	0.031	---	0.046	---	---	---	0.054
F_2^{tu} (ksi)	93.22	92.97	107.62	109.19	---	---	121.74	123.34
E_2^t (Msi)	9.30	9.28	9.51	9.66	---	---	9.45	9.60
F_1^{cu} (ksi)	129.16	129.76	115.13	122.37	100.23	100.88	72.78	76.84
E_1^c (Msi)	8.53	8.57	8.65	9.20	8.45	8.51	8.57	8.98
ν_{12}^c	---	0.054	---	0.046	---	0.054	---	0.053
F_2^{cu} (ksi)	120.83	122.55	109.12	113.31	87.33	91.57	64.89	64.54
E_2^c (Msi)	8.58	8.70	8.67	9.01	8.41	8.87	8.46	8.53
ν_{21}^c	---	0.062	---	0.054	---	0.046	---	0.053
$F_{12}^{s5\%strain}$ (ksi)	---	---	---	---	---	---	---	5.43
$F_{12}^{s0.2\%}$ (ksi)	---	11.01	---	8.11	---	---	---	3.21
G_{12}^s (Msi)	---	0.83	---	0.72	---	---	---	0.32
SBS (ksi)	---	13.45	---	13.36	---	9.41	---	7.07

Table 2-1: Lamina Summary Data

2.2 Laminate Level Test Summary

Prepreg Material:	Hexcel 8552S AS4 plain weave fabric NMS 128/3 Material Specification				**Hexcel 8552 AS4 35 PW Laminate Properties Summary**
Fiber	3K Plain Weave AS4		**Resin**	8552S	
Tg(dry):	396.75 ° F	**Tg(wet):**	332.02°F	**Tg Method:**	DMA (SRM 18-94)
PROCESSING:	NPS 81228 "M" Cure Cycle				

	A	B	C		
Date of fiber manufacture	11/6/2007	11/21/2006	10/20/2006	**Date of testing**	4/30/09 to 8/16/10
Date of resin manufacture	1/23/2007	2/9/2007	2/11/2007	**Date of data submittal**	9/1/2010
Date of prepreg manufacture	1/23/2007	2/9/2007	2/11/2007		
Date of composite manufacture	11/1/2008 to 1/1/2009				

LAMINATE MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT= .0078 inch)

	Layup:	**25/50/25**		**10/80/10**		**40/20/40**	
	Test Condition	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
OHT Strength (ksi)	**CTD**	38.97	38.97	40.85	41.10	43.88	44.63
	RTD	42.72	43.13	43.21	43.89	50.36	50.67
	ETW	48.62	48.04	33.25	32.83	60.55	60.08
OHC Strength (ksi)	**RTD**	47.49	47.70	42.19	42.42	49.99	50.31
	ETW	31.77	31.72	26.67	26.61	32.35	32.16
UNT Strength (ksi)	**CTD**	74.21	74.16	53.33	53.28	85.46	85.63
	RTD	83.82	84.62	54.12	54.91	97.95	99.44
	ETW	90.19	89.63	47.85	47.36	115.02	114.55
Modulus (msi)	**CTD**	7.01	7.01	4.82	4.82	8.69	8.71
	RTD	6.75	6.81	4.46	4.53	8.40	8.53
	ETW	6.37	6.32	3.57	3.53	8.25	8.21
UNC Strength (ksi)	**RTD**	90.57	92.36	61.60	63.52	90.60	92.63
	ETW	54.16	54.44	35.98	35.91	63.78	63.50
Modulus (msi)	**RTD**	6.31	6.43	4.37	4.50	7.72	7.89
	ETW	5.87	5.91	3.56	3.56	7.62	7.58
νUNC	**RTD**	---	0.317	---	0.526	---	0.135
	ETW	---	0.347	---	0.606	---	0.141
FHT Strength (ksi)	**CTD**	43.17	43.70	44.07	44.48	48.35	49.64
	RTD	49.10	49.49	46.47	46.23	54.84	54.63
	ETW	51.58	51.14	35.25	34.71	59.44	59.16
FHC Strength (ksi)	**RTD**	85.00	84.51	61.20	61.29	84.27	84.87
	ETW	54.87	53.46	37.51	37.54	58.50	58.19
LSBS Strength (ksi)	**RTD**	---	12.99	---	---	---	---
	ETW	---	6.27	---	---	---	---
PB 2% offset Strength (ksi)	**RTD**	106.95	108.25	102.14	104.13	96.40	95.11
	ETW	79.01	83.55	78.44	84.57	70.69	75.40
ILT Strength (ksi)	**CTD**	---	12.12	---	---	---	---
	RTD	---	10.72	---	---	---	---
	ETW	---	3.97	---	---	---	---
CAI Strength (ksi)	**RTD**	31.22	31.67	---	---	---	---

Table 2-2: Laminate Summary Data

2.3 Individual Test Summaries

2.3.1 Warp Tension Properties

Material:	Hexcel 8552 - AS4 Plain Weave							**Tension, 1-axis** Gr/ Ep Hexcel 8552 - AS4 PW $[0]_{15}$	
Resin content:	36.63 % w eight	**Comp. density:** 1.57 [g/cc]							
Fiber volume:	55.53 % vol								
Ply count:	15								
Test method:	ASTM D3039-00	**Modulus calculation:** 1000 to 3000 microstrain							
Normalized by:	0.0078	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		HFPJXXXXB		HFPJXXXXA		HFPJXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean	95.97	96.17	109.02	111.52	130.29	132.15		
	Minimum	91.45	91.15	101.12	103.37	115.39	114.05		
	Maximum	100.54	103.19	114.18	119.24	143.25	148.58		
F_1^{tu} (ksi)	**C.V.(%)**	2.86	2.95	2.55	4.29	6.45	6.57		
	No. Specimens	24		19		20			
	No. Prepreg Lots	3		3		3			
	Mean	9.28	9.30	9.36	9.58	9.33	9.47		
	Minimum	9.16	9.17	9.27	9.28	9.13	9.08		
	Maximum	9.45	9.75	9.50	10.10	9.52	10.14		
E_1^t (Msi)	**C.V.(%)**	0.90	1.50	0.80	3.04	1.34	3.32		
	No. Specimens	23		19		20			
	No. Prepreg Lots	3		3		3			

2.3.2 Fill Tension Properties

Material:	Hexcel 8552 - AS4 Plain Weave							**Tension, 2-axis** Gr/ Ep Hexcel 8552 - AS4 PW $[90]_{15}$	
Resin content:	36.52 % w eight		**Comp. density:** 1.57 [g/cc]						
Fiber volume:	55.58 % vol								
Ply count:	15								
Test method:	ASTM D3039-00		**Modulus calculation:** 1000 to 3000 microstrain						
Normalized by:	0.0078	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			HFPUXXXXB		HFPUXXXXA		HFPUXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	
	Mean		93.22	92.97	107.62	109.19	121.74	123.34	
	Minimum		87.10	85.16	99.86	98.53	107.13	112.39	
	Maximum		102.01	99.93	116.07	121.37	129.89	133.40	
F_2^{tu} (ksi)	**C.V.(%)**		4.99	4.64	4.32	5.45	4.43	5.31	
	No. Specimens		19		20		19		
	No. Prepreg Lots		3		3		3		
	Mean		9.30	9.28	9.51	9.66	9.45	9.60	
	Minimum		8.93	8.94	9.16	9.04	8.39	8.85	
	Maximum		9.56	9.79	10.22	10.58	10.95	10.76	
E_2^t (Msi)	**C.V.(%)**		1.64	2.48	2.82	4.19	6.56	6.31	
	No. Specimens		19		22		21		
	No. Prepreg Lots		3		3		3		

2.3.3 Warp Compression Properties

Material:	Hexcel 8552 - AS4 Plain Weave								**Compression, 1-axis** **Gr/ Ep** Hexcel 8552 - AS4 PW **[0]15**	
Resin content:	35.66 % w eight				**Comp. density:** 1.57 [g/cc]					
Fiber volume:	56.49 % vol									
Ply count:	15									
Test method:	ASTM D6641-01				**Modulus calculation:** 1000 to 3000 microstrain					
Normalized by:	0.0078	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		HFPLXXXXB		HFPLXXXXA		HFPLXXXXC		HFPLXXXXD		
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	
F_1^{cu} (ksi)	**Mean**	129.16	129.76	115.13	122.37	100.23	100.88	72.78	76.84	
	Minimum	107.68	107.01	105.21	110.42	89.15	90.49	60.34	61.12	
	Maximum	143.51	142.87	125.50	134.40	105.75	107.08	86.99	93.43	
	C.V.(%)	7.13	7.06	4.67	4.67	3.98	4.35	11.28	11.47	
	No. Specimens	19		20		19		19		
	No. Prepreg Lots	3		3		3		3		
E_1^c (Msi)	**Mean**	8.53	8.57	8.65	9.20	8.45	8.51	8.57	8.98	
	Minimum	7.43	7.39	8.19	8.32	8.01	8.08	8.21	8.59	
	Maximum	9.37	9.51	9.36	10.16	8.80	8.92	9.09	9.64	
	C.V.(%)	5.10	5.41	4.39	5.63	2.30	2.73	3.00	3.01	
	No. Specimens	21		20		24		19		
	No. Prepreg Lots	3		3		3		3		
ν_{12}	**Mean**	0.054		0.046		0.054		0.053		
	No. Specimens	20		20		24		19		
	No. Prepreg Lots	3		3		3		3		

2.3.4 Fill Compression Properties

Material:	Hexcel 8552 - AS4 Plain Weave									**Compression, 2-axis** Gr/ Ep Hexcel 8552 - AS4 PW $[90]_{15}$	
Resin content:	33.87 % weight			**Comp. density:** 1.58 [g/cc]							
Fiber volume:	58.34 % vol										
Ply count:	15										
Test method:	ASTM D6641-01e1			**Modulus calculation:** 1000 to 3000 microstrain							
Normalized by:	0.0078	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		HFPZXXXXB		HFPZXXXXA		HFPZXXXXC		HFPZXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean	120.83	122.55	109.12	113.31	87.33	91.57	64.89	64.54		
	Minimum	105.55	104.52	84.94	86.33	74.40	74.08	53.09	51.90		
	Maximum	136.91	137.84	122.84	130.16	99.52	102.01	81.44	79.87		
F_2^{cu} (ksi)	**C.V.(%)**	7.68	7.83	9.27	10.56	8.47	8.11	11.75	11.23		
	No. Specimens	19		18		15		18			
	No. Prepreg Lots	3		3		3		3			
	Mean	8.58	8.70	8.67	9.01	8.41	8.87	8.46	8.53		
	Minimum	8.22	8.18	8.07	8.08	7.80	8.09	7.60	7.44		
	Maximum	8.88	9.52	9.11	9.52	8.79	9.68	8.87	9.13		
E_2^c (Msi)	**C.V.(%)**	2.17	3.64	2.70	4.03	2.95	5.00	5.01	6.15		
	No. Specimens	21		19		19		19			
	No. Prepreg Lots	3		3		3		3			
	Mean	0.062		0.054		0.046		0.053			
ν_{21}	**No. Specimens**	19		19		19		19			
	No. Prepreg Lots	3		3		3		3			

2.3.5 In-Plane Shear Properties

Material:	Hexcel 8552 - AS4 Plain Weave						**In-Plane Shear**		
							Gr/ Ep		
Resin content:	37.32 % w eight		**Comp. density:** 1.57 [g/cc]				Hexcel 8552 - AS4 PW		
Fiber volume:	54.85 % vol						**[45/-45]2s**		
Ply count:	8								
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			HFPNXXXXB		HFPNXXXXA		HFPNXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	
	Mean							5.43	
	Minimum							5.05	
	Maximum							5.78	
$F_{12}^{s5\% \text{ strain}}$ (ksi)	**C.V.(%)**							4.43	
	No. Specimens						15		
	No. Prepreg Lots						3		
	Mean			11.01		8.11		3.21	
	Minimum			10.70		7.81		2.92	
	Maximum			11.41		8.41		3.88	
$F_{12}^{s0.2\%}$ (ksi)	**C.V.(%)**			1.82		2.13		6.49	
	No. Specimens		21		19		18		
	No. Prepreg Lots		3		3		3		
	Mean			0.83		0.72		0.32	
	Minimum			0.79		0.69		0.29	
	Maximum			0.87		0.77		0.38	
G_{12}^{s} (Msi)	**C.V.(%)**			2.57		2.89		6.29	
	No. Specimens		21		19		18		
	No. Prepreg Lots		3		3		3		

5% SHEAR STRENGTH VALUE WAS NOT OBTAINED for CTD and RTD.

2.3.6 Unnotched Tension 1 Properties

Material: Hexcel 8552 - AS4 Plain Weave

Resin content: 37.35 % w eight
Fiber volume: 54.80 % vol
Ply count: 16

Comp. density: 1.57 [g/cc]

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

Test method: ASTM D3039-00

Modulus calculation: 1000 to 3000 microstrain

Normalized by: 0.0078 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		HFPAXXXXB		HFPAXXXXA		HFPAXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	74.21	74.16	83.82	84.62	90.19	89.63
	Minimum	67.97	6.64	77.45	77.46	84.76	82.77
	Maximum	80.33	7.37	92.48	94.32	93.65	95.11
UNT1	**C.V.(%)**	4.79	4.83	3.69	4.53	3.36	4.74
Strength (ksi)							
	No. Specimens	24		19		22	
	No. Prepreg Lots	3		3		3	
	Mean	7.01	7.01	6.75	6.81	6.37	6.32
	Minimum	6.77	6.64	6.27	6.13	6.07	6.03
	Maximum	7.35	7.37	6.94	7.26	6.79	6.87
UNT1	**C.V.(%)**	2.07	2.69	2.32	3.81	2.45	3.13
Modulus (Msi)							
	No. Specimens	24		19		22	
	No. Prepreg Lots	3		3		3	

2.3.7 Unnotched Tension 2 Properties

Material:	Hexcel 8552 - AS4 Plain Weave					**Unnotched Tension 2** Gr/ Ep Hexcel 8552 - AS4 PW [45/-45/0/45/-45/45/-45/90/45/-45]s	
Resin content:	36.24 % w eight		**Comp. density:** 1.57 [g/cc]				
Fiber volume:	55.91 % vol						
Ply count:	20						
Test method:	ASTM D3039-00		**Modulus calculation:** 1000 to 3000 microstrain				
Normalized by:	0.0078	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			HFPBXXXXB		HFPBXXXXA		HFPBXXXXD	
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		53.33	53.28	54.12	54.91	47.85	47.36
	Minimum		50.87	50.65	52.71	51.52	46.26	44.02
	Maximum		55.51	57.32	55.70	60.00	49.64	50.31
UNT2 Strength (ksi)	**C.V.(%)**		2.45	2.73	1.67	3.77	1.96	3.52
	No. Specimens		23		20		22	
	No. Prepreg Lots		3		3		3	
	Mean		4.82	4.82	4.46	4.53	3.57	3.53
	Minimum		4.63	4.49	4.04	3.99	3.17	2.97
	Maximum		5.10	5.12	5.14	5.17	3.80	3.82
UNT2 Modulus (Msi)	**C.V.(%)**		2.38	3.68	5.32	7.21	5.32	6.06
	No. Specimens		23		20		21	
	No. Prepreg Lots		3		3		3	

2.3.8 Unnotched Tension 3 Properties

Material:	Hexcel 8552 - AS4 Plain Weave					**Unnotched Tension 3** Gr/ Ep Hexcel 8552 - AS4 PW [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0]	
Resin content:	36.46 % w eight		**Comp. density:** 1.57 [g/cc]				
Fiber volume:	55.67 % vol						
Ply count:	15						
Test method:	ASTM D3039-00		**Modulus calculation: 1000 to 3000 microstrain**				
Normalized by:	0.0078	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			HFPCXXXXB		HFPCXXXXA		HFPCXXXXD	
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		85.46	85.63	97.95	99.44	115.02	114.55
	Minimum		79.63	81.04	91.35	93.36	107.66	106.67
	Maximum		89.30	90.54	104.84	106.83	122.84	122.92
UNT3 Strength (ksi)	**C.V.(%)**		3.25	2.80	3.46	3.60	4.03	4.57
	No. Specimens		19		21		21	
	No. Prepreg Lots		3		3		3	
	Mean		8.69	8.71	8.40	8.53	8.25	8.21
	Minimum		8.43	8.25	8.08	8.08	7.95	7.83
	Maximum		8.89	9.43	9.13	8.99	8.38	8.47
UNT3 Modulus (Msi)	**C.V.(%)**		1.30	3.30	2.79	2.99	1.30	1.94
	No. Specimens		19		21		21	
	No. Prepreg Lots		3		3		3	

2.3.9 Unnotched Compression 1 Properties

Material:	Hexcel 8552 - AS4 Plain Weave					**Unnotched Compression 1**	
						Gr/ Ep	
Resin content:	35.01 % w eight		**Comp. density:** 1.58 [g/cc]			Hexcel 8552 - AS4 PW	
Fiber volume:	57.24 % vol					**[45/0/-45/90]2S**	
Ply count:	16						
Test method:	ASTM D6641-01^{E1}		**Modulus calculation:**		1000 to 3000 microstrain		
Normalized by:	0.0078	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			75 F		250 F		
Moisture Conditioning					equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFPWXXXXA		HFPWXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	
	Mean		90.57	92.36	54.16	54.44	
	Minimum		81.43	82.55	48.17	48.38	
	Maximum		95.95	98.78	60.63	61.08	
UNC1	**C.V.(%)**		4.20	4.51	6.25	6.32	
Strength (ksi)							
	No. Specimens		19		21		
	No. Prepreg Lots		3		3		
	Mean		6.31	6.43	5.87	5.91	
	Minimum		6.00	6.12	5.63	5.66	
	Maximum		6.68	6.87	6.13	6.13	
UNC1	**C.V.(%)**		2.30	3.10	2.18	2.14	
Modulus (Msi)							
	No. Specimens		19		21		
	No. Prepreg Lots		3		3		
	Mean		0.317		0.347		
νUNC1	**No. Specimens**		19		21		
	No. Prepreg Lots		3		3		

2.3.10 Unnotched Compression 2 Properties

Material: Hexcel 8552 - AS4 PW

Resin content: 35.06 % w eight
Fiber volume: 57.19 % vol
Ply count: 20

Comp. density: 1.58 [g/cc]

Unnotched Compression 2
Gr/ Ep
Hexcel 8552 - AS4 PW
[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: 0.0078 in. CPT

		RTD		ETW			
Test Temperature [°F]		75 F		250 F			
Moisture Conditioning				equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFPXXXXXA		HFPXXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**		
	Mean	61.60	63.52	35.98	35.91		
	Minimum	55.62	57.61	32.80	32.53		
	Maximum	64.45	66.79	39.23	39.14		
UNC2	**C.V.(%)**	3.71	3.52	4.70	4.93		
Strength (ksi)							
	No. Specimens	19		21			
	No. Prepreg Lots	3		3			
	Mean	4.37	4.50	3.56	3.56		
	Minimum	4.15	4.17	3.20	3.28		
	Maximum	4.56	4.78	4.04	4.04		
UNC2	**C.V.(%)**	2.62	3.48	5.65	5.01		
Modulus (Msi)							
	No. Specimens	19		21			
	No. Prepreg Lots	3		3			
	Mean	0.526		0.606			
νUNC2	**No. Specimens**	19		21			
	No. Prepreg Lots	3		3			

2.3.11 Unnotched Compression 3 Properties

Material: Hexcel 8552 - AS4 Plain Weave

Unnotched Compression 3
Gr/ Ep
Hexcel 8552 - AS4 PW
[0/90/45/0/90/0/90-45/0/90]s

Resin content: 35.49 % w eight
Fiber volume: 56.77 % vol
Ply count: 20
Comp. density: 1.58 [g/cc]

Test method: ASTM D6641-01^{E1}
Modulus calculation: 1000 to 3000 microstrain

Normalized by: 0.0078 in. CPT

		RTD		ETW			
Test Temperature [°F]		75 F		250 F			
Moisture Conditioning				equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFPYXXXXA		HFPYXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**		
	Mean	90.60	92.63	63.78	63.50		
	Minimum	81.39	82.68	56.41	57.56		
	Maximum	101.07	102.00	70.48	68.92		
UNC3	**C.V.(%)**	6.46	6.23	6.16	5.03		
Strength (ksi)							
	No. Specimens	19		22			
	No. Prepreg Lots	3		3			
	Mean	7.72	7.89	7.62	7.58		
	Minimum	7.53	7.53	7.33	7.17		
	Maximum	7.96	8.47	7.83	7.86		
UNC3	**C.V.(%)**	1.80	3.05	1.85	2.01		
Modulus (Msi)							
	No. Specimens	19		21			
	No. Prepreg Lots	3		3			
	Mean	0.135		0.141			
νUNC3	**No. Specimens**	19		21			
	No. Prepreg Lots	3		3			

2.3.12 Laminate Short Beam Strength Properties

Material:	Hexcel 8552 - AS4 Plain Weave					**Laminate Short Beam Strength** **Gr/ Ep** Hexcel 8552 - AS4 PW **[45/0/-45/90/45/0/-45/90/-45/90]s**	
Resin content:	See OHC1	**Comp. density:** See OHC1					
Fiber volume:	See OHC1						
Ply count:	20						
Test method:	ASTM D2344-00^{E1}						
Normalized by:	NA						
		RTD		**ETW**			
Test Temperature [°F]		75		250			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFPqXXXXA		HFPqXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**		
LSBS Strength (ksi)	**Mean**		12.99		6.27		
	Minimum		11.64		5.80		
	Maximum		13.77		6.92		
	C.V.(%)		3.86		4.05		
	No. Specimens	21		21			
	No. Prepreg Lots	3		3			

2.3.13 Lamina Short Beam Strength Properties

Material: Hexcel 8552 - AS4 Plain Weave

Resin content: 36.63 % weight
Fiber volume: 55.51 % vol
Ply count: 32
Comp. density: 1.57 [g/cc]

Test method: ASTM D2344-00^{E1}

Normalized by: NA

Short Beam Strength
Gr/ Ep
Hexcel 8552 - AS4 PW
[0]32

		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		HFPQXXXXB		HFPQXXXXA		HFPQXXXXC		HFPQXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
SBS Strength (ksi)	**Mean**		13.45		13.36		9.41		7.07
	Minimum		12.98		9.78		8.96		6.76
	Maximum		14.64		14.72		9.90		7.72
	C.V.(%)		4.47		8.44		3.08		2.56
	No. Specimens	7		24		21		21	
	No. Prepreg Lots	3		3		3		3	

2.3.14 Open Hole Tension 1 Properties

Material:	Hexcel 8552 - AS4 Plain Weave							**Open Hole Tension 1** Gr/ Ep Hexcel 8552 - AS4 PW [45/0/-45/90]2S	
Resin content:	36.58 % w eight		**Comp. density:** 1.57 [g/cc]						
Fiber volume:	55.55 % vol								
Ply count:	16								
Test method:	ASTM D5766-02a								
Normalized by:	0.0078	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			HFPDXXXXB		HFPDXXXXA		HFPDXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	
	Mean		38.97	38.97	42.72	43.13	48.62	48.04	
	Minimum		35.92	34.41	39.31	38.35	44.31	43.26	
	Maximum		43.12	42.48	45.87	48.81	52.69	53.06	
OHT1	**C.V.(%)**		4.29	5.37	4.20	6.21	4.22	5.19	
Strength (ksi)									
	No. Specimens		19		19		21		
	No. Prepreg Lots		3		3		3		

2.3.15 Open Hole Tension 2 Properties

Material:	Hexcel 8552 - AS4 Plain Weave							**Open Hole Tension 2** Gr/ Ep Hexcel 8552 - AS4 PW [45/-45/0/45/-45/45/-45/90/45/-45]s	
Resin content:	35.30 % w eight		**Comp. density:** 1.57 [g/cc]						
Fiber volume:	56.93 % vol								
Ply count:	20								
Test method:	ASTM D5766-02a								
Normalized by:	0.0078	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			HFPEXXXXB		HFPEXXXXA		HFPEXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		40.85	41.10	43.21	43.89	33.25	32.83		
	Minimum		38.19	38.02	41.31	40.53	32.39	31.65		
	Maximum		42.48	44.18	45.68	46.53	34.47	34.88		
OHT2	**C.V.(%)**		2.75	3.61	2.48	3.50	1.90	2.70		
Strength (ksi)										
	No. Specimens		19		19		21			
	No. Prepreg Lots		1		1		1			

2.3.16 Open Hole Tension 3 Properties

Material:	Hexcel 8552 - AS4 Plain Weave					**Open Hole Tension 3**	
						Gr/ Ep	
Resin content:	35.94 % w eight		**Comp. density:** 1.57 [g/cc]			Hexcel 8552 - AS4 PW	
Fiber volume:	56.23 % vol					**[0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0]S**	
Ply count:	15						
Test method:	ASTM D5766-02a						
Normalized by:	0.0078	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			HFPFXXXXB		HFPFXXXXA		HFPFXXXXD	
			Normalized	**Measured**	**Normalized**	**Measured**		
	Mean		43.88	44.63	50.36	50.67	60.55	60.08
	Minimum		37.37	37.33	45.96	45.26	56.26	56.01
	Maximum		47.95	50.03	55.30	56.05	65.40	65.54
OHT3 Strength (ksi)	**C.V.(%)**		5.34	6.80	4.22	5.64	4.04	4.44
	No. Specimens		19		19		21	
	No. Prepreg Lots		3		3		3	

2.3.17 Filled-Hole Tension 1 Properties

Material:	Hexcel 8552 - AS4 Plain Weave					**Filled Hole Tension 1** Gr/ Ep Hexcel 8552 - AS4 PW [45/0/-45/90]2S	
Resin content:	35.21 % weight	**Comp. density:** 1.58 [g/cc]					
Fiber volume:	57.03 % vol						
Ply count:	16						
Test method:	ASTM D6742-02						
Normalized by:	0.0078	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		HFP4XXXXB		HFP4XXXXA		HFP4XXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	43.17	43.70	49.10	49.49	51.58	51.14
	Minimum	40.21	40.09	43.34	44.74	47.90	46.94
	Maximum	46.69	49.35	52.84	55.13	53.92	53.74
FHT1	**C.V.(%)**	4.24	5.72	4.89	5.56	3.23	3.86
Strength (ksi)							
	No. Specimens	21		24		21	
	No. Prepreg Lots	3		3		3	

2.3.18 Filled-Hole Tension 2 Properties

Material:	Hexcel 8552 - AS4 PW					**Filled Hole Tension 2** Gr/ Ep Hexcel 8552 - AS4 PW [45/-45/0/45/-45/45/-45/90/45/-45]S	
Resin content:	35.58 % weight		**Comp. density:** 1.57 [g/cc]				
Fiber volume:	56.65 % vol						
Ply count:	20						
Test method:	ASTM D6742-02						
Normalized by:	0.0078	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			HFP5XXXXB		HFP5XXXXA		HFP5XXXXD	
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		44.07	44.48	46.47	46.23	35.25	34.71
	Minimum		39.06	40.90	44.94	43.67	33.54	32.59
	Maximum		46.33	49.26	47.88	49.85	36.53	36.17
FHT2 Strength (ksi)	**C.V.(%)**		3.81	4.90	1.73	3.33	2.17	2.77
	No. Specimens		22		21		21	
	No. Prepreg Lots		3		3		3	

2.3.19 Filled-Hole Tension 3 Properties

Material:	Hexcel 8552 - AS4 Plain Weave					**Filled Hole Tension 3** Gr/ Ep Hexcel 8552 - AS4 PW [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0]	
Resin content:	35.52 % weight	**Comp. density:** 1.57 [g/cc]					
Fiber volume:	56.65 % vol						
Ply count:	15						
Test method:	ASTM D6742-02						
Normalized by:	0.0078	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		HFP6XXXXB		HFP6XXXXA		HFP6XXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	48.35	49.64	54.84	54.63	59.44	59.16
	Minimum	43.15	44.56	49.90	48.71	54.52	53.83
	Maximum	54.43	53.73	61.68	62.35	63.92	64.72
FHT3	**C.V.(%)**	5.69	6.11	5.76	6.42	5.09	6.00
Strength (ksi)							
	No. Specimens	23		21		21	
	No. Prepreg Lots	3		3		3	

2.3.20 Open Hole Compression 1 Properties

Material:	Hexcel 8552 - AS4 Plain Weave					**Open Hole Compression 1** Gr/ Ep Hexcel 8552 - AS4 PW [45/0/-45/90/45/0/-45/90/-45/90]s	
Resin content:	36.88 % w eight	**Comp. density:** 1.57 [g/cc]					
Fiber volume:	55.23 % vol						
Ply count:	20						
Test method:	ASTM D6484-04						
Normalized by:	0.0078	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			75		250		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFPGXXXXA		HFPGXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	
	Mean		47.49	47.70	31.77	31.72	
	Minimum		45.24	45.88	28.86	28.59	
	Maximum		49.72	50.36	37.51	37.61	
OHC1 Strength (ksi)	**C.V.(%)**		2.67	2.58	5.56	6.04	
	No. Specimens		19		22		
	No. Prepreg Lots		3		3		

2.3.21 Open Hole Compression 2 Properties

Material:	Hexcel 8552 - AS4 Plain Weave					**Open Hole Compression 2** Gr/ Ep Hexcel 8552 - AS4 PW [45/-45/0/45/-45/45/-45/90/45/-45]s	
Resin content:	35.67 % w eight	**Comp. density:** 1.57 [g/cc]					
Fiber volume:	56.60 % vol						
Ply count:	20						
Test method:	ASTM D6484-04						
Normalized by:	0.0078	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			75		250		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFPHXXXXA		HFPHXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		42.19	42.42	26.67	26.61		
	Minimum		39.70	39.65	24.17	24.25		
	Maximum		44.05	44.41	28.14	28.65		
OHC2 Strength (ksi)	**C.V.(%)**		2.98	2.56	3.67	3.65		
	No. Specimens		19		21			
	No. Prepreg Lots		3		3			

2.3.22 Open Hole Compression 3 Properties

Material:	Hexcel 8552 - AS4 Plain Weave					**Open Hole Compression 3** Gr/ Ep Hexcel 8552 - AS4 PW [0/90/45/90/0/0/90/-45/90/0]S	
Resin content:	35.78 % w eight		**Comp. density:** 1.57 [g/cc]				
Fiber volume:	56.49 % vol						
Ply count:	20						
Test method:	ASTM D6484-04						
Normalized by:	0.0078	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			75		250		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFPIXXXXA		HFPIXXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		49.99	50.31	32.35	32.16		
	Minimum		47.30	48.65	29.90	29.13		
	Maximum		52.60	52.70	35.82	35.46		
OHC3 Strength (ksi)	**C.V.(%)**		2.62	2.30	5.45	5.53		
	No. Specimens		21		22			
	No. Prepreg Lots		3		3			

2.3.23 Filled-Hole Compression 1 Properties

Material:	Hexcel 8552-AS4 Plain Weave					**Filled Hole Compression 1** Gr/ Ep HEXCEL 8552-AS4 PW $[45/0/-45/90]_{2S}$	
Resin content:	35.97 % weight	**Comp. density:** 1.57 [g/cc]					
Fiber volume:	56.29 % vol						
Ply count:	20						
Test method:	ASTM D6742-02						
Normalized by:	0.0078	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			75		250		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFP7XXXXA		HFP7XXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		85.00	84.51	54.87	53.46		
	Minimum		78.72	77.35	45.04	44.41		
	Maximum		92.72	89.34	61.28	57.86		
FHC1 Strength (ksi)	**C.V.(%)**		5.07	4.47	8.53	7.56		
	No. Specimens		21		10			
	No. Prepreg Lots		3		3			

2.3.24 Filled-Hole Compression 2 Properties

Material:	Hexcel 8552-AS4 Plain Weave					**Filled Hole Compression 2** Gr/ Ep HEXCEL 8552 AS4 PW [45/-45/0/45/-45/45/-45/90/45/-45]s	
Resin content:	35.68 % weight		**Comp. density:** 1.57 [g/cc]				
Fiber volume:	56.53 % vol						
Ply count:	20						
Test method:	ASTM D6742-02						
Normalized by:	0.0078	in. CPT					
			RTD		**ETW**		
Test Temperature [°F]			75		250		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFP8XXXXA		HFP8XXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		61.20	61.29	37.51	37.54		
	Minimum		57.66	58.55	33.90	35.19		
	Maximum		65.85	64.72	42.32	44.40		
FHC2 Strength (ksi)	**C.V.(%)**		3.40	2.50	6.02	6.72		
	No. Specimens		21		19			
	No. Prepreg Lots		3		3			

2.3.25 Filled-Hole Compression 3 Properties

Material:	HEXCEL 8552-AS4 Plain Weave					**Filled Hole Compression 3** Gr/ Ep HEXCEL 8552-AS4 PW [0/45/0/90/0/-45/0/45/0/-45]s	
Resin content:	34.95 % wt	**Comp. density:** 1.58 [g/cc]					
Fiber volume:	57.35 % vol						
Ply count:	20						
Test method:	ASTM D6742-02						
Normalized by:	0.0078	in. CPT					
		RTD		**ETW**			
Test Temperature [°F]		75		250			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFP9XXXXA		HFP9XXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	84.27	84.87	58.50	58.19		
	Minimum	76.99	77.17	48.67	47.63		
	Maximum	88.23	88.62	69.65	69.17		
FHC3	**C.V.(%)**	3.64	3.25	12.30	12.65		
Strength (ksi)							
	No. Specimens	19		13			
	No. Prepreg Lots	3		3			

2.3.26 Single Shear Bearing 1 Properties

Material:	Hexcel 8552 - AS4 Plain Weave				**Single Shear Bearing 1** **Gr/ Ep** Hexcel 8552 - AS4 PW **[45/0/-45/90]S**	
Resin content:	36.83 % w eight	**Comp. density:** 1.57 [g/cc]				
Fiber volume:	55.45 % vol					
Ply count:	8					
Test method:	ASTM D5961-05					
Normalized by:	NA					
		RTD		**ETW**		
Test Temperature [°F]		70		250		
Moisture Conditioning		dry		equilibrium		
Equilibrium at T, RH				160 F,85%		
Source code		HFP1XXXXA		HFP1XXXXD		
		Normalized	**Measured**	**Normalized**	**Measured**	
	Mean	135.32	137.09	96.37	101.97	
	Minimum	120.67	127.91	82.75	89.86	
	Maximum	152.41	149.54	109.63	116.08	
SSB1	**C.V.(%)**	5.23	4.34	6.73	6.44	
Ultimate Strength						
(ksi)	**No. Specimens**	19		22		
	No. Prepreg Lots	3		3		
	Mean	106.95	108.25	79.01	83.55	
	Minimum	83.37	88.37	66.13	67.37	
	Maximum	121.43	118.30	91.33	96.70	
SSB1	**C.V.(%)**	8.97	7.30	9.34	8.22	
2% offset Strength						
(ksi)	**No. Specimens**	19		22		
	No. Prepreg Lots	3		3		

2.3.27 Single Shear Bearing 2 Properties

Material:	Hexcel 8552 - AS4 Plain Weave			**Single Shear Bearing 2**		
				Gr/ Ep		
Resin content:	35.69 % weight	**Comp. density:** 1.58 [g/cc]		Hexcel 8552 - AS4 PW		
Fiber volume:	56.62 % vol			**[45/-45/90/45/-45]S**		
Ply count:	10					
Test method:	ASTM D5961-05					
Normalized by:	NA					
			RTD		**ETW**	
Test Temperature [°F]			75		250	
Moisture Conditioning			dry		equilibrium	
Equilibrium at T, RH					160 F,85%	
Source code			HFP2XXXXA		HFP2XXXXD	
			Normalized	**Measured**	**Normalized**	**Measured**
	Mean		132.73	135.29	96.26	103.86
	Minimum		117.48	124.73	90.30	96.07
	Maximum		149.80	150.25	103.10	110.62
SSB2	**C.V.(%)**		6.57	4.94	3.43	3.26
Ultimate Strength						
(ksi)	**No. Specimens**		19		21	
	No. Prepreg Lots		3		3	
	Mean		102.14	104.13	78.44	84.57
	Minimum		92.52	98.17	64.86	73.27
	Maximum		115.23	114.50	92.22	98.27
SSB2	**C.V.(%)**		5.34	3.74	8.43	7.47
2% offset Strength						
(ksi)	**No. Specimens**		19		21	
	No. Prepreg Lots		3		3	

2.3.28 Single Shear Bearing 3 Properties

Material:	Hexcel 8552 - AS4 Plain Weave				**Single Shear Bearing 3** **Gr/ Ep** Hexcel 8552 - AS4 PW **[0/90/45/0/90]S**	
Resin content:	36.54 % w eight	**Comp. density:** 1.57 [g/cc]				
Fiber volume:	55.75 % vol					
Ply count:	10					
Test method:	ASTM D5961-05					
Normalized by:	NA					
		RTD		**ETW**		
Test Temperature [°F]		75		250		
Moisture Conditioning		dry		equilibrium		
Equilibrium at T, RH				160 F,85%		
Source code		HFP3XXXXA		HFP3XXXXD		
		Normalized	**Measured**	**Normalized**	**Measured**	
	Mean	125.02	123.39	87.68	93.57	
	Minimum	114.72	113.53	81.92	83.69	
	Maximum	136.20	131.81	98.63	104.80	
SSB3	**C.V.(%)**	5.17	4.37	5.27	6.59	
Ultimate Strength						
(ksi)	**No. Specimens**	19		21		
	No. Prepreg Lots	3		3		
	Mean	96.40	95.11	70.69	75.40	
	Minimum	80.24	81.29	57.55	60.88	
	Maximum	107.11	104.84	83.13	89.35	
SSB3	**C.V.(%)**	9.11	8.24	9.21	9.58	
2% offset Strength						
(ksi)	**No. Specimens**	19		21		
	No. Prepreg Lots	3		3		

2.3.29 Compression after Impact Properties

Material: Hexcel 8552-AS4 Plain Weave

Resin content: 32.75 % w eight **Comp. density:** 1.58 [g/cc]
Fiber volume: 59.21 % vol
Ply count: 24

Test method: ASTM D7136 & D7137

Normalized by: 0.0078 in. CPT

Compression After Impact
Gr/ Ep
Hexcel 8552-AS4 PW
[45,0,-45,90]3s

		RTD					
Test Temperature [°F]		75					
Moisture Conditioning		dry					
Equilibrium at T, RH							
Source code		HFPKXXXXA					
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
CAI Strength (ksi)	**Mean**	31.22	31.67				
	Minimum	29.58	30.46				
	Maximum	32.50	32.70				
	C.V.(%)	3.76	2.98				
	No. Specimens	6					
	No. Prepreg Lots	1					

2.3.30 Interlaminar Tension Properties

Material: Hexcel 8552 - AS4 Plain Weave

Resin content: 37.31 % w eight **Comp. density:** 1.57 [g/cc]
Fiber volume: 54.84 % vol
Ply count: 21

Test method: ASTM D6415-99^{E1}

Normalized by: NA

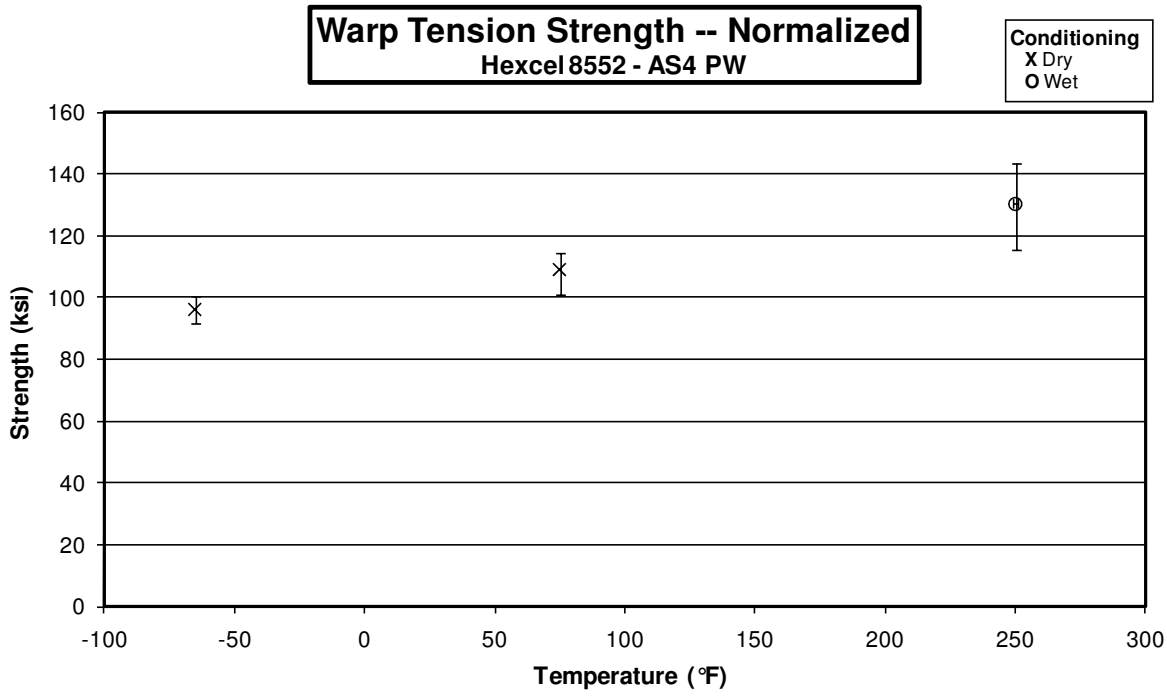
Interlaminar Tension
Gr/ Ep
Hexcel 8552 - AS4 PW
[0]21

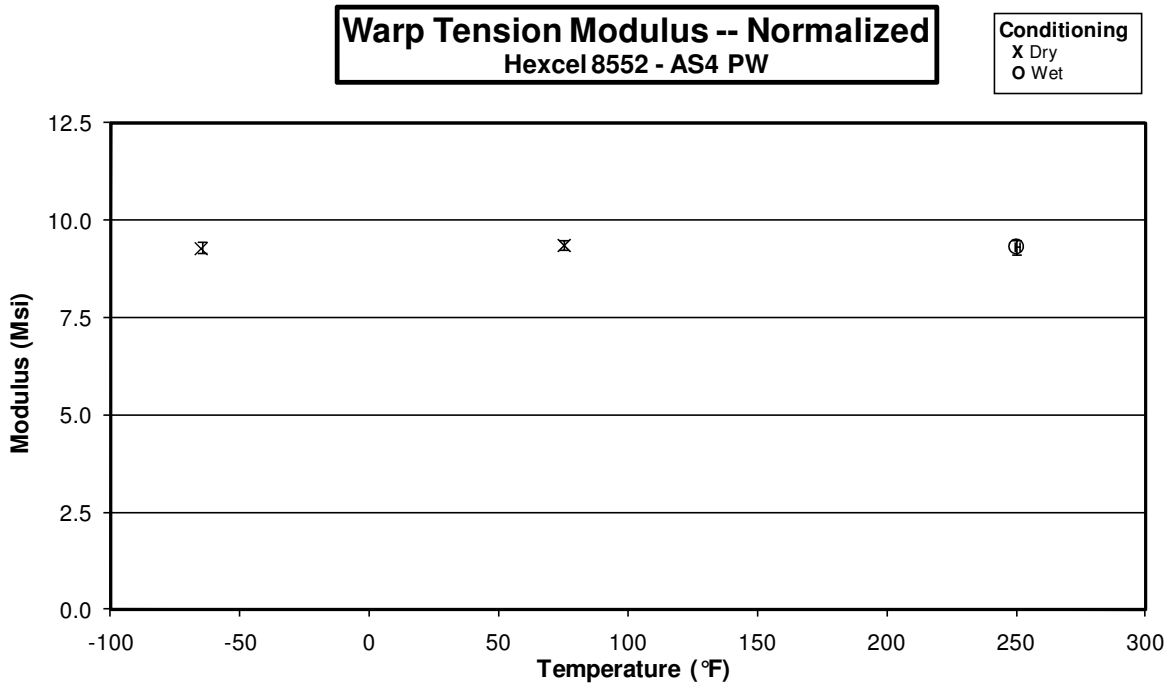
		CTD		RTD		ETW	
Test Temperature [°F]		-65		75		250	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFPMXXXXB		HFPMXXXXA		HFPMXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		12.12		10.72		3.97
	Minimum		9.58		9.49		3.74
	Maximum		13.52		12.72		4.43
ILT	**C.V.(%)**		9.75		9.87		6.25
Strength (ksi)							
	No. Specimens	8		7		7	
	No. Prepreg Lots	1		1		1	

3. Individual Test Charts

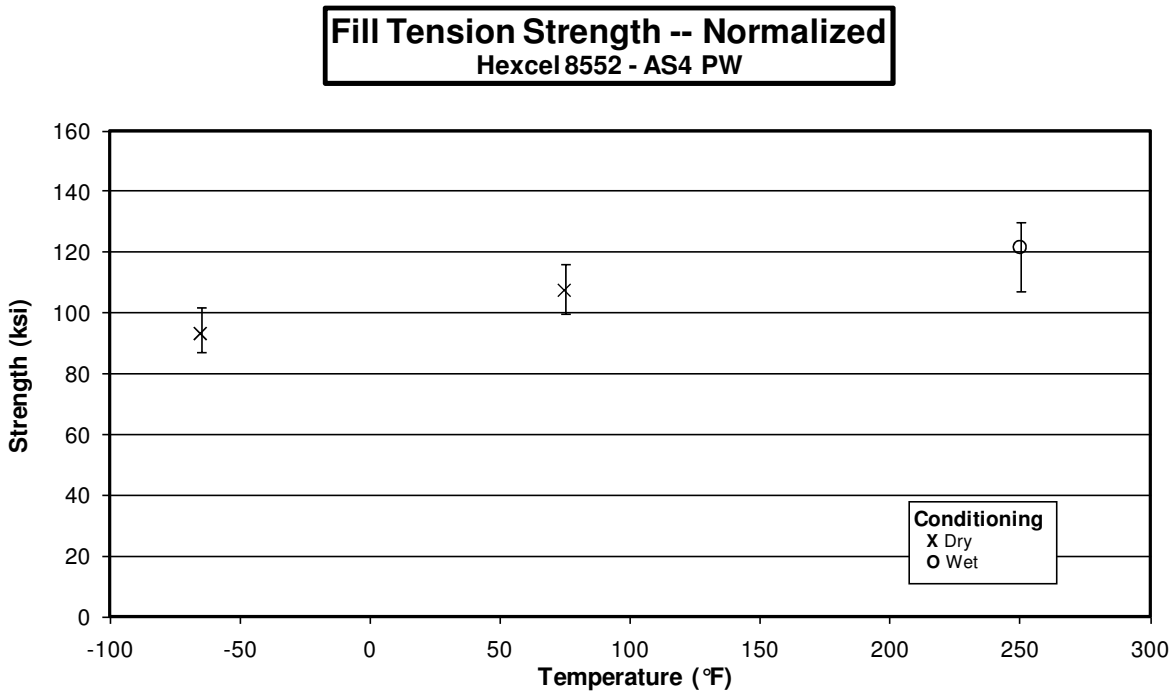
These charts combine all three batches of data and plot the minimum and maximum modulus and strength range based on the test temperature.

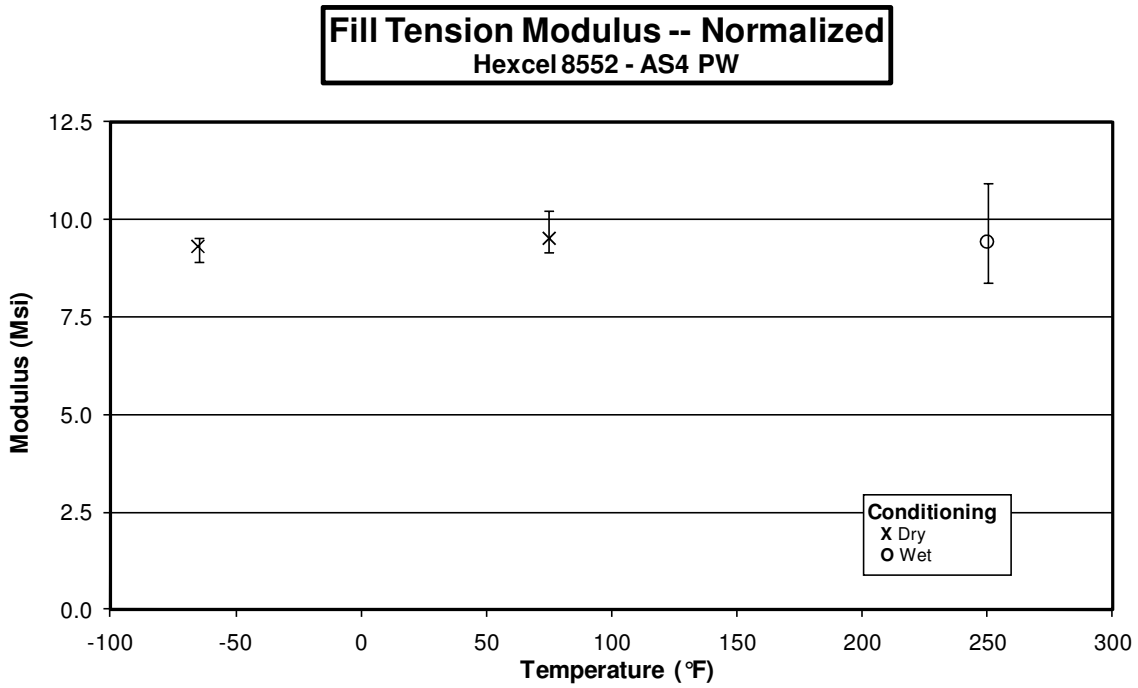
3.1 Warp Tension Properties



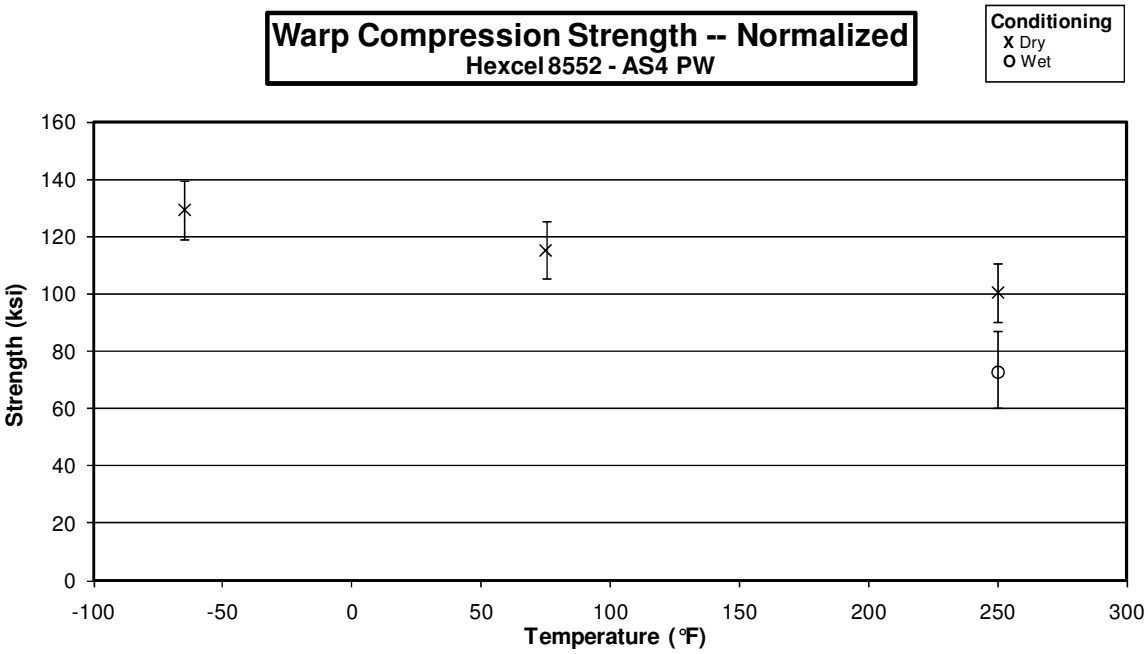


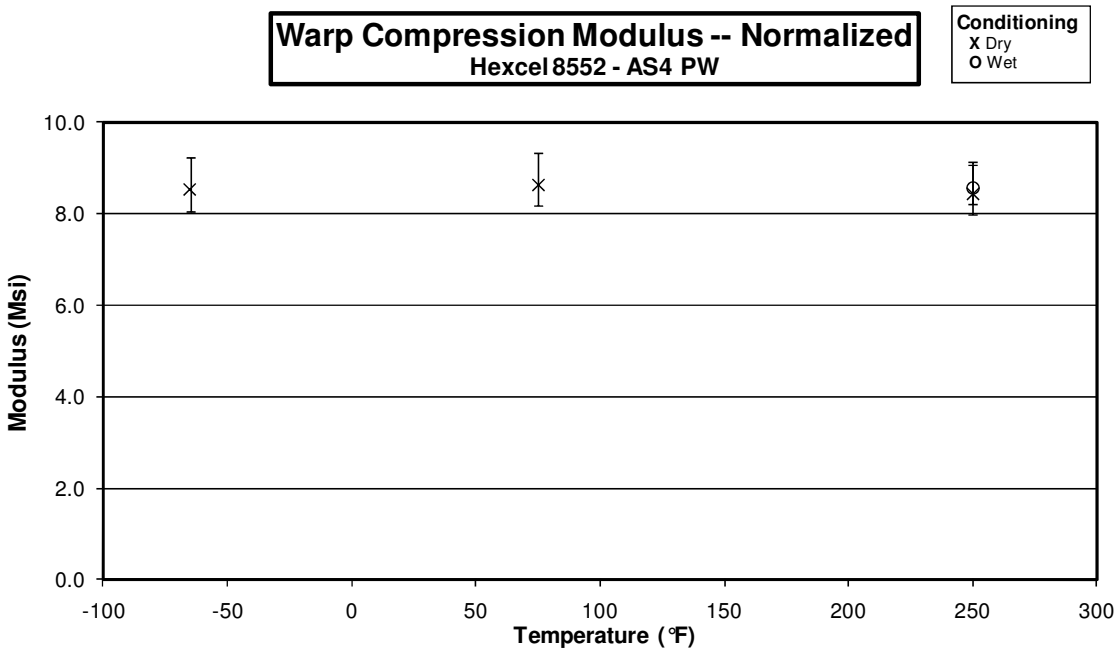
3.2 Fill Tension Properties



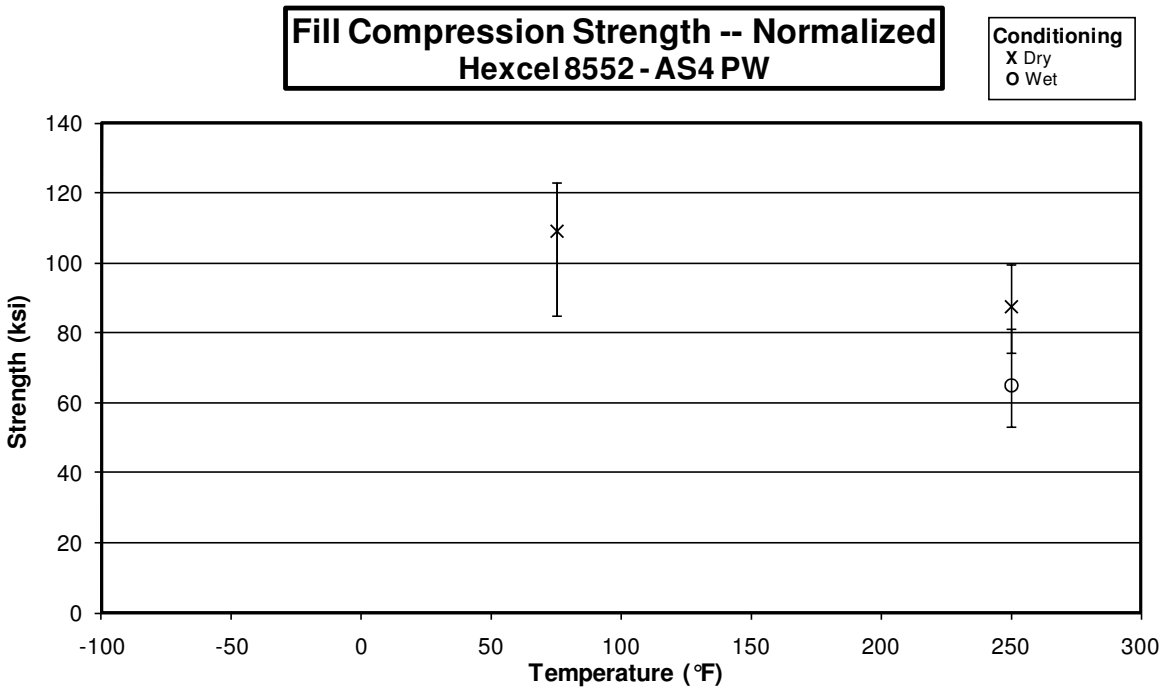


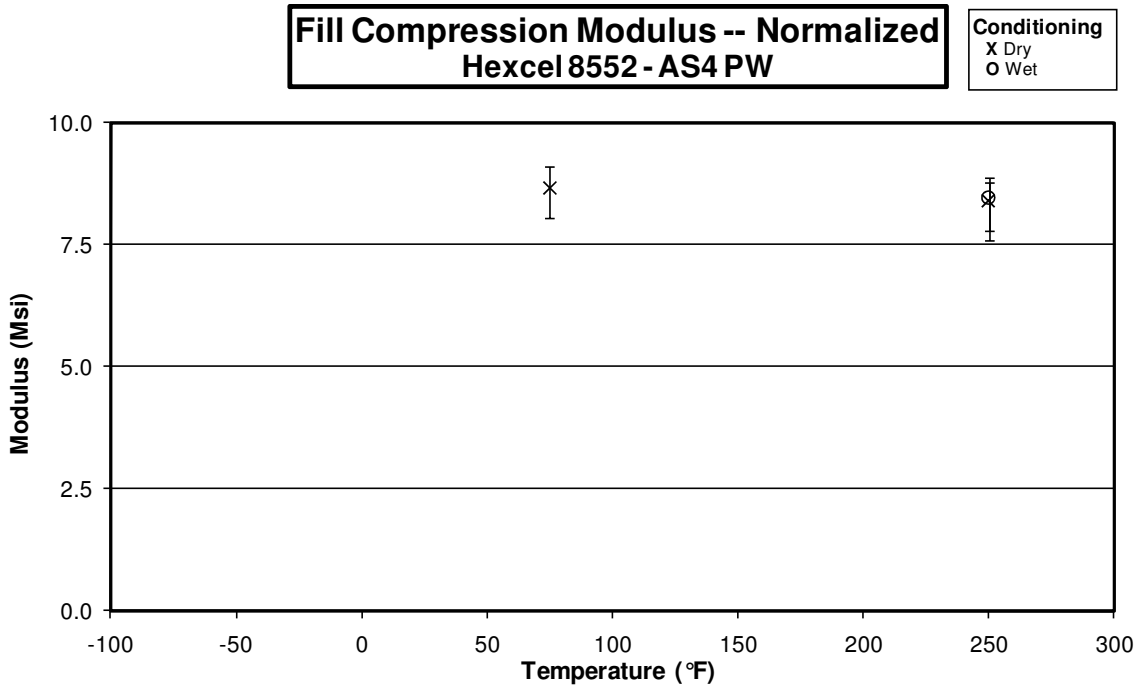
3.3 Warp Compression Properties



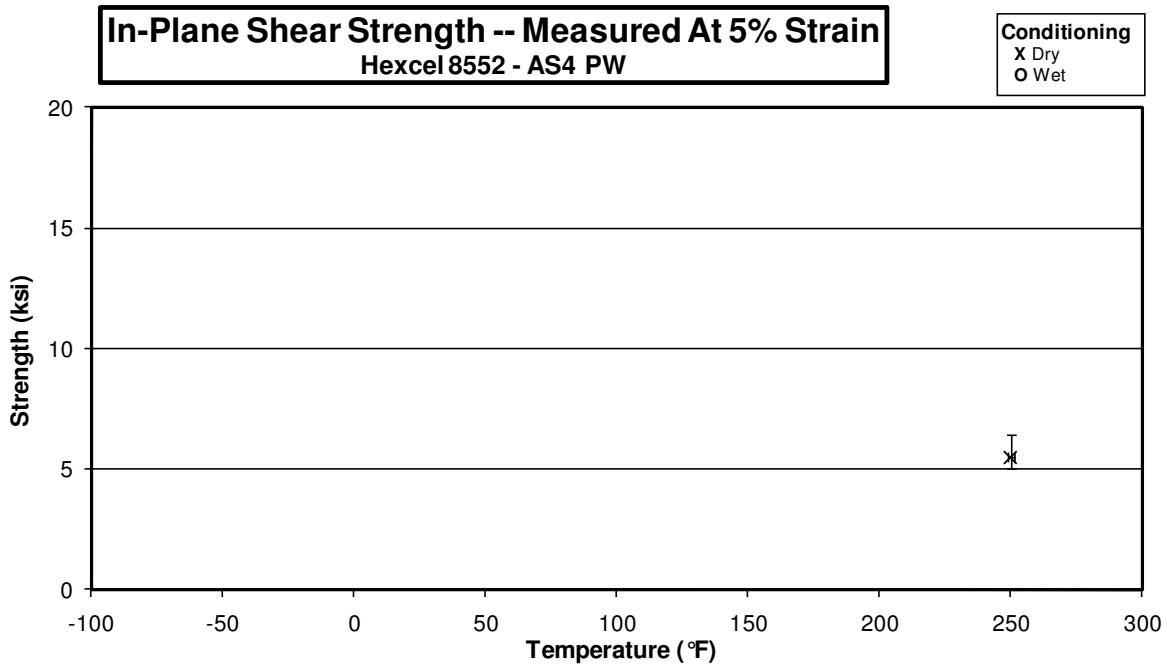


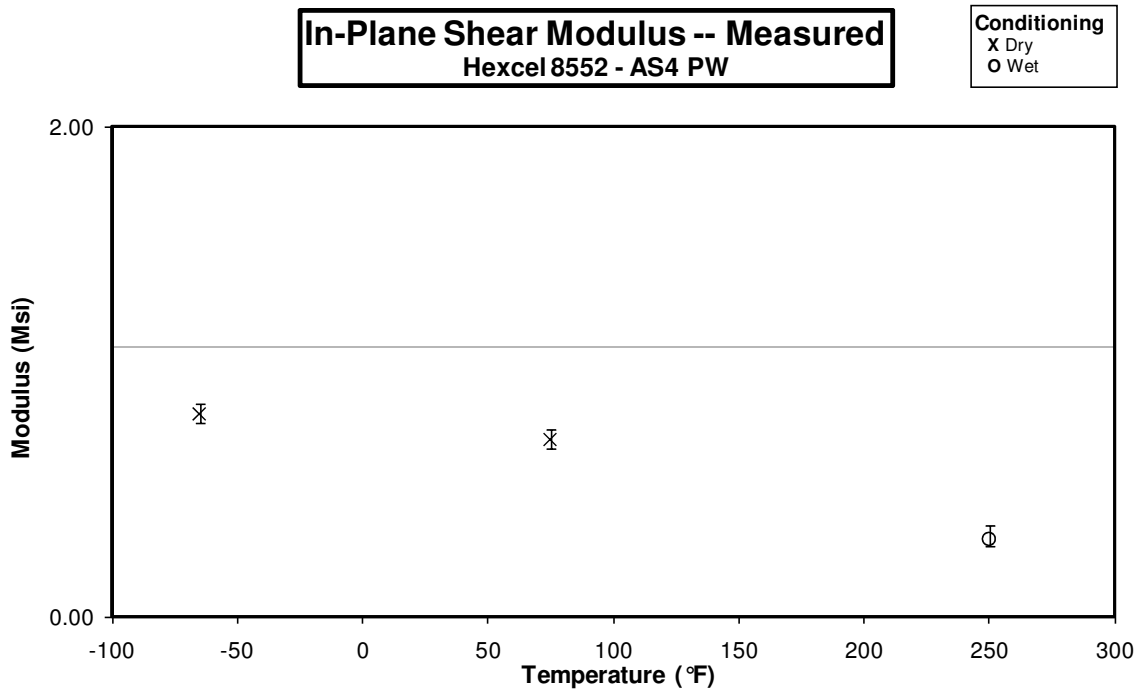
3.4 Fill Compression Properties



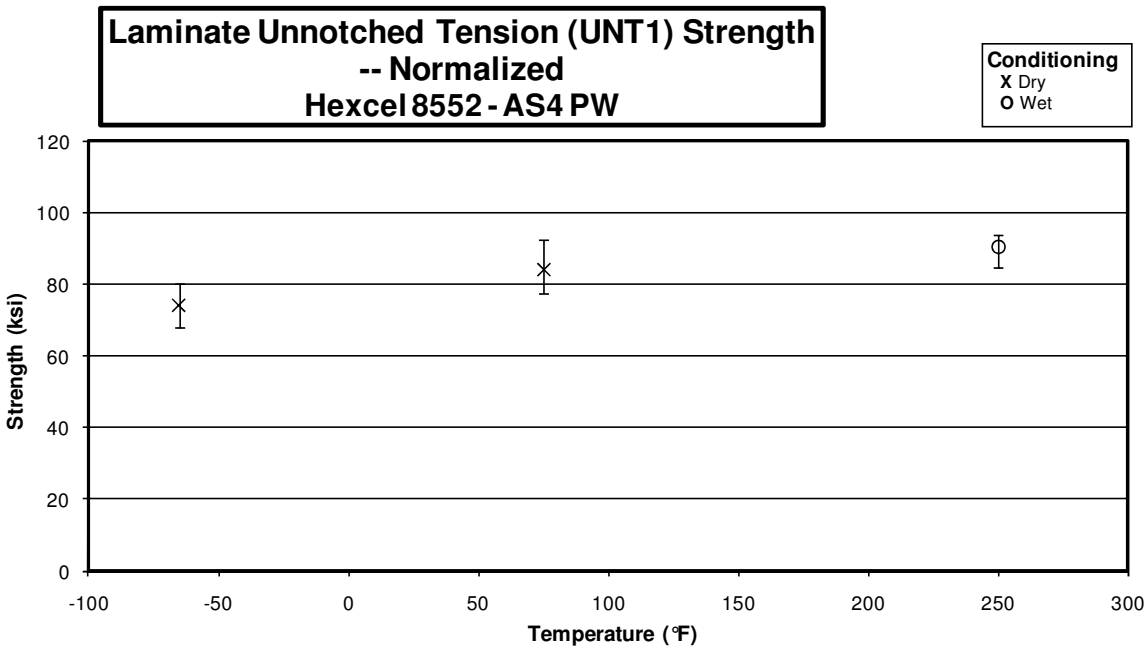


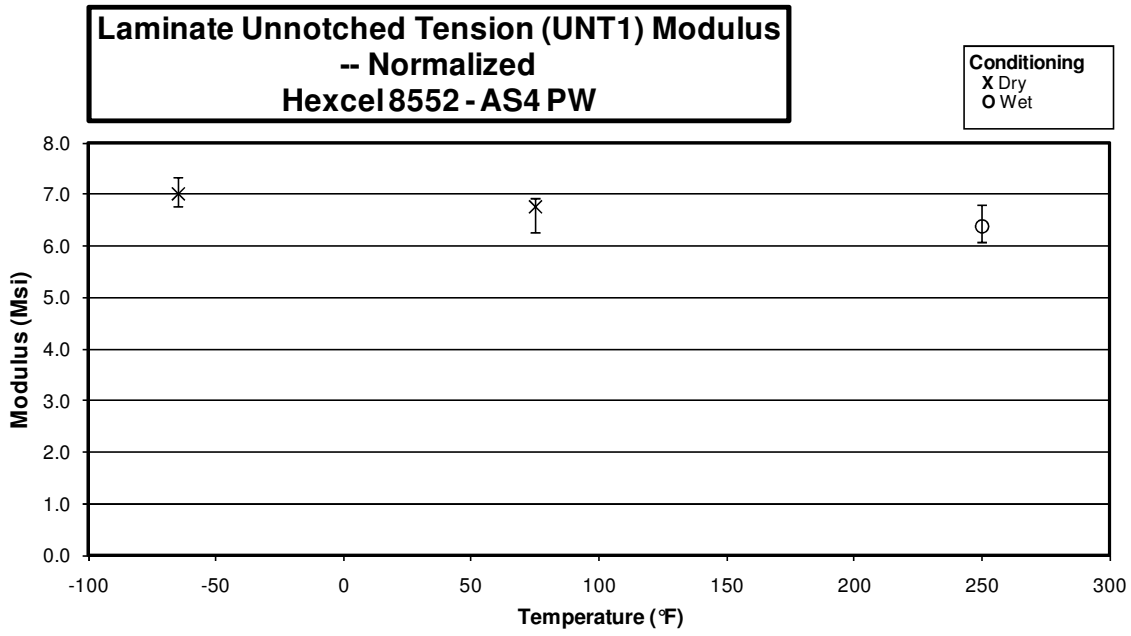
3.5 In-Plane Shear Properties



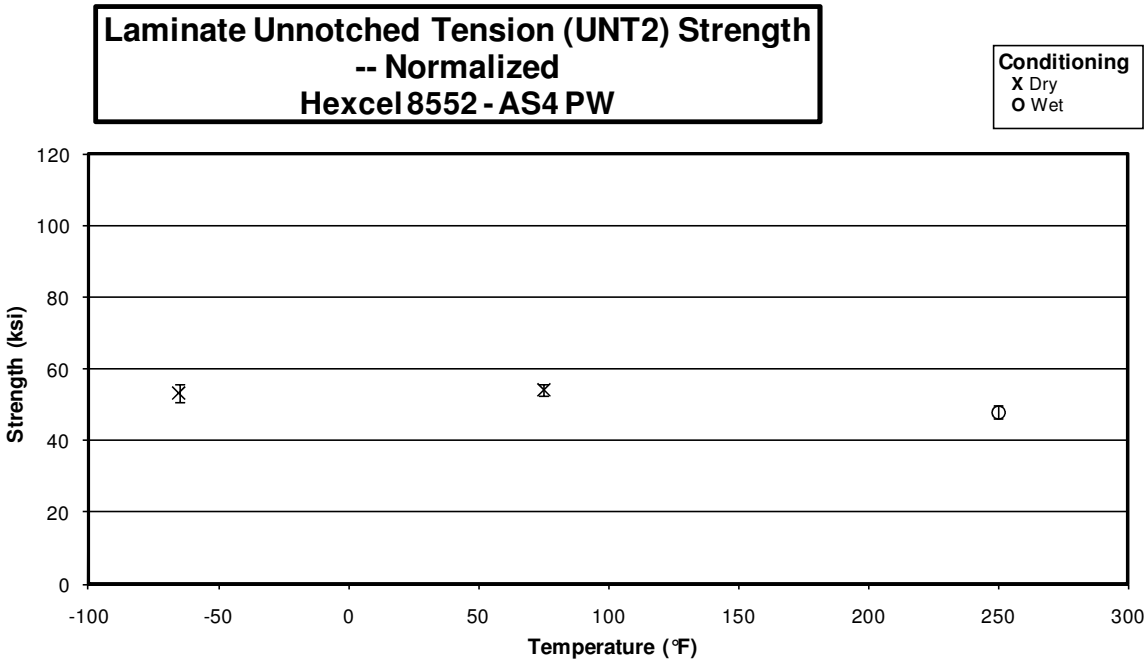


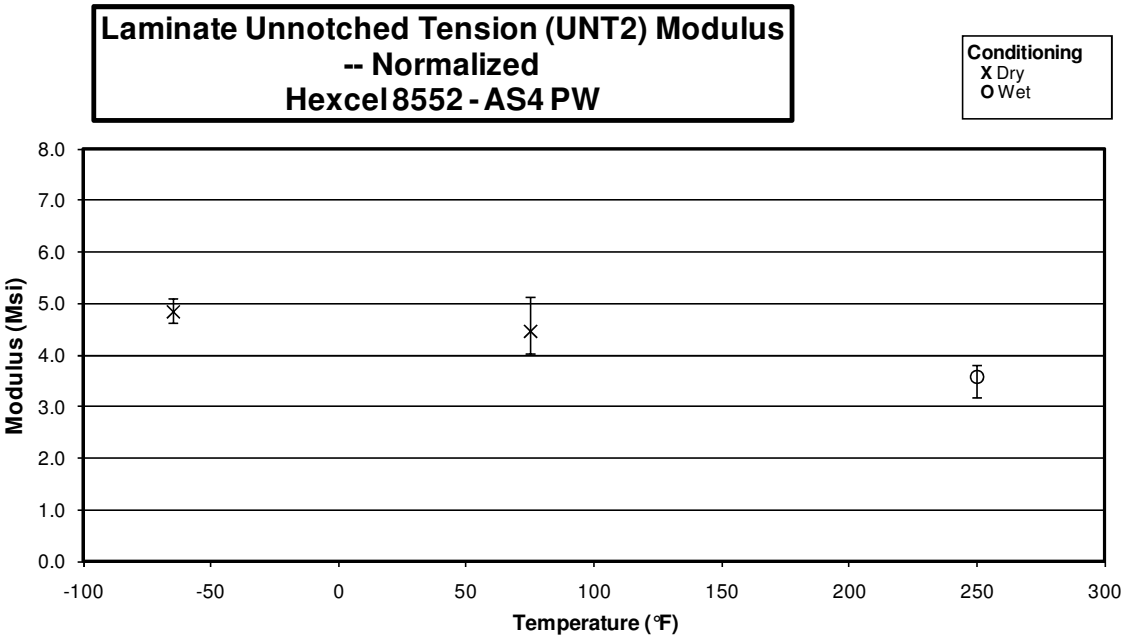
3.6 Unnotched Tension 1 Properties



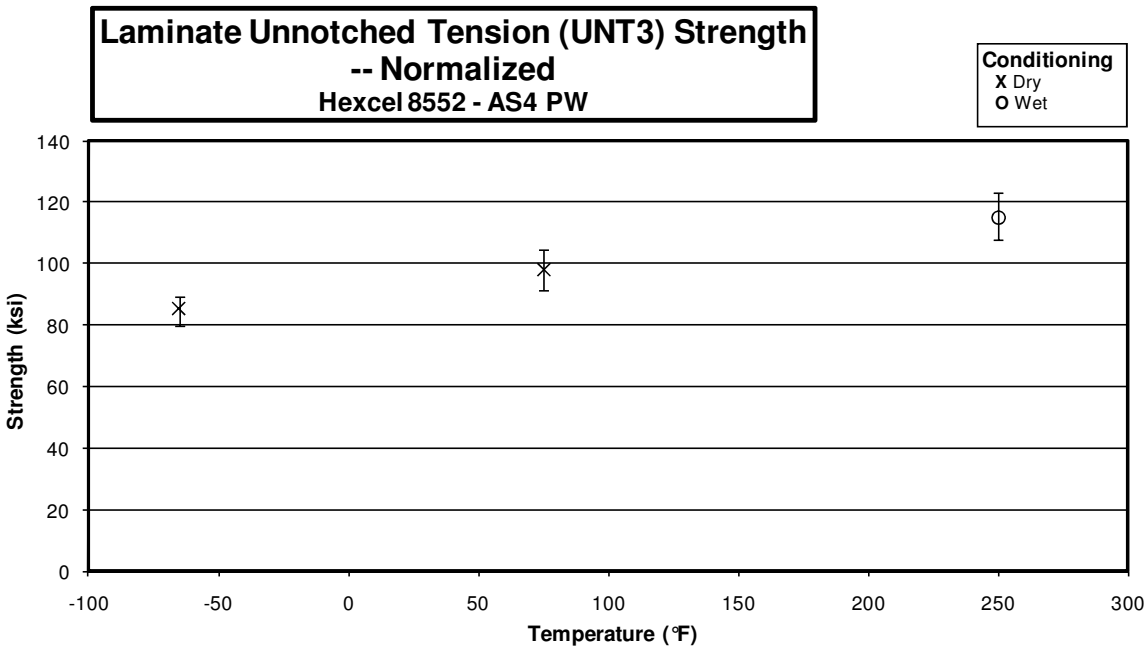


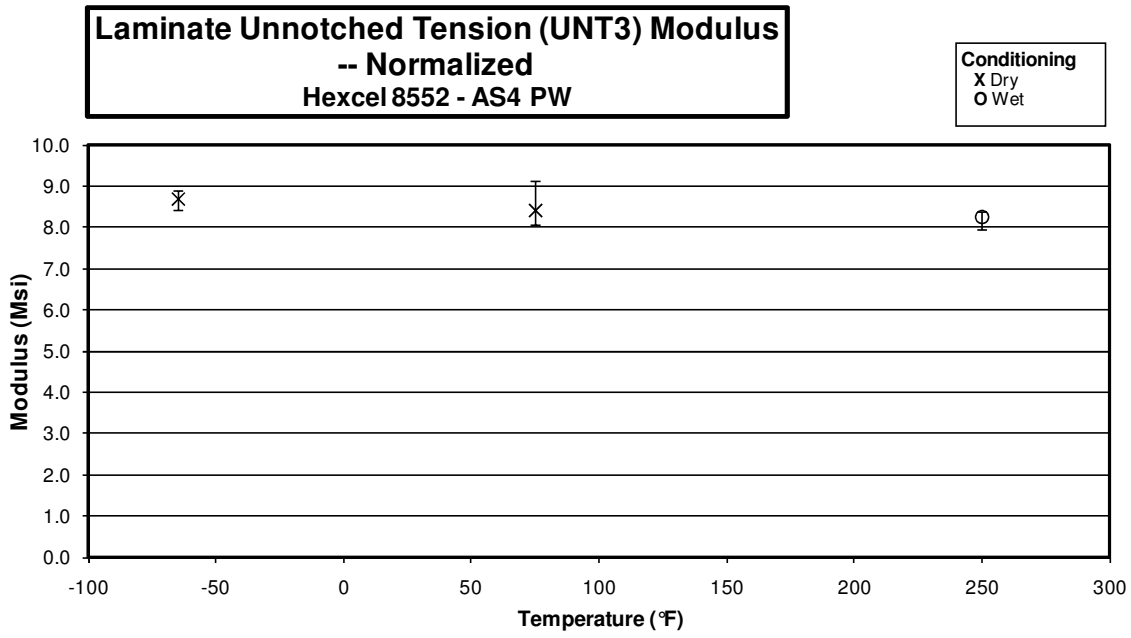
3.7 Unnotched Tension 2 Properties



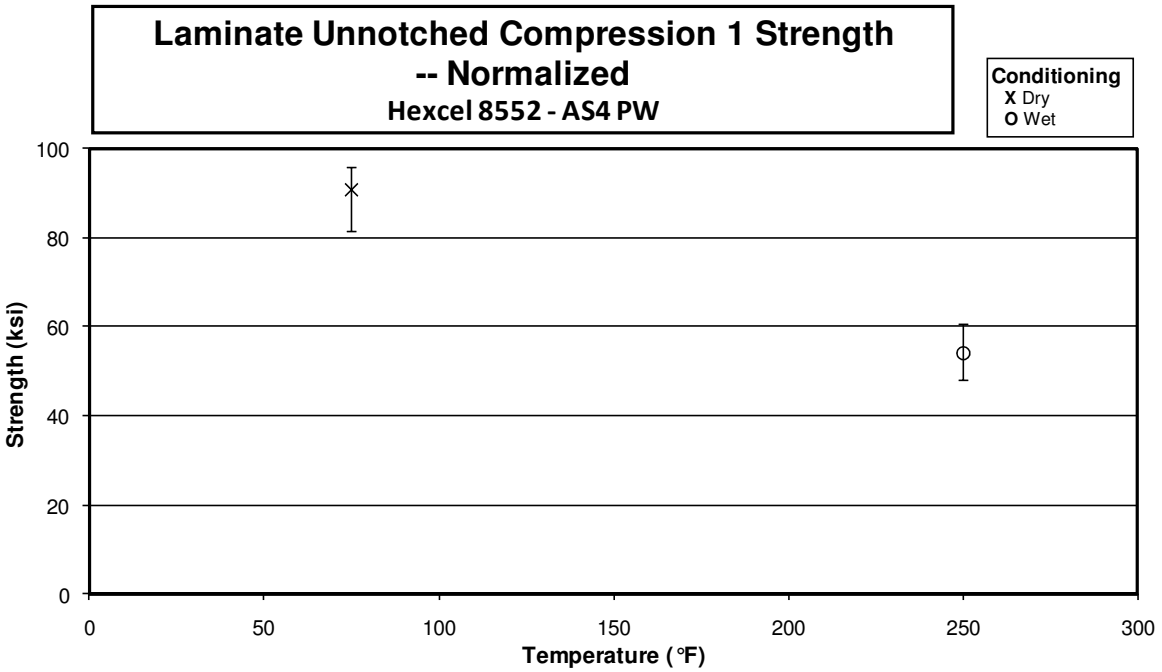


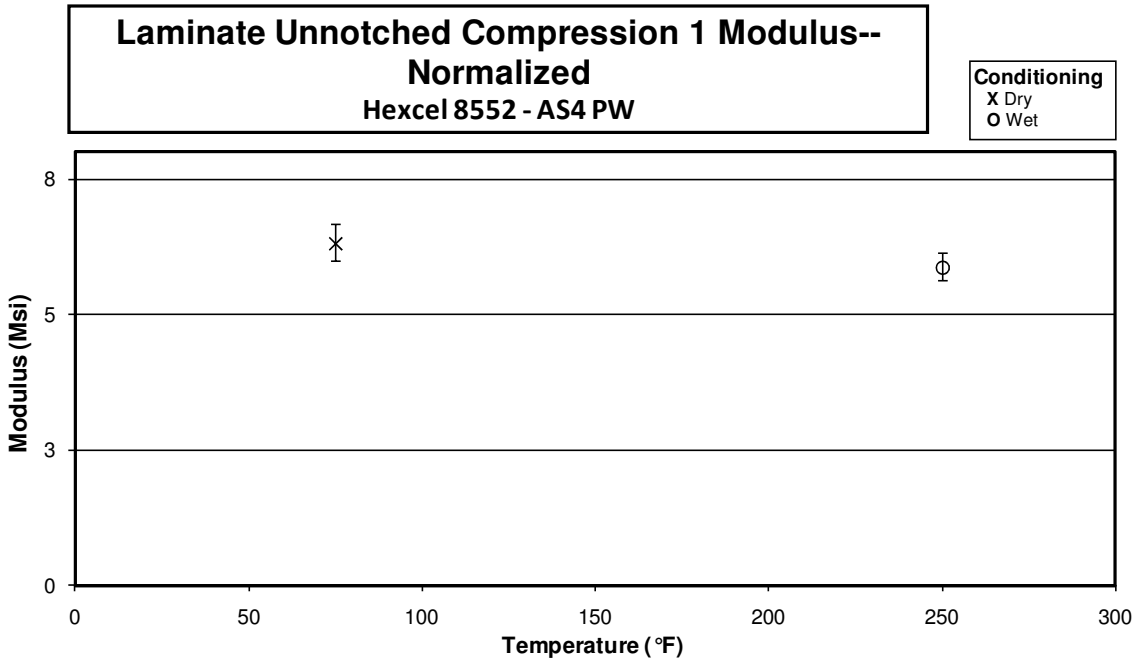
3.8 Unnotched Tension 3 Properties



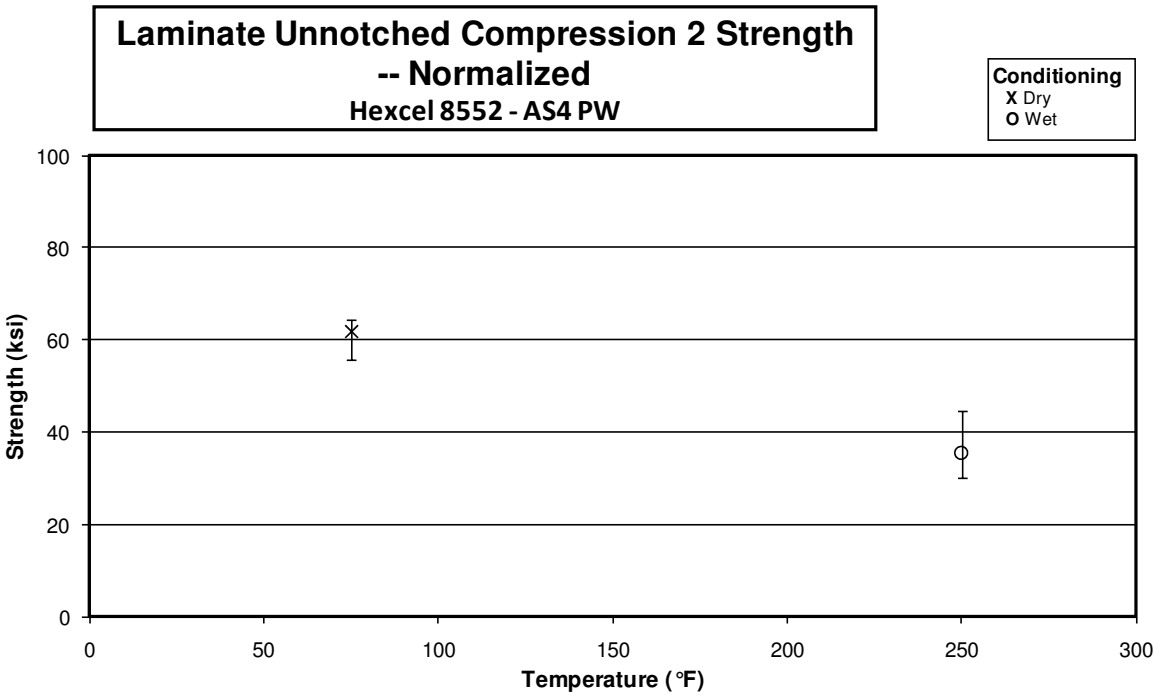


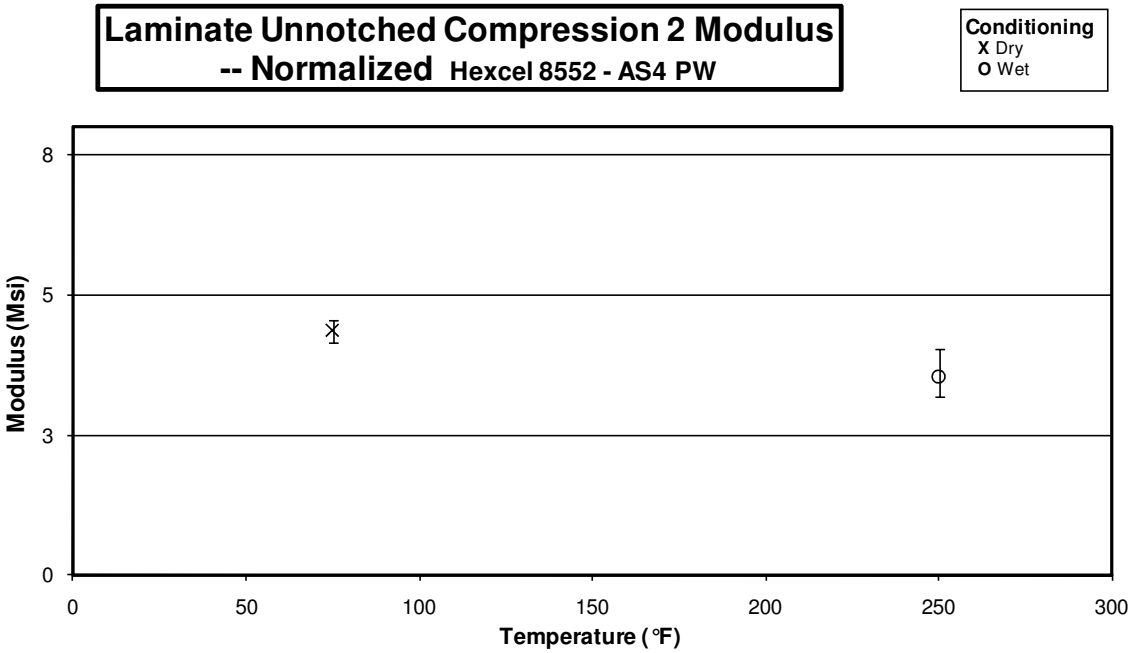
3.9 Unnotched Compression 1 Properties



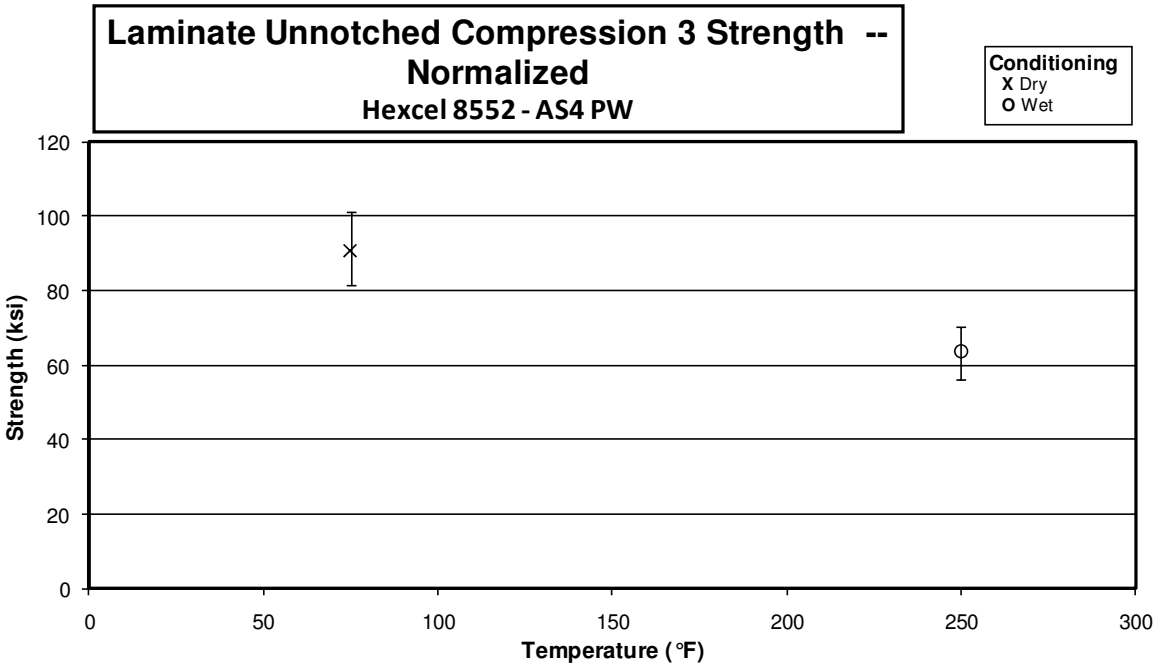


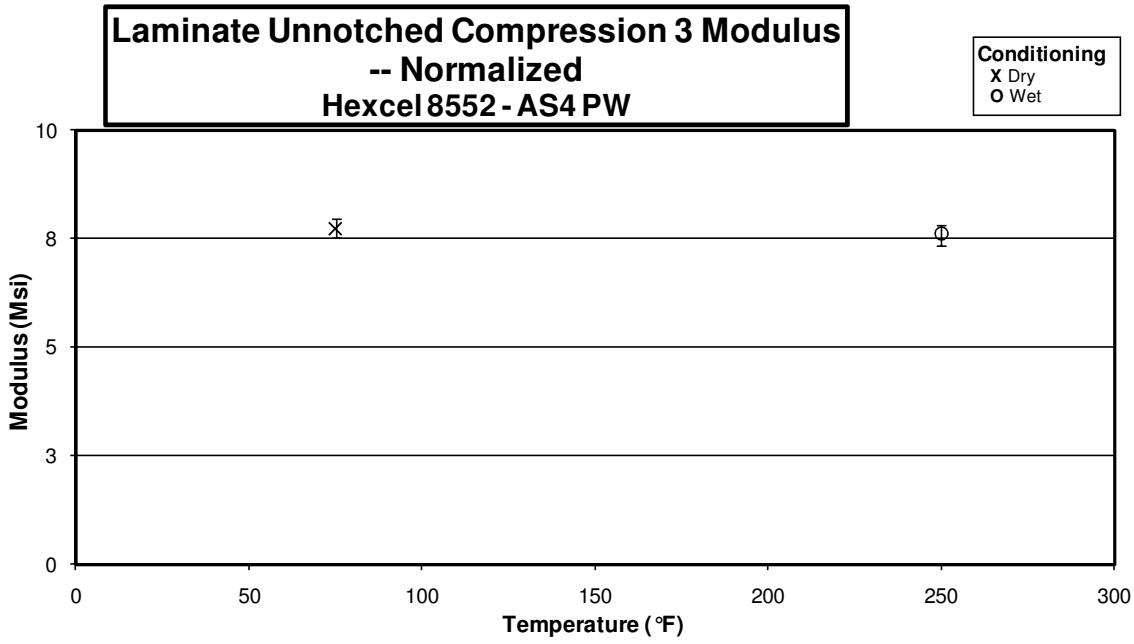
3.10 Unnotched Compression 2 Properties



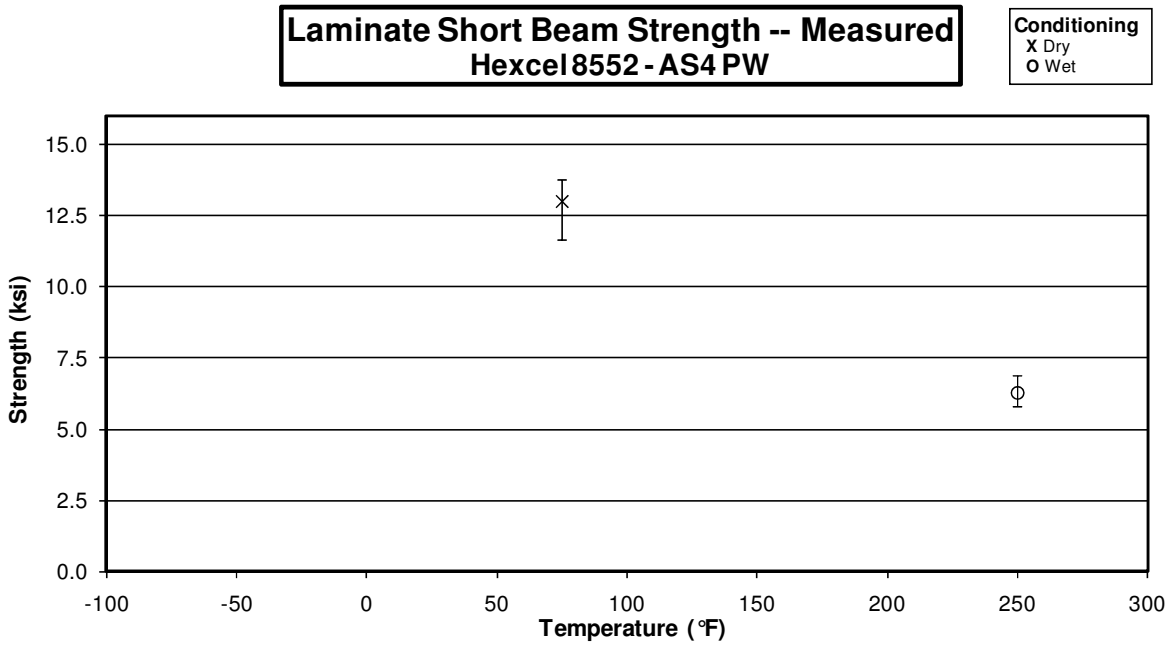


3.11 Unnotched Compression 3 Properties

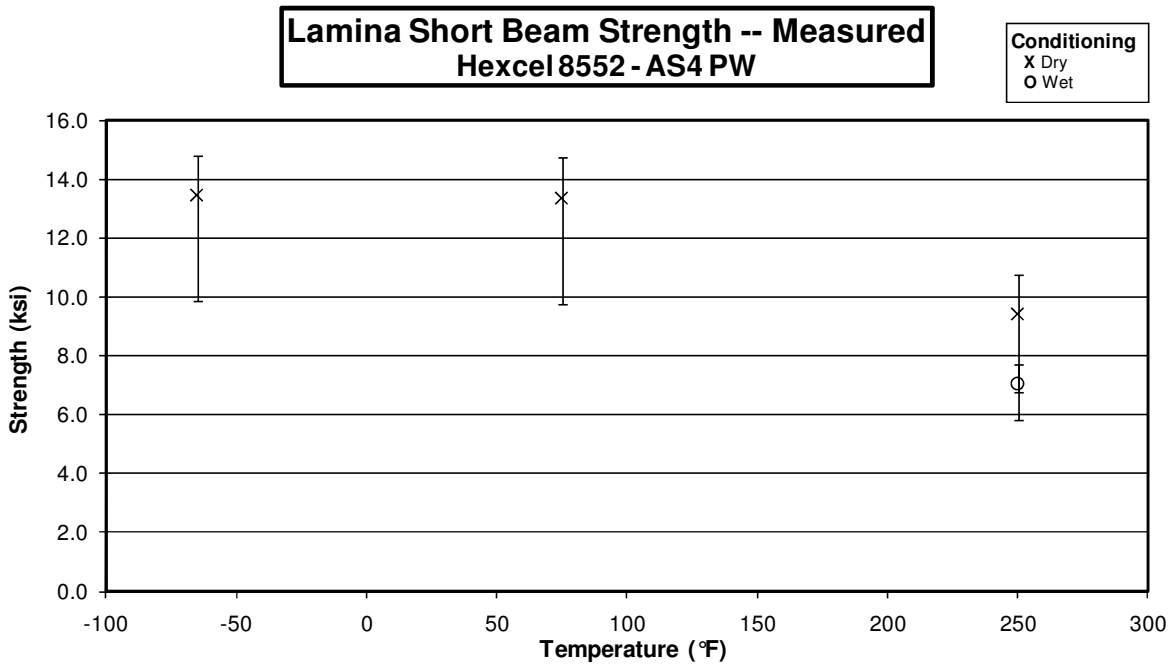




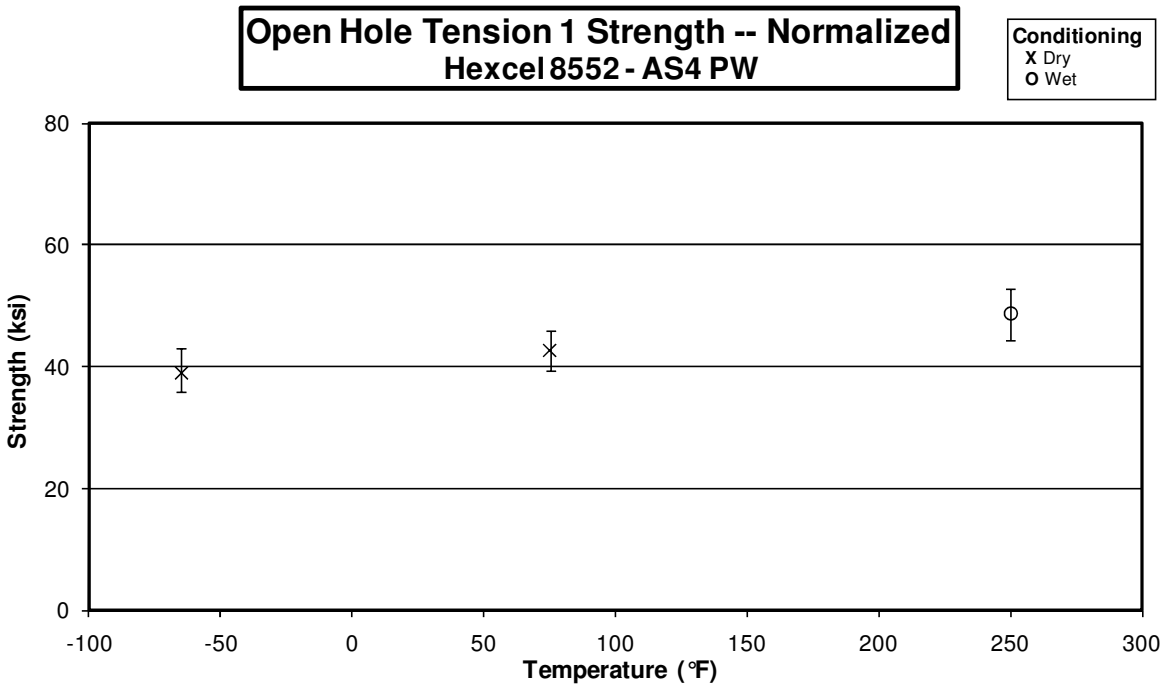
3.12 Laminate Short Beam Shear Properties



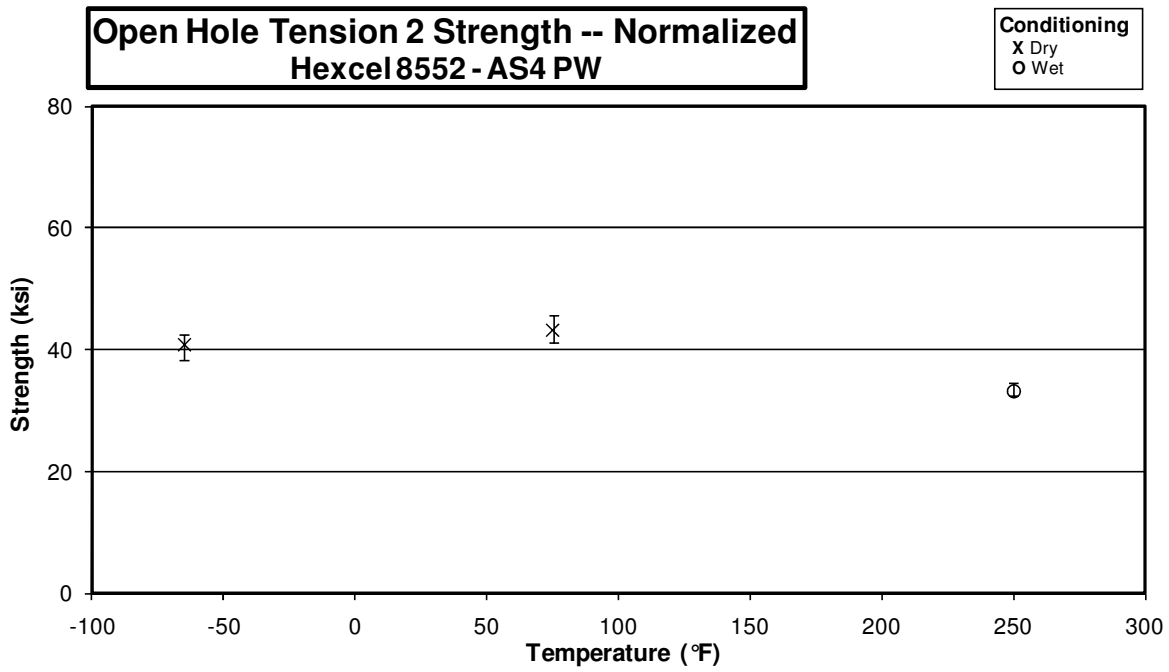
3.13 Lamina Short Beam Strength Properties



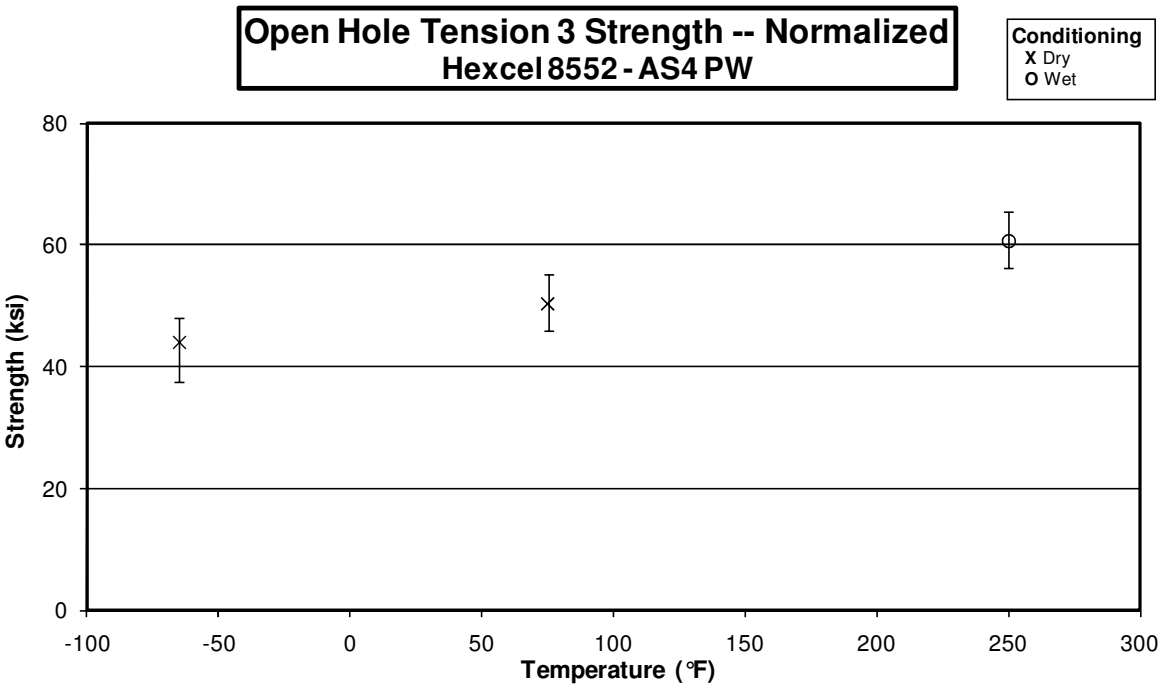
3.14 Open Hole Tension 1 Properties



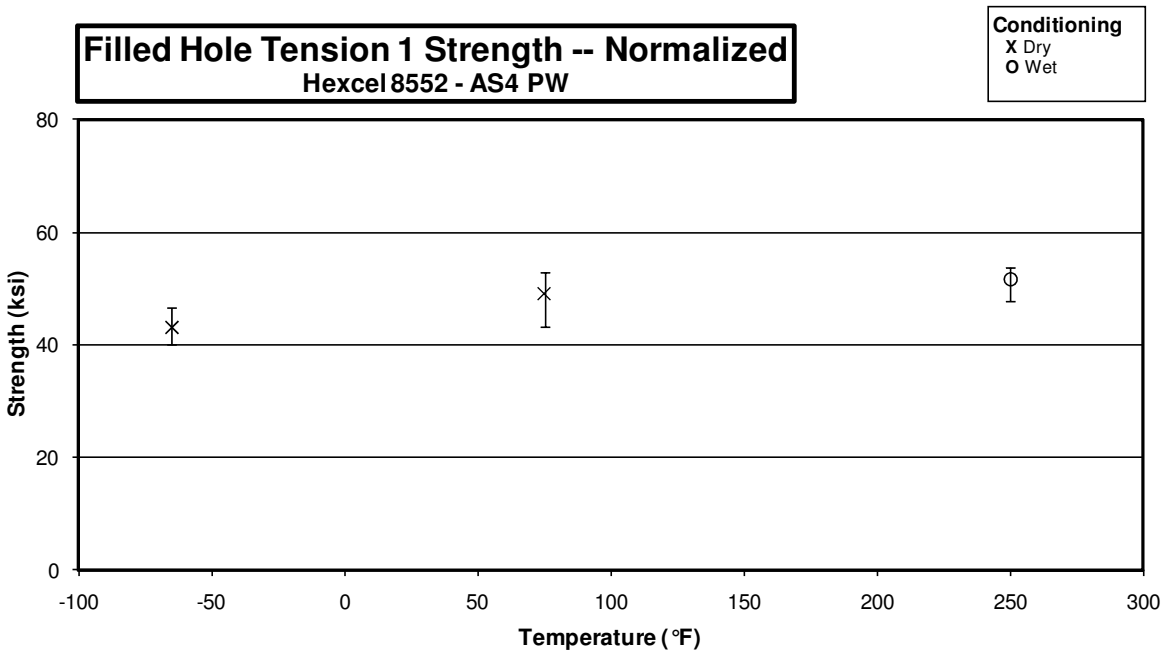
3.15 Open Hole Tension 2 Properties



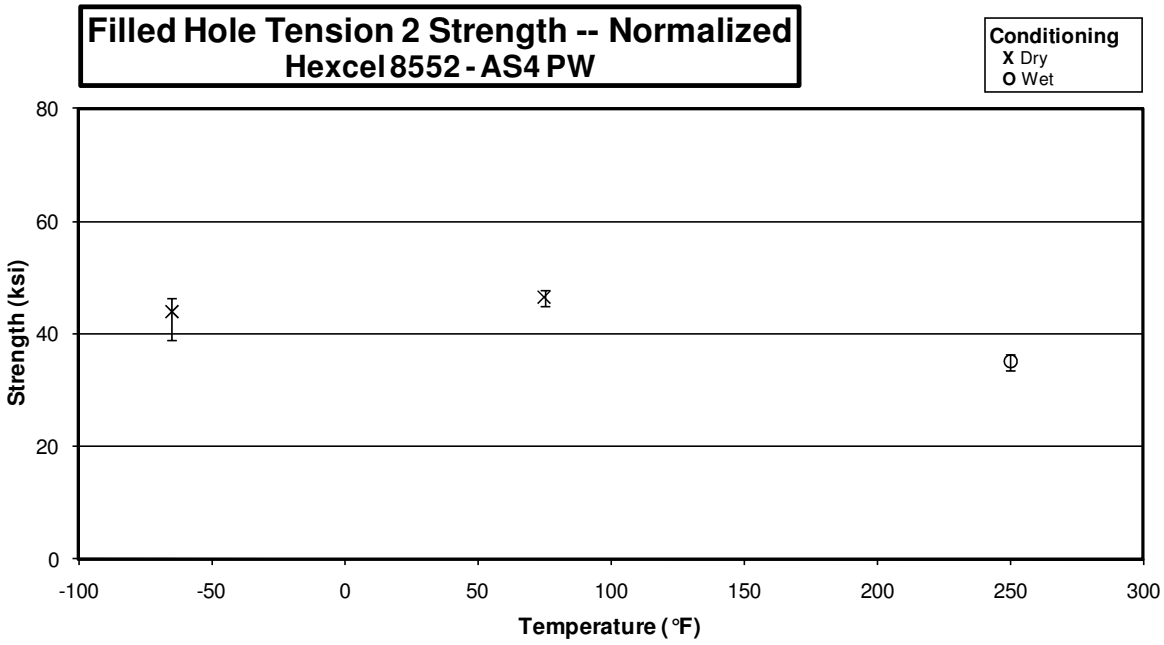
3.16 Open Hole Tension 3 Properties



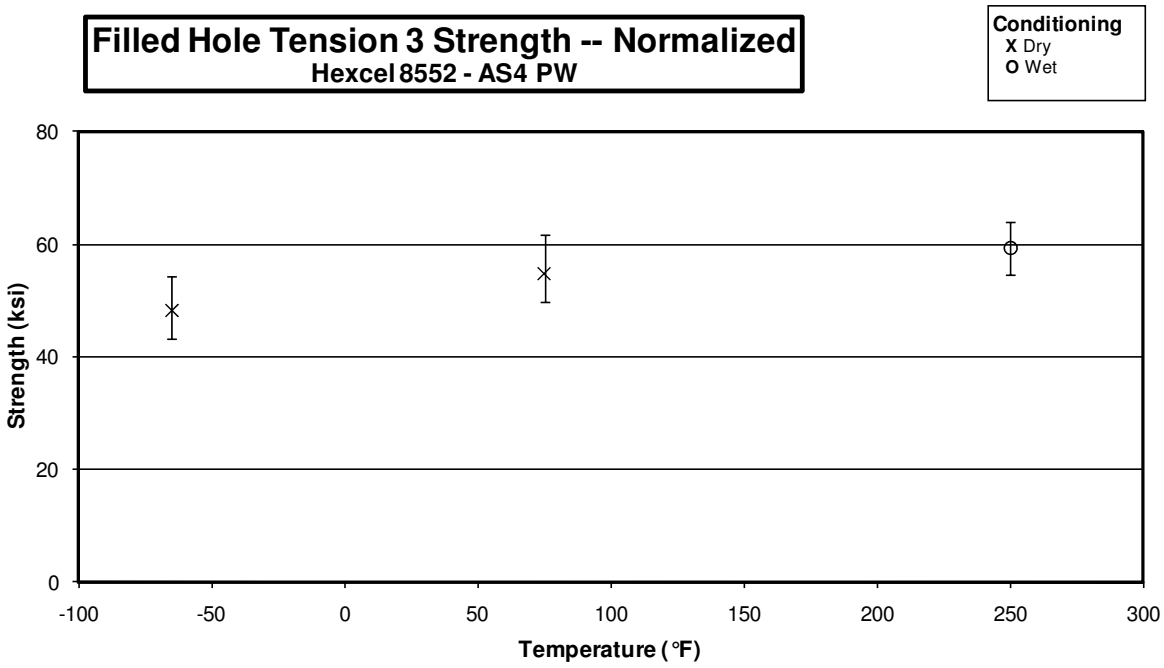
3.17 Filled-Hole Tension 1 Properties



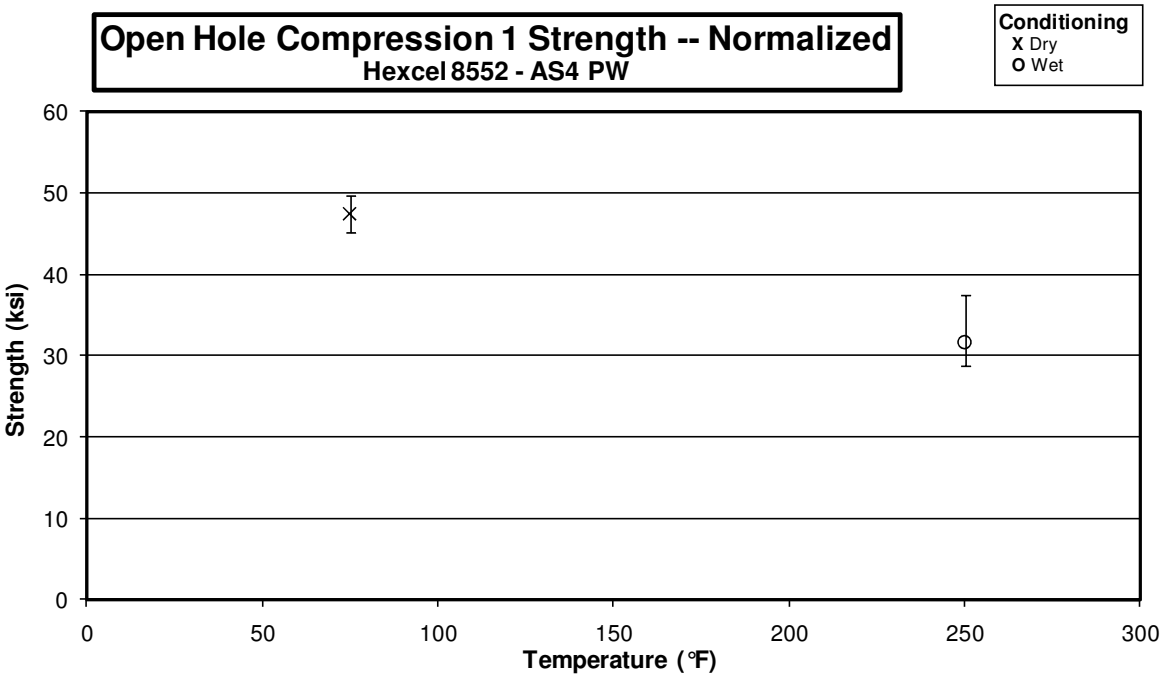
3.18 Filled-Hole Tension 2 Properties



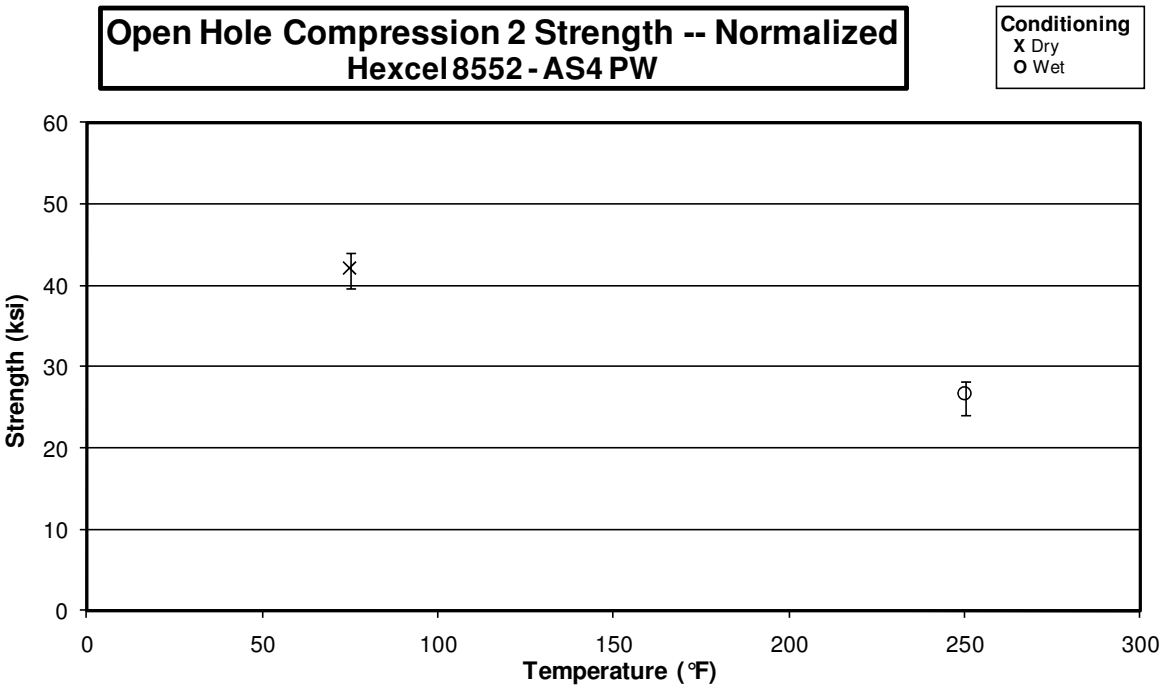
3.19 Filled-Hole Tension 3 Properties



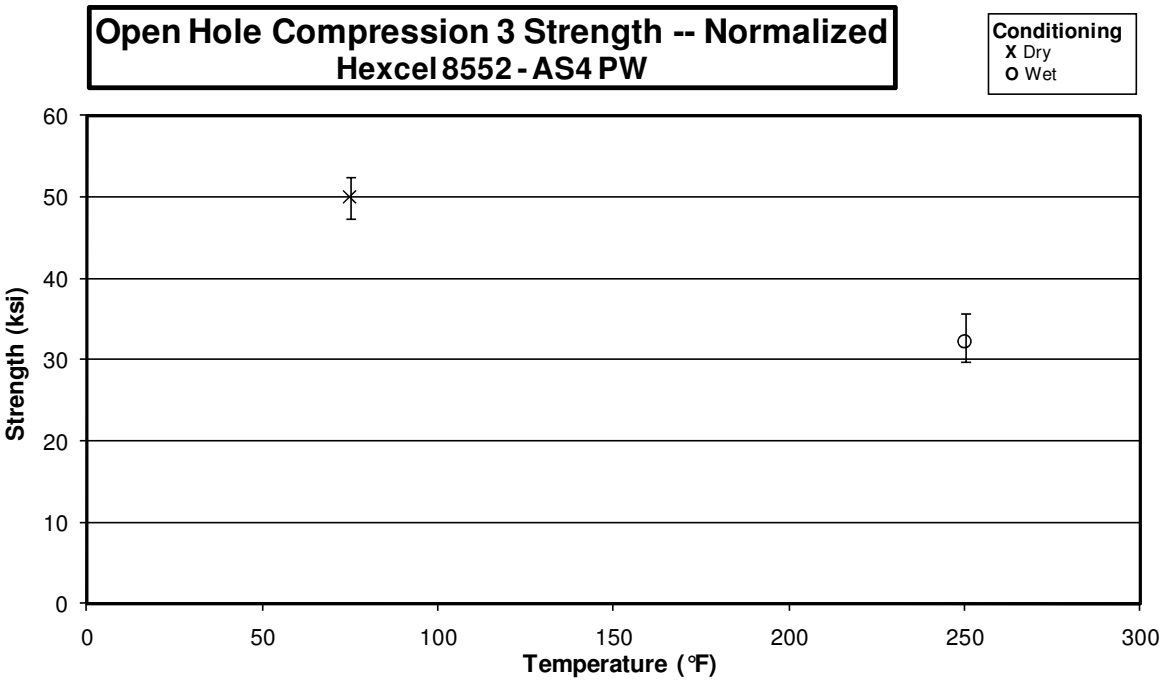
3.20 Open Hole Compression 1 Properties



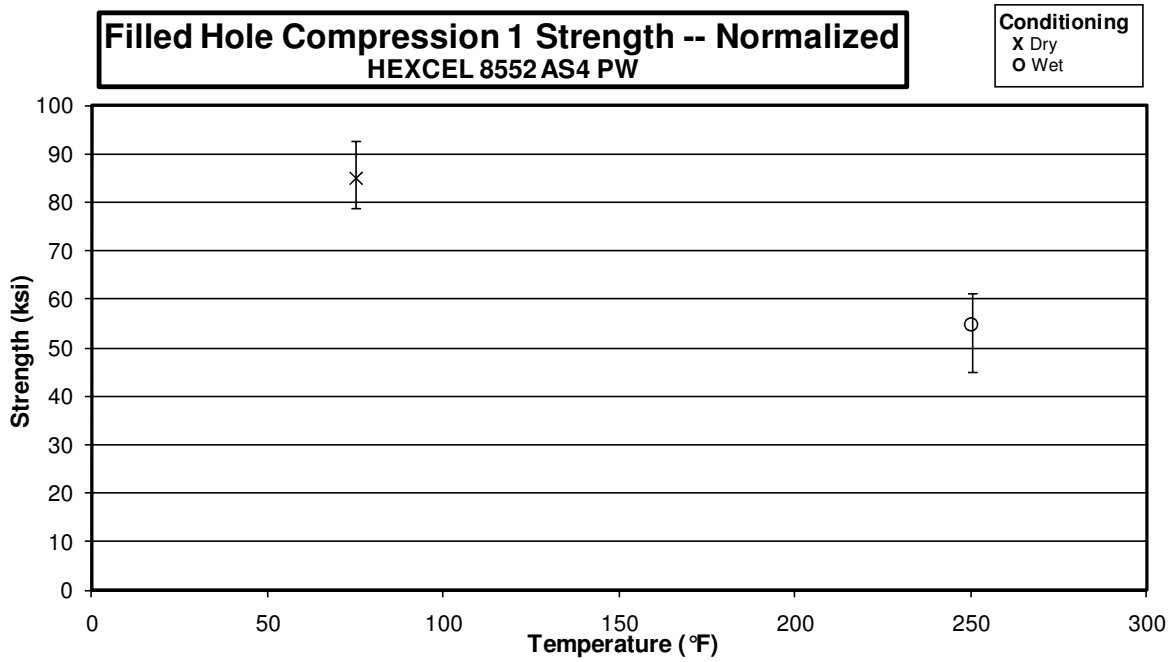
3.21 Open Hole Compression 2 Properties



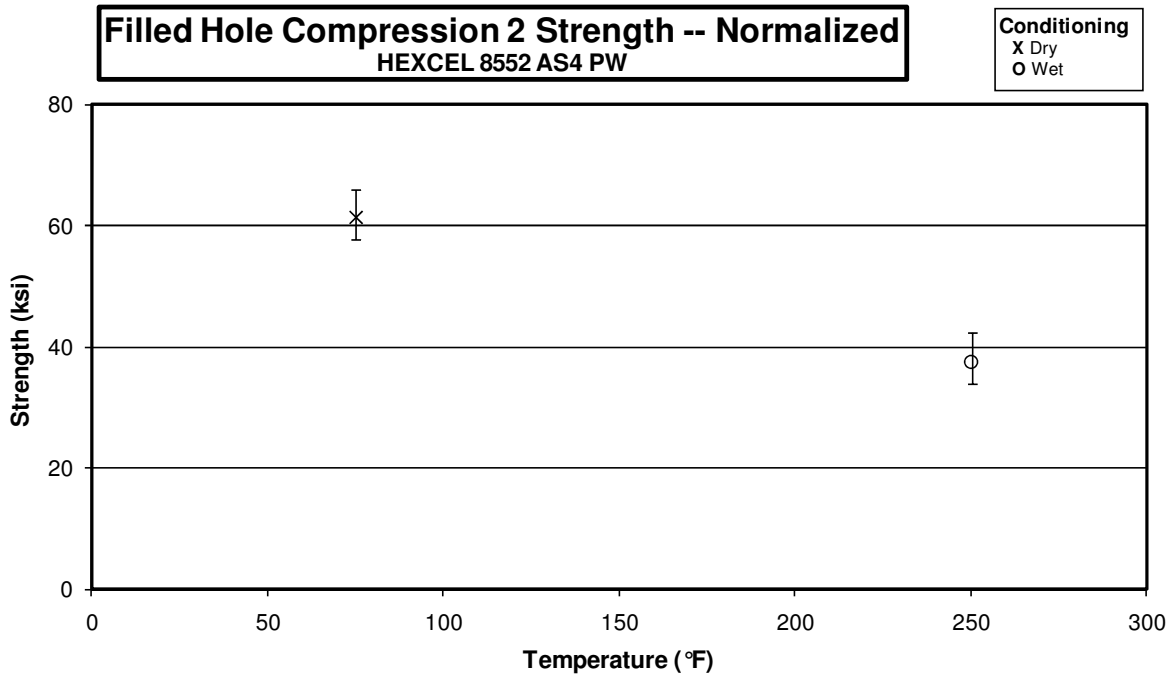
3.22 Open Hole Compression 3 Properties



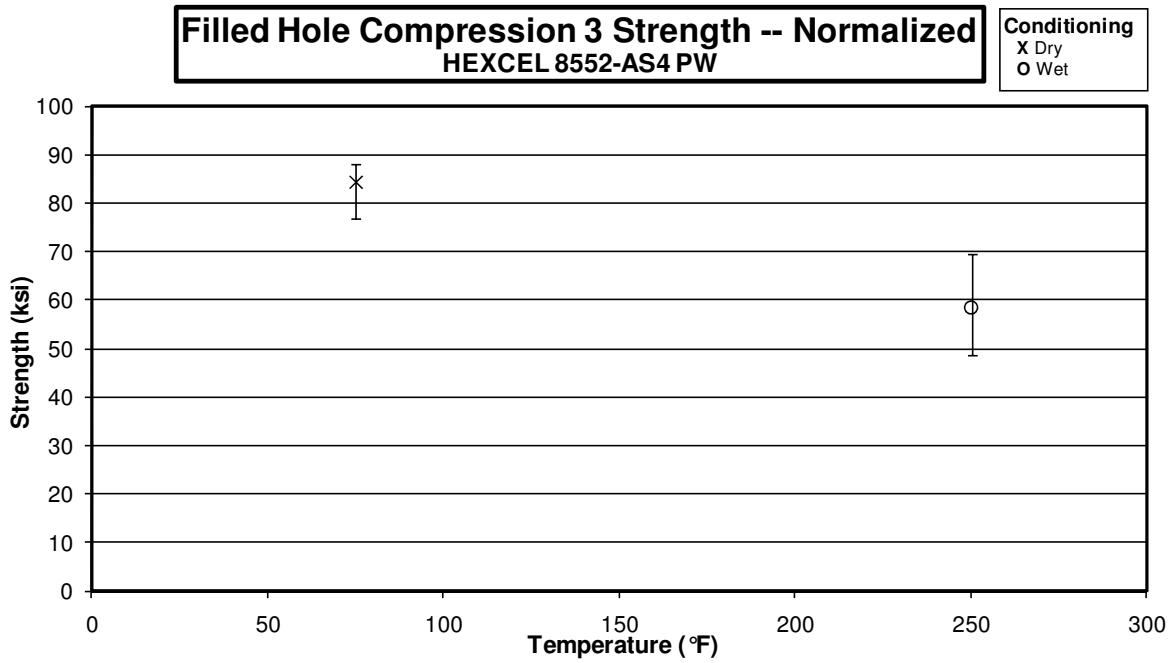
3.23 Filled-Hole Compression 1 Properties



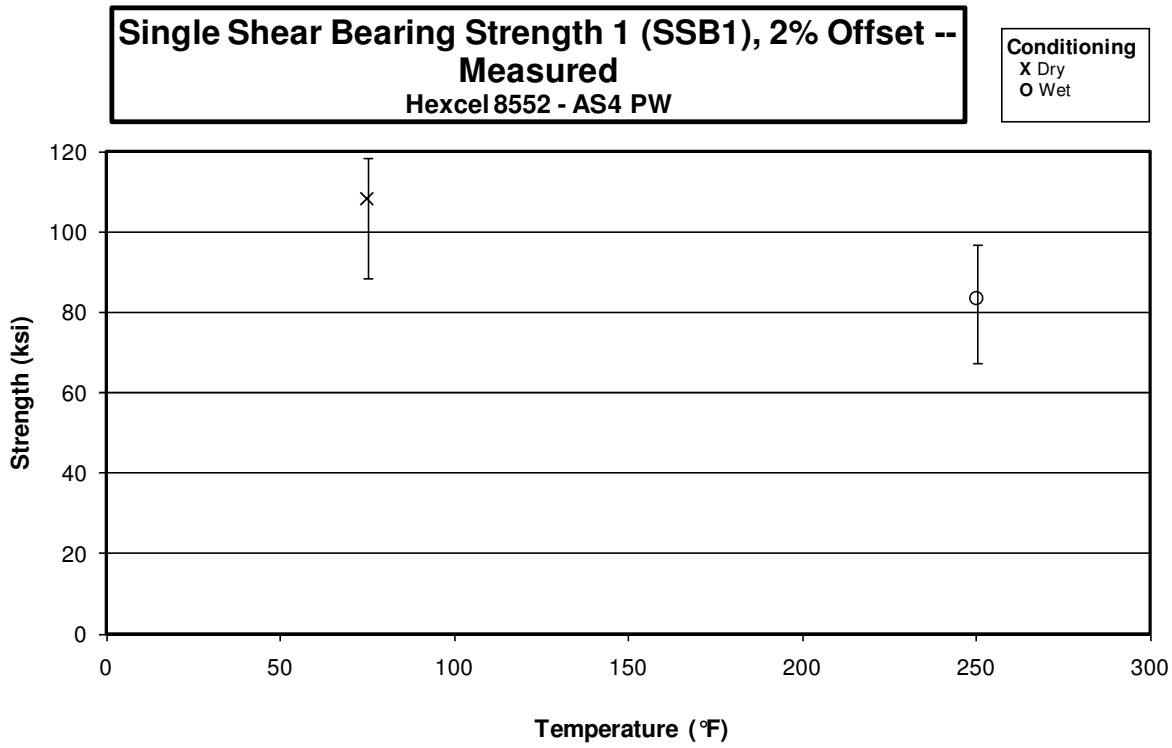
3.24 Filled-Hole Compression 2 Properties



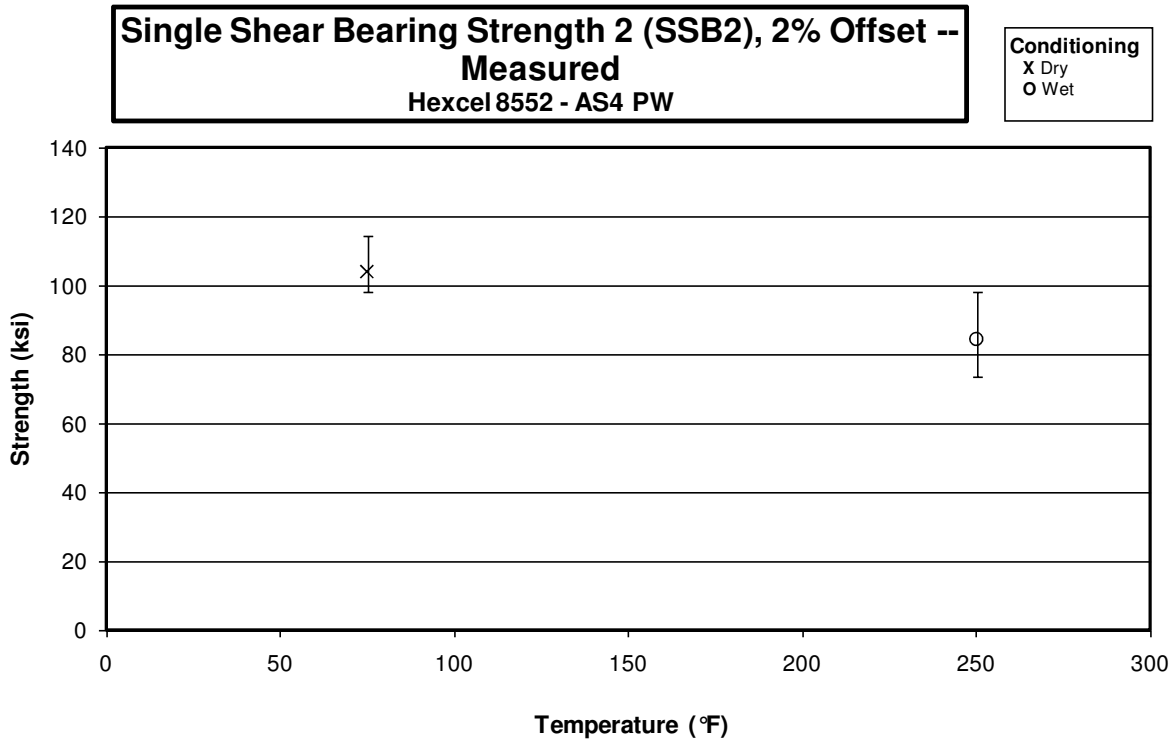
3.25 Filled-Hole Compression 3 Properties



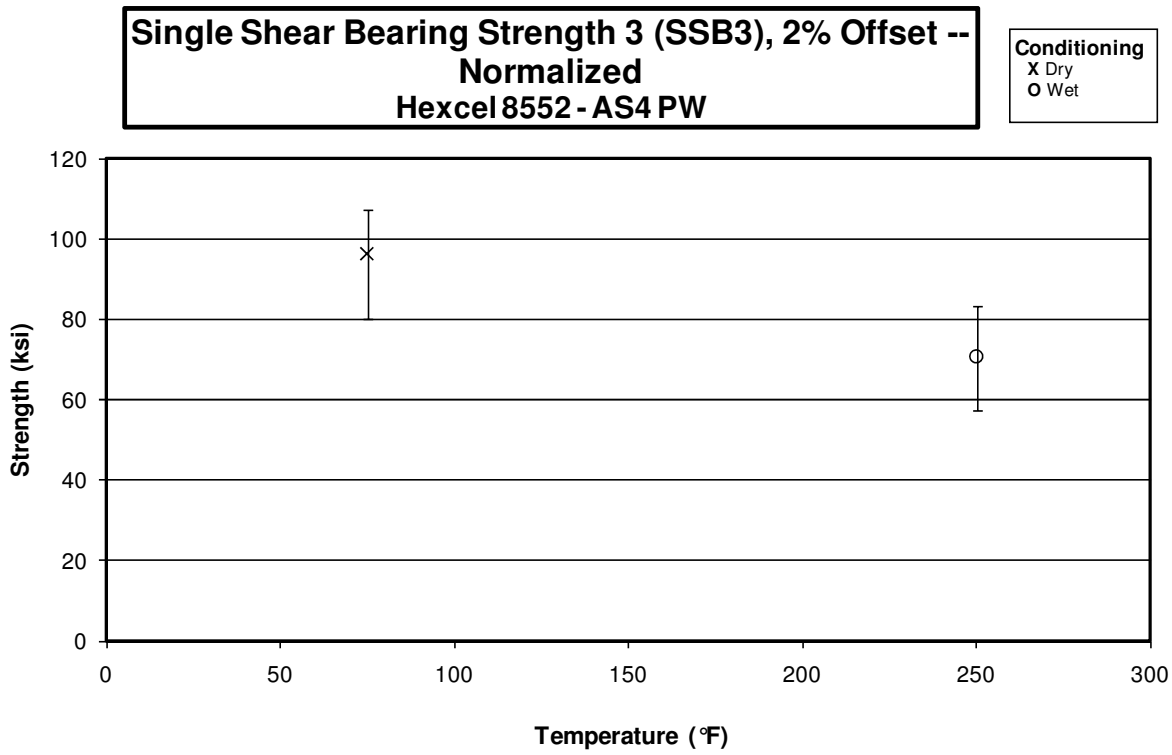
3.26 Single Shear Bearing Strength1 Properties



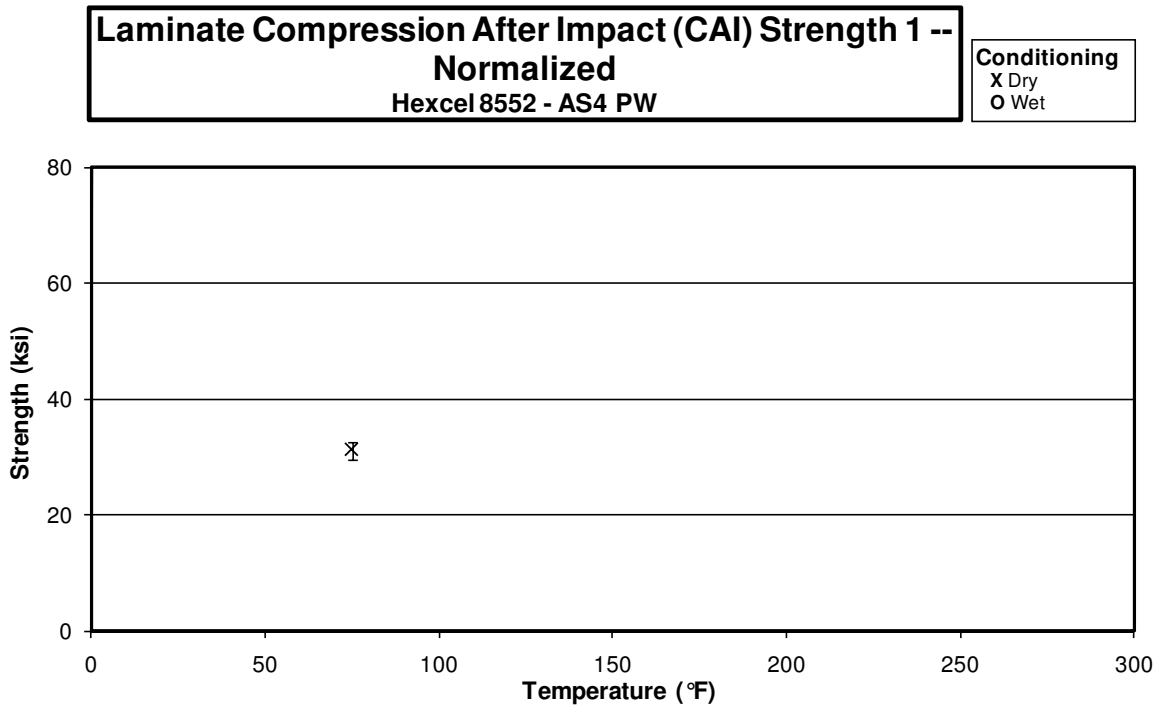
3.27 Single Shear Bearing Strength 2 Properties



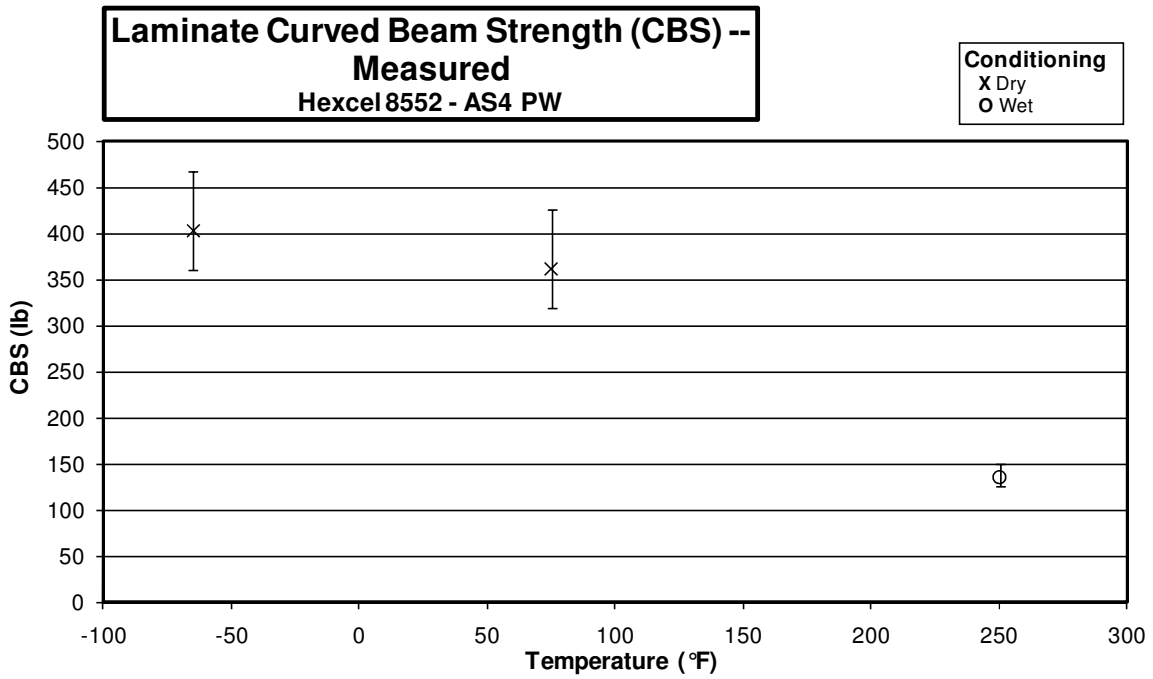
3.28 Single Shear Bearing 3 Properties

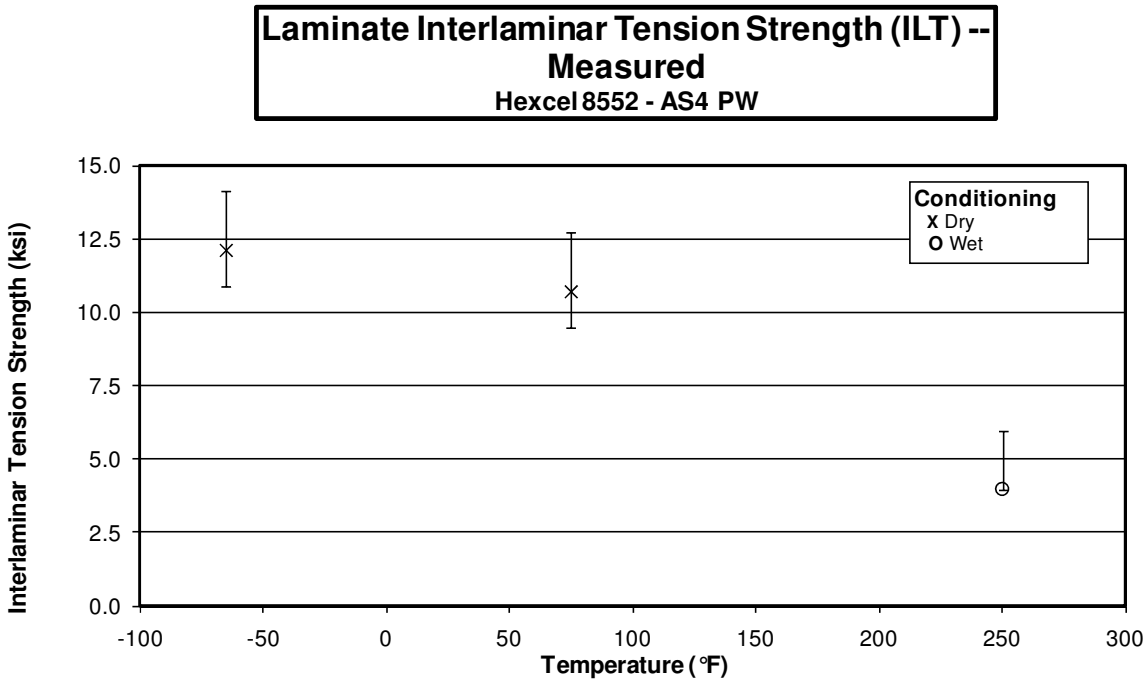


3.29 Compression Strength After Impact 1 Properties



3.30 Interlaminar Tension Properties





4. Raw Data

4.1 Warp Tension Properties

Warp Tension Properties (WT) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

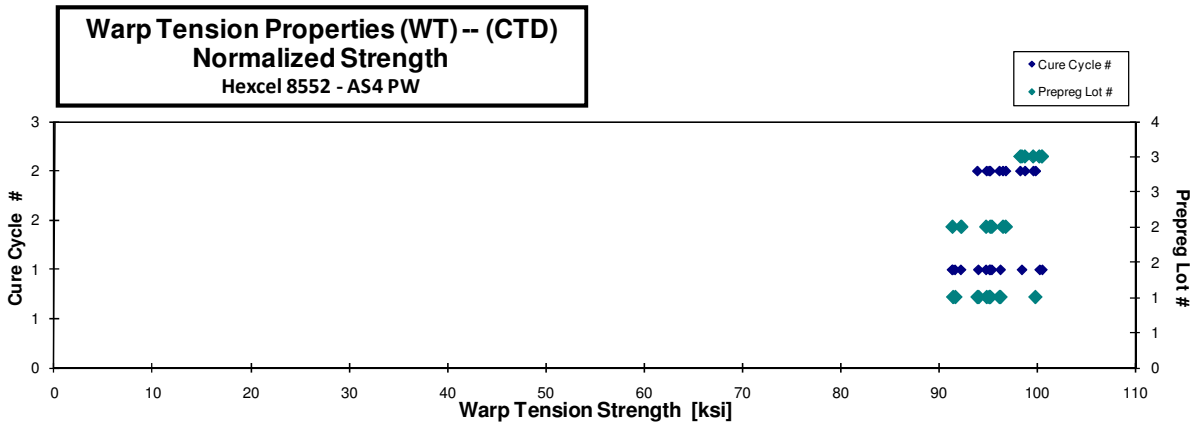
normalizing t_{ply} [in]: 0.0078

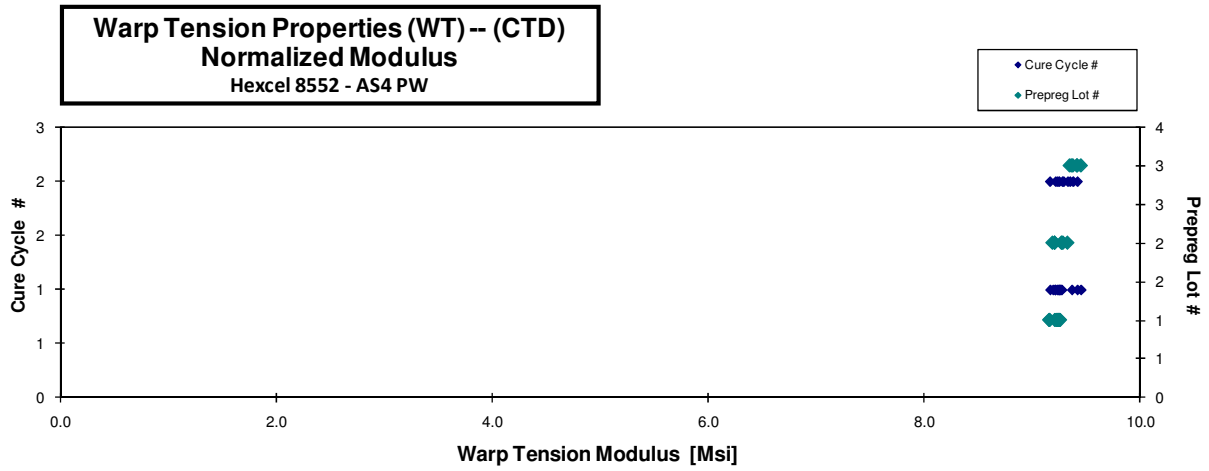
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFPJA116B	A	M1	1	1	91.646	9.176	0.038	0.117	15	LWB	0.0078	91.516	9.163
HFPJA117B	A	M1	1	1	91.160	9.192		0.118	15	LWB	0.0079	91.744	9.251
HFPJA118B	A	M1	1	1	95.542	9.253		0.117	15	LGM	0.0078	95.297	9.229
HFPJA119B	A	M1	1	1	97.995	9.531	0.008	0.114	15	LGM	0.0076	95.217	9.261
HFPJA11AB	A	M1	1	1	99.338	9.752	0.036	0.111	15	LGM	0.0074	94.103	9.238
HFPJA115A	A	M1	1	1	96.607	9.277	0.038	0.117	15	LGM	0.0078	96.331	9.250
HFPJA216B	A	M2	1	2	95.178	9.364	0.041	0.116	15	LWB	0.0077	93.999	9.248
HFPJA217B	A	M2	1	2	96.896	9.299		0.116	15	LWB	0.0077	96.219	9.234
HFPJA218B	A	M2	1	2	95.887			0.116	15	LWB	0.0077	95.190	
HFPJA219B	A	M2	1	2	103.193	9.520	0.026	0.113	15	LWT	0.0075	99.870	9.214
HFPJA214A	A	M2	1	2	95.718	9.237	0.010	0.116	15	LWT	0.0077	94.927	9.161
HFPJB116B	B	M1	2	1	91.151	9.180	0.037	0.117	15	LWT	0.0078	91.450	9.210
HFPJB117B	B	M1	2	1	94.167	9.203	0.039	0.118	15	LGM	0.0079	94.878	9.273
HFPJB118B	B	M1	2	1	91.978	9.174		0.117	15	LGM	0.0078	92.345	9.210
HFPJB119B	B	M1	2	1	97.402	9.377	0.022	0.115	15	LGM	0.0076	95.459	9.190
HFPJB216B	B	M2	2	2	95.861	9.232	0.034	0.118	15	LWB	0.0079	96.858	9.328
HFPJB217B	B	M2	2	2	94.484	9.210	0.033	0.118	15	LGM	0.0079	95.292	9.289
HFPJB218B	B	M2	2	2	95.827	9.207	0.033	0.118	15	LGM	0.0079	96.578	9.279
HFPJC116B	C	M1	3	1	97.094	9.235	0.035	0.119	15	LGM	0.0079	98.491	9.368
HFPJC117B	C	M1	3	1	98.794	9.289	0.034	0.119	15	LGM	0.0079	100.539	9.453
HFPJC118B	C	M1	3	1	98.892	9.289	0.032	0.119	15	LGM	0.0079	100.273	9.419
HFPJC216B	C	M2	3	2	97.627	9.350	0.036	0.118	15	LAT	0.0079	98.336	9.418
HFPJC217B	C	M2	3	2	98.229	9.216	0.030	0.119	15	LWB	0.0079	99.656	9.350
HFPJC218B	C	M2	3	2	97.424	9.247	0.034	0.119	15	LGM	0.0079	98.812	9.379

Poisson ratio for HFPJA117B, HFPJA118B & HFPJA217B were omitted due to non linear region. Modulus and Possion for HFPJA218B was omitted due to high variation.
HFPJA115A & HFPJA214A WERE MOVED TO HFPJA11XB & HFPJA21XB RESPECTIVELY

Average	**96.170**	**9.296**	**0.031**
Standard Dev.	**2.837**	**0.139**	**0.009**
Coeff. of Var. [%]	**2.949**	**1.500**	**28.541**
Min.	**91.151**	**9.174**	**0.008**
Max.	**103.193**	**9.752**	**0.041**
Number of Spec.	**24**	**23**	**19**

$Average_{norm}$	**0.0078**	**95.974**	**9.279**
$Standard\ Dev._{norm}$		**2.741**	**0.083**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.856**	**0.899**
Min.	**0.0074**	**91.450**	**9.161**
Max.	**0.0079**	**100.539**	**9.453**
Number of Spec.	**24**	**24**	**23**


Warp Tension Properties (WT) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Strength [ksi]


Warp Tension Properties (WT) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Modulus [Msi]

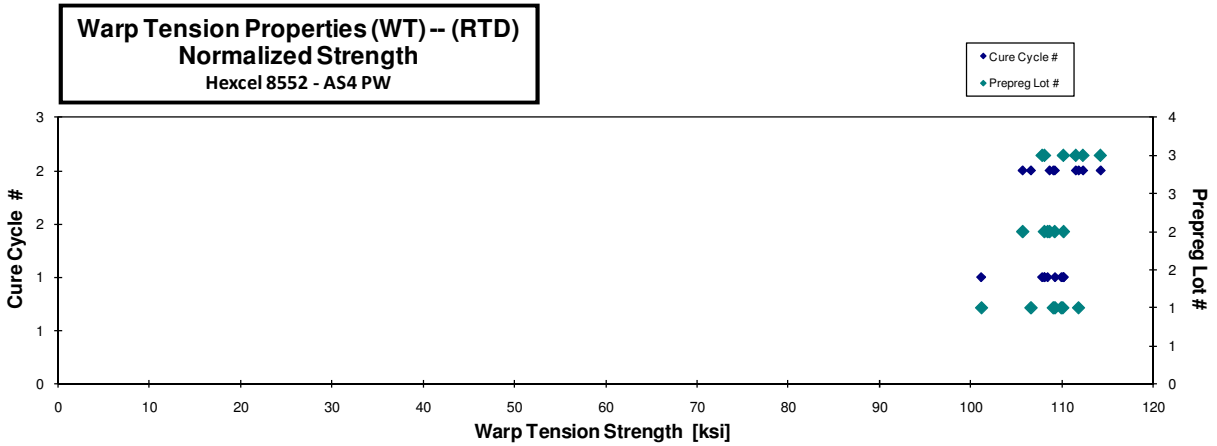
Warp Tension Properties (WT) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

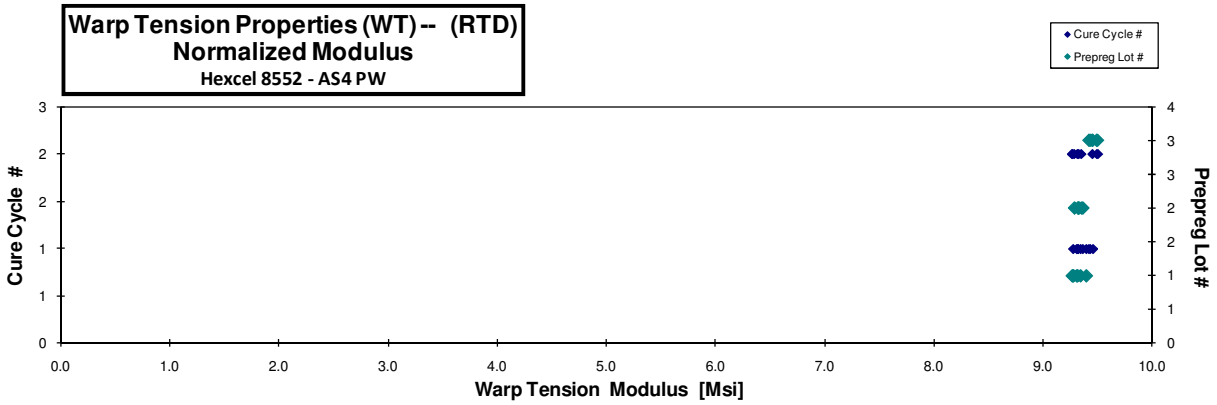
normalizing t_{ply} [in]: 0.0078

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]
HFPJA111A	A	M1	1	1	117.836	10.013	0.042	0.108	15	LGM	0.0072	109.191	9.279
HFPJA112A	A	M1	1	1	103.369	9.553	0.042	0.114	15	LWB	0.0076	101.116	9.345
HFPJA113A	A	M1	1	1	109.635	9.360	0.039	0.117	15	LWT	0.0078	110.057	9.396
HFPJA114A	A	M1	1	1	110.460	9.357	0.043	0.116	15	LGM	0.0078	109.894	9.309
HFPJA211A	A	M2	1	2	117.036	9.949	0.040	0.109	15	LAT	0.0073	109.017	9.267
HFPJA212A	A	M2	1	2	113.757	9.437	0.050	0.115	15	LGM	0.0077	111.780	9.273
HFPJA213A	A	M2	1	2	107.658	9.413	0.047	0.116	15	LGM	0.0077	106.554	9.317
HFPJB111A	B	M1	2	1	118.504	10.030	0.044	0.109	15	LGM	0.0072	110.131	9.321
HFPJB112A	B	M1	2	1	109.452	9.458	0.050	0.116	15	LWB	0.0077	108.376	9.365
HFPJB113A	B	M1	2	1	107.755	9.298	0.048	0.117	15	LWT	0.0078	108.031	9.322
HFPJB211A	B	M2	2	2	118.102	10.102	0.044	0.108	15	LGM	0.0072	108.597	9.289
HFPJB212A	B	M2	2	2	110.551	9.447	0.048	0.116	15	LGM	0.0077	109.166	9.329
HFPJB213A	B	M2	2	2	104.811	9.277	0.050	0.118	15	LWT	0.0079	105.648	9.351
HFPJC111A	C	M1	3	1	113.416	9.901	0.049	0.111	15	LAB	0.0074	108.036	9.432
HFPJC112A	C	M1	3	1	110.649	9.502	0.044	0.116	15	LAT	0.0078	110.113	9.456
HFPJC113A	C	M1	3	1	106.367	9.296	0.049	0.119	15	LGM	0.0079	107.776	9.419
HFPJC211A	C	M2	3	2	119.241	9.869	0.047	0.112	15	LWB	0.0075	114.179	9.450
HFPJC212A	C	M2	3	2	110.289	9.389	0.051	0.118	15	LAB	0.0079	111.467	9.490
HFPJC213A	C	M2	3	2	110.076	9.316	0.052	0.119	15	LAT	0.0080	112.256	9.501

Average	**111.524**	**9.577**	**0.046**
Standard Dev.	**4.784**	**0.291**	**0.004**
Coeff. of Var. [%]	**4.290**	**3.042**	**8.544**
Min.	**103.369**	**9.277**	**0.039**
Max.	**119.241**	**10.102**	**0.052**
Number of Spec.	**19**	**19**	**19**

$Average_{norm}$	**0.0076**	**109.020**	**9.364**
$Standard\ Dev._{norm}$		**2.779**	**0.075**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.549**	**0.797**
Min.	**0.0072**	**101.116**	**9.267**
Max.	**0.0080**	**114.179**	**9.501**
Number of Spec.	**19**	**19**	**19**


Warp Tension Properties (WT) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120

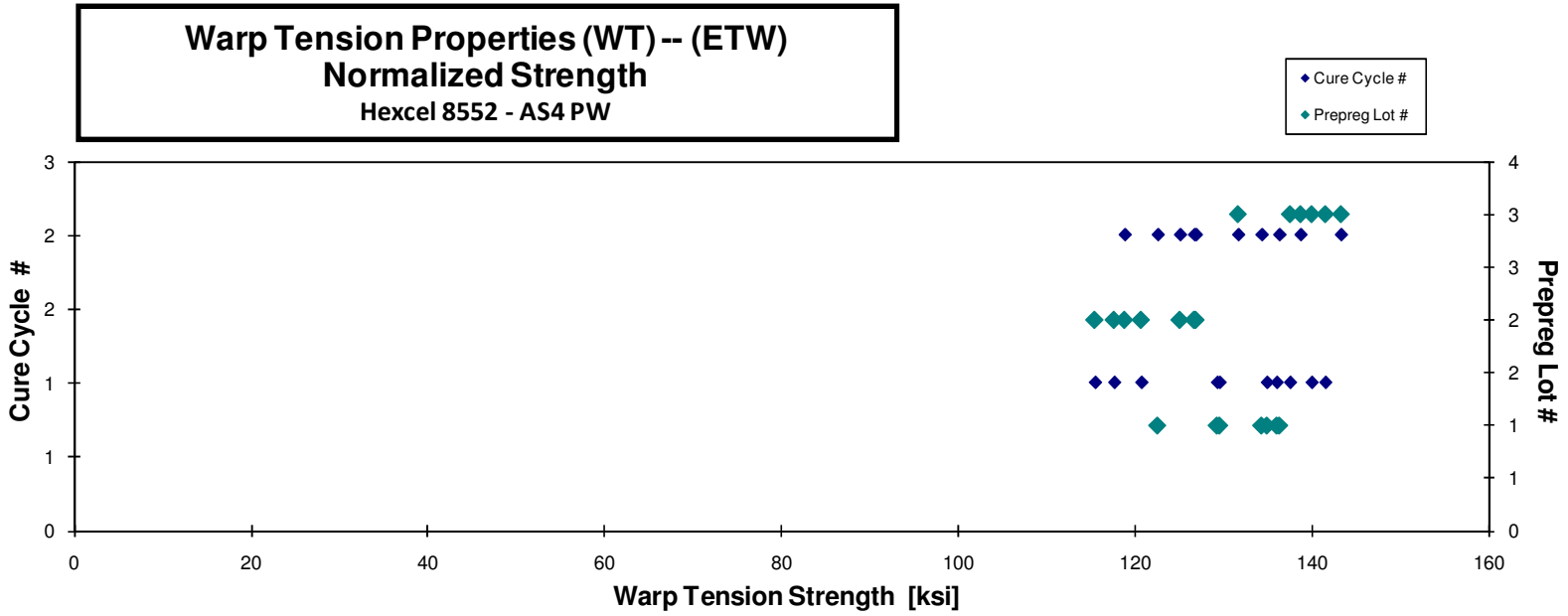

Warp Tension Properties (WT) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Modulus [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0

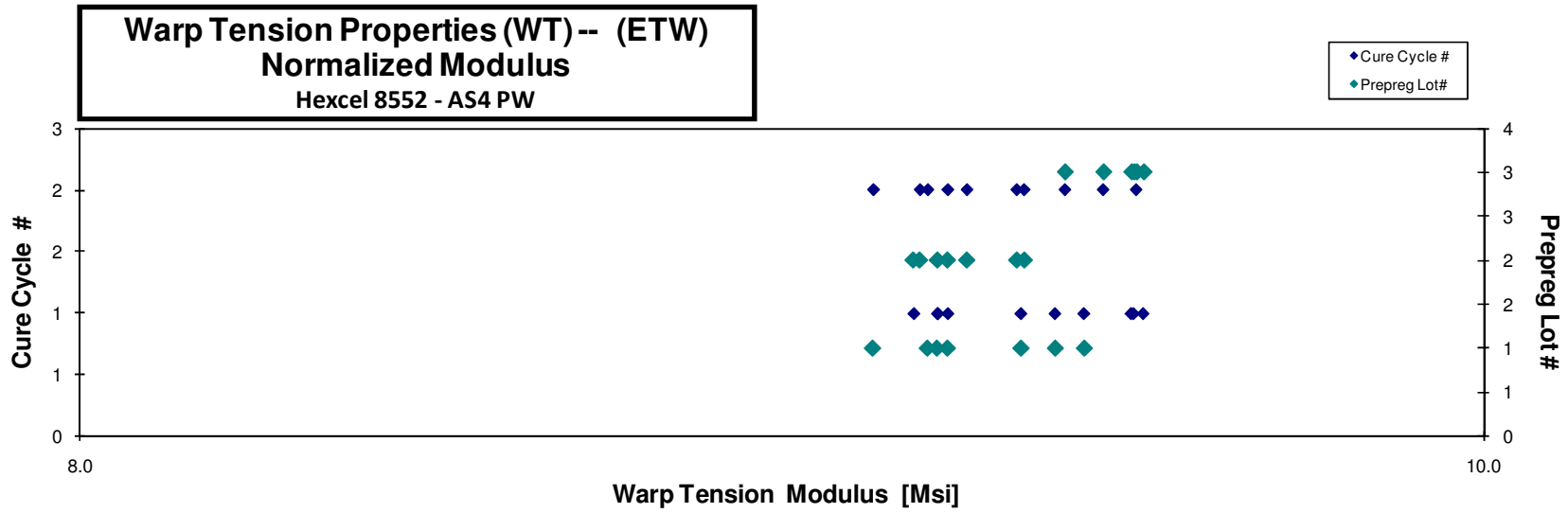
Warp Tension Properties (WT) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPJA11BD	A	M1	1	1	138.216	9.545	0.047	0.115	15	LGM	0.0077	135.971	9.390
HFPJA11CD	A	M1	1	1	135.968	9.297	0.043	0.116	15	LGM	0.0077	134.864	9.221
HFPJA11DD	A	M1	1	1	130.188	9.501	0.140	0.116	15	LWT	0.0077	129.223	9.431
HFPJA11ED	A	M1	1	1	130.023	9.378	0.077	0.117	15	LAT	0.0078	129.505	9.341
HFPJA21AD	A	M2	1	2	132.153	9.934	0.053	0.108	15	LWT	0.0072	122.495	9.208
HFPJA21BD	A	M2	1	2	137.503	9.213	0.048	0.116	15	LGM	0.0077	136.269	9.130
HFPJA21CD	A	M2	1	2	134.646	9.263	0.042	0.117	15	LWT	0.0078	134.263	9.236
HFPJB11AD	B	M1	2	1	127.177	9.737	0.047	0.111	15	LGM	0.0074	120.637	9.236
HFPJB11BD	B	M1	2	1	117.803	9.206	0.053	0.117	15	LAB	0.0078	117.568	9.188
HFPJB11CD	B	M1	2	1	114.053	9.116	0.050	0.118	15	LWB	0.0079	115.385	9.222
HFPJB21AD	B	M2	2	2	128.970	10.138	0.079	0.108	15	LGM	0.0072	118.755	9.335
HFPJB21BD	B	M2	2	2	127.549	9.534	0.042	0.115	15	LWT	0.0076	125.024	9.346
HFPJB21CD	B	M2	2	2	124.908	9.125	0.050	0.119	15	LGM	0.0079	126.812	9.264
HFPJB21DD	B	M2	2	2	124.957	9.075	0.066	0.119	15	LWB	0.0079	126.631	9.197
HFPJC11AD	C	M1	3	1	148.583	10.104	0.039	0.110	15	LGM	0.0073	139.927	9.516
HFPJC11BD	C	M1	3	1	141.499	9.500	0.040	0.117	15	LGM	0.0078	141.479	9.498
HFPJC11CD	C	M1	3	1	134.878	9.321	0.042	0.119	15	LWT	0.0080	137.491	9.502
HFPJC21AD	C	M2	3	2	147.628	9.691	0.033	0.114	15	LGM	0.0076	143.254	9.404
HFPJC21BD	C	M2	3	2	137.456	9.376	0.040	0.118	15	LWT	0.0079	138.670	9.459
HFPJC21CD	C	M2	3	2	128.768	9.300	0.043	0.120	15	LWB	0.0080	131.612	9.506

Average	**132.146**	**9.468**	**0.054**	**$Average_{norm}$**	**0.0077**	**130.292**	**9.331**
Standard Dev.	**8.682**	**0.314**	**0.024**	**Standard $Dev._{norm}$**		**8.400**	**0.125**
Coeff. of Var. [%]	**6.570**	**3.316**	**43.879**	**Coeff. of Var. $[\%]_{norm}$**		**6.447**	**1.341**
Min.	**114.053**	**9.075**	**0.033**	**Min.**	**0.0072**	**115.385**	**9.130**
Max.	**148.583**	**10.138**	**0.140**	**Max.**	**0.0080**	**143.254**	**9.516**
Number of Spec.	**20**	**20**	**20**	**Number of Spec.**	**20**	**20**	**20**


Warp Tension Properties (WT) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Strength [ksi]
0
20
40
60
80
100
120
140
160


Warp Tension Properties (WT) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot#
Cure Cycle #
Prepreg Lot #
Warp Tension Modulus [Msi]
8.0
10.0

4.2 Fill Tension Properties

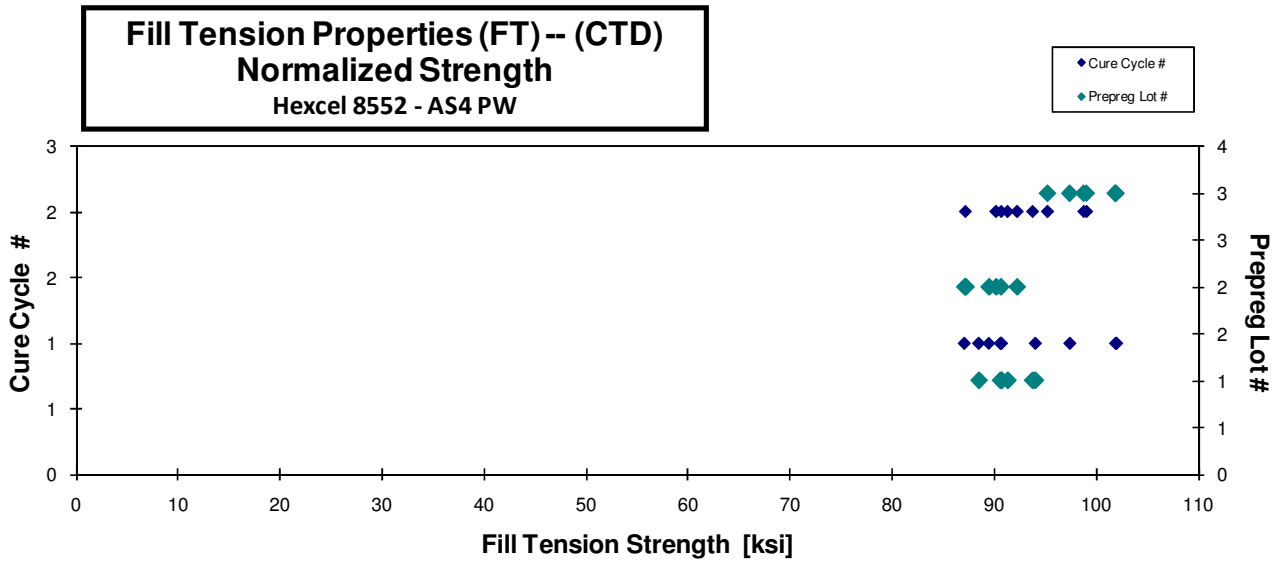
Fill Tension Properties (FT) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

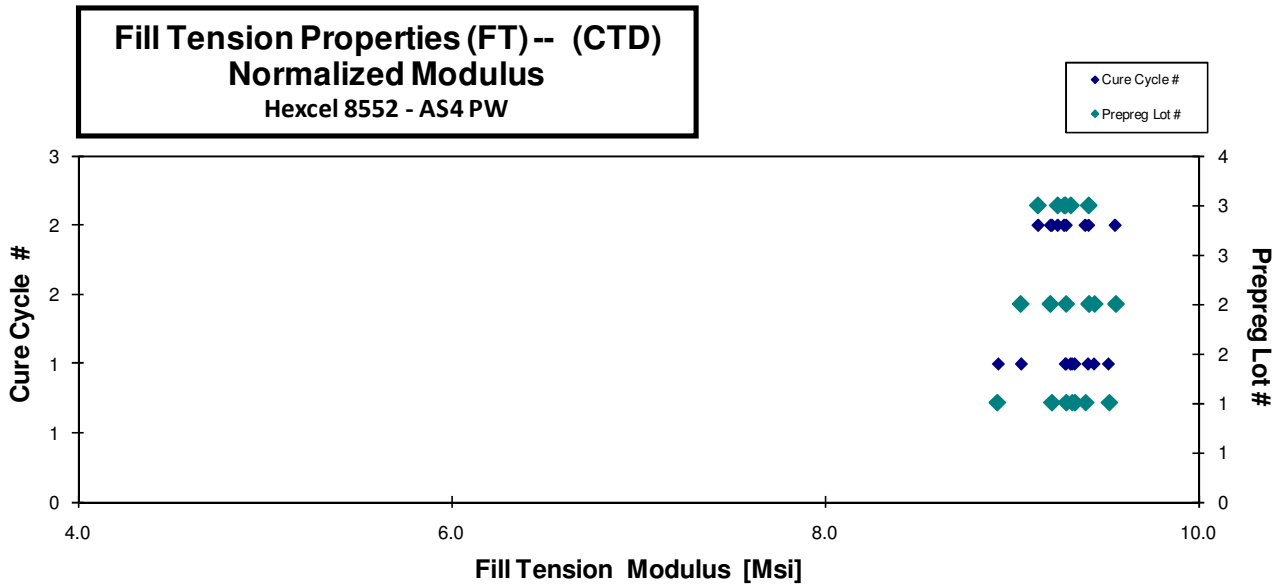
normalizing t_{ply} [in]: 0.0078

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]
HFPUA116B	A	M1	1	1	94.870	9.606	0.116	15	LGM	0.0077	94.046	9.522
HFPUA117B	A	M1	1	1	91.923	9.043	0.115	15	LGM	0.0077	90.732	8.926
HFPUA118B	A	M1	1	1	92.412	9.524	0.115	15	LWT	0.0076	90.622	9.339
HFPUA119B	A	M1	1	1	92.899	9.788	0.111	15	LGM	0.0074	88.506	9.325
HFPUA216B	A	M2	1	2	92.042	9.429	0.115	15	LGM	0.0077	90.718	9.293
HFPUA217B	A	M2	1	2	92.882	9.372	0.115	15	LGM	0.0077	91.334	9.216
HFPUA218B	A	M2	1	2	95.859	9.604	0.114	15	LGM	0.0076	93.783	9.396
HFPUB116B	B	M1	2	1	89.823	9.206	0.118	15	LGM	0.0079	90.667	9.292
HFPUB117B	B	M1	2	1	88.437	8.943	0.118	15	LGM	0.0079	89.496	9.050
HFPUB118B	B	M1	2	1	85.592	9.280	0.119	15	LGM	0.0079	87.104	9.444
HFPUB216B	B	M2	2	2	88.839	9.414	0.119	15	LGM	0.0079	90.194	9.558
HFPUB217B	B	M2	2	2	90.702	9.052	0.119	15	LGM	0.0079	92.266	9.208
HFPUB218B	B	M2	2	2	85.157	9.193	0.120	15	LGM	0.0080	87.207	9.415
HFPUC116B	C	M1	3	1	99.889	9.123	0.119	15	LGM	0.0080	102.009	9.317
HFPUC117B	C	M1	3	1	99.927	9.229	0.119	15	LGM	0.0080	101.906	9.412
HFPUC118B	C	M1	3	1	95.671	9.120	0.119	15	LGM	0.0079	97.429	9.288
HFPUC216B	C	M2	3	2	97.349	9.112	0.119	15	LGM	0.0079	98.791	9.247
HFPUC217B	C	M2	3	2	93.709	9.133	0.119	15	LGM	0.0079	95.244	9.282
HFPUC218B	C	M2	3	2	98.356	9.075	0.118	15	LGM	0.0079	99.071	9.141

Average	**92.965**	**9.276**	
Standard Dev.	**4.312**	**0.230**	
Coeff. of Var. [%]	**4.638**	**2.484**	
Min.	**85.157**	**8.943**	
Max.	**99.927**	**9.788**	
Number of Spec.	**19**	**19**	

$Average_{norm}$	**0.0078**	**93.217**	**9.298**
$Standard\ Dev._{norm}$		**4.653**	**0.153**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.992**	**1.644**
Min.	**0.0074**	**87.104**	**8.926**
Max.	**0.0080**	**102.009**	**9.558**
Number of Spec.	**19**	**19**	**19**


Fill Tension Properties (FT) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
110


Fill Tension Properties (FT) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Modulus [Msi]
4.0
6.0
8.0
10.0

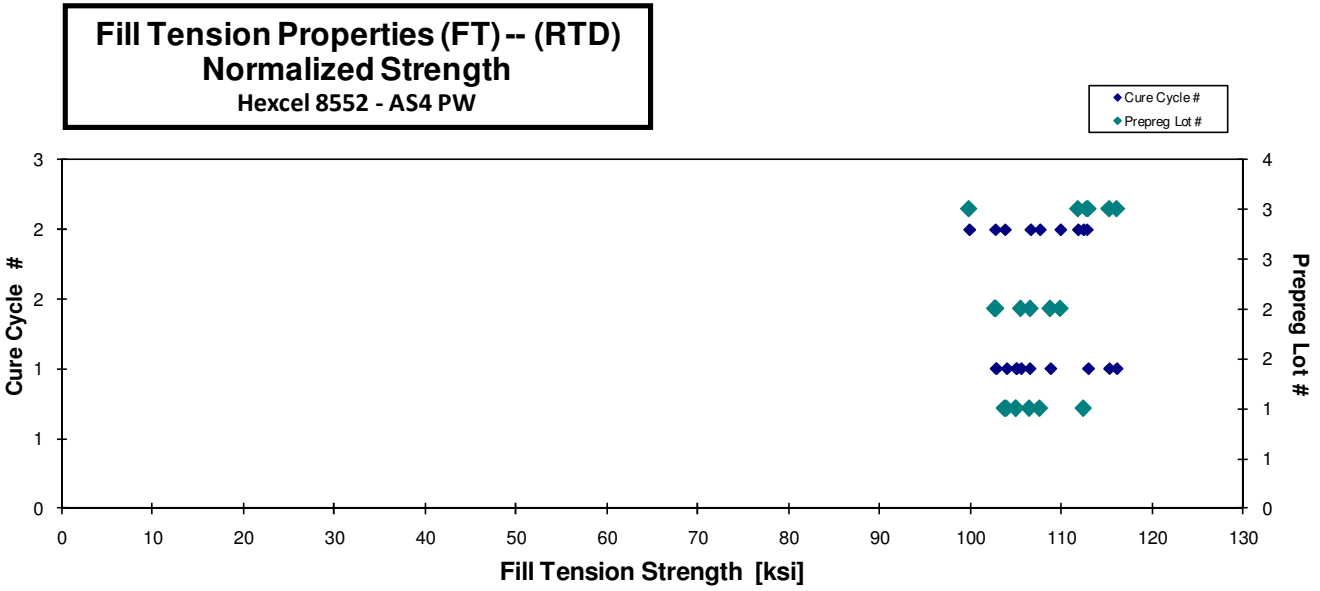
Fill Tension Properties (FT) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

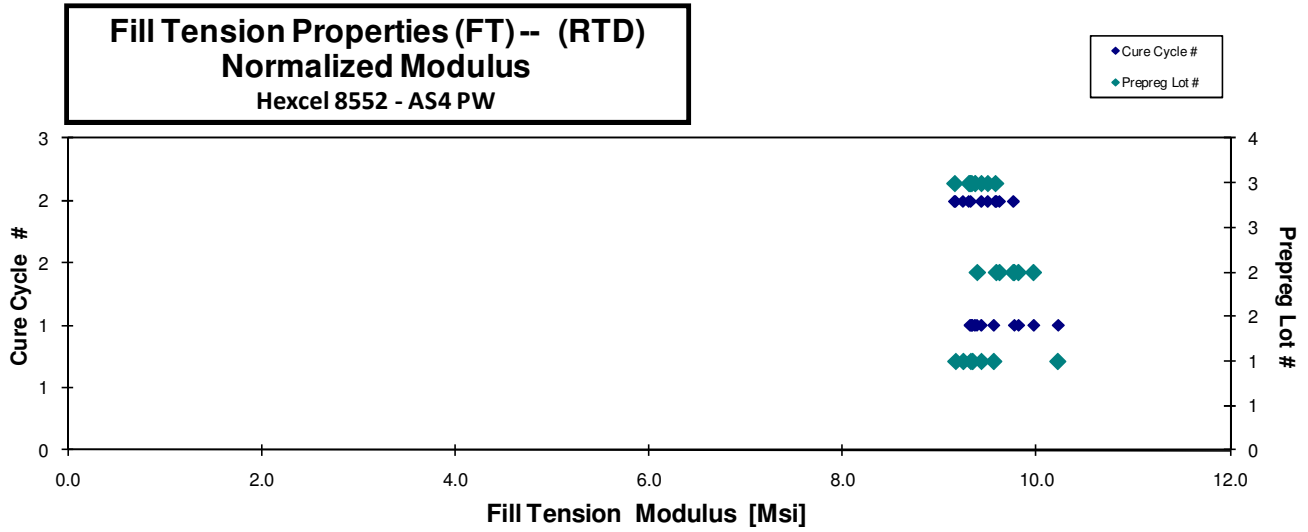
normalizing t_{ply} [in]: 0.0078

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]
HFPUA111A	A	M1	1	1	115.064	10.579	0.106	15	LWB	0.0070	103.983	9.560
HFPUA112A	A	M1	1	1	107.939	10.505	0.114	15	LWT	0.0076	105.033	10.222
HFPUA113A	A	M1	1	1	108.023	9.567	0.115	15	LGM	0.0077	106.499	9.432
HFPUA114A	A	M1	1	1	105.787	9.408	0.116	15	LGM	0.0077	105.019	9.340
HFPUA211A	A	M2	1	2	116.672	9.936	0.108	15	LGM	0.0072	107.630	9.166
HFPUA212A	A	M2	1	2	105.449	9.472	0.115	15	LAT	0.0077	103.782	9.322
HFPUA213A	A	M2	1	2	113.431	9.326	0.116	15	LGM	0.0077	112.429	9.244
HFPUB111A	B	M1	2	1	112.194	10.123	0.113	15	LGM	0.0076	108.790	9.815
HFPUB112A	B	M1	2	1	102.392	9.934	0.117	15	LGM	0.0078	102.772	9.971
HFPUB113A	B	M1	2	1	102.347	9.726	0.118	15	LGM	0.0078	102.828	9.772
HFPUB114A	B	M1	2	1	104.732	9.315	0.118	15	LGM	0.0079	105.553	9.388
HFPUB211A	B	M2	2	2	112.437	9.841	0.114	15	LGM	0.0076	109.890	9.618
HFPUB212A	B	M2	2	2	105.491	9.660	0.118	15	LGM	0.0079	106.603	9.762
HFPUB213A	B	M2	2	2	101.177	9.442	0.119	15	LWB	0.0079	102.720	9.586
HFPUC111A	C	M1	3	1	121.366	9.810	0.111	15	LGM	0.0074	115.263	9.316
HFPUC112A	C	M1	3	1	115.811	9.310	0.117	15	LWT	0.0078	116.075	9.332
HFPUC113A	C	M1	3	1	111.433	9.242	0.119	15	LAT	0.0079	112.941	9.367
HFPUC211A	C	M2	3	2		10.061	0.110	15	LIT	0.0073		9.432
HFPUC212A	C	M2	3	2	112.268	9.339	0.117	15	LWB	0.0078	111.836	9.303
HFPUC213A	C	M2	3	2		9.465	0.118	15	LIT	0.0079		9.577
HFPUC214A	C	M2	3	2	111.352	9.039	0.119	15	LAB	0.0079	112.796	9.156
HFPUC215A	C	M2	3	2	98.530	9.371	0.119	15	LAT	0.0079	99.863	9.498

	Strength [ksi]	Modulus [Msi]
Average	**109.195**	**9.658**
Standard Dev.	**5.948**	**0.404**
Coeff. of Var. [%]	**5.447**	**4.188**
Min.	**98.530**	**9.039**
Max.	**121.366**	**10.579**
Number of Spec.	**20**	**22**

	t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	**0.0077**	**107.615**	**9.508**
Standard $Dev._{norm}$		**4.651**	**0.268**
Coeff. of Var. $[\%]_{norm}$		**4.322**	**2.818**
Min.	**0.0070**	**99.863**	**9.156**
Max.	**0.0079**	**116.075**	**10.222**
Number of Spec.	**22**	**20**	**22**


Fill Tension Properties (FT) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
0
1
2
3
4


Fill Tension Properties (FT) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
0
1
2
3
4

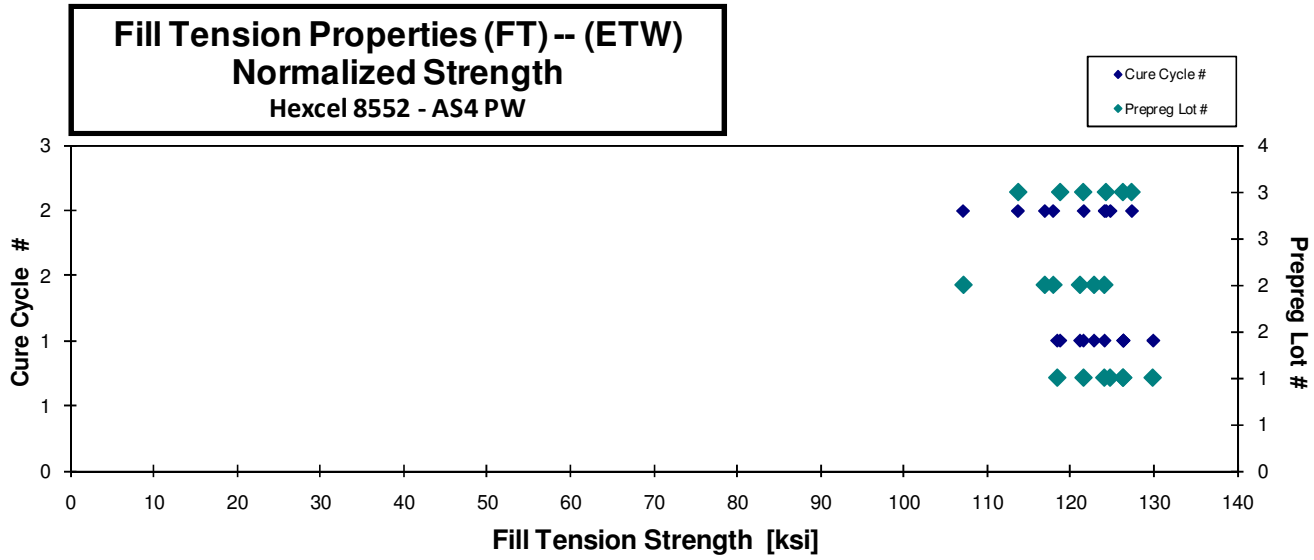
Fill Tension Properties (FT) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

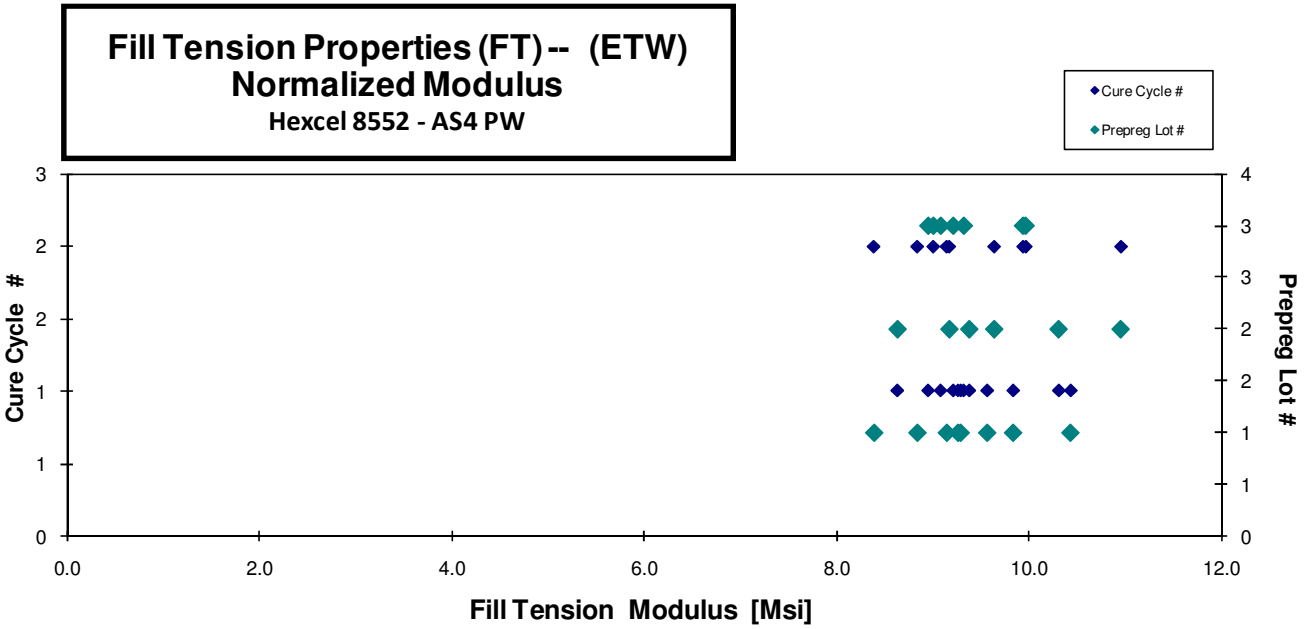
normalizing t_{ply} [in]: 0.0078

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]
HFPUA11AD	A	M1	1	1	128.749	10.407	0.108	15	LWT/LWB	0.0072	118.387	9.569
HFPUA11BD	A	M1	1	1		9.513	0.114	15	LIT/LWB	0.0076		9.267
HFPUA11CD	A	M1	1	1	126.361	9.843	0.117	15	LGM	0.0078	126.307	9.838
HFPUA11DD	A	M1	1	1	130.723	10.502	0.116	15	LGM	0.0078	129.885	10.435
HFPUA11ED	A	M1	1	1	127.115	9.352	0.116	15	LGM	0.0078	126.318	9.293
HFPUA21AD	A	M2	1	2	133.399	9.025	0.109	15	LGM	0.0073	124.069	8.394
HFPUA21BD	A	M2	1	2	122.963	9.255	0.116	15	LGM	0.0077	121.562	9.149
HFPUA21CD	A	M2	1	2	124.781	8.846	0.117	15	LWT/LWB	0.0078	124.763	8.845
HFPUB11AD	B	M1	2	1	125.893	8.856	0.114	15	LGM	0.0076	122.808	8.639
HFPUB11BD	B	M1	2	1	123.677	9.356	0.117	15	LGM/LAT	0.0078	124.047	9.384
HFPUB11CD	B	M1	2	1	120.118	10.225	0.118	15	LWB	0.0079	121.127	10.311
HFPUB21AD	B	M2	2	2	113.188	10.187	0.111	15	LGM	0.0074	107.126	9.641
HFPUB21CD	B	M2	2	2	113.627	8.918	0.120	15	LGM	0.0080	116.913	9.176
HFPUB21DD	B	M2	2	2	115.822	10.760	0.119	15	LGM	0.0079	117.917	10.954
HFPUC11AD	C	M1	3	1		10.101	0.108	15	LGM/LIB	0.0072		9.326
HFPUC11BD	C	M1	3	1	122.343	9.018	0.116	15	LWT/LAB	0.0077	121.524	8.958
HFPUC11CD	C	M1	3	1	116.503	9.044	0.119	15	LAB	0.0080	118.744	9.218
HFPUC11DD	C	M1	3	1	124.317	8.944	0.119	15	LGM	0.0079	126.301	9.087
HFPUC21AD	C	M2	3	2	133.266	9.664	0.109	15	LWB	0.0073	124.268	9.011
HFPUC21BD	C	M2	3	2	128.246	10.013	0.116	15	LWB	0.0077	127.333	9.941
HFPUC21CD	C	M2	3	2	112.390	9.855	0.118	15	LAB/LWT	0.0079	113.687	9.969

	Strength	Modulus
Average	**123.341**	**9.604**
Standard Dev.	**6.552**	**0.606**
Coeff. of Var. [%]	**5.312**	**6.307**
Min.	**112.390**	**8.846**
Max.	**133.399**	**10.760**
Number of Spec.	**19**	**21**

	t_{ply}	$Strength_{norm}$	$Modulus_{norm}$
$Average_{norm}$	**0.0077**	**121.741**	**9.448**
Standard $Dev._{norm}$		**5.399**	**0.620**
Coeff. of Var. $[\%]_{norm}$		**4.435**	**6.563**
Min.	**0.0072**	**107.126**	**8.394**
Max.	**0.0080**	**129.885**	**10.954**
Number of Spec.	**21**	**19**	**21**


Fill Tension Properties (FT) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140


Fill Tension Properties (FT) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0

4.3 Warp Compression Properties

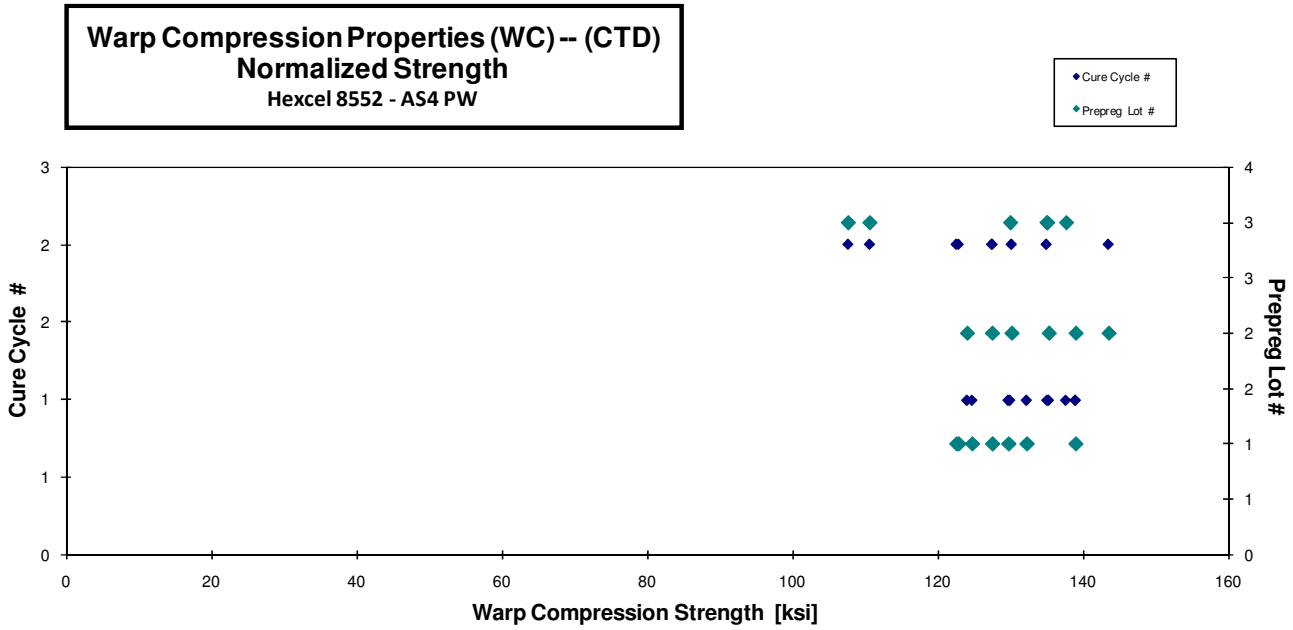
Warp Compression Properties (WC) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

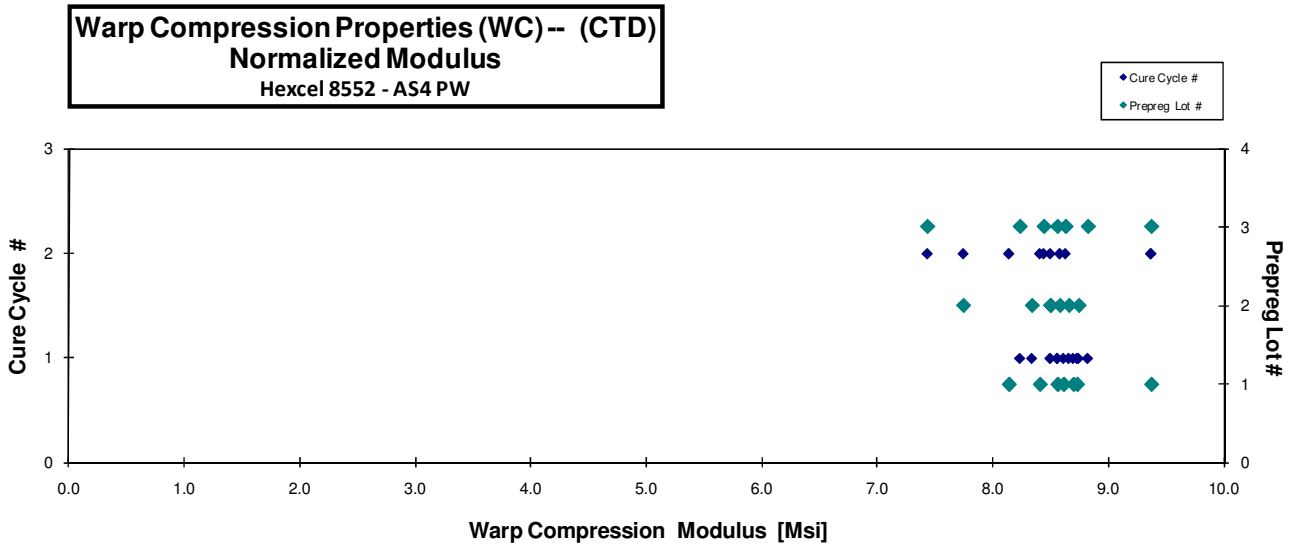
normalizing t_{ply} [in]: 0.0078

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]
HFPLA116B	A	M1	1	1	135.916	8.853	0.046	0.114	15	BGM	0.0076	132.237	8.613
HFPLA117B	A	M1	1	1	127.142	8.726	0.059	0.115	15	BGM	0.0077	124.734	8.561
HFPLA118B	A	M1	1	1	132.524	8.918	0.055	0.115	15	BGM	0.0076	129.730	8.730
HFPLA119B	A	M1	1	1	141.826	8.876	0.050	0.115	15	BGM	0.0076	138.957	8.697
HFPLA216B	A	M2	1	2	124.432	8.263	0.061	0.115	15	BGM	0.0077	122.571	8.139
HFPLA217B	A	M2	1	2	129.425	9.513	0.080	0.115	15	BGM	0.0077	127.507	9.372
HFPLA218B	A	M2	1	2	124.887	8.545	0.020	0.115	15	BGM	0.0077	122.876	8.407
HFPLB116B	B	M1	2	1		8.412	0.050	0.116	15	ENDCRUSH	0.0077		8.338
HFPLB117B	B	M1	2	1	139.011	8.500	0.047	0.117	15	BGM	0.0078	138.971	8.498
HFPLB118B	B	M1	2	1	135.173	8.736	0.057	0.117	15	BGM	0.0078	135.289	8.744
HFPLB119B	B	M1	2	1	123.521	8.622	0.056	0.118	15	BGM	0.0078	124.049	8.659
HFPLB216B	B	M2	2	2	127.576	8.504	0.053	0.117	15	BGM	0.0078	127.485	8.498
HFPLB217B	B	M2	2	2	142.874	7.710	0.035	0.118	15	BAB	0.0078	143.505	7.744
HFPLB218B	B	M2	2	2	129.048	8.507	0.054	0.118	15	BGM	0.0079	130.170	8.581
HFPLC116B	C	M1	3	1	130.133	8.834	0.057	0.117	15	BGM	0.0078	129.967	8.823
HFPLC117B	C	M1	3	1	136.851	8.509	0.069	0.118	15	BGM	0.0078	137.650	8.559
HFPLC118B	C	M1	3	1	134.032	8.172		0.118	15	BGM	0.0079	135.063	8.235
HFLPC216B*	C	M2	3	2	111.408	8.499	0.073	0.116	15	BGM	0.0077	110.647	8.441
HFLPC217B*	C	M2	3	2	107.012	7.385	0.049	0.118	15	BGM	0.0078	107.683	7.431
HFLPC218B	C	M2	3	2		9.302	0.054	0.118	15	CIT	0.0079		9.372
HFLPC219B	C	M2	3	2	132.685	8.484	0.057	0.119	15	BGM	0.0079	134.972	8.630

*REMOVED STRENGTH and/or Poisson's Ratio DUE TO A BAD FAILURE MODE
Specimens have uneven grip marks so strength values are removed.

Average	**129.762**	**8.565**	**0.054**	**$Average_{norm}$**	**0.0078**	**129.161**	**8.527**
Standard Dev.	**9.167**	**0.463**	**0.013**	**$Standard\ Dev._{norm}$**		**9.207**	**0.435**
Coeff. of Var. [%]	**7.065**	**5.411**	**23.414**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.128**	**5.100**
Min.	**107.012**	**7.385**	**0.020**	**Min.**	**0.0076**	**107.683**	**7.431**
Max.	**142.874**	**9.513**	**0.080**	**Max.**	**0.0079**	**143.505**	**9.372**
Number of Spec.	**19**	**21**	**20**	**Number of Spec.**	**21**	**19**	**21**


Warp Compression Properties (WC) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Strength [ksi]
0
20
40
60
80
100
120
140
160


Warp Compression Properties (WC) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Modulus [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0

Warp Compression Properties (WC) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

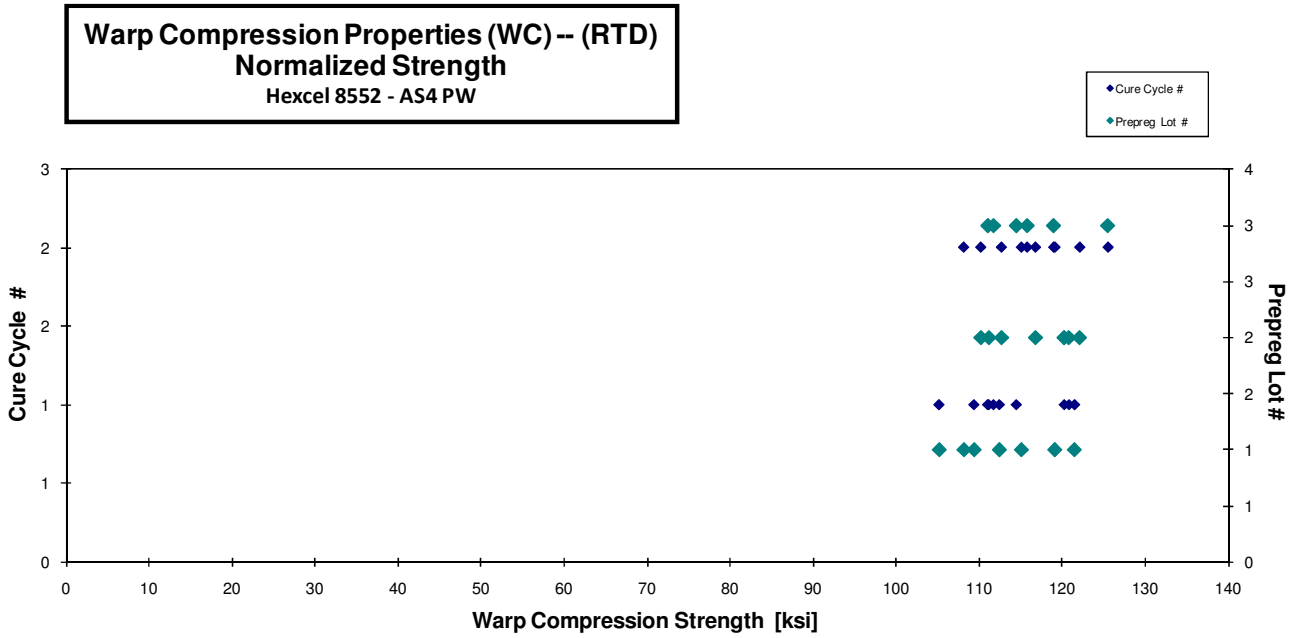
normalizing t_{ply} [in]: 0.0078

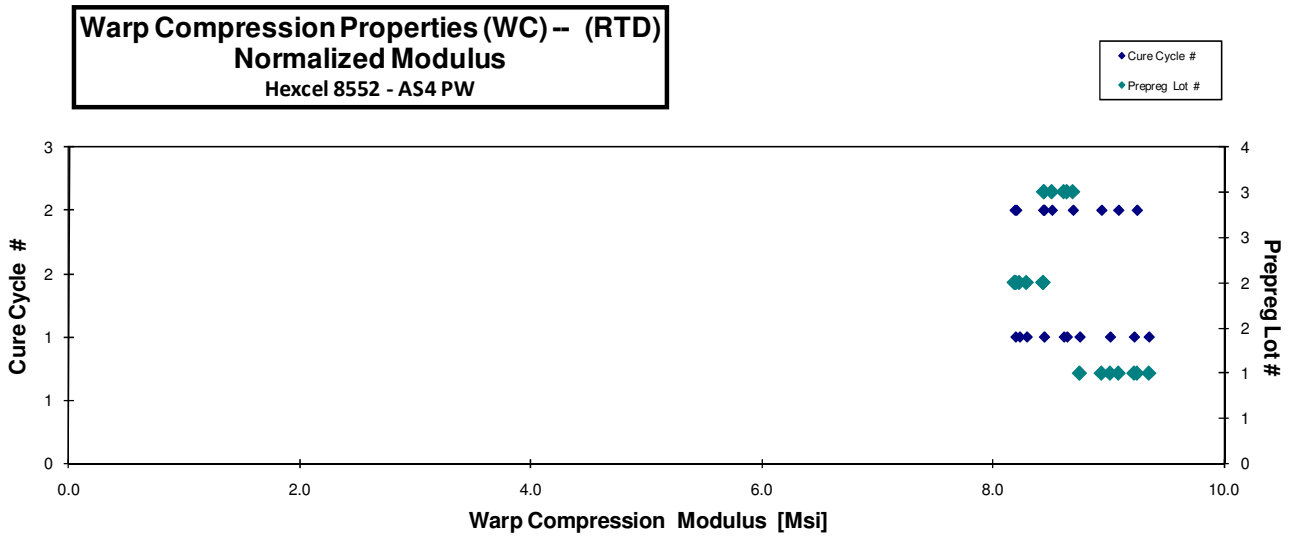
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFPLA111A	A	M1	1	1	119.431	9.937	0.049	0.103	15	BGM	0.0069	105.208	8.753
HFPLA112A	A	M1	1	1	120.517	10.163	0.059	0.106	15	BGM	0.0071	109.409	9.227
HFPLA113A	A	M1	1	1	129.330	9.960	0.058	0.110	15	BGM	0.0073	121.482	9.355
HFPLA114A	A	M1	1	1	117.415	9.416	0.048	0.112	15	BGM	0.0075	112.447	9.018
HFPLA211A	A	M2	1	2	129.347	10.046	0.049	0.108	15	BGM	0.0072	119.121	9.252
HFPLA212A	A	M2	1	2	120.795	9.385	0.043	0.111	15	BGM	0.0074	115.100	8.943
HFPLA213A	A	M2	1	2	110.422	9.279	0.045	0.115	15	BGM	0.0076	108.173	9.090
HFPLB111A	B	M1	2	1	123.233	9.081	0.052	0.106	15	BGM	0.0070	111.191	8.194
HFPLB113A	B	M1	2	1	126.208	8.704	0.044	0.111	15	BGM	0.0074	120.239	8.293
HFPLB114A	B	M1	2	1	124.314	8.469	0.032	0.114	15	BGM	0.0076	120.808	8.230
HFPLB211A	B	M2	2	2	126.524	8.886	0.044	0.108	15	BGM	0.0072	116.791	8.203
HFPLB212A	B	M2	2	2	116.406	8.911	0.033	0.111	15	BGM	0.0074	110.221	8.438
HFPLB213A	B	M2	2	2	126.150	8.717	0.042	0.113	15	BGM / HIB	0.0076	122.107	8.438
HFPLB214A	B	M2	2	2	114.486	8.317	0.037	0.115	15	BGM	0.0077	112.708	8.188
HFPLC111A	C	M1	3	1	124.021	9.429	0.050	0.105	15	HAT / BGM	0.0070	111.054	8.444
HFPLC112A	C	M1	3	1	123.494	9.293	0.053	0.108	15	HAT / BGM	0.0072	114.487	8.615
HFPLC113A	C	M1	3	1	117.044	9.053	0.050	0.112	15	HAT / BGM	0.0074	111.742	8.643
HFLPC212A	C	M2	3	2	134.399	9.044	0.031	0.109	15	BGM	0.0073	125.496	8.445
HFLPC213A	C	M2	3	2	124.575	8.913	0.046	0.112	15	BGM / HAT	0.0074	118.968	8.512
HFLPC214A	C	M2	3	2	119.198	8.951	0.050	0.114	15	HAT	0.0076	115.785	8.695

Note: Modulus and Poisson ratio for HFPLA111A and HNPLA112A are average values.

Average	**122.365**	**9.198**	**0.046**
Standard Dev.	**5.710**	**0.518**	**0.008**
Coeff. of Var. [%]	**4.666**	**5.628**	**17.237**
Min.	**110.422**	**8.317**	**0.031**
Max.	**134.399**	**10.163**	**0.059**
Number of Spec.	**20**	**20**	**20**

$Average_{norm}$	**0.0073**	**115.127**	**8.649**
Standard $Dev._{norm}$		**5.377**	**0.380**
Coeff. of Var. $[\%]_{norm}$		**4.671**	**4.391**
Min.	**0.0069**	**105.208**	**8.188**
Max.	**0.0077**	**125.496**	**9.355**
Number of Spec.	**20**	**20**	**20**


Warp Compression Properties (WC) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140


Warp Compression Properties (WC) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0

Warp Compression Properties (WC) -- (ETD)
Strength & Modulus
Hexcel 8552 - AS4 PW

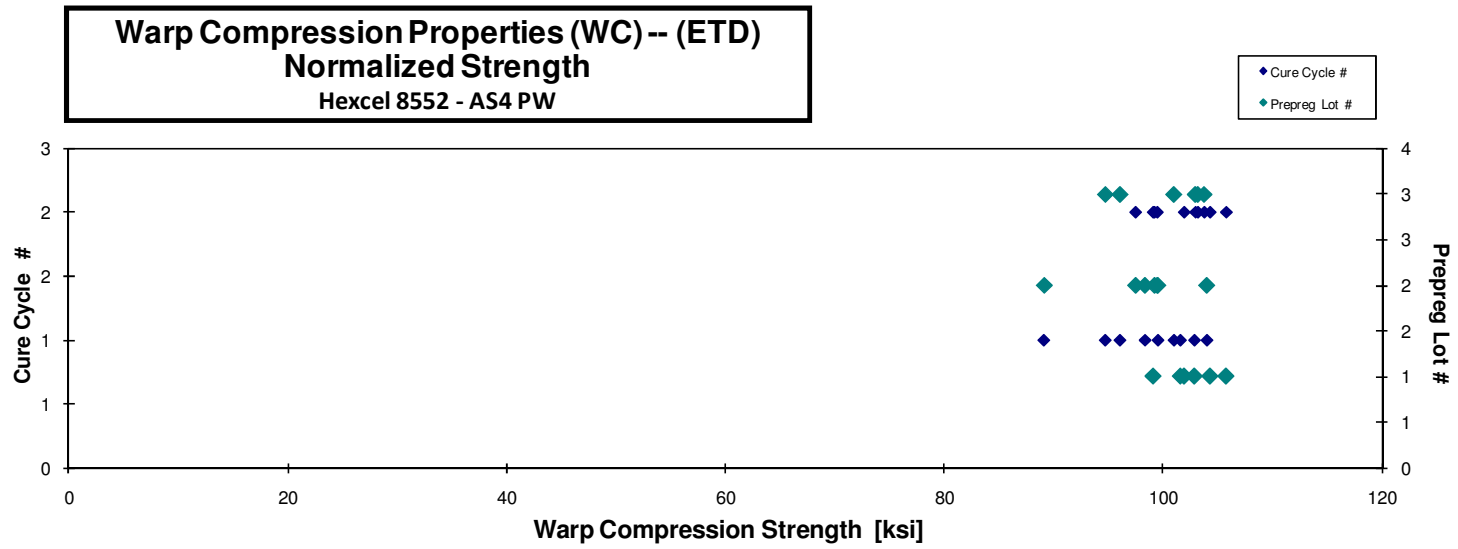
normalizing t_{ply} [in]: 0.0078

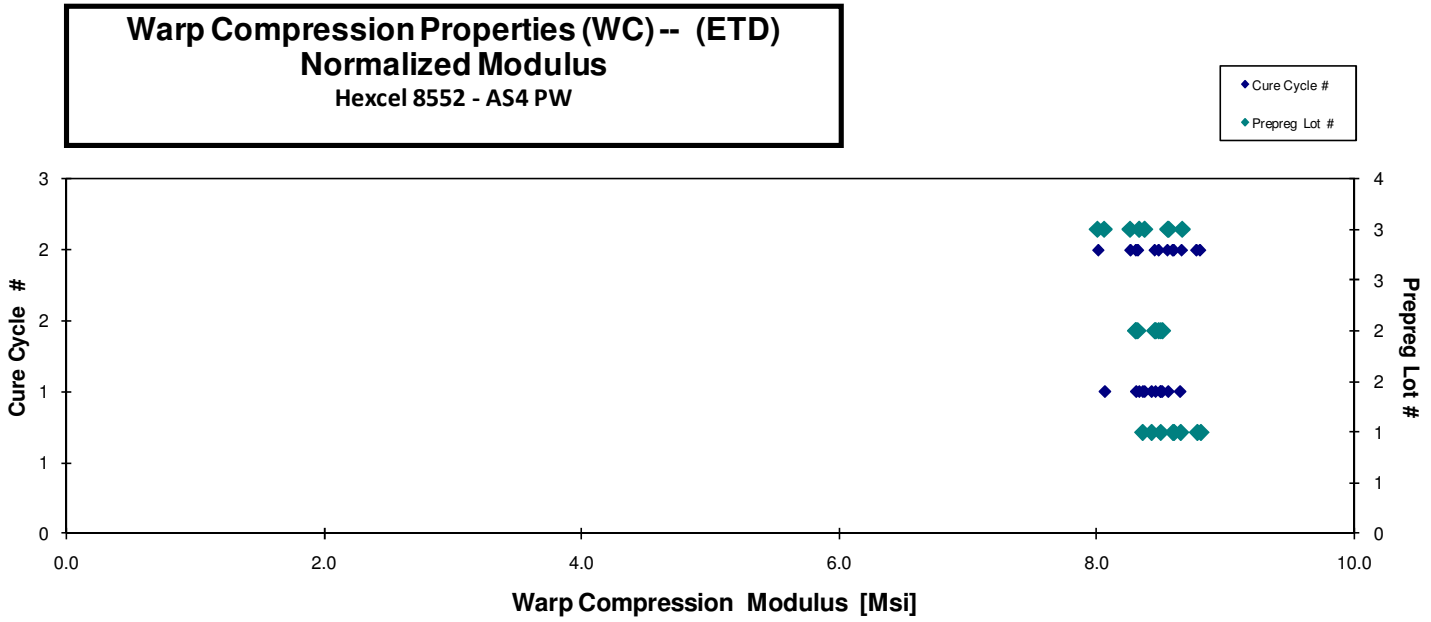
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFPLA11AC	A	M1	1	1		8.597	0.066	0.115	15	ENDCRUSH	0.0076		8.425
HFPLA11BC	A	M1	1	1		8.565	0.057	0.114	15	HIT / BGM	0.0076		8.357
HFPLA11CC	A	M1	1	1	105.911	8.905	0.054	0.114	15	BGM	0.0076	102.863	8.649
HFPLA11DC	A	M1	1	1	105.054	8.785	0.056	0.113	15	BGM	0.0075	101.583	8.495
HFPLA21AC	A	M2	1	2	105.796	8.905	0.054	0.115	15	HAB / BGM	0.0077	104.289	8.778
HFPLA21BC	A	M2	1	2	103.241	8.710	0.040	0.116	15	HAB / BGM	0.0077	101.918	8.598
HFPLA21CC	A	M2	1	2	100.394	8.920	0.047	0.115	15	HAB / BGM	0.0077	99.092	8.805
HFPLA21DC	A	M2	1	2	107.080	8.697	0.047	0.116	15	BGM	0.0077	105.753	8.590
HFPLB11AC	B	M1	2	1	97.814	8.410	0.064	0.118	15	BGM	0.0078	98.357	8.456
HFPLB11BC	B	M1	2	1	99.316	8.477	0.071	0.117	15	BGM	0.0078	99.529	8.495
HFPLB11CC	B	M1	2	1	103.875	8.498	0.059	0.117	15	BGM	0.0078	103.993	8.508
HFPLB11DC	B	M1	2	1	90.488	8.429	0.054	0.115	15	BGM	0.0077	89.147	8.304
HFPLB21AC	B	M2	2	2	98.797	8.266	0.035	0.118	15	BGM / HAB	0.0078	99.219	8.302
HFPLB21BC	B	M2	2	2		8.498	0.052	0.117	15	HIT / BGM	0.0078		8.480
HFPLB21CC	B	M2	2	2	97.867	8.481	0.033	0.117	15	BGM	0.0078	97.504	8.449
HFPLB21DC	B	M2	2	2	100.546	8.408	0.041	0.116	15	BGM	0.0077	99.472	8.318
HFPLC11AC	C	M1	3	1		8.448	0.066	0.119	15	HIT/BGM	0.0079		8.557
HFPLC11BC	C	M1	3	1	93.706	8.238	0.067	0.118	15	HAB/BGM	0.0079	94.734	8.328
HFPLC11CC	C	M1	3	1	96.004	8.365	0.063	0.117	15	HAB/BGM	0.0078	96.073	8.371
HFPLC11DC	C	M1	3	1	101.274	8.082	0.044	0.117	15	HAT/BGM	0.0078	100.986	8.059
HFLPC21AC	C	M2	3	2	101.951	8.576	0.055	0.118	15	HAT/BGM	0.0079	102.953	8.660
HFLPC21BC	C	M2	3	2	103.370	8.518	0.061	0.117	15	HAT/BGM	0.0078	103.753	8.549
HFLPC21CC	C	M2	3	2		8.299	0.056	0.116	15	HIT/BGM	0.0078		8.259
HFLPC21DC	C	M2	3	2	104.172	8.084	0.051	0.116	15	BGM	0.0077	103.178	8.007

HFPLA11AC & HFPLA11BC STRENGTH VALUES WERE REMOVED DUE TO BAD FAILURE MODES
COMPRESSIVE STRENGTH WAS NOT REPORTED FOR SPECIMEN # HFPLC11AC & HFLPC21CC DUE TO INVALID FAILURE MODE

Average	**100.877**	**8.507**	**0.054**
Standard Dev.	**4.391**	**0.232**	**0.010**
Coeff. of Var. [%]	**4.353**	**2.733**	**18.905**
Min.	**90.488**	**8.082**	**0.033**
Max.	**107.080**	**8.920**	**0.071**
Number of Spec.	**19**	**24**	**24**

$Average_{norm}$	**0.0077**	**100.231**	**8.450**
$Standard\ Dev._{norm}$		**3.989**	**0.194**
Coeff. of Var. $[\%]_{norm}$		**3.980**	**2.296**
Min.	**0.0075**	**89.147**	**8.007**
Max.	**0.0079**	**105.753**	**8.805**
Number of Spec.	**24**	**19**	**24**


Warp Compression Properties (WC) -- (ETD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Strength [ksi]
0
20
40
60
80
100
120


Warp Compression Properties (WC) -- (ETD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0

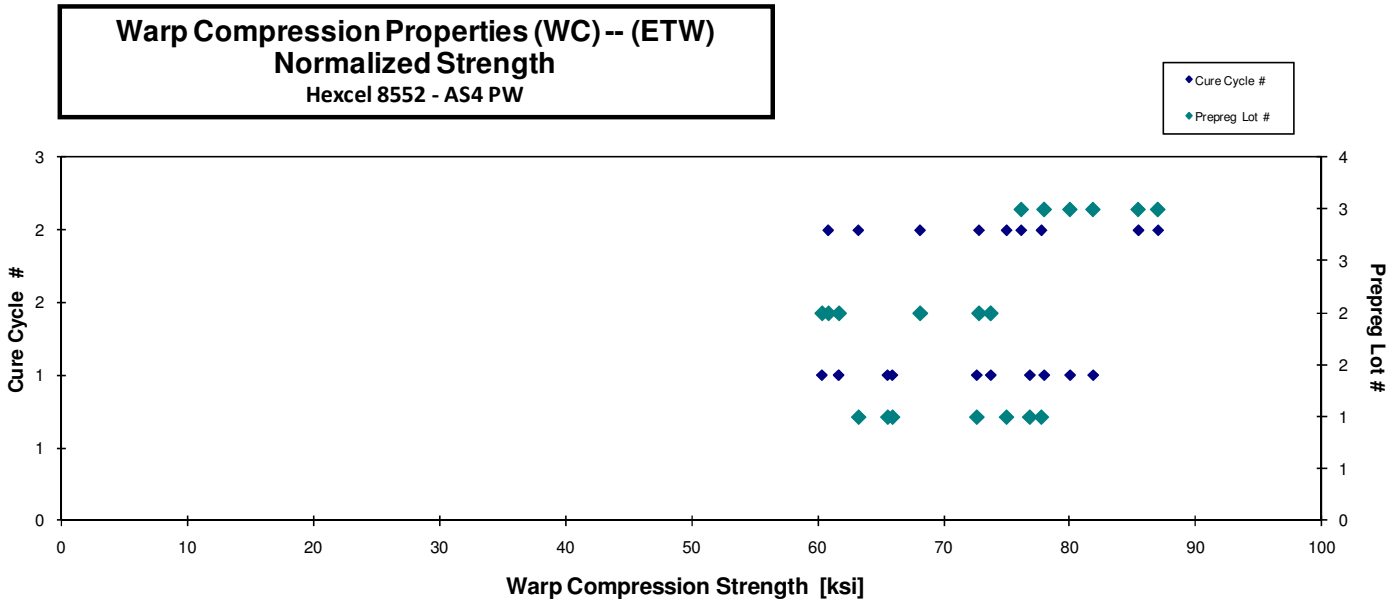
Warp Compression Properties (WC) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

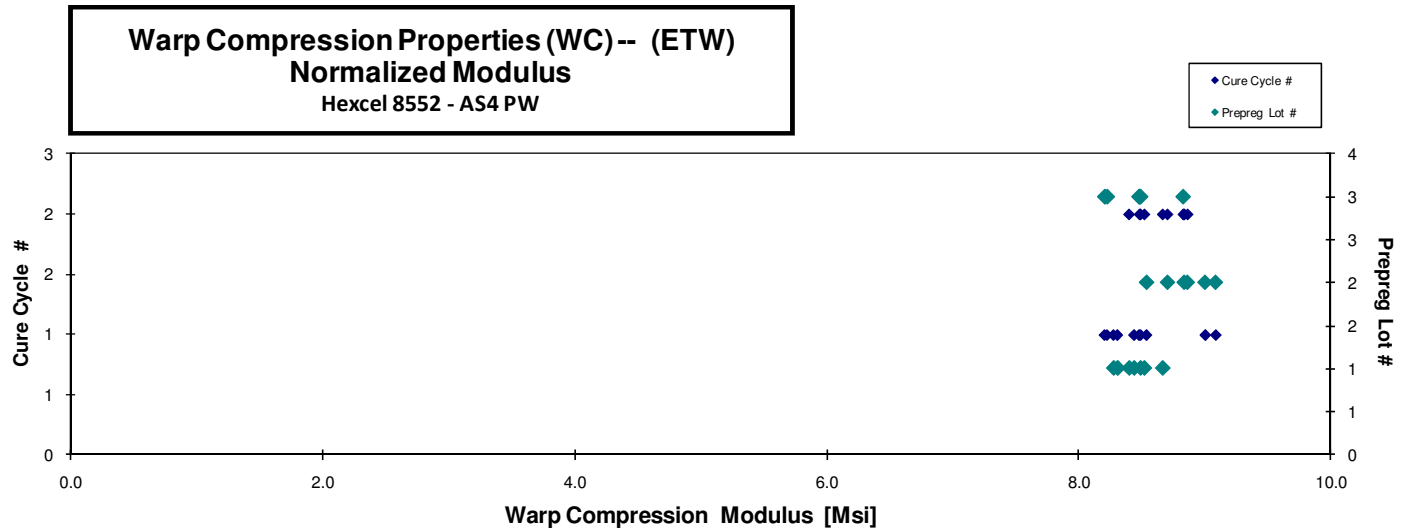
normalizing t_{ply} [in]: 0.0078

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]
HFPLA11FD	A	M1	1	1		8.752	0.051	0.113	15	BGM	0.0075		8.441
HFPLA11GD	A	M1	1	1		8.811	0.050	0.113	15	BGM	0.0075		8.492
HFPLA11HD	A	M1	1	1		9.062	0.055	0.107	15	HIB/BGM	0.0072		8.310
HFPLA11ID	A	M1	1	1		9.090	0.036	0.107	15	BGM	0.0071		8.278
HFPLA11JD	A	M1	1	1	81.681			0.110	15	BGM	0.0073	76.829	
HFPLA11KD	A	M1	1	1	75.347			0.113	15	BGM	0.0075	72.621	
HFPLA115D	A	M1	1	1	67.791			0.113	15	BGM	0.0075	65.551	
HFPLA11ED	A	M1	1	1	69.465			0.111	15	BGM	0.0074	65.933	
HFPLA21ED	A	M2	1	2		8.587	0.089	0.116	15	BGM	0.0077		8.523
HFPLA21FD*	A	M2	1	2		8.761	0.054	0.116	15	HGM	0.0077		8.668
HFPLA21GD*	A	M2	1	2		9.037	0.075	0.109	15	BGM	0.0073		8.402
HFPLA21HD*	A	M2	1	2	68.270			0.108	15	BGM	0.0072	63.233	
HFPLA21ID	A	M2	1	2	80.921			0.108	15	BAT	0.0072	74.984	
HFPLA215D	A	M2	1	2	78.554			0.116	15	BGM	0.0077	77.749	
HFPLB11ED	B	M1	2	1		8.745	0.046	0.114	15	BGM	0.0076		8.540
HFPLB11FD	B	M1	2	1		9.346	0.037	0.113	15	BGM	0.0075		9.004
HFPLB11GD	B	M1	2	1		9.637	0.053	0.110	15	BGM	0.0074		9.088
HFPLB11HD	B	M1	2	1	80.191			0.108	15	BGM	0.0072	73.726	
HFPLB11ID	B	M1	2	1	67.149			0.107	15	HGM	0.0072	61.678	
HFPLB115D	B	M1	2	1	61.118			0.116	15	BGM	0.0077	60.343	
HFPLB21ED*	B	M2	2	2		9.027	0.049	0.115	15	BGM	0.0076		8.838
HFPLB21FD*	B	M2	2	2		9.062	0.043	0.112	15	BGM	0.0075		8.705
HFPLB21GD*	B	M2	2	2		9.353	0.036	0.111	15	HGM	0.0074		8.864
HFPLB21HD	B	M2	2	2	73.056			0.109	15	HGM	0.0073	68.123	
HFPLB21ID	B	M2	2	2	65.125			0.109	15	HGM	0.0073	60.848	
HFPLB215D	B	M2	2	2	73.416			0.116	15	HGM	0.0077	72.799	
HFPLC11ED	C	M1	3	1		8.633	0.046	0.115	15	BAT/HAT	0.0077		8.481
HFPLC11FD	C	M1	3	1	83.202			0.113	15	BGM	0.0075	80.014	
HFPLC11GD	C	M1	3	1		8.850	0.046	0.109	15	BGM	0.0072		8.208
HFPLC11HD	C	M1	3	1	86.932			0.105	15	BGM	0.0070	77.966	
HFPLC11ID	C	M1	3	1		9.206	0.048	0.105	15	BGM	0.0070		8.228
HFPLC115D	C	M1	3	1	82.574			0.116	15	BGM	0.0077	81.844	
HFLPC21ED	C	M2	3	2		8.982	0.059	0.115	15	BGM	0.0077		8.831
HFLPC21FD	C	M2	3	2		8.743	0.067	0.114	15	BGM	0.0076		8.485
HFLPC21GD	C	M2	3	2		9.001	0.065	0.110	15	BGM	0.0074		8.492
HFLPC21HD	C	M2	3	2	83.225			0.107	15	BGM	0.0071	76.147	
HFLPC21ID	C	M2	3	2	93.433			0.107	15	BGM	0.0071	85.434	
HFLPC215D	C	M2	3	2	88.515			0.115	15	BGM	0.0077	86.989	

	Strength [ksi]	Modulus [Msi]	Poisson's Ratio
Average	**76.840**	**8.983**	**0.053**
Standard Dev.	**8.813**	**0.271**	**0.014**
Coeff. of Var. [%]	**11.470**	**3.013**	**25.637**
Min.	**61.118**	**8.587**	**0.036**
Max.	**93.433**	**9.637**	**0.089**
Number of Spec.	**19**	**19**	**19**

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	**0.0074**	**72.779**	**8.572**
Standard $Dev._{norm}$		**8.212**	**0.257**
Coeff. of Var. $[\%]_{norm}$		**11.284**	**2.995**
Min.	**0.0070**	**60.343**	**8.208**
Max.	**0.0077**	**86.989**	**9.088**
Number of Spec.	**38**	**19**	**19**


Warp Compression Properties (WC) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100


Warp Compression Properties (WC) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0

4.4 Fill Compression Properties

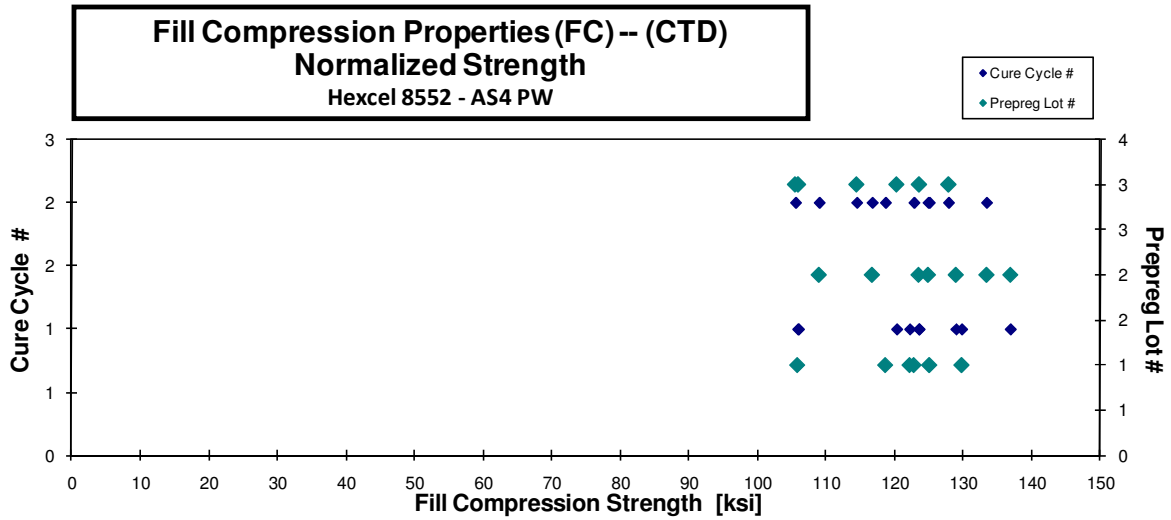
Fill Compression Properties (FC) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

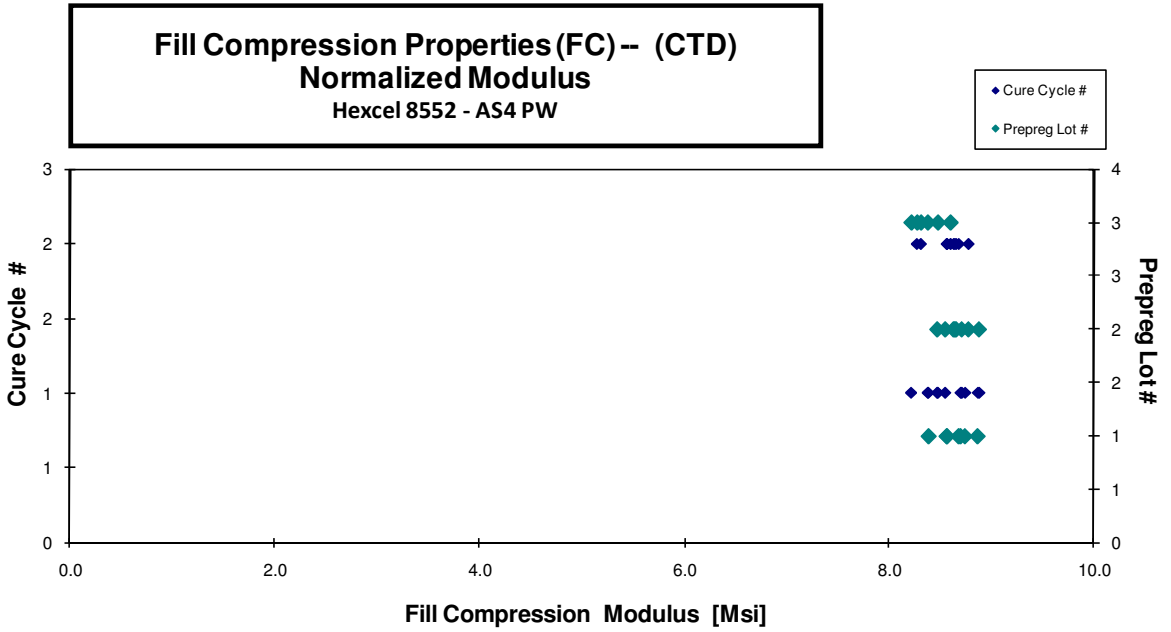
normalizing t_{ply} [in]: 0.0078

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]
HFPZA115B	A	M1	1	1	107.593	8.522	0.043	0.115	15	BGM	0.0077	105.876	8.386
HFPZA116B	A	M1	1	1	130.294	8.902	0.046	0.117	15	BGM	0.0078	129.793	8.867
HFPZA117B	A	M1	1	1		8.701	0.077	0.117	15	END CRUSH*	0.0078		8.699
HFPZA118B	A	M1	1	1	121.613	8.700	0.035	0.118	15	BAT	0.0078	122.219	8.744
HFPZA216B	A	M2	1	2	122.892	8.990	0.058	0.113	15	BGM	0.0075	118.673	8.681
HFPZA217B	A	M2	1	2	128.331	8.785	0.050	0.114	15	BGM	0.0076	125.096	8.564
HFPZA218B	A	M2	1	2	126.360	8.814	0.070	0.114	15	BAT	0.0076	122.832	8.568
HFPZB112B	B	M1	2	1	136.726	9.063	0.028	0.110	15	BAB	0.0074	128.974	8.549
HFPZB116B	B	M1	2	1		8.613	0.064	0.115	15	BGM / CIB	0.0077		8.471
HFPZB117B	B	M1	2	1	125.285	8.834	0.060	0.115	15	BGM	0.0077	123.536	8.711
HFPZB118B	B	M1	2	1	137.836	8.940	0.073	0.116	15	BGM	0.0077	136.913	8.881
HFPZB212B	B	M2	2	2	118.267	9.523		0.108	15	BAT	0.0072	109.001	8.777
HFPZB216B	B	M2	2	2	119.116	8.819	0.070	0.115	15	BGM	0.0076	116.741	8.643
HFPZB217B	B	M2	2	2	125.863	8.723		0.116	15	BGM	0.0077	124.913	8.657
HFPZB218B	B	M2	2	2	133.620	8.644	0.056	0.117	15	BGM	0.0078	133.430	8.632
HFPZC116B	C	M1	3	1	105.252	8.322	0.081	0.118	15	BGM	0.0079	105.987	8.380
HFPZC117B	C	M1	3	1	119.719	8.177	0.099	0.118	15	BGM/HAT	0.0078	120.316	8.218
HFPZC118B	C	M1	3	1	123.122	8.447	0.066	0.117	15	BGM	0.0078	123.596	8.479
HFPZC216B	C	M2	3	2	114.667	8.616	0.080	0.117	15	BGM	0.0078	114.487	8.603
HFPZC217B	C	M2	3	2	127.448	8.284	0.073	0.117	15	BGM	0.0078	127.883	8.313
HFPZC218B	C	M2	3	2	104.523	8.194	0.044	0.118	15	BGM	0.0079	105.551	8.275

HFPZB116B: STRENGTH REMOVED DUE TO A BAD FAILURE MODE
POISSON'S RATIO FOR HFPZB212B & HFPZB217B WAS NOT REPORTED SINCE THE GRAPH WAS NOT LINEAR

Average	**122.554**	**8.696**	**0.062**	**$Average_{norm}$**	**0.0077**	**120.832**	**8.576**
Standard Dev.	**9.595**	**0.316**	**0.018**	**$Standard\ Dev._{norm}$**		**9.276**	**0.186**
Coeff. of Var. [%]	**7.829**	**3.639**	**28.789**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.677**	**2.165**
Min.	**104.523**	**8.177**	**0.028**	**Min.**	**0.0072**	**105.551**	**8.218**
Max.	**137.836**	**9.523**	**0.099**	**Max.**	**0.0079**	**136.913**	**8.881**
Number of Spec.	**19**	**21**	**19**	**Number of Spec.**	**21**	**19**	**21**


Fill Compression Properties (FC) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150


Fill Compression Properties (FC) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0

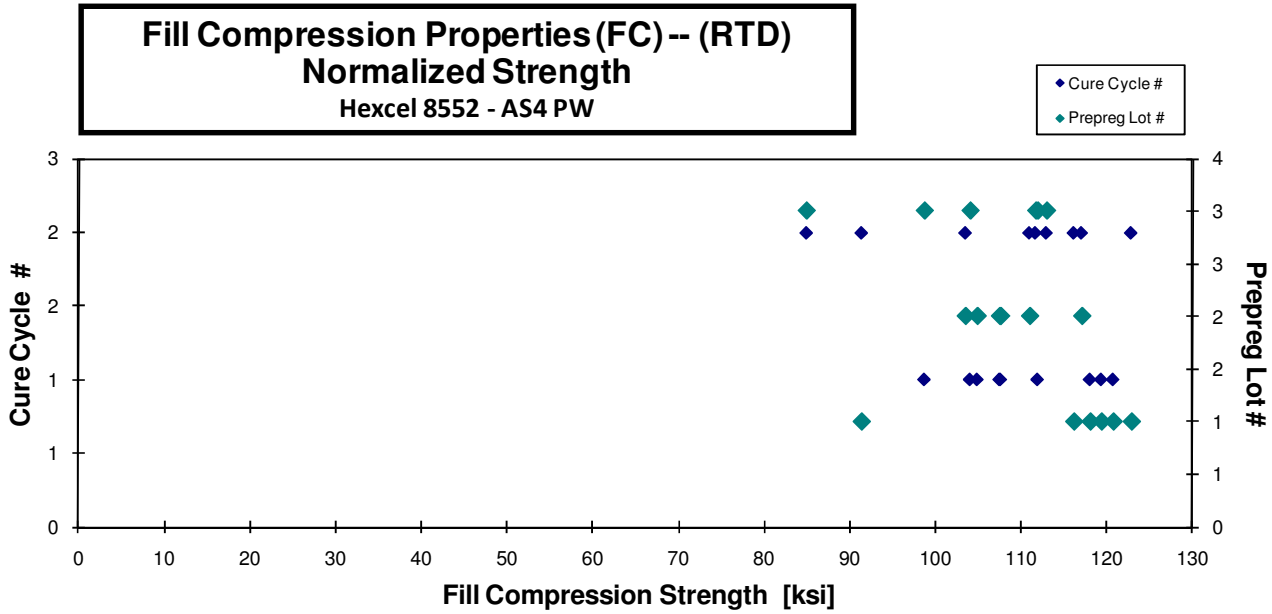
Fill Compression Properties (FC) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPZA111A	A	M1	1	1	130.163	9.385	0.044	0.106	15	BGM	0.0071	118.036	8.511
HFPZA112A	A	M1	1	1		9.347	0.054	0.109	15	HIT	0.0073		8.739
HFPZA113A	A	M1	1	1	125.425	9.186	0.046	0.111	15	BGM	0.0074	119.350	8.741
HFPZA114A	A	M1	1	1	124.637	9.038	0.057	0.113	15	BGM/HAT	0.0076	120.731	8.754
HFPZA215A	A	M2	1	2	94.214	9.002	0.040	0.113	15	BGM	0.0076	91.369	8.730
HFPZA213A	A	M2	1	2	128.092	9.121	0.048	0.112	15	BGM	0.0075	122.837	8.747
HFPZA214A	A	M2	1	2	123.035	9.468	0.056	0.110	15	BGM	0.0074	116.147	8.938
HFPZB113A	B	M1	2	1	113.114	9.280	0.048	0.111	15	BGM	0.0074	107.490	8.819
HFPZB114A	B	M1	2	1	108.524	9.074	0.065	0.113	15	BGM	0.0075	104.875	8.769
HFPZB115A	B	M1	2	1	110.762	9.195	0.055	0.114	15	BGM	0.0076	107.606	8.933
HFPZB213A	B	M2	2	2	124.072	9.065	0.051	0.110	15	BGM	0.0074	117.055	8.553
HFPZB214A	B	M2	2	2	108.087	9.516	0.077	0.112	15	BGM	0.0075	103.499	9.112
HFPZB215A	B	M2	2	2	114.089	8.968	0.052	0.114	15	BGM	0.0076	110.969	8.723
HFPZC113A	C	M1	3	1	105.158	8.653	0.061	0.116	15	BGM	0.0077	104.034	8.560
HFPZC114A	C	M1	3	1	99.031	8.641	0.076	0.117	15	BGM	0.0078	98.693	8.612
HFPZC115A	C	M1	3	1	112.091	8.081	0.044	0.117	15	BGM	0.0078	111.915	8.068
HFPZC213A	C	M2	3	2	117.710	8.817	0.039	0.112	15	BGM	0.0075	112.948	8.460
HFPZC214A	C	M2	3	2	115.069	8.803	0.060	0.114	15	BGM	0.0076	111.675	8.543
HFPZC215A	C	M2	3	2	86.329	8.475	0.054	0.115	15	BGM	0.0077	84.939	8.338

COMPRESSIVE STRENGTH IS NOT REPORTED FOR SPECIMEN HFPZA112A DUE TO A BAD FAILURE MODE

Average	**113.311**	**9.006**	**0.054**	**$Average_{norm}$**	**0.0075**	**109.121**	**8.666**
Standard Dev.	**11.961**	**0.363**	**0.011**	**$Standard\ Dev._{norm}$**		**10.120**	**0.234**
Coeff. of Var. [%]	**10.556**	**4.033**	**19.679**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**9.274**	**2.698**
Min.	**86.329**	**8.081**	**0.039**	**Min.**	**0.0071**	**84.939**	**8.068**
Max.	**130.163**	**9.516**	**0.077**	**Max.**	**0.0078**	**122.837**	**9.112**
Number of Spec.	**18**	**19**	**19**	**Number of Spec.**	**19**	**18**	**19**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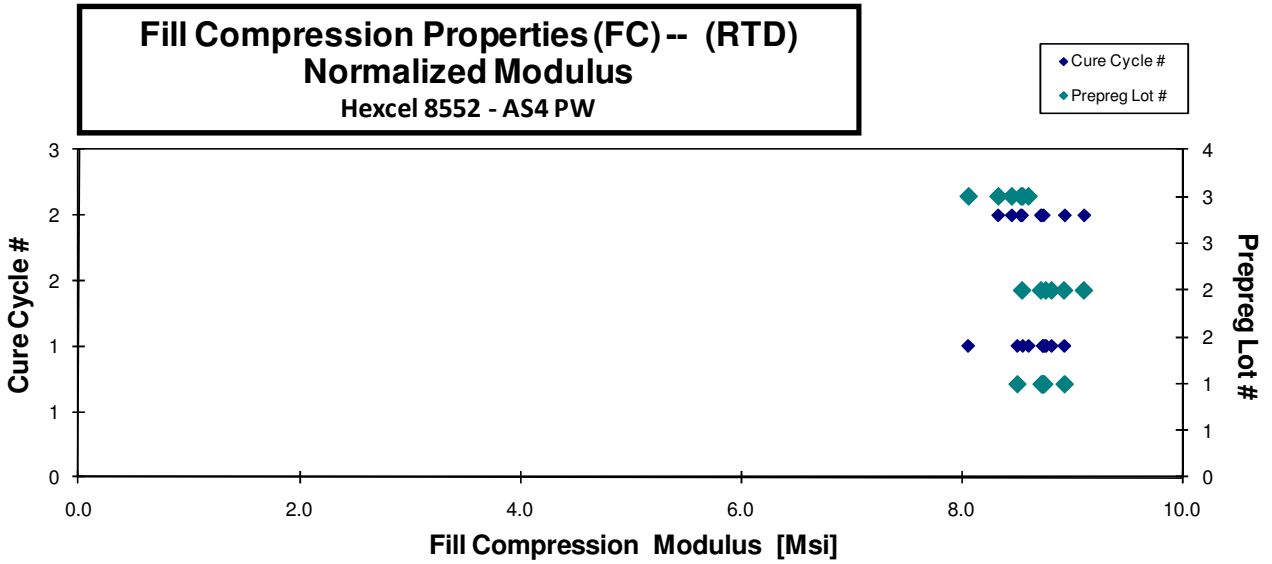
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120
130


Fill Compression Properties (FC) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0

Fill Compression Properties (FC) -- (ETD)
Strength & Modulus
Hexcel 8552 - AS4 PW

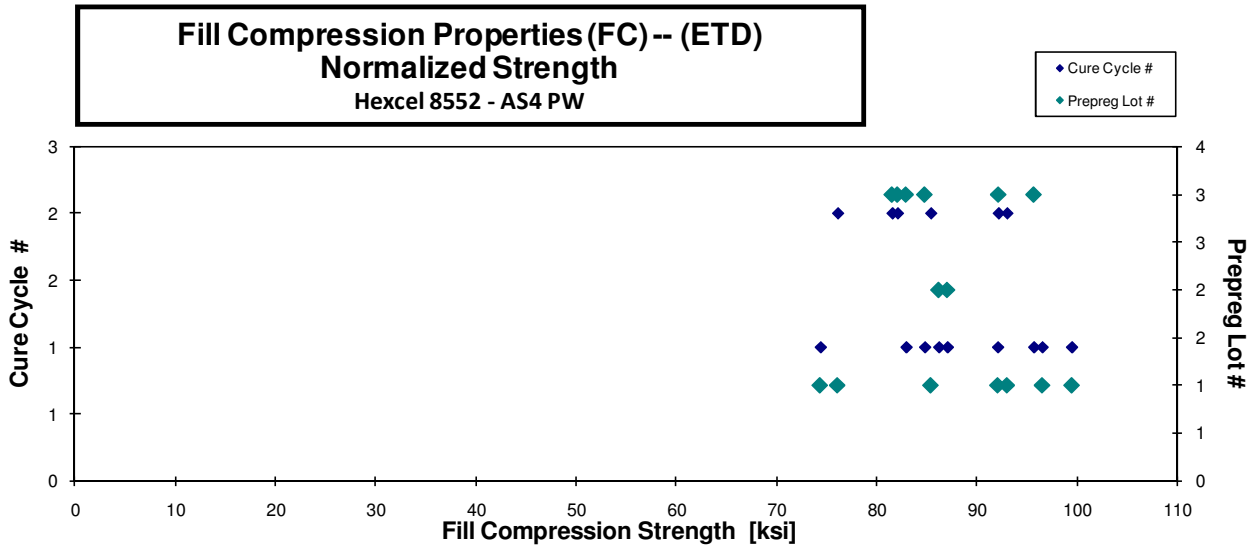
normalizing t_{ply} [in]: 0.0078

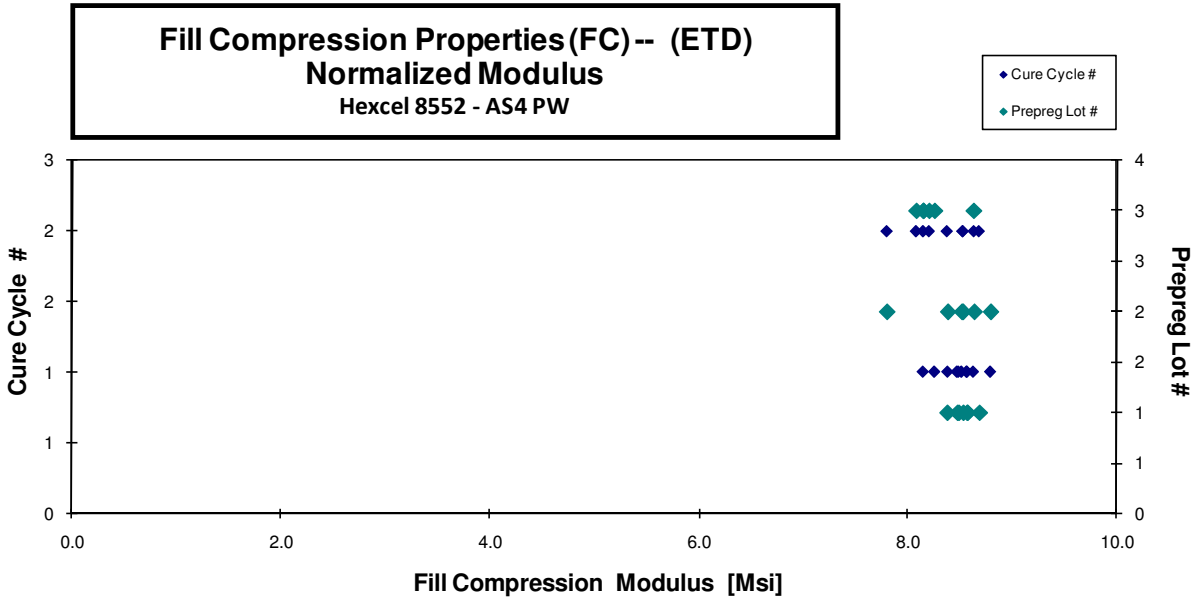
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFPZA119C	A	M1	1	1	74.085	8.532	0.064	0.118	15	BGM	0.0078	74.401	8.568
HFPZA11AC	A	M1	1	1	99.165	8.441	0.054	0.117	15	HAT	0.0078	99.518	8.471
HFPZA11BC	A	M1	1	1	98.958	9.115	0.040	0.109	15	BGM	0.0073	92.121	8.485
HFPZA11CC	A	M1	1	1	100.994	8.957	0.052	0.112	15	BGM	0.0075	96.563	8.564
HFPZA219C	A	M2	1	2	87.684	8.595	0.031	0.114	15	BGM	0.0076	85.435	8.375
HFPZA21AC	A	M2	1	2	86.412	9.679	0.040	0.103	15	BGM	0.0069	76.134	8.528
HFPZA21BC	A	M2	1	2	102.014	9.518	0.042	0.107	15	BGM	0.0071	93.048	8.682
HFPZB119C	B	M1	2	1	86.552	8.824	0.041	0.117	15	HAT/BAT	0.0078	86.231	8.791
HFPZB11AC	B	M1	2	1	95.775	9.217	0.050	0.106	15	BGM	0.0071	87.084	8.380
HFPZB11BC	B	M1	2	1		9.133	0.042	0.109	15	HIT	0.0073		8.514
HFPZB219C	B	M2	2	2		8.644	0.049	0.117	15	BGM/CIB	0.0078		8.633
HFPZB21AC	B	M2	2	2		9.626	0.054	0.104	15	HAT/CIB	0.0069		8.525
HFPZB21BC	B	M2	2	2		8.519	0.032	0.107	15	HIB/CIB	0.0071		7.796
HFPZC119C	C	M1	3	1	95.505	8.234	0.037	0.117	15	BGM	0.0078	95.722	8.253
HFPZC11AC	C	M1	3	1	92.770	8.906	0.033	0.107	15	BGM	0.0071	84.828	8.144
HFPZC11BC	C	M1	3	1	86.586	9.003	0.061	0.112	15	HAT	0.0075	82.960	8.626
HFPZC219C	C	M2	3	2	90.933	8.090	0.038	0.119	15	BGM	0.0079	92.189	8.201
HFPZC21AC	C	M2	3	2	89.354	8.790	0.058	0.108	15	BGM	0.0072	82.111	8.078
HFPZC21BC	C	M2	3	2	86.700	8.657	0.054	0.110	15	BGM	0.0073	81.574	8.146

Specimens had bad failures so strength values are removed

Average	**91.566**	**8.867**	**0.046**
Standard Dev.	**7.422**	**0.443**	**0.010**
Coeff. of Var. [%]	**8.106**	**4.998**	**22.153**
Min.	**74.085**	**8.090**	**0.031**
Max.	**102.014**	**9.679**	**0.064**
Number of Spec.	**15**	**19**	**19**

$Average_{norm}$	**0.0074**	**87.328**	**8.408**
$Standard\ Dev._{norm}$		**7.400**	**0.248**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**8.473**	**2.953**
Min.	**0.0069**	**74.401**	**7.796**
Max.	**0.0079**	**99.518**	**8.791**
Number of Spec.	**19**	**15**	**19**


Fill Compression Properties (FC) -- (ETD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
110


Fill Compression Properties (FC) -- (ETD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0

Fill Compression Properties (FC) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

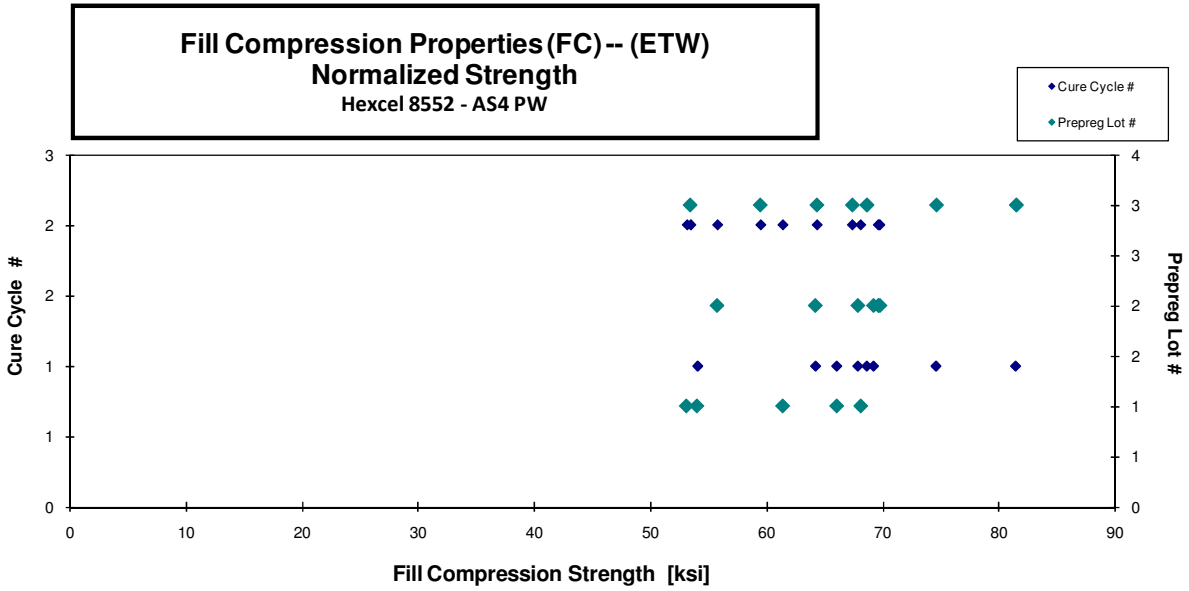
normalizing t_{ply} [in]: 0.0078

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]
HFPZA11DD	A	M1	1	1		9.031	0.047	0.114	15	BGM	0.0076		8.816
HFPZA11ED	A	M1	1	1		8.354	0.055	0.117	15	BGM	0.0078		8.341
HFPZA11FD	A	M1	1	1		8.277	0.034	0.118	15	BGM	0.0079		8.381
HFPZA11GD*	A	M1	1	1		8.677	0.070	0.120	15	BGM	0.0080		8.875
HFPZA11HD*	A	M1	1	1	52.664			0.120	15	HGM	0.0080	53.999	
HFPZA11KD	A	M1	1	1	64.693			0.119	15	BGM	0.0080	66.010	
HFPZA21DD	A	M2	1	2		9.060	0.058	0.112	15	BGM	0.0075		8.653
HFPZA21ED	A	M2	1	2		8.957	0.053	0.113	15	BGM	0.0075		8.662
HFPZA21FD	A	M2	1	2		8.652	0.049	0.115	15	BGM	0.0076		8.467
HFPZA21GD	A	M2	1	2	62.427			0.115	15	BGM	0.0077	61.369	
HFPZA21HD	A	M2	1	2	69.318			0.115	15	BGM	0.0077	68.084	
HFPZA21ID	A	M2	1	2	53.890			0.115	15	BGM	0.0077	53.092	
HFPZB11DD	B	M1	2	1		8.999	0.060	0.114	15	BGM	0.0076		8.744
HFPZB11ED	B	M1	2	1		8.993	0.035	0.115	15	BGM	0.0077		8.829
HFPZB11FD	B	M1	2	1		8.800	0.050	0.116	15	BGM	0.0078		8.756
HFPZB11GD	B	M1	2	1	63.841			0.118	15	BGM	0.0078	64.177	
HFPZB11HD	B	M1	2	1	66.971			0.119	15	BGM	0.0079	67.830	
HFPZB11ID	B	M1	2	1	68.302			0.119	15	BGM	0.0079	69.178	
HFPZB21CD*	B	M2	2	2	58.932			0.111	15	BGM	0.0074	55.725	
HFPZB21DD*	B	M2	2	2		9.134	0.047	0.113	15	BGM	0.0075		8.840
HFPZB21ED	B	M2	2	2		8.857	0.030	0.115	15	HIT / BGM	0.0077		8.736
HFPZB21FD	B	M2	2	2		8.736	0.059	0.117	15	HIB/BGM	0.0078		8.762
HFPZB21GD	B	M2	2	2	68.619			0.119	15	BGM	0.0079	69.724	
HFPZB21HD	B	M2	2	2	67.893			0.120	15	BGM	0.0080	69.595	
HFPZC11CD	C	M1	3	1	75.347			0.116	15	BGM	0.0077	74.585	
HFPZC11DD	C	M1	3	1		7.984	0.037	0.118	15	HIT/BGM	0.0078		8.031
HFPZC11ED	C	M1	3	1		7.925	0.063	0.119	15	BGM	0.0080		8.079
HFPZC11FD	C	M1	3	1		7.443	0.061	0.120	15	BGM	0.0080		7.602
HFPZC11GD	C	M1	3	1	79.874			0.119	15	BGM	0.0080	81.444	
HFPZC11ID	C	M1	3	1	67.563			0.119	15	BGM	0.0079	68.612	
HFPZC21CD	C	M2	3	2	61.623			0.113	15	BGM	0.0075	59.446	
HFPZC21DD*	C	M2	3	2		7.736	0.105	0.115	15	BGM	0.0077		7.613
HFPZC21ED	C	M2	3	2		8.687	0.041	0.117	15	HIT/BGM	0.0078		8.659
HFPZC21FD	C	M2	3	2		7.762	0.060	0.118	15	BGM	0.0079		7.829
HFPZC21GD	C	M2	3	2	63.081			0.119	15	BGM	0.0080	64.312	
HFPZC21HD*	C	M2	3	2	51.901			0.120	15	BGM	0.0080	53.417	
HFPZC21ID	C	M2	3	2	64.820			0.122	15	BGM	0.0081	67.369	

STRENGTH FOR SPECIMEN HFPZC11DD, HFPZC11HD, HFPZC21ED NOT REPORTED DUE TO BAD FAILURE MODE.
THE STRENGTH FOR SPECIMEN HFPZB11CD, HFPZB21ED, HFPZB21FD, , HFPZB21ID NOT REPORTED DUE TO BAD FAILURE MODE.
THE SECOND POISSON RATIO FOR HFPZA11ED NOT REPORTED DUE TO NON-LINEARITY.
***Specimens removed due to uneven grip marks on specimen**

Average	64.542	8.530	0.053
Standard Dev.	7.248	0.525	0.017
Coeff. of Var. [%]	11.231	6.153	31.395
Min.	51.901	7.443	0.030
Max.	79.874	9.134	0.105
Number of Spec.	18	19	19

$Average_{norm}$	0.0078	64.887	8.457
$Standard\ Dev._{norm}$		7.625	0.424
$Coeff.\ of\ Var.\ [\%]_{norm}$		11.751	5.012
Min.	0.0074	53.092	7.602
Max.	0.0081	81.444	8.875
Number of Spec.	37	18	19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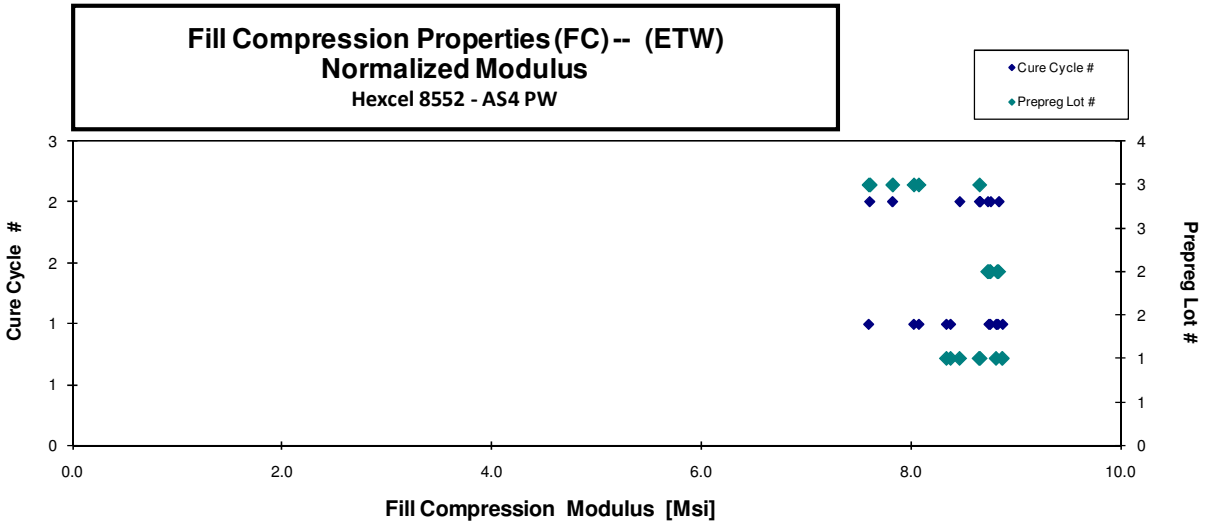
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
90


Fill Compression Properties (FC) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0

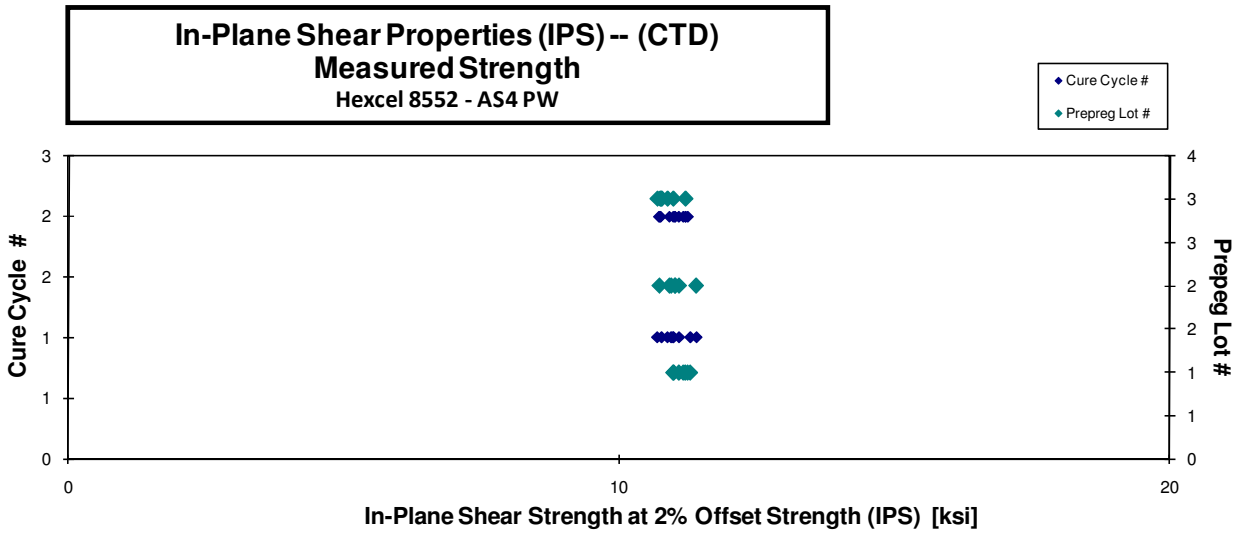
4.5 In-Plane Shear Properties

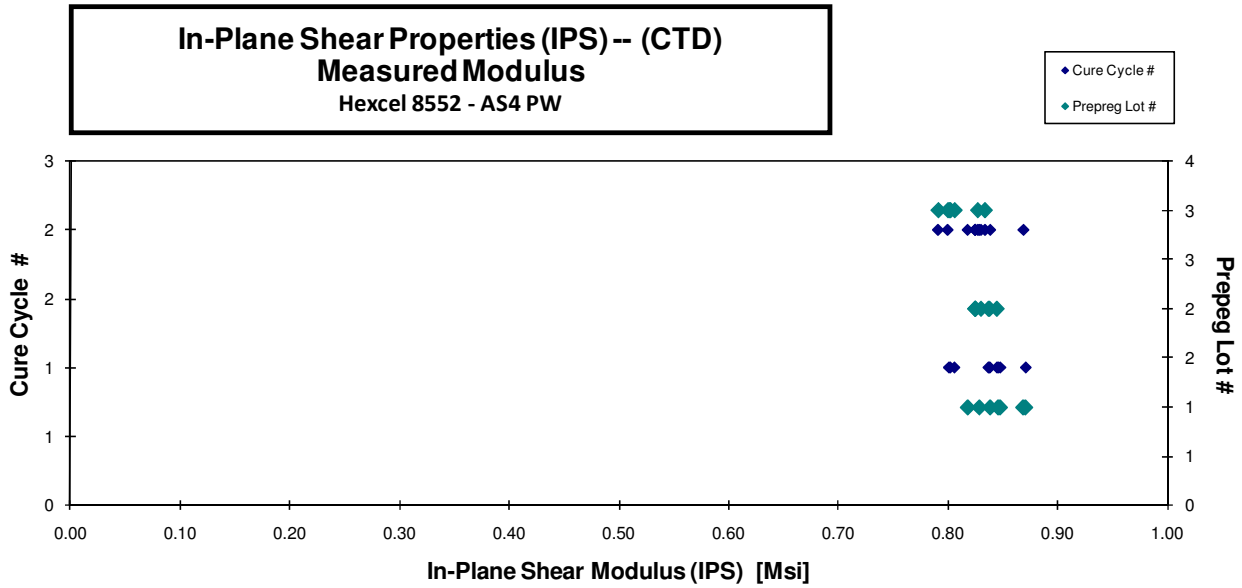
In-Plane Shear Properties (IPS) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

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]
HFPNA11AB	A	M1	1	1	11.298	0.871	0.059	8	0.0074
HFPNA11BB	A	M1	1	1	10.996	0.846	0.062	8	0.0078
HFPNA11CB	A	M1	1	1	10.983	0.848	0.062	8	0.0077
HFPNA216B	A	M2	1	2	11.252	0.818	0.062	8	0.0078
HFPNA217B	A	M2	1	2	11.090	0.839	0.062	8	0.0077
HFPNA218B	A	M2	1	2	11.171	0.829	0.062	8	0.0078
HFPNA219B	A	M2	1	2	11.209	0.869	0.060	8	0.0075
HFPNB116B	B	M1	2	1	10.952	0.837	0.063	8	0.0079
HFPNB117B	B	M1	2	1	11.093	0.845	0.063	8	0.0079
HFPNB118B	B	M1	2	1	11.408	0.838	0.064	8	0.0079
HFPNB216B	B	M2	2	2	11.024	0.830	0.064	8	0.0080
HFPNB217B	B	M2	2	2	10.920	0.825	0.064	8	0.0080
HFPNB218B	B	M2	2	2	10.733	0.825	0.064	8	0.0080
HFPNB219B	B	M2	2	2	11.019	0.825	0.063	8	0.0078
HFPNC116B	C	M1	3	1	10.778	0.801	0.064	8	0.0080
HFPNC117B	C	M1	3	1	10.699	0.802	0.063	8	0.0079
HFPNC118B	C	M1	3	1	10.884	0.806	0.063	8	0.0079
HFPNC216B	C	M2	3	2	11.213	0.800	0.063	8	0.0078
HFPNC217B	C	M2	3	2	10.763	0.791	0.063	8	0.0079
HFPNC218B	C	M2	3	2	10.750	0.827	0.063	8	0.0079
HFPNC219B	C	M2	3	2	10.989	0.834	0.062	8	0.0078

5% SHEAR STRENGTH VALUE WAS NOT OBTAINED.

Average	**11.011**	**0.829**	**Average**	**0.0078**
Standard Dev.	**0.201**	**0.021**	**Standard Dev.**	
Coeff. of Var. [%]	**1.822**	**2.568**	**Coeff. of Var. [%]**	
Min.	**10.699**	**0.791**	**Min.**	**0.0074**
Max.	**11.408**	**0.871**	**Max.**	**0.0080**
Number of Spec.	**21**	**21**	**Number of Spec.**	**21**


In-Plane Shear Properties (IPS) -- (CTD)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Strength at 2% Offset Strength (IPS) [ksi]
0
10
20

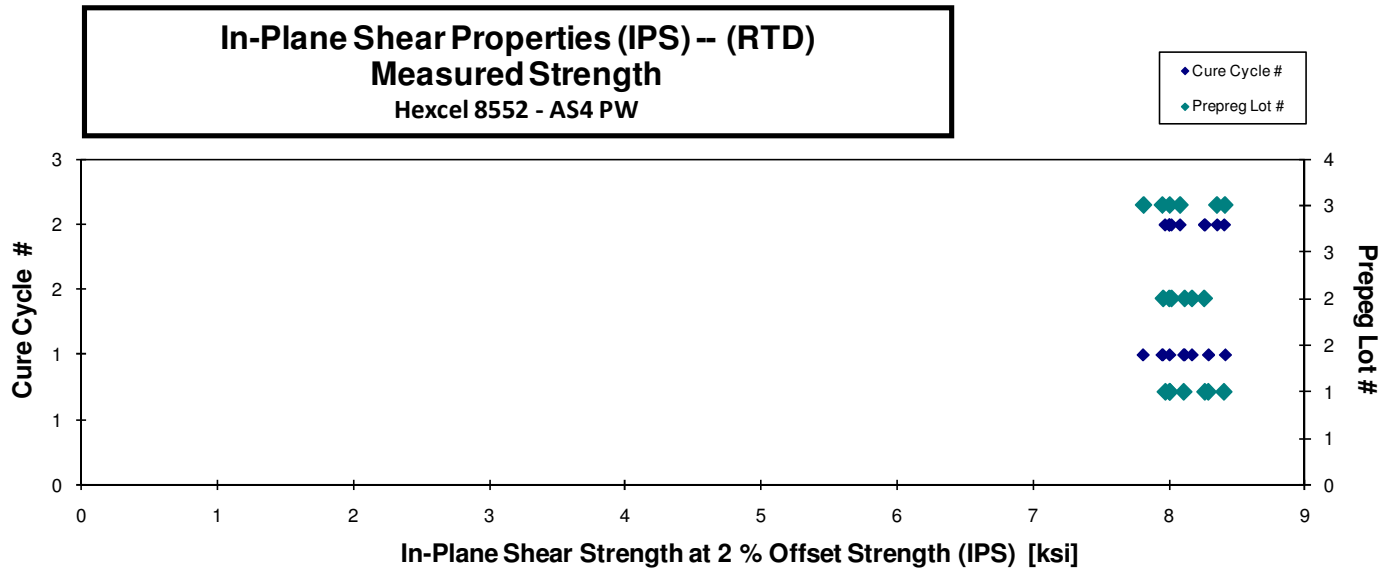

In-Plane Shear Properties (IPS) -- (CTD)
Measured Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Modulus (IPS) [Msi]
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00

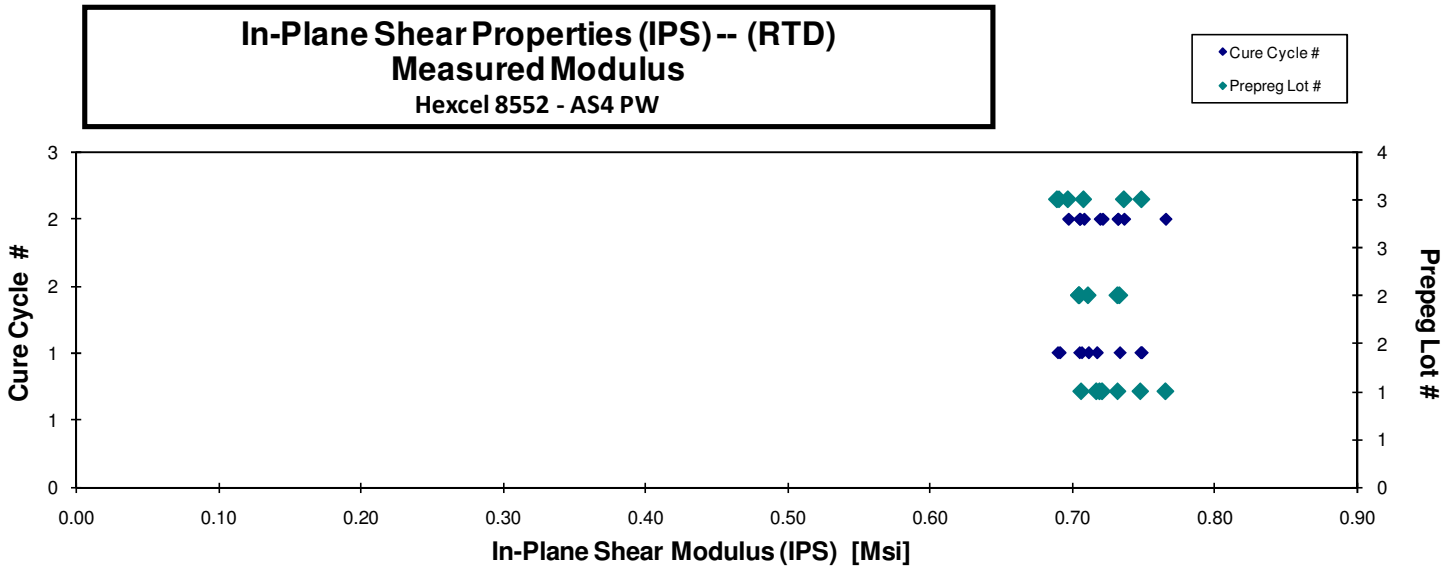
In-Plane Shear Properties (IPS) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

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]
HFPNA111A	A	M1	1	1	8.290	0.748	0.059	8	0.0074
HFPNA112A	A	M1	1	1	8.004	0.706	0.063	8	0.0079
HFPNA113A	A	M1	1	1	8.108	0.717	0.062	8	0.0078
HFPNA211A	A	M2	1	2	8.405	0.765	0.057	8	0.0071
HFPNA212A	A	M2	1	2	7.971	0.721	0.060	8	0.0075
HFPNA213A	A	M2	1	2	8.265	0.732	0.061	8	0.0076
HFPNA215A	A	M2	1	2	8.002	0.719	0.062	8	0.0077
HFPNB111A	B	M1	2	1	8.169	0.733	0.060	8	0.0075
HFPNB112A	B	M1	2	1	7.955	0.705	0.063	8	0.0079
HFPNB113A	B	M1	2	1	8.115	0.711	0.063	8	0.0079
HFPNB211A	B	M2	2	2	8.259	0.732	0.060	8	0.0075
HFPNB212A	B	M2	2	2	8.017	0.705	0.063	8	0.0079
HFPNB213A	B	M2	2	2	8.001	0.705	0.064	8	0.0080
HFPNC111A	C	M1	3	1	8.413	0.748	0.058	8	0.0073
HFPNC112A	C	M1	3	1	7.949	0.691	0.063	8	0.0079
HFPNC113A	C	M1	3	1	7.809	0.689	0.063	8	0.0079
HFPNC211A	C	M2	3	2	8.353	0.736	0.060	8	0.0075
HFPNC212A	C	M2	3	2	8.080	0.708	0.062	8	0.0077
HFPNC213A	C	M2	3	2	8.003	0.697	0.063	8	0.0078

5% SHEAR STRENGTH VALUE WAS NOT OBTAINED.

Average	**8.114**	**0.719**	**Average**	**0.0077**
Standard Dev.	**0.172**	**0.021**	**Standard Dev.**	
Coeff. of Var. [%]	**2.125**	**2.895**	**Coeff. of Var. [%]**	
Min.	**7.809**	**0.689**	**Min.**	**0.0071**
Max.	**8.413**	**0.765**	**Max.**	**0.0080**
Number of Spec.	**19**	**19**	**Number of Spec.**	**19**


In-Plane Shear Properties (IPS) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Strength at 2 % Offset Strength (IPS) [ksi]

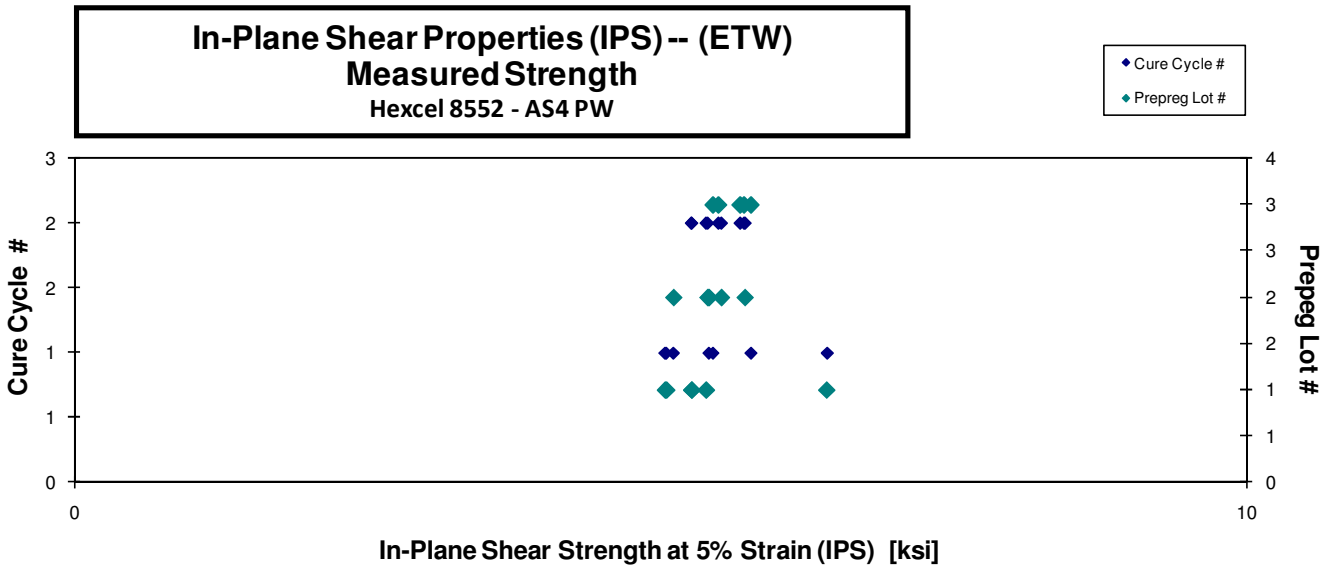

In-Plane Shear Properties (IPS) -- (RTD)
Measured Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Modulus (IPS) [Msi]

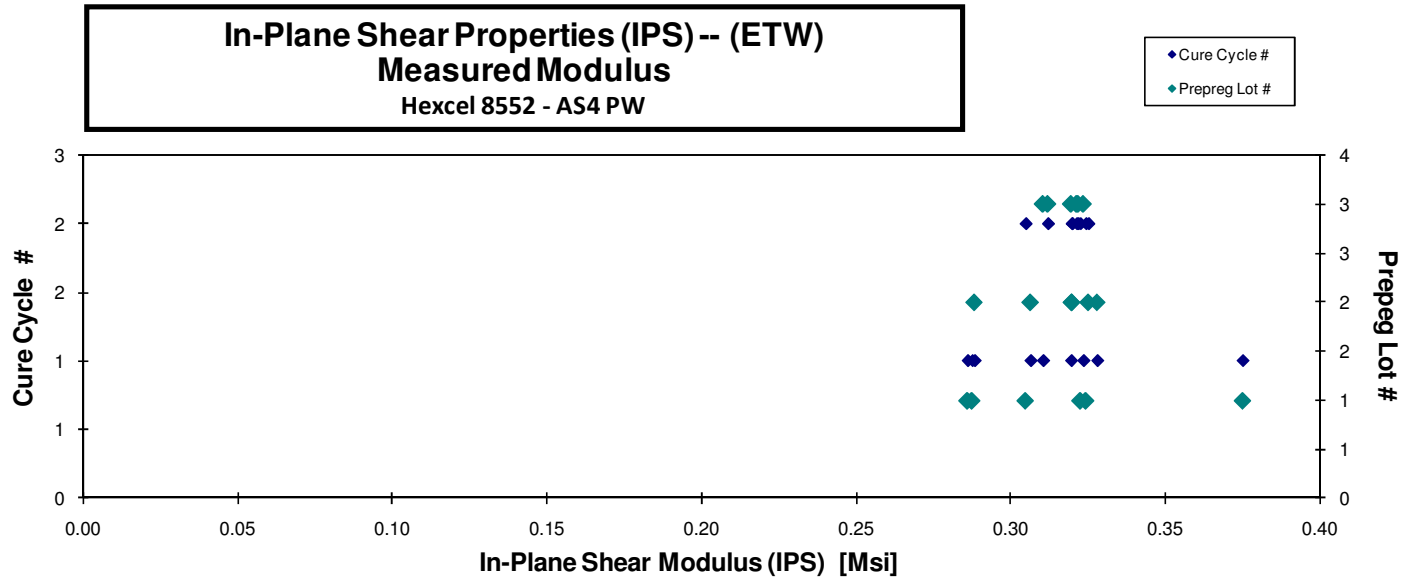
In-Plane Shear Properties (IPS) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

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]
HFPNA11DD	A	M1	1	1	5.048	2.918	0.286	0.061	8	0.0077
HFPNA11ED	A	M1	1	1	5.060	2.947	0.288	0.062	8	0.0077
HFPNA11FD	A	M1	1	1	6.429	3.875	0.375	0.062	8	0.0077
HFPNA21AD	A	M2	1	2	5.273	3.205	0.323	0.056	8	0.0070
HFPNA21BD	A	M2	1	2	5.398	3.182	0.324	0.062	8	0.0077
HFPNA21CD	A	M2	1	2	5.276	3.038	0.305	0.063	8	0.0079
HFPNB11AD	B	M1	2	1	5.423	3.138	0.306	0.059	8	0.0073
HFPNB11BD*	B	M1	2	1		3.357	0.328	0.058	8	0.0073
HFPNB11CD	B	M1	2	1	5.120	2.970	0.288	0.064	8	0.0079
HFPNB21AD	B	M2	2	2	5.731	3.211	0.325	0.061	8	0.0076
HFPNB21BD	B	M2	2	2	5.412	3.175	0.320	0.063	8	0.0079
HFPNB21CD	B	M2	2	2	5.529	3.169	0.320	0.063	8	0.0079
HFPNC11AD	C	M1	3	1	5.780	3.307	0.324	0.058	8	0.0073
HFPNC11BD	C	M1	3	1	5.457	3.214	0.320	0.063	8	0.0078
HFPNC11CD*	C	M1	3	1		3.233	0.310	0.064	8	0.0080
HFPNC21AD	C	M2	3	2	5.688	3.217	0.321	0.061	8	0.0076
HFPNC21BD	C	M2	3	2	5.722	3.313	0.322	0.063	8	0.0079
HFPNC21CD	C	M2	3	2	5.503	3.232	0.312	0.063	8	0.0078

* 5% SHEAR STRENGTH VALUE WAS NOT OBTAINED.

Average	**5.491**	**3.205**	**0.317**	**Average**	**0.0077**
Standard Dev.	**0.341**	**0.208**	**0.020**	**Standard Dev.**	
Coeff. of Var. [%]	**6.217**	**6.491**	**6.288**	**Coeff. of Var. [%]**	
Min.	**5.048**	**2.918**	**0.286**	**Min.**	**0.0070**
Max.	**6.429**	**3.875**	**0.375**	**Max.**	**0.0080**
Number of Spec.	**16**	**18**	**18**	**Number of Spec.**	**18**


In-Plane Shear Properties (IPS) -- (ETW)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Strength at 5% Strain (IPS) [ksi]
0
10


In-Plane Shear Properties (IPS) -- (ETW)
Measured Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Modulus (IPS) [Msi]
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40

4.6 Unnotched Tension 1 Properties

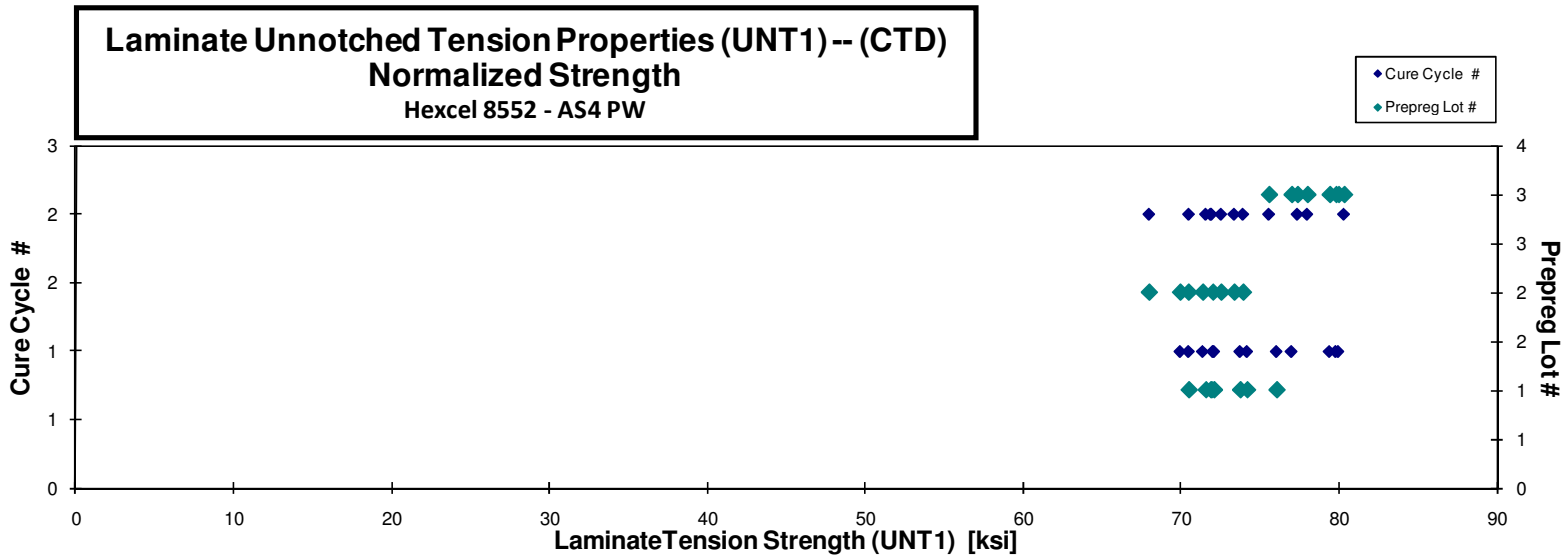
Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

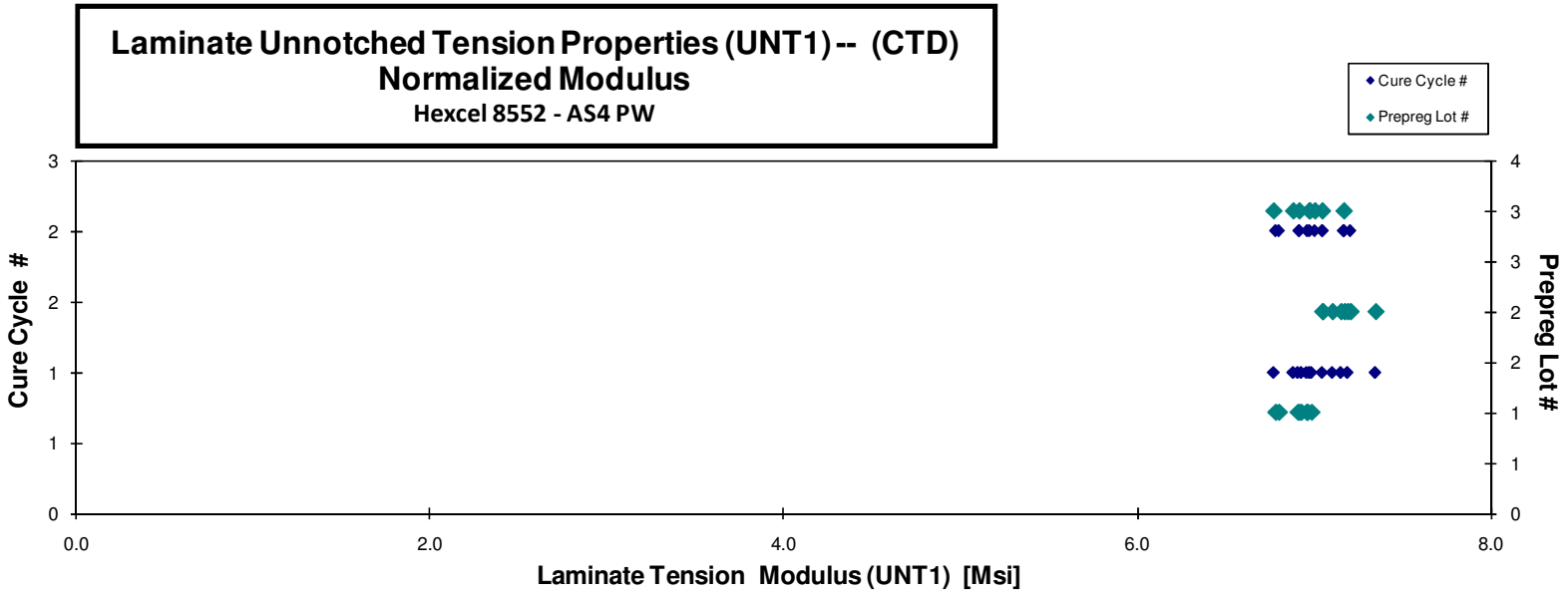
normalizing t_{ply} [in]: 0.0078

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]
HFPAA116B	A	M1	1	1	74.620	6.968	0.124	16	LGM	0.0078	74.181	6.927
HFPAA117B	A	M1	1	1	74.160	6.996	0.124	16	LGM	0.0078	73.744	6.957
HFPAA118B	A	M1	1	1	76.514	7.027	0.124	16	LGM	0.0078	76.055	6.985
HFPAA119B	A	M1	1	1	74.669	7.155	0.120	16	LGM	0.0075	72.086	6.907
HFPAA215B	A	M2	1	2	71.972	6.838	0.124	16	LGM	0.0078	71.568	6.800
HFPAA216B	A	M2	1	2	72.581	6.985	0.124	16	LGM	0.0077	71.873	6.917
HFPAA217B	A	M2	1	2	72.647	6.849	0.124	16	LGM	0.0077	71.929	6.781
HFPAA218B	A	M2	1	2	74.591	7.367	0.118	16	LWB	0.0074	70.487	6.962
HFPAB115B	B	M1	2	1	70.373	7.246	0.127	16	LGM	0.0079	71.369	7.348
HFPAB116B	B	M1	2	1	69.677	7.109	0.126	16	LGM	0.0079	70.468	7.190
HFPAB117B	B	M1	2	1	70.849	7.037	0.127	16	LGM	0.0079	72.013	7.152
HFPAB118B	B	M1	2	1	70.068	7.117	0.125	16	LWT	0.0078	69.937	7.104
HFPAB215B	B	M2	2	2	71.307	6.930	0.127	16	LGM	0.0079	72.536	7.049
HFPAB216B	B	M2	2	2	72.011	6.916	0.127	16	LGM	0.0079	73.367	7.046
HFPAB217B	B	M2	2	2	72.594	7.077	0.127	16	LGM	0.0079	73.922	7.207
HFPAB218B	B	M2	2	2	68.961	7.277	0.123	16	LWT	0.0077	67.966	7.172
HFPAC115B	C	M1	3	1	78.486	6.766	0.127	16	LGM	0.0079	79.817	6.881
HFPAC116B	C	M1	3	1	77.992	6.847	0.127	16	LGM	0.0079	79.419	6.972
HFPAC117B	C	M1	3	1	75.573	6.644	0.127	16	LGM	0.0079	77.007	6.770
HFPAC118B	C	M1	3	1	83.222	7.331	0.120	16	LGM	0.0075	79.976	7.046
HFPAC215B	C	M2	3	2	73.082	6.773	0.129	16	LWB	0.0081	75.571	7.004
HFPAC216B	C	M2	3	2	75.113	6.770	0.129	16	LGM	0.0080	77.380	6.975
HFPAC217B	C	M2	3	2	78.845	7.035	0.127	16	LGM	0.0079	80.329	7.168
HFPAC218B	C	M2	3	2	79.978	7.091	0.122	16	LGM	0.0076	78.002	6.915

Average	**74.162**	**7.006**	
Standard Dev.	**3.585**	**0.189**	
Coeff. of Var. [%]	**4.833**	**2.693**	
Min.	**68.961**	**6.644**	
Max.	**83.222**	**7.367**	
Number of Spec.	**24**	**24**	

$Average_{norm}$	**0.0078**	**74.208**	**7.010**
$Standard\ Dev._{norm}$		**3.555**	**0.145**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.791**	**2.069**
Min.	**0.0074**	**67.966**	**6.770**
Max.	**0.0081**	**80.329**	**7.348**
Number of Spec.	**24**	**24**	**24**


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


Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT1) [Msi]
0.0
2.0
4.0
6.0
8.0

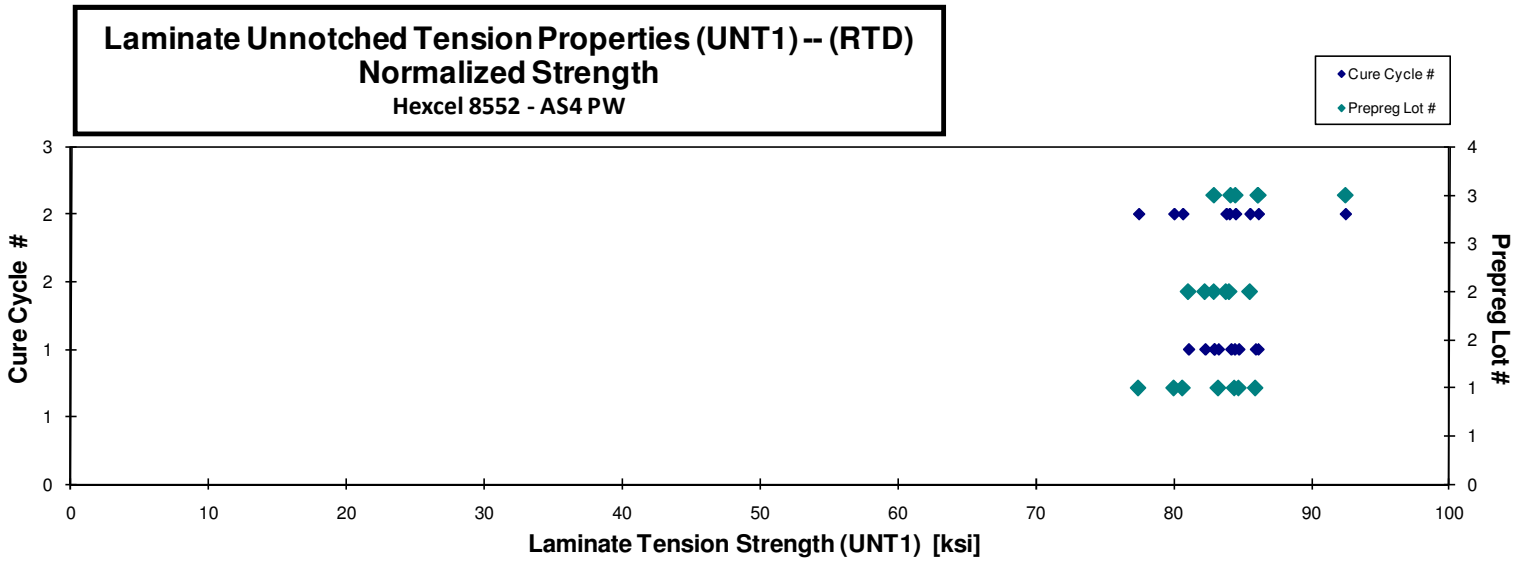
Laminate Unnotched Tension Properties (UNT1) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

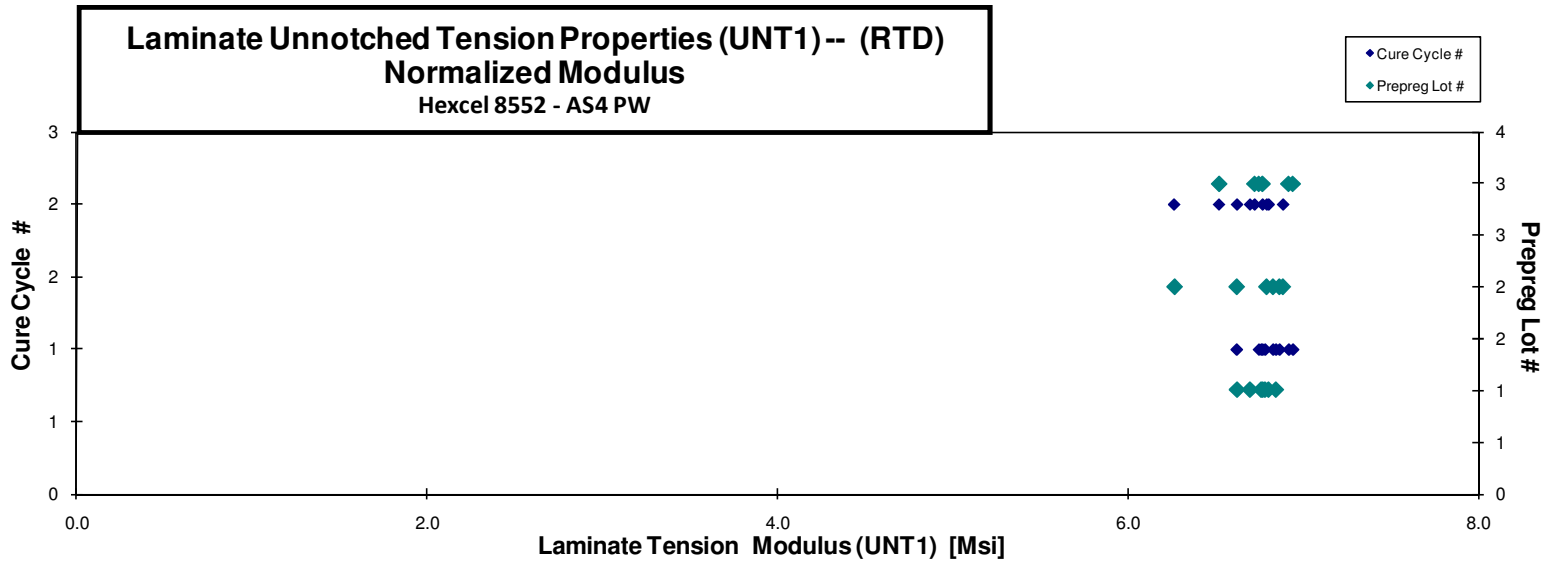
normalizing t_{ply} [in]: 0.0078

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]
HFPAA111A	A	M1	1	1	91.193	7.264	0.118	16	LGM	0.0074	85.944	6.846
HFPAA112A	A	M1	1	1	83.901	6.837	0.124	16	LWB	0.0077	83.251	6.784
HFPAA113A	A	M1	1	1	84.866	6.773	0.125	16	LGM	0.0078	84.730	6.762
HFPAA114A	A	M1	1	1	84.900	6.809	0.124	16	LAT	0.0078	84.423	6.771
HFPAA211A	A	M2	1	2	87.154	7.158	0.116	16	LGM	0.0072	80.660	6.624
HFPAA212A	A	M2	1	2	81.298	6.805	0.123	16	LWT	0.0077	80.028	6.698
HFPAA213A	A	M2	1	2	77.460	6.805	0.125	16	LGM	0.0078	77.450	6.804
HFPAB111A	B	M1	2	1	85.469	6.825	0.121	16	LGM	0.0076	82.935	6.623
HFPAB112A	B	M1	2	1	80.422	6.810	0.126	16	LGM	0.0079	81.077	6.866
HFPAB113A	B	M1	2	1	80.804	6.707	0.127	16	LWB	0.0079	82.283	6.830
HFPAB211A	B	M2	2	2	87.479	7.167	0.120	16	LGM	0.0075	84.045	6.886
HFPAB212A	B	M2	2	2	83.283	6.749	0.126	16	LWT	0.0079	83.816	6.793
HFPAB213A	B	M2	2	2	83.734	6.135	0.128	16	LWB	0.0080	85.546	6.268
HFPAC111A	C	M1	3	1	87.094	6.984	0.121	16	LWB	0.0075	84.163	6.749
HFPAC112A	C	M1	3	1	82.892	6.938	0.125	16	LGM	0.0078	82.947	6.942
HFPAC113A	C	M1	3	1	84.886	6.818	0.127	16	LGM	0.0079	86.133	6.918
HFPAC211A	C	M2	3	2	94.323	6.858	0.122	16	LGM	0.0076	92.484	6.724
HFPAC212A	C	M2	3	2	82.569	6.615	0.128	16	LGM	0.0080	84.499	6.770
HFPAC213A	C	M2	3	2	84.105	6.367	0.128	16	LGM	0.0080	86.160	6.522

Average	**84.623**	**6.812**	
Standard Dev.	**3.830**	**0.259**	
Coeff. of Var. [%]	**4.526**	**3.807**	
Min.	**77.460**	**6.135**	
Max.	**94.323**	**7.264**	
Number of Spec.	**19**	**19**	

$Average_{norm}$	**0.0077**	**83.820**	**6.746**
Standard $Dev._{norm}$		**3.090**	**0.156**
Coeff. of Var. $[\%]_{norm}$		**3.687**	**2.315**
Min.	**0.0072**	**77.450**	**6.268**
Max.	**0.0080**	**92.484**	**6.942**
Number of Spec.	**19**	**19**	**19**


Laminate Unnotched Tension Properties (UNT1) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Strength (UNT1) [ksi]
0
10
20
30
40
50
60
70
80
90
100


Laminate Unnotched Tension Properties (UNT1) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT1) [Msi]
0.0
2.0
4.0
6.0
8.0

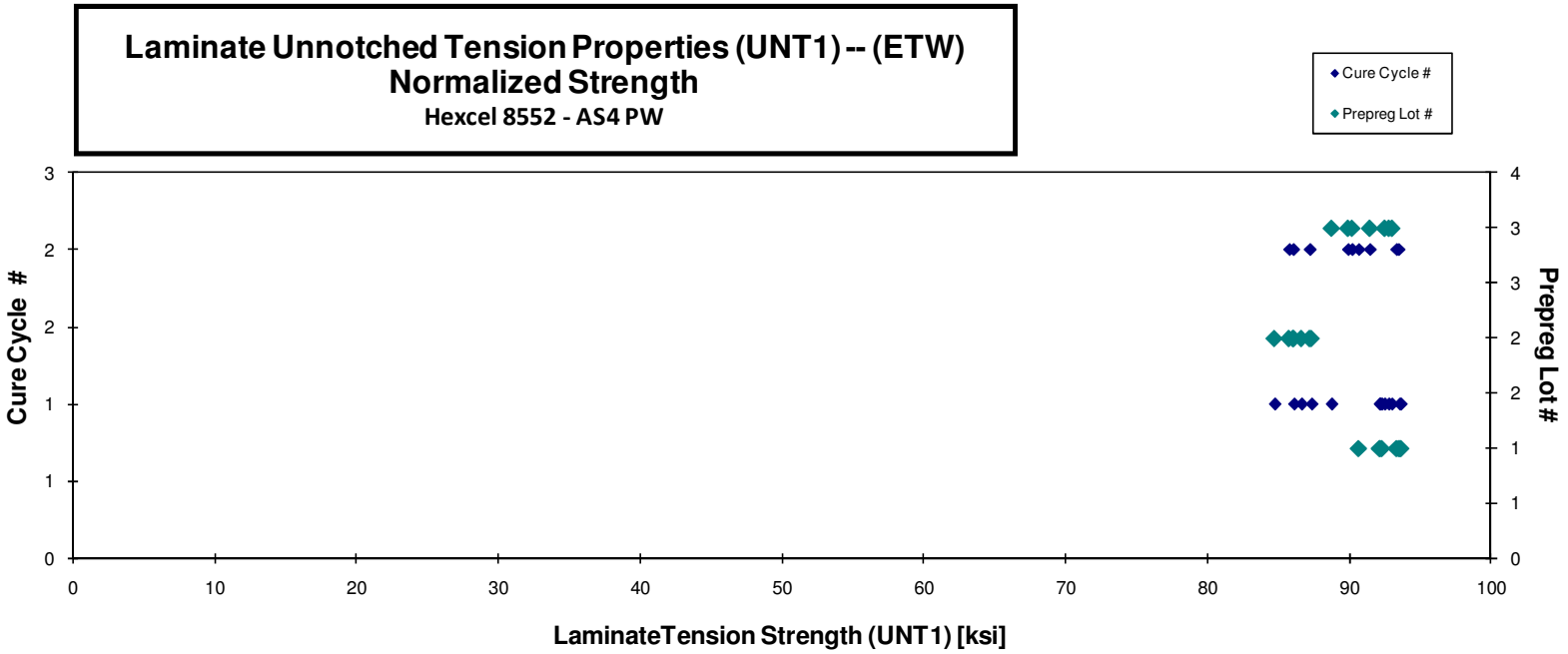
Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

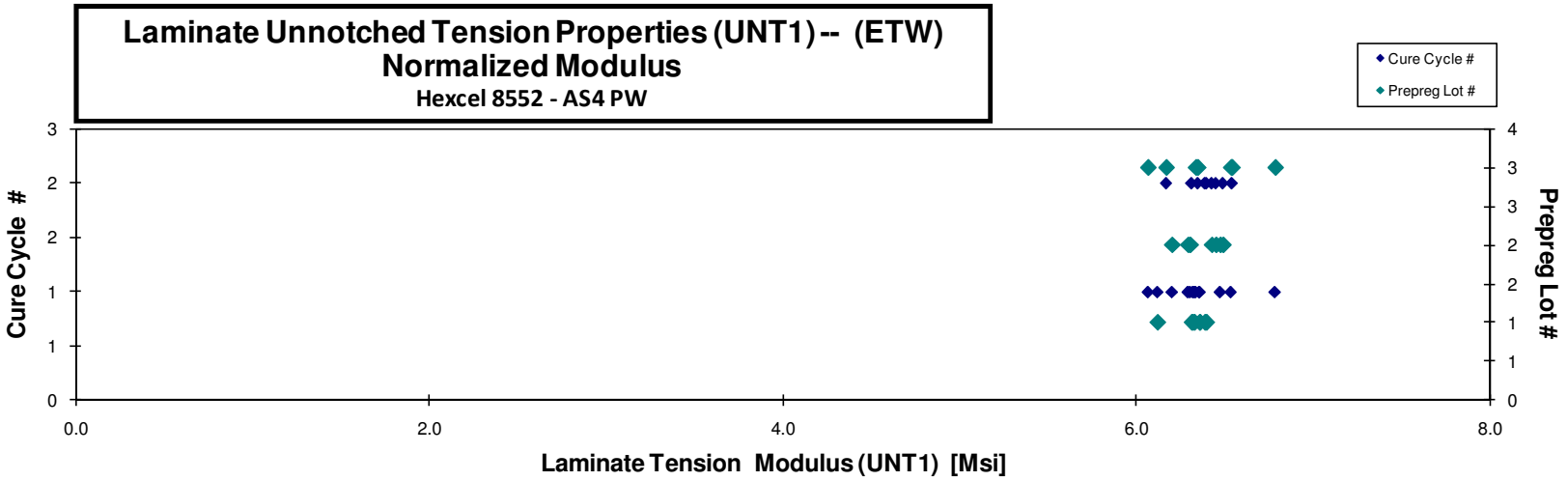
normalizing t_{ply} [in]: 0.0078

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]
HFPAA11BD	A	M1	1	1	93.956	6.474	0.123	16	LGM / LWT	0.0077	92.313	6.361
HFPAA11CD	A	M1	1	1	95.115	6.434	0.123	16	LGM	0.0077	93.578	6.330
HFPAA11DD	A	M1	1	1	94.523	6.380	0.124	16	LGM / LWB	0.0077	93.652	6.321
HFPAA11ED	A	M1	1	1	93.044	6.420	0.124	16	LGM / LWT	0.0077	92.149	6.358
HFPAA11FD	A	M1	1	1	92.808	6.161	0.124	16	LGM /LWB	0.0077	92.200	6.121
HFPAA219D	A	M2	1	2	91.692	6.470	0.123	16	LGM	0.0077	90.675	6.398
HFPAA21AD	A	M2	1	2	93.609	6.397	0.125	16	LWT / LGM	0.0078	93.497	6.389
HFPAA21BD	A	M2	1	2	93.590	6.331	0.124	16	LWB / LWT	0.0078	93.340	6.314
HFPAB119D	B	M1	2	1	84.815	6.172	0.128	16	LGM	0.0080	86.650	6.306
HFPAB11AD	B	M1	2	1	83.900	6.043	0.128	16	LGM	0.0080	86.119	6.203
HFPAB11BD	B	M1	2	1	82.765	6.325	0.128	16	LGM	0.0080	84.755	6.477
HFPAB11CD	B	M1	2	1	85.077	6.129	0.128	16	LGM	0.0080	87.360	6.294
HFPAB219D	B	M2	2	2	85.519	6.451	0.126	16	LGM	0.0078	86.056	6.492
HFPAB21AD	B	M2	2	2	84.606	6.364	0.127	16	LWT / LWB	0.0079	85.781	6.452
HFPAB21BD	B	M2	2	2	85.786	6.322	0.127	16	LGM / LWB	0.0079	87.230	6.428
HFPAC119D	C	M1	3	1	93.818	6.407	0.123	16	LGM / LWT	0.0077	92.803	6.338
HFPAC11AD	C	M1	3	1	91.933	6.029	0.126	16	LGM	0.0078	92.510	6.067
HFPAC11BD	C	M1	3	1	94.193	6.873	0.123	16	LGM / LWT	0.0077	93.023	6.788
HFPAC11CD	C	M1	3	1	88.068	6.485	0.126	16	LGM	0.0079	88.774	6.537
HFPAC219D	C	M2	3	2	90.010	6.072	0.127	16	LGM	0.0079	91.464	6.170
HFPAC21AD	C	M2	3	2	87.502	6.347	0.129	16	LWT / LWB	0.0080	90.213	6.543
HFPAC21BD	C	M2	3	2	85.533	6.039	0.131	16	LGM	0.0082	89.931	6.349

Average	**89.630**	**6.324**
Standard Dev.	**4.246**	**0.198**
Coeff. of Var. [%]	**4.737**	**3.133**
Min.	**82.765**	**6.029**
Max.	**95.115**	**6.873**
Number of Spec.	**22**	**22**

$Average_{norm}$	**0.0079**	**90.185**	**6.365**
Standard $Dev._{norm}$		**3.030**	**0.156**
Coeff. of Var. $[\%]_{norm}$		**3.360**	**2.448**
Min.	**0.0077**	**84.755**	**6.067**
Max.	**0.0082**	**93.652**	**6.788**
Number of Spec.	**22**	**22**	**22**


Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT1) [ksi]


Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT1) [Msi]

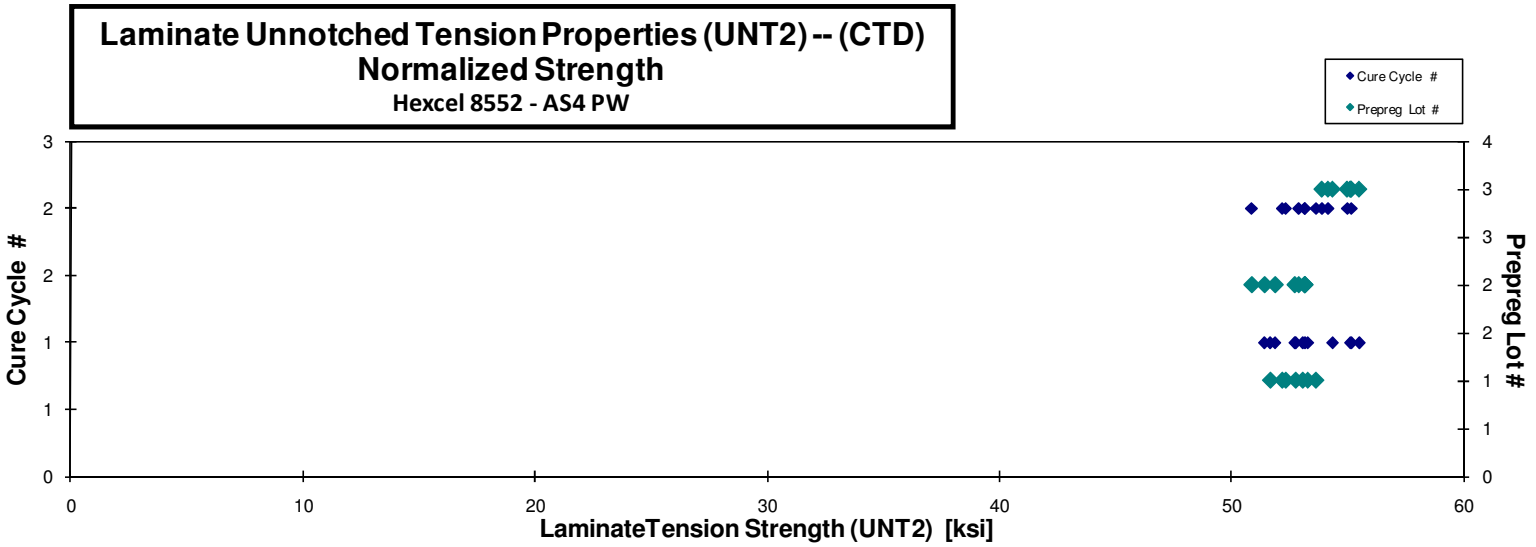
4.7 Unnotched Tension 2 Properties

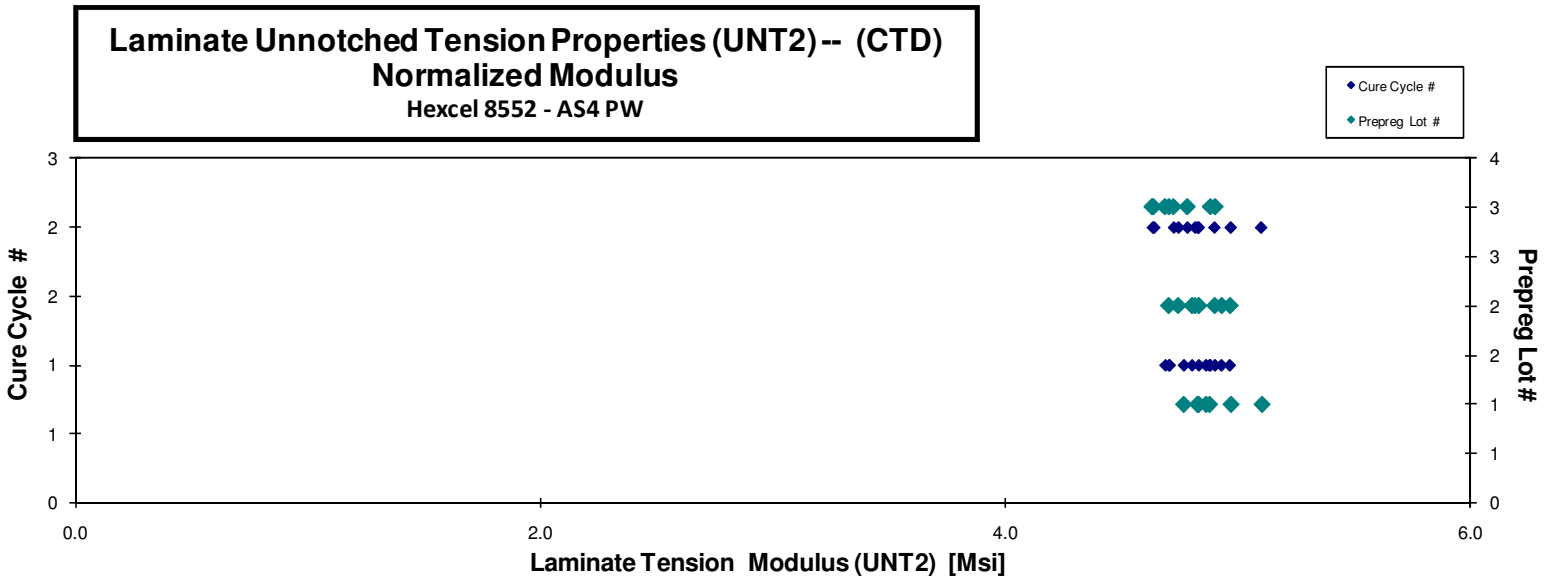
Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPBA116B	A	M1	1	1	53.124	4.867	0.156	20	LWB	0.0078	53.073	4.862
HFPBA117B	A	M1	1	1	53.451	4.846	0.156	20	LGM	0.0078	53.291	4.831
HFPBA118B	A	M1	1	1	53.043	4.903	0.155	20	LGM	0.0078	52.771	4.878
HFPBA119B	A	M1	1	1	55.378	5.109	0.146	20	AGM	0.0073	51.668	4.767
HFPBA215B	A	M2	1	2	52.522	5.120	0.155	20	AGM	0.0078	52.337	5.102
HFPBA216B	A	M2	1	2	52.758	4.878	0.154	20	LWT	0.0077	52.189	4.825
HFPBA217B	A	M2	1	2	54.167	5.017	0.155	20	LWT	0.0077	53.646	4.969
HFPBB116B	B	M1	2	1	52.522	4.904	0.158	20	LGM	0.0079	53.173	4.965
HFPBB117B	B	M1	2	1	51.986	4.859	0.158	20	LAT	0.0079	52.731	4.929
HFPBB118B	B	M1	2	1	54.084	4.902	0.150	20	AGM	0.0075	51.883	4.703
HFPBB119B	B	M1	2	1	51.657	4.824	0.155	20	AGM	0.0078	51.419	4.802
HFPBB215B	B	M2	2	2	51.809	4.715	0.159	20	LWT	0.0080	52.899	4.814
HFPBB216B	B	M2	2	2	51.763	4.618	0.160	20	LWB	0.0080	53.163	4.743
HFPBB217B	B	M2	2	2	52.282	4.818	0.159	20	LGM	0.0079	53.159	4.899
HFPBB218B	B	M2	2	2	50.654	4.811	0.157	20	LWT	0.0078	50.865	4.831
HFPBC115B	C	M1	3	1	53.488	4.756	0.161	20	LGM	0.0080	55.122	4.901
HFPBC116B	C	M1	3	1	53.185	4.517	0.162	20	LWB	0.0081	55.174	4.686
HFPBC117B	C	M1	3	1	52.973	4.489	0.163	20	LWT	0.0082	55.514	4.704
HFPBC118B	C	M1	3	1	55.288	4.964	0.153	20	LWT	0.0077	54.361	4.881
HFPBC215B	C	M2	3	2	54.152	4.708	0.158	20	LWB	0.0079	54.996	4.782
HFPBC216B	C	M2	3	2	53.530	4.583	0.158	20	LWT	0.0079	54.165	4.637
HFPBC217B	C	M2	3	2	54.413	4.569	0.158	20	LGM	0.0079	55.163	4.632
HFPBC218B	C	M2	3	2	57.315	5.022	0.147	20	LGM	0.0073	53.898	4.723

Average	**53.284**	**4.817**	**$Average_{norm}$**	**0.0078**	**53.333**	**4.820**
Standard Dev.	**1.455**	**0.177**	**$Standard\ Dev._{norm}$**		**1.307**	**0.115**
Coeff. of Var. [%]	**2.731**	**3.679**	**Coeff. of Var. [%]$_{norm}$**		**2.451**	**2.383**
Min.	**50.654**	**4.489**	**Min.**	**0.0073**	**50.865**	**4.632**
Max.	**57.315**	**5.120**	**Max.**	**0.0082**	**55.514**	**5.102**
Number of Spec.	**23**	**23**	**Number of Spec.**	**23**	**23**	**23**


Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT2) [ksi]
0
10
20
30
40
50
60


Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT2) [Msi]
0.0
2.0
4.0
6.0

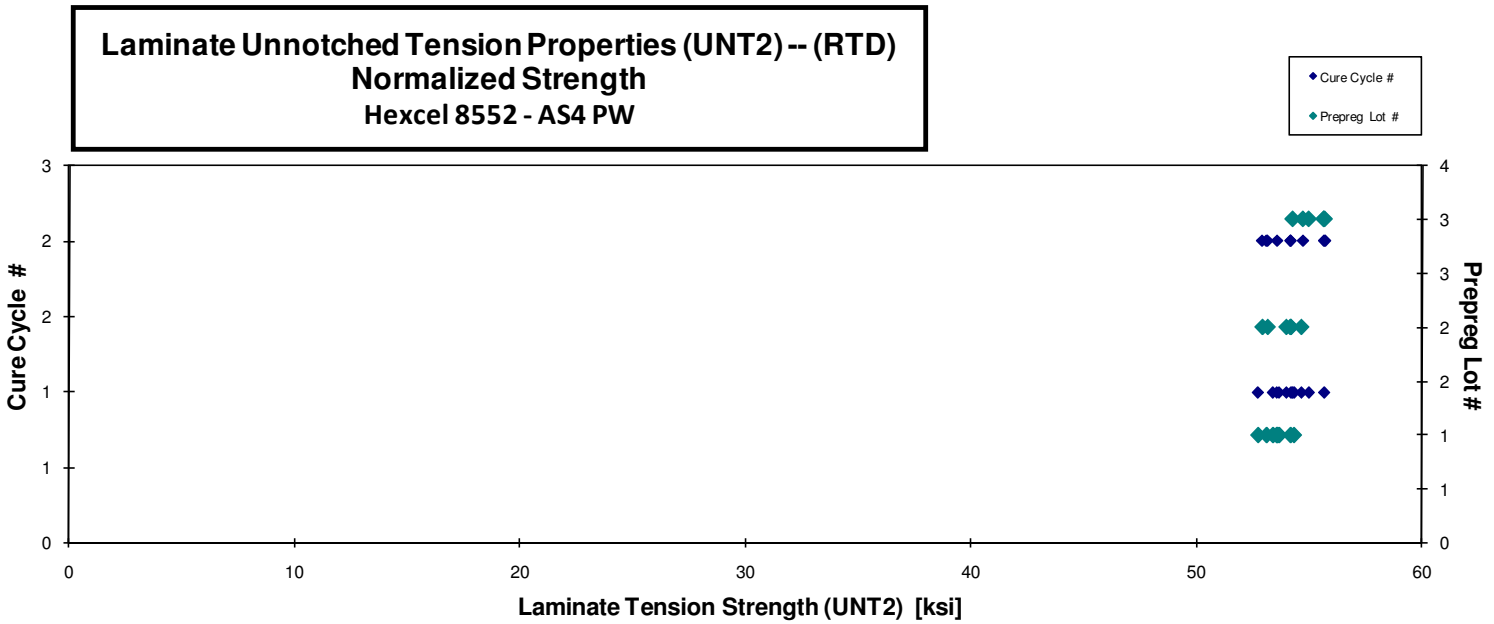
Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

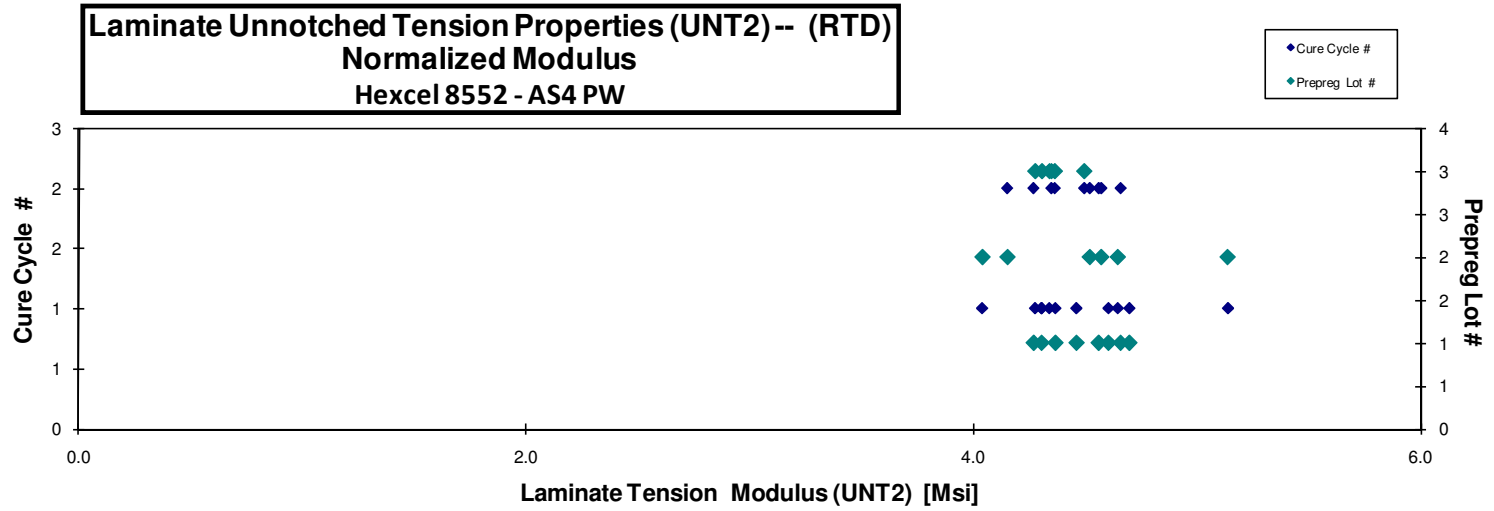
normalizing t_{ply} [in]: 0.0078

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]
HFPBA111A	A	M1	1	1	58.046	5.175	0.142	20	AGM	0.0071	52.706	4.699
HFPBA112A	A	M1	1	1	55.401	4.616	0.151	20	AGM	0.0075	53.549	4.462
HFPBA113A	A	M1	1	1	54.075	4.363	0.154	20	AGM	0.0077	53.370	4.306
HFPBA114A	A	M1	1	1	53.885	4.387	0.155	20	AGM	0.0078	53.649	4.368
HFPBA115A	A	M1	1	1	54.576	4.627	0.155	20	AWT	0.0078	54.319	4.605
HFPBA211A	A	M2	1	2	57.542	5.006	0.145	20	AGM	0.0073	53.564	4.660
HFPBA212A	A	M2	1	2	54.934	4.331	0.154	20	AGM	0.0077	54.165	4.271
HFPBA213A	A	M2	1	2	52.829	4.540	0.157	20	AWB	0.0078	53.083	4.562
HFPBB112A	B	M1	2	1	54.171	5.157	0.155	20	AGM	0.0078	53.974	5.138
HFPBB113A	B	M1	2	1	53.599	4.597	0.158	20	AGM	0.0079	54.183	4.647
HFPBB114A	B	M1	2	1	53.958	3.991	0.158	20	AGM	0.0079	54.644	4.042
HFPBB211A	B	M2	2	2	55.826	4.772	0.148	20	AGM	0.0074	52.897	4.522
HFPBB212A	B	M2	2	2	52.852	4.464	0.160	20	AWT	0.0080	54.151	4.573
HFPBB213A	B	M2	2	2	51.523	4.028	0.161	20	AGM	0.0080	53.135	4.154
HFPBC111A	C	M1	3	1	56.914	4.488	0.149	20	AWB / LWB	0.0074	54.251	4.278
HFPBC112A	C	M1	3	1	54.827	4.277	0.158	20	AWT	0.0079	55.653	4.341
HFPBC113A	C	M1	3	1	52.661	4.126	0.163	20	LGM	0.0081	54.973	4.308
HFPBC211A	C	M2	3	2	60.003	4.691	0.145	20	AGM	0.0072	55.643	4.350
HFPBC212A	C	M2	3	2	56.607	4.437	0.154	20	LGM	0.0077	55.699	4.365
HFPBC213A	C	M2	3	2	54.000	4.439	0.158	20	AWB	0.0079	54.709	4.497

Average	**54.911**	**4.526**	
Standard Dev.	**2.073**	**0.326**	
Coeff. of Var. [%]	**3.775**	**7.209**	
Min.	**51.523**	**3.991**	
Max.	**60.003**	**5.175**	
Number of Spec.	**20**	**20**	

$Average_{norm}$	**0.0077**	**54.116**	**4.457**
$Standard\ Dev._{norm}$		**0.905**	**0.237**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**1.672**	**5.323**
Min.	**0.0071**	**52.706**	**4.042**
Max.	**0.0081**	**55.699**	**5.138**
Number of Spec.	**20**	**20**	**20**


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


Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT2) [Msi]
0.0
2.0
4.0
6.0

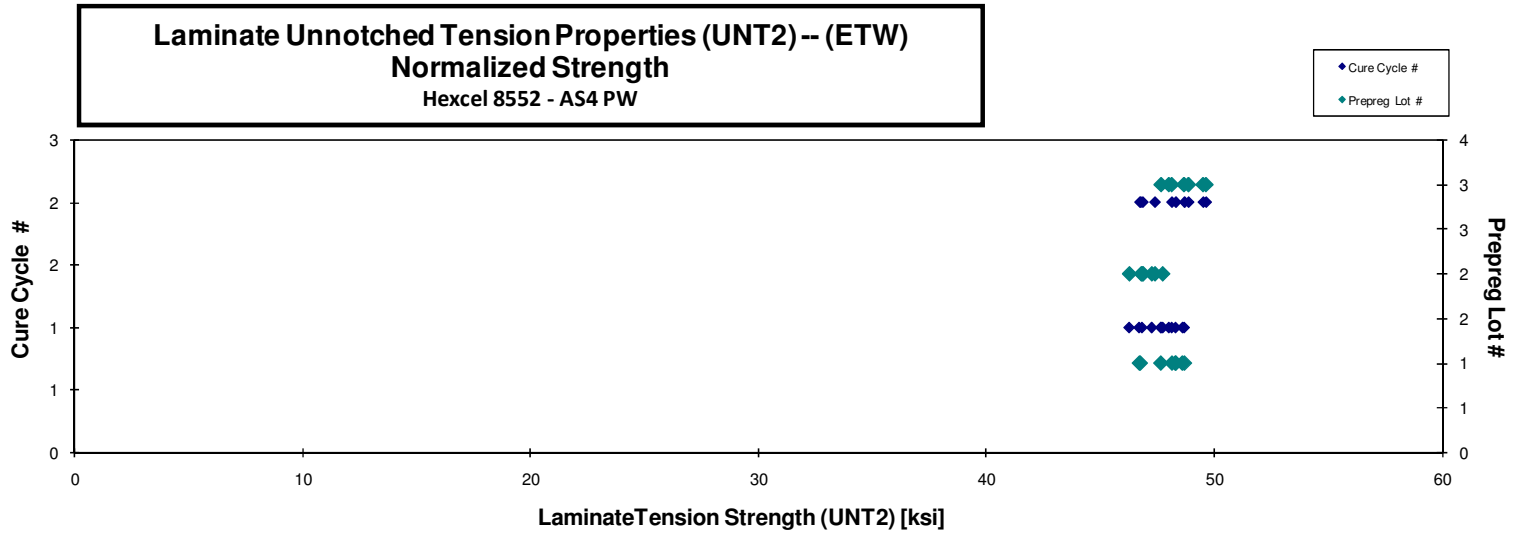
Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

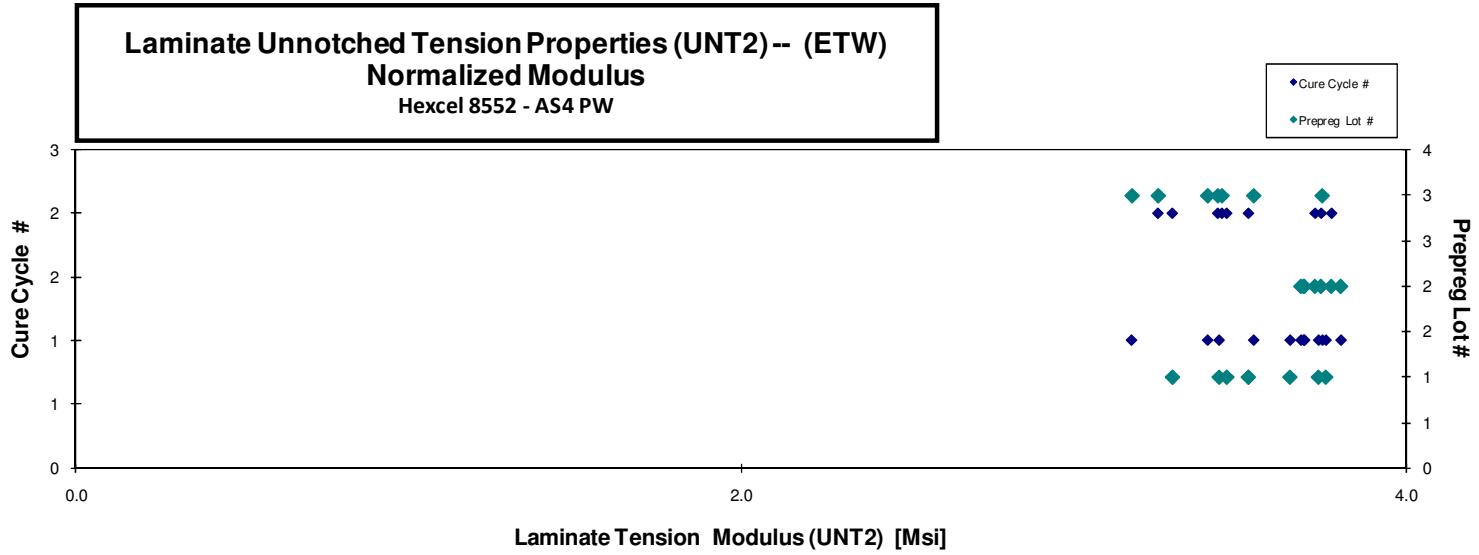
normalizing t_{ply} [in]: 0.0078

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]
HFPBA11BD	A	M1	1	1	48.456	3.822	0.153	20	AGM	0.0077	47.648	3.758
HFPBA11CD	A	M1	1	1	47.274	3.696	0.154	20	AGM	0.0077	46.699	3.651
HFPBA11DD	A	M1	1	1	49.027	3.490	0.154	20	AWB	0.0077	48.293	3.437
HFPBA11ED	A	M1	1	1	49.371	3.795	0.154	20	AGM	0.0077	48.601	3.736
HFPBA219D	A	M2	1	2	47.902	3.379	0.152	20	AGM	0.0076	46.735	3.297
HFPBA21AD	A	M2	1	2	48.770	3.505	0.154	20	AGM	0.0077	48.139	3.460
HFPBA21BD	A	M2	1	2	48.675		0.155	20	AWB	0.0077	48.316	
HFPBA21CD	A	M2	1	2	49.343	3.572	0.154	20	AGM	0.0077	48.695	3.525
HFPBB11AD	B	M1	2	1	46.807	3.659	0.157	20	AGM	0.0079	47.252	3.694
HFPBB11BD	B	M1	2	1	45.821	3.648	0.158	20	AGM	0.0079	46.261	3.684
HFPBB11CD	B	M1	2	1	47.713	3.690	0.156	20	AGM	0.0078	47.733	3.691
HFPBB11DD	B	M1	2	1	46.536	3.780	0.157	20	AGM	0.0078	46.825	3.803
HFPBB219D	B	M2	2	2	46.261	3.733	0.158	20	AGM	0.0079	46.784	3.775
HFPBB21AD	B	M2	2	2	45.866	3.605	0.161	20	AGM	0.0081	47.395	3.726
HFPBB21BD	B	M2	2	2	45.716	3.652	0.160	20	AGM	0.0080	46.868	3.744
HFPBC119D	C	M1	3	1	46.092	3.222	0.165	20	AGM	0.0082	48.672	3.403
HFPBC11AD	C	M1	3	1	45.658	3.368	0.164	20	AGM	0.0082	48.004	3.541
HFPBC11BD	C	M1	3	1	45.059	2.972	0.167	20	AWB	0.0083	48.125	3.175
HFPBC11CD	C	M1	3	1	44.019	3.461	0.169	20	AGM	0.0084	47.660	3.748
HFPBC219D	C	M2	3	2	50.309	3.297	0.154	20	AGM	0.0077	49.643	3.254
HFPBC21AD	C	M2	3	2	48.567	3.412	0.157	20	AWT	0.0078	48.873	3.433
HFPBC21BD	C	M2	3	2	48.644	3.385	0.159	20	AGM	0.0079	49.517	3.446

Tensile Modulus is not reported for HFPBA21BD, as extensometer slipped during testing

	Strength [ksi]	Modulus [Msi]		t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
Average	47.358	3.531	$Average_{norm}$	0.0079	47.852	3.570
Standard Dev.	1.667	0.214	$Standard\ Dev._{norm}$		0.938	0.190
Coeff. of Var. [%]	3.520	6.061	$Coeff.\ of\ Var.\ [\%]_{norm}$		1.961	5.316
Min.	44.019	2.972	Min.	0.0076	46.261	3.175
Max.	50.309	3.822	Max.	0.0084	49.643	3.803
Number of Spec.	22	21	Number of Spec.	22	22	21


Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT2) [ksi]


Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT2) [Msi]

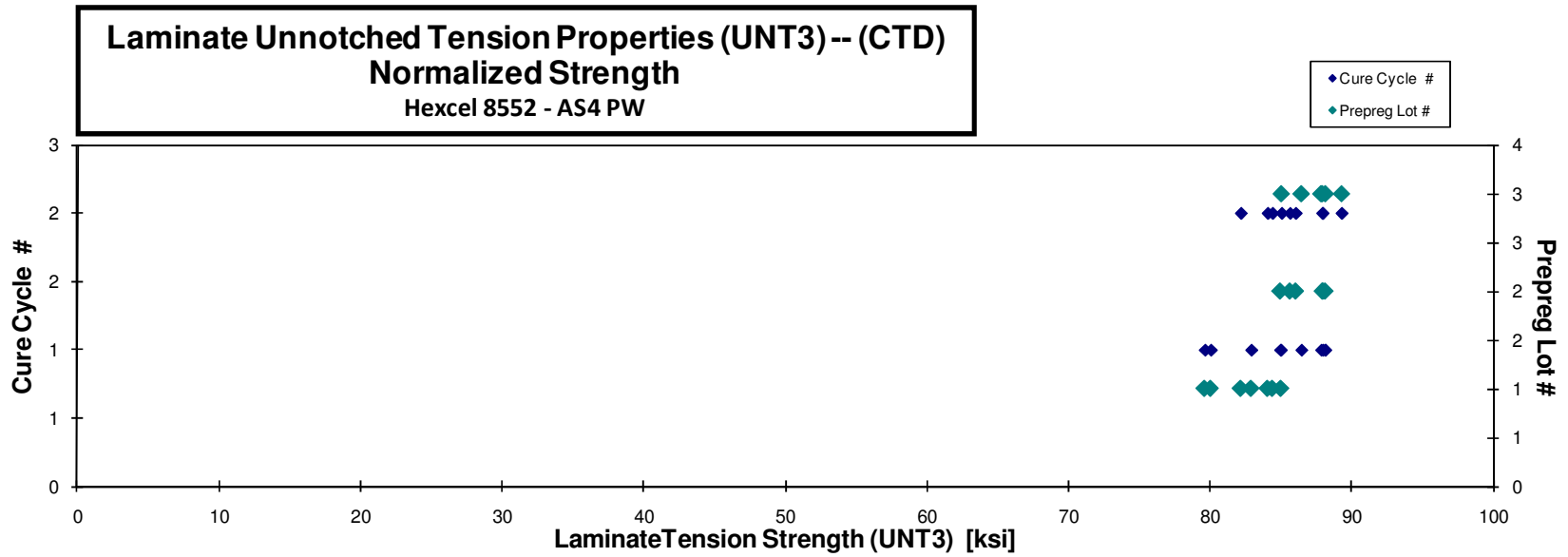
4.8 Unnotched Tension 3 Properties

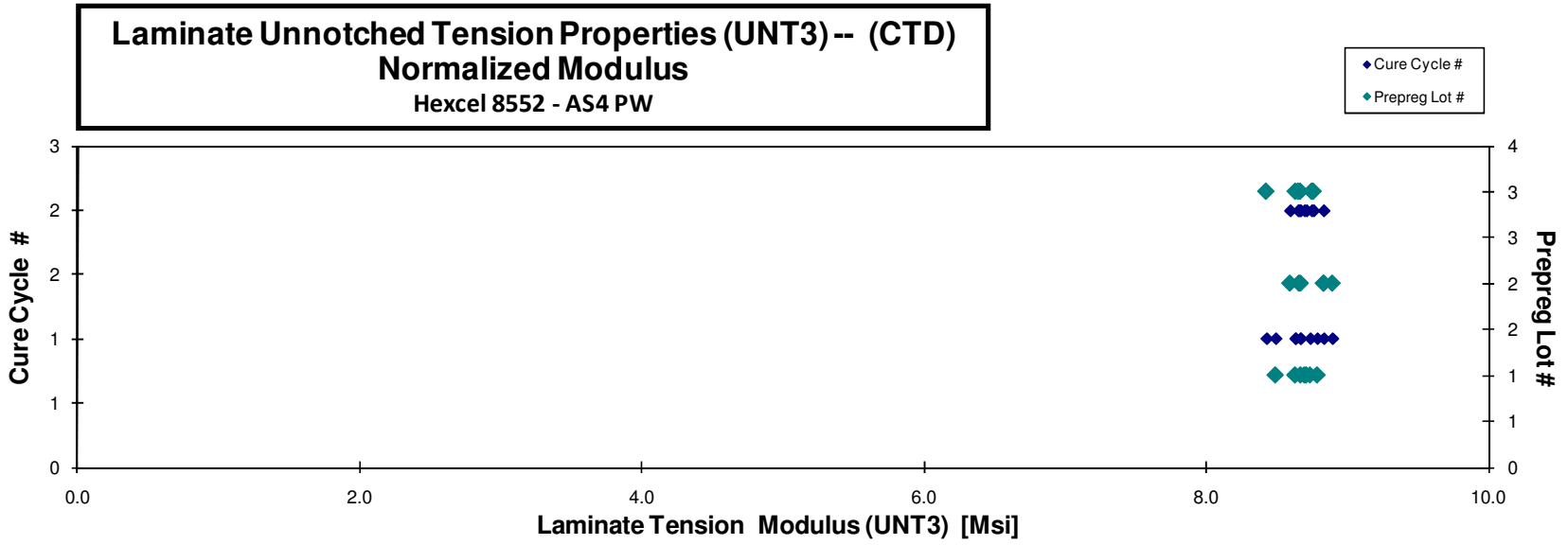
Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPCA115B	A	M1	1	1	81.035	8.941	0.115	15	LGM	0.0077	79.627	8.786
HFPCA116B	A	M1	1	1	86.541	8.644	0.115	15	LGM	0.0077	85.012	8.491
HFPCA117B	A	M1	1	1	81.370	8.880	0.115	15	LGM	0.0077	80.049	8.736
HFPCA118B	A	M1	1	1	90.544	9.426	0.107	15	LWT	0.0071	82.909	8.631
HFPCA215B	A	M2	1	2	85.202	8.777	0.116	15	LGM	0.0077	84.413	8.696
HFPCA216B	A	M2	1	2	84.993	8.763	0.116	15	LGM	0.0077	84.072	8.668
HFPCA217B	A	M2	1	2	82.837	8.780	0.116	15	LGM	0.0077	82.176	8.710
HFPCB116B	B	M1	2	1	84.440	8.462	0.122	15	LGM	0.0081	88.133	8.832
HFPCB117B	B	M1	2	1	87.171	8.588	0.118	15	LWT/LWB	0.0079	87.978	8.668
HFPCB118B	B	M1	2	1	89.257	9.343	0.111	15	LGM	0.0074	84.959	8.893
HFPCB215B	B	M2	2	2	85.639	8.616	0.118	15	LWT	0.0078	86.054	8.658
HFPCB216B	B	M2	2	2	85.355	8.564	0.117	15	LGM	0.0078	85.647	8.594
HFPCB217B	B	M2	2	2	87.120	8.747	0.118	15	LGM	0.0079	87.951	8.831
HFPCC116B	C	M1	3	1	86.551	8.503	0.119	15	LWT	0.0079	87.858	8.631
HFPCC117B	C	M1	3	1	86.370	8.491	0.119	15	LGM	0.0080	88.154	8.666
HFPCC118B	C	M1	3	1	84.660	8.251	0.119	15	LGM	0.0080	86.457	8.426
HFPCC215B	C	M2	3	2	87.962	8.521	0.119	15	LGM	0.0079	89.302	8.651
HFPCC216B	C	M2	3	2	83.793	8.629	0.119	15	LWB	0.0079	85.058	8.759
HFPCC217B	C	M2	3	2	86.123	8.567	0.119	15	LWB	0.0080	87.939	8.747

Average	**85.630**	**8.710**	**$Average_{norm}$**	**0.0078**	**85.460**	**8.688**
Standard Dev.	**2.395**	**0.287**	**$Standard\ Dev._{norm}$**		**2.781**	**0.113**
Coeff. of Var. [%]	**2.797**	**3.297**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.254**	**1.303**
Min.	**81.035**	**8.251**	**Min.**	**0.0071**	**79.627**	**8.426**
Max.	**90.544**	**9.426**	**Max.**	**0.0081**	**89.302**	**8.893**
Number of Spec.	**19**	**19**	**Number of Spec.**	**19**	**19**	**19**


Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT3) [ksi]
0
10
20
30
40
50
60
70
80
90
100

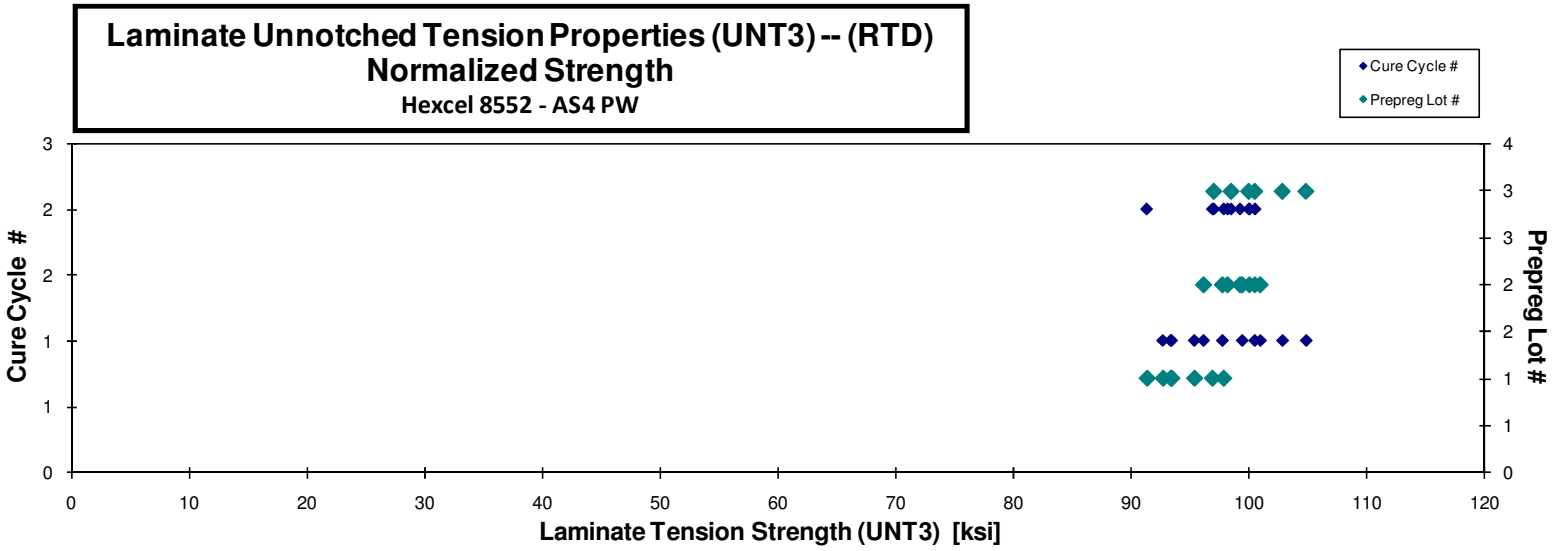

Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT3) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0

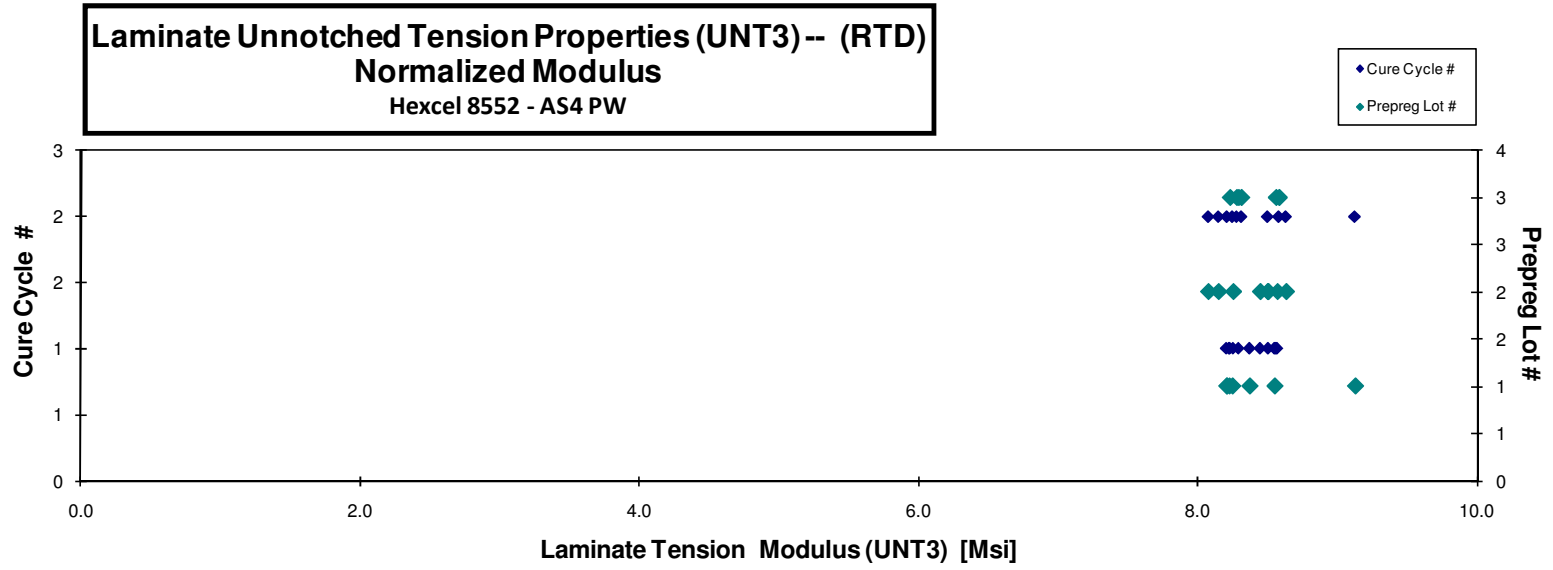
Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPCA111A	A	M1	1	1	101.186	8.887	0.108	15	LGM	0.0072	93.446	8.207
HFPCA112A	A	M1	1	1	97.487	8.409	0.114	15	LWT/LWB	0.0076	95.376	8.227
HFPCA113A	A	M1	1	1	95.500	8.565	0.114	15	LGM	0.0076	93.364	8.373
HFPCA114A	A	M1	1	1	93.359	8.613	0.116	15	LGM	0.0077	92.707	8.552
HFPCA211A	A	M2	1	2	96.501	8.674	0.111	15	LGM	0.0074	91.346	8.211
HFPCA212A	A	M2	1	2	98.284	8.368	0.115	15	LGM	0.0077	96.897	8.250
HFPCA213A	A	M2	1	2	96.393	8.991	0.119	15	LGM	0.0079	97.862	9.128
HFPCB111A	B	M1	2	1	103.301	8.577	0.113	15	LAT	0.0075	99.431	8.256
HFPCB112A	B	M1	2	1	101.274	8.476	0.117	15	LGM	0.0078	100.957	8.449
HFPCB113A	B	M1	2	1	95.264	8.428	0.118	15	LGM	0.0079	96.146	8.506
HFPCB114A	B	M1	2	1	97.253	8.528	0.118	15	LGM	0.0078	97.752	8.572
HFPCB211A	B	M2	2	2	103.192	8.978	0.113	15	LGM	0.0075	99.237	8.634
HFPCB212A	B	M2	2	2	100.359	8.102	0.117	15	LWT	0.0078	100.044	8.077
HFPCB213A	B	M2	2	2	97.292	8.076	0.118	15	LGM	0.0079	98.179	8.150
HFPCB214A	B	M2	2	2	99.794	8.442	0.118	15	LGM	0.0079	100.504	8.502
HFPCC111A	C	M1	3	1	105.970	8.321	0.116	15	LWB	0.0077	104.838	8.233
HFPCC112A	C	M1	3	1	106.835	8.818	0.110	15	LWB	0.0073	100.489	8.294
HFPCC113A	C	M1	3	1	101.429	8.445	0.119	15	LGM	0.0079	102.830	8.562
HFPCC211A	C	M2	3	2	102.406	8.610	0.113	15	LWT	0.0075	98.482	8.280
HFPCC212A	C	M2	3	2	97.039	8.585	0.117	15	LWT/LWB	0.0078	97.011	8.583
HFPCC212A	C	M2	3	2	98.107	8.158	0.119	15	LAT	0.0079	99.979	8.314

	Strength [ksi]	Modulus [Msi]			$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
Average	**99.439**	**8.526**		**$Average_{norm}$**	**97.947**	**8.398**
Standard Dev.	**3.581**	**0.255**		**Standard $Dev._{norm}$**	**3.393**	**0.234**
Coeff. of Var. [%]	**3.601**	**2.994**		**Coeff. of Var. $[\%]_{norm}$**	**3.464**	**2.788**
Min.	**93.359**	**8.076**		**Min.**	**91.346**	**8.077**
Max.	**106.835**	**8.991**		**Max.**	**104.838**	**9.128**
Number of Spec.	**21**	**21**		**Number of Spec.**	**21**	**21**


Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Strength (UNT3) [ksi]
0
10
20
30
40
50
60
70
80
90
100
110
120


Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
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

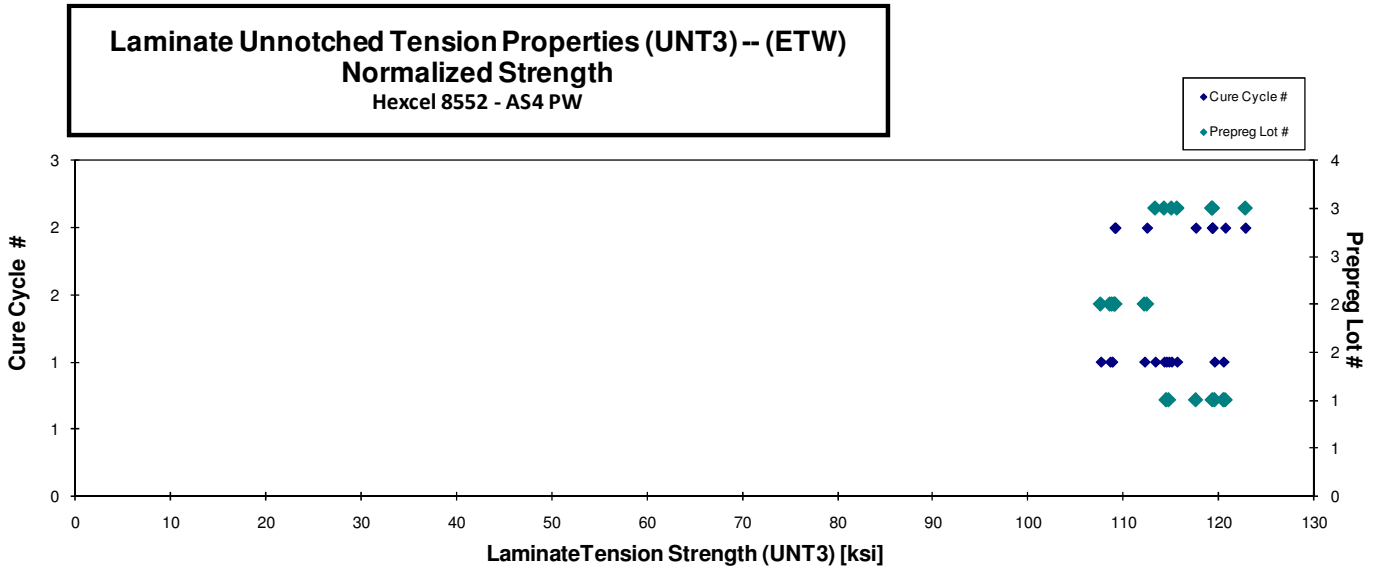
Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

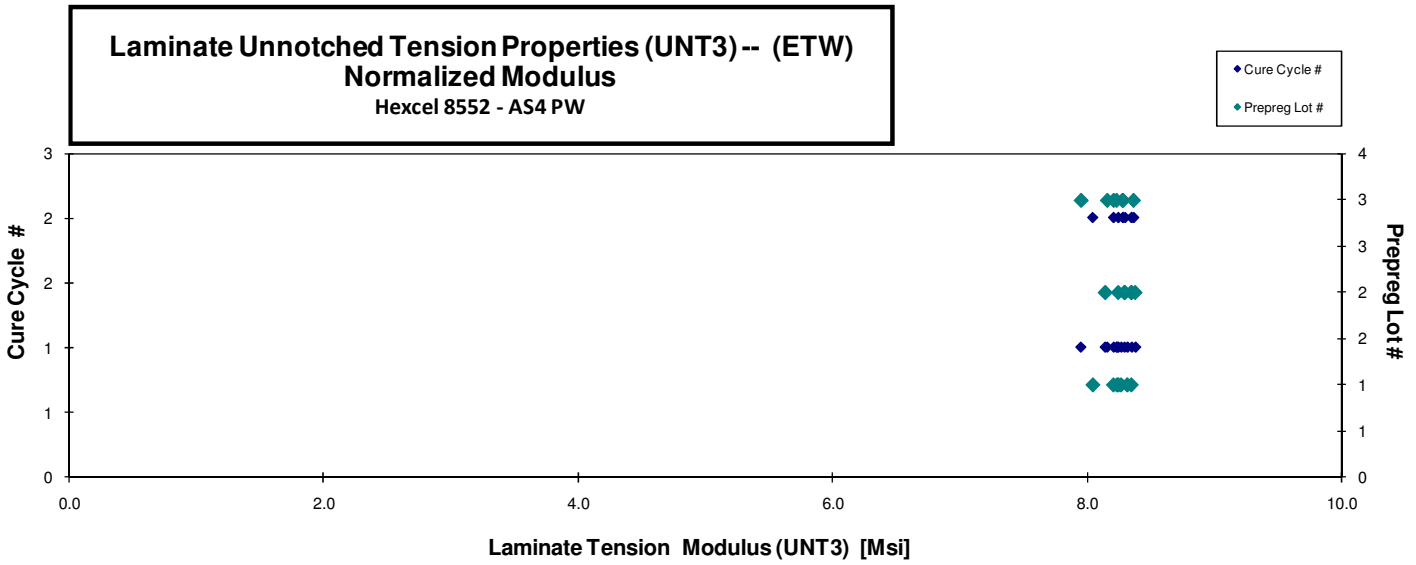
normalizing t_{ply} [in]: 0.0078

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]
HFPCA11AD	A	M1	1	1	116.855	8.413	0.115	15	LGM	0.0076	114.541	8.247
HFPCA11BD	A	M1	1	1	116.631	8.367	0.115	15	LGM / LWB	0.0077	114.803	8.236
HFPCA11CD	A	M1	1	1	122.924	8.433	0.115	15	LGM	0.0076	120.543	8.270
HFPCA11DD	A	M1	1	1	121.772	8.469	0.115	15	LWT / LWB	0.0077	119.603	8.319
HFPCA21AD	A	M2	1	2	121.303	8.390	0.116	15	LGM / LWB	0.0078	120.733	8.351
HFPCA21BD	A	M2	1	2	118.425	8.098	0.116	15	LWB	0.0077	117.632	8.043
HFPCA21CD	A	M2	1	2	120.663	8.296	0.116	15	LGM / LWB	0.0077	119.374	8.208
HFPCB11AD	B	M1	2	1	110.889	8.280	0.118	15	LWB/LGM	0.0079	112.247	8.382
HFPCB11BD	B	M1	2	1	106.672	8.067	0.118	15	LGM	0.0079	107.659	8.142
HFPCB11CD	B	M1	2	1	107.385	8.241	0.119	15	LGM	0.0079	108.839	8.352
HFPCB11DD	B	M1	2	1	108.192	8.263	0.117	15	LGM/LWB	0.0078	108.623	8.295
HFPCB219D	B	M2	2	2	109.223	8.303	0.117	15	LWB/LGM	0.0078	109.176	8.299
HFPCB21AD	B	M2	2	2	107.727	8.141	0.119	15	LWT/LGM	0.0079	109.108	8.246
HFPCB21BD	B	M2	2	2	111.362	8.265	0.118	15	LWT/LGM	0.0079	112.505	8.350
HFPCC11BD	C	M1	3	1	111.597	7.825	0.119	15	LWT/LGM	0.0079	113.378	7.950
HFPCC11CD	C	M1	3	1	113.483	8.077	0.119	15	LAB/LGM/LWT	0.0080	115.665	8.232
HFPCC11DD	C	M1	3	1	113.218	8.076	0.119	15	LGM/LWB	0.0079	115.089	8.210
HFPCC11ED	C	M1	3	1	112.540	8.031	0.119	15	LGM/LWB	0.0079	114.319	8.158
HFPCC21AD	C	M2	3	2	116.915	8.199	0.119	15	LGM	0.0080	119.330	8.368
HFPCC21BD	C	M2	3	2	120.636	8.134	0.119	15	LWT/LWB	0.0079	122.835	8.282
HFPCC21CD	C	M2	3	2	117.234	8.133	0.119	15	LGM	0.0079	119.388	8.282

Average	**114.555**	**8.214**	
Standard Dev.	**5.233**	**0.159**	
Coeff. of Var. [%]	**4.568**	**1.940**	
Min.	**106.672**	**7.825**	
Max.	**122.924**	**8.469**	
Number of Spec.	**21**	**21**	

$Average_{norm}$	**0.0078**	**115.019**	**8.249**
Standard $Dev._{norm}$		**4.631**	**0.107**
Coeff. of Var. $[\%]_{norm}$		**4.026**	**1.301**
Min.	**0.0076**	**107.659**	**7.950**
Max.	**0.0080**	**122.835**	**8.382**
Number of Spec.	**21**	**21**	**21**


Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
LaminateTension Strength (UNT3) [ksi]


Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT3) [Msi]

4.9 Unnotched Compression 1 Properties

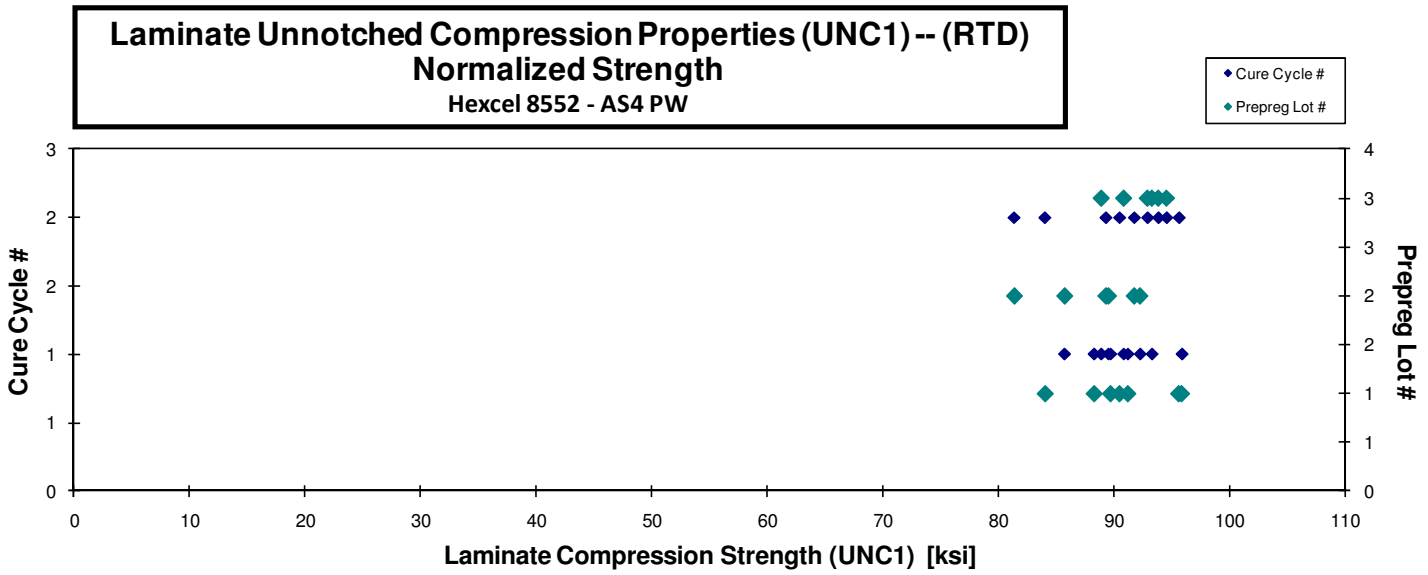
Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

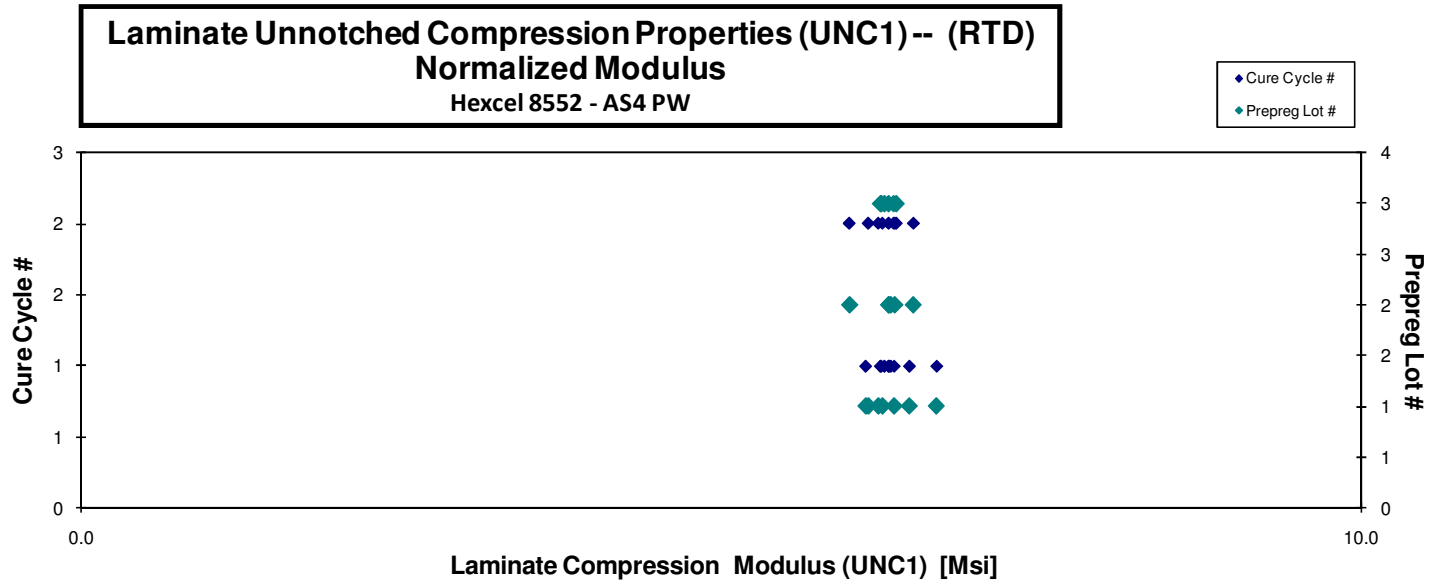
normalizing t_{ply} [in]: 0.0078

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]
HFPWA113A	A	M1	1	1	90.009	6.806	0.309	0.123	16	BGM	0.0077	88.350	6.681
HFPWA114A	A	M1	1	1	89.957	6.482	0.295	0.125	16	BGM	0.0078	89.777	6.469
HFPWA115A	A	M1	1	1	91.174	6.123	0.310	0.125	16	BGM	0.0078	91.271	6.129
HFPWA116A	A	M1	1	1	95.673	6.332	0.314	0.125	16	BGM	0.0078	95.954	6.351
HFPWA213A	A	M2	1	2	94.140	6.507	0.327	0.120	16	BGM	0.0075	90.557	6.259
HFPWA214A	A	M2	1	2	94.145	6.125	0.305	0.127	16	BGM	0.0079	95.704	6.227
HFPWA215A	A	M2	1	2	85.423	6.247	0.316	0.123	16	BGM	0.0077	84.088	6.149
HFPWB113A	B	M1	2	1	91.782	6.464	0.319	0.122	16	BGM	0.0076	89.588	6.309
HFPWB114A	B	M1	2	1	94.108	6.428	0.322	0.122	16	BGM	0.0077	92.336	6.307
HFPWB115A	B	M1	2	1	86.752	6.396	0.299	0.123	16	BGM	0.0077	85.790	6.325
HFPWB213A	B	M2	2	2	91.226	6.126	0.295	0.122	16	BGM	0.0076	89.374	6.002
HFPWB214A	B	M2	2	2	82.550	6.443	0.329	0.123	16	BGM	0.0077	81.425	6.356
HFPWB215A	B	M2	2	2	92.212	6.527	0.336	0.124	16	BGM	0.0078	91.830	6.500
HFPWC111A	C	M1	3	1	97.899	6.870	0.325	0.113	16	BGM	0.0071	88.969	6.243
HFPWC112A	C	M1	3	1	98.782	6.613	0.310	0.118	16	BGM	0.0074	93.360	6.250
HFPWC113A	C	M1	3	1	93.560	6.458	0.311	0.121	16	BGM	0.0076	90.911	6.275
HFPWC213A	C	M2	3	2	96.798	6.492	0.334	0.122	16	BGM	0.0076	94.627	6.346
HFPWC214A	C	M2	3	2	95.191	6.393	0.317	0.123	16	BGM	0.0077	93.920	6.307
HFPWC215A	C	M2	3	2	93.519	6.403	0.339	0.124	16	BGM	0.0078	92.982	6.367

Average	**92.363**	**6.433**	**0.317**
Standard Dev.	**4.170**	**0.200**	**0.013**
Coeff. of Var. [%]	**4.515**	**3.105**	**4.154**
Min.	**82.550**	**6.123**	**0.295**
Max.	**98.782**	**6.870**	**0.339**
Number of Spec.	**19**	**19**	**19**

$Average_{norm}$	**0.0077**	**90.569**	**6.308**
$Standard\ Dev._{norm}$		**3.807**	**0.145**
Coeff. of Var. [%]$_{norm}$		**4.204**	**2.302**
Min.	**0.0071**	**81.425**	**6.002**
Max.	**0.0079**	**95.954**	**6.681**
Number of Spec.	**19**	**19**	**19**


Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC1) [ksi]
0
10
20
30
40
50
60
70
80
90
100
110


Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC1) [Msi]
0.0
10.0

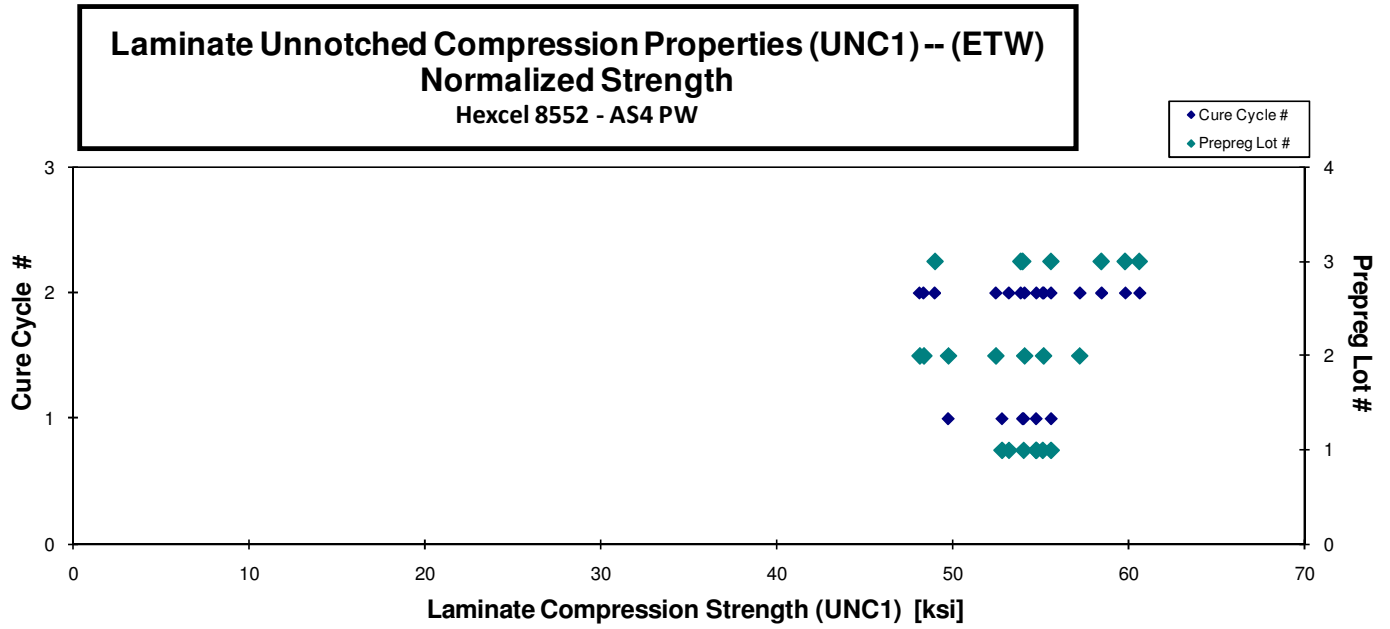
Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

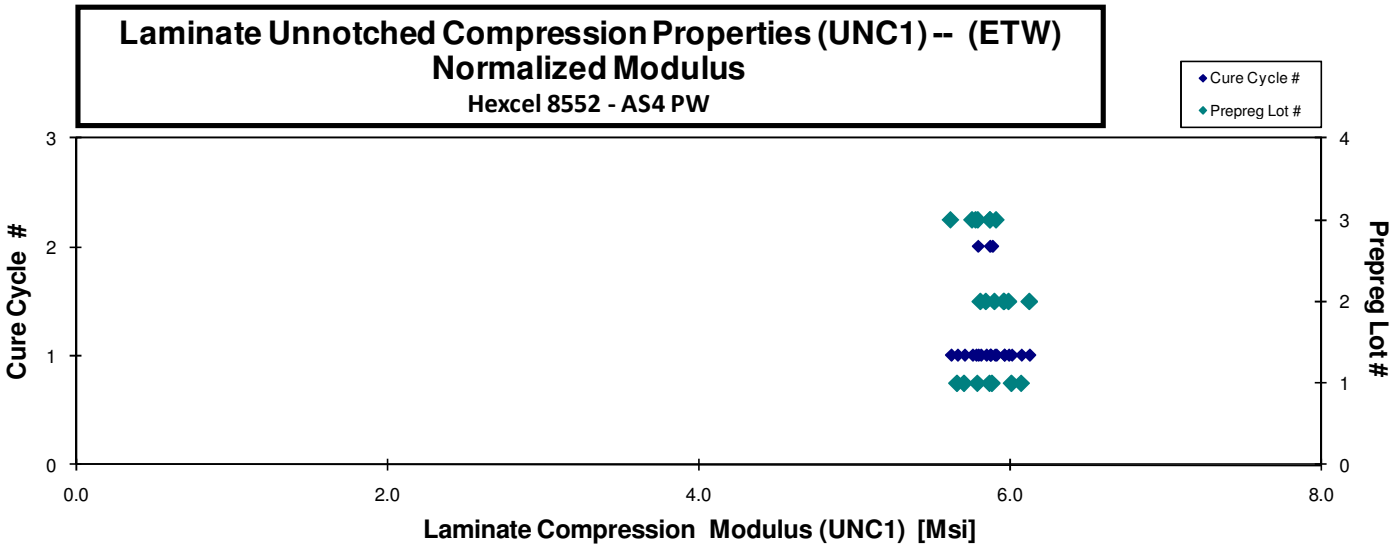
normalizing t_{ply} [in]: 0.0078

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]
HFPWA117D	A	M1	1	1		5.781	0.341	0.123	16	BGM	0.0077		5.713
HFPWA118D	A	M1	1	1		5.657	0.323	0.125	16	BGM	0.0078		5.668
HFPWA119D	A	M1	1	1		6.068	0.358	0.125	16	BAB	0.0078		6.079
HFPWA11AD	A	M1	1	1		6.054	0.355	0.124	16	HGM	0.0078		6.017
HFPWA11BD	A	M1	1	1	56.817			0.122	16	BGM	0.0076	55.618	
HFPWA11CD	A	M1	1	1	53.812			0.127	16	BGM	0.0079	54.768	
HFPWA11DD	A	M1	1	1	52.697			0.125	16	BGM	0.0078	52.838	
HFPWA11FD	A	M1	1	1	54.669			0.123	16	BGM	0.0077	54.063	
HFPWA217D	A	M2	1	2		5.716	0.358	0.127	16	BGM	0.0079		5.799
HFPWA218D	A	M2	1	2		5.937	0.336	0.124	16	HGM	0.0077		5.877
HFPWA219D	A	M2	1	2		5.905	0.339	0.125	16	BGM	0.0078		5.892
HFPWA21DD	A	M2	1	2	55.042			0.125	16	BGM	0.0078	55.145	
HFPWA21ED	A	M2	1	2	54.159			0.123	16	BGM	0.0077	53.226	
HFPWA21FD	A	M2	1	2	55.167			0.124	16	BGM	0.0077	54.784	
HFPWB117D	B	M1	2	1		5.874	0.349	0.124	16	BGM	0.0078		5.853
HFPWB118D	B	M1	2	1		5.993	0.350	0.124	16	HAB	0.0078		5.970
HFPWB119D	B	M1	2	1		6.000	0.349	0.124	16	HAT	0.0078		5.968
HFPWB11AD	B	M1	2	1	50.019			0.124	16	BGM	0.0078	49.792	
HFPWB11BD	B	M1	2	2	48.706			0.124	16	BGM	0.0078	48.400	
HFPWB11CD	B	M1	2	2	48.377			0.124	16	BGM	0.0078	48.170	
HFPWB11DD	B	M1	2	2	56.670			0.126	16	BGM	0.0079	57.246	
HFPWB11ED	B	M1	2	1		5.876	0.334	0.124	16	BGM	0.0077		5.818
HFPWB217D	B	M2	2	1		6.030	0.350	0.124	16	HGM	0.0078		5.998
HFPWB218D	B	M2	2	1		6.133	0.361	0.125	16	HGM	0.0078		6.131
HFPWB219D	B	M2	2	1		5.891	0.334	0.125	16	HGM	0.0078		5.908
HFPWB21AD	B	M2	2	2	54.102			0.125	16	BGM	0.0078	54.116	
HFPWB21BD	B	M2	2	2	52.399			0.125	16	BGM/HGM	0.0078	52.490	
HFPWB21CD	B	M2	2	2	55.057			0.125	16	BGM/HGM	0.0078	55.196	
HFPWC117D	C	M1	3	1		5.971	0.334	0.123	16	BGM	0.0077		5.881
HFPWC118D	C	M1	3	1		5.887	0.336	0.122	16	BGM	0.0076		5.765
HFPWC119D	C	M1	3	1		5.904	0.350	0.122	16	HGM	0.0076		5.788
HFPWC11AD	C	M1	3	1		6.002	0.383	0.122	16	HGM	0.0076		5.879
HFPWC11BD	C	M1	3	2	54.865			0.123	16	BGM/HGM	0.0077	53.898	
HFPWC11CD	C	M1	3	2	50.034			0.122	16	BGM	0.0076	49.032	
HFPWC11DD	C	M1	3	2	55.609			0.125	16	BGM	0.0078	55.609	
HFPWC11ED	C	M1	3	1	53.887			0.125	16	BGM	0.0078	54.002	
HFPWC217D	C	M2	3	1		5.976	0.339	0.124	16	BGM / DGM	0.0077		5.918
HFPWC218D	C	M2	3	1		5.863	0.369	0.124	16	BGM	0.0077		5.801
HFPWC219D	C	M2	3	1		5.677	0.342	0.124	16	BGM	0.0077		5.627
HFPWC21AD	C	M2	3	2	59.323			0.123	16	BGM	0.0077	58.468	
HFPWC21BD	C	M2	3	2	60.677			0.123	16	HGM	0.0077	59.818	
HFPWC21CD	C	M2	3	2	61.082			0.124	16	BGM	0.0077	60.626	

	Strength [ksi]	Modulus [Msi]	Poisson's Ratio
Average	54.437	5.914	0.347
Standard Dev.	3.443	0.126	0.014
Coeff. of Var. [%]	6.324	2.137	4.004
Min.	48.377	5.657	0.323
Max.	61.082	6.133	0.383
Number of Spec.	21	21	21

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	0.0078	54.1574	5.8739
$Standard\ Dev._{norm}$		3.383	0.128
$Coeff.\ of\ Var.\ [\%]_{norm}$		6.246	2.184
Min.	0.0076	48.1701	5.6266
Max.	0.0079	60.6256	6.1313
Number of Spec.	42	21	21


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


Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC1) [Msi]
0.0
2.0
4.0
6.0
8.0
0
1
2
3
4

4.10 Unnotched Compression 2 Properties

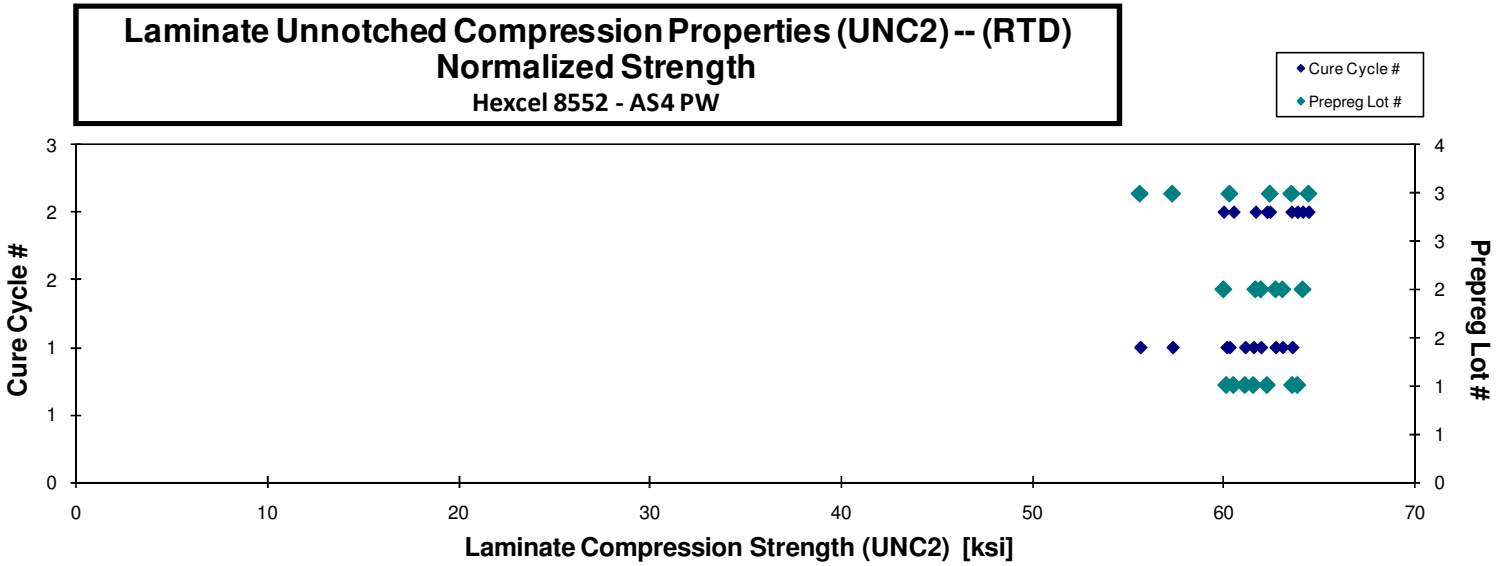
Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

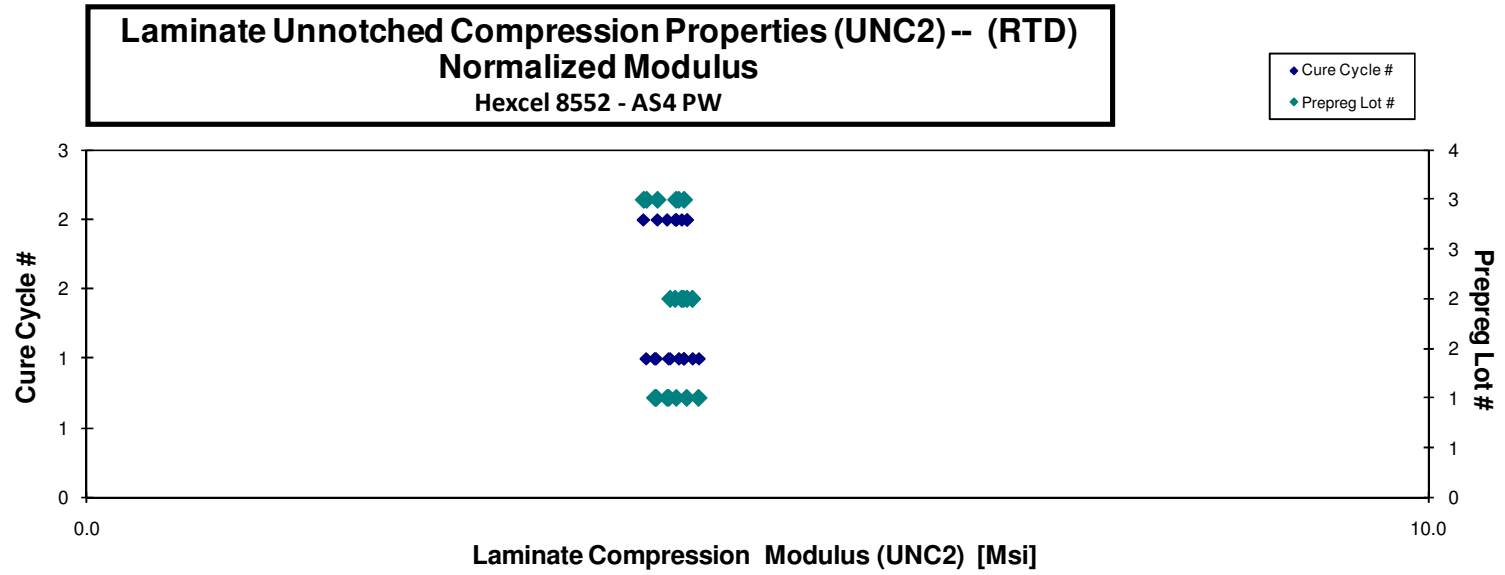
normalizing t_{ply} [in]: 0.0078

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]
HFPXA111A	A	M1	1	1	65.997	4.570	0.515	0.145	20	BGM	0.0072	61.131	4.233
HFPXA112A	A	M1	1	1	63.829	4.502	0.524	0.147	20	BGM	0.0074	60.160	4.244
HFPXA113A	A	M1	1	1	66.792	4.553	0.531	0.149	20	BGM	0.0074	63.603	4.335
HFPXA114A	A	M1	1	1	64.063	4.743	0.554	0.150	20	BGM	0.0075	61.565	4.558
HFPXA213A	A	M2	1	2	64.022	4.516	0.510	0.152	20	BGM	0.0076	62.278	4.393
HFPXA214A	A	M2	1	2	61.957	4.577	0.527	0.152	20	BGM	0.0076	60.521	4.470
HFPXA215A	A	M2	1	2	65.302	4.421	0.526	0.153	20	BGM	0.0076	63.872	4.324
HFPXB113A	B	M1	2	1	64.449	4.635	0.539	0.152	20	BGM	0.0076	62.735	4.512
HFPXB114A	B	M1	2	1	64.175	4.523	0.515	0.153	20	BGM	0.0077	63.092	4.446
HFPXB115A	B	M1	2	1	62.822	4.407	0.518	0.154	20	BGM	0.0077	61.963	4.347
HFPXB213A	B	M2	2	2	63.632	4.614	0.531	0.151	20	BGM	0.0076	61.681	4.473
HFPXB214A	B	M2	2	2	65.257	4.460	0.512	0.153	20	BGM	0.0077	64.148	4.385
HFPXB215A	B	M2	2	2	60.733	4.486	0.541	0.154	20	BGM	0.0077	60.000	4.432
HFPXC111A	C	M1	3	1	61.634	4.785	0.545	0.145	20	BGM	0.0073	57.321	4.450
HFPXC112A	C	M1	3	1	57.612	4.569	0.550	0.151	20	BGM	0.0075	55.624	4.411
HFPXC113A	C	M1	3	1	60.244	4.166	0.509	0.156	20	BGM	0.0078	60.315	4.171
HFPXC213A	C	M2	3	2	64.451	4.533	0.519	0.151	20	BGM	0.0076	62.434	4.392
HFPXC214A	C	M2	3	2	64.822	4.338	0.508	0.153	20	BGM	0.0076	63.562	4.253
HFPXC215A	C	M2	3	2	65.087	4.191	0.518	0.154	20	BGM	0.0077	64.454	4.150

Average	**63.520**	**4.505**	**0.526**
Standard Dev.	**2.235**	**0.157**	**0.014**
Coeff. of Var. [%]	**3.518**	**3.475**	**2.689**
Min.	**57.612**	**4.166**	**0.508**
Max.	**66.792**	**4.785**	**0.554**
Number of Spec.	**19**	**19**	**19**

$Average_{norm}$	**0.0076**	**61.603**	**4.367**
$Standard\ Dev._{norm}$		**2.287**	**0.114**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.713**	**2.616**
Min.	**0.0072**	**55.624**	**4.150**
Max.	**0.0078**	**64.454**	**4.558**
Number of Spec.	**19**	**19**	**19**


Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
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 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC2) [Msi]
0.0
10.0

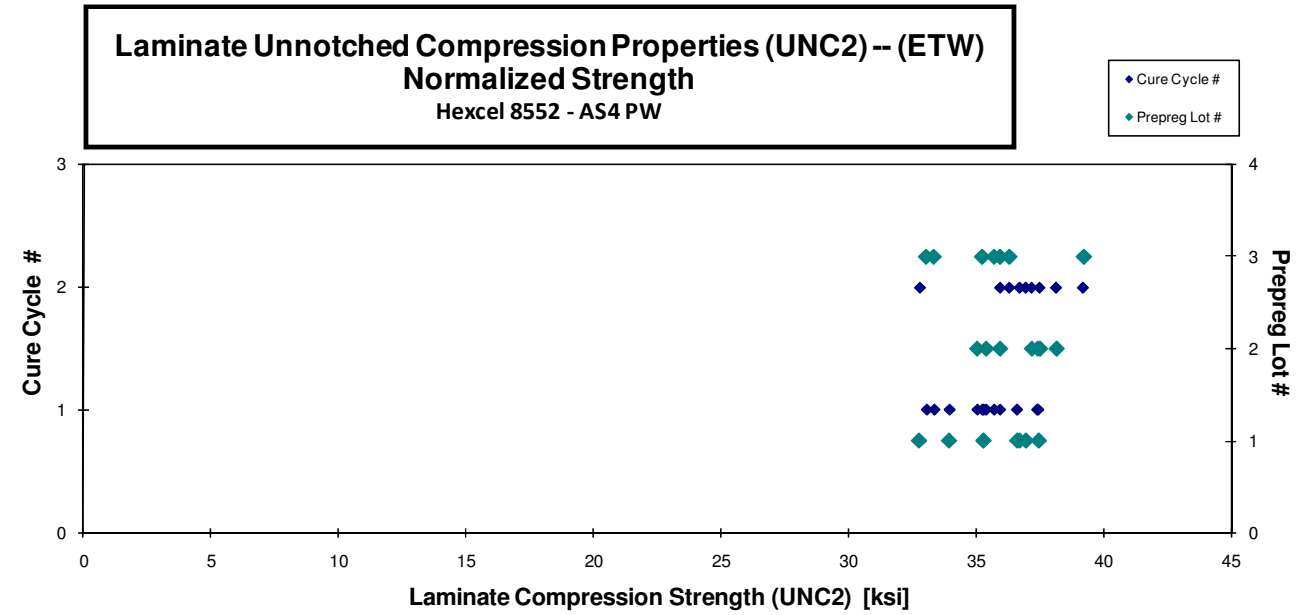
Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

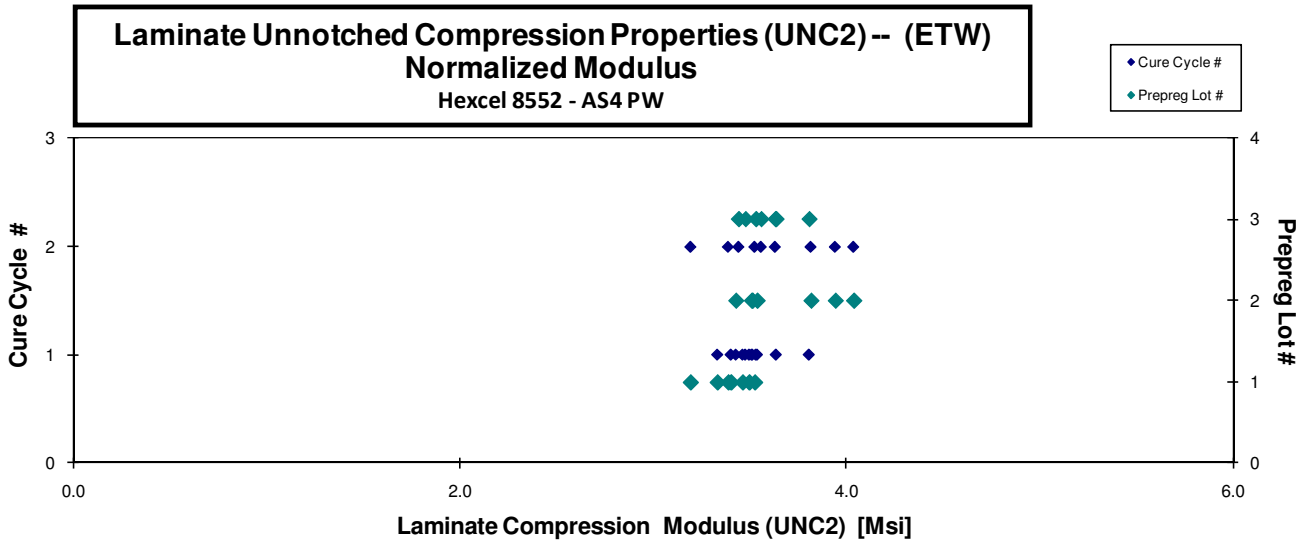
normalizing t_{ply} [in]: 0.0078

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]
HFPXA117D	A	M1	1	1		3.575	0.607	0.153	20	HGM	0.0076		3.499
HFPXA118D	A	M1	1	1		3.399	0.619	0.153	20	BGM	0.0077		3.335
HFPXA119D	A	M1	1	1		3.527	0.599	0.153	20	BGM	0.0077		3.465
HFPXA11AD	A	M1	1	1		3.471	0.597	0.153	20	BGM	0.0077		3.404
HFPXA11BD	A	M1	1	1	37.263			0.153	20	BGM	0.0077	36.630	
HFPXA11CD	A	M1	1	1	36.057			0.153	20	BGM	0.0076	35.314	
HFPXA11DD	A	M1	1	1	37.752			0.155	20	BGM	0.0077	37.470	
HFPXA11FD	A	M1	1	1	34.285			0.155	20	BGM	0.0077	33.970	
HFPXA217D	A	M2	1	2		3.469	0.605	0.152	20	BGM	0.0076		3.390
HFPXA218D	A	M2	1	2		3.276	0.607	0.152	20	HGM	0.0076		3.196
HFPXA219D	A	M2	1	2		3.611	0.629	0.152	20	HGM	0.0076		3.527
HFPXA21AD	A	M2	1	2	33.666			0.152	20	BGM	0.0076	32.799	
HFPXA21BD	A	M2	1	2	37.761			0.152	20	BGM	0.0076	36.728	
HFPXA21CD	A	M2	1	2	37.908			0.152	20	BGM	0.0076	36.969	
HFPXB117D	B	M1	2	1		3.457	0.648	0.155	20	BGM	0.0077		3.430
HFPXB118D	B	M1	2	1		3.529	0.643	0.155	20	BGM	0.0078		3.516
HFPXB119D	B	M1	2	1		3.537	0.628	0.156	20	BGM/HGM	0.0078		3.540
HFPXB11AD	B	M1	2	1		3.505	0.619	0.156	20	BGM	0.0078		3.512
HFPXB11BD	B	M1	2	1	35.389			0.156	20	BGM	0.0078	35.419	
HFPXB11CD	B	M1	2	1	35.864			0.156	20	BGM/HGM	0.0078	35.964	
HFPXB11DD	B	M1	2	1	35.108			0.156	20	BGM	0.0078	35.067	
HFPXB11ED	B	M1	2	1	37.061			0.158	20	BGM	0.0079	37.426	
HFPXB217D	B	M2	2	2		4.040	0.600	0.156	20	BGM	0.0078		4.038
HFPXB218D	B	M2	2	2		3.935	0.621	0.156	20	BGM	0.0078		3.943
HFPXB219D	B	M2	2	2		3.791	0.598	0.157	20	BGM	0.0079		3.818
HFPXB21DD	B	M2	2	2	37.256			0.160	20	BGM	0.0080	38.168	
HFPXB21ED	B	M2	2	2	36.919			0.159	20	BGM	0.0079	37.518	
HFPXB21FD	B	M2	2	2	36.882			0.157	20	BGM	0.0079	37.201	
HFPXC117D	C	M1	3	1		3.683	0.592	0.161	20	BGM	0.0081		3.808
HFPXC118D	C	M1	3	1		3.571	0.599	0.159	20	BGM/HGM	0.0079		3.638
HFPXC119D	C	M1	3	1		3.433	0.580	0.161	20	BGM	0.0080		3.533
HFPXC11AD	C	M1	3	1		3.419	0.580	0.159	20	BGM	0.0079		3.479
HFPXC11BD	C	M1	3	1	34.697			0.161	20	BGM	0.0080	35.731	
HFPXC11CD	C	M1	3	1	34.126			0.161	20	BGM	0.0081	35.260	
HFPXC11DD	C	M1	3	1	32.525			0.159	20	BGM/HGM	0.0079	33.074	
HFPXC11ED	C	M1	3	1	32.810			0.159	20	BGM	0.0079	33.367	
HFPXC217D	C	M2	3	2		3.437	0.570	0.156	20	BGM	0.0078		3.444
HFPXC218D	C	M2	3	2		3.606	0.618	0.157	20	BGM	0.0079		3.633
HFPXC219D	C	M2	3	2		3.535	0.573	0.157	20	BGM	0.0079		3.560
HFPXC21AD	C	M2	3	2	35.651			0.157	20	BGM	0.0079	35.963	
HFPXC21BD	C	M2	3	2	35.991			0.157	20	BGM	0.0079	36.322	
HFPXC21CD	C	M2	3	2	39.137			0.156	20	BGM	0.0078	39.229	

Average	**35.910**	**3.562**	**0.606**
Standard Dev.	**1.769**	**0.178**	**0.021**
Coeff. of Var. [%]	**4.925**	**5.005**	**3.508**
Min.	**32.525**	**3.276**	**0.570**
Max.	**39.137**	**4.040**	**0.648**
Number of Spec.	**21**	**21**	**21**

$Average_{norm}$	**0.0078**	**35.9804**	**3.5576**
Standard $Dev._{norm}$		**1.691**	**0.201**
Coeff. of Var. $[\%]_{norm}$		**4.700**	**5.648**
Min.	**0.0076**	**32.7988**	**3.1961**
Max.	**0.0081**	**39.2289**	**4.0383**
Number of Spec.	**42**	**21**	**21**


Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC2) [ksi]
0
5
10
15
20
25
30
35
40
45
0
1
2
3
4


Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 PW
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
4

4.11 Unnotched Compression 3 Properties

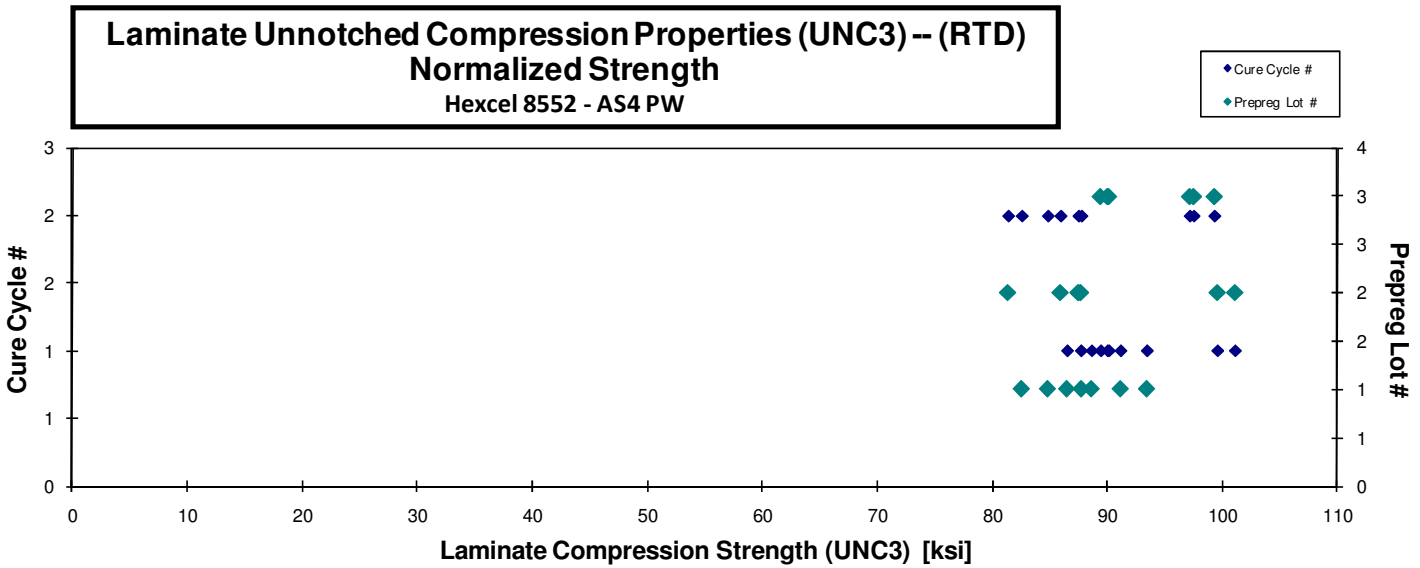
Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

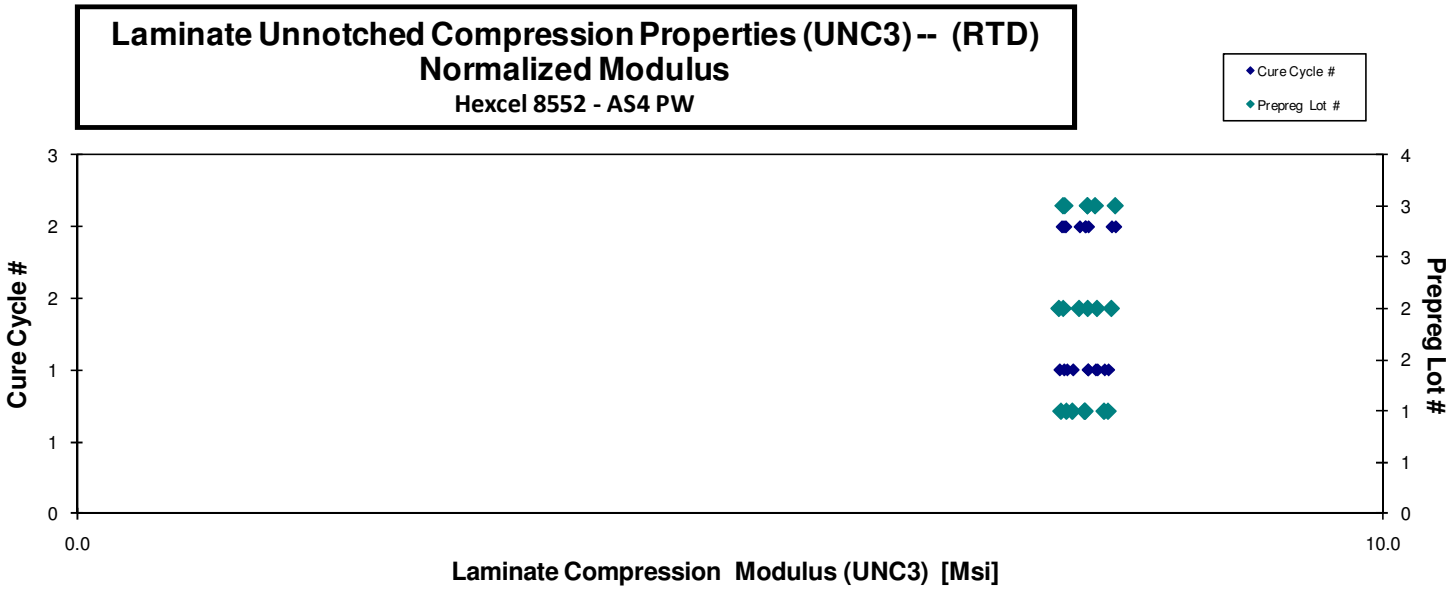
normalizing t_{ply} [in]: 0.0078

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]
HFPYA111A	A	M1	1	1	97.706	8.474	0.142	0.146	20	BGM	0.0073	91.140	7.904
HFPYA112A	A	M1	1	1	93.060	8.269	0.139	0.149	20	BGM	0.0074	88.626	7.875
HFPYA113A	A	M1	1	1	89.016	7.852	0.124	0.152	20	BGM	0.0076	86.505	7.631
HFPYA114A	A	M1	1	1	94.924	7.706	0.136	0.154	20	BGM	0.0077	93.423	7.585
HFPYA213A	A	M2	1	2	91.082	7.830	0.128	0.150	20	BGM	0.0075	87.754	7.544
HFPYA214A	A	M2	1	2	87.045	7.925	0.136	0.152	20	BGM	0.0076	84.841	7.724
HFPYA215A	A	M2	1	2	84.536	7.912	0.146	0.152	20	BGM	0.0076	82.577	7.728
HFPYB113A	B	M1	2	1	101.048	7.675	0.132	0.154	20	BGM	0.0077	99.536	7.561
HFPYB114A	B	M1	2	1	102.003	7.596	0.125	0.155	20	BGM	0.0077	101.065	7.527
HFPYB115A	B	M1	2	1	88.002	7.847	0.127	0.155	20	BGM	0.0078	87.702	7.820
HFPYB213A	B	M2	2	2	87.891	8.111	0.138	0.153	20	BGM	0.0076	85.938	7.931
HFPYB214A	B	M2	2	2	82.679	7.871	0.135	0.154	20	BAT	0.0077	81.389	7.749
HFPYB215A	B	M2	2	2	88.154	7.740	0.136	0.155	20	BAB	0.0077	87.494	7.682
HFPYC111A	C	M1	3	1	94.232	8.111	0.131	0.149	20	BGM	0.0075	90.004	7.747
HFPYC112A	C	M1	3	1	92.067	7.912	0.144	0.153	20	BGM	0.0076	90.130	7.746
HFPYC113A	C	M1	3	1	90.174	7.872	0.152	0.155	20	BAT	0.0077	89.413	7.806
HFPYC212A	C	M2	3	2	101.471	8.136	0.138	0.153	20	BGM	0.0076	99.281	7.960
HFPYC213A	C	M2	3	2	97.934	7.620	0.138	0.155	20	BGM	0.0077	97.139	7.559
HFPYC214A	C	M2	3	2	96.953	7.532	0.127	0.157	20	BGM	0.0078	97.481	7.573

Average	**92.630**	**7.894**	**0.135**
Standard Dev.	**5.768**	**0.240**	**0.008**
Coeff. of Var. [%]	**6.227**	**3.046**	**5.563**
Min.	**82.679**	**7.532**	**0.124**
Max.	**102.003**	**8.474**	**0.152**
Number of Spec.	**19**	**19**	**19**

$Average_{norm}$	**0.0076**	**90.602**	**7.718**
$Standard\ Dev._{norm}$		**5.850**	**0.139**
Coeff. of Var. $[\%]_{norm}$		**6.457**	**1.804**
Min.	**0.0073**	**81.389**	**7.527**
Max.	**0.0078**	**101.065**	**7.960**
Number of Spec.	**19**	**19**	**19**


Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
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


Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC3) [Msi]
0.0
10.0

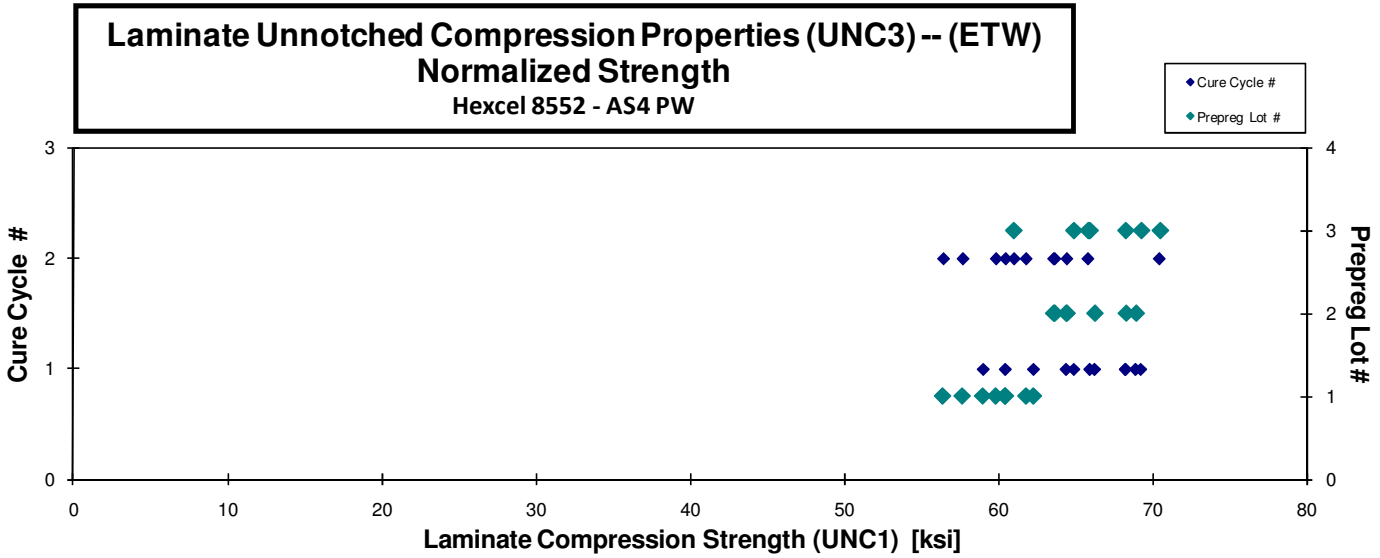
Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

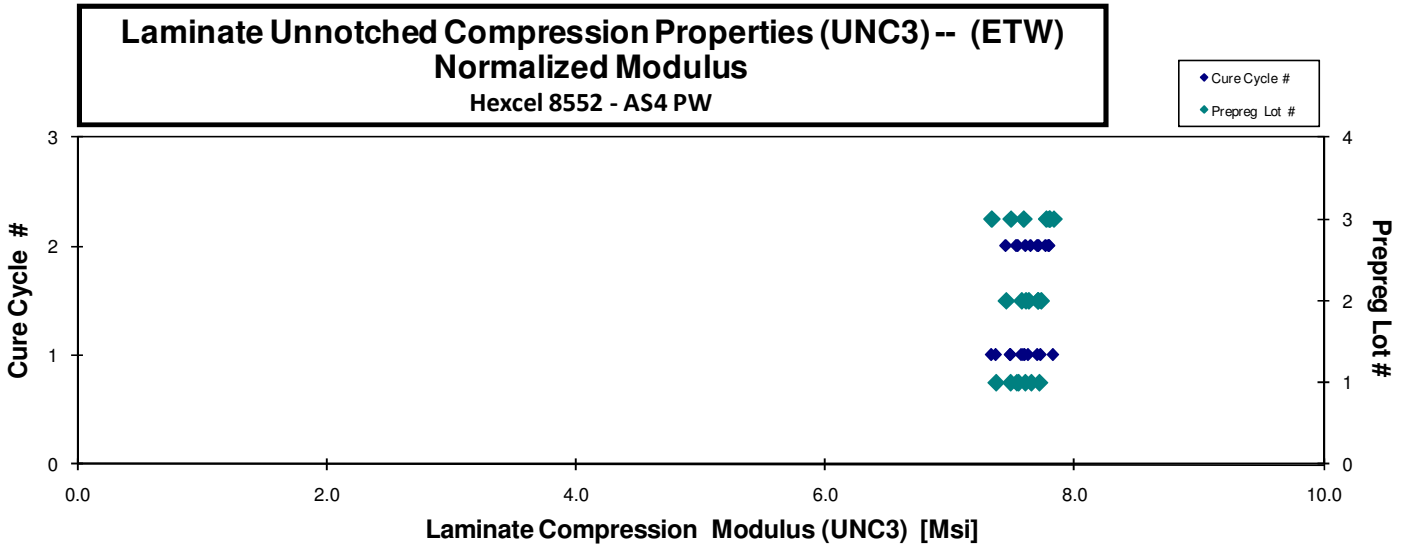
normalizing t_{ply} [in]: 0.0078

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]
HFPYA11AD	A	M1	1	1		7.681	0.153	0.154	20	END CRUSH/BGM	0.0077		7.604
HFPYA11BD	A	M1	1	1		7.431	0.133	0.155	20	BGM	0.0077		7.369
HFPYA11CD	A	M1	1	1		7.550	0.151	0.155	20	HGM	0.0077		7.486
HFPYA11DD	A	M1	1	1	62.717			0.155	20	BGM	0.0077	62.275	
HFPYA11ED	A	M1	1	1	59.432			0.155	20	BGM	0.0077	59.001	
HFPYA11FD	A	M1	1	1	61.147			0.154	20	BGM/HGM	0.0077	60.435	
HFPYA217D	A	M2	1	2		7.808	0.144	0.153	20	BGM	0.0076		7.652
HFPYA218D	A	M2	1	2		7.861	0.154	0.153	20	BGM	0.0077		7.717
HFPYA219D	A	M2	1	2		7.649	0.129	0.154	20	BGM	0.0077		7.535
HFPYA21AD	A	M2	1	2	61.445			0.154	20	BAB	0.0077	60.467	
HFPYA21BD	A	M2	1	2	57.558			0.153	20	BAB	0.0076	56.414	
HFPYA21CD	A	M2	1	2	62.883			0.153	20	BGM	0.0077	61.801	
HFPYA21DD	A	M2	1	2	58.663			0.153	20	BGM	0.0077	57.679	
HFPYA21ED	A	M2	1	2		7.615	0.136	0.155	20	HGM	0.0077		7.549
HFPYA21FD	A	M2	1	2	60.799			0.154	20	BAB	0.0077	59.844	
HFPYB117D	B	M1	2	1		7.599	0.142	0.157	20	HGM/BGM	0.0078		7.632
HFPYB118D	B	M1	2	1		7.678	0.164	0.157	20	BGM	0.0079		7.732
HFPYB119D	B	M1	2	1		7.523	0.120	0.157	20	HGM/BGM	0.0079		7.575
HFPYB11AD	B	M1	2	1		7.637	0.168	0.157	20	BGM	0.0079		7.706
HFPYB11CD	B	M1	2	1	63.893			0.157	20	HGM	0.0079	64.398	
HFPYB11DD	B	M1	2	1	65.012			0.159	20	BGM	0.0079	66.255	
HFPYB11ED	B	M1	2	1	67.989			0.158	20	BGM	0.0079	68.919	
HFPYB11FD	B	M1	2	1	68.117			0.156	20	BGM	0.0078	68.277	
HFPYB217D	B	M2	2	2		7.451	0.130	0.156	20	BGM	0.0078		7.450
HFPYB218D	B	M2	2	2		7.675	0.136	0.157	20	END CRUSH/BGM	0.0078		7.706
HFPYB219D	B	M2	2	2		7.556	0.141	0.157	20	BGM	0.0079		7.610
HFPYB21AD	B	M2	2	2	63.183			0.157	20	BGM	0.0079	63.588	
HFPYB21BD	B	M2	2	2	64.021			0.157	20	HGM	0.0079	64.452	
HFPYB21CD	B	M2	2	2	63.098			0.157	20	BGM/HGM	0.0079	63.664	
HFPYC117D	C	M1	3	1		7.740	0.146	0.158	20	HGM/BGM	0.0079		7.834
HFPYC118D	C	M1	3	1		7.493	0.118	0.158	20	BGM	0.0079		7.591
HFPYC119D	C	M1	3	1		7.369	0.138	0.159	20	HGM/BGM	0.0079		7.489
HFPYC11AD	C	M1	3	1	67.995			0.159	20	BGM	0.0079	69.259	
HFPYC11CD	C	M1	3	1	63.278			0.160	20	BGM	0.0080	64.901	
HFPYC11DD	C	M1	3	1	66.751			0.160	20	HGM/BGM	0.0080	68.249	
HFPYC11ED	C	M1	3	1		7.170	0.124	0.160	20	BGM	0.0080		7.334
HFPYC11FD	C	M1	3	1	64.898			0.159	20	HGM	0.0079	65.938	
HFPYC217D	C	M2	3	2		7.558	0.145	0.160	20	BGM/HGM	0.0080		7.774
HFPYC218D	C	M2	3	2		7.586	0.150	0.160	20	BGM/HGM	0.0080		7.802
HFPYC219D	C	M2	3	2		7.501	0.138	0.162	20	BAB	0.0081		7.797
HFPYC21DD	C	M2	3	2	68.915			0.160	20	BGM	0.0080	70.476	
HFPYC21ED	C	M2	3	2	60.073			0.158	20	BGM	0.0079	61.016	
HFPYC21FD	C	M2	3	2	65.164			0.158	20	BGM	0.0079	65.825	

	Strength	Modulus	Poisson's Ratio
Average	63.501	7.578	0.141
Standard Dev.	3.195	0.153	0.013
Coeff. of Var. [%]	5.031	2.013	9.350
Min.	57.558	7.170	0.118
Max.	68.915	7.861	0.168
Number of Spec.	22	21	21

	t_{ply}	$Strength_{norm}$	$Modulus_{norm}$
$Average_{norm}$	0.0078	63.779	7.616
Standard $Dev._{norm}$		3.930	0.141
Coeff. of Var. $[\%]_{norm}$		6.162	1.848
Min.	0.0076	56.414	7.334
Max.	0.0081	70.476	7.834
Number of Spec.	43	22	21


Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC1) [ksi]
0
10
20
30
40
50
60
70
80
0
1
2
3
4

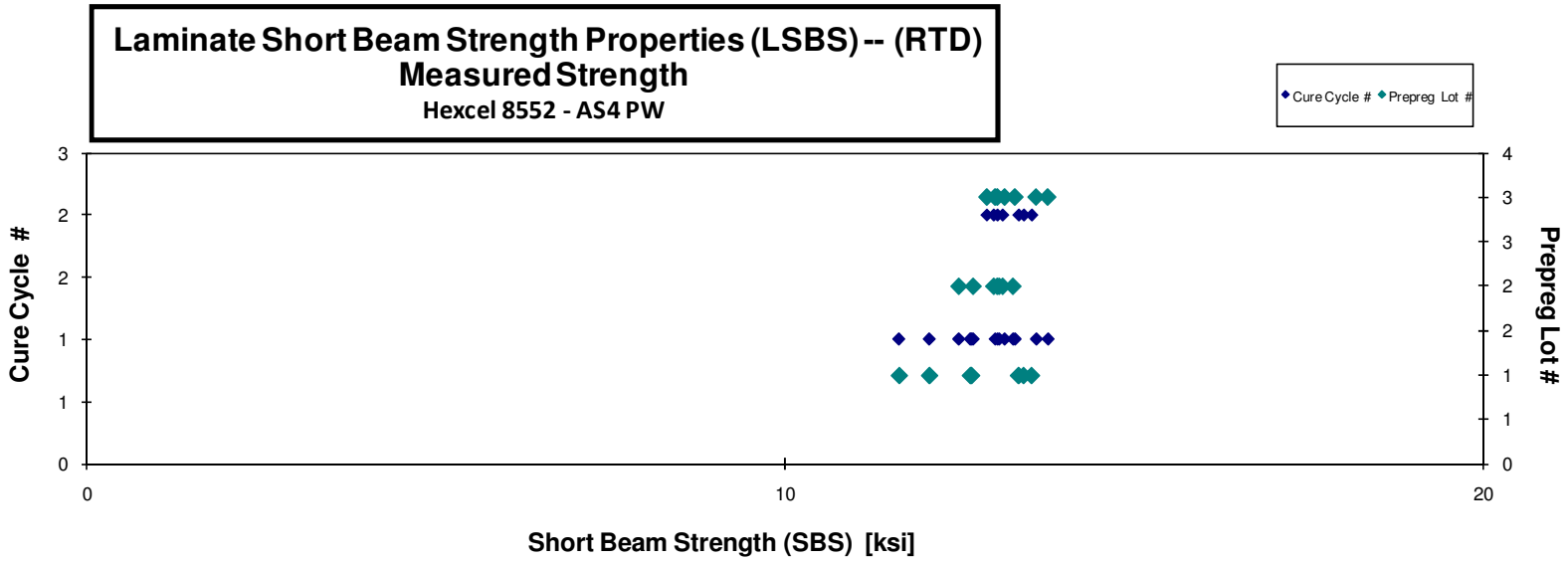

Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Normalized Modulus
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC3) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
0
1
2
3
4

4.12 Laminate Short Beam Strength Properties

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

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
HFPqA1G3A	A	M1	1	1	12.675	0.148	20	0.0074	ILS
HFPqA1G4A	A	M1	1	1	12.658	0.149	20	0.0075	ILS
HFPqA1G5A	A	M1	1	1	11.639	0.149	20	0.0075	ILS
HFPqA1G6A	A	M1	1	1	12.072	0.149	20	0.0075	ILS
HFPqA2G4A	A	M2	1	2	13.350	0.142	20	0.0071	ILS
HFPqA2G5A	A	M2	1	2	13.536	0.145	20	0.0073	ILS
HFPqA2G6A	A	M2	1	2	13.422	0.146	20	0.0073	ILS
HFPqB1G3A	B	M1	2	1	13.071	0.147	20	0.0073	ILS
HFPqB1G4A	B	M1	2	1	13.044	0.148	20	0.0074	ILS
HFPqB1G5A	B	M1	2	1	12.493	0.149	20	0.0075	ILS
HFPqB1G6A	B	M1	2	1	12.698	0.149	20	0.0074	ILS
HFPqB2G1A	B	M2	2	1	13.269	0.149	20	0.0075	ILS
HFPqB2G2A	B	M2	2	2	13.120	0.149	20	0.0074	ILS
HFPqB2G3A	B	M2	2	2	12.993	0.149	20	0.0074	ILS
HFPqC1G1A	C	M1	3	1	13.768	0.144	20	0.0072	ILS
HFPqC1G2A	C	M1	3	1	13.296	0.145	20	0.0073	ILS
HFPqC1G3A	C	M1	3	1	13.600	0.146	20	0.0073	ILS
HFPqC1G4A	C	M1	3	1	13.012	0.147	20	0.0073	ILS
HFPqC2G3A	C	M2	3	1	13.148	0.142	20	0.0071	ILS
HFPqC2G4A	C	M2	3	2	13.045	0.143	20	0.0071	ILS
HFPqC2G5A	C	M2	3	2	12.895	0.143	20	0.0072	ILS

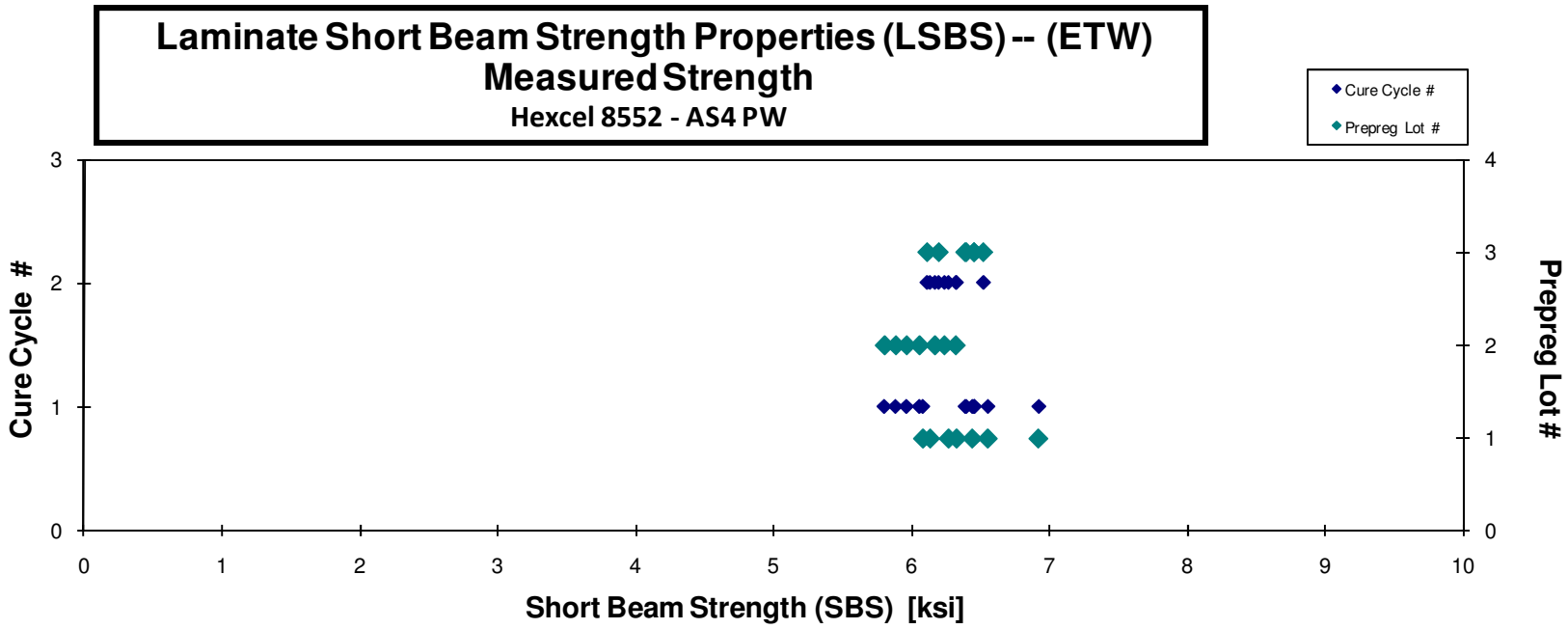
Average	**12.991**	**Average**	**0.0073**
Standard Dev.	**0.502**	**Standard Dev.**	
Coeff. of Var. [%]	**3.863**	**Coeff. of Var. [%]**	
Min.	**11.639**	**Min.**	**0.0071**
Max.	**13.768**	**Max.**	**0.0075**
Number of Spec.	**21**	**Number of Spec.**	**21**


Laminate Short Beam Strength Properties (LSBS) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short Beam Strength (SBS) [ksi]
0
10
20
0
1
1
2
2
3
0
1
2
3
4

Laminate Short Beam Strength Properties (LSBS) -- (ETW)
Strength
Hexcel 8552 - AS4 PW

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
HFPqA1G7D	A	M1	1	1	6.917	0.149	20	0.0075	ILS
HFPqA1G8D	A	M1	1	1	6.551	0.149	20	0.0075	ILS
HFPqA1G9D	A	M1	1	1	6.438	0.151	20	0.0076	ILS
HFPqA1GAD	A	M1	1	1	6.082	0.150	20	0.0075	ILS
HFPqA2G7D	A	M2	1	2	6.134	0.148	20	0.0074	ILS
HFPqA2G8D	A	M2	1	2	6.325	0.148	20	0.0074	ILS
HFPqA2G9D	A	M2	1	2	6.267	0.148	20	0.0074	ILS
HFPqB1G7D	B	M1	2	1	6.057	0.148	20	0.0074	ILS
HFPqB1G8D	B	M1	2	1	5.964	0.148	20	0.0074	ILS
HFPqB1G9D	B	M1	2	1	5.804	0.149	20	0.0074	ILS
HFPqB1GAD	B	M1	2	1	5.886	0.148	20	0.0074	ILS
HFPqB2G7D	B	M2	2	2	6.319	0.149	20	0.0074	ILS
HFPqB2G9D	B	M2	2	2	6.237	0.149	20	0.0075	ILS
HFPqB2GCD	B	M2	2	2	6.169	0.149	20	0.0074	ILS
HFPqC1G9D	C	M1	3	1	6.387	0.147	20	0.0073	ILS
HFPqC1GAD	C	M1	3	1	6.452	0.146	20	0.0073	ILS
HFPqC1GBD	C	M1	3	1	6.452	0.146	20	0.0073	ILS
HFPqC1GCD	C	M1	3	1	6.396	0.146	20	0.0073	ILS
HFPqC2G8D	C	M2	3	2	6.519	0.145	20	0.0072	ILS
HFPqC2GBD	C	M2	3	2	6.196	0.144	20	0.0072	ILS
HFPqC2GCD	C	M2	3	2	6.112	0.144	20	0.0072	ILS

Average	**6.270**	**Average**	**0.0074**
Standard Dev.	**0.254**	**Standard Dev.**	
Coeff. of Var. [%]	**4.047**	**Coeff. of Var. [%]**	
Min.	**5.804**	**Min.**	**0.0072**
Max.	**6.917**	**Max.**	**0.0076**
Number of Spec.	**21**	**Number of Spec.**	**21**


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

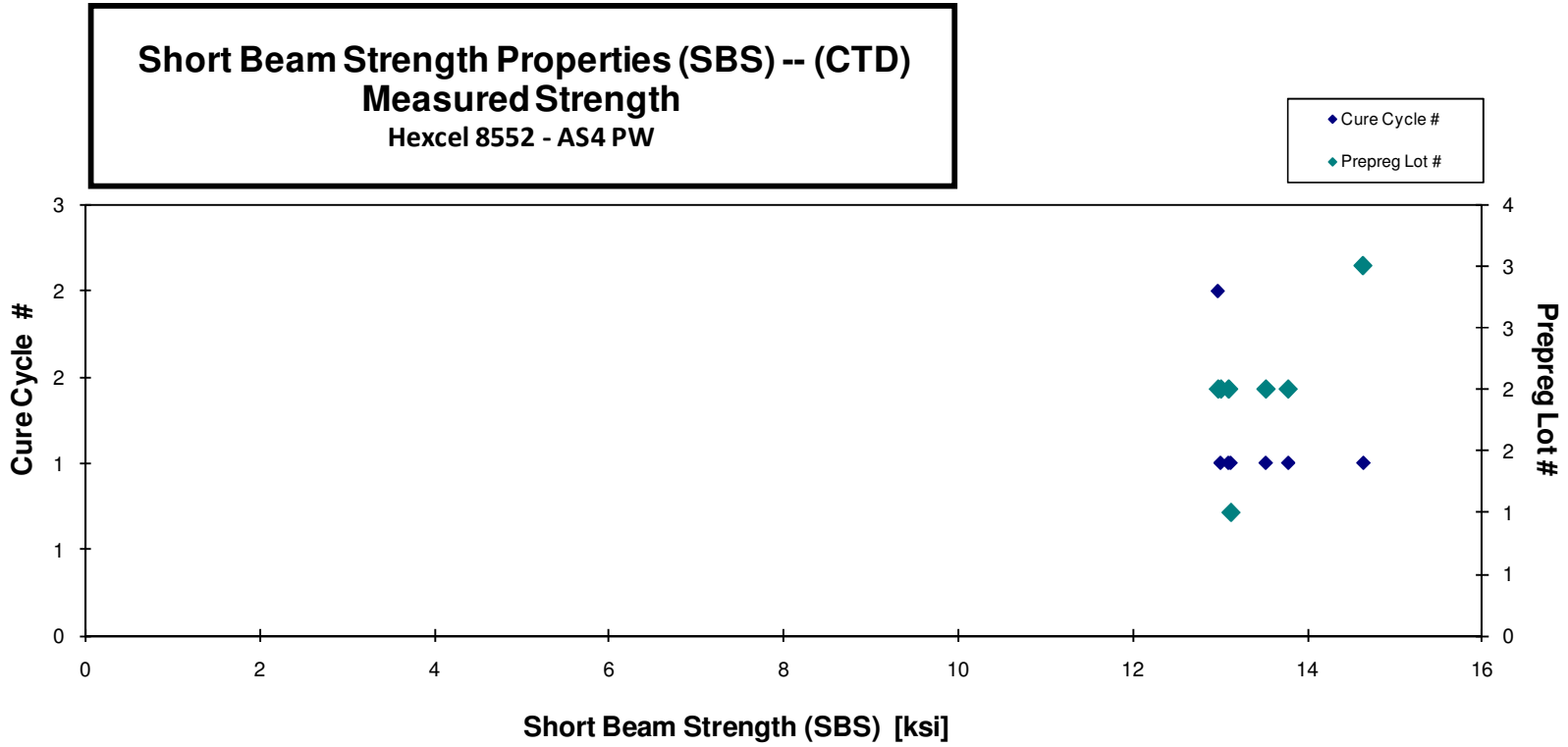
4.13 Lamina Short Beam Strength Properties

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

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
HFPQA118B	A	M1	1	1					TENSION
HFPQA11AB	A	M1	1	1					TENSION
HFPQA11BB	A	M1	1	1					TENSION
HFPQA11FB	A	M1	1	1	13.124	0.242	32	0.0076	ILS
HFPQA217B	A	M2	1	2					TENSION
HFPQA218B	A	M2	1	2					TENSION
HFPQA219B	A	M2	1	2					TENSION
HFPQB116B	B	M1	2	1	13.524	0.235	32	0.0073	ILS
HFPQB117B	B	M1	2	1	13.010	0.230	32	0.0072	ILS/TENSION
HFPQB118B	B	M1	2	1	13.780	0.240	32	0.0075	ILS
HFPQB119B	B	M1	2	1	13.098	0.253	32	0.0079	ILS/TENSION
HFPQB217B	B	M2	2	2					TENSION
HFPQB218B	B	M2	2	2					TENSION
HFPQB219B	B	M2	2	2	12.978	0.226	32	0.0071	ILS
HFPQC116B	C	M1	3	1	14.637	0.233	32	0.0073	ILS/TENSION
HFPQC117B	C	M1	3	1					TENSION
HFPQC118B	C	M1	3	1					TENSION
HFPQC119B	C	M1	3	1					TENSION
HFPQC216B	C	M2	3	2					TENSION
HFPQC218B	C	M2	3	2					TENSION
HFPQC219B	C	M2	3	2					TENSION

Values with Tension failures were removed to improper failure mode

Average	**13.450**	**Average**	**0.0074**
Standard Dev.	**0.601**	**Standard Dev.**	
Coeff. of Var. [%]	**4.471**	**Coeff. of Var. [%]**	
Min.	**12.978**	**Min.**	**0.0071**
Max.	**14.637**	**Max.**	**0.0079**
Number of Spec.	**7**	**Number of Spec.**	**7**


Short Beam Strength Properties (SBS) -- (CTD)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short Beam Strength (SBS) [ksi]
0
1
2
3
0
1
2
3
4
0
2
4
6
8
10
12
14
16

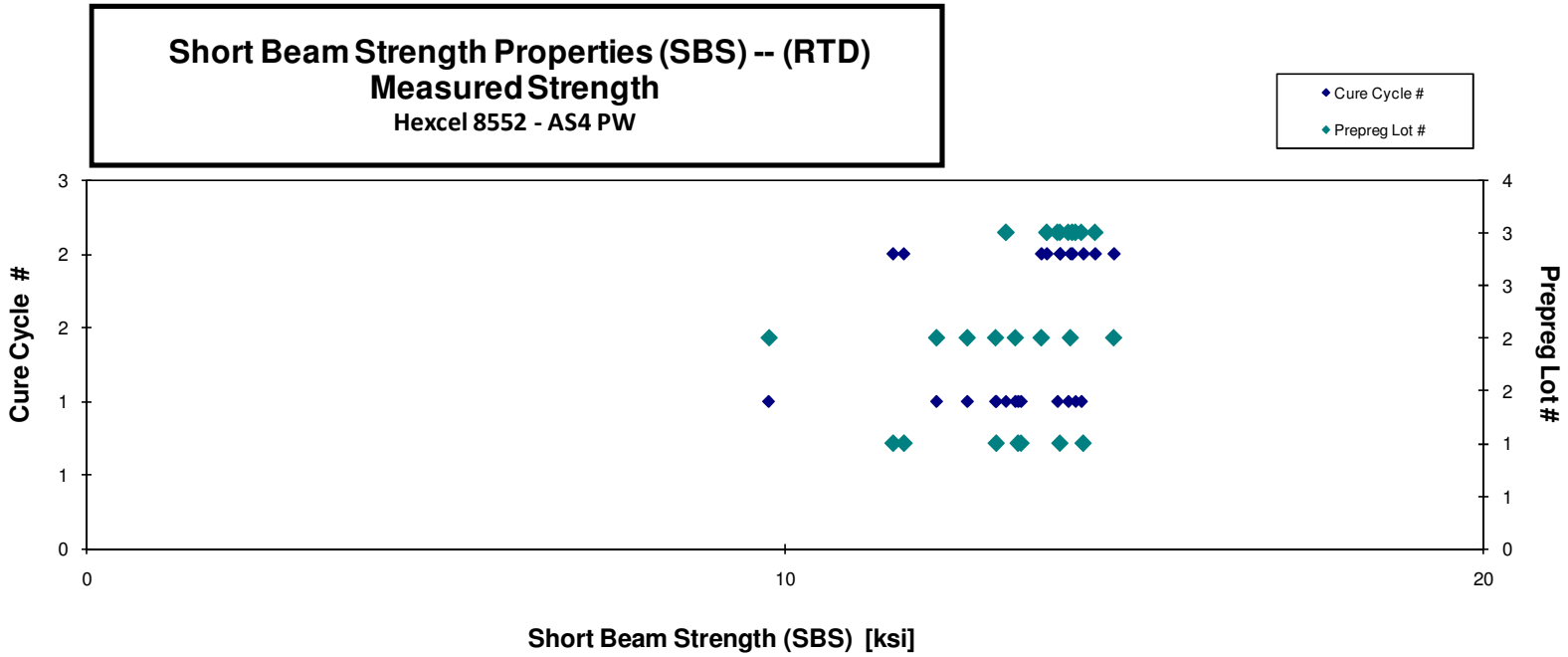
Short Beam Strength Properties (SBS) -- (RTD) Strength

Hexcel 8552 - AS4 PW

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
HFPQA111A	A	M1	1	1	13.391	0.250	32	0.0078	INTERLAMINAR SHEAR
HFPQA112A	A	M1	1	1					TENSION
HFPQA113A	A	M1	1	1					TENSION
HFPQA116A	A	M1	1	1	13.350	0.249	32	0.0078	INTERLAMINAR SHEAR
HFPQA117A	A	M1	1	1	13.036	0.248	32	0.0078	INTERLAMINAR SHEAR
HFPQA211A	A	M2	1	2	13.949	0.234	32	0.0073	INTERLAMINAR SHEAR
HFPQA213A	A	M2	1	2	14.284	0.235	32	0.0074	INTERLAMINAR SHEAR
HFPQA214A	A	M2	1	2	11.713	0.223	32	0.0070	INTERLAMINAR SHEAR
HFPQA215A	A	M2	1	2	11.558	0.222	32	0.0069	INTERLAMINAR SHEAR
HFPQB111A	B	M1	2	1	9.779	0.220	32	0.0069	INTERLAMINAR SHEAR
HFPQB112A	B	M1	2	1	13.026	0.252	32	0.0079	INTERLAMINAR SHEAR
HFPQB113A	B	M1	2	1	12.181	0.231	32	0.0072	INTERLAMINAR SHEAR
HFPQB114A	B	M1	2	1	12.621	0.240	32	0.0075	INTERLAMINAR SHEAR
HFPQB115A	B	M1	2	1	13.309	0.223	32	0.0070	INTERLAMINAR SHEAR
HFPQB211A	B	M2	2	2					TENSION
HFPQB212A	B	M2	2	2	14.098	0.228	32	0.0071	INTERLAMINAR SHEAR
HFPQB213A	B	M2	2	2	14.720	0.235	32	0.0074	INTERLAMINAR SHEAR
HFPQB214A	B	M2	2	2	13.681	0.238	32	0.0074	INTERLAMINAR SHEAR
HFPQC111A	C	M1	3	1	14.068	0.224	32	0.0070	INTERLAMINAR SHEAR
HFPQC112A	C	M1	3	1	13.913	0.248	32	0.0077	INTERLAMINAR SHEAR/TENSION
HFPQC113A	C	M1	3	1	13.174	0.234	32	0.0073	INTERLAMINAR SHEAR
HFPQC114A	C	M1	3	1	14.171	0.239	32	0.0075	INTERLAMINAR SHEAR
HFPQC115A	C	M1	3	1	14.254	0.244	32	0.0076	INTERLAMINAR SHEAR
HFPQC212A	C	M2	3	2	13.949	0.229	32	0.0071	INTERLAMINAR SHEAR
HFPQC213A	C	M2	3	2	14.452	0.233	32	0.0073	INTERLAMINAR SHEAR
HFPQC214A	C	M2	3	2	13.761	0.237	32	0.0074	INTERLAMINAR SHEAR
HFPQC215A	C	M2	3	2	14.123	0.239	32	0.0075	INTERLAMINAR SHEAR

Values with Tension failures were removed to improper failure mode

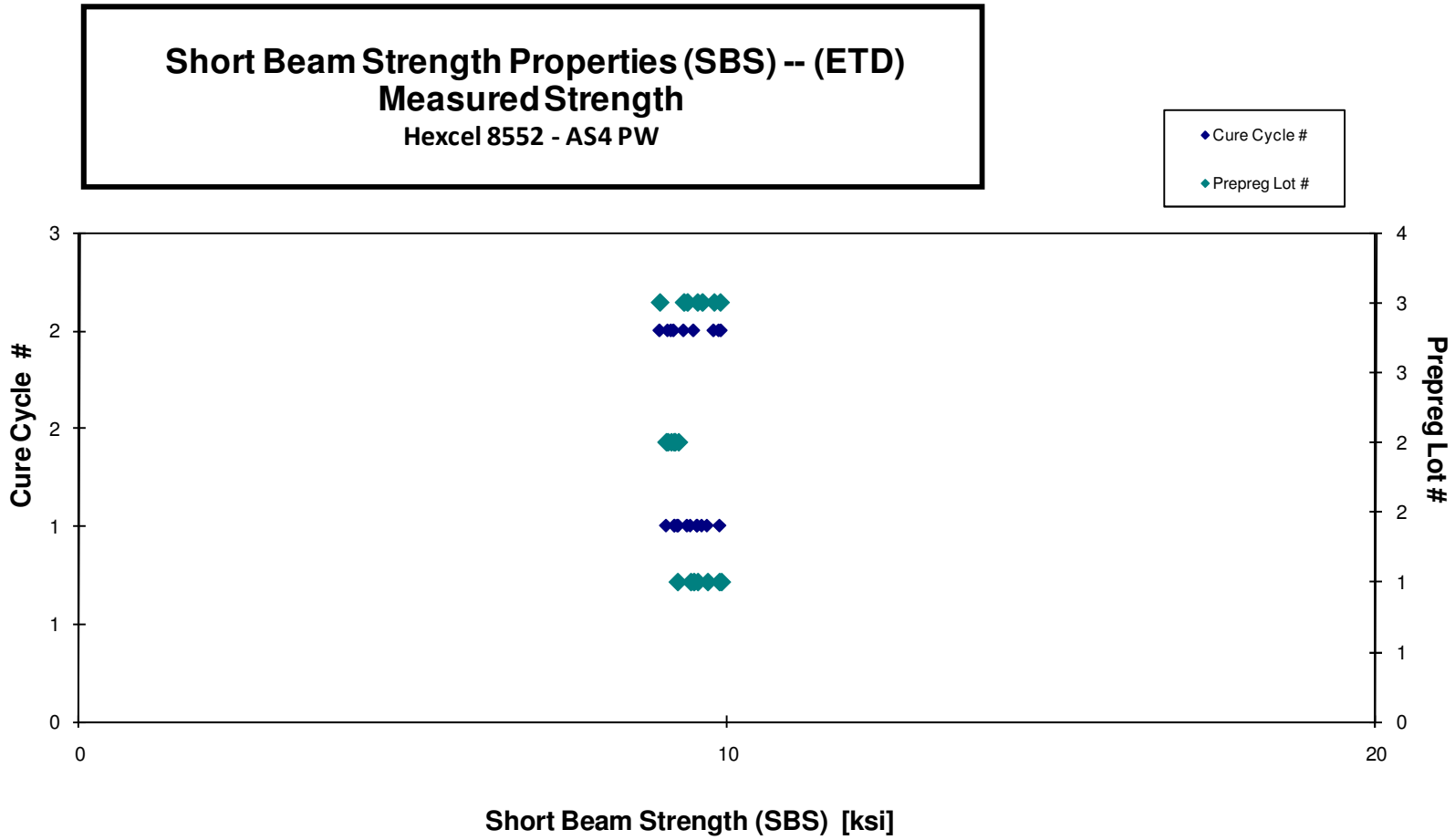
Average	**13.357**	**Average**	**0.0074**
Standard Dev.	**1.127**	**Standard Dev.**	
Coeff. of Var. [%]	**8.439**	**Coeff. of Var. [%]**	
Min.	**9.779**	**Min.**	**0.0069**
Max.	**14.720**	**Max.**	**0.0079**
Number of Spec.	**24**	**Number of Spec.**	**24**


Short Beam Strength Properties (SBS) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short Beam Strength (SBS) [ksi]
0
10
20
0
1
2
3
4

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

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
HFPQA11GC	A	M1	1	1	9.233	0.245	32	0.0076	INTERLAMINAR SHEAR
HFPQA11JC	A	M1	1	1	9.689	0.249	32	0.0078	INTERLAMINAR SHEAR
HFPQA11KC	A	M1	1	1	9.538	0.250	32	0.0078	INTERLAMINAR SHEAR
HFPQA11MC	A	M1	1	1	9.431	0.251	32	0.0078	INTERLAMINAR SHEAR
HFPQA21AC	A	M2	1	2	9.479	0.230	32	0.0072	INTERLAMINAR SHEAR
HFPQA21BC	A	M2	1	2	9.866	0.237	32	0.0074	INTERLAMINAR SHEAR
HFPQA21CC	A	M2	1	2	9.899	0.238	32	0.0074	INTERLAMINAR SHEAR
HFPQB11AC	B	M1	2	1	9.061	0.230	32	0.0072	INTERLAMINAR SHEAR
HFPQB11BC	B	M1	2	1	9.189	0.248	32	0.0077	INTERLAMINAR SHEAR
HFPQB11CC	B	M1	2	1	9.246	0.240	32	0.0075	INTERLAMINAR SHEAR
HFPQB11DC	B	M1	2	1	9.191	0.243	32	0.0076	INTERLAMINAR SHEAR
HFPQB21AC	B	M2	2	2	9.085	0.231	32	0.0072	INTERLAMINAR SHEAR
HFPQB21BC	B	M2	2	2	9.175	0.239	32	0.0075	INTERLAMINAR SHEAR
HFPQB21CC	B	M2	2	2	9.135	0.245	32	0.0077	INTERLAMINAR SHEAR
HFPQC11AC	C	M1	3	1	9.880	0.233	32	0.0073	INTERLAMINAR SHEAR
HFPQC11BC	C	M1	3	1	9.607	0.236	32	0.0074	INTERLAMINAR SHEAR
HFPQC11CC	C	M1	3	1	9.533	0.248	32	0.0078	INTERLAMINAR SHEAR
HFPQC11DC	C	M1	3	1	9.381	0.230	32	0.0072	INTERLAMINAR SHEAR
HFPQC21AC	C	M2	3	2	8.961	0.223	32	0.0070	INTERLAMINAR SHEAR
HFPQC21BC	C	M2	3	2	9.787	0.234	32	0.0073	INTERLAMINAR SHEAR
HFPQC21CC	C	M2	3	2	9.327	0.240	32	0.0075	INTERLAMINAR SHEAR

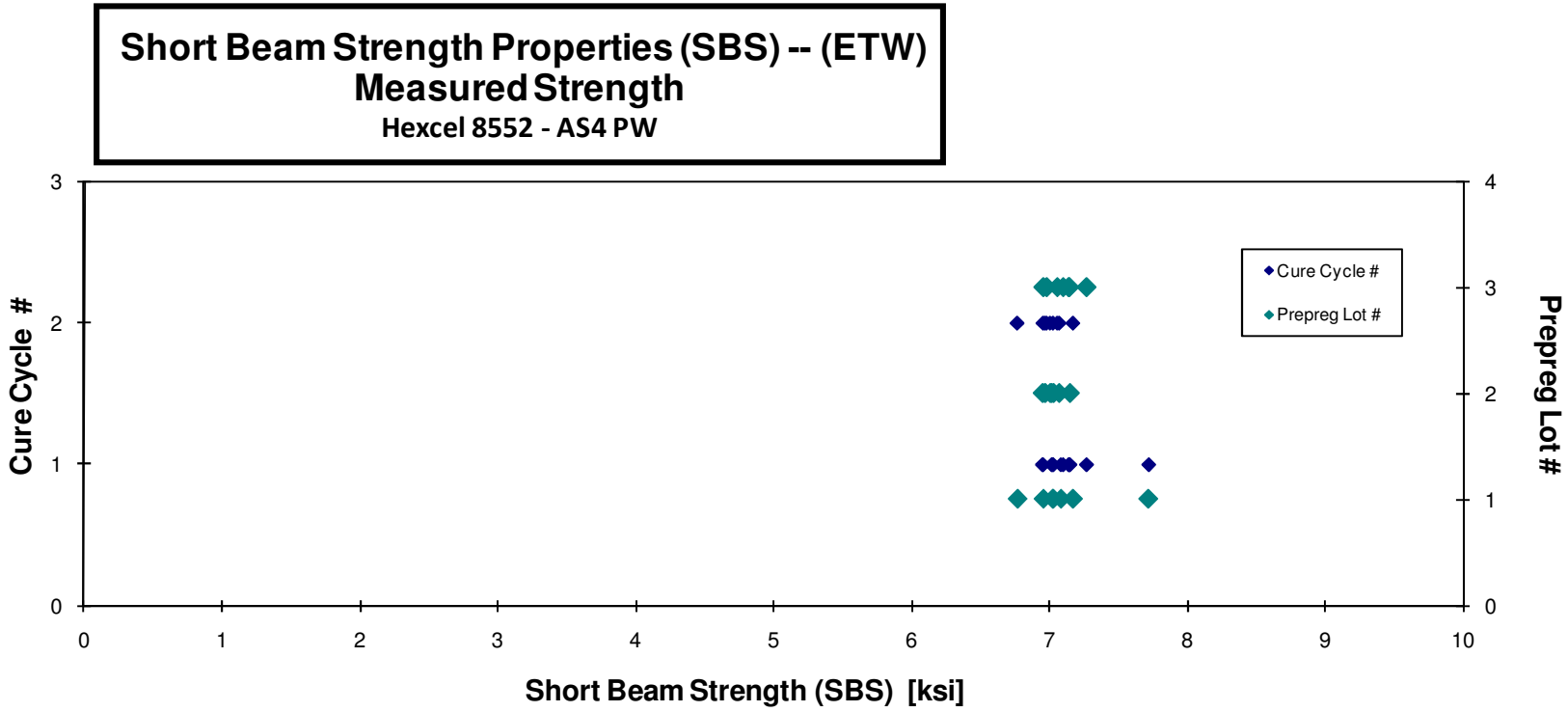
Average	**9.414**	**Average**	**0.0075**
Standard Dev.	**0.290**	**Standard Dev.**	
Coeff. of Var. [%]	**3.084**	**Coeff. of Var. [%]**	
Min.	**8.961**	**Min.**	**0.0070**
Max.	**9.899**	**Max.**	**0.0078**
Number of Spec.	**21**	**Number of Spec.**	**21**


Short Beam Strength Properties (SBS) -- (ETD)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short Beam Strength (SBS) [ksi]
0
10
20
0
1
2
3
0
1
2
3
4

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

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
HFPQA11OD	A	M1	1	1	6.952	0.251	32	0.0078	COMPRESSION
HFPQA11PD	A	M1	1	1	7.716	0.250	32	0.0078	COMPRESSION
HFPQA11QD	A	M1	1	1	7.080	0.249	32	0.0078	COMPRESSION
HFPQA11RD	A	M1	1	1	7.019	0.248	32	0.0077	COMPRESSION
HFPQA21ED	A	M2	1	2	6.763	0.251	32	0.0079	COMPRESSION
HFPQA21GD	A	M2	1	2	7.023	0.244	32	0.0076	COMPRESSION
HFPQA21HD	A	M2	1	2	7.167	0.239	32	0.0075	COMPRESSION
HFPQB11ED	B	M1	2	1	6.946	0.252	32	0.0079	COMPRESSION
HFPQB11FD	B	M1	2	1	7.145	0.240	32	0.0075	COMPRESSION
HFPQB11GD	B	M1	2	1	7.013	0.237	32	0.0074	COMPRESSION
HFPQB11HD	B	M1	2	1	7.025	0.249	32	0.0078	COMPRESSION
HFPQB21FD	B	M2	2	2	7.001	0.250	32	0.0078	COMPRESSION
HFPQB21GD	B	M2	2	2	6.964	0.248	32	0.0077	COMPRESSION
HFPQB21HD	B	M2	2	2	7.067	0.243	32	0.0076	COMPRESSION
HFPQC11ED	C	M1	3	1	7.096	0.238	32	0.0074	COMPRESSION
HFPQC11FD	C	M1	3	1	7.140	0.240	32	0.0075	COMPRESSION
HFPQC11HD	C	M1	3	1	7.135	0.238	32	0.0074	COMPRESSION
HFPQC11ID	C	M1	3	1	7.266	0.249	32	0.0078	COMPRESSION
HFPQC21ED	C	M2	3	2	6.976	0.248	32	0.0077	COMPRESSION
HFPQC21FD	C	M2	3	2	7.053	0.249	32	0.0078	COMPRESSION
HFPQC21GD	C	M2	3	2	6.951	0.249	32	0.0078	COMPRESSION

Average	**7.071**	**Average**	**0.0077**
Standard Dev.	**0.181**	**Standard Dev.**	
Coeff. of Var. [%]	**2.557**	**Coeff. of Var. [%]**	
Min.	**6.763**	**Min.**	**0.0074**
Max.	**7.716**	**Max.**	**0.0079**
Number of Spec.	**21**	**Number of Spec.**	**21**


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

4.14 Open Hole Tension 1 Properties

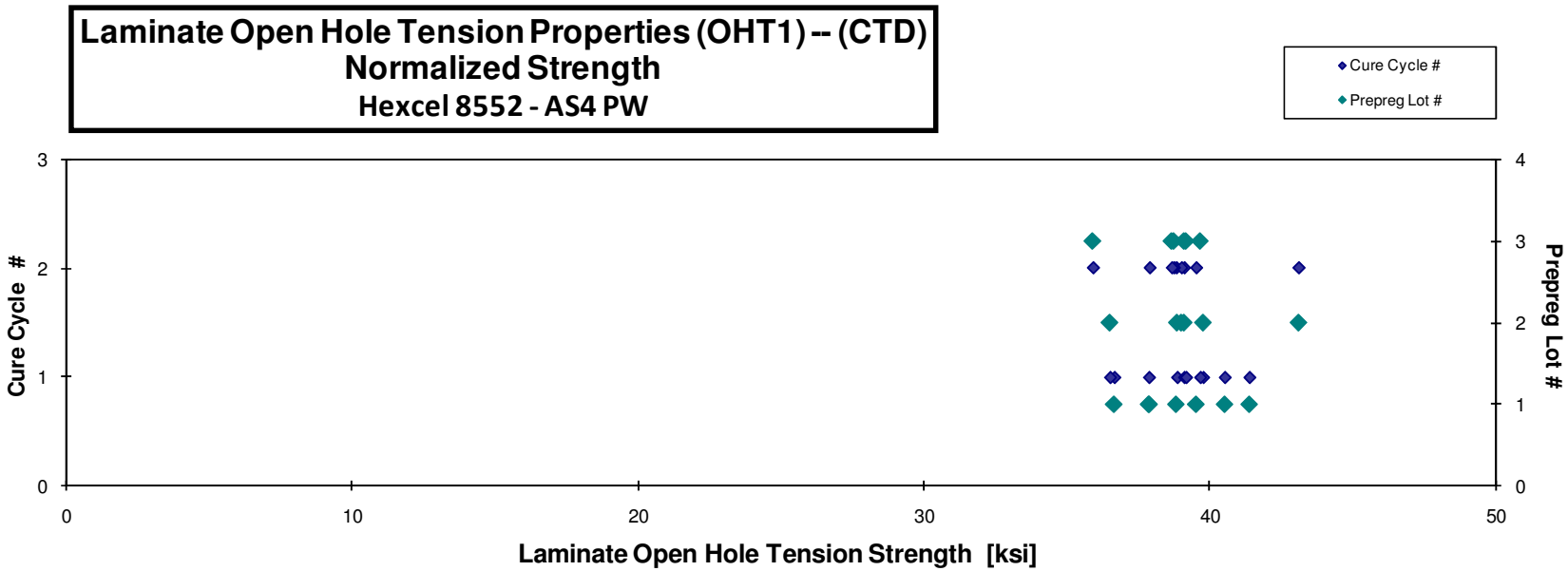
Laminate Open Hole Tension Properties (OHT1) -- (CTD)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPDA116B	A	M1	1	1	38.058	0.124	16	LGM	0.0078	37.880
HFPDA117B	A	M1	1	1	41.525	0.124	16	LGM	0.0078	41.398
HFPDA118B	A	M1	1	1	41.499	0.122	16	LGM	0.0076	40.535
HFPDA119B	A	M1	1	1	36.792	0.124	16	LGM	0.0078	36.664
HFPDA216B	A	M2	1	2	38.676	0.125	16	LGM	0.0078	38.836
HFPDA217B	A	M2	1	2	38.420	0.123	16	LGM	0.0077	37.901
HFPDA218B	A	M2	1	2	42.477	0.116	16	LGM	0.0073	39.533
HFPDB116B	B	M1	2	1	35.920	0.127	16	LGM	0.0079	36.515
HFPDB117B	B	M1	2	1	38.316	0.127	16	LGM	0.0079	38.869
HFPDB118B	B	M1	2	1	39.960	0.124	16	LGM	0.0078	39.779
HFPDB216B	B	M2	2	2	42.396	0.127	16	LGM	0.0079	43.121
HFPDB217B	B	M2	2	2	38.631	0.126	16	LGM	0.0079	39.111
HFPDB218B	B	M2	2	2	38.458	0.127	16	LGM	0.0079	39.013
HFPDC116B	C	M1	3	1	37.947	0.129	16	LGM	0.0080	39.108
HFPDC117B	C	M1	3	1	38.748	0.128	16	LGM	0.0080	39.674
HFPDC118B	C	M1	3	1	40.323	0.121	16	LGM	0.0076	39.181
HFPDC216B	C	M2	3	2	38.198	0.127	16	LGM	0.0079	38.754
HFPDC217B	C	M2	3	2	34.405	0.130	16	LGM	0.0081	35.917
HFPDC218B	C	M2	3	2	39.594	0.122	16	LGM	0.0076	38.679

Average	38.965	
Standard Dev.	2.092	
Coeff. of Var. [%]	5.368	
Min.	34.405	
Max.	42.477	
Number of Spec.	19	

$Average_{norm}$	0.0078	38.972
$Standard\ Dev._{norm}$		1.671
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.289
Min.	0.0073	35.917
Max.	0.0081	43.121
Number of Spec.	19	19


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

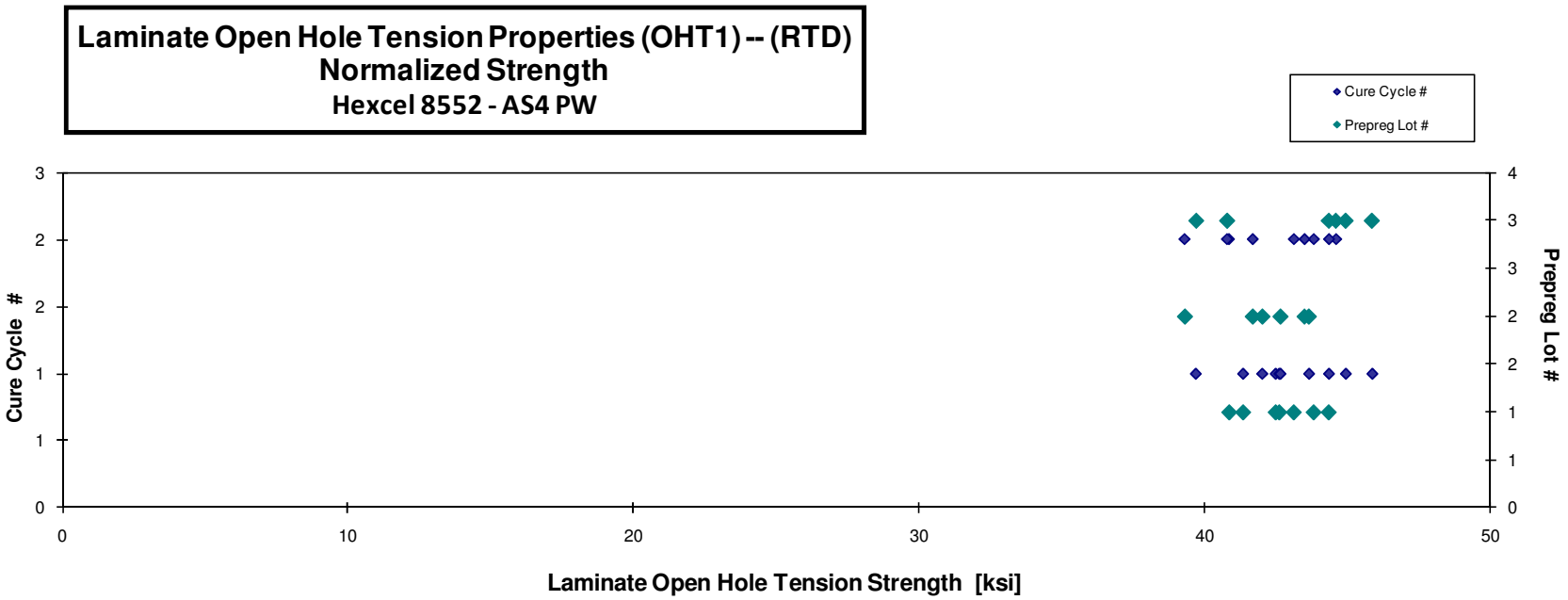
Laminate Open Hole Tension Properties (OHT1) -- (RTD) Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPDA111A	A	M1	1	1	42.838	0.120	16	LGM	0.0075	41.351
HFPDA112A	A	M1	1	1	42.660	0.124	16	LGM	0.0078	42.490
HFPDA113A	A	M1	1	1	44.734	0.124	16	LGM	0.0077	44.352
HFPDA114A	A	M1	1	1	43.040	0.124	16	LGM	0.0077	42.615
HFPDA211A	A	M2	1	2	44.035	0.116	16	LGM	0.0072	40.860
HFPDA212A	A	M2	1	2	44.306	0.123	16	LGM	0.0077	43.821
HFPDA213A	A	M2	1	2	42.890	0.125	16	LGM	0.0078	43.125
HFPDB111A	B	M1	2	1	44.162	0.119	16	LGM	0.0074	42.021
HFPDB112A	B	M1	2	1	43.080	0.126	16	LGM	0.0079	43.656
HFPDB113A	B	M1	2	1	41.939	0.127	16	LGM	0.0079	42.656
HFPDB211A	B	M2	2	2	44.687	0.121	16	LGM	0.0076	43.500
HFPDB212A	B	M2	2	2	38.352	0.128	16	LGM	0.0080	39.310
HFPDB213A	B	M2	2	2	40.912	0.127	16	LGM	0.0079	41.688
HFPDC111A	C	M1	3	1	48.805	0.117	16	LGM	0.0073	45.866
HFPDC112A	C	M1	3	1	44.413	0.126	16	LGM	0.0079	44.941
HFPDC113A	C	M1	3	1	38.421	0.129	16	LGM	0.0081	39.704
HFPDC211A	C	M2	3	2	47.838	0.116	16	LGM	0.0073	44.599
HFPDC212A	C	M2	3	2	39.519	0.129	16	LGM	0.0081	40.791
HFPDC213A	C	M2	3	2	42.811	0.129	16	LGM	0.0081	44.355

Average	43.129	
Standard Dev.	2.679	
Coeff. of Var. [%]	6.211	
Min.	38.352	
Max.	48.805	
Number of Spec.	19	

$Average_{norm}$	0.00774	42.721
$Standard\ Dev._{norm}$		1.794
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.200
Min.	0.0072	39.310
Max.	0.0081	45.866
Number of Spec.	19	19


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

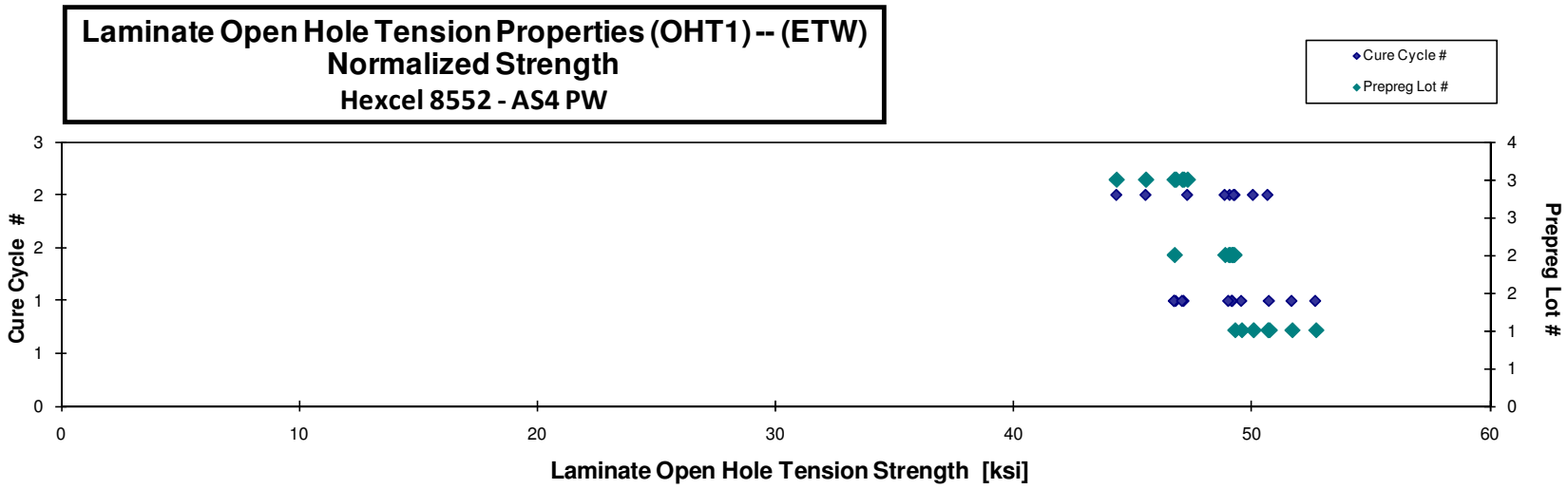
Laminate Open Hole Tension Properties (OHT1) -- (ETW)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPDA11AD	A	M1	1	1	50.884	0.124	16	LGM	0.0078	50.735
HFPDA11BD	A	M1	1	1	51.934	0.124	16	LGM	0.0078	51.692
HFPDA11CD	A	M1	1	1	53.058	0.124	16	LGM	0.0077	52.690
HFPDA11DD	A	M1	1	1	49.498	0.125	16	LGM	0.0078	49.571
HFPDA21AD	A	M2	1	2	50.760	0.123	16	LGM	0.0077	50.062
HFPDA21BD	A	M2	1	2	50.595	0.125	16	LGM	0.0078	50.676
HFPDA21CD	A	M2	1	2	49.383	0.125	16	LGM	0.0078	49.291
HFPDB11AD	B	M1	2	1	48.331	0.127	16	LGM	0.0079	49.196
HFPDB11BD	B	M1	2	1	48.246	0.127	16	LGM	0.0079	49.167
HFPDB11CD	B	M1	2	1	48.041	0.127	16	LGM	0.0080	49.022
HFPDB11DD	B	M1	2	1	45.789	0.127	16	LGM	0.0080	46.749
HFPDB21AD	B	M2	2	2	47.799	0.128	16	LGM	0.0080	49.082
HFPDB21BD	B	M2	2	2	47.570	0.128	16	LGM	0.0080	48.873
HFPDB21CD	B	M2	2	2	48.054	0.128	16	LGM	0.0080	49.254
HFPDC11AD	C	M1	3	1	46.407	0.127	16	LGM	0.0079	47.144
HFPDC11BD	C	M1	3	1	45.668	0.128	16	LGM	0.0080	46.809
HFPDC11CD	C	M1	3	1	46.120	0.126	16	LGM	0.0079	46.742
HFPDC11DD	C	M1	3	1	46.267	0.127	16	LGM	0.0079	47.077
HFPDC21AD	C	M2	3	2	44.474	0.128	16	LGM	0.0080	45.543
HFPDC21BD	C	M2	3	2	43.261	0.128	16	LGM	0.0080	44.313
HFPDC21CD	C	M2	3	2	46.641	0.127	16	LGM	0.0079	47.295

Average	48.037	
Standard Dev.	2.494	
Coeff. of Var. [%]	5.192	
Min.	43.261	
Max.	53.058	
Number of Spec.	21	

$Average_{norm}$	0.00790	48.618
$Standard\ Dev._{norm}$		2.052
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.221
Min.	0.0077	44.313
Max.	0.0080	52.690
Number of Spec.	21	21


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

4.15 Open Hole Tension 2 Properties

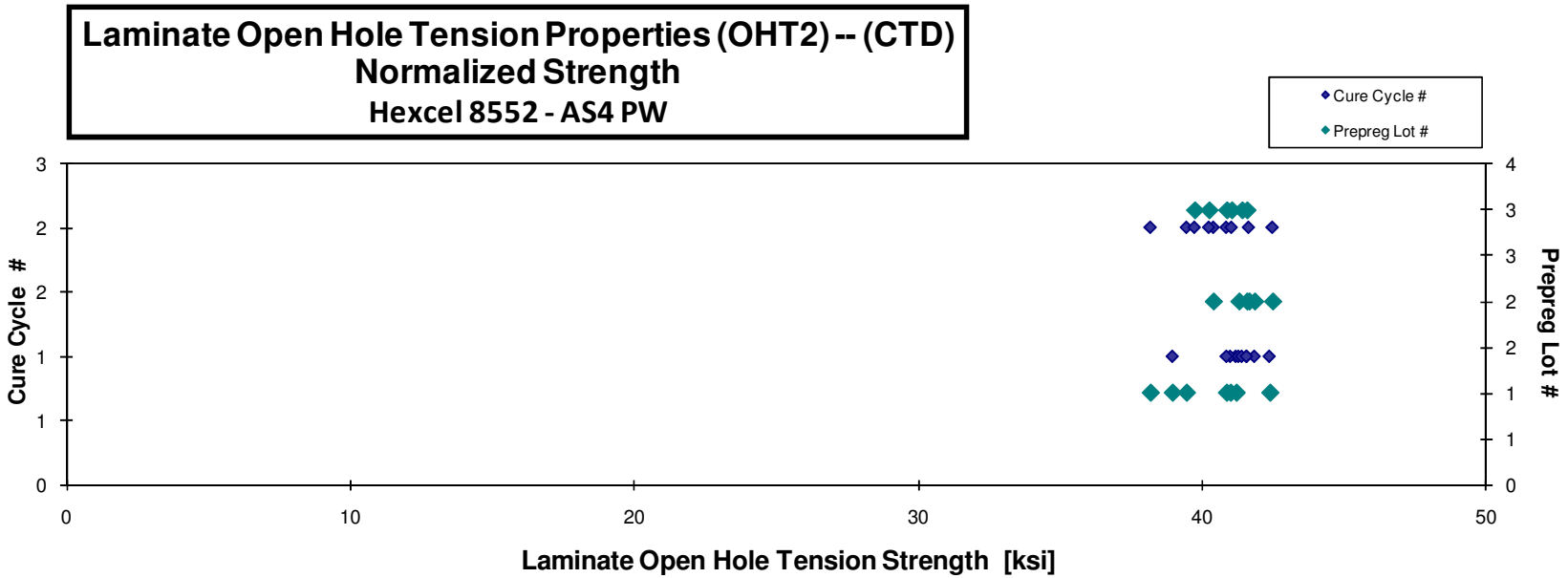
Laminate Open Hole Tension Properties (OHT2) -- (CTD)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPEA116B	A	M1	1	1	41.182	0.156	20	LGM	0.0078	41.200
HFPEA117B	A	M1	1	1	39.691	0.153	20	LGM	0.0077	38.966
HFPEA118B	A	M1	1	1	42.860	0.149	20	LGM	0.0075	41.005
HFPEA119B	A	M1	1	1	42.559	0.155	20	LGM	0.0078	42.381
HFPEA216B	A	M2	1	2	38.017	0.157	20	LGM	0.0078	38.188
HFPEA217B	A	M2	1	2	40.924	0.156	20	LGM	0.0078	40.863
HFPEA218B	A	M2	1	2	41.260	0.149	20	LGM	0.0075	39.461
HFPEB116B	B	M1	2	1	40.472	0.160	20	LGM	0.0080	41.579
HFPEB117B	B	M1	2	1	40.517	0.159	20	LGM	0.0080	41.296
HFPEB119B	B	M1	2	1	41.468	0.157	20	LGM	0.0079	41.849
HFPEB216B	B	M2	2	2	41.199	0.161	20	LGM	0.0080	42.484
HFPEB217B	B	M2	2	2	39.601	0.159	20	LGM	0.0080	40.405
HFPEB218B	B	M2	2	2	42.416	0.153	20	LGM	0.0077	41.650
HFPEC116B	C	M1	3	1	40.675	0.159	20	LGM	0.0079	41.409
HFPEC117B	C	M1	3	1	40.786	0.156	20	LGM	0.0078	40.869
HFPEC118B	C	M1	3	1	44.178	0.147	20	LGM	0.0073	41.578
HFPEC216B	C	M2	3	2	39.813	0.158	20	LGM	0.0079	40.247
HFPEC217B	C	M2	3	2	39.938	0.155	20	LGM	0.0078	39.742
HFPEC218B	C	M2	3	2	43.391	0.148	20	LGM	0.0074	41.041

Average	**41.102**	
Standard Dev.	**1.484**	
Coeff. of Var. [%]	**3.611**	
Min.	**38.017**	
Max.	**44.178**	
Number of Spec.	**19**	

$Average_{norm}$	**0.0078**	**40.853**
$Standard\ Dev._{norm}$		**1.125**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.753**
Min.	**0.0073**	**38.188**
Max.	**0.0080**	**42.484**
Number of Spec.	**19**	**19**


Laminate Open Hole Tension Properties (OHT2) -- (CTD)
Normalized Strength
Hexcel 8552 - AS4 PW
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 (OHT2) -- (RTD) Strength

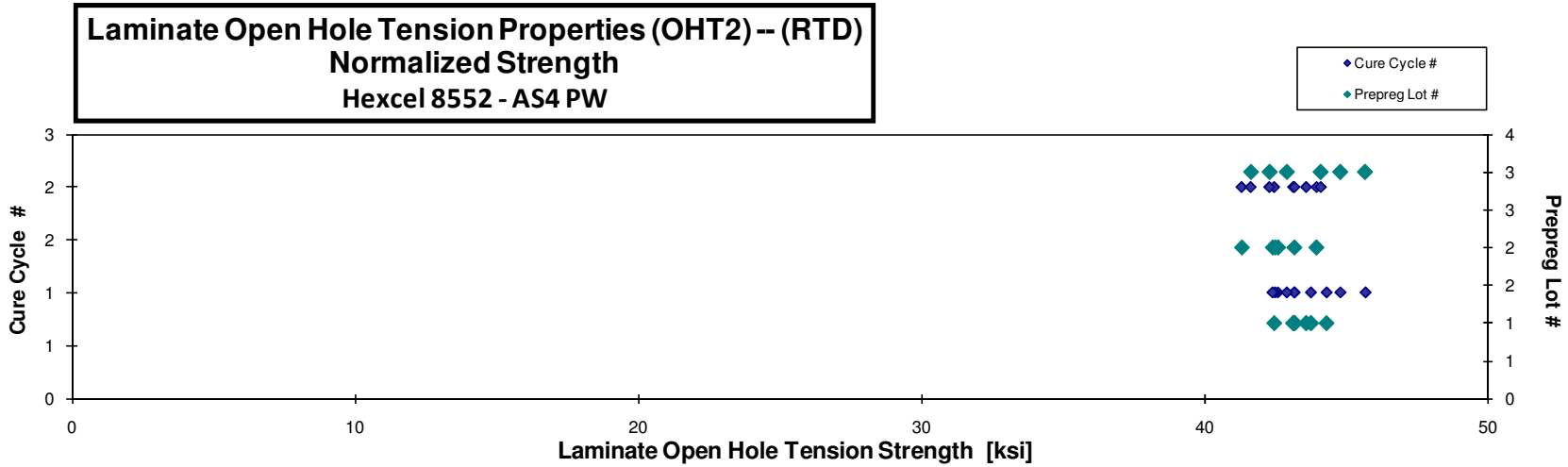
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

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]
HFPEA111A	A	M1	1	1	45.281	0.149	20	LGM	0.0074	43.186
HFPEA112A	A	M1	1	1	43.580	0.155	20	LGM	0.0077	43.171
HFPEA113A	A	M1	1	1	44.209	0.156	20	LGM	0.0078	44.313
HFPEA114A	A	M1	1	1	43.674	0.156	20	LGM	0.0078	43.758
HFPEA211A	A	M2	1	2	45.197	0.149	20	LGM	0.0074	43.130
HFPEA212A	A	M2	1	2	43.794	0.151	20	MGM	0.0076	42.461
HFPEA213A	A	M2	1	2	44.374	0.153	20	MGM	0.0077	43.592
HFPEB111A	B	M1	2	1	43.332	0.153	20	LGM	0.0077	42.595
HFPEB112A	B	M1	2	1	41.935	0.158	20	LGM	0.0079	42.495
HFPEB113A	B	M1	2	1	41.441	0.160	20	LGM	0.0080	42.406
HFPEB211A	B	M2	2	2	44.052	0.153	20	LGM	0.0076	43.177
HFPEB212A	B	M2	2	2	40.531	0.159	20	LGM	0.0080	41.315
HFPEB214A	B	M2	2	2	42.618	0.161	20	LGM	0.0080	43.957
HFPEC111A	C	M1	3	1	45.707	0.146	20	MGM	0.0073	42.909
HFPEC112A	C	M1	3	1	46.535	0.153	20	LGM	0.0077	45.679
HFPEC113A	C	M1	3	1	44.370	0.158	20	LGM	0.0079	44.796
HFPEC211A	C	M2	3	2	46.044	0.141	20	MGM	0.0071	41.636
HFPEC212A	C	M2	3	2	43.589	0.151	20	LGM	0.0076	42.294
HFPEC213A	C	M2	3	2	43.631	0.158	20	LGM	0.0079	44.106

Average	**43.889**	
Standard Dev.	**1.537**	
Coeff. of Var. [%]	**3.501**	
Min.	**40.531**	
Max.	**46.535**	
Number of Spec.	**19**	

$Average_{norm}$	**0.00769**	**43.209**
$Standard\ Dev._{norm}$		**1.073**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.484**
Min.	**0.0071**	**41.315**
Max.	**0.0080**	**45.679**
Number of Spec.	**19**	**19**


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

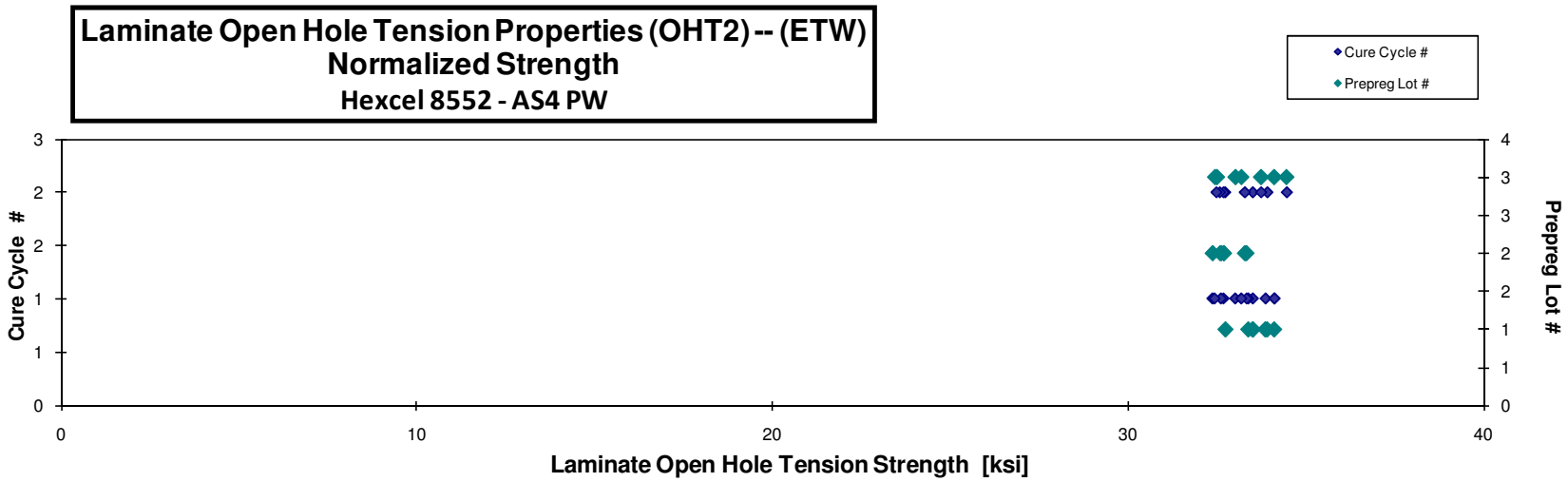
Laminate Open Hole Tension Properties (OHT2) -- (ETW)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPEA11AD	A	M1	1	1	33.427	0.158	20	AGM	0.0079	33.877
HFPEA11BD	A	M1	1	1	32.939	0.159	20	AGM	0.0079	33.524
HFPEA11CD	A	M1	1	1	32.906	0.158	20	AGM	0.0079	33.395
HFPEA11DD	A	M1	1	1	33.754	0.158	20	AGM	0.0079	34.126
HFPEA21AD	A	M2	1	2	34.217	0.155	20	AGM	0.0077	33.929
HFPEA21BD	A	M2	1	2	32.894	0.155	20	AGM	0.0078	32.750
HFPEA21CD	A	M2	1	2	33.578	0.156	20	AGM	0.0078	33.525
HFPEB11AD	B	M1	2	1	31.647	0.160	20	AGM	0.0080	32.391
HFPEB11BD	B	M1	2	1	31.983	0.160	20	AGM	0.0080	32.704
HFPEB11CD	B	M1	2	1	31.813	0.160	20	AGM	0.0080	32.632
HFPEB11DD	B	M1	2	1	32.552	0.160	20	AGM	0.0080	33.348
HFPEB21AD	B	M2	2	2	32.315	0.161	20	AGM	0.0080	33.299
HFPEB21BD	B	M2	2	2	31.706	0.161	20	AGM	0.0080	32.702
HFPEB21CD	B	M2	2	2	31.666	0.161	20	AGM	0.0080	32.600
HFPEC11AD	C	M1	3	1	34.879	0.153	20	AGM	0.0076	34.127
HFPEC11BD	C	M1	3	1	32.511	0.159	20	AGM	0.0079	33.032
HFPEC11CD	C	M1	3	1	32.643	0.159	20	AGM	0.0079	33.201
HFPEC11DD	C	M1	3	1	32.147	0.157	20	AGM	0.0079	32.452
HFPEC21AD	C	M2	3	2	33.043	0.153	20	AGM	0.0077	32.507
HFPEC21BD	C	M2	3	2	33.865	0.159	20	AGM	0.0079	34.473
HFPEC21CD	C	M2	3	2	32.949	0.160	20	AGM	0.0080	33.755

Average	32.830	
Standard Dev.	0.888	
Coeff. of Var. [%]	2.704	
Min.	31.647	
Max.	34.879	
Number of Spec.	21	

$Average_{norm}$	0.00790	33.255
$Standard\ Dev._{norm}$		0.631
Coeff. of Var. $[\%]_{norm}$		1.896
Min.	0.0076	32.391
Max.	0.0080	34.473
Number of Spec.	21	21


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

4.16 Open Hole Tension 3 Properties

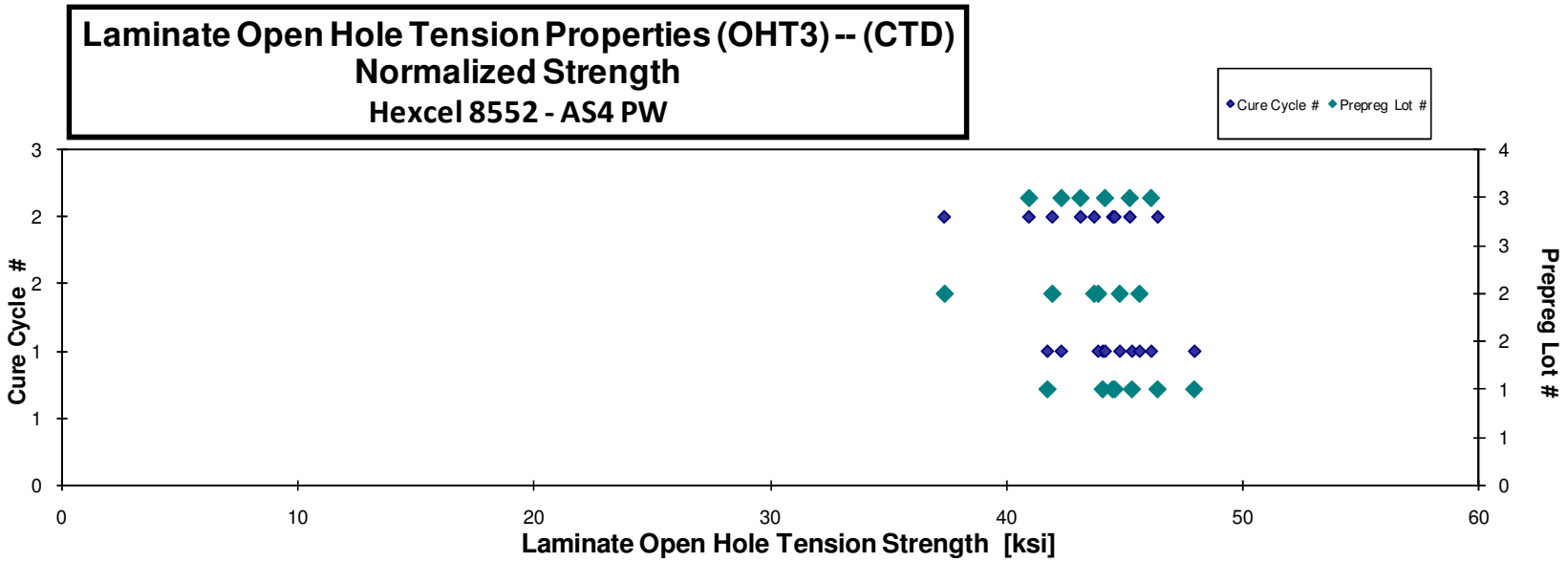
Laminate Open Hole Tension Properties (OHT3) -- (CTD)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

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]
HFPFA116B	A	M1	1	1	45.793	0.116	15	LGM	0.0077	45.303
HFPFA117B	A	M1	1	1	42.233	0.116	15	LGM	0.0077	41.727
HFPFA118B	A	M1	1	1	50.034	0.112	15	LGM	0.0075	47.946
HFPFA119B	A	M1	1	1	47.482	0.109	15	LGM	0.0072	44.067
HFPFA216B	A	M2	1	2	44.331	0.117	15	LGM	0.0078	44.489
HFPFA217B	A	M2	1	2	44.754	0.117	15	LGM	0.0078	44.576
HFPFA218B	A	M2	1	2	47.275	0.115	15	LGM	0.0077	46.393
HFPFB116B	B	M1	2	1	44.821	0.119	15	LGM	0.0079	45.625
HFPFB117B	B	M1	2	1	43.515	0.118	15	LGM	0.0079	43.874
HFPFB118B	B	M1	2	1	45.857	0.114	15	LGM	0.0076	44.792
HFPFB216B	B	M2	2	2	41.570	0.118	15	LGM	0.0079	41.931
HFPFB217B	B	M2	2	2	37.332	0.117	15	LGM	0.0078	37.369
HFPFB218B	B	M2	2	2	45.987	0.111	15	LGM	0.0074	43.707
HFPFC116B	C	M1	3	1	43.327	0.119	15	LGM	0.0080	44.167
HFPFC117B	C	M1	3	1	42.498	0.117	15	LGM	0.0078	42.316
HFPFC118B	C	M1	3	1	49.792	0.108	15	LGM	0.0072	46.118
HFPFC216B	C	M2	3	2	44.697	0.118	15	LGM	0.0079	45.213
HFPFC217B	C	M2	3	2	40.997	0.117	15	LGM	0.0078	40.945
HFPFC218B	C	M2	3	2	45.630	0.111	15	LGM	0.0074	43.128

Average	**44.628**	
Standard Dev.	**3.036**	
Coeff. of Var. [%]	**6.803**	
Min.	**37.332**	
Max.	**50.034**	
Number of Spec.	**19**	

$Average_{norm}$	**0.0077**	**43.878**
$Standard\ Dev._{norm}$		**2.345**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**5.345**
Min.	**0.0072**	**37.369**
Max.	**0.0080**	**47.946**
Number of Spec.	**19**	**19**


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

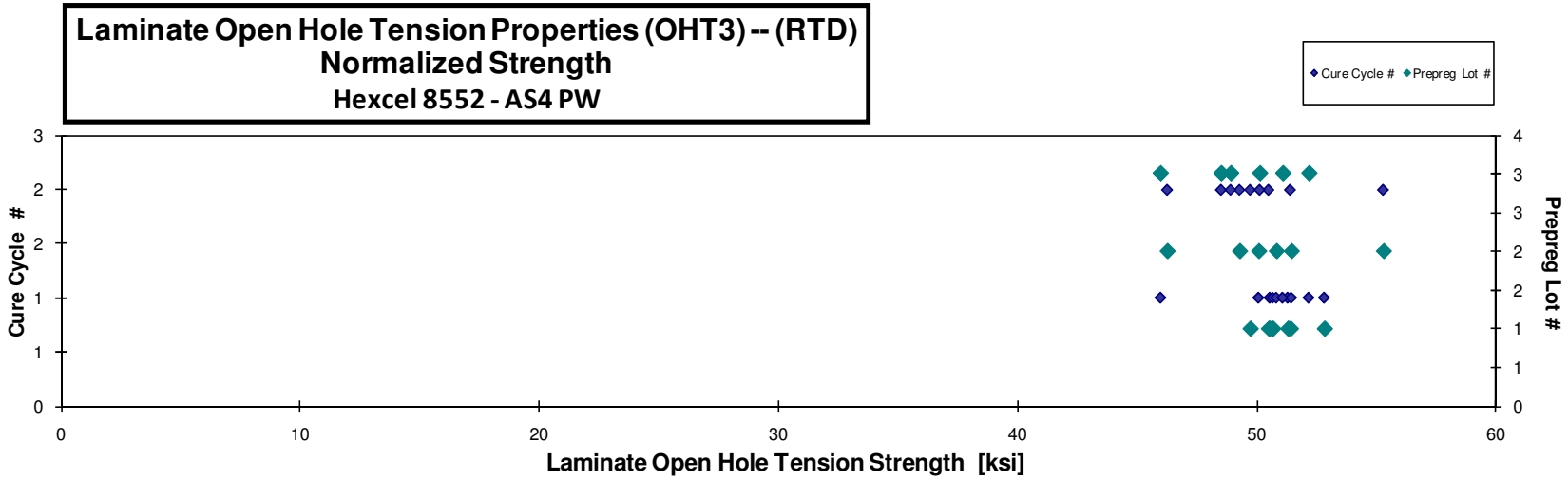
Laminate Open Hole Tension Properties (OHT3) -- (RTD)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPFA111A	A	M1	1	1	55.716	0.108	15	LGM	0.0072	51.295
HFPFA112A	A	M1	1	1	49.892	0.124	15	LGM	0.0083	52.820
HFPFA113A	A	M1	1	1	47.423	0.125	15	LGM	0.0083	50.538
HFPFA114A	A	M1	1	1	50.560	0.117	15	LGM	0.0078	50.661
HFPFA211A	A	M2	1	2	51.748	0.114	15	LGM	0.0076	50.487
HFPFA212A	A	M2	1	2	51.834	0.116	15	LGM	0.0077	51.398
HFPFA213A	A	M2	1	2	49.911	0.117	15	LGM	0.0078	49.719
HFPFB111A	B	M1	2	1	50.155	0.117	15	LGM	0.0078	50.069
HFPFB112A	B	M1	2	1	51.185	0.118	15	LGM	0.0078	51.440
HFPFB113A	B	M1	2	1	50.191	0.118	15	LGM	0.0079	50.813
HFPFB211A	B	M2	2	2	48.867	0.111	15	LGM	0.0074	46.243
HFPFB212A	B	M2	2	2	55.233	0.117	15	LGM	0.0078	55.296
HFPFB213A	B	M2	2	2	48.939	0.118	15	LGM	0.0079	49.273
HFPFC111A	C	M1	3	1	56.052	0.109	15	LGM	0.0073	52.171
HFPFC112A	C	M1	3	1	51.549	0.116	15	LGM	0.0077	51.079
HFPFC113A	C	M1	3	1	45.263	0.119	15	LGM	0.0079	45.960
HFPFC211A	C	M2	3	2	52.599	0.111	15	LGM	0.0074	50.119
HFPFC212A	C	M2	3	2	48.411	0.117	15	LGM	0.0078	48.501
HFPFC213A	C	M2	3	2	47.239	0.121	15	LGM	0.0081	48.901

Average	50.672	
Standard Dev.	2.859	
Coeff. of Var. [%]	5.642	
Min.	45.263	
Max.	56.052	
Number of Spec.	19	

$Average_{norm}$	0.00776	50.357
$Standard\ Dev._{norm}$		2.125
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.220
Min.	0.0072	45.960
Max.	0.0083	55.296
Number of Spec.	19	19


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

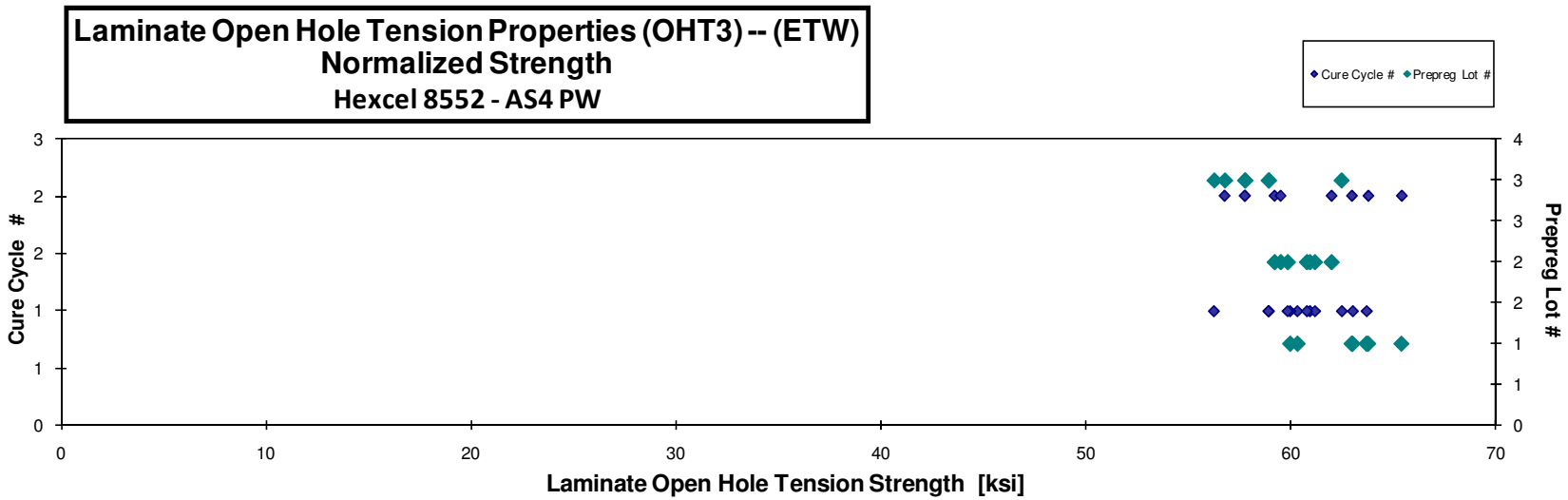
Laminate Open Hole Tension Properties (OHT3) -- (ETW)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPFA11AD	A	M1	1	1	59.853	0.118	15	LGM	0.0079	60.322
HFPFA11BD	A	M1	1	1	62.689	0.118	15	LGM	0.0078	63.020
HFPFA11CD	A	M1	1	1	62.987	0.118	15	LGM	0.0079	63.696
HFPFA11DD	A	M1	1	1	59.053	0.119	15	LGM	0.0079	59.970
HFPFA21AD	A	M2	1	2	65.535	0.117	15	LGM	0.0078	65.404
HFPFA21BD	A	M2	1	2	63.869	0.117	15	LGM	0.0078	63.778
HFPFA21CD	A	M2	1	2	62.563	0.118	15	LGM	0.0079	62.973
HFPFB11AD	B	M1	2	1	60.488	0.118	15	LGM	0.0079	60.936
HFPFB11BD	B	M1	2	1	59.124	0.118	15	LGM	0.0079	59.848
HFPFB11CD	B	M1	2	1	60.236	0.119	15	LGM	0.0079	61.180
HFPFB11DD	B	M1	2	1	59.897	0.119	15	LGM	0.0079	60.784
HFPFB21AD	B	M2	2	2	61.786	0.117	15	LGM	0.0078	61.989
HFPFB21BD	B	M2	2	2	57.828	0.120	15	LGM	0.0080	59.212
HFPFB21CD	B	M2	2	2	58.278	0.119	15	LGM	0.0080	59.506
HFPFC11AD	C	M1	3	1	63.611	0.115	15	LGM	0.0077	62.487
HFPFC11BD	C	M1	3	1	58.561	0.118	15	LGM	0.0079	58.936
HFPFC11CD	C	M1	3	1	58.363	0.118	15	LGM	0.0079	58.912
HFPFC11DD	C	M1	3	1	56.006	0.118	15	LGM	0.0078	56.262
HFPFC21AD	C	M2	3	2	56.791	0.117	15	LGM	0.0078	56.783
HFPFC21BD	C	M2	3	2	56.942	0.119	15	LGM	0.0079	57.770
HFPFC21CD	C	M2	3	2	57.186	0.118	15	LGM	0.0079	57.764

Average	**60.078**	
Standard Dev.	**2.668**	
Coeff. of Var. [%]	**4.441**	
Min.	**56.006**	
Max.	**65.535**	
Number of Spec.	**21**	

$Average_{norm}$	**0.00786**	**60.549**
$Standard\ Dev._{norm}$		**2.443**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.035**
Min.	**0.0077**	**56.262**
Max.	**0.0080**	**65.404**
Number of Spec.	**21**	**21**


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

4.17 Filled-Hole Tension 1 Properties

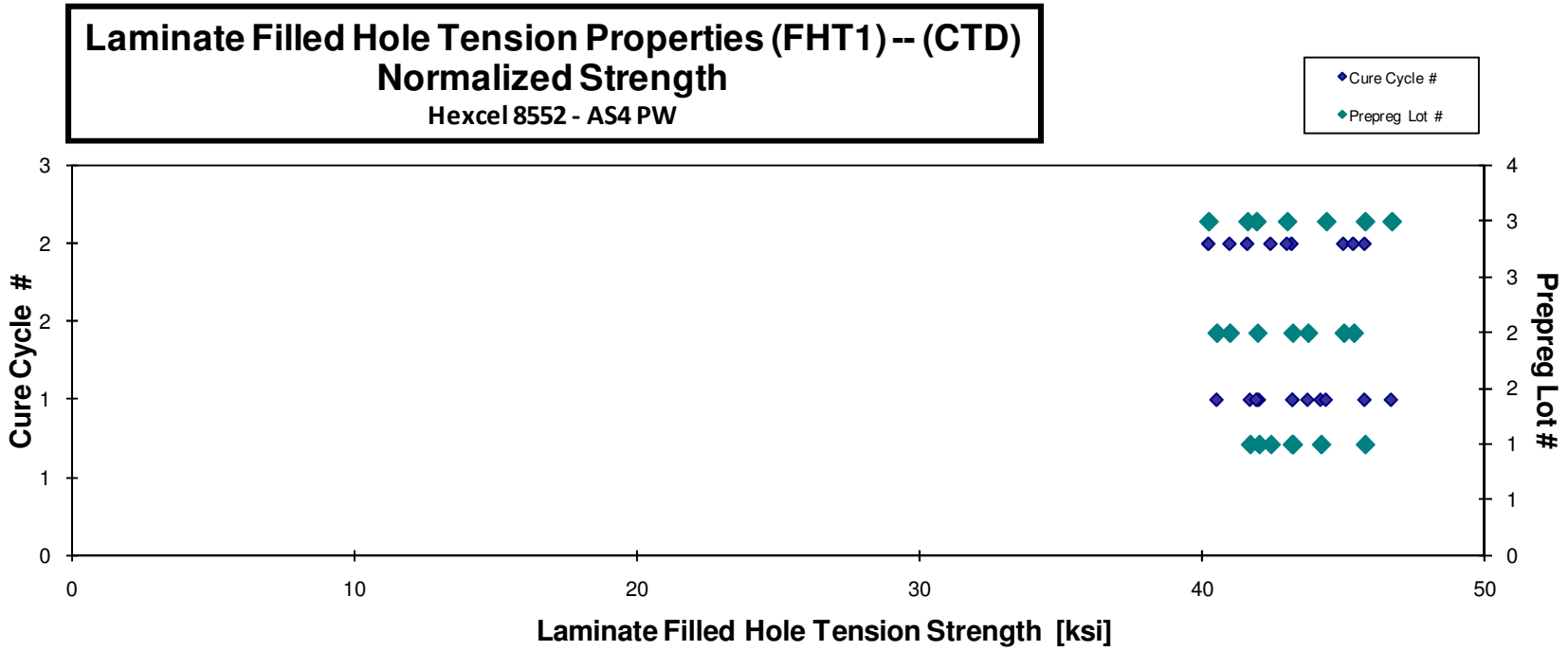
Laminate Filled Hole Tension Properties (FHT1) -- (CTD)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFP4A116B	A	M1	1	1	43.284	0.125	16	LGM	0.0078	43.197
HFP4A117B	A	M1	1	1	42.104	0.124	16	LGM	0.0077	41.682
HFP4A118B	A	M1	1	1	44.069	0.119	16	LGM	0.0074	42.004
HFP4A119B	A	M1	1	1	45.417	0.121	16	LGM	0.0076	44.192
HFP4A216B	A	M2	1	2	45.900	0.124	16	LGM	0.0078	45.747
HFP4A218B	A	M2	1	2	44.809	0.118	16	LGM	0.0074	42.415
HFP4A219B	A	M2	1	2	44.280	0.122	16	LGM	0.0076	43.162
HFP4B116B	B	M1	2	1	42.697	0.128	16	LGM	0.0080	43.729
HFP4B117B	B	M1	2	1	41.014	0.128	16	LGM	0.0080	41.945
HFP4B118B	B	M1	2	1	44.804	0.120	16	LGM	0.0075	43.189
HFP4B119B	B	M1	2	1	40.099	0.126	16	LGM	0.0079	40.506
HFP4B216B	B	M2	2	2	40.085	0.128	16	LGM	0.0080	40.963
HFP4B217B	B	M2	2	2	44.660	0.126	16	LGM	0.0079	44.994
HFP4B219B	B	M2	2	2	45.536	0.124	16	LGM	0.0078	45.348
HFP4C116B	C	M1	3	1	40.564	0.129	16	LGM	0.0081	41.908
HFP4C117B	C	M1	3	1	43.684	0.127	16	LGM	0.0079	44.378
HFP4C118B	C	M1	3	1	49.352	0.118	16	LGM	0.0074	46.689
HFP4C119B	C	M1	3	1	48.560	0.118	16	LGM	0.0073	45.746
HFP4C216B	C	M2	3	2	42.189	0.127	16	LGM	0.0079	42.995
HFP4C217B	C	M2	3	2	41.514	0.125	16	LGM	0.0078	41.592
HFP4C219B	C	M2	3	2	43.030	0.117	16	LGM	0.0073	40.214

Average	**43.698**	
Standard Dev.	**2.499**	
Coeff. of Var. [%]	**5.719**	
Min.	**40.085**	
Max.	**49.352**	
Number of Spec.	**21**	

$Average_{norm}$	**0.0077**	**43.171**
$Standard\ Dev._{norm}$		**1.830**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.240**
Min.	**0.0073**	**40.214**
Max.	**0.0081**	**46.689**
Number of Spec.	**21**	**21**


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

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

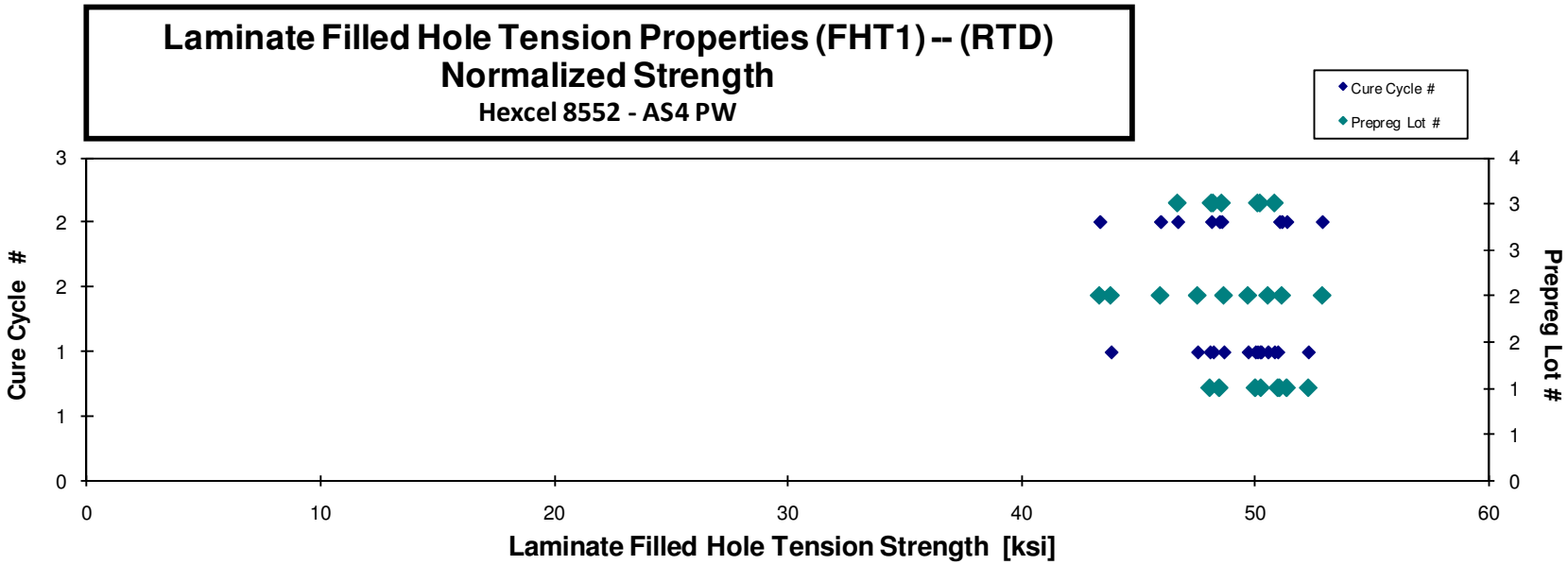
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFP4A111A	A	M1	1	1	55.126	0.118	16	LGM	0.0074	52.255
HFP4A112A	A	M1	1	1	51.949	0.122	16	LGM	0.0077	50.950
HFP4A113A	A	M1	1	1	48.061	0.125	16	LGM	0.0078	48.048
HFP4A114A	A	M1	1	1	49.790	0.125	16	LGM	0.0078	49.990
HFP4A115A	A	M1	1	1	50.286	0.125	16	LGM	0.0078	50.232
HFP4A211A	A	M2	1	2	51.548	0.117	16	LGM	0.0073	48.457
HFP4A213A	A	M2	1	2	51.706	0.123	16	LGM	0.0077	51.023
HFP4A215A	A	M2	1	2	51.180	0.125	16	LGM	0.0078	51.331
HFP4B111A	B	M1	2	1	45.982	0.119	16	LGM	0.0074	43.827
HFP4B112A	B	M1	2	1	49.218	0.126	16	LGM	0.0079	49.678
HFP4B113A	B	M1	2	1	49.553	0.127	16	LGM	0.0080	50.526
HFP4B114A	B	M1	2	1	47.686	0.127	16	LGM	0.0080	48.647
HFP4B115A	B	M1	2	1	46.507	0.128	16	LGM	0.0080	47.526
HFP4B211A	B	M2	2	2	45.588	0.119	16	LGM	0.0074	43.341
HFP4B212A	B	M2	2	2	52.499	0.126	16	LGM	0.0079	52.843
HFP4B213A	B	M2	2	2	44.743	0.128	16	LGM	0.0080	45.938
HFP4B214A	B	M2	2	2	50.181	0.127	16	LGM	0.0079	51.120
HFP4C111A	C	M1	3	1	53.811	0.118	16	LGM	0.0074	50.807
HFP4C112A	C	M1	3	1	47.921	0.126	16	LGM	0.0078	48.196
HFP4C113A	C	M1	3	1	48.970	0.128	16	LGM	0.0080	50.187
HFP4C114A	C	M1	3	1	48.768	0.128	16	LGM	0.0080	50.084
HFP4C211A	C	M2	3	2	52.656	0.115	16	LGM	0.0072	48.556
HFP4C212A	C	M2	3	2	48.627	0.123	16	LGM	0.0077	48.114
HFP4C214A	C	M2	3	2	45.400	0.128	16	LGM	0.0080	46.673

	Strength [ksi]
Average	49.490
Standard Dev.	2.749
Coeff. of Var. [%]	5.555
Min.	44.743
Max.	55.126
Number of Spec.	24

	t_{ply} [in]	$Strength_{norm}$ [ksi]
$Average_{norm}$	0.0077	49.098
$Standard\ Dev._{norm}$		2.403
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.894
Min.	0.0072	43.341
Max.	0.0080	52.843
Number of Spec.	24	24


Laminate Filled Hole Tension Properties (FHT1) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
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

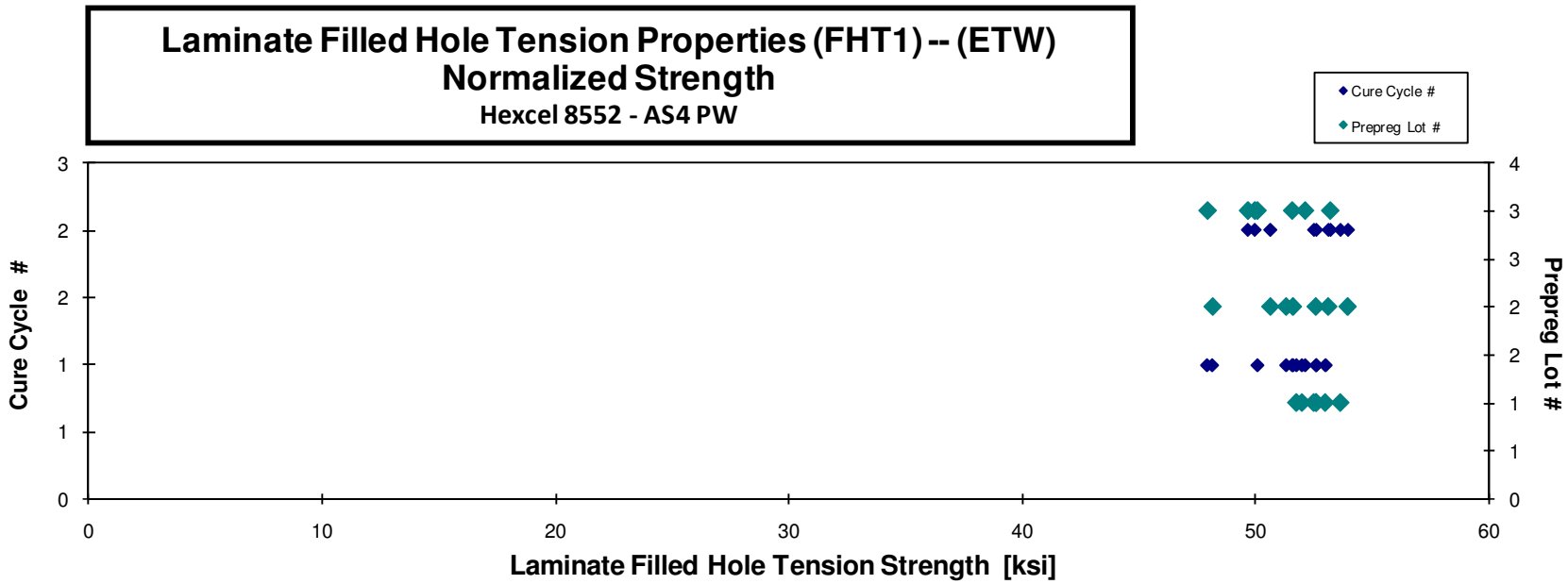
Laminate Filled Hole Tension Properties (FHT1) -- (ETW)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFP4A11AD	A	M1	1	1	52.617	0.123	16	LGM	0.0077	51.710
HFP4A11BD	A	M1	1	1	52.658	0.123	16	LGM	0.0077	51.948
HFP4A11CD	A	M1	1	1	53.120	0.124	16	LGM	0.0077	52.566
HFP4A11DD	A	M1	1	1	53.737	0.123	16	LGM	0.0077	52.954
HFP4A21AD	A	M2	1	2	52.808	0.124	16	LGM	0.0077	52.463
HFP4A21BD	A	M2	1	2	52.735	0.124	16	LGM	0.0078	52.559
HFP4A21CD	A	M2	1	2	53.504	0.125	16	LGM	0.0078	53.597
HFP4B11AD	B	M1	2	1	50.299	0.128	16	LGM	0.0080	51.568
HFP4B11BD	B	M1	2	1	46.944	0.128	16	LGM	0.0080	48.117
HFP4B11CD	B	M1	2	1	51.237	0.128	16	LGM	0.0080	52.550
HFP4B11DD	B	M1	2	1	50.114	0.128	16	LGM	0.0080	51.278
HFP4B21AD	B	M2	2	2	49.792	0.127	16	LGM	0.0079	50.597
HFP4B21BD	B	M2	2	2	53.074	0.127	16	LGM	0.0079	53.918
HFP4B21CD	B	M2	2	2	52.386	0.126	16	LGM	0.0079	53.079
HFP4C11AD	C	M1	3	1	47.693	0.125	16	LGM	0.0078	47.903
HFP4C11BD	C	M1	3	1	48.999	0.127	16	LGM	0.0080	50.046
HFP4C11CD	C	M1	3	1	50.961	0.128	16	LGM	0.0080	52.090
HFP4C11DD	C	M1	3	1	50.306	0.128	16	LGM	0.0080	51.535
HFP4C21AD	C	M2	3	2	50.147	0.124	16	LGM	0.0078	49.932
HFP4C21BD	C	M2	3	2	52.233	0.127	16	LGM	0.0079	53.168
HFP4C21CD	C	M2	3	2	48.666	0.127	16	LGM	0.0080	49.634

Average	51.144	
Standard Dev.	1.975	
Coeff. of Var. [%]	3.863	
Min.	46.944	
Max.	53.737	
Number of Spec.	21	

$Average_{norm}$	0.0079	51.582
$Standard\ Dev._{norm}$		1.669
$Coeff.\ of\ Var.\ [\%]_{norm}$		3.235
Min.	0.0077	47.903
Max.	0.0080	53.918
Number of Spec.	21	21


Laminate Filled Hole Tension Properties (FHT1) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
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
0
1
2
3
4

4.18 Filled-Hole Tension 2 Properties

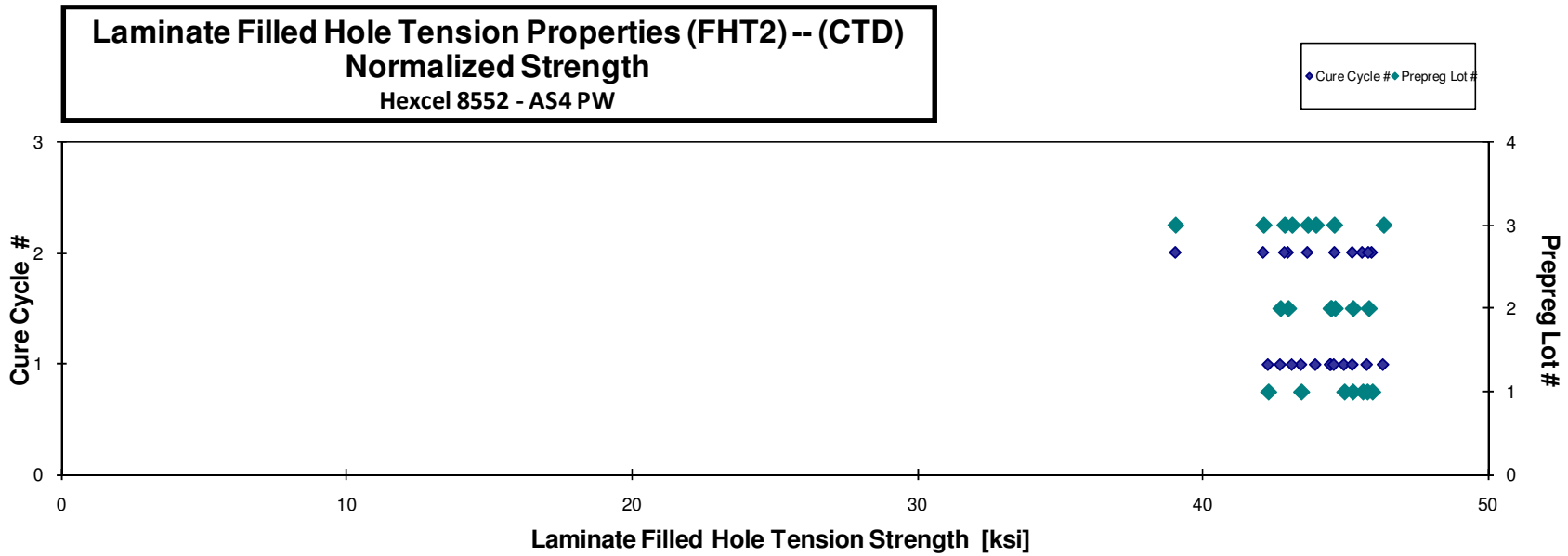
Laminate Filled Hole Tension Properties (FHT2) -- (CTD)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

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]
HFP5A116B	A	M1	1	1	43.036	0.158	20	LGM	0.0079	43.463
HFP5A117B	A	M1	1	1	42.715	0.155	20	LGM	0.0077	42.309
HFP5A118B	A	M1	1	1	47.805	0.147	20	LGM	0.0073	44.965
HFP5A119B	A	M1	1	1	49.260	0.145	20	LGM	0.0072	45.766
HFP5A216B	A	M2	1	2	45.812	0.155	20	LGM	0.0078	45.607
HFP5A217B	A	M2	1	2	45.778	0.154	20	LGM	0.0077	45.259
HFP5A218B	A	M2	1	2	48.286	0.148	20	LGM	0.0074	45.939
HFP5B116B	B	M1	2	1	43.039	0.161	20	LGM	0.0081	44.506
HFP5B117B	B	M1	2	1	44.255	0.160	20	LGM	0.0080	45.262
HFP5B118B	B	M1	2	1	44.294	0.157	20	LGM	0.0078	44.483
HFP5B119B	B	M1	2	1	42.225	0.158	20	LGM	0.0079	42.735
HFP5B216B	B	M2	2	2	43.162	0.161	20	LGM	0.0081	44.638
HFP5B217B	B	M2	2	2	42.474	0.158	20	LGM	0.0079	43.000
HFP5B219B	B	M2	2	2	45.275	0.158	20	LGM	0.0079	45.816
HFP5C116B	C	M1	3	1	45.487	0.159	20	LGM	0.0079	46.332
HFP5C117B	C	M1	3	1	44.116	0.158	20	LGM	0.0079	44.611
HFP5C118B	C	M1	3	1	44.108	0.153	20	LGM	0.0076	43.142
HFP5C119B	C	M1	3	1	46.593	0.147	20	LGM	0.0074	43.964
HFP5C216B	C	M2	3	2	41.391	0.159	20	LGM	0.0079	42.138
HFP5C217B	C	M2	3	2	43.630	0.156	20	LGM	0.0078	43.686
HFP5C218B	C	M2	3	2	44.851	0.149	20	LGM	0.0075	42.882
HFP5C219B	C	M2	3	2	40.899	0.149	20	LGM	0.0075	39.064

Average	**44.477**	
Standard Dev.	**2.179**	
Coeff. of Var. [%]	**4.898**	
Min.	**40.899**	
Max.	**49.260**	
Number of Spec.	**22**	

$Average_{norm}$	**0.0077**	**44.071**
Standard $Dev._{norm}$		**1.678**
Coeff. of Var. $[\%]_{norm}$		**3.808**
Min.	**0.0072**	**39.064**
Max.	**0.0081**	**46.332**
Number of Spec.	**22**	**22**


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

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

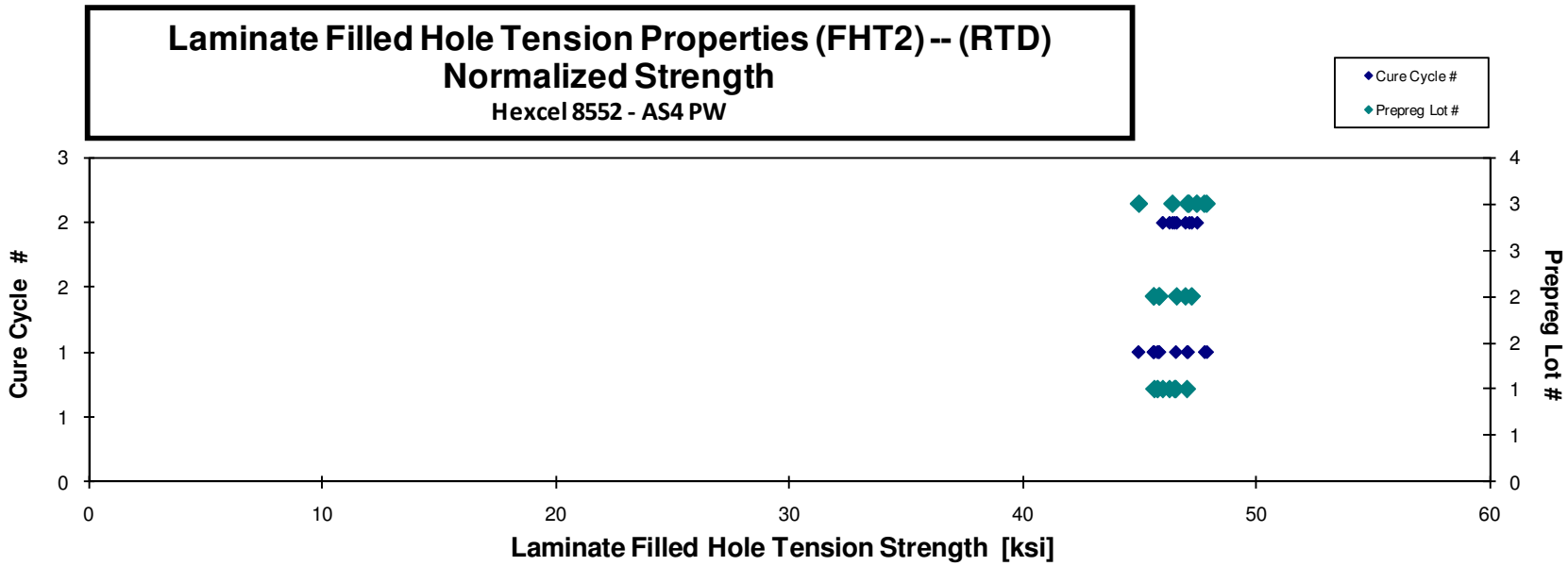
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

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]
HFP5A112A	A	M1	1	1	47.241	0.154	20	LGM	0.0077	46.545
HFP5A113A	A	M1	1	1	46.632	0.157	20	LGM	0.0079	47.031
HFP5A114A	A	M1	1	1	44.883	0.159	20	LGM	0.0080	45.751
HFP5A115A	A	M1	1	1	44.735	0.159	20	LGM	0.0080	45.610
HFP5A211A	A	M2	1	2	49.198	0.147	20	LGM	0.0074	46.496
HFP5A212A	A	M2	1	2	47.366	0.152	20	MGM	0.0076	46.273
HFP5A215A	A	M2	1	2	46.054	0.156	20	LGM	0.0078	45.980
HFP5B111A	B	M1	2	1	47.131	0.151	20	MGM	0.0075	45.590
HFP5B112A	B	M1	2	1	45.219	0.158	20	LGM	0.0079	45.808
HFP5B113A	B	M1	2	1	44.276	0.162	20	LGM	0.0081	45.837
HFP5B114A	B	M1	2	1	43.665	0.163	20	LGM	0.0081	45.587
HFP5B213A	B	M2	2	2	44.955	0.162	20	LGM	0.0081	46.583
HFP5B214A	B	M2	2	2	44.936	0.163	20	LGM	0.0082	46.962
HFP5B215A	B	M2	2	2	45.211	0.163	20	LGM	0.0081	47.235
HFP5C111A	C	M1	3	1	47.029	0.149	20	MGM	0.0075	44.939
HFP5C112A	C	M1	3	1	47.257	0.158	20	LGM	0.0079	47.782
HFP5C113A	C	M1	3	1	45.979	0.160	20	LGM	0.0080	47.065
HFP5C114A	C	M1	3	1	46.889	0.159	20	LGM	0.0080	47.881
HFP5C211A	C	M2	3	2	49.850	0.149	20	LGM	0.0074	47.459
HFP5C212A	C	M2	3	2	46.423	0.156	20	LGM	0.0078	46.399
HFP5C214A	C	M2	3	2	45.916	0.160	20	LGM	0.0080	47.122

Average	**46.231**	
Standard Dev.	**1.539**	
Coeff. of Var. [%]	**3.329**	
Min.	**43.665**	
Max.	**49.850**	
Number of Spec.	**21**	

$Average_{norm}$	**0.0078**	**46.473**
$Standard\ Dev._{norm}$		**0.803**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**1.729**
Min.	**0.0074**	**44.939**
Max.	**0.0082**	**47.881**
Number of Spec.	**21**	**21**


Laminate Filled Hole Tension Properties (FHT2) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
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
0
1
1
2
2
3
3
4

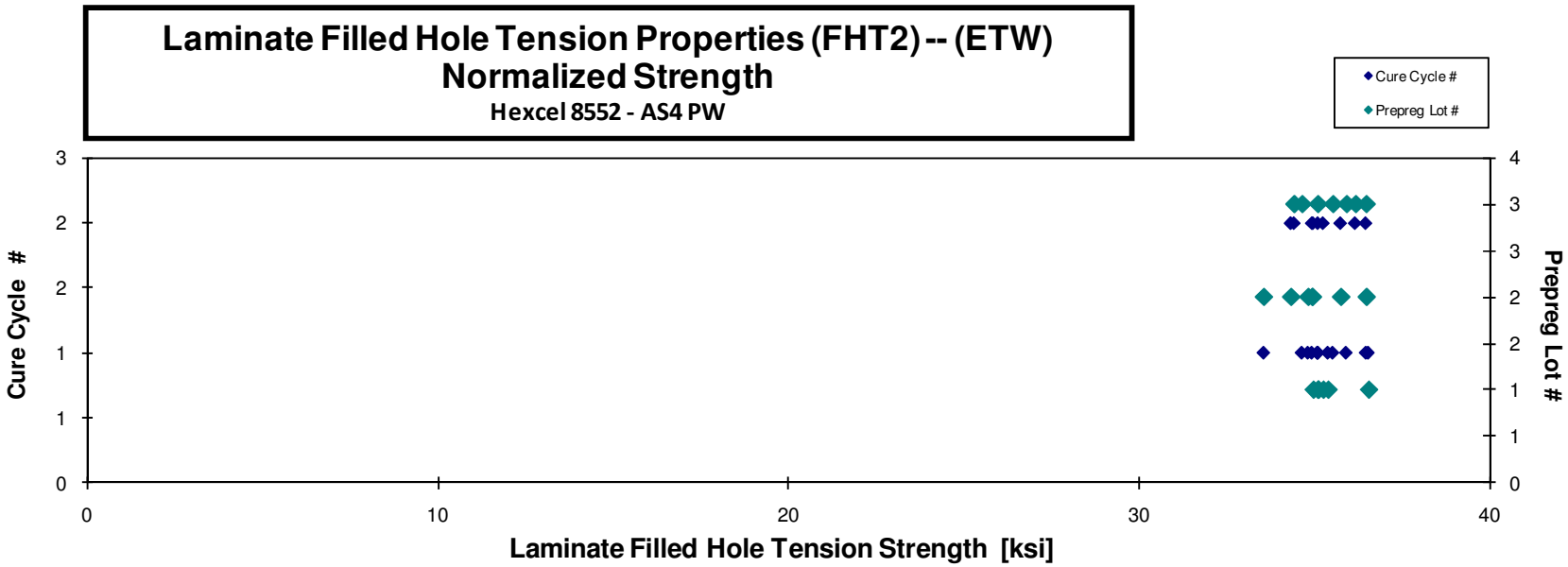
Laminate Filled Hole Tension Properties (FHT2) -- (ETW)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

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]
HFP5A11AD	A	M1	1	1	35.722	0.153	20	AGM	0.0077	35.096
HFP5A11BD	A	M1	1	1	34.887	0.157	20	AGM	0.0078	35.081
HFP5A11CD	A	M1	1	1	34.906	0.158	20	AGM	0.0079	35.376
HFP5A11DD	A	M1	1	1	35.808	0.159	20	AGM	0.0080	36.534
HFP5A21AD	A	M2	1	2	35.394	0.155	20	AGM	0.0077	35.088
HFP5A21BD	A	M2	1	2	34.906	0.156	20	AGM	0.0078	34.955
HFP5A21CD	A	M2	1	2	35.202	0.156	20	AGM	0.0078	35.236
HFP5B11AD	B	M1	2	1	34.189	0.153	20	AGM	0.0077	33.535
HFP5B11BD	B	M1	2	1	33.684	0.161	20	AGM	0.0081	34.807
HFP5B11CD	B	M1	2	1	33.313	0.164	20	AGM	0.0082	34.918
HFP5B11DD	B	M1	2	1	34.705	0.164	20	AGM	0.0082	36.467
HFP5B21AD	B	M2	2	2	33.573	0.162	20	AGM	0.0081	34.925
HFP5B21BD	B	M2	2	2	32.587	0.164	20	AGM	0.0082	34.314
HFP5B21CD	B	M2	2	2	33.974	0.164	20	AGM	0.0082	35.738
HFP5C11AD	C	M1	3	1	34.770	0.157	20	AGM	0.0079	35.082
HFP5C11BD	C	M1	3	1	34.237	0.158	20	AGM	0.0079	34.632
HFP5C11CD	C	M1	3	1	35.589	0.157	20	AGM	0.0079	35.900
HFP5C11DD	C	M1	3	1	35.225	0.157	20	AGM	0.0079	35.514
HFP5C21AD	C	M2	3	2	36.167	0.156	20	AGM	0.0078	36.159
HFP5C21BD	C	M2	3	2	36.074	0.158	20	AGM	0.0079	36.463
HFP5C21CD	C	M2	3	2	33.930	0.158	20	AGM	0.0079	34.405

Average	**34.707**	
Standard Dev.	**0.962**	
Coeff. of Var. [%]	**2.773**	
Min.	**32.587**	
Max.	**36.167**	
Number of Spec.	**21**	

$Average_{norm}$	**0.0079**	**35.249**
$Standard\ Dev._{norm}$		**0.765**
Coeff. of Var. $[\%]_{norm}$		**2.169**
Min.	**0.0077**	**33.535**
Max.	**0.0082**	**36.534**
Number of Spec.	**21**	**21**


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

4.19 Filled-Hole Tension 3 Properties

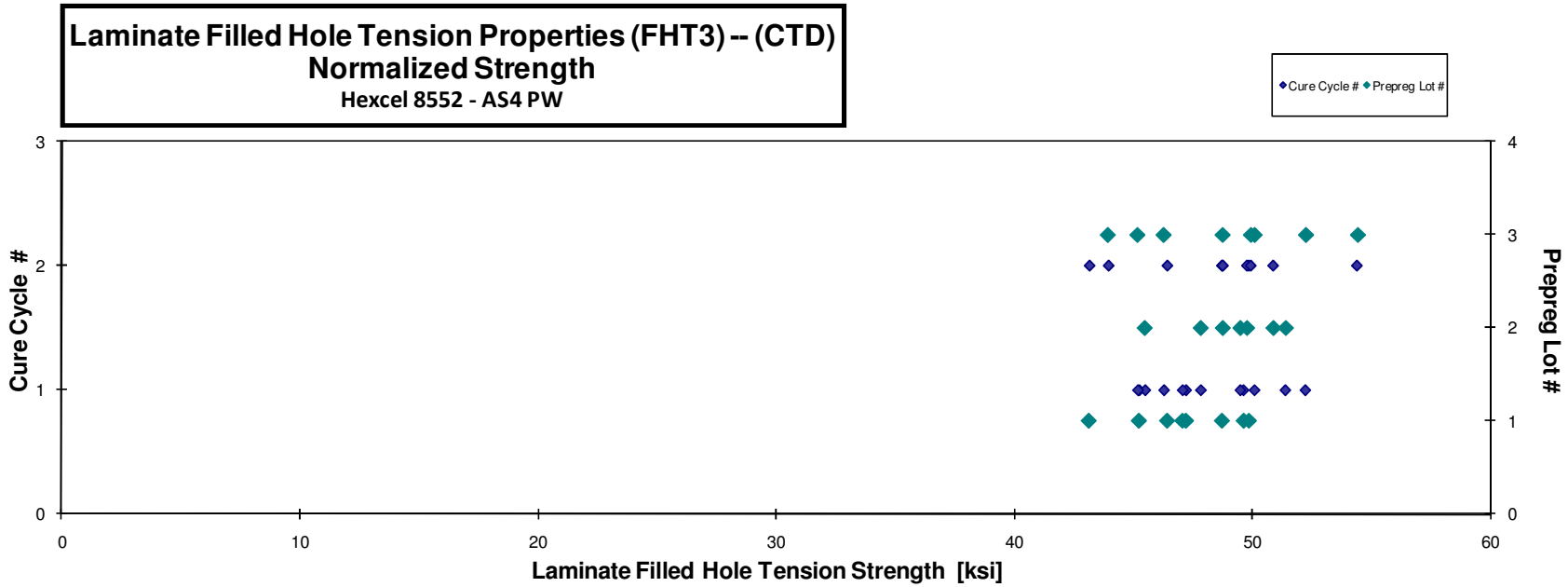
Laminate Filled Hole Tension Properties (FHT3) -- (CTD) Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

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]
HFP6A116B	A	M1	1	1	44.564	0.119	15	LGM	0.0079	45.256
HFP6A117B	A	M1	1	1	47.046	0.117	15	LGM	0.0078	47.227
HFP6A118B	A	M1	1	1	49.431	0.111	15	LGM	0.0074	47.079
HFP6A119B	A	M1	1	1	53.725	0.108	15	LGM	0.0072	49.646
HFP6A216B	A	M2	1	2	46.613	0.117	15	LGM	0.0078	46.434
HFP6A217B	A	M2	1	2	45.540	0.111	15	LGM	0.0074	43.153
HFP6A218B	A	M2	1	2	52.923	0.108	15	LGM	0.0072	48.731
HFP6A219B	A	M2	1	2	51.136	0.114	15	LGM	0.0076	49.861
HFP6B116B	B	M1	2	1	48.897	0.118	15	LGM	0.0079	49.510
HFP6B117B	B	M1	2	1	45.388	0.117	15	LGM	0.0078	45.498
HFP6B118B	B	M1	2	1	53.468	0.113	15	LGM	0.0075	51.411
HFP6B119B	B	M1	2	1	51.038	0.110	15	LGM	0.0073	47.847
HFP6B217B	B	M2	2	2	48.796	0.117	15	LGM	0.0078	48.768
HFP6B218B	B	M2	2	2	52.592	0.113	15	LGM	0.0075	50.891
HFP6B219B	B	M2	2	2	52.771	0.110	15	LGM	0.0074	49.787
HFP6C116B	C	M1	3	1	51.422	0.119	15	LGM	0.0079	52.257
HFP6C117B	C	M1	3	1	45.454	0.116	15	LGM	0.0078	45.195
HFP6C118B	C	M1	3	1	52.525	0.112	15	LGM	0.0074	50.109
HFP6C119B	C	M1	3	1	49.727	0.109	15	LGM	0.0073	46.292
HFP6C216B	C	M2	3	2	53.101	0.120	15	LGM	0.0080	54.432
HFP6C217B	C	M2	3	2	49.318	0.119	15	LGM	0.0079	49.950
HFP6C218B	C	M2	3	2	45.462	0.113	15	LGM	0.0075	43.953
HFP6C219B	C	M2	3	2	50.706	0.113	15	LGM	0.0075	48.763

Average	**49.637**	
Standard Dev.	**3.033**	
Coeff. of Var. [%]	**6.111**	
Min.	**44.564**	
Max.	**53.725**	
Number of Spec.	**23**	

$Average_{norm}$	**0.0076**	**48.350**
$Standard\ Dev._{norm}$		**2.752**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**5.692**
Min.	**0.0072**	**43.153**
Max.	**0.0080**	**54.432**
Number of Spec.	**23**	**23**


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

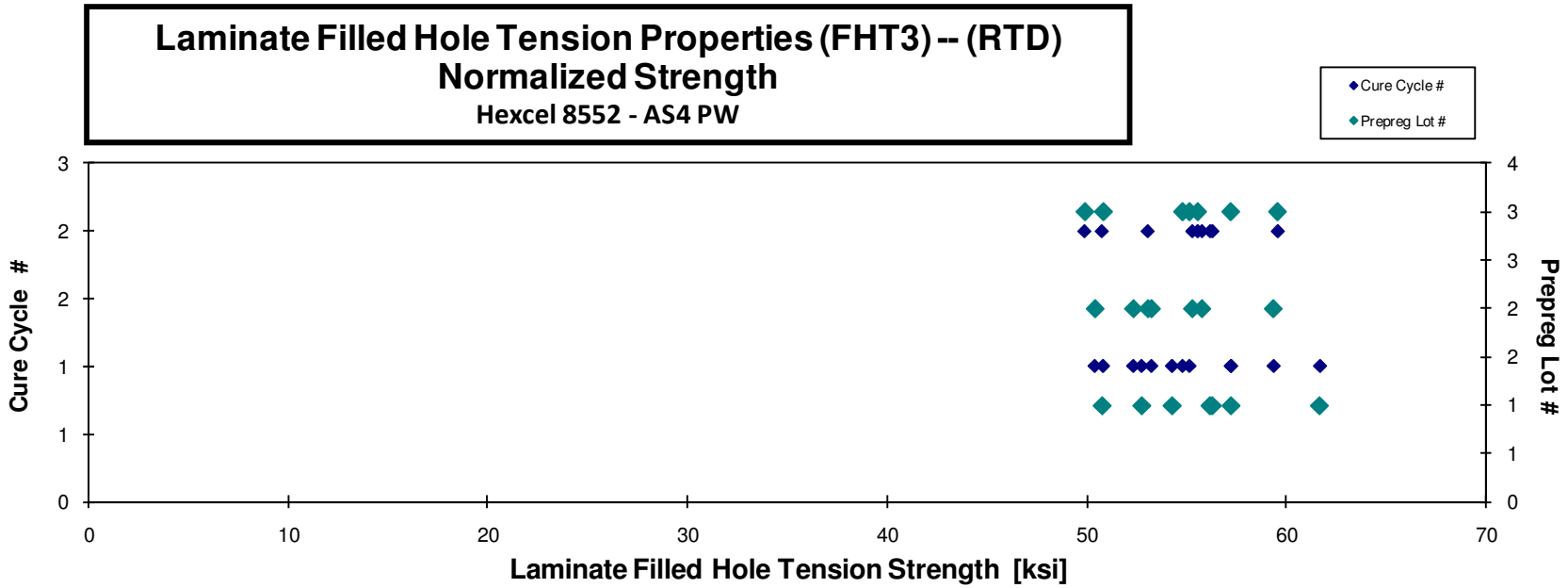
Laminate Filled Hole Tension Properties (FHT3) -- (RTD) Strength

Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

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]
HFP6A112A	A	M1	1	1	62.355	0.116	15	LGM	0.0077	61.680
HFP6A113A	A	M1	1	1	52.672	0.117	15	LGM	0.0078	52.754
HFP6A114A	A	M1	1	1	53.996	0.118	15	LGM	0.0078	54.281
HFP6A115A	A	M1	1	1	56.712	0.118	15	LGM	0.0079	57.237
HFP6A213A	A	M2	1	2	50.350	0.118	15	LGM	0.0079	50.766
HFP6A214A	A	M2	1	2	55.919	0.118	15	LGM	0.0078	56.182
HFP6A215A	A	M2	1	2	56.068	0.117	15	LGM	0.0078	56.299
HFP6B111A	B	M1	2	1	56.839	0.110	15	LGM	0.0073	53.244
HFP6B112A	B	M1	2	1	52.080	0.118	15	LGM	0.0078	52.340
HFP6B113A	B	M1	2	1	49.214	0.120	15	LGM	0.0080	50.412
HFP6B114A	B	M1	2	1	58.175	0.119	15	LGM	0.0080	59.360
HFP6B213A	B	M2	2	2	54.535	0.119	15	LGM	0.0079	55.296
HFP6B214A	B	M2	2	2	54.899	0.119	15	LGM	0.0079	55.775
HFP6B215A	B	M2	2	2	52.445	0.118	15	LGM	0.0079	53.065
HFP6C111A	C	M1	3	1	58.708	0.109	15	LGM	0.0073	54.802
HFP6C112A	C	M1	3	1	57.271	0.117	15	LGM	0.0078	57.222
HFP6C113A	C	M1	3	1	54.073	0.119	15	LGM	0.0080	55.152
HFP6C114A	C	M1	3	1	49.655	0.120	15	LGM	0.0080	50.829
HFP6C213A	C	M2	3	2	58.307	0.120	15	LGM	0.0080	59.570
HFP6C214A	C	M2	3	2	48.714	0.120	15	LGM	0.0080	49.901
HFP6C215A	C	M2	3	2	54.189	0.120	15	LGM	0.0080	55.563

	Strength [ksi]		$Strength_{norm}$ [ksi]
Average	**54.627**	**$Average_{norm}$**	**0.0078**	**54.844**
Standard Dev.	**3.506**	**Standard $Dev._{norm}$**		**3.162**
Coeff. of Var. [%]	**6.417**	**Coeff. of Var. $[\%]_{norm}$**		**5.765**
Min.	**48.714**	**Min.**	**0.0073**	**49.901**
Max.	**62.355**	**Max.**	**0.0080**	**61.680**
Number of Spec.	**21**	**Number of Spec.**	**21**	**21**


Laminate Filled Hole Tension Properties (FHT3) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
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

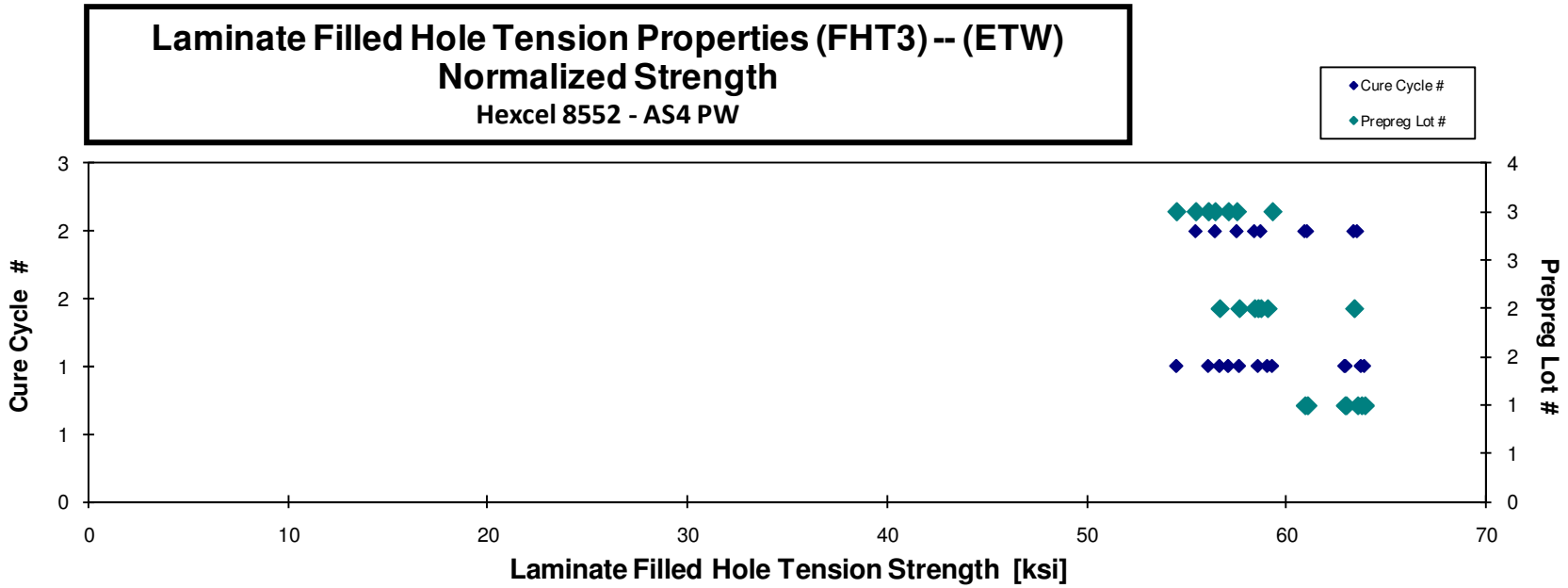
Laminate Filled Hole Tension Properties (FHT3) -- (ETW)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

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]
HFP6A11AD	A	M1	1	1	64.715	0.114	15	LGM	0.0076	62.927
HFP6A11BD	A	M1	1	1	64.554	0.116	15	LGM	0.0077	63.919
HFP6A11CD	A	M1	1	1	63.234	0.117	15	LGM	0.0078	62.990
HFP6A11DD	A	M1	1	1	63.890	0.117	15	LGM	0.0078	63.754
HFP6A21AD	A	M2	1	2	63.625	0.117	15	LGM	0.0078	63.562
HFP6A21BD	A	M2	1	2	60.561	0.118	15	LGM	0.0078	60.932
HFP6A21CD	A	M2	1	2	60.765	0.118	15	LGM	0.0078	61.060
HFP6B11AD	B	M1	2	1	56.731	0.117	15	LGM	0.0078	56.682
HFP6B11BD	B	M1	2	1	58.354	0.118	15	LGM	0.0079	59.069
HFP6B11CD	B	M1	2	1	57.839	0.119	15	LGM	0.0079	58.597
HFP6B11DD	B	M1	2	1	56.987	0.118	15	LGM	0.0079	57.661
HFP6B21AD	B	M2	2	2	63.613	0.117	15	LGM	0.0078	63.386
HFP6B21BD	B	M2	2	2	57.468	0.119	15	LGM	0.0079	58.418
HFP6B21CD	B	M2	2	2	57.888	0.119	15	LGM	0.0079	58.737
HFP6C11AD	C	M1	3	1	59.628	0.116	15	LGM	0.0078	59.314
HFP6C11BD	C	M1	3	1	53.835	0.119	15	LGM	0.0079	54.525
HFP6C11CD	C	M1	3	1	56.419	0.118	15	LGM	0.0079	57.118
HFP6C11DD	C	M1	3	1	55.298	0.119	15	LGM	0.0079	56.117
HFP6C21AD	C	M2	3	2	56.160	0.118	15	LGM	0.0078	56.456
HFP6C21BD	C	M2	3	2	56.446	0.119	15	LGM	0.0080	57.540
HFP6C21CD	C	M2	3	2	54.273	0.120	15	LGM	0.0080	55.486

Average	**59.156**	
Standard Dev.	**3.550**	
Coeff. of Var. [%]	**6.000**	
Min.	**53.835**	
Max.	**64.715**	
Number of Spec.	**21**	

$Average_{norm}$	**0.0078**	**59.440**
$Standard\ Dev._{norm}$		**3.023**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**5.086**
Min.	**0.0076**	**54.525**
Max.	**0.0080**	**63.919**
Number of Spec.	**21**	**21**


Laminate Filled Hole Tension Properties (FHT3) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
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
0
1
2
3
4

4.20 Open Hole Compression 1 Properties

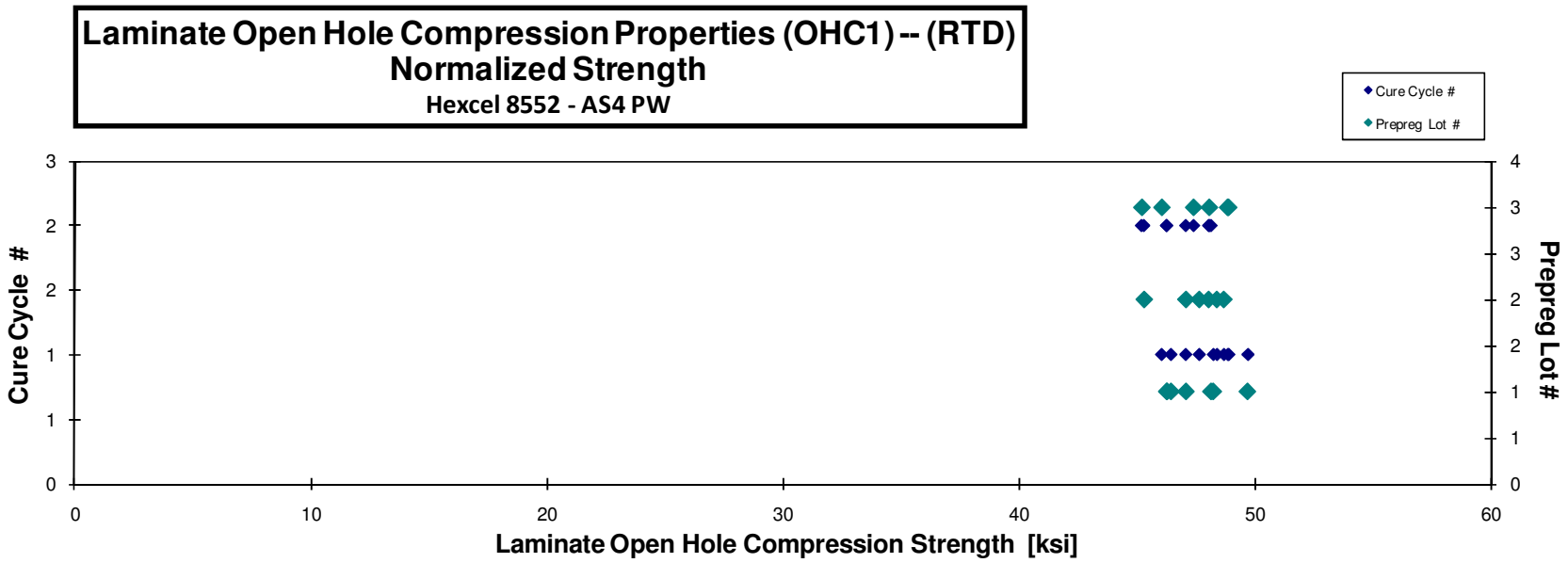
Laminate Open Hole Compression Properties (OHC1) -- (RTD) Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPGA111A	A	M1	1	1	48.047	0.153	20	LGM	0.0076	47.107
HFPGA112A	A	M1	1	1	47.979	0.157	20	LGM	0.0078	48.266
HFPGA113A	A	M1	1	1	49.597	0.156	20	LGM	0.0078	49.724
HFPGA114A	A	M1	1	1	46.507	0.156	20	LGM	0.0078	46.477
HFPGA211A	A	M2	1	2	48.462	0.149	20	LGM	0.0075	46.298
HFPGA212A	A	M2	1	2	46.537	0.155	20	LGM	0.0078	46.294
HFPGA213A	A	M2	1	2	47.698	0.158	20	LGM	0.0079	48.172
HFPGB111A	B	M1	2	1	49.615	0.152	20	LGM	0.0076	48.422
HFPGB112A	B	M1	2	1	46.509	0.160	20	LGM	0.0080	47.671
HFPGB113A	B	M1	2	1	47.359	0.160	20	LGM	0.0080	48.715
HFPGB211A	B	M2	2	2	46.612	0.152	20	LGM	0.0076	45.333
HFPGB212A	B	M2	2	2	46.589	0.158	20	LGM	0.0079	47.106
HFPGB213A	B	M2	2	2	46.800	0.160	20	LGM	0.0080	48.070
HFPGC111A	C	M1	3	1	50.363	0.152	20	LGM	0.0076	48.921
HFPGC112A	C	M1	3	1	45.881	0.157	20	LGM	0.0078	46.087
HFPGC113A	C	M1	3	1	48.301	0.158	20	LGM	0.0079	48.879
HFPGC211A	C	M2	3	2	47.833	0.148	20	LGM	0.0074	45.237
HFPGC212A	C	M2	3	2	48.503	0.155	20	LGM	0.0077	48.104
HFPGC214A	C	M2	3	2	47.193	0.157	20	LGM	0.0078	47.435

	Strength [ksi]
Average	47.704
Standard Dev.	1.231
Coeff. of Var. [%]	2.580
Min.	45.881
Max.	50.363
Number of Spec.	19

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
$Average_{norm}$	0.0078	47.490
$Standard\ Dev._{norm}$		1.270
$Coeff.\ of\ Var.\ [\%]_{norm}$		2.674
Min.	0.0074	45.237
Max.	0.0080	49.724
Number of Spec.	19	19

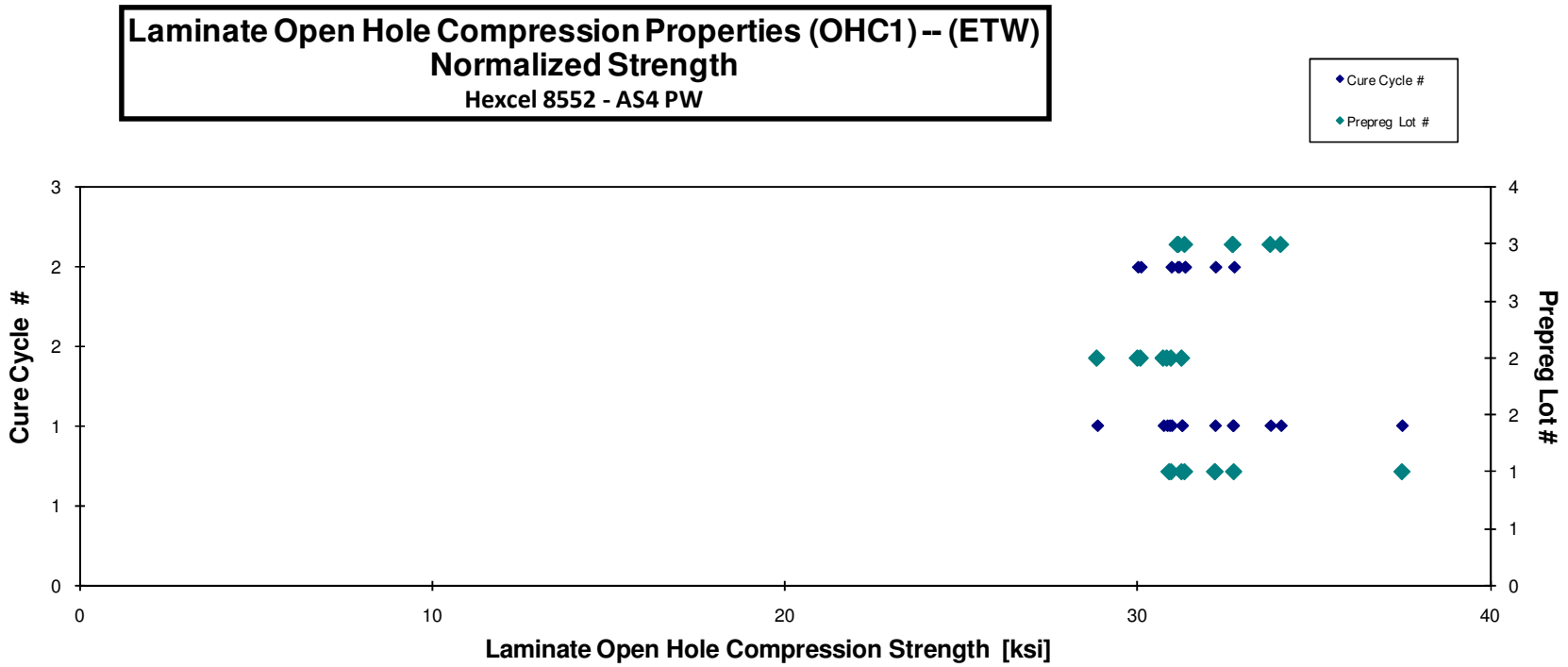

Laminate Open Hole Compression Properties (OHC1) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
10
20
30
40
50
60
0
1
1
2
2
3
0
1
1
2
2
3
3
4

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

normalizing t_{ply} [in]
0.0078

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]
HFPGA117D	A	M1	1	1	31.996	0.151	20	LGM	0.0075	30.967
HFPGA118D	A	M1	1	1	37.607	0.156	20	LGM	0.0078	37.514
HFPGA119D	A	M1	1	1	32.254	0.156	20	LGM	0.0078	32.203
HFPGA11AD	A	M1	1	1	31.482	0.155	20	LGM	0.0077	31.260
HFPGA11BD	A	M1	1	1	30.930	0.156	20	LGM	0.0078	30.910
HFPGA216D	A	M2	1	2	32.737	0.149	20	LGM	0.0075	31.349
HFPGA217D	A	M2	1	2	32.234	0.156	20	LGM	0.0078	32.216
HFPGA218D	A	M2	1	2	32.270	0.158	20	LGM	0.0079	32.742
HFPGB117D	B	M1	2	1	28.593	0.157	20	LGM	0.0079	28.856
HFPGB118D	B	M1	2	1	29.912	0.160	20	LGM	0.0080	30.740
HFPGB119D	B	M1	2	1	29.864	0.161	20	LGM	0.0081	30.843
HFPGB11AD	B	M1	2	1	30.302	0.161	20	LGM	0.0080	31.264
HFPGB216D	B	M2	2	2	30.711	0.152	20	LGM	0.0076	30.009
HFPGB217D	B	M2	2	2	30.584	0.158	20	LGM	0.0079	30.963
HFPGB218D	B	M2	2	2	29.252	0.161	20	LGM	0.0080	30.096
HFPGC116D	C	M1	3	1	33.867	0.151	20	LGM	0.0075	32.705
HFPGC118D	C	M1	3	1	32.333	0.158	20	LGM	0.0079	32.720
HFPGC119D	C	M1	3	1	33.831	0.157	20	LGM	0.0079	34.073
HFPGC11AD	C	M1	3	1	33.322	0.158	20	LGM	0.0079	33.778
HFPGC217D	C	M2	3	2	31.425	0.155	20	LGM	0.0077	31.140
HFPGC218D	C	M2	3	2	31.270	0.156	20	LGM	0.0078	31.350
HFPGC219D	C	M2	3	2	31.010	0.157	20	LGM	0.0078	31.179

	Strength		$Strength_{norm}$
Average	31.718	$Average_{norm}$	31.767
Standard Dev.	1.915	$Standard\ Dev._{norm}$	1.765
Coeff. of Var. [%]	6.037	$Coeff.\ of\ Var.\ [\%]_{norm}$	5.556
Min.	28.593	Min.	28.856
Max.	37.607	Max.	37.514
Number of Spec.	22	Number of Spec.	22


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

4.21 Open Hole Compression 2 Properties

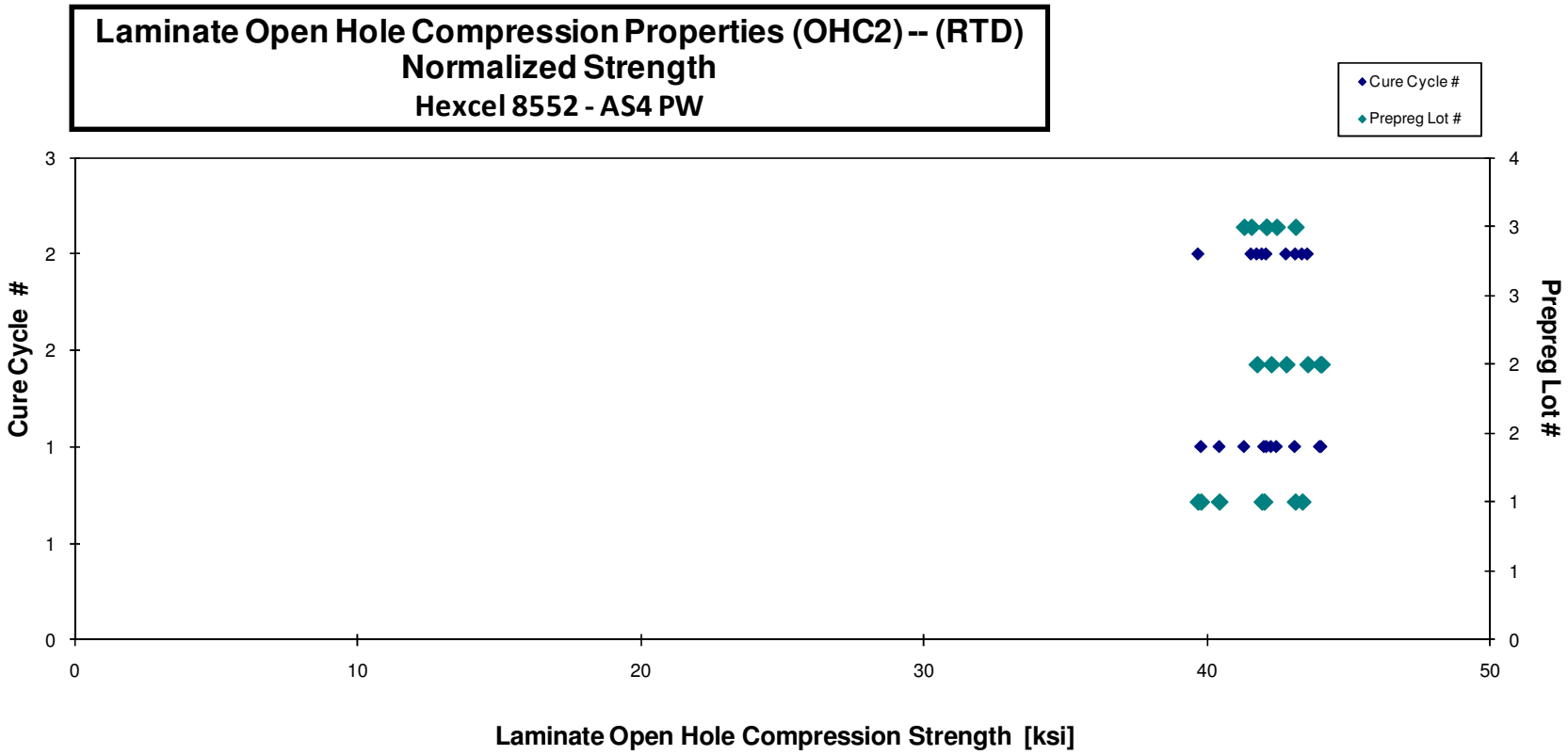
Laminate Open Hole Compression Properties (OHC2) -- (RTD)
Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPHA111A	A	M1	1	1	42.405	0.149	20	AGM	0.0074	40.448
HFPHA112A	A	M1	1	1	42.959	0.153	20	LGM	0.0076	42.028
HFPHA114A	A	M1	1	1	39.650	0.157	20	LGM/AGM	0.0078	39.803
HFPHA115A	A	M1	1	1	43.025	0.156	20	LGM/AGM	0.0078	43.117
HFPHA211A	A	M2	1	2	43.050	0.144	20	LGM/AGM	0.0072	39.702
HFPHA212A	A	M2	1	2	44.405	0.152	20	LGM/AGM	0.0076	43.366
HFPHA213A	A	M2	1	2	41.918	0.156	20	LGM/AGM	0.0078	41.949
HFPHB111A	B	M1	2	1	43.395	0.152	20	LGM/AGM	0.0076	42.278
HFPHB112A	B	M1	2	1	43.278	0.159	20	LGM/AGM	0.0079	44.046
HFPHB113A	B	M1	2	1	42.764	0.161	20	LGM/AGM	0.0080	43.997
HFPHB211A	B	M2	2	2	42.688	0.153	20	LGM/AGM	0.0076	41.772
HFPHB212A	B	M2	2	2	42.313	0.158	20	LGM/AGM	0.0079	42.806
HFPHB213A	B	M2	2	2	42.238	0.161	20	LGM/AGM	0.0080	43.560
HFPHC111A	C	M1	3	1	41.094	0.157	20	LGM/AGM	0.0078	41.322
HFPHC112A	C	M1	3	1	40.951	0.160	20	LGM/AGM	0.0080	42.115
HFPHC113A	C	M1	3	1	41.590	0.159	20	LGM/AGM	0.0080	42.465
HFPHC211A	C	M2	3	2	43.720	0.148	20	LGM/AGM	0.0074	41.576
HFPHC212A	C	M2	3	2	42.046	0.156	20	LGM	0.0078	42.100
HFPHC213A	C	M2	3	2	42.501	0.158	20	LGM/AGM	0.0079	43.132

Average	**42.421**	
Standard Dev.	**1.087**	
Coeff. of Var. [%]	**2.563**	
Min.	**39.650**	
Max.	**44.405**	
Number of Spec.	**19**	

$Average_{norm}$	**0.0078**	**42.188**
$Standard\ Dev._{norm}$		**1.258**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.983**
Min.	**0.0072**	**39.702**
Max.	**0.0080**	**44.046**
Number of Spec.	**19**	**19**

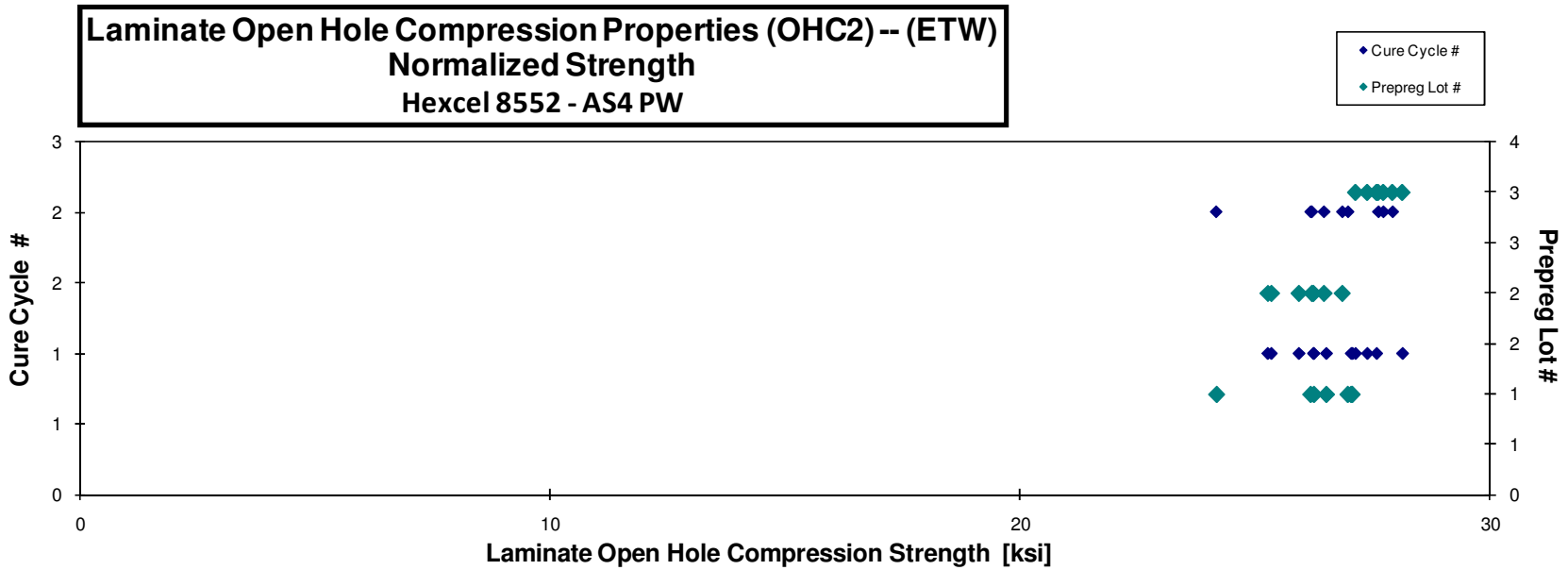

Laminate Open Hole Compression Properties (OHC2) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
10
20
30
40
50
0
1
2
3
4

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

normalizing t_{ply} [in]: 0.0078

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]
HFPHA117D	A	M1	1	1	28.650	0.147	20	LGMAGM	0.0074	27.049
HFPHA118D	A	M1	1	1	26.451	0.155	20	LGM/AGM	0.0077	26.256
HFPHA119D	A	M1	1	1	26.661	0.158	20	LGM	0.0079	27.074
HFPHA11AD	A	M1	1	1	25.960	0.159	20	LGM	0.0080	26.520
HFPHA216D	A	M2	1	2	26.222	0.144	20	LGM	0.0072	24.175
HFPHA217D	A	M2	1	2	26.777	0.153	20	LGM	0.0076	26.184
HFPHA218D	A	M2	1	2	26.822	0.157	20	LGM	0.0078	26.980
HFPHB116D	B	M1	2	1	25.784	0.153	20	LGM	0.0076	25.271
HFPHB117D	B	M1	2	1	25.542	0.158	20	LGM	0.0079	25.935
HFPHB118D	B	M1	2	1	25.529	0.160	20	LGM	0.0080	26.243
HFPHB119D	B	M1	2	1	24.249	0.163	20	LGM	0.0082	25.348
HFPHB216D	B	M2	2	2	27.219	0.152	20	LGM	0.0076	26.468
HFPHB217D	B	M2	2	2	25.953	0.158	20	LGM	0.0079	26.211
HFPHB218D	B	M2	2	2	26.112	0.160	20	LGM	0.0080	26.860
HFPHC117D	C	M1	3	1	26.758	0.158	20	LGM	0.0079	27.141
HFPHC118D	C	M1	3	1	27.020	0.159	20	LGM	0.0080	27.589
HFPHC119D	C	M1	3	1	26.789	0.160	20	LGM	0.0080	27.390
HFPHC11AD	C	M1	3	1	27.951	0.157	20	LGM	0.0079	28.140
HFPHC217D	C	M2	3	2	27.351	0.158	20	LGM	0.0079	27.734
HFPHC218D	C	M2	3	2	27.871	0.156	20	LGM	0.0078	27.928
HFPHC219D	C	M2	3	2	27.088	0.159	20	LGM	0.0080	27.626

	Strength [ksi]		$Strength_{norm}$ [ksi]
Average	26.608	$Average_{norm}$	26.672
Standard Dev.	0.971	$Standard\ Dev._{norm}$	0.978
Coeff. of Var. [%]	3.648	$Coeff.\ of\ Var.\ [\%]_{norm}$	3.668
Min.	24.249	Min.	24.175
Max.	28.650	Max.	28.140
Number of Spec.	21	Number of Spec.	21


Laminate Open Hole Compression Properties (OHC2) -- (ETW)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
10
20
30
0
1
2
3
0
1
2
3
4

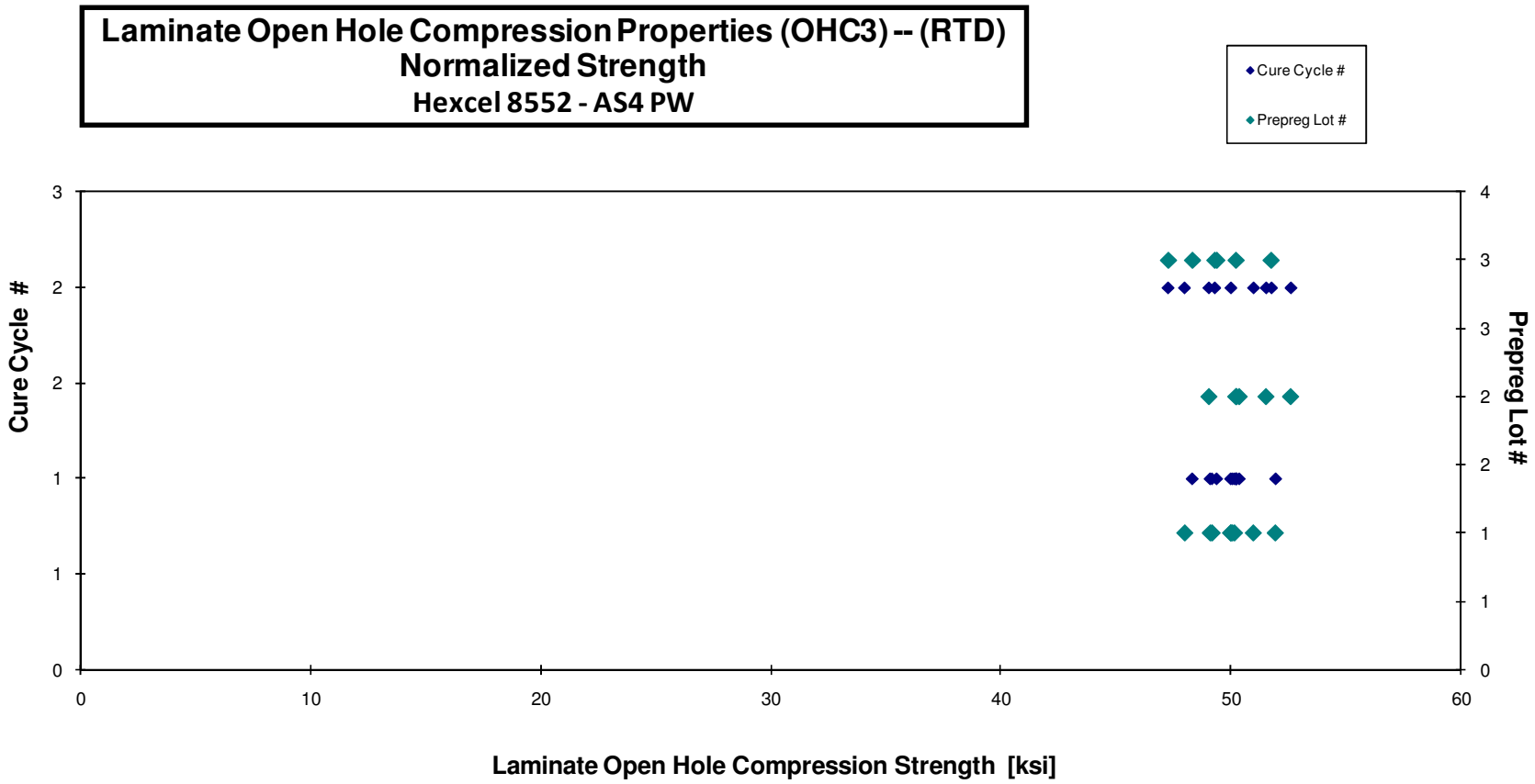
4.22 Open Hole Compression 3 Properties

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

normalizing t_{ply} [in]: 0.0078

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]
HFPIA111A	A	M1	1	1	52.699	0.148	20	LGM	0.0074	50.070
HFPIA112A	A	M1	1	1	50.817	0.153	20	LGM	0.0077	49.997
HFPIA113A	A	M1	1	1	52.151	0.155	20	LGM	0.0078	51.933
HFPIA114A	A	M1	1	1	50.107	0.156	20	LGM	0.0078	50.160
HFPIA115A	A	M1	1	1	49.334	0.155	20	LGM	0.0078	49.113
HFPIA116A	A	M1	1	1	49.366	0.155	20	LGM	0.0078	49.192
HFPIA211A	A	M2	1	2	48.654	0.154	20	MGM	0.0077	48.004
HFPIA212A	A	M2	1	2	50.479	0.155	20	LGM	0.0077	50.004
HFPIA213A	A	M2	1	2	50.665	0.157	20	LGM	0.0078	50.979
HFPIB111A	B	M1	2	1	51.645	0.152	20	LGM	0.0076	50.221
HFPIB112A	B	M1	2	1	49.586	0.158	20	LGM	0.0079	50.248
HFPIB113A	B	M1	2	1	49.166	0.160	20	LGM	0.0080	50.369
HFPIB211A	B	M2	2	2	49.825	0.154	20	LGM	0.0077	49.053
HFPIB212A	B	M2	2	2	51.740	0.159	20	LGM	0.0079	52.597
HFPIB213A	B	M2	2	2	50.350	0.160	20	LGM	0.0080	51.528
HFPIC111A	C	M1	3	1	51.410	0.147	20	LGM	0.0073	48.340
HFPIC112A	C	M1	3	1	49.939	0.157	20	LGM	0.0078	50.232
HFPIC113A	C	M1	3	1	48.701	0.158	20	LGM	0.0079	49.393
HFPIC211A	C	M2	3	2	49.347	0.150	20	LGM	0.0075	47.296
HFPIC212A	C	M2	3	2	49.245	0.156	20	LGM	0.0078	49.308
HFPIC213A	C	M2	3	2	51.184	0.158	20	LGM	0.0079	51.752

	Strength [ksi]	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
Average	50.305	$Average_{norm}$	0.0078	49.990
Standard Dev.	1.158	$Standard\ Dev._{norm}$		1.312
Coeff. of Var. [%]	2.301	$Coeff.\ of\ Var.\ [\%]_{norm}$		2.624
Min.	48.654	Min.	0.0073	47.296
Max.	52.699	Max.	0.0080	52.597
Number of Spec.	21	Number of Spec.	21	21

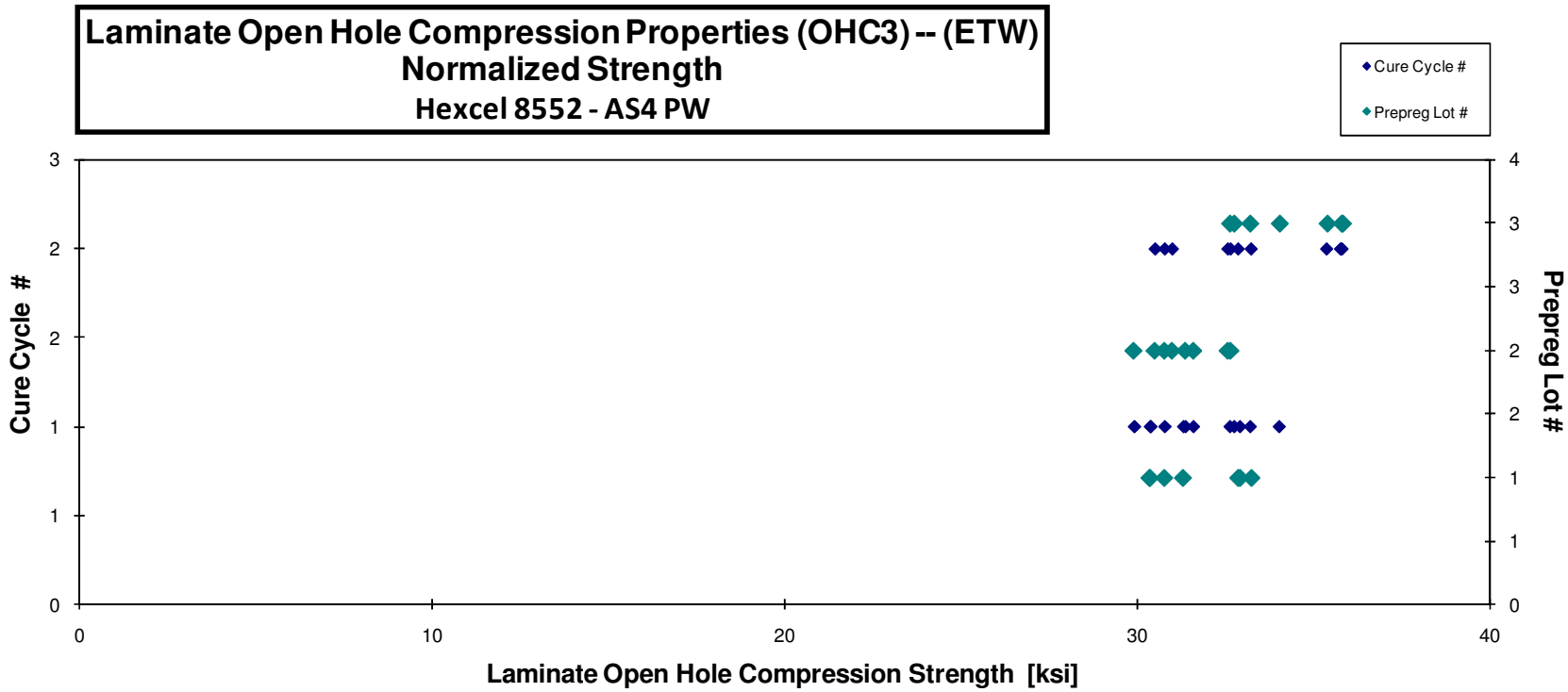

Laminate Open Hole Compression Properties (OHC3) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open Hole Compression Strength [ksi]
0
10
20
30
40
50
60
0
1
1
2
2
3
0
1
2
3
4

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

normalizing t_{ply} [in]: 0.0078

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]
HFPIA118D	A	M1	1	1	30.785	0.154	20	LGM	0.0077	30.351
HFPIA119D	A	M1	1	1	31.326	0.156	20	LGM	0.0078	31.299
HFPIA11AD	A	M1	1	1	33.072	0.155	20	LGM	0.0078	32.913
HFPIA11BD	A	M1	1	1	30.474	0.155	20	LGM	0.0078	30.370
HFPIA217D	A	M2	1	2	33.525	0.155	20	LGM	0.0077	33.231
HFPIA218D	A	M2	1	2	30.745	0.156	20	LGM	0.0078	30.768
HFPIA219D	A	M2	1	2	32.770	0.156	20	LGM	0.0078	32.861
HFPIB116D	B	M1	2	1	32.137	0.152	20	LGM	0.0076	31.361
HFPIB117D	B	M1	2	1	31.008	0.159	20	LGM	0.0079	31.584
HFPIB118D	B	M1	2	1	29.132	0.160	20	LGM	0.0080	29.897
HFPIB119D	B	M1	2	1	29.912	0.160	20	LGM	0.0080	30.768
HFPIB216D	B	M2	2	2	30.962	0.154	20	LGM	0.0077	30.492
HFPIB217D	B	M2	2	2	31.922	0.159	20	LGM	0.0080	32.563
HFPIB218D	B	M2	2	2	32.028	0.159	20	LGM	0.0079	32.640
HFPIB219D	B	M2	2	2	30.363	0.159	20	LGM	0.0080	30.979
HFPIC116D	C	M1	3	1	35.360	0.146	20	LGM	0.0073	33.202
HFPIC117D	C	M1	3	1	32.275	0.158	20	LGM	0.0079	32.627
HFPIC118D	C	M1	3	1	31.755	0.161	20	LGM	0.0080	32.745
HFPIC119D	C	M1	3	1	33.142	0.160	20	LGM	0.0080	34.034
HFPIC217D	C	M2	3	2	35.460	0.157	20	LGM	0.0079	35.786
HFPIC218D	C	M2	3	2	34.545	0.160	20	LGM	0.0080	35.383
HFPIC219D	C	M2	3	2	34.918	0.160	20	LGM	0.0080	35.821

	Strength		$Strength_{norm}$
Average	32.164	$Average_{norm}$	0.0078	32.349
Standard Dev.	1.778	$Standard\ Dev._{norm}$		1.763
Coeff. of Var. [%]	5.527	$Coeff.\ of\ Var.\ [\%]_{norm}$		5.450
Min.	29.132	Min.	0.0073	29.897
Max.	35.460	Max.	0.0080	35.821
Number of Spec.	22	Number of Spec.	22	22


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

4.23 Filled-Hole Compression 1 Properties

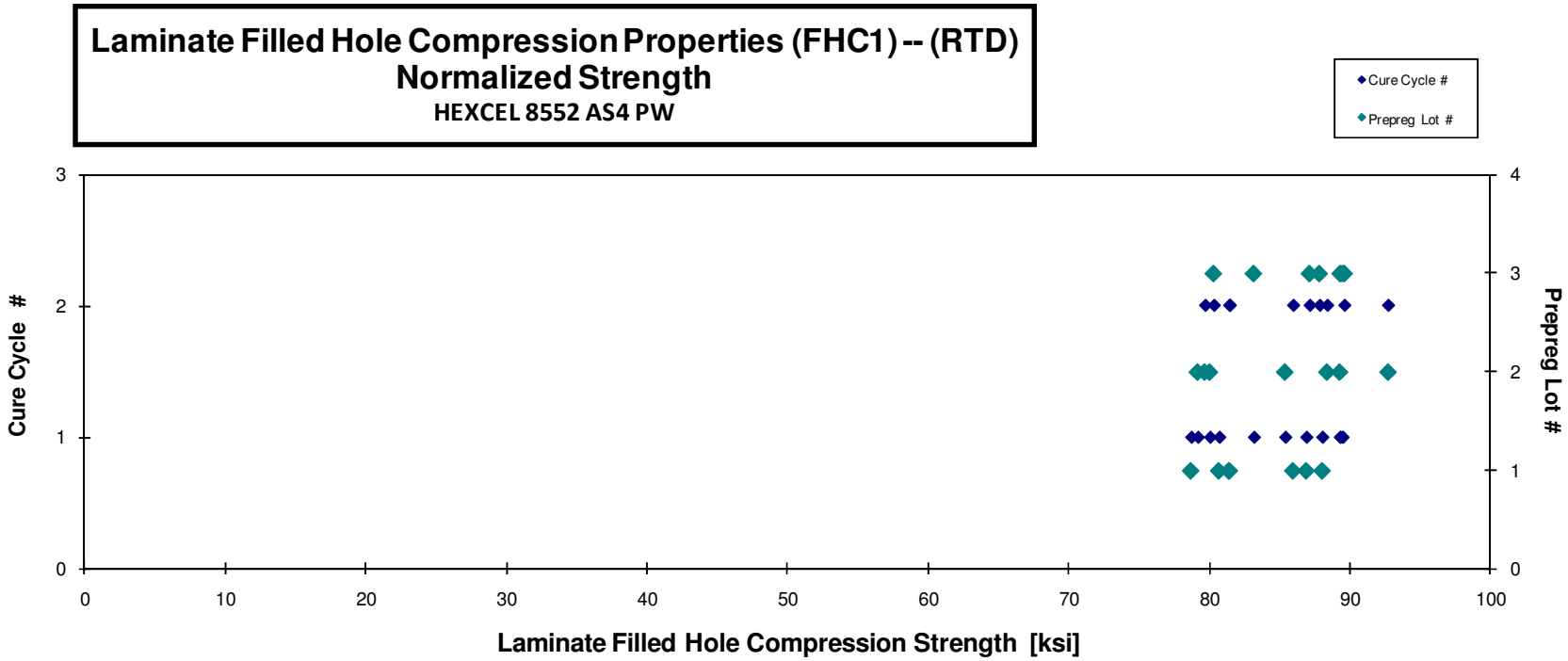
Laminate Filled Hole Compression Properties (FHC1) -- (RTD) Strength
HEXCEL 8552 AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFP7A113A	A	M1	1	1	79.862	0.154	20	LGF	0.0077	78.719
HFP7A114A	A	M1	1	1	80.812	0.156	20	LGF	0.0078	80.709
HFP7A115A	A	M1	1	1	88.075	0.156	20	LGF/MGF	0.0078	88.046
HFP7A116A	A	M1	1	1	87.455	0.155	20	LGF	0.0078	86.913
HFP7A211A	A	M2	1	2	85.238	0.149	20	LGF	0.0075	81.459
HFP7A212A	A	M2	1	2	86.120	0.156	20	LGF	0.0078	85.964
HFP7A213A	A	M2	1	2	80.874	0.157	20	LGF	0.0079	81.419
HFP7B112A	B	M1	2	1	78.513	0.159	20	LGF	0.0080	80.056
HFP7B113A	B	M1	2	1	77.348	0.160	20	LGF	0.0080	79.199
HFP7B114A	B	M1	2	1	83.164	0.160	20	LGF	0.0080	85.403
HFP7B115A	B	M1	2	1	86.961	0.160	20	LGF	0.0080	89.283
HFP7B211A	B	M2	2	2	88.414	0.164	20	LGF	0.0082	92.721
HFP7B214A	B	M2	2	2	86.720	0.159	20	LGF	0.0080	88.388
HFP7B215A	B	M2	2	2	83.046	0.150	20	LGM	0.0075	79.701
HFP7C112A	C	M1	3	1	88.379	0.158	20	AGF	0.0079	89.494
HFP7C113A	C	M1	3	1	81.881	0.158	20	LGF	0.0079	83.176
HFP7C114A	C	M1	3	1	88.326	0.158	20	LGF	0.0079	89.327
HFP7C115A	C	M1	3	1			20			
HFP7C212A	C	M2	3	2	87.016	0.156	20	LGF	0.0078	87.147
HFP7C213A	C	M2	3	2	87.274	0.157	20	LGF	0.0079	87.843
HFP7C214A	C	M2	3	2	79.838	0.157	20	LGF	0.0078	80.333
HFP7C215A	C	M2	3	2	89.338	0.156	20	AGF	0.0078	89.614

Compressive strength for HFP7C111A, HFP7C115A & HFP7C211A is not reported as the unacceptable failure modes were observed.

Average	84.507	$Average_{norm}$	84.996
Standard Dev.	3.780	$Standard\ Dev._{norm}$	4.306
Coeff. of Var. [%]	4.474	$Coeff.\ of\ Var.\ [\%]_{norm}$	5.066
Min.	77.348	Min.	78.719
Max.	89.338	Max.	92.721
Number of Spec.	21	Number of Spec.	21


Laminate Filled Hole Compression Properties (FHC1) -- (RTD)
Normalized Strength
HEXCEL 8552 AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4

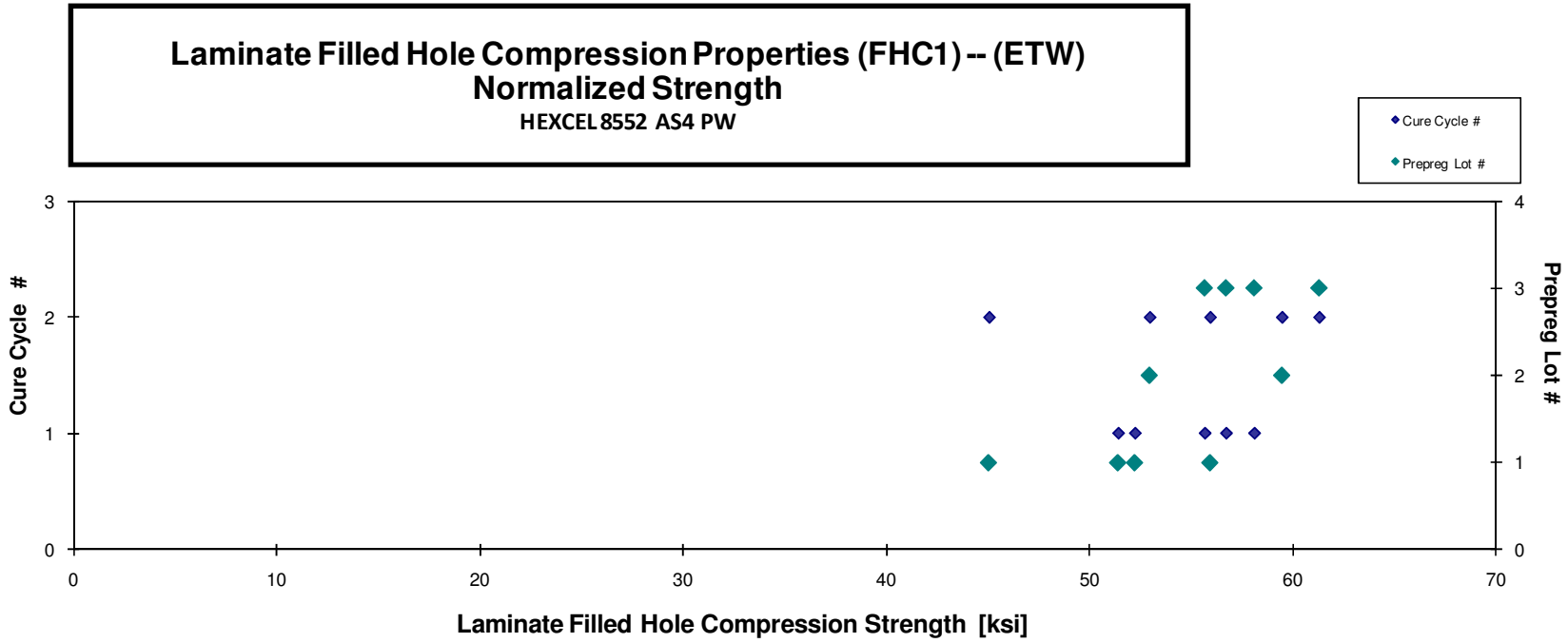
Laminate Filled Hole Compression Properties (FHC1) -- (ETW)
Strength
HEXCEL 8552 AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFP7A11BD	A	M1	1	1	51.924	0.157	20	LGF	0.0078	52.223
HFP7A11CD	A	M1	1	1	51.286	0.156	20	LGF	0.0078	51.396
HFP7A219D	A	M2	1	2	54.748	0.159	20	MGF	0.0080	55.924
HFP7A21AD	A	M2	1	2	44.406	0.158	20	LGF	0.0079	45.041
HFP7B217D	B	M2	2	2	56.427	0.164	20	LGF	0.008	59.453
HFP7B218D	B	M2	2	2	50.396	0.164	20	LGF	0.008	52.948
HFP7C117D	C	M1	3	1	55.472	0.159	20	LGF	0.008	56.705
HFP7C118D	C	M1	3	1	56.821	0.159	20	LGF	0.008	58.090
HFP7C119D	C	M1	3	1	55.254	0.157	20	LGF	0.008	55.656
HFP7C217D	C	M2	3	2	57.864	0.165	20	LGF	0.008	61.282

Average	53.460	
Standard Dev.	4.040	
Coeff. of Var. [%]	7.557	
Min.	44.406	
Max.	57.864	
Number of Spec.	10	

$Average_{norm}$	0.0080	54.872
$Standard\ Dev._{norm}$		4.678
$Coeff.\ of\ Var.\ [\%]_{norm}$		8.525
Min.	0.0078	45.041
Max.	0.0083	61.282
Number of Spec.	10	10


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

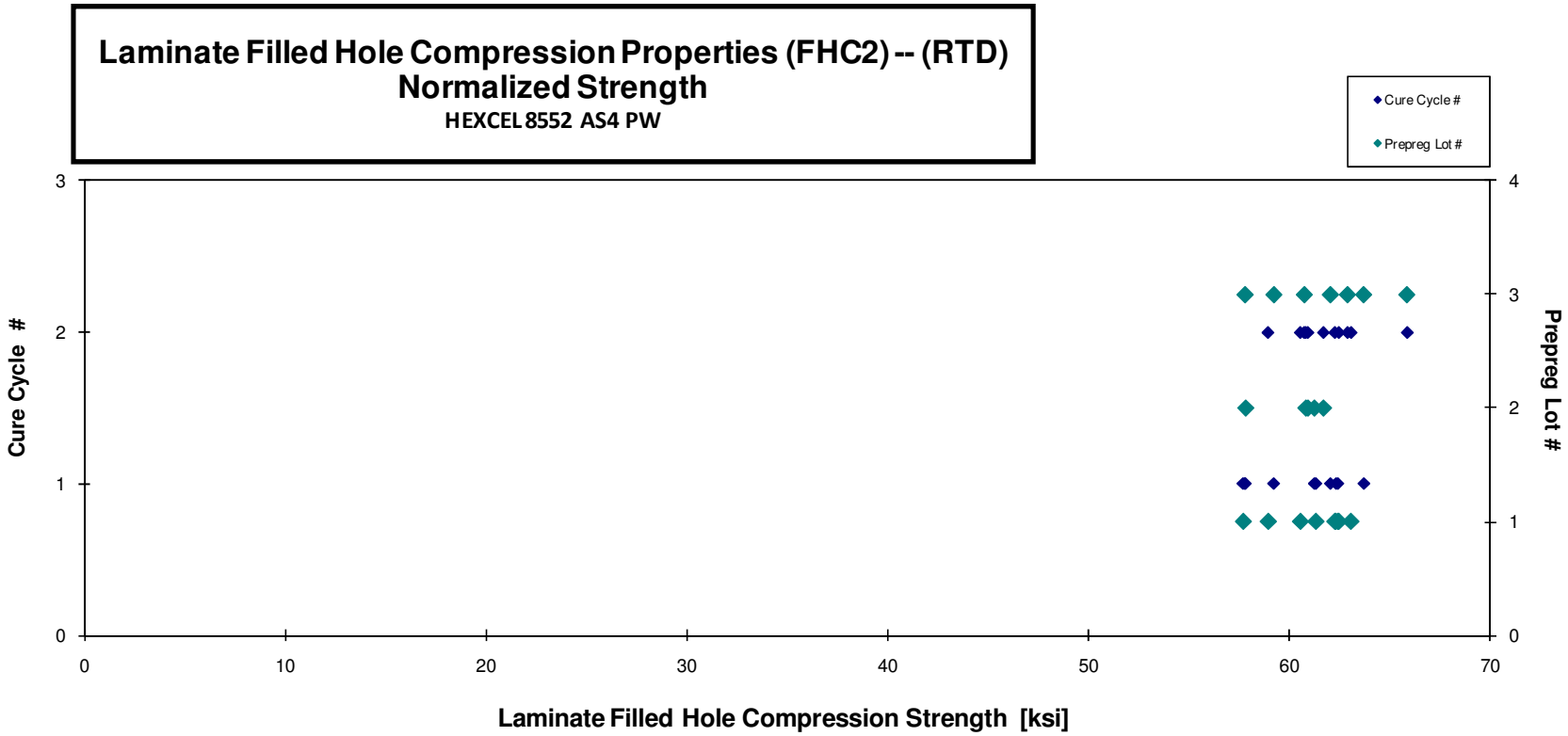
4.24 Filled-Hole Compression 2 Properties

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

normalizing t_{ply} [in]: 0.0078

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]
HFP8A111A	A	M1	1	1	59.971	0.150	20	AGF	0.0075	57.664
HFP8A113A	A	M1	1	1	62.430	0.156	20	AGF	0.0078	62.390
HFP8A114A	A	M1	1	1	62.094	0.157	20	AGF	0.0078	62.300
HFP8A115A	A	M1	1	1	60.844	0.157	20	MGF	0.0079	61.299
HFP8A211A	A	M2	1	2	62.279	0.148	20	AGF	0.0074	58.912
HFP8A212A	A	M2	1	2	63.577	0.155	20	AGF/AGO	0.0077	63.047
HFP8A213A	A	M2	1	2	59.945	0.158	20	AGM/AGF	0.0079	60.522
HFP8A214A	A	M2	1	2	61.208	0.159	20	LGF	0.0079	62.241
HFP8A215A	A	M2	1	2	61.569	0.158	20	MGF/AGF	0.0079	62.444
HFP8B111A	B	M1	2	1	59.285	0.152	20	MGF	0.0076	57.784
HFP8B114A	B	M1	2	1	59.953	0.159	20	MGF/AGF	0.0080	61.222
HFP8B211A	B	M2	2	2	62.337	0.152	20	AGF	0.0076	60.899
HFP8B212A	B	M2	2	2	60.553	0.157	20	AGO/AGF	0.0078	60.793
HFP8B214A	B	M2	2	2	60.107	0.160	20	AGO/AGF	0.0080	61.674
HFP8C111A	C	M1	3	1	60.486	0.149	20	AGF	0.0074	57.753
HFP8C112A	C	M1	3	1	62.196	0.156	20	AGF	0.0078	62.023
HFP8C113A	C	M1	3	1	58.549	0.158	20	AGM/AGF	0.0079	59.194
HFP8C114A	C	M1	3	1	62.973	0.158	20	AGF	0.0079	63.686
HFP8C211A	C	M2	3	2	64.721	0.159	20	LGF/AGF	0.0079	65.848
HFP8C212A	C	M2	3	2	59.846	0.158	20	AGF	0.0079	60.716
HFP8C213A	C	M2	3	2	62.092	0.158	20	AGF/MGF	0.0079	62.874

	Strength [ksi]	$Strength_{norm}$ [ksi]	Avg. t_{ply} [in]
Average	61.287	61.204	0.0078
Standard Dev.	1.535	2.079	
Coeff. of Var. [%]	2.505	3.397	
Min.	58.549	57.664	0.0074
Max.	64.721	65.848	0.0080
Number of Spec.	21	21	21


Laminate Filled Hole Compression Properties (FHC2) -- (RTD)
Normalized Strength
HEXCEL 8552 AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Compression Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60
70

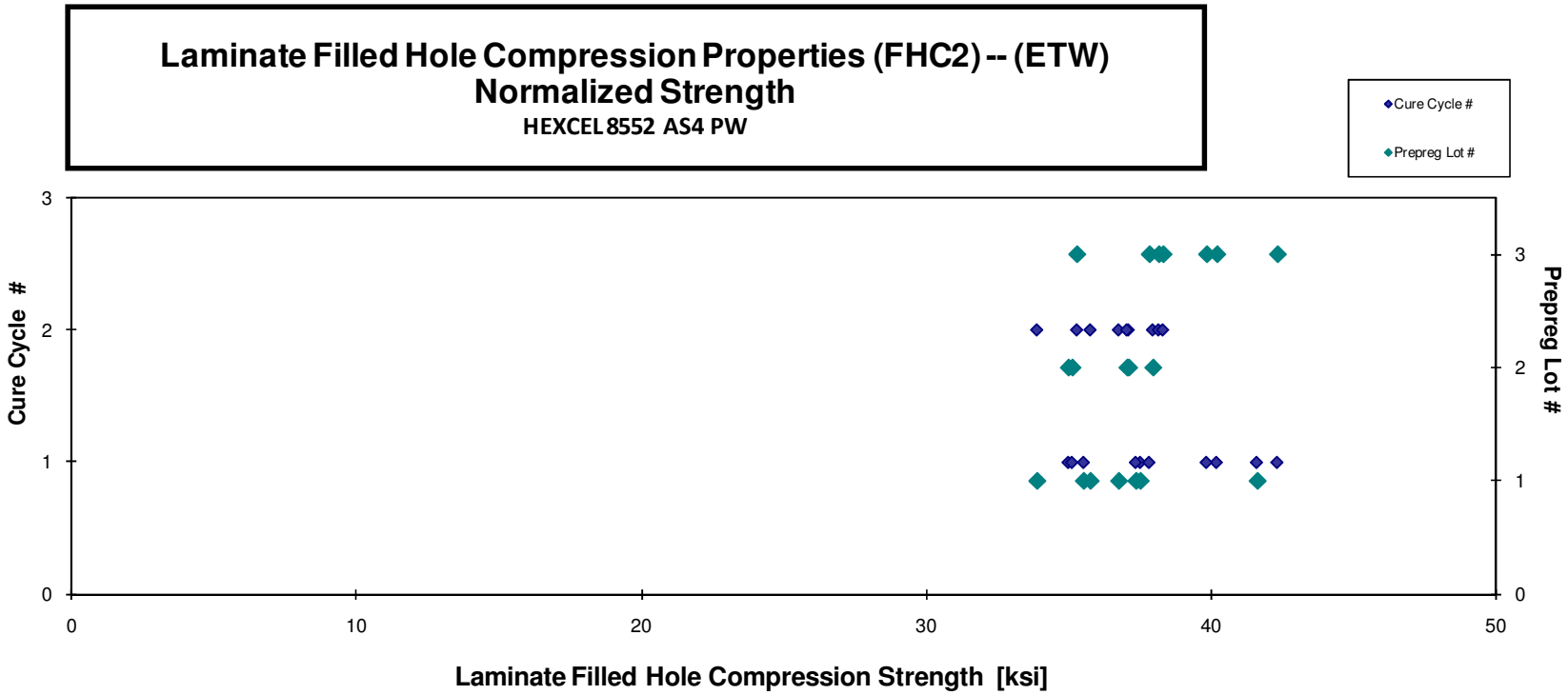
Laminate Filled Hole Compression Properties (FHC2) -- (ETW)
Strength
HEXCEL 8552 AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFP8A118D	A	M1	1	1	35.186	0.158	20	MGF	0.0079	35.528
HFP8A119D	A	M1	1	1	40.483	0.160	20	MGF	0.0080	41.608
HFP8A11AD	A	M1	1	1	36.462	0.161	20	MGF	0.0080	37.518
HFP8A11BD	A	M1	1	1	36.291	0.161	20	MGF	0.0080	37.365
HFP8A216D	A	M2	1	2	36.033	0.159	20	MGF	0.0080	36.761
HFP8A217D	A	M2	1	2	35.682	0.156	20	LGF	0.0078	35.766
HFP8A218D	A	M2	1	2	35.466	0.149	20	LGF	0.0075	33.897
HFP8B118D	B	M1	2	1	35.778	0.153	20	MGF	0.0076	34.998
HFP8B119D	B	M1	2	1	35.718	0.153	20	AGF	0.0077	35.130
HFP8B217D	B	M2	2	2	37.317	0.159	20	LGF	0.0079	37.959
HFP8B218D	B	M2	2	2	35.960	0.161	20	AGF	0.0080	37.109
HFP8B219D	B	M2	2	2	35.691	0.162	20	LGF	0.0081	37.053
HFP8C116D	C	M1	3	1	39.947	0.157	20	LGF	0.0078	40.198
HFP8C117D	C	M1	3	1	38.112	0.155	20	LGF	0.0077	37.835
HFP8C118D	C	M1	3	1	44.404	0.149	20	LGF	0.0074	42.316
HFP8C119D	C	M1	3	1	42.017	0.148	20	LGF	0.0074	39.840
HFP8C218D	C	M2	3	2	37.535	0.159	20	LGF	0.0079	38.161
HFP8C219D	C	M2	3	2	38.559	0.155	20	AGF	0.0078	38.316
HFP8C21AD	C	M2	3	2	36.642	0.150	20	LGF	0.0075	35.295

Average	37.541	
Standard Dev.	2.522	
Coeff. of Var. [%]	6.717	
Min.	35.186	
Max.	44.404	
Number of Spec.	19	

$Average_{norm}$	0.0078	37.508
$Standard\ Dev._{norm}$		2.258
$Coeff.\ of\ Var.\ [\%]_{norm}$		6.020
Min.	0.0074	33.897
Max.	0.0081	42.316
Number of Spec.	19	19


Laminate Filled Hole Compression Properties (FHC2) -- (ETW)
Normalized Strength
HEXCEL 8552 AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
10
20
30
40
50
Laminate Filled Hole Compression Strength [ksi]

4.25 Filled-Hole Compression 3 Properties

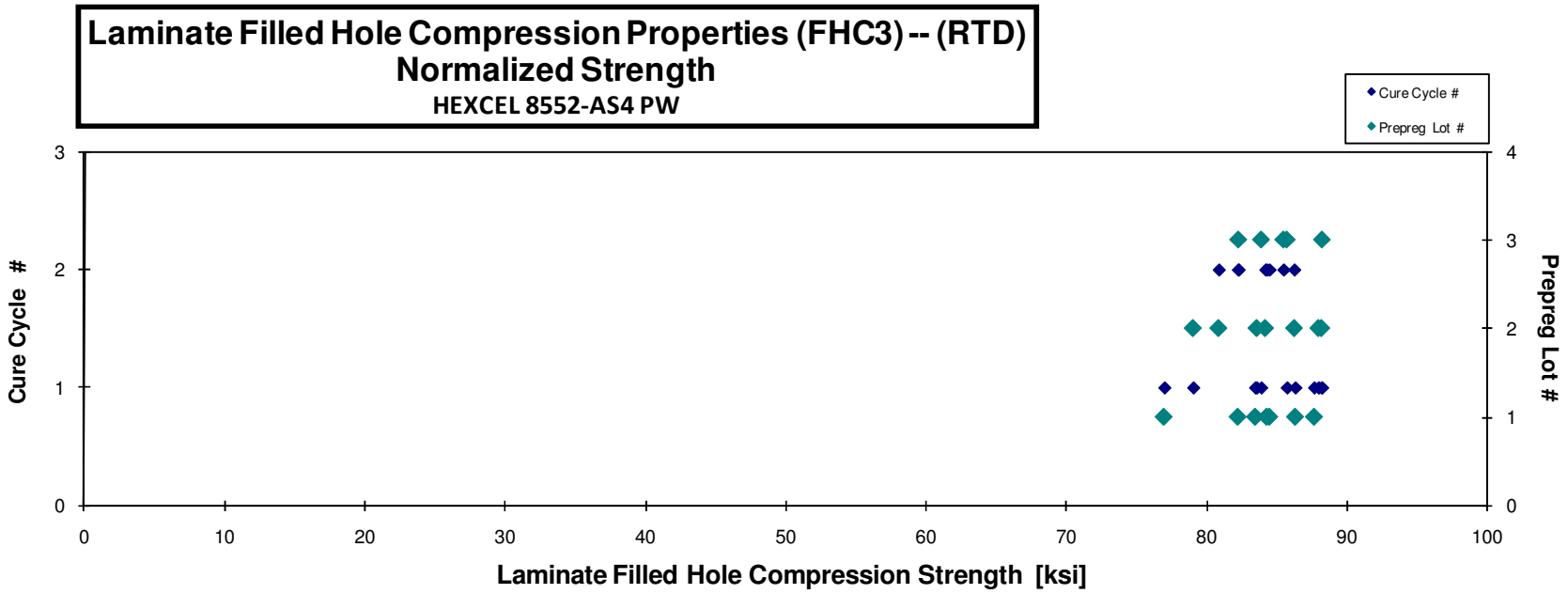
Laminate Filled Hole Compression Properties (FHC3) -- (RTD)
Strength
HEXCEL 8552-AS4 PW

normalizing t_{ply} [in]
0.0078

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]
HFP9A112A	A	M1	1	1	84.042	0.155	20	LGF	0.0077	83.467
HFP9A113A	A	M1	1	1	87.301	0.157	20	LGF	0.0078	87.664
HFP9A114A	A	M1	1	1	86.363	0.156	20	LGF / AGF	0.0078	86.317
HFP9A115A	A	M1	1	1	77.167	0.156	20	LGF	0.0078	76.985
HFP9A211A	A	M2	1	2	86.383	0.149	20	LGF	0.0074	82.230
HFP9A212A	A	M2	1	2	85.416	0.154	20	LGF	0.0077	84.293
HFP9A213A	A	M2	1	2	85.137	0.155	20	LGF	0.0077	84.473
HFP9B111A	B	M1	2	1	82.402	0.150	20	MGF	0.0075	79.047
HFP9B112A	B	M1	2	1	87.781	0.156	20	MGF	0.0078	87.969
HFP9B113A	B	M1	2	1	86.727	0.159	20	MGF	0.0079	88.182
HFP9B114A	B	M1	2	1	82.004	0.159	20	MGF	0.0079	83.573
HFP9B211A	B	M2	2	2	86.190	0.146	20	LGF	0.0073	80.868
HFP9B212A	B	M2	2	2	86.956	0.155	20	MGF	0.0077	86.241
HFP9B213A	B	M2	2	2	83.031	0.158	20	MGF	0.0079	84.184
HFP9C111A	C	M1	3	1	85.148	0.157	20	LGF	0.0079	85.721
HFP9C112A	C	M1	3	1	86.806	0.159	20	LIT	0.0079	88.225
HFP9C113A	C	M1	3	1	83.218	0.157	20	LAT	0.0079	83.893
HFP9C211A	C	M2	3	2	88.624	0.150	20	LGF	0.0075	85.480
HFP9C213A	C	M2	3	2	81.750	0.157	20	LGF	0.0079	82.274

Average	**84.866**	
Standard Dev.	**2.758**	
Coeff. of Var. [%]	**3.250**	
Min.	**77.167**	
Max.	**88.624**	
Number of Spec.	**19**	

$Average_{norm}$	**0.0077**	**84.268**
$Standard\ Dev._{norm}$		**3.066**
Coeff. of Var. $[\%]_{norm}$		**3.638**
Min.	**0.0073**	**76.985**
Max.	**0.0079**	**88.225**
Number of Spec.	**19**	**19**


Laminate Filled Hole Compression Properties (FHC3) -- (RTD)
Normalized Strength
HEXCEL 8552-AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled Hole Compression Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100

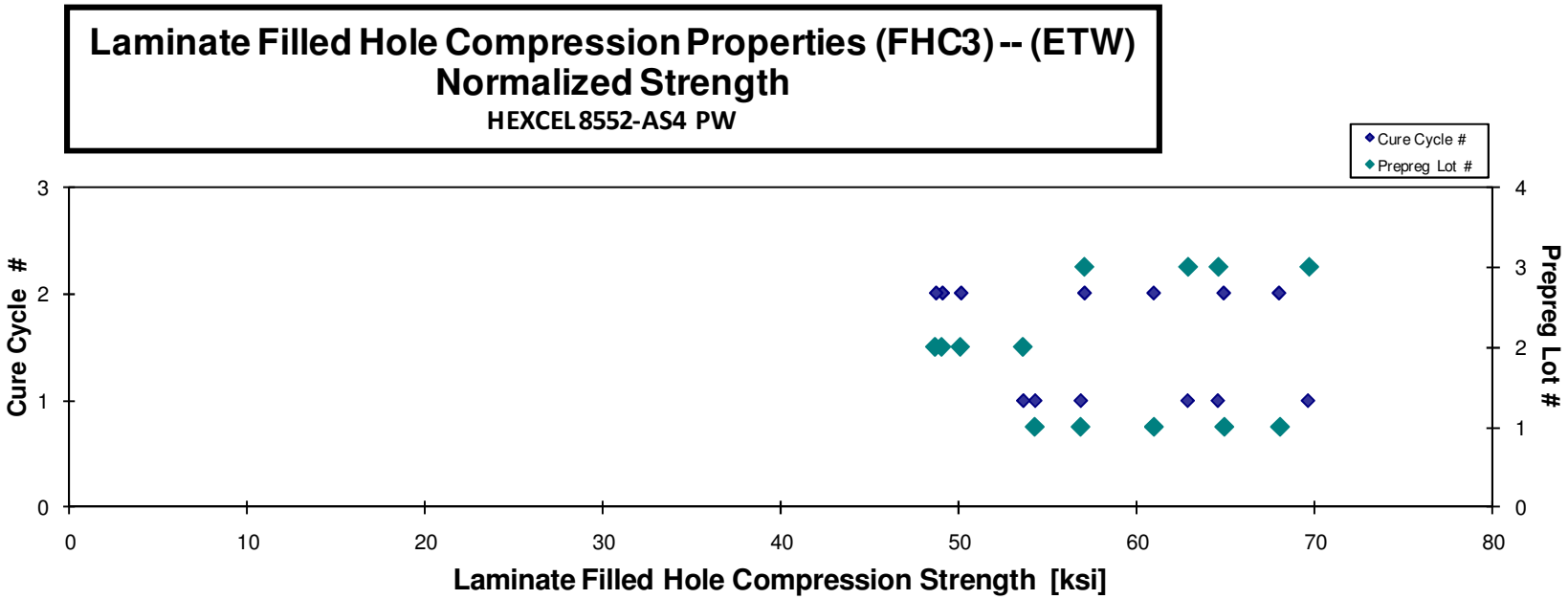
Laminate Filled Hole Compression Properties (FHC3) -- (ETW)
Strength
HEXCEL 8552-AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFP9A119D	A	M1	1	1	54.521	0.155	20	LGF	0.0078	54.259
HFP9A11BD	A	M1	1	1	56.751	0.156	20	LGF	0.0078	56.830
HFP9A217D	A	M2	1	2	69.174	0.153	20	LGF	0.0077	68.014
HFP9A218D	A	M2	1	2	65.463	0.155	20	LGF	0.0077	64.889
HFP9A21AD	A	M2	1	2	61.451	0.155	20	LGM	0.0077	60.946
HFP9B118D	B	M1	2	1	52.220	0.160	20	LGF	0.0080	53.593
HFP9B216D	B	M2	2	2	47.632	0.161	20	LGF	0.0080	49.036
HFP9B217D	B	M2	2	2	49.436	0.158	20	LGF	0.0079	50.086
HFP9B218D	B	M2	2	2	50.261	0.151	20	LGF	0.0076	48.672
HFP9C116D	C	M1	3	1	68.919	0.158	20	LGO	0.0079	69.648
HFP9C117D	C	M1	3	1	63.435	0.159	20	LGO / LGM	0.0079	64.560
HFP9C118D	C	M1	3	1	61.828	0.159	20	LGM / LGF	0.0079	62.858
HFP9C21AD	C	M2	3	2	55.359	0.161	20	LGF	0.0080	57.045

	Strength [ksi]
Average	58.188
Standard Dev.	7.361
Coeff. of Var. [%]	12.650
Min.	47.632
Max.	69.174
Number of Spec.	13

	t_{ply} [in]	$Strength_{norm}$ [ksi]
$Average_{norm}$	0.0078	58.4950
$Standard\ Dev._{norm}$		7.195
$Coeff.\ of\ Var.\ [\%]_{norm}$		12.300
Min.	0.0076	48.6719
Max.	0.0080	69.6476
Number of Spec.	13	13


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

4.26 Single Shear Bearing 1 Properties

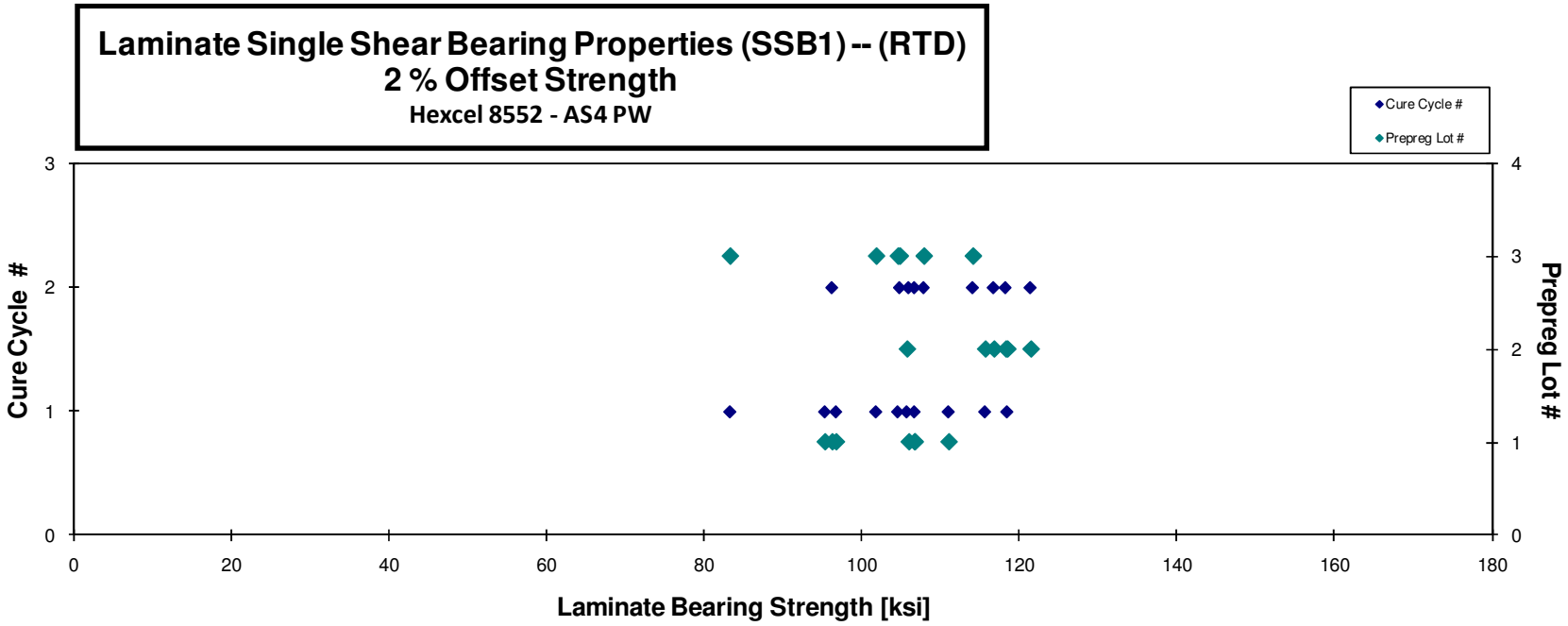
Laminate Single Shear Bearing Properties (SSB1) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFP1A112A	A	M1	1	1	97.449	129.959	0.062	8	B1I / 2% OFFSET FOR UBS*	0.0077	96.798
HFP1A113A	A	M1	1	1	110.492	131.541	0.063	8	B1I / 2% OFFSET FOR UBS*	0.0078	111.052
HFP1A114A	A	M1	1	1	106.054	142.158	0.063	8	B1I / 2% OFFSET FOR UBS*	0.0079	106.734
HFP1A115A	A	M1	1	1	101.081	144.813	0.059	8	B1I / 2% OFFSET FOR UBS*	0.0074	95.385
HFP1A211A	A	M2	1	2	97.196	137.823	0.062	8	B1I / 2% OFFSET FOR UBS*	0.0077	96.288
HFP1A212A	A	M2	1	2	107.893	130.584	0.062	8	B1I / 2% OFFSET FOR UBS*	0.0077	106.740
HFP1A213A	A	M2	1	2	106.290	142.633	0.062	8	B1I / 2% OFFSET FOR UBS*	0.0078	106.006
HFP1B111A	B	M1	2	1	115.866	139.444	0.062	8	B1I / 2% OFFSET FOR UBS*	0.0078	115.680
HFP1B112A	B	M1	2	1	117.379	138.302	0.063	8	B1I / 2% OFFSET FOR UBS*	0.0079	118.476
HFP1B113A	B	M1	2	1	104.924	133.380	0.063	8	B1I / 2% OFFSET FOR UBS*	0.0079	105.764
HFP1B211A	B	M2	2	2	113.110	128.310	0.064	8	B1I / 2% OFFSET FOR UBS*	0.0081	116.766
HFP1B212A	B	M2	2	2	118.303	137.937	0.064	8	B1I / 2% OFFSET FOR UBS*	0.0080	121.431
HFP1B213A	B	M2	2	2	116.384	133.375	0.063	8	B1I / 2% OFFSET FOR UBS*	0.0079	118.280
HFP1C111A	C	M1	3	1	111.578	141.300	0.057	8	B1I / 2% OFFSET FOR UBS*	0.0071	101.863
HFP1C112A	C	M1	3	1	109.026	135.858	0.060	8	B1I / 2% OFFSET FOR UBS*	0.0075	104.629
HFP1C113A	C	M1	3	1	88.374	127.910	0.059	8	B1I / 2% OFFSET FOR UBS*	0.0074	83.370
HFP1C211A	C	M2	3	2	115.819	142.073	0.057	8	B1I / 2% OFFSET FOR UBS*	0.0071	104.868
HFP1C212A	C	M2	3	2	107.638	137.755	0.063	8	B1I / 2% OFFSET FOR UBS*	0.0078	107.897
HFP1C213A	C	M2	3	2	111.963	149.538	0.064	8	B1I / 2% OFFSET FOR UBS*	0.0080	114.116
									*Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)		

Average	**108.254**	**137.089**
Standard Dev.	**7.907**	**5.947**
Coeff. of Var. [%]	**7.304**	**4.338**
Min.	**88.374**	**127.910**
Max.	**118.303**	**149.538**
Number of Spec.	**19**	**19**

Average	**0.0077**	**106.955**
Standard Dev.		**9.595**
Coeff. of Var. [%]		**8.971**
Min.	**0.0071**	**83.370**
Max.	**0.0081**	**121.431**
Number of Spec.	**19**	**19**


Laminate Single Shear Bearing Properties (SSB1) -- (RTD)
2 % Offset Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
1
2
3
4
0
20
40
60
80
100
120
140
160
180

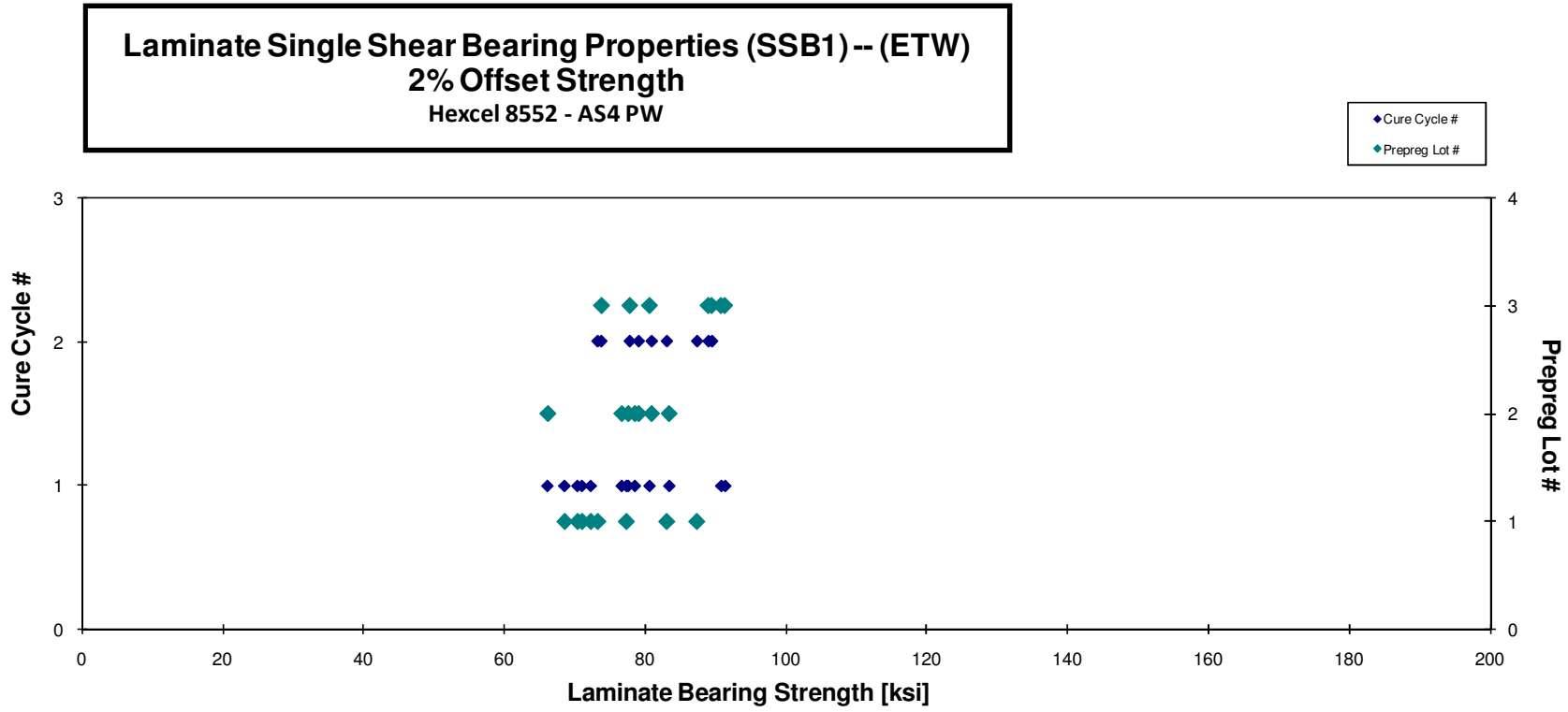
Laminate Single Shear Bearing Properties (SSB1) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFP1A117D	A	M1	1	1	82.132	94.059	0.055	8	B1I	0.0069	72.261
HFP1A118D	A	M1	1	1	82.238	97.365	0.059	8	B1I	0.0073	77.317
HFP1A119D	A	M1	1	1	75.490	96.521	0.058	8	B1I	0.0073	70.368
HFP1A11AD	A	M1	1	1	76.300	92.971	0.058	8	B1I	0.0073	71.022
HFP1A11BD	A	M1	1	1	73.330	109.177	0.058	8	B1I	0.0073	68.531
HFP1A216D	A	M2	1	2	78.482	107.984	0.058	8	B1I	0.0073	73.241
HFP1A217D	A	M2	1	2	89.493	104.179	0.058	8	B1I	0.0072	83.063
HFP1A218D	A	M2	1	2	90.097	100.819	0.061	8	B1I	0.0076	87.354
HFP1B116D	B	M1	2	1	83.565	101.431	0.059	8	B1I	0.0073	78.521
HFP1B117D	B	M1	2	1	82.217	98.480	0.058	8	B1I	0.0073	76.662
HFP1B118D	B	M1	2	1	79.747	103.369	0.061	8	B1I	0.0076	77.595
HFP1B119D	B	M1	2	1	67.369	89.863	0.061	8	B1I	0.0077	66.128
HFP1B216D	B	M2	2	1	88.754	106.403	0.059	8	B1I	0.0073	83.396
HFP1B217D	B	M2	2	2	85.643	106.748	0.058	8	B1I	0.0072	79.078
HFP1B218D	B	M2	2	2	83.085	102.182	0.061	8	B1I	0.0076	80.910
HFP1C116D	C	M1	3	1	96.703	116.083	0.059	8	B1I	0.0074	91.330
HFP1C117D	C	M1	3	1	88.548	107.634	0.057	8	B1I	0.0071	80.601
HFP1C118D	C	M1	3	1	89.938	107.518	0.063	8	B1I	0.0079	90.779
HFP1C216D	C	M2	3	2	88.647	94.928	0.063	8	B1I	0.0078	88.978
HFP1C217D	C	M2	3	2	81.888	109.802	0.056	8	B1I	0.0070	73.774
HFP1C218D	C	M2	3	2	81.884	100.130	0.059	8	B1I	0.0074	77.794
HFP1C219D	C	M2	3	2	92.475	95.796	0.060	8	B1I	0.0075	89.462

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

Average	**83.547**	**101.975**	**Average**	**0.0074**	**79.008**
Standard Dev.	**6.864**	**6.571**	**Standard Dev.**		**7.377**
Coeff. of Var. [%]	**8.215**	**6.444**	**Coeff. of Var. [%]**		**9.338**
Min.	**67.369**	**89.863**	**Min.**	**0.0069**	**66.128**
Max.	**96.703**	**116.083**	**Max.**	**0.0079**	**91.330**
Number of Spec.	**22.000**	**22**	**Number of Spec.**	**22**	**22**


Laminate Single Shear Bearing Properties (SSB1) -- (ETW)
2% Offset Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Bearing Strength [ksi]
0
20
40
60
80
100
120
140
160
180
200
0
1
2
3
4

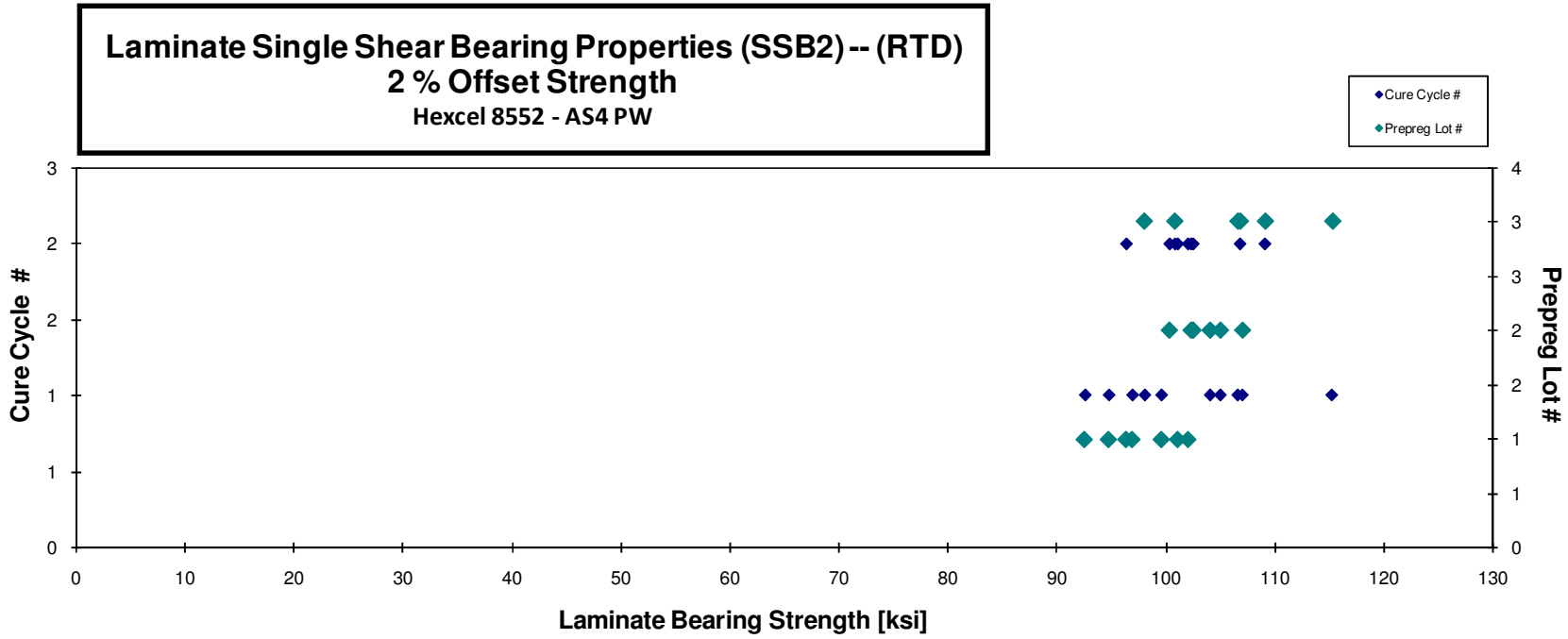
4.27 Single Shear Bearing 2 Properties

Laminate Single Shear Bearing Properties (SSB2) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFP2A111A	A	M1	1	1	100.818	141.350	0.072	10	B1I / 2% OFFSET FOR UBS*	0.0072	92.525
HFP2A112A	A	M1	1	1	104.671	138.612	0.072	10	B1I / 2% OFFSET FOR UBS*	0.0072	96.888
HFP2A113A	A	M1	1	1	108.606	137.378	0.072	10	B1I / 2% OFFSET FOR UBS*	0.0072	99.555
HFP2A114A	A	M1	1	1	103.838	132.401	0.071	10	B1I / 2% OFFSET FOR UBS*	0.0071	94.719
HFP2A211A	A	M2	1	2	98.167	133.111	0.077	10	B1I / 2% OFFSET FOR UBS*	0.0077	96.321
HFP2A212A	A	M2	1	2	100.705	124.727	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	101.049
HFP2A213A	A	M2	1	2	100.667	129.793	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	102.000
HFP2B111A	B	M1	2	1	102.995	135.906	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	104.029
HFP2B112A	B	M1	2	1	106.201	145.183	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	106.995
HFP2B113A	B	M1	2	1	103.992	136.396	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	104.970
HFP2B211A	B	M2	2	2	100.482	127.791	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	100.310
HFP2B212A	B	M2	2	2	102.537	127.806	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	102.472
HFP2B213A	B	M2	2	2	102.585	150.250	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	102.278
HFP2C111A	C	M1	3	1	109.466	138.608	0.076	10	B1I / 2% OFFSET FOR UBS*	0.0076	106.566
HFP2C112A	C	M1	3	1	114.499	133.757	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	115.233
HFP2C113A	C	M1	3	1	107.129	128.404	0.071	10	B1I / 2% OFFSET FOR UBS*	0.0071	98.019
HFP2C211A	C	M2	3	2	101.589	130.774	0.077	10	B1I / 2% OFFSET FOR UBS*	0.0077	100.808
HFP2C212A	C	M2	3	2	106.438	144.184	0.080	10	B1I / 2% OFFSET FOR UBS*	0.0080	109.076
HFP2C213A	C	M2	3	2	103.043	134.105	0.081	10	B1I / 2% OFFSET FOR UBS*	0.0081	106.786
									Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)		

Average	**104.128**	**135.291**	**Average**	**0.008**	**102.137**
Standard Dev.	**3.890**	**6.684**	**Standard Dev.**	**0.000**	**5.452**
Coeff. of Var. [%]	**3.736**	**4.941**	**Coeff. of Var. [%]**	**4.223**	**5.338**
Min.	**98.167**	**124.727**	**Min.**	**0.007**	**92.525**
Max.	**114.499**	**150.250**	**Max.**	**0.008**	**115.233**
Number of Spec.	**19**	**19**	**Number of Spec.**	**19**	**19**


Laminate Single Shear Bearing Properties (SSB2) -- (RTD)
2 % Offset Strength
Hexcel 8552 - AS4 PW
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
1
2
2
3
0
1
1
2
2
3
3
4

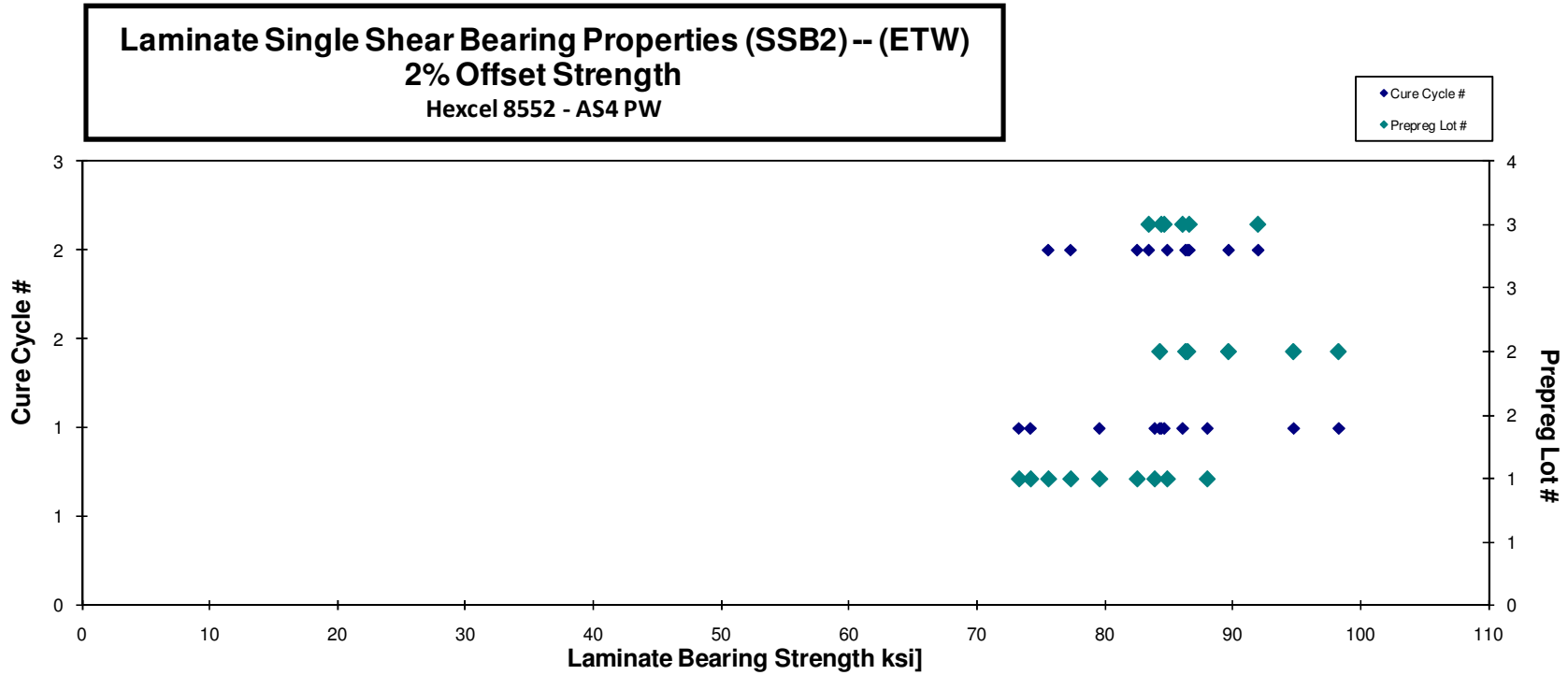
Laminate Single Shear Bearing Properties (SSB2) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFP2A116D	A	M1	1	1	73.267	107.245	0.069	10	B1I	0.0069	64.860
HFP2A117D	A	M1	1	1	74.170	101.369	0.073	10	B1I	0.0073	69.226
HFP2A118D	A	M1	1	1	79.566	101.388	0.073	10	B1I	0.0073	74.551
HFP2A119D	A	M1	1	1	83.893	101.520	0.072	10	B1I	0.0072	77.780
HFP2A11AD	A	M1	1	1	88.000	100.463	0.073	10	B1I	0.0073	81.833
HFP2A216D	A	M2	1	2	82.512	103.731	0.073	10	B1I	0.0073	76.712
HFP2A217D	A	M2	1	2	77.308	106.407	0.070	10	B1I	0.0070	69.181
HFP2A218D	A	M2	1	2	75.562	108.496	0.073	10	B1I	0.0073	70.411
HFP2A219D	A	M2	1	2	84.872	96.073	0.073	10	B1I	0.0073	79.776
HFP2B116D	B	M1	2	1	94.746	110.619	0.073	10	B1I	0.0073	88.308
HFP2B117D	B	M1	2	1	98.272	104.808	0.073	10	B1I	0.0073	92.224
HFP2B118D	B	M1	2	1	84.274	104.958	0.076	10	B1I	0.0076	82.618
HFP2B216D	B	M2	2	2	89.661	102.277	0.074	10	B1I	0.0074	84.584
HFP2B217D	B	M2	2	2	86.464	104.226	0.072	10	B1I	0.0072	79.481
HFP2B218D	B	M2	2	2	86.301	98.071	0.075	10	B1I	0.0075	83.498
HFP2C116D	C	M1	3	1	84.407	102.626	0.071	10	B1I	0.0071	76.904
HFP2C117D	C	M1	3	1	84.627	105.998	0.068	10	B1I	0.0068	74.031
HFP2C118D	C	M1	3	1	86.068	105.906	0.072	10	B1I	0.0072	79.521
HFP2C216D	C	M2	3	2	86.588	106.292	0.073	10	B1I	0.0073	81.482
HFP2C217D	C	M2	3	2	91.968	104.427	0.070	10	B1I	0.0070	82.889
HFP2C218D	C	M2	3	2	83.423	104.151	0.072	10	B1I	0.0072	77.326

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

Average	**84.569**	**103.859**	**Average**	**0.0072**	**78.438**
Standard Dev.	**6.315**	**3.391**	**Standard Dev.**		**6.610**
Coeff. of Var. [%]	**7.468**	**3.265**	**Coeff. of Var. [%]**		**8.427**
Min.	**73.267**	**96.073**	**Min.**	**0.0068**	**64.860**
Max.	**98.272**	**110.619**	**Max.**	**0.0076**	**92.224**
Number of Spec.	**21.000**	**21**	**Number of Spec.**	**21**	**21**


Laminate Single Shear Bearing Properties (SSB2) -- (ETW)
2% Offset Strength
Hexcel 8552 - AS4 PW
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
1
2
2
3
0
1
1
2
2
3
3
4

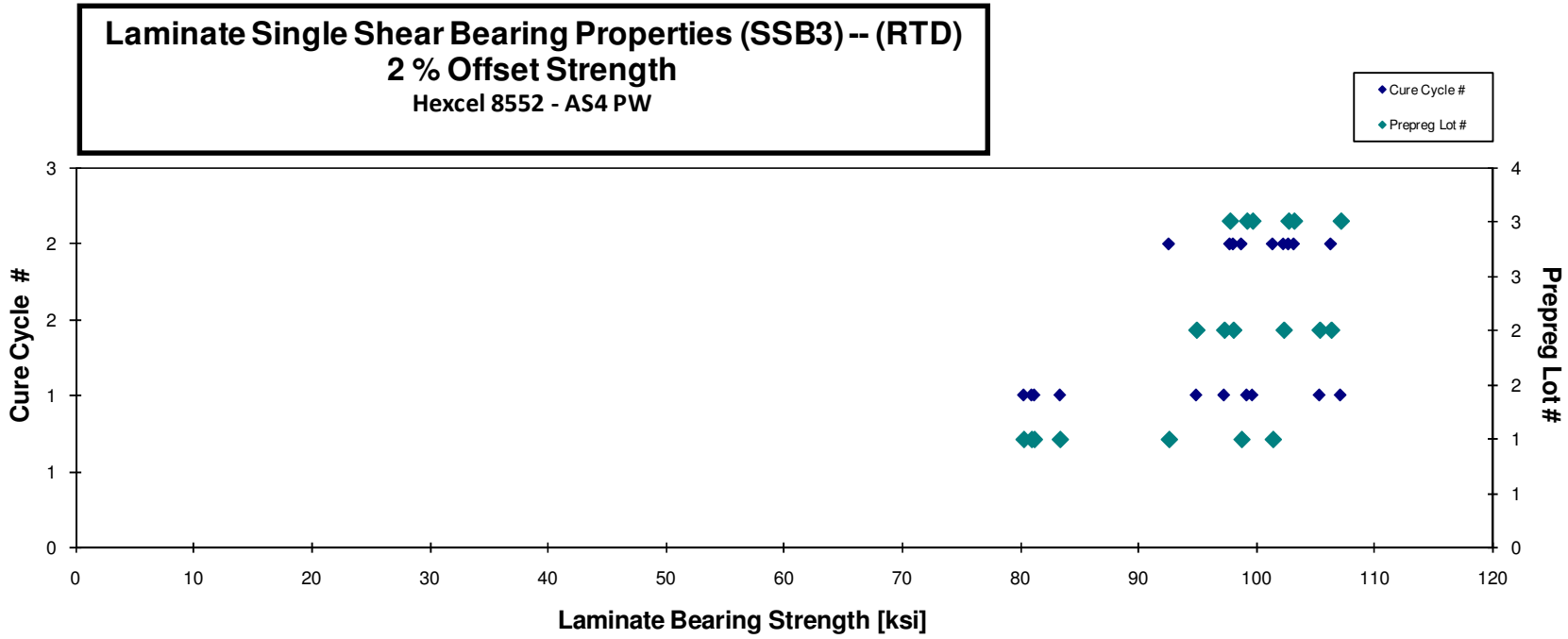
4.28 Single Shear Bearing 3 Properties

Laminate Single Shear Bearing Properties (SSB3) -- (RTD)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFP3A111A	A	M1	1	1	82.187	120.564	0.076	10	B1I / 2% OFFSET FOR UBS*	0.0076	80.237
HFP3A112A	A	M1	1	1	81.375	116.511	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	81.131
HFP3A113A	A	M1	1	1	83.602	117.832	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	83.317
HFP3A114A	A	M1	1	1	81.289	115.259	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	80.907
HFP3A211A	A	M2	1	2	101.484	130.001	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	101.353
HFP3A212A	A	M2	1	2	97.127	125.044	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	98.705
HFP3A213A	A	M2	1	2	92.215	124.402	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	92.550
HFP3B111A	B	M1	2	1	104.835	124.531	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	105.328
HFP3B112A	B	M1	2	1	95.778	122.823	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	97.231
HFP3B113A	B	M1	2	1	93.477	120.494	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	94.876
HFP3B211A	B	M2	2	2	100.959	113.526	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	102.275
HFP3B212A	B	M2	2	2	104.840	125.524	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	106.296
HFP3B213A	B	M2	2	2	96.670	122.631	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	98.013
HFP3C111A	C	M1	3	1	99.507	131.813	0.078	10	B1I / 2% OFFSET FOR UBS*	0.0078	99.635
HFP3C112A	C	M1	3	1	103.270	129.164	0.081	10	B1I / 2% OFFSET FOR UBS*	0.0081	107.110
HFP3C113A	C	M1	3	1	94.984	121.854	0.081	10	B1I / 2% OFFSET FOR UBS*	0.0081	99.165
HFP3C211A	C	M2	3	2	101.690	130.982	0.079	10	B1I / 2% OFFSET FOR UBS*	0.0079	102.690
HFP3C212A	C	M2	3	2	93.333	121.544	0.082	10	B1I / 2% OFFSET FOR UBS*	0.0082	97.721
HFP3C213A	C	M2	3	2	98.384	129.900	0.082	10	B1I / 2% OFFSET FOR UBS*	0.0082	103.156
									Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)		

Average	**95.106**	**123.389**	**Average**	**0.0079**	**96.405**
Standard Dev.	**7.833**	**5.387**	**Standard Dev.**		**8.781**
Coeff. of Var. [%]	**8.236**	**4.366**	**Coeff. of Var. [%]**		**9.108**
Min.	**81.289**	**113.526**	**Min.**	**0.0076**	**80.237**
Max.	**104.840**	**131.813**	**Max.**	**0.0082**	**107.110**
Number of Spec.	**19**	**19**	**Number of Spec.**	**19**	**19**


Laminate Single Shear Bearing Properties (SSB3) -- (RTD)
2 % Offset Strength
Hexcel 8552 - AS4 PW
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
1
2
2
3
0
1
1
2
2
3
3
4

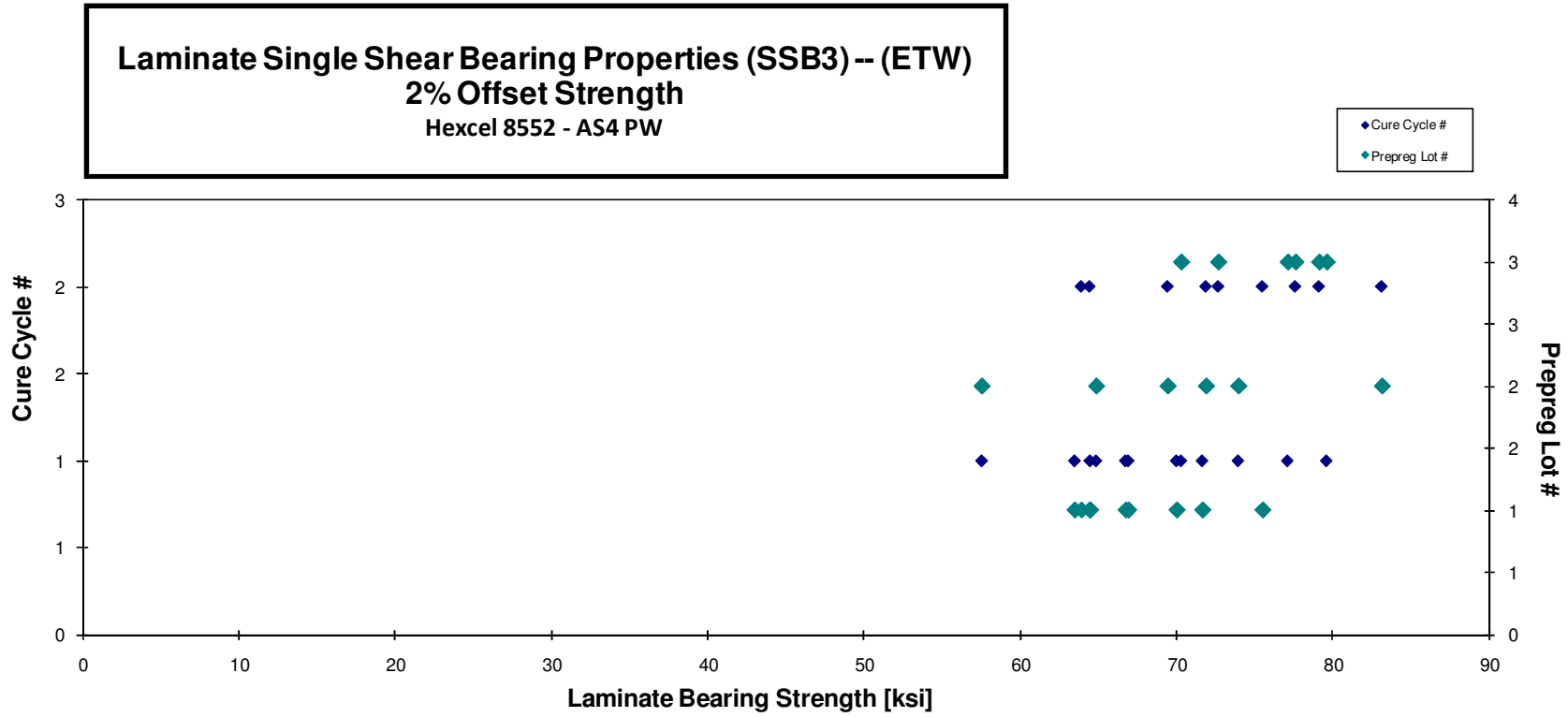
Laminate Single Shear Bearing Properties (SSB3) -- (ETW)
Strength & Modulus
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]
0.0078

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFP3A116D	A	M1	1	1	76.828	92.880	0.073	10	B1I	0.0073	71.657
HFP3A117D	A	M1	1	1	74.574	94.157	0.070	10	B1I	0.0070	66.750
HFP3A118D	A	M1	1	1	70.367	92.254	0.074	10	B1I	0.0074	66.924
HFP3A119D	A	M1	1	1	72.302	91.635	0.076	10	B1I	0.0076	70.016
HFP3A11AD	A	M1	1	1	67.033	85.649	0.075	10	B1I	0.0075	64.484
HFP3A11BD	A	M1	1	1	66.372	87.336	0.075	10	B1I	0.0075	63.493
HFP3A217D	A	M2	1	2	70.728	96.922	0.071	10	B1I	0.0071	64.441
HFP3A219D	A	M2	1	2	80.231	87.479	0.073	10	B1I	0.0073	75.499
HFP3A21AD	A	M2	1	2	67.614	88.896	0.074	10	B1I	0.0074	63.915
HFP3B116D	B	M1	2	1	77.710	92.769	0.074	10	B1I	0.0074	73.957
HFP3B117D	B	M1	2	1	71.150	89.845	0.071	10	B1I	0.0071	64.871
HFP3B118D	B	M1	2	1	60.882	92.186	0.074	10	B1I	0.0074	57.552
HFP3B217D	B	M2	2	2	72.961	93.255	0.074	10	B1I	0.0074	69.438
HFP3B218D	B	M2	2	2	83.400	83.686	0.078	10	B1I	0.0078	83.133
HFP3B219D	B	M2	2	2	73.893	88.644	0.076	10	B1I	0.0076	71.888
HFP3C116D	C	M1	3	1	84.563	98.168	0.071	10	B1I	0.0071	77.118
HFP3C117D	C	M1	3	1	89.346	101.163	0.070	10	B1I	0.0070	79.609
HFP3C118D	C	M1	3	1	75.395	94.311	0.073	10	B1I	0.0073	70.304
HFP3C216D	C	M2	3	2	84.024	104.360	0.073	10	B1I	0.0073	79.122
HFP3C217D	C	M2	3	2	81.800	104.800	0.069	10	B1I	0.0069	72.676
HFP3C218D	C	M2	3	2	82.318	104.621	0.074	10	B1I	0.0074	77.604

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

Average	**75.404**	**93.572**	**Average**	**0.0073**	**70.688**
Standard Dev.	**7.221**	**6.167**	**Standard Dev.**		**6.513**
Coeff. of Var. [%]	**9.577**	**6.590**	**Coeff. of Var. [%]**		**9.213**
Min.	**60.882**	**83.686**	**Min.**	**0.0069**	**57.552**
Max.	**89.346**	**104.800**	**Max.**	**0.0078**	**83.133**
Number of Spec.	**21.000**	**21**	**Number of Spec.**	**21**	**21**


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

4.29 Compression Strength After Impact 1 Properties

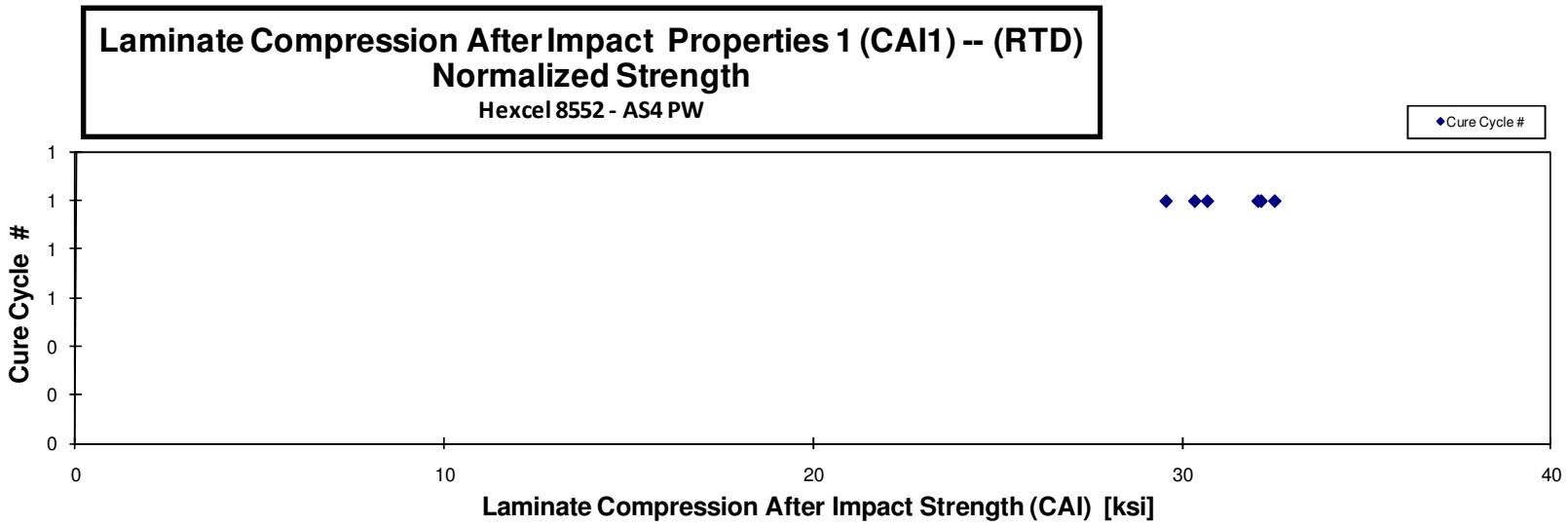
Laminate Compression After Impact Properties (CAI) -- (RTD) Strength
Hexcel 8552 - AS4 PW

normalizing t_{ply} [in]: 0.0078

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]
HFPKA112A	A	M1	1	1	275.34	32.617	0.184	24	LDM	0.0077	32.135
HFPKA114A	A	M1	1	1	274.95	30.463	0.182	24	LDM	0.0076	29.581
HFPKA115A	A	M1	1	1	279.87	32.703	0.186	24	LDM	0.0078	32.502
HFPKA116A	A	M1	1	1	278.44	30.930	0.186	24	LDM	0.0077	30.693
HFPKA117A	A	M1	1	1	275.03	31.170	0.182	24	LDM	0.0076	30.354
HFPKA118A	A	M1	1	1	280.06	32.166	0.187	24	LDM	0.0078	32.052

Average	31.675	
Standard Dev.	0.945	
Coeff. of Var. [%]	2.983	
Min.	30.463	
Max.	32.703	
Number of Spec.	6	

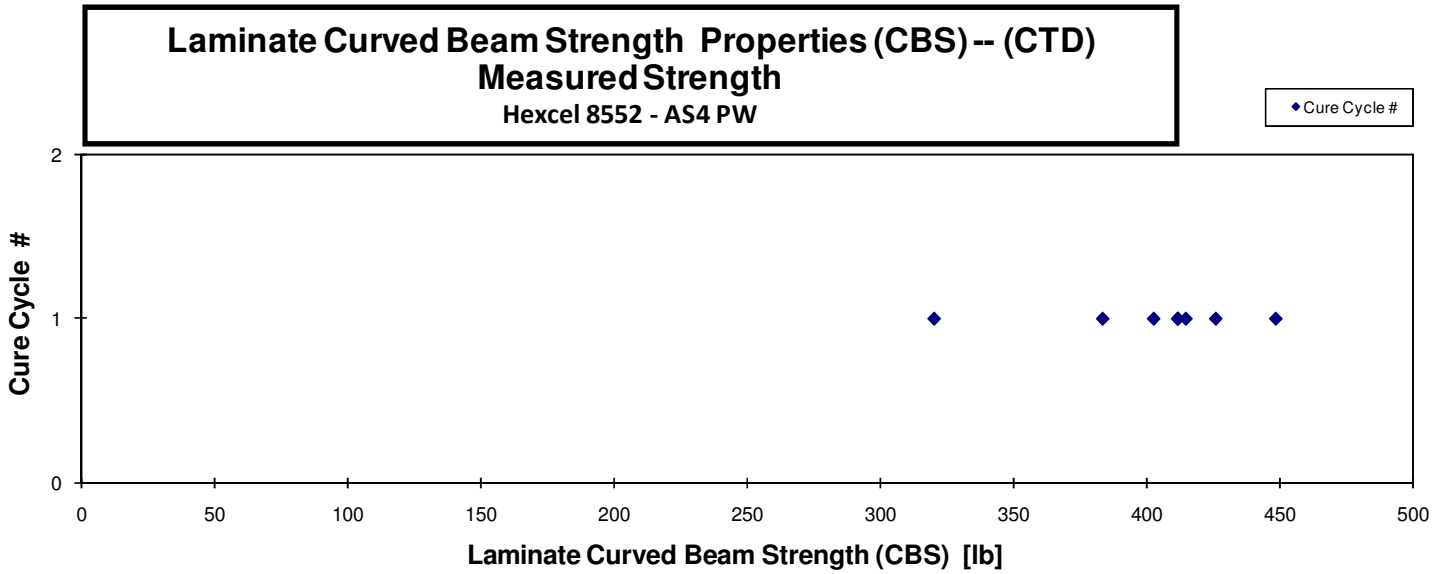
$Average_{norm}$	0.00769	31.219
$Standard\ Dev._{norm}$		1.173
$Coeff.\ of\ Var.\ [\%]_{norm}$		3.758
Min.	0.0076	29.581
Max.	0.0078	32.502
Number of Spec.	6	6

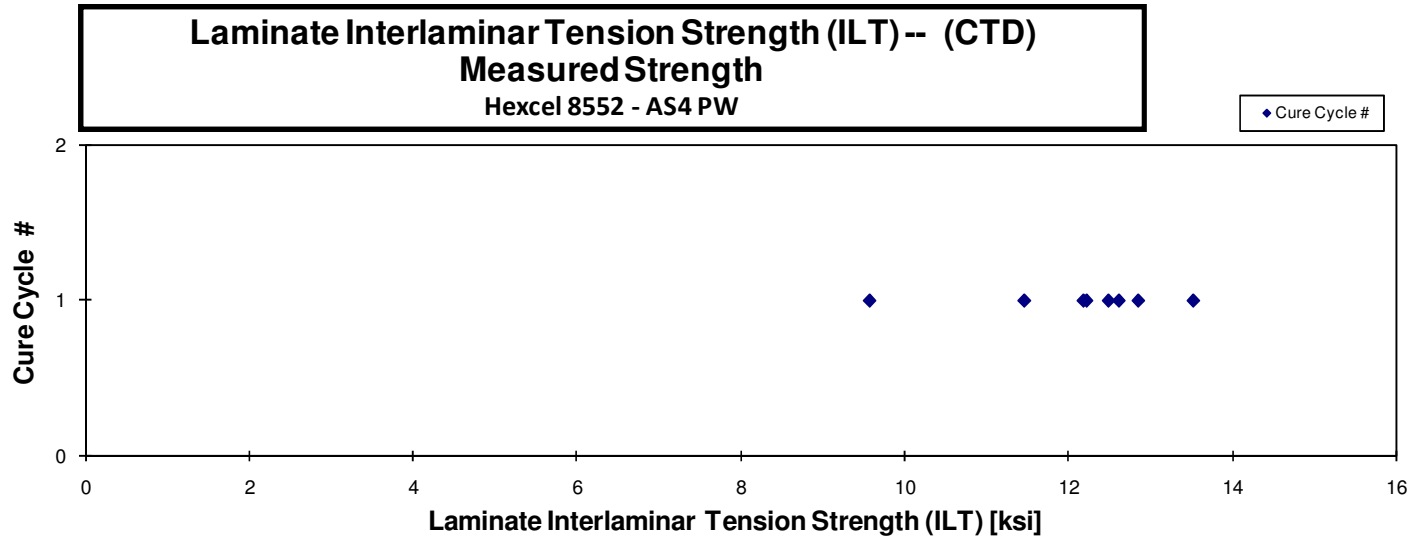

Laminate Compression After Impact Properties 1 (CAI1) -- (RTD)
Normalized Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Cure Cycle #
1
1
1
1
0
0
0
0
10
20
30
40
Laminate Compression After Impact Strength (CAI) [ksi]

4.30 Interlaminar Tension Properties

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

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	Avg. t_{ply} [in]
HFPMA119B	A	M1	1	1	402.730	12.185	0.156	21	0.0074
HFPMA11AB	A	M1	1	1	448.501	13.523	0.156	21	0.0074
HFPMA11BB	A	M1	1	1	414.781	12.490	0.156	21	0.0074
HFPMA11CB	A	M1	1	1	383.573	11.465	0.157	21	0.0075
HFPMA11DB	A	M1	1	1	411.664	12.223	0.158	21	0.0075
HFPMA11EB	A	M1	1	1	411.895	12.617	0.154	21	0.0073
HFPMA11FB	A	M1	1	1	320.351	9.582	0.157	21	0.0075
HFPMA11GB	A	M1	1	1	426.012	12.853	0.156	21	0.0074
				Average	**402.438**	**12.117**			**0.0074**
				Standard Dev.	**37.982**	**1.182**			
				Coeff. of Var. [%]	**9.438**	**9.751**			
				Min.	**320.351**	**9.582**			**0.0073**
				Max.	**448.501**	**13.523**			**0.0075**
				Number of Spec.	**8**	**8**			**8**

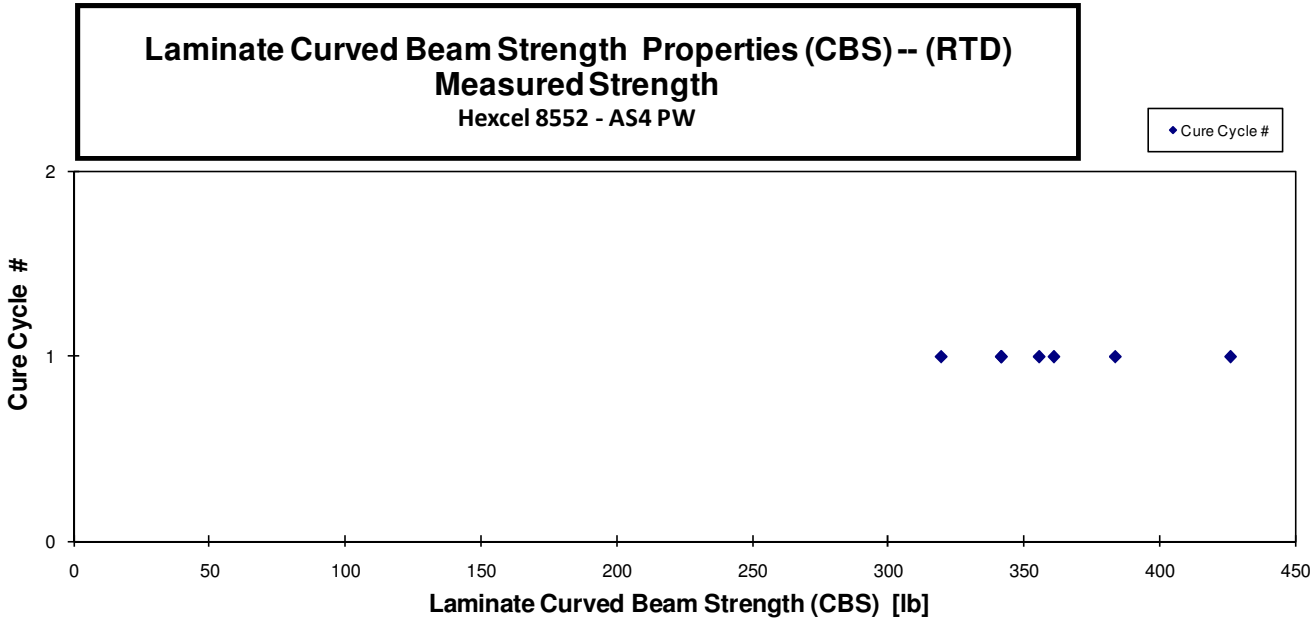

Laminate Curved Beam Strength Properties (CBS) -- (CTD)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Cure Cycle #
0
1
2
0
50
100
150
200
250
300
350
400
450
500
Laminate Curved Beam Strength (CBS) [lb]

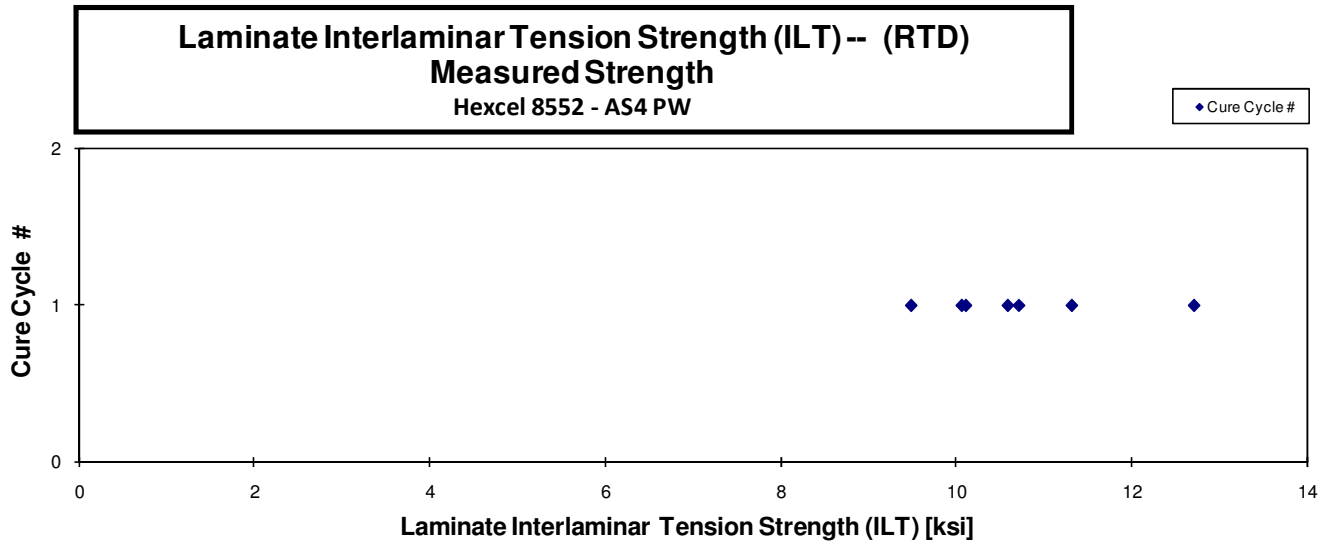

Laminate Interlaminar Tension Strength (ILT) -- (CTD)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Cure Cycle #
0
1
2
0
2
4
6
8
10
12
14
16
Laminate Interlaminar Tension Strength (ILT) [ksi]

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

Hexcel 8552 - AS4 PW

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	Avg. t_{ply} [in]
HFPMA111A	A	M1	1	1	341.546	10.063	0.159	21	0.0076
HFPMA112A	A	M1	1	1	341.400	10.110	0.159	21	0.0075
HFPMA113A	A	M1	1	1	319.296	9.486	0.158	21	0.0075
HFPMA114A	A	M1	1	1	383.546	11.324	0.159	21	0.0076
HFPMA115A	A	M1	1	1	355.441	10.592	0.158	21	0.0075
HFPMA116A	A	M1	1	1	360.941	10.717	0.158	21	0.0075
HFPMA117A	A	M1	1	1	426.070	12.721	0.157	21	0.0075
				Average	**361.177**	**10.716**			**0.0075**
				Standard Dev.	**34.821**	**1.057**			
				Coeff. of Var. [%]	**9.641**	**9.868**			
				Min.	**319.296**	**9.486**			**0.0075**
				Max.	**426.070**	**12.721**			**0.0076**
				Number of Spec.	**7**	**7**			**7**


Laminate Curved Beam Strength Properties (CBS) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Cure Cycle #
0
1
2
0
50
100
150
200
250
300
350
400
450
Laminate Curved Beam Strength (CBS) [lb]

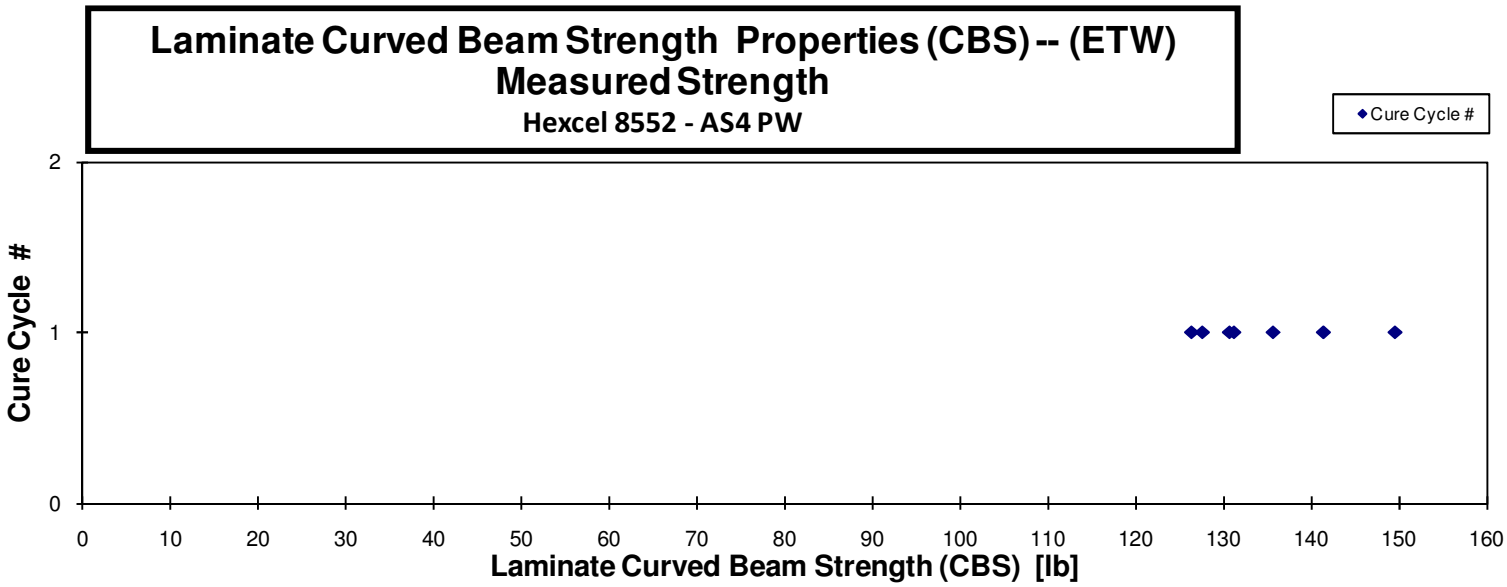

Laminate Interlaminar Tension Strength (ILT) -- (RTD)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Cure Cycle #
0
1
2
0
2
4
6
8
10
12
14
Laminate Interlaminar Tension Strength (ILT) [ksi]

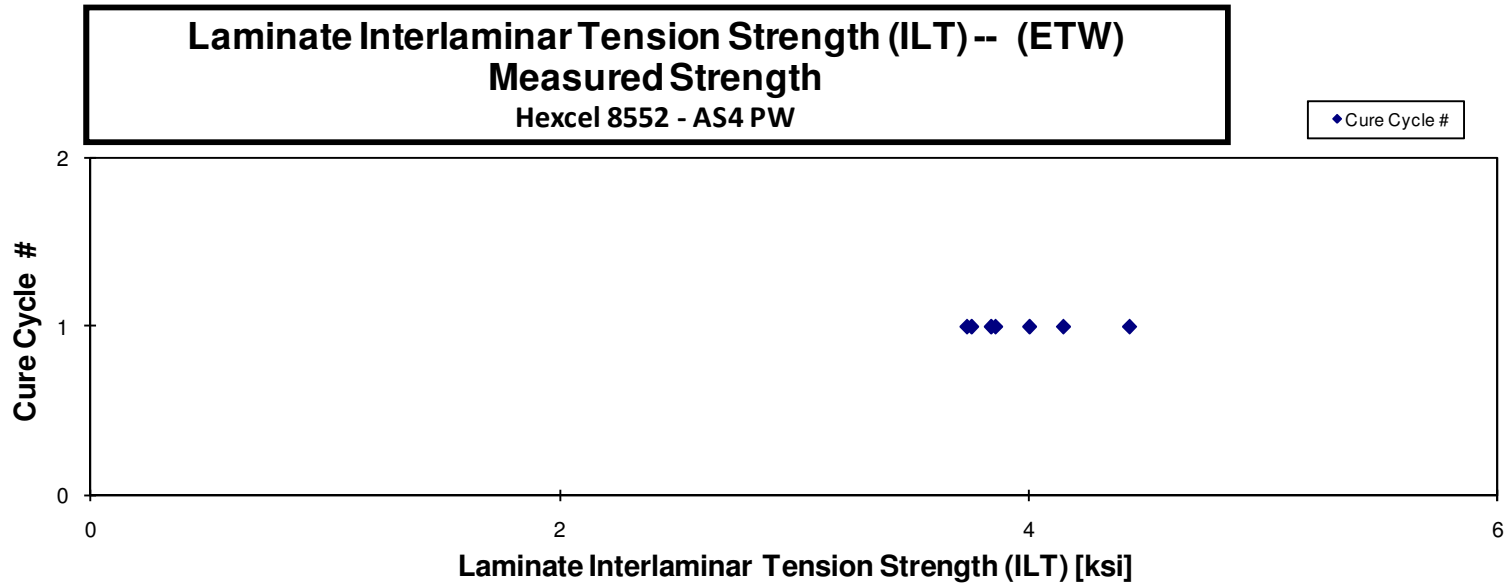
Laminate Curved Beam Strength Properties (ILT) -- (ETW) Strength

Hexcel 8552 - AS4 PW

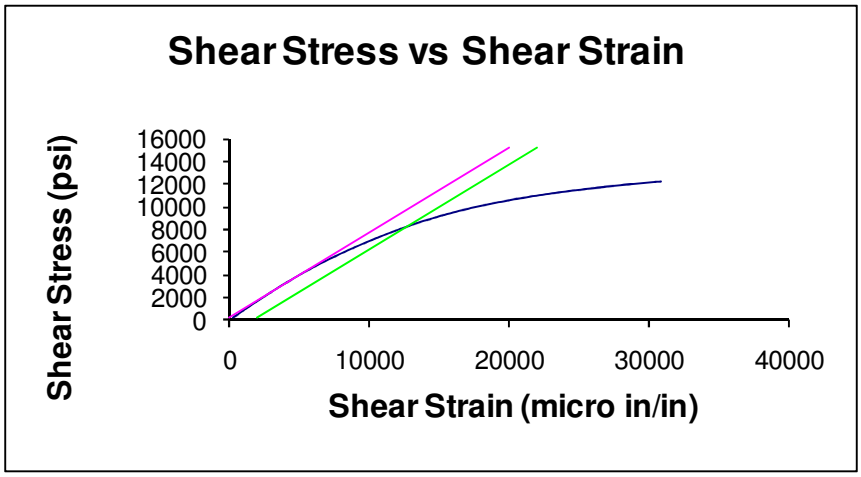
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
HFPMA11HD	A	M1	1	1	130.699	3.860	0.159	21
HFPMA11ID	A	M1	1	1	126.398	3.739	0.159	21
HFPMA11JD	A	M1	1	1	127.637	3.759	0.159	21
HFPMA11KD	A	M1	1	1	141.362	4.148	0.160	21
HFPMA11LD	A	M1	1	1	149.482	4.428	0.158	21
HFPMA11MD	A	M1	1	1	131.209	3.841	0.160	21
HFPMA11ND	A	M1	1	1	135.648	4.004	0.159	21

Average	**134.633**	**3.969**
Standard Dev.	**8.274**	**0.248**
Coeff. of Var. [%]	**6.145**	**6.254**
Min.	**126.398**	**3.739**
Max.	**149.482**	**4.428**
Number of Spec.	**7**	**7**


Laminate Curved Beam Strength Properties (CBS) -- (ETW)
Measured Strength
Hexcel 8552 - AS4 PW
Cure Cycle #
Cure Cycle #
0
1
2
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160
Laminate Curved Beam Strength (CBS) [lb]


Laminate Interlaminar Tension Strength (ILT) -- (ETW)
Measured Strength
Hexcel 8552 - AS4 PW
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	Average Short Beam Strength With Fluid (ksi)	Same Environment Short Beam Strength Without Fluid (ksi) (RTD)	Worst Case Environment Short Beam Strength (ksi) (RTW)	% Strength Reduction With Respect to RTD (no fluid)
a	12.095	12.766	12.157	5.257
b	12.327	12.766	12.157	3.440
c	12.664	12.766	12.157	0.807
d	12.440	12.766	12.157	2.556
e	12.010	12.766	12.157	5.922
f	12.824	12.766	12.157	-0.447
g	11.642	12.766	12.157	8.807
h	12.461	12.766	12.157	2.394
i	12.110	12.766	12.157	5.145
j	12.198	12.766	12.157	4.455
k	12.574	12.766	12.157	1.510
l	12.675	12.766	12.157	0.715
r	12.322	12.766	12.157	3.483
A	12.766	12.766	12.157	0.000
t	12.157	12.766	12.157	4.777

a	100 Low lead Fuel
b	SAE AMS 2629
c	Mil-H-5606 Hydraulic Oil
d	Mil-H-83282 Hydraulic Oil
e	Engine Lube Oil Mil-L-7808
f	Engine Lube Oil Mil-L-23699
g	Salt Water
h	Skydrol LD-4
i	50% Water w/ 50% Skydrol
j	MEK Washing Fluid
k	P.G. Deicer I Mil-A-8243
l	I.A. Deicing Agent (TT-I-735)
r	Distilled Water
A	Dry
t	85% Relative Humidity

Fluid	Average Short Beam Strength With Fluid (ksi)	Same Environment Short Beam Strength Without Fluid (ksi) (ETD)	Worst Case Environment Short Beam Strength (ksi) (ETW)	% Strength Reduction With Respect to ETD (no fluid)
1	9.297	10.036	7.054	7.363
2	9.237	10.036	7.054	7.960
3	9.571	10.036	7.054	4.639
4	9.306	10.036	7.054	7.280
5	9.361	10.036	7.054	6.727
6	9.402	10.036	7.054	6.319
7	8.402	10.036	7.054	16.287
8	9.814	10.036	7.054	2.210
9	8.533	10.036	7.054	14.979
m	9.908	10.036	7.054	1.275
n	9.860	10.036	7.054	1.754
p	10.081	10.036	7.054	-0.441
s	8.560	10.036	7.054	14.713
C	10.036	10.036	7.054	0.000
D	7.054	10.036	7.054	29.718

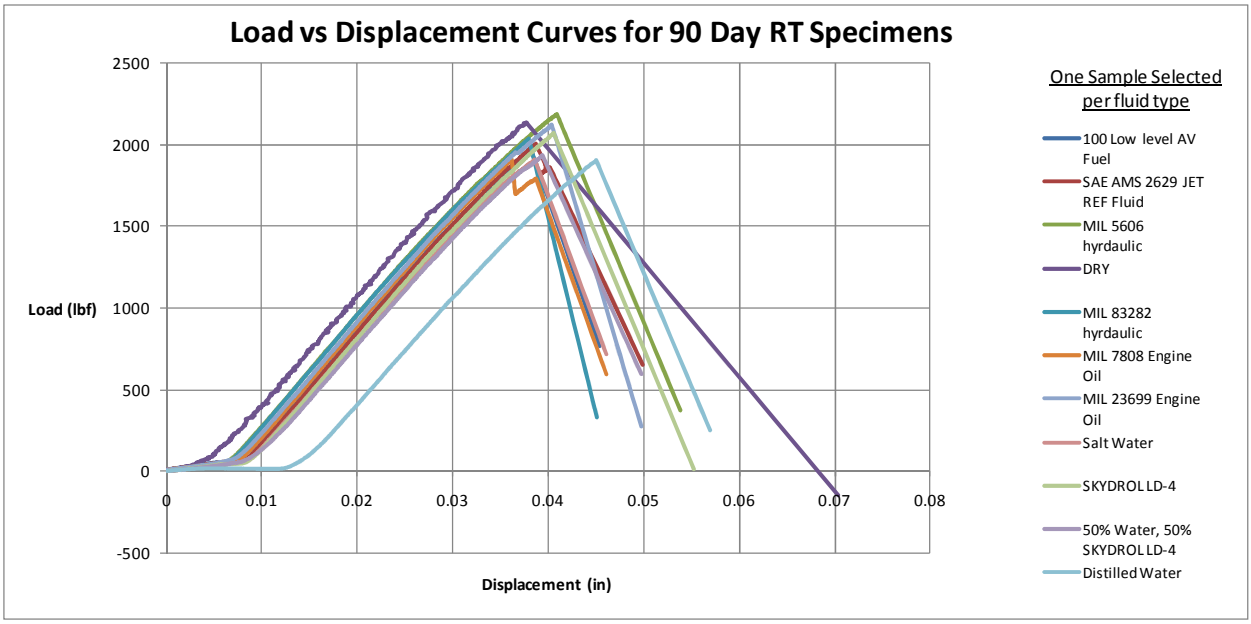
1 100 Low lead Fuel
2 SAE AMS 2629
3 Mil-H-5606 Hydraulic Oil
4 Mil-H-83282 Hydraulic Oil
5 Engine Lube Oil Mil-L-7808
6 Engine Lube Oil Mil-L-23699
7 Salt Water
8 Skydrol LD-4
9 50% Water w/ 50% Skydrol
m MEK Washing Fluid
n P.G. Deicer I Mil-A-8243
p I.A. Deicing Agent (TT-I-735)
s Distilled Water
C Dry
D 85% Relative Humidity

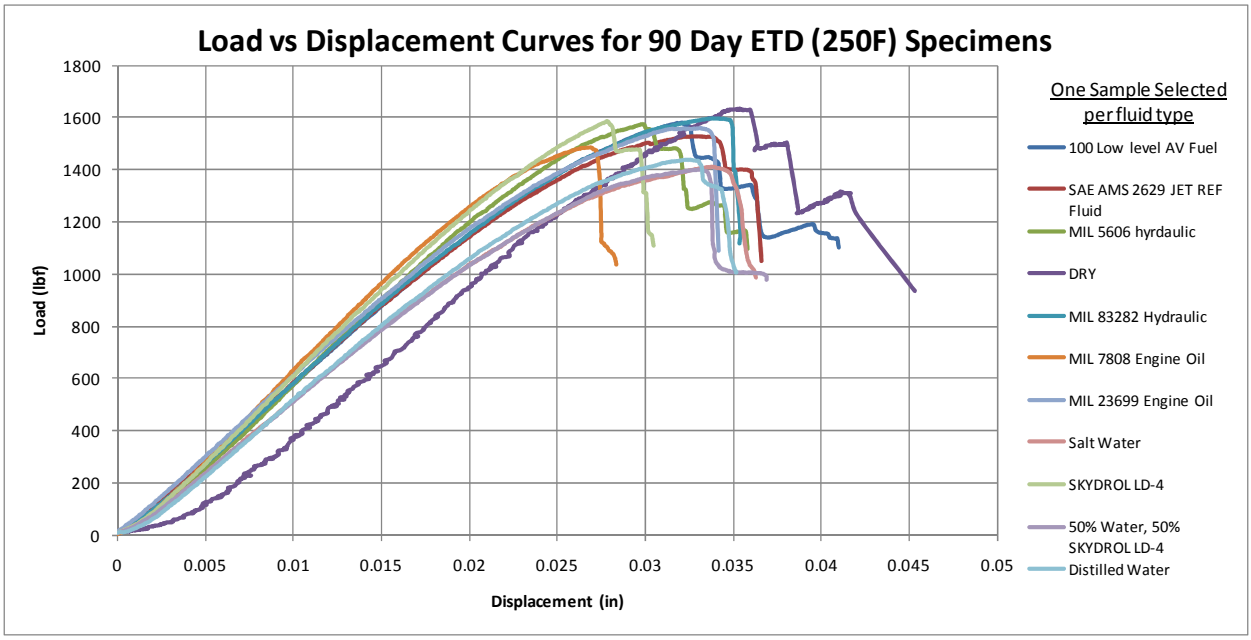
Fluid Sensitivity Screening
Short Beam Strength (SBS) -- (ETD) Strength
Hexcel 8552 - AS4 PW

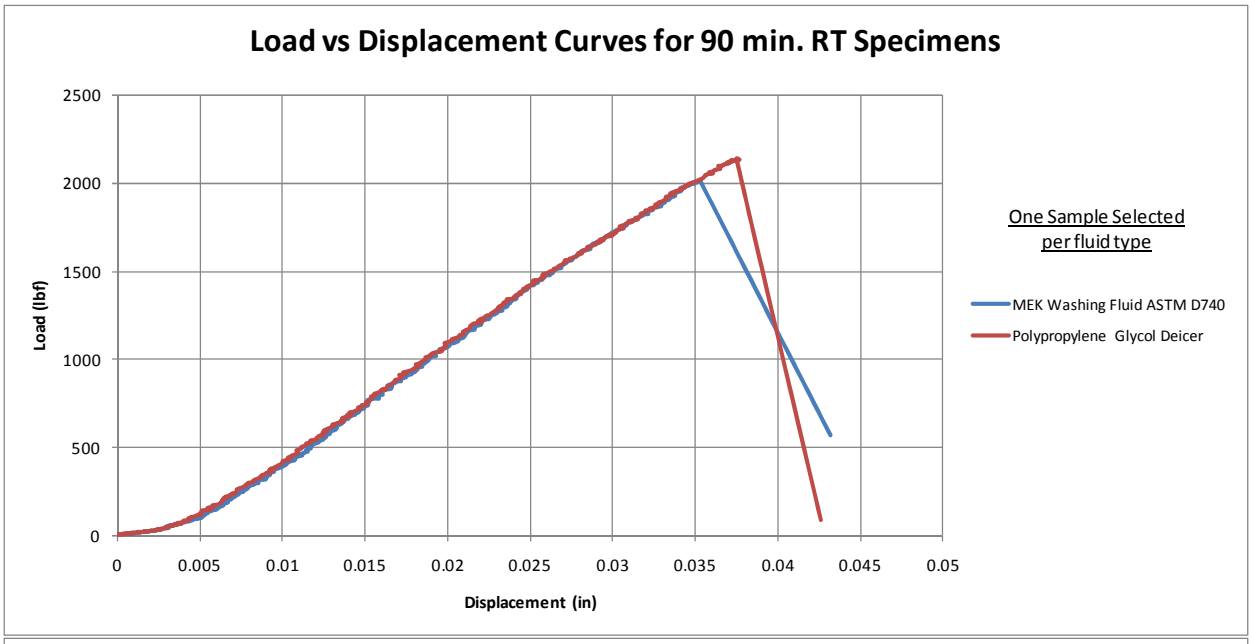
Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Fluid	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode	
HFPQA121a	A	M1	1	1	12.291	0.238	14	0.0170	Interlaminar Shear	
HFPQA122a	A	M1	1	1	13.107	0.240	14	0.0172	Interlaminar Shear	
HFPQA124a	A	M1	1	1	11.892	0.247	14	0.0176	Interlaminar Shear	12.095
HFPQA125a	A	M1	1	1	11.105	0.249	14	0.0178	Interlaminar Shear	
HFPQA126a	A	M1	1	1	12.135	0.251	14	0.0179	Interlaminar Shear	
HFPQA127a	A	M1	1	1	12.042	0.252	14	0.0180	Interlaminar Shear	
HFPQA12Gb	A	M1	1	2	12.146	0.247	14	0.0176	Interlaminar Shear	
HFPQA12Hb	A	M1	1	2	12.355	0.245	14	0.0175	Interlaminar Shear	
HFPQA12Ib	A	M1	1	2	11.484	0.242	14	0.0173	Interlaminar Shear	12.327
HFPQA12Jb	A	M1	1	2	12.017	0.239	14	0.0171	Interlaminar Shear	
HFPQA12Kb	A	M1	1	2	12.893	0.238	14	0.0170	Interlaminar Shear	
HFPQA12Lb	A	M1	1	2	13.069	0.240	14	0.0172	Interlaminar Shear	
HFPQA131c	A	M1	1	3	13.060	0.251	14	0.0179	Interlaminar Shear	
HFPQA132c	A	M1	1	3	12.240	0.251	14	0.0179	Interlaminar Shear	
HFPQA133c	A	M1	1	3	12.817	0.251	14	0.0179	Interlaminar Shear	12.664
HFPQA134c	A	M1	1	3	12.669	0.250	14	0.0178	Interlaminar Shear	
HFPQA135c	A	M1	1	3	12.396	0.249	14	0.0178	Interlaminar Shear	
HFPQA136c	A	M1	1	3	12.799	0.247	14	0.0177	Interlaminar Shear	
HFPQA13Fd	A	M1	1	4	12.256	0.249	14	0.0178	Interlaminar Shear	
HFPQA13Gd	A	M1	1	4	12.202	0.250	14	0.0179	Interlaminar Shear	12.440
HFPQA13Hd	A	M1	1	4	12.388	0.251	14	0.0179	Interlaminar Shear	
HFPQA13Id	A	M1	1	4	12.406	0.252	14	0.0180	Interlaminar Shear	
HFPQA13Jd	A	M1	1	4	12.684	0.253	14	0.0181	Interlaminar Shear	
HFPQA13Kd	A	M1	1	4	12.706	0.253	14	0.0181	Interlaminar Shear	
HFPQA141e	A	M1	1	5	11.511	0.248	14	0.0177	Interlaminar Shear	
HFPQA142e	A	M1	1	5	11.214	0.247	14	0.0177	Interlaminar Shear	12.010
HFPQA143e	A	M1	1	5	12.561	0.248	14	0.0177	Interlaminar Shear	
HFPQA144e	A	M1	1	5	12.414	0.247	14	0.0176	Interlaminar Shear	
HFPQA145e	A	M1	1	5	12.457	0.247	14	0.0176	Interlaminar Shear	
HFPQA146e	A	M1	1	5	11.912	0.245	14	0.0175	Interlaminar Shear	
HFPQA147e	A	M1	1	5	12.005	0.242	14	0.0173	Interlaminar Shear	
HFPQA14Gf	A	M1	1	6	12.803	0.248	14	0.0177	Interlaminar Shear	12.824
HFPQA14Hf	A	M1	1	6	12.979	0.249	14	0.0178	Interlaminar Shear	
HFPQA14If	A	M1	1	6	12.747	0.250	14	0.0178	Interlaminar Shear	
HFPQA14Jf	A	M1	1	6	13.023	0.250	14	0.0179	Interlaminar Shear	
HFPQA14Kf	A	M1	1	6	12.951	0.250	14	0.0179	Interlaminar Shear	
HFPQA14Lf	A	M1	1	6	12.439	0.250	14	0.0179	Interlaminar Shear	
HFPQA151g	A	M1	1	7	11.638	0.245	14	0.0175	Interlaminar Shear	
HFPQA152g	A	M1	1	7	11.814	0.243	14	0.0173	Interlaminar Shear	
HFPQA153g	A	M1	1	7	11.684	0.240	14	0.0171	Interlaminar Shear	11.642
HFPQA155g	A	M1	1	7	12.341	0.237	14	0.0169	Interlaminar Shear	
HFPQA156g	A	M1	1	7	11.143	0.241	14	0.0172	Interlaminar Shear	
HFPQA157g	A	M1	1	7	11.232	0.244	14	0.0174	Interlaminar Shear	
HFPQA15Fh	A	M1	1	8	12.316	0.252	14	0.0180	Interlaminar Shear	
HFPQA15Gh	A	M1	1	8	12.191	0.252	14	0.0180	Interlaminar Shear	
HFPQA15Hh	A	M1	1	8	13.244	0.250	14	0.0179	Interlaminar Shear	12.461
HFPQA15Ih	A	M1	1	8	12.687	0.249	14	0.0178	Interlaminar Shear	
HFPQA15Jh	A	M1	1	8	12.858	0.248	14	0.0177	Interlaminar Shear	
HFPQA15Kh	A	M1	1	8	11.550	0.247	14	0.0176	Interlaminar Shear	
HFPQA15Lh	A	M1	1	8	12.381	0.244	14	0.0174	Interlaminar Shear	
HFPQA161i	A	M1	1	9	11.964	0.242	14	0.0173	Interlaminar Shear	
HFPQA162i	A	M1	1	9	12.509	0.240	14	0.0172	Interlaminar Shear	12.110
HFPQA163i	A	M1	1	9	12.136	0.237	14	0.0169	Interlaminar Shear	
HFPQA164i	A	M1	1	9	11.381	0.237	14	0.0169	Interlaminar Shear	
HFPQA165i	A	M1	1	9	12.303	0.240	14	0.0171	Interlaminar Shear	
HFPQA166i	A	M1	1	9	12.365	0.242	14	0.0173	Interlaminar Shear	
HFPQA16Fj	A	M1	1	10	12.112	0.250	14	0.0179	Interlaminar Shear	
HFPQA16Gj	A	M1	1	10	11.283	0.249	14	0.0178	Interlaminar Shear	
HFPQA16Hj	A	M1	1	10	12.588	0.249	14	0.0178	Interlaminar Shear	12.198
HFPQA16Ij	A	M1	1	10	11.511	0.247	14	0.0176	Interlaminar Shear	
HFPQA16Jj	A	M1	1	10	12.663	0.245	14	0.0175	Interlaminar Shear	
HFPQA16Kj	A	M1	1	10	12.715	0.242	14	0.0173	Interlaminar Shear	
HFPQA16Lj	A	M1	1	10	12.512	0.239	14	0.0171	Interlaminar Shear	
HFPQA171k	A	M1	1	11	12.743	0.251	14	0.0179	Interlaminar Shear	
HFPQA172k	A	M1	1	11	12.108	0.252	14	0.0180	Interlaminar Shear	
HFPQA173k	A	M1	1	11	12.812	0.252	14	0.0180	Interlaminar Shear	12.574
HFPQA174k	A	M1	1	11	12.685	0.252	14	0.0180	Interlaminar Shear	
HFPQA175k	A	M1	1	11	12.278	0.252	14	0.0180	Interlaminar Shear	
HFPQA176k	A	M1	1	11	12.847	0.251	14	0.0179	Interlaminar Shear	
HFPQA177k	A	M1	1	11	12.545	0.251	14	0.0179	Interlaminar Shear	
HFPQA17Fl	A	M1	1	12	12.549	0.240	14	0.0172	Interlaminar Shear	
HFPQA17Gl	A	M1	1	12	13.091	0.243	14	0.0174	Interlaminar Shear	12.675
HFPQA17Hl	A	M1	1	12	12.970	0.245	14	0.0175	Interlaminar Shear	
HFPQA17Il	A	M1	1	12	13.412	0.247	14	0.0177	Interlaminar Shear	
HFPQA17Jl	A	M1	1	12	12.066	0.248	14	0.0177	Interlaminar Shear	
HFPQA17Kl	A	M1	1	12	11.962	0.249	14	0.0178	Interlaminar Shear	
HFPQA182r	A	M1	1	13	11.948	0.239	14	0.0171	Interlaminar Shear	
HFPQA183r	A	M1	1	13	12.265	0.242	14	0.0173	Interlaminar Shear	12.322
HFPQA184r	A	M1	1	13	12.146	0.245	14	0.0175	Interlaminar Shear	
HFPQA185r	A	M1	1	13	12.212	0.247	14	0.0176	Interlaminar Shear	
HFPQA186r	A	M1	1	13	12.976	0.249	14	0.0178	Interlaminar Shear	
HFPQA187r	A	M1	1	13	12.384	0.250	14	0.0179	Interlaminar Shear	
HFPQA18FA	A	M1	1	14	12.912	0.247	14	0.0177	Interlaminar Shear	
HFPQA18GA	A	M1	1	14	12.929	0.245	14	0.0175	Interlaminar Shear	12.766
HFPQA18HA	A	M1	1	14	12.701	0.242	14	0.0173	Interlaminar Shear	
HFPQA18IA	A	M1	1	14	12.656	0.239	14	0.0171	Interlaminar Shear	
HFPQA18JA	A	M1	1	14	12.450	0.237	14	0.0169	Interlaminar Shear	
HFPQA18KA	A	M1	1	14	12.504	0.235	14	0.0168	Interlaminar Shear	
HFPQA18LA	A	M1	1	14	13.214	0.238	14	0.0170	Interlaminar Shear	
HFPQA193t	A	M1	1	15	12.296	0.237	14	0.0169	Interlaminar Shear	
HFPQA196t	A	M1	1	15	12.502	0.247	14	0.0177	Interlaminar Shear	12.157
HFPQA197t	A	M1	1	15	11.959	0.249	14	0.0178	Interlaminar Shear	
HFPQA198t	A	M1	1	15	12.023	0.252	14	0.0180	Interlaminar Shear	
HFPQA19At	A	M1	1	15	12.023	0.253	14	0.0180	Interlaminar Shear	
HFPQA19Bt	A	M1	1	15	12.137	0.253	14	0.0181	Interlaminar Shear	

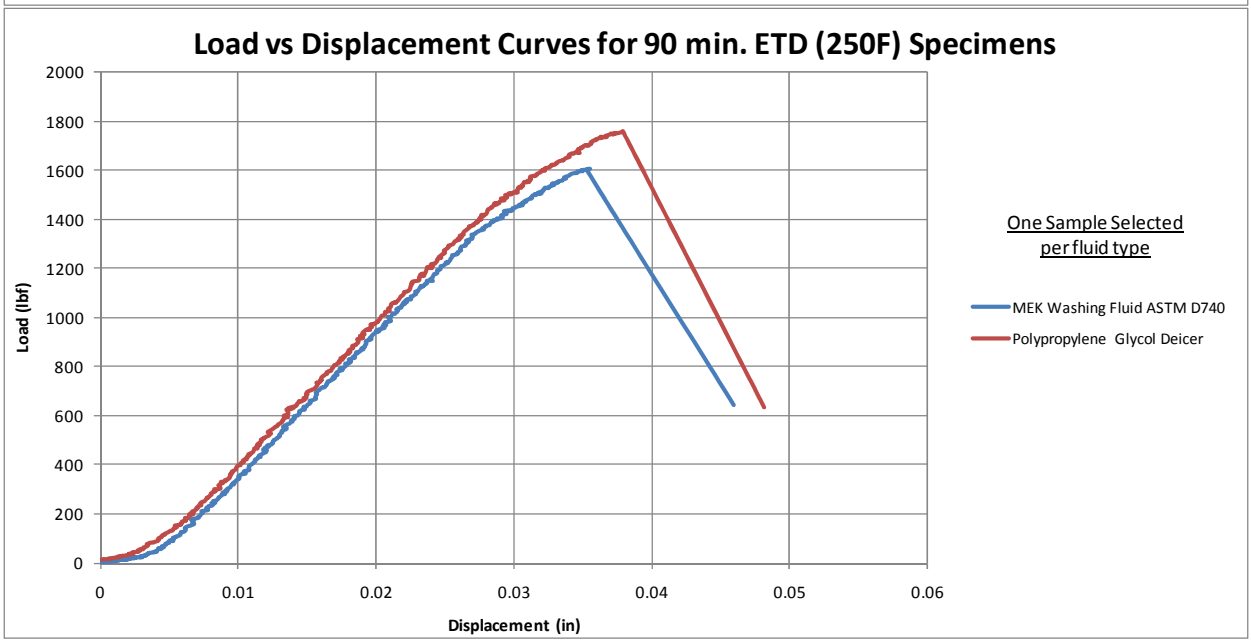
Fluid Sensitivity Screening
Short Beam Shear(SBS) -- (RT) Strength
Hexcel 8552 - AS4 PW

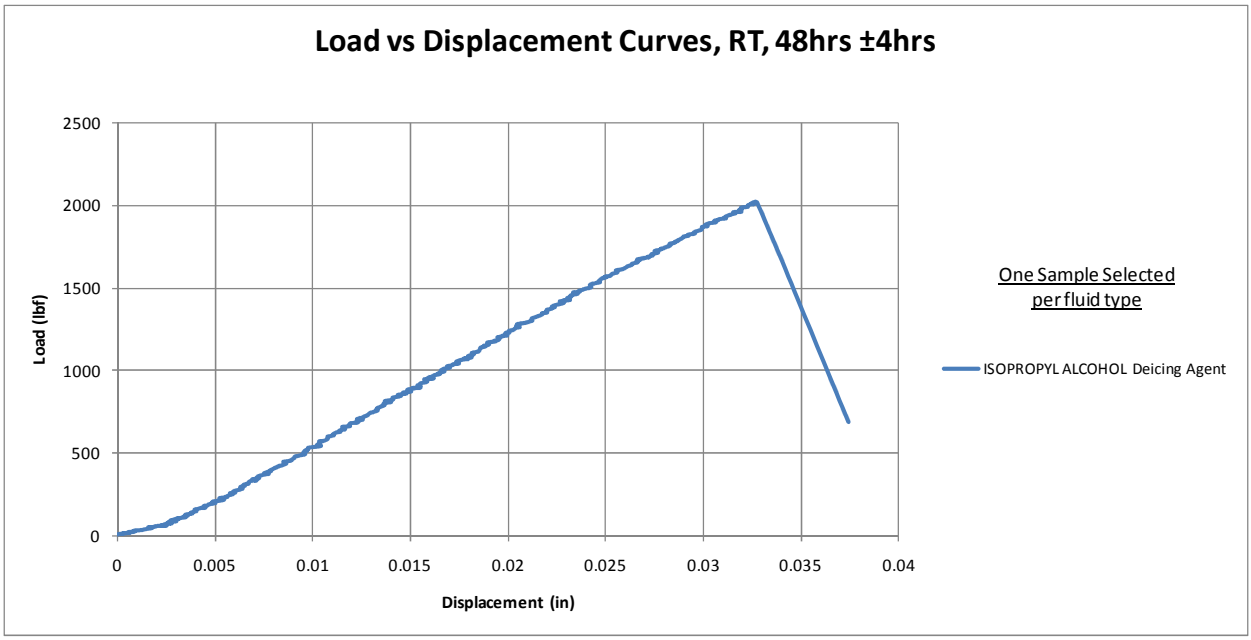
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Fluid	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode	
HFPQA1281	A	M1	1	1	9.380	0.253	14	0.0181	Interlaminar Shear	
HFPQA1291	A	M1	1	1	9.358	0.253	14	0.0181	Interlaminar Shear	
HFPQA12A1	A	M1	1	1	9.205	0.254	14	0.0181	Interlaminar Shear	9.297
HFPQA12B1	A	M1	1	1	9.287	0.253	14	0.0181	Interlaminar Shear	
HFPQA12C1	A	M1	1	1	9.264	0.252	14	0.0180	Interlaminar Shear	
HFPQA12D1	A	M1	1	1	9.290	0.252	14	0.0180	Interlaminar Shear	
HFPQA12N2	A	M1	1	2	9.330	0.246	14	0.0175	Interlaminar Shear	
HFPQA12O2	A	M1	1	2	9.208	0.248	14	0.0177	Interlaminar Shear	
HFPQA12P2	A	M1	1	2	9.160	0.249	14	0.0178	Interlaminar Shear	9.237
HFPQA12Q2	A	M1	1	2	9.213	0.250	14	0.0179	Interlaminar Shear	
HFPQA12R2	A	M1	1	2	9.226	0.250	14	0.0179	Interlaminar Shear	
HFPQA12S2	A	M1	1	2	9.286	0.251	14	0.0179	Interlaminar Shear	
HFPQA1383	A	M1	1	3	9.773	0.242	14	0.0173	Interlaminar Shear	
HFPQA1393	A	M1	1	3	9.619	0.238	14	0.0170	Interlaminar Shear	
HFPQA13A3	A	M1	1	3	9.485	0.235	14	0.0168	Interlaminar Shear	9.571
HFPQA13B3	A	M1	1	3	9.438	0.238	14	0.0170	Interlaminar Shear	
HFPQA13C3	A	M1	1	3	9.603	0.241	14	0.0172	Interlaminar Shear	
HFPQA13D3	A	M1	1	3	9.507	0.244	14	0.0175	Interlaminar Shear	
HFPQA13M4	A	M1	1	4	9.486	0.253	14	0.0180	Interlaminar Shear	
HFPQA13N4	A	M1	1	4	9.271	0.253	14	0.0180	Interlaminar Shear	
HFPQA13O4	A	M1	1	4	9.286	0.250	14	0.0179	Interlaminar Shear	9.306
HFPQA13P4	A	M1	1	4	9.189	0.249	14	0.0178	Interlaminar Shear	
HFPQA13Q4	A	M1	1	4	9.189	0.248	14	0.0177	Interlaminar Shear	
HFPQA13R4	A	M1	1	4	9.413	0.245	14	0.0175	Interlaminar Shear	
HFPQA1485	A	M1	1	5	9.281	0.240	14	0.0172	Interlaminar Shear	
HFPQA1495	A	M1	1	5	9.325	0.236	14	0.0169	Interlaminar Shear	
HFPQA14A5	A	M1	1	5	9.400	0.234	14	0.0167	Interlaminar Shear	9.361
HFPQA14B5	A	M1	1	5	9.377	0.236	14	0.0169	Interlaminar Shear	
HFPQA14C5	A	M1	1	5	9.291	0.240	14	0.0171	Interlaminar Shear	
HFPQA14D5	A	M1	1	5	9.495	0.242	14	0.0173	Interlaminar Shear	
HFPQA14M6	A	M1	1	6	9.412	0.249	14	0.0178	Interlaminar Shear	
HFPQA14N6	A	M1	1	6	9.393	0.248	14	0.0177	Interlaminar Shear	
HFPQA14O6	A	M1	1	6	9.321	0.248	14	0.0177	Interlaminar Shear	9.402
HFPQA14P6	A	M1	1	6	9.452	0.246	14	0.0176	Interlaminar Shear	
HFPQA14Q6	A	M1	1	6	9.449	0.244	14	0.0174	Interlaminar Shear	
HFPQA14R6	A	M1	1	6	9.385	0.241	14	0.0172	Interlaminar Shear	
HFPQA1597	A	M1	1	7	8.513	0.249	14	0.0178	Interlaminar Shear	
HFPQA15A7	A	M1	1	7	8.432	0.250	14	0.0178	Interlaminar Shear	
HFPQA15B7	A	M1	1	7	8.343	0.251	14	0.0180	Interlaminar Shear	8.402
HFPQA15C7	A	M1	1	7	8.434	0.251	14	0.0179	Interlaminar Shear	
HFPQA15D7	A	M1	1	7	8.302	0.252	14	0.0180	Interlaminar Shear	
HFPQA15E7	A	M1	1	7	8.387	0.252	14	0.0180	Interlaminar Shear	
HFPQA15M8	A	M1	1	8	9.881	0.241	14	0.0172	Interlaminar Shear	
HFPQA15N8	A	M1	1	8	9.733	0.237	14	0.0169	Interlaminar Shear	
HFPQA15O8	A	M1	1	8	9.805	0.224	14	0.0160	Interlaminar Shear	9.814
HFPQA15P8	A	M1	1	8	9.977	0.228	14	0.0163	Interlaminar Shear	
HFPQA15R8	A	M1	1	8	9.886	0.234	14	0.0167	Interlaminar Shear	
HFPQA15S8	A	M1	1	8	9.605	0.236	14	0.0169	Interlaminar Shear	
HFPQA1699	A	M1	1	9	8.482	0.249	14	0.0178	Interlaminar Shear	
HFPQA16A9	A	M1	1	9	8.476	0.250	14	0.0178	Interlaminar Shear	
HFPQA16B9	A	M1	1	9	8.547	0.251	14	0.0179	Interlaminar Shear	8.533
HFPQA16C9	A	M1	1	9	8.665	0.251	14	0.0179	Interlaminar Shear	
HFPQA16D9	A	M1	1	9	8.584	0.251	14	0.0180	Interlaminar Shear	
HFPQA16E9	A	M1	1	9	8.443	0.251	14	0.0179	Interlaminar Shear	
HFPQA16Mm	A	M1	1	10	10.234	0.236	14	0.0168	Interlaminar Shear	
HFPQA16Nm	A	M1	1	10	9.920	0.240	14	0.0171	Interlaminar Shear	
HFPQA16Om	A	M1	1	10	10.003	0.243	14	0.0174	Interlaminar Shear	9.908
HFPQA16Pm	A	M1	1	10	9.771	0.245	14	0.0175	Interlaminar Shear	
HFPQA16Qm	A	M1	1	10	9.786	0.247	14	0.0177	Interlaminar Shear	
HFPQA16Rm	A	M1	1	10	9.736	0.249	14	0.0178	Interlaminar Shear	
HFPQA178n	A	M1	1	11	10.576	0.249	14	0.0178	Interlaminar Shear	
HFPQA179n	A	M1	1	11	9.773	0.248	14	0.0177	Interlaminar Shear	
HFPQA17An	A	M1	1	11	9.568	0.245	14	0.0175	Interlaminar Shear	9.860
HFPQA17Bn	A	M1	1	11	9.663	0.243	14	0.0173	Interlaminar Shear	
HFPQA17Cn	A	M1	1	11	9.821	0.239	14	0.0171	Interlaminar Shear	
HFPQA17En	A	M1	1	11	9.759	0.238	14	0.0170	Interlaminar Shear	
HFPQA17Mp	A	M1	1	12	10.088	0.250	14	0.0179	Interlaminar Shear	
HFPQA17Np	A	M1	1	12	10.026	0.251	14	0.0179	Interlaminar Shear	
HFPQA17Op	A	M1	1	12	9.877	0.251	14	0.0179	Interlaminar Shear	10.081
HFPQA17Pp	A	M1	1	12	10.433	0.250	14	0.0179	Interlaminar Shear	
HFPQA17Qp	A	M1	1	12	9.919	0.250	14	0.0178	Interlaminar Shear	
HFPQA17Rp	A	M1	1	12	10.141	0.249	14	0.0178	Interlaminar Shear	
HFPQA188s	A	M1	1	13	8.629	0.251	14	0.0179	Interlaminar Shear	
HFPQA189s	A	M1	1	13	8.641	0.252	14	0.0180	Interlaminar Shear	
HFPQA18As	A	M1	1	13	8.452	0.253	14	0.0181	Interlaminar Shear	8.560
HFPQA18Bs	A	M1	1	13	8.498	0.252	14	0.0180	Interlaminar Shear	
HFPQA18Cs	A	M1	1	13	8.521	0.251	14	0.0179	Interlaminar Shear	
HFPQA18Ds	A	M1	1	13	8.516	0.250	14	0.0178	Interlaminar Shear	
HFPQA18Es	A	M1	1	13	8.662	0.248	14	0.0177	Interlaminar Shear	
HFPQA18MC	A	M1	1	14	10.198	0.240	14	0.0172	Interlaminar Shear	
HFPQA18NC	A	M1	1	14	10.072	0.242	14	0.0173	Interlaminar Shear	
HFPQA18OC	A	M1	1	14	10.086	0.244	14	0.0174	Interlaminar Shear	10.036
HFPQA18PC	A	M1	1	14	10.051	0.246	14	0.0175	Interlaminar Shear	
HFPQA18QC	A	M1	1	14	9.930	0.246	14	0.0176	Interlaminar Shear	
HFPQA18RC	A	M1	1	14	9.882	0.247	14	0.0176	Interlaminar Shear	
HFPQA19CD	A	M1	1	15	7.871	0.253	14	0.0181	Interlaminar Shear	
HFPQA19ED	A	M1	1	15	7.170	0.253	14	0.0181	Interlaminar Shear	
HFPQA19FD	A	M1	1	15	6.486	0.257	14	0.0184	Interlaminar Shear	7.054
HFPQA19ID	A	M1	1	15	7.177	0.247	14	0.0177	Interlaminar Shear	
HFPQA19LD	A	M1	1	15	6.871	0.240	14	0.0171	Interlaminar Shear	
HFPQA19PD	A	M1	1	15	6.748	0.244	14	0.0174	Interlaminar Shear	

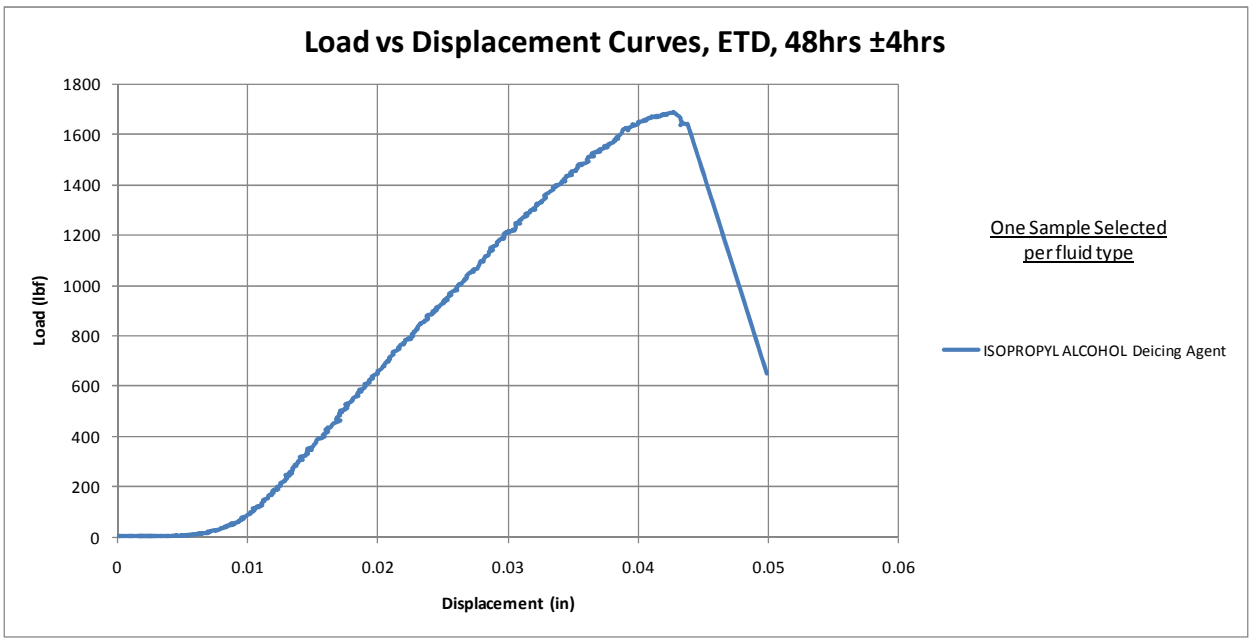

Load vs Displacement Curves for 90 Day RT Specimens
Load (lbf)
2500
2000
1500
1000
500
0
-500
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
Displacement (in)
One Sample Selected per fluid type
100 Low level AV Fuel
SAE AMS 2629 JET REF Fluid
MIL 5606 hyrdaulic
DRY
MIL 83282 hyrdaulic
MIL 7808 Engine Oil
MIL 23699 Engine Oil
Salt Water
SKYDROL LD-4
50% Water, 50% SKYDROL LD-4
Distilled Water

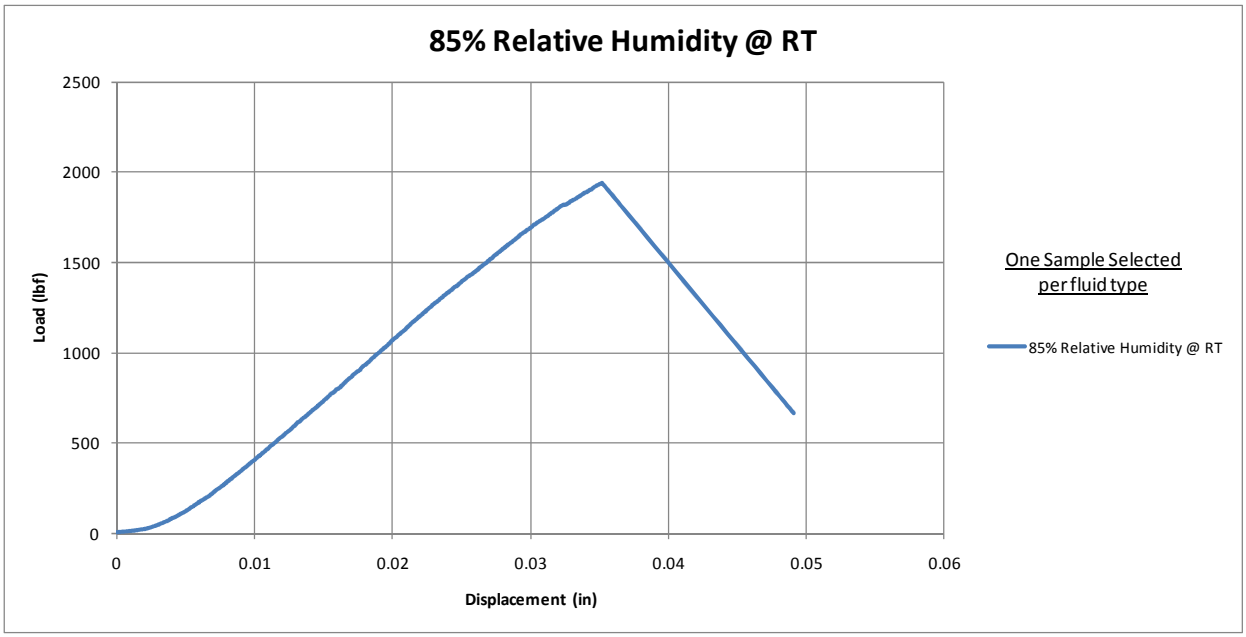

Load vs Displacement Curves for 90 Day ETD (250F) Specimens
Load (lbf)
1800
1600
1400
1200
1000
800
600
400
200
0
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
0.05
Displacement (in)
One Sample Selected per fluid type
100 Low level AV Fuel
SAE AMS 2629 JET REF Fluid
MIL 5606 hyrdaulic
DRY
MIL 83282 Hydraulic
MIL 7808 Engine Oil
MIL 23699 Engine Oil
Salt Water
SKYDROL LD-4
50% Water, 50% SKYDROL LD-4
Distilled Water

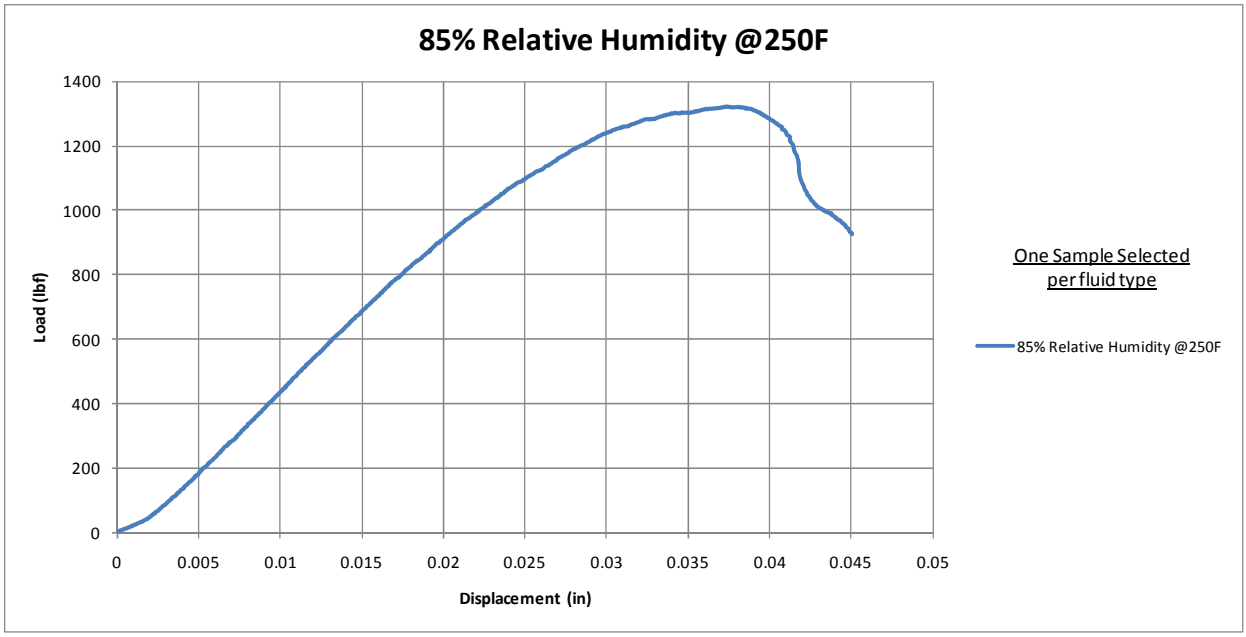

Load vs Displacement Curves for 90 min. RT Specimens
Load (lbf)
2500
2000
1500
1000
500
0
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
0.05
Displacement (in)
One Sample Selected per fluid type
MEK Washing Fluid ASTM D740
Polypropylene Glycol Deicer


Load vs Displacement Curves for 90 min. ETD (250F) Specimens
Load (lbf)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
0.01
0.02
0.03
0.04
0.05
0.06
Displacement (in)
One Sample Selected per fluid type
MEK Washing Fluid ASTM D740
Polypropylene Glycol Deicer


Load vs Displacement Curves, RT, 48hrs ±4hrs
Load (lbf)
2500
2000
1500
1000
500
0
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
Displacement (in)
One Sample Selected per fluid type
ISOPROPYL ALCOHOL Deicing Agent

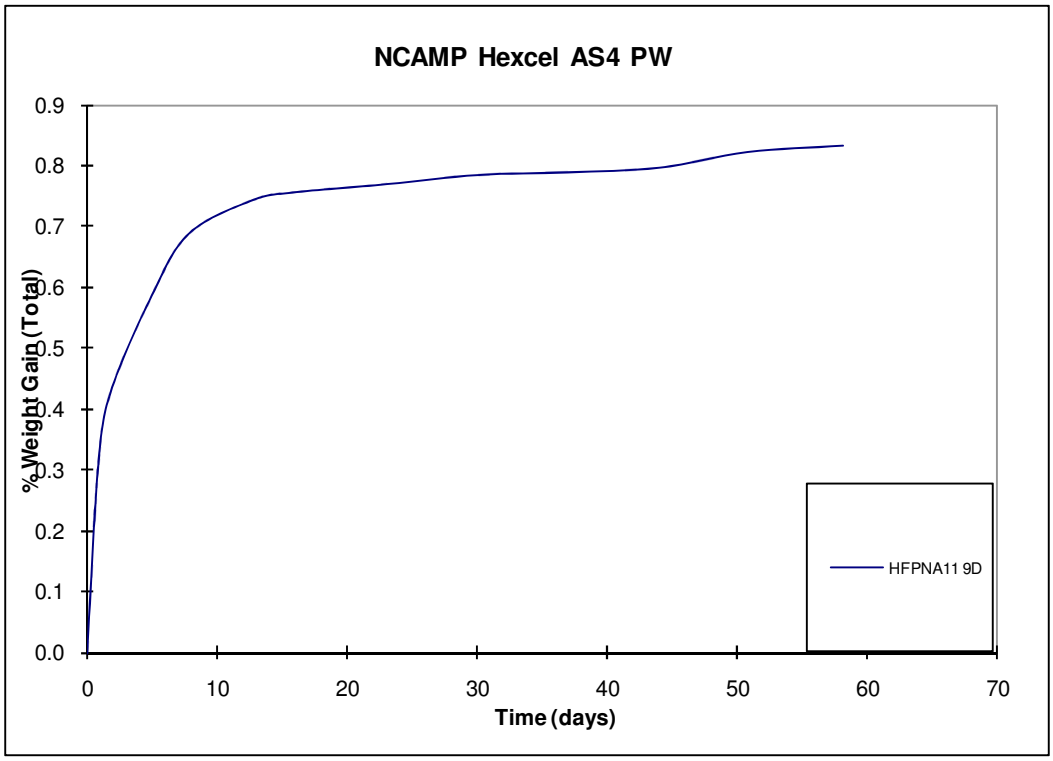

Load vs Displacement Curves, ETD, 48hrs ±4hrs
Load (lbf)
1800
1600
1400
1200
1000
800
600
400
200
0
0
0.01
0.02
0.03
0.04
0.05
0.06
Displacement (in)
One Sample Selected per fluid type
ISOPROPYL ALCOHOL Deicing Agent


85% Relative Humidity @ RT
2500
2000
1500
1000
500
0
Load (lbf)
0
0.01
0.02
0.03
0.04
0.05
0.06
Displacement (in)
One Sample Selected per fluid type
85% Relative Humidity @ RT

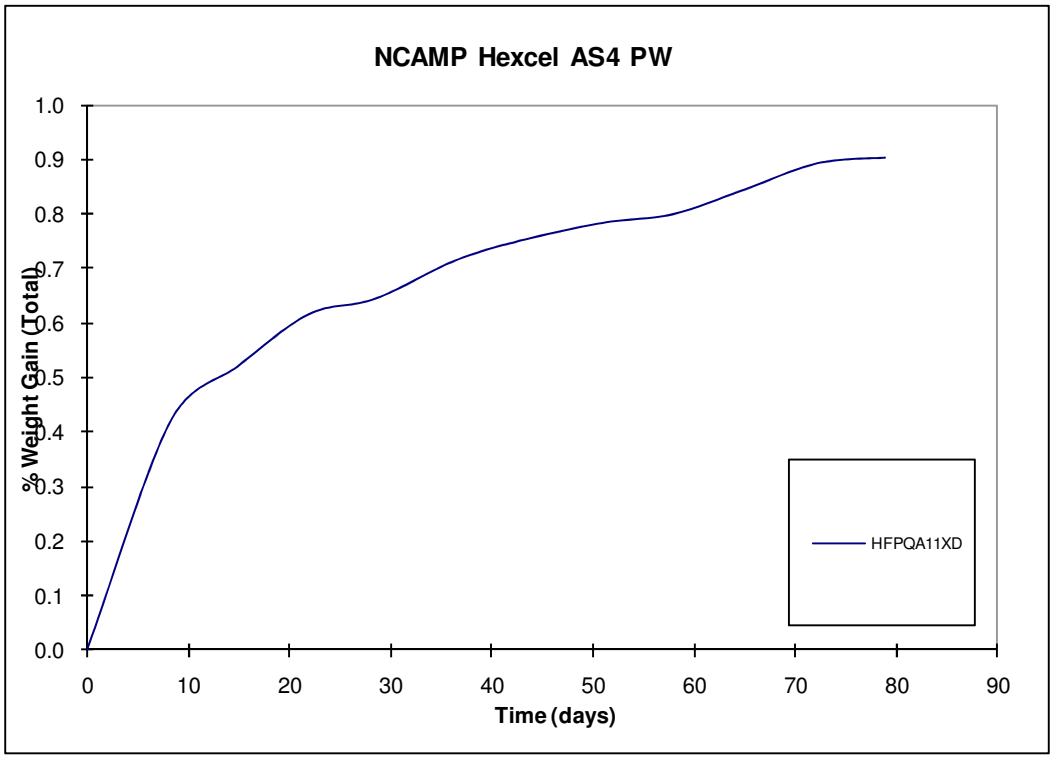

85% Relative Humidity @250F
1400
1200
1000
800
600
400
200
0
Load (lbf)
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
0.05
Displacement (in)
One Sample Selected per fluid type
85% Relative Humidity @250F

7. MOISTURE CONDITIONING CHARTS

7.1 In-Plane Shear – Thinnest Panel



7.2 Short Beam Strength – Thickest Panel



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

8. DMA Results

DMA Results Summary				
Hexcel / Cessna Aircraft Company HXPDX XX Wet				
Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	Average		Average	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
HFPDA 1L	180.00	356.00	196.66	385.99
HFPDA 2L	178.97	354.14	195.51	383.92
HFPDB 1L	179.91	355.84	196.71	386.07
HFPDB 2L	178.73	353.71	195.84	384.51
HFPDC 1L	180.21	356.38	196.97	386.54
HFPDC 2L	179.45	355.01	197.06	386.71
HFPDA 1A	152.43	306.37	169.08	336.34
HFPDA 2A	152.66	306.79	169.38	336.88
HFPDB 1A	152.57	306.62	169.08	336.34
HFPDB 2A	152.03	305.65	168.39	335.10
HFPDC 1A	156.97	314.54	171.76	341.17
HFPDC 2A	156.25	313.25	170.63	339.13
Average		332.02		

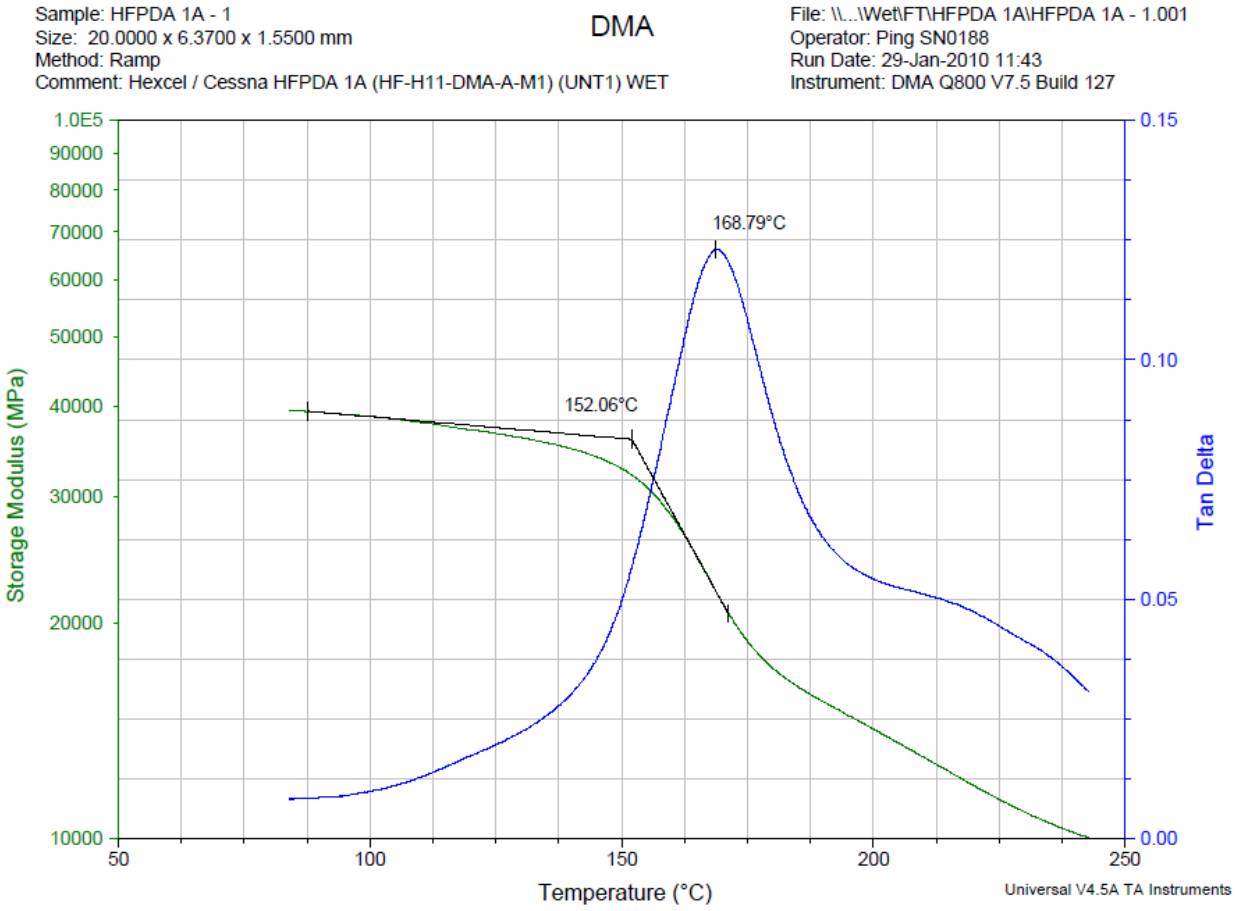
Table 8-1: DMA Wet Results

DMA Results Summary				
Hexcel / Cessna HXPDX XX Dry				
Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	Average		Average	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
HFPDA 1A	198.36	389.04	216.81	422.25
HFPDA 2A	198.60	389.48	216.93	422.47
HFPDB 1A	198.65	389.57	217.17	422.90
HFPDB 2A	196.82	386.28	216.39	421.50
HFPDC 1A	202.33	396.19	221.51	430.72
HFPDC 2A	201.80	395.24	221.88	431.38
HFPDA 1L	205.09	401.15	219.89	427.79
HFPDA 2L	204.73	400.51	219.84	427.70
HFPDB 1L	205.87	402.56	220.52	428.93
HFPDB 2L	204.12	399.42	219.32	426.77
HFPDC 1L	206.96	404.53	223.70	434.65
HFPDC 2L	208.33	406.99	225.09	437.16
AVERAGE		**396.75**		

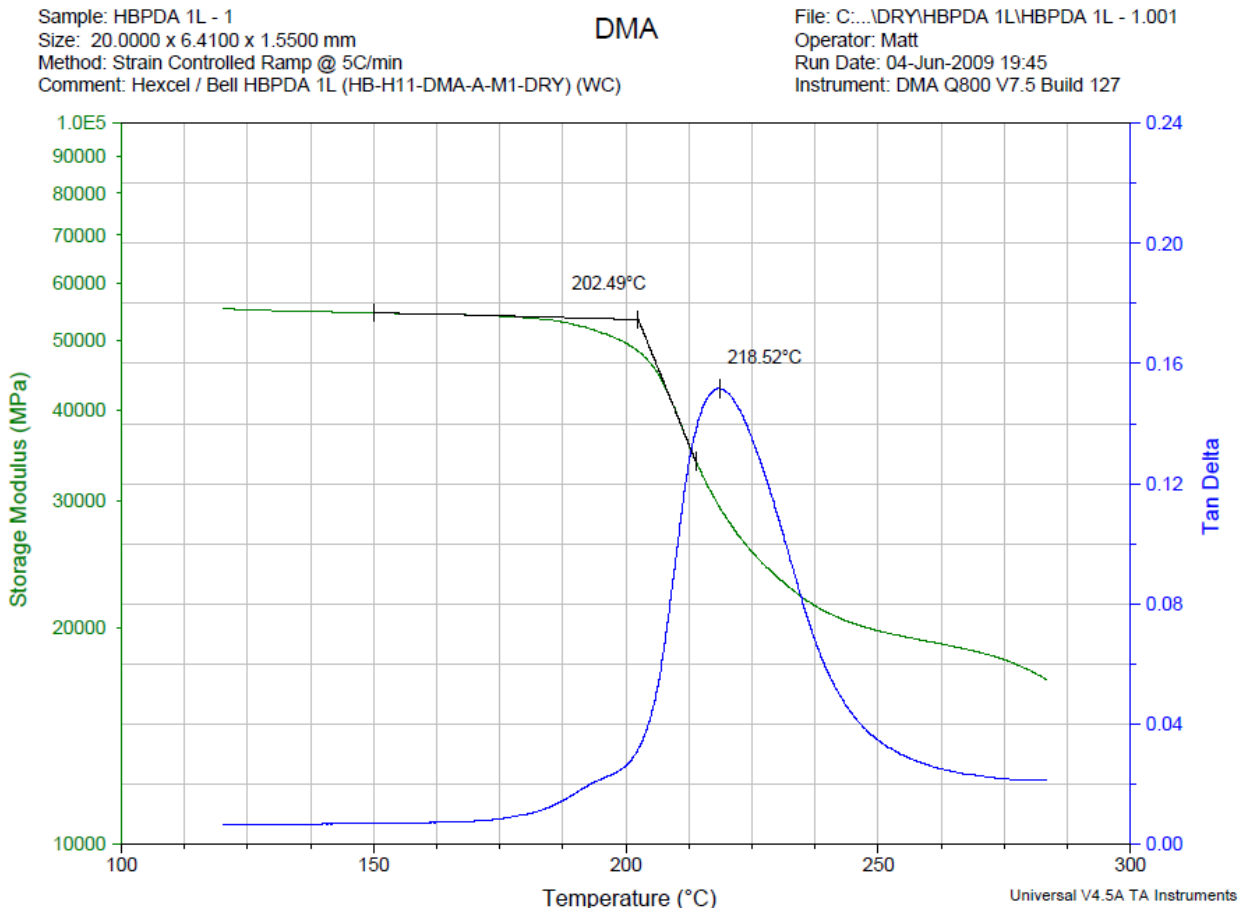
Table 8-2: DMA Dry Results

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

8.1 DMA Wet Batch A



8.2 DMA Dry Batch A



9. TMA Results

The following TMA results were obtained at Hexcel.

Hexcel 8552 AS4 PW	TMA TG 1 (°C)	TMA TG 2 (°C)	Average (°C)	Average (°F)
HF-H11-TMA-A-M1-Wet (UNT 1)	208.01	212.85	210.43	410.77
HF-H11-TMA-A-M2-Wet (UNT 1)	210.36	208.72	209.54	409.17
HF-H11-TMA-B-M1-Wet (UNT 1)	197.97	195.96	196.965	386.54
HF-H11-TMA-B-M2-Wet (UNT 1)	201.25	202.24	201.745	395.14
HF-H11-TMA-C-M1-Wet (UNT 1)	203.95	214.41	209.18	408.52
HF-H11-TMA-C-M2-Wet (UNT 1)	211.41	206.37	208.89	408.00
Overall Average				**403.03**

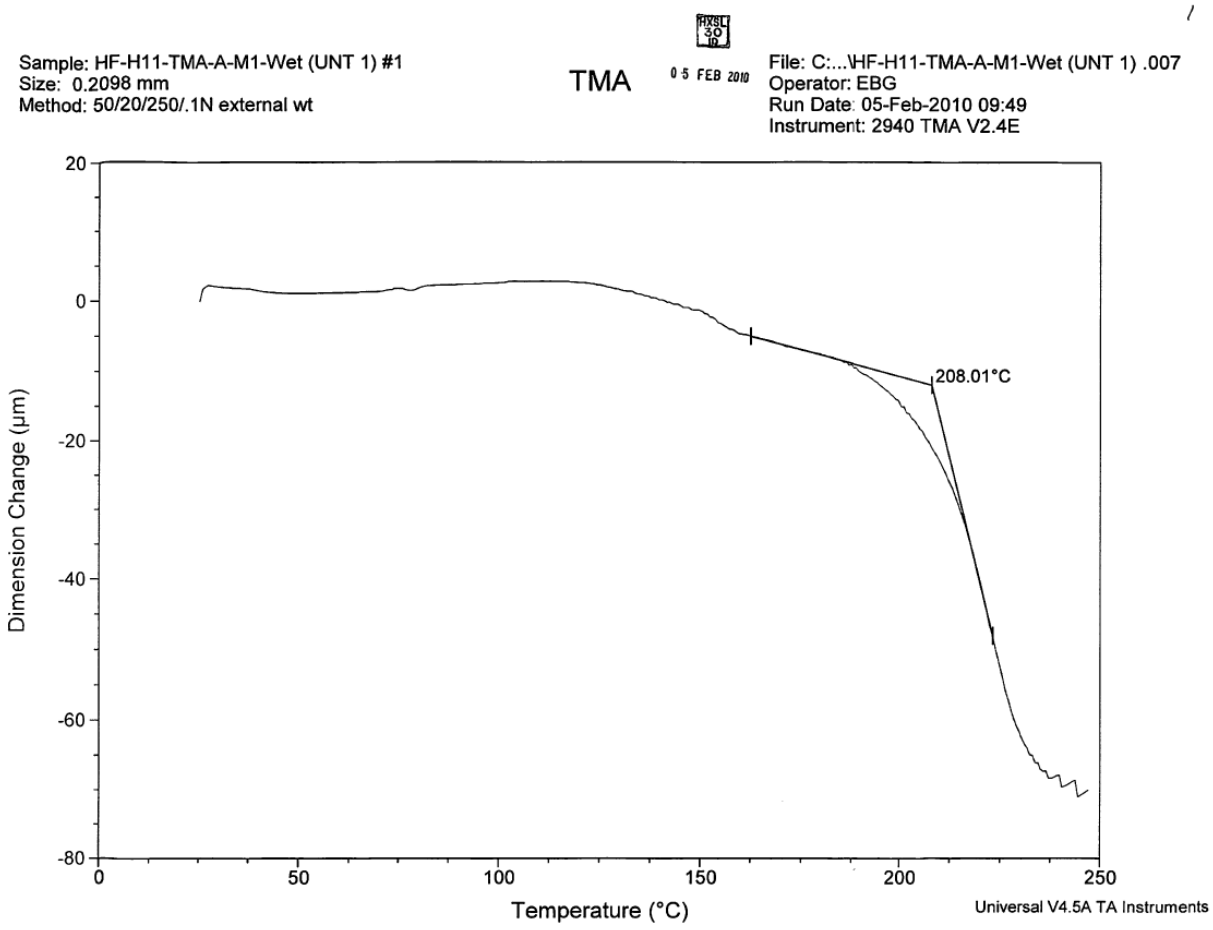
HEXCEL

5/18/2009

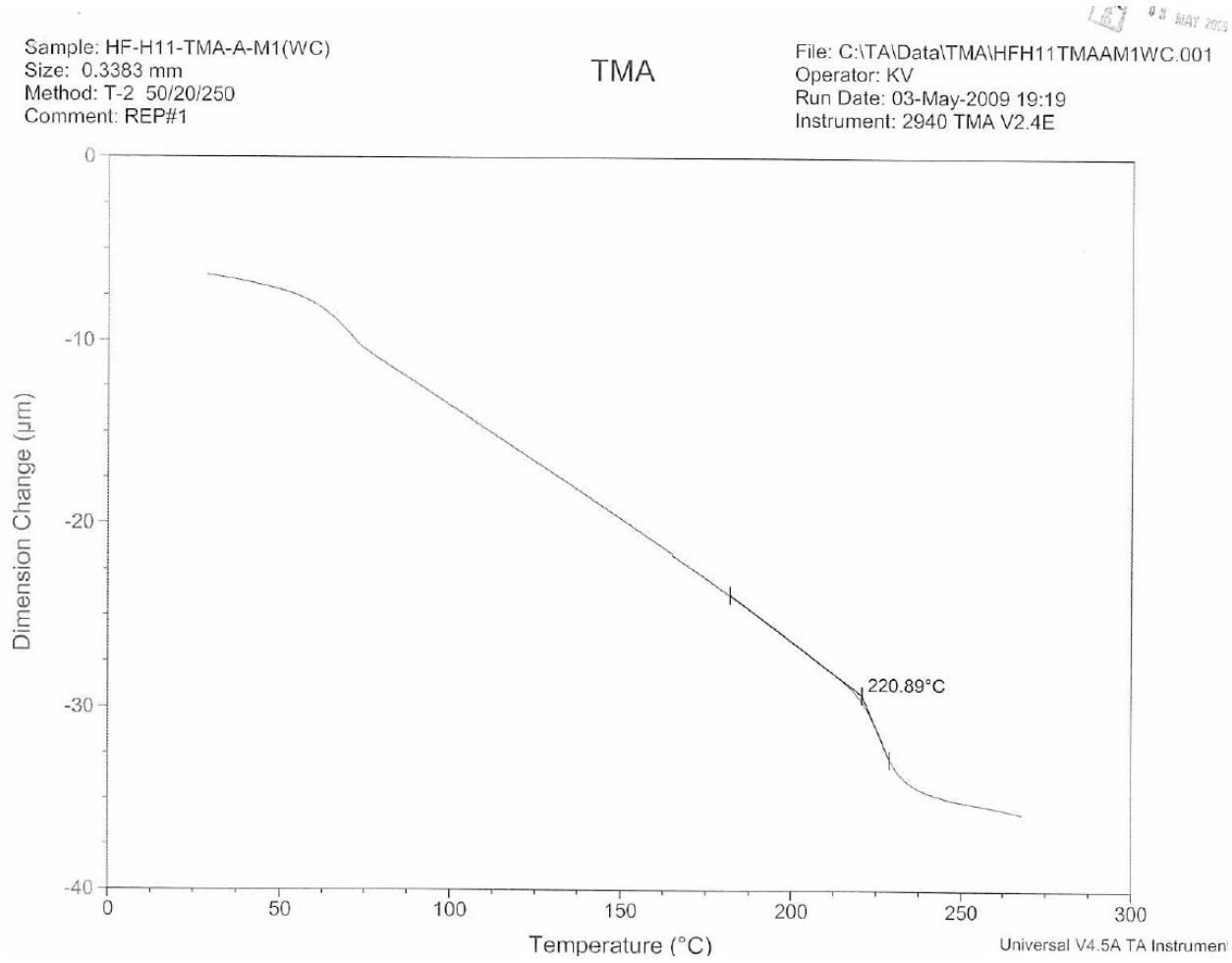
Summary of NCAMP Supplied Tg (TMA) Specimens

Specimen ID	Rep	Tg	Avg	Test Date	Time	Operator	Average ° F
HF-H11-TMA-A-M1 (WC)	1	220.89	219.98	5/3/2009	19:19	KV	427.96
	2	219.07		5/3/2009	19:38	KV	
HF-H11-TMA-A-M2 (WC)	1	215.15	216.46	5/3/2009	20:09	KV	421.63
	2	217.77		5/3/2009	20:28	KV	
HF-H11-TMA-B-M1 (WC)	1	213.36	215.02	5/3/2009	22:01	KV	419.03
	2	216.67		5/3/2009	22:26	KV	
HF-H11-TMA-B-M2 (WC)	1	216.66	215.00	5/3/2009	22:46	KV	419.00
	2	213.34		5/3/2009	23:17	KV	
HF-H11-TMA-C-M1 (WC)	1	224.82	224.96	5/3/2009	17:04	AJK	436.92
	2	225.09		5/3/2009	17:31	AJK	
HF-H11-TMA-C-M2 (WC)	1	218.17	218.84	5/3/2009	16:23	AJK	425.90
	2	219.50		5/3/2009	16:42	AJK	
HF-H11-TMA-A-M1 (UNT 1)	1	221.01	220.43	5/3/2009	8:31	AJK	428.77
	2	219.85		5/3/2009	10:02	AJK	
HF-H11-TMA-A-M2 (UNT 1)	1	216.68	219.54	5/3/2009	12:57	AJK	427.17
	2	222.40		5/3/2009	13:30	AJK	
HF-H11-TMA-B-M1 (UNT 1)	1	214.47	217.84	5/3/2009	11:03	AJK	424.11
	2	221.21		5/3/2009	11:22	AJK	
HF-H11-TMA-B-M2 (UNT 1)	1	215.23	215.11	5/3/2009	10:19	AJK	419.19
	2	214.98		5/3/2009	10:40	AJK	
HF-H11-TMA-C-M1 (UNT 1)	1	225.22	223.21	5/3/2009	7:02	AJK	433.78
	2	221.20		5/3/2009	7:23	AJK	
HF-H11-TMA-C-M2 (UNT 1)	1	224.43	225.85	5/3/2009	7:45	AJK	438.52
	2	227.26		5/3/2009	8:11	AJK	
Overall Average							**426.83**

9.1 TMA Wet Batch A



9.2 TMA Dry Batch A



10. Physical Test Results

The physical testing results were obtained at Hexcel and can be found on the CD accompanying this report.

11. Deviations

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

OHC or FHC can be used for LSBS coupons in place of the CAI, as called out in Appendix 1. Exact sub-panel used can be decoded with the Hexcel Naming Format chart provided in this report.