Report No: CAM-RP-2009-015 Rev B
Report Date: April 16, 2019

Hexcel 8552 IM7 Unidirectional Prepreg 190 gsm & 35%RC Qualification Material Property Data Report

FAA Special Project Number SP4614WI-Q

NCAMP Test Report Number: CAM-RP-2009-015 Rev B

Report Date: April 16, 2019

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REVISIONS:

Rev	By	Date	Pages Revised or Added
N/C	Kristin Marlett	11/17/2010	Minor lamina chart template changed and IPS conditioning chart modified
N/C	Kristin Marlett	10/18/2010	Ultimate Strength & Modulus removed for all SSB1,2,3 conditions
N/C	Kristin Marlett	9/27/2010	FSBS chart title edited
N/C	Kristin Marlett	8/30/2010	IPS RTD values changed due to extensometer slippage
N/C	Kristin Marlett	8/18/2010	FSBS chart edited to change the worst case environment values
N/C	Kristin Marlett	8/2/2010	stress strain curve modified and introduction edited (material spec release date and process spec cure cycle).
N/C	Kristin Marlett	7/6/2010	worst case environments changed on FSBS
N/C	Kristin Marlett	7/1/2010	Minor formatting changes

REVISIONS Continued:

Rev	By	Date	Pages Revised or Added
N/C	Kristin Marlett	6/15/2010	UNTO back-out calculations revised (RTD) and additional justifications provided for normalization
N/C	Kristin Marlett	6/10/2010	several formatting changes. The following test methods had specimens removed: IPS 0.2% offset (RTD); UNT2 (CTD), OHC2 (RTD), UNT0 (RTD, ETW), TC (ETW)
N/C	Kristin Marlett	5/10/2010	UNTO back-out calculations revised
N/C	Kristin Marlett	4/14/2011	ILT values updated. Test Summary for LT updated. Test Chart for IPS updated and TC and UNC3 Modulus plots in Raw Data section updated.
A	Kristin Marlett	4/22/2011	UNT1-B-C2 data removed due to unbalanced layup.
B	Michelle Man	4/16/2019	Removed CAI1 and FHT2-B-M2 Data (see section 11 for details; Typographical and Editorial Changes; 0.2% offset Charts have been added to Section 3.5 and 4.5; Resin Content in Section 2 has been updated from %vol to % wt values; %RC and %FV values updated for UNC0, UNT1, UNC1, UNC2, FHT2; Graph in Section 5 and 7.1 and Section 11 has been updated. Added CTD IPS Max Shear Strength data

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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 CMH-17-1G —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 IM7 Unidirectional Prepreg 190 gsm 35% RC Qualification Statistical Analysis Report NCP-RP-2009-028 Rev B or later revisions. The qualification material was procured to NCAMP Material Specification NMS 128/2 Rev - Initial Release dated February 6, 2007. The panels were fabricated by Cessna Aircraft Company, 5800 E Pawnee, Wichita, KS 67218. The qualification test panels were cured in accordance with Baseline Cure Cycle (M) of NCAMP Process Specification NPS 81228 Rev A dated June 7, 2007. The NCAMP Test Plan NTP 1828Q1 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 CMH-17-1G. 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 CMH-17-1G are adequate for the given program.

Aircraft companies should not use the data published in this report without specifying NCAMP Material Specification NMS 128/2. NMS 128/2 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 128/2.* NMS 128/2 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

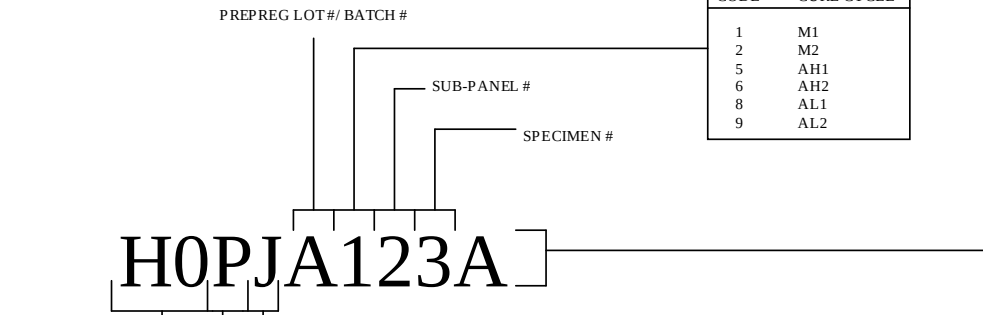
1	axis; longitudinal / warp direction (parallel to warp direction of reinforcement)
2	axis; transverse / fill direction (parallel to fill direction of reinforcement)
12	in-plane

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
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/SACMA 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-00e1 – Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
- ASTM D3039/D3039M-00 – 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
- SACMA SRM 18R-94 – SACMA Recommended Method for Glass Transition Temperature (Tg) Determination by DMA of Oriented Fiber-Resin Composites

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.

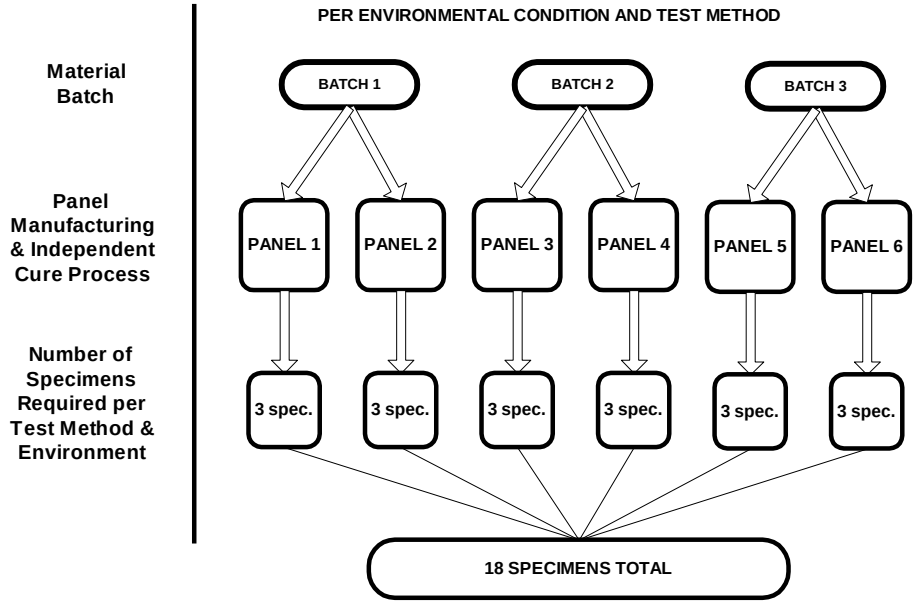


Figure 1-1: Specimen Selection Methodology

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

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

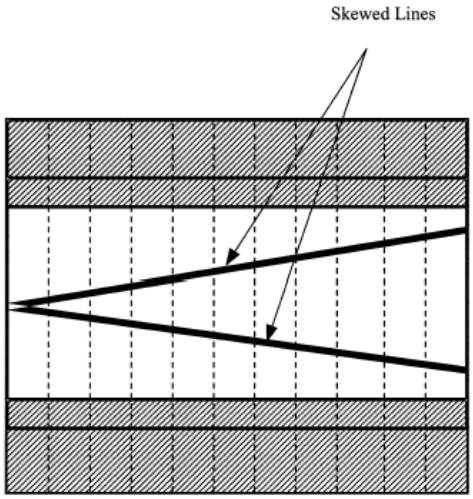


Figure 1-2: Specimen Traceability Line

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

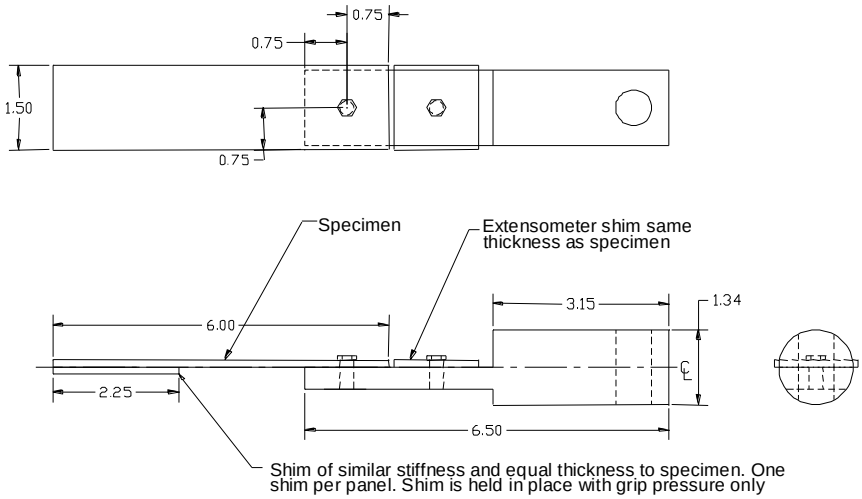


Figure 1-3: Modified ASTM D5961 (Single Shear Bearing) Specimen and Loading Arrangement

1.5.2 Specimen & Testing Details

1.5.2.1 Tabbing

Tabs were used on all Longitudinal Tension specimens.

1.5.2.2 Specimen Dimensions & Test Configuration

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

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

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

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

1.5.3 Test Matrix

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

Layup	Test Type and Direction	Property	Number of Batches x No. of Panels x No. of Specimens			
			Test Temperature/Moisture Condition			
			CTD	RTD	ETD	ETW
$[0]_6$	ASTM D3039 0° Tension	Strength, Modulus and Poisson's Ratio	3x2x3	3x2x3		3x2x3
$[0]_{14}$	ASTM D6641 0° Compression (Note 1)	Modulus	3x2x3	3x2x3	3x2x3	3x2x3
$[90]_{11}$	ASTM D3039 90° Tension	Strength and Modulus	3x2x3	3x2x3		3x2x3
$[90]_{14}$	ASTM D6641 90° Compression (Note 1)	Strength and Modulus	3x2x3	3x2x3		3x2x3
$[0/90]_{2S}$	ASTM D3039 0° Tension (see Note 2)	Strength and Modulus	3x2x3	3x2x3		3x2x3
$[90/0/90]_5$	ASTM D6641 0° Compression (see Note 1 & 2)	Strength and Modulus	3x2x3	3x2x3	3x2x3	3x2x3
$[45/-45]_{3S}$	ASTM D3518 In-Plane Shear	Strength and Modulus	3x2x3	3x2x3		3x2x3
$[0]_{34}$	ASTM D2344 Short Beam	Strength	3x2x3	3x2x3	3x2x3	3x2x3

Table 1-1: Lamina Level Test Matrix

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

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

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

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

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

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

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

(%0º/%±45º/%90º) Actual Test Type	Test Type and Layup (5)	Property	Number of Batches x Number of Panels x Number of Test Specimens		
			Test Temperature/Moisture Condition		
			CTD	RTD	ETW
(25/50/25 - QI) UNT1	ASTM D3039 Un-notched Tension [45/0/-45/90]2S	Strength & modulus	3x2x3	3x2x3	3x2x3
(10/80/10) UNT2	ASTM D3039 Un-notched Tension [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength & modulus	3x2x3	3x2x3	3x2x3
(50/40/10) UNT3	ASTM D3039 Un-notched Tension [0/45/0/90/0/-45/0/45/0/-45]S	Strength & modulus	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) UNC1	ASTM D6641 Un-notched Compression (4) [45/0/-45/90]2S	Strength & modulus		3x2x3	3x2x3
(10/80/10) UNC2	ASTM D6641 Un-notched Compression (4) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength & modulus		3x2x3	3x2x3
(50/40/10) UNC3	ASTM D6641 Un-notched Compression (4) [45/0/90/0/-45/0/45/0/-45/0]S	Strength & modulus		3x2x3	3x2x3
(25/50/25 - QI) SBS1	ASTM D2344 Short Beam (specimens may be taken from panels designed for (25/50/25 - QI) CAI1)	Strength		3x2x3	3x2x3
(25/50/25 - QI) OHT1	ASTM D5766 Open Hole Tension (1) [45/0/-45/90]2S	Strength	3x2x3	3x2x3	3x2x3
(10/80/10) OHT2	ASTM D5766 Open Hole Tension (1) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength	3x2x3	3x2x3	3x2x3
(50/40/10) OHT3	ASTM D5766 Open Hole Tension (1) [0/45/0/90/0/-45/0/45/0/-45]S	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) FHT1	ASTM D6742 Filled Hole Tension (2) [45/0/-45/90]2S	Strength	3x2x3	3x2x3	3x2x3
(10/80/10) FHT2	ASTM D6742 Filled Hole Tension (2) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength	3x2x3	3x2x3	3x2x3
(50/40/10) FHT3	ASTM D6742 Filled Hole Tension (2) [0/45/0/90/0/-45/0/45/0/-45]S	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) OHC1	ASTM D6484 Open Hole Compression (1)(4) [45/0/-45/90]3S	Strength		3x2x3	3x2x3
(10/80/10) OHC2	ASTM D6484 Open Hole Compression (1)(4) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength		3x2x3	3x2x3
(50/40/10) OHC3	ASTM D6484 Open Hole Compression (1)(4) [0/45/0/90/0/-45/0/45/0/-45]S	Strength		3x2x3	3x2x3
(25/50/25 - QI) FHC1	ASTM D6742 Filled Hole Compression (2) [45/0/-45/90]3S	Strength		3x2x3	3x2x3
(10/80/10) FHC2	ASTM D6742 Filled Hole Compression (2) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength		3x2x3	3x2x3
(50/40/10) FHC3	ASTM D6742 Filled Hole Compression (2) [0/45/0/90/0/-45/0/45/0/-45]S	Strength		3x2x3	3x2x3
(25/50/25 - QI) SSB1	ASTM D5961 Single Shear Bearing (3) (6) [45/0/-45/90]2S	Strength & Deformation		3x2x3	3x2x3
(10/80/10) SSB2	ASTM D5961 Single Shear Bearing (3) (6) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength & Deformation		3x2x3	3x2x3
(50/40/10) SSB3	ASTM D5961 Single Shear Bearing (3) (6) [0/45/0/90/0/-45/0/45/0/-45]S	Strength & Deformation		3x2x3	3x2x3
(100/0/0) ILT	ASTM D6415 Interlaminar Tension [0]22	Strength	1x1x6	1x1x6	1x1x6
(25/50/25 - QI) CAI1	ASTM D7136 & D7137 Compression After Impact (1500 in.lb/in) (4) [45/0/-45/90]3S	Strength		1x1x6	

Table 1-2: Laminate Level Test Matrix

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

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

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)

Table 1-3: Physical Testing Matrix

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.

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.

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-gauged 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	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	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.

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

Method I Fiber Volume (%vol) is 58.535 and Method 2 Fiber Volume (%vol) is 59.405. By comparing Fiber Volume values obtained from Method I and Method II, the values are deemed close enough therefore the FAW is close to the nominal of ~190 gsm. Based on the FAW data from Hexcel (Avg ~190 gsm) and our Method I Phys test data (Avg. void content ~ 0% except for a panel where it is close to 4%) it is appropriate to use the CPT Method for normalization.

The average cured ply thickness of 0.0072 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, we predicted the cured ply thickness value to be 0.0074 inch. However, the as-measured cured ply thickness of the qualification and the equivalency panels are 0.007174 inch and 0.007293 inch, respectively. The grand average of all qualification and equivalency panel thickness is 0.007229 inch. A vote was taken among the material users, and 3 out of the four participating companies agreed that 0.0072 inch was an acceptable CPT. Not all companies cast a vote.

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.

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.

2. Test Results

2.1 Lamina Level Test Summary

Prepreg Material: Hexcel Corporation - Hexcel 8552 IM7 Unidirectional
Material Specification: NMS 128/2
Process Specification: NPS 81228 "M" Cure Cycle
Fiber: IM7 unidirectional **Resin:** Hexcel 8552

Hexcel 8552 IM7 Unidirectional Tape Lamina Properties Summary

Tg(dry): 406.43° F **Tg(wet):** 321.41 ° F **Tg METHOD:** DMA (SRM 18-94)

	Lot 1	Lot 2	Lot 3		
Date of fiber manufacture	1/26/2007	12/25/2006	2/5/2007	**Date of testing**	1/22/2008 to 3/4/2010
Date of resin manufacture	2/28/2007	1/24/2007	3/1/2007	**Date of data submittal**	4/5/2010
Date of prepreg manufacture	2/28/2007	1/24/2007	3/1/2007		
Date of composite manufacture		9/2007 to 10/2007			

LAMINA MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT=0.0072 inch)

	CTD Mean		RTD Mean		ETD Mean		ETW Mean	
	Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured
F_1^{tu} [ksi]								
from LT	357.39	353.70	362.69	371.08	---	---	333.50	327.96
from UNT0*	286.78	281.57	324.62	320.79	---	---	346.85	340.46
E_1^t [Msi]	22.57	22.33	22.99	23.51	---	---	24.00	23.77
ν_{12}^t	---	0.270	---	0.316	---	---	---	0.393
F_2^{tu} [ksi]	---	9.60	---	9.29	---	---	---	3.49
E_2^t [Msi]	---	1.46	---	1.30	---	---	---	0.81
UNT0 Strength [ksi]	152.58	149.90	171.38	169.16	---	---	179.23	175.98
UNT0 Modulus [Msi]	11.92	11.71	11.99	11.85	---	---	11.94	11.74
F_1^{cu} [ksi] from UNC0*	296.49	291.99	248.94	251.13	201.93	199.50	173.00	172.58
E_1^c [Msi]	20.68	20.53	20.04	20.44	20.25	20.00	20.37	20.65
ν_{12}^c	---	0.362	---	0.356	---	0.374	---	0.383
F_2^{cu} [ksi]	---	55.31	---	41.44	---	---	---	19.02
E_2^c [Msi]	---	1.53	---	1.41	---	---	---	1.18
ν_{21}^c	---	0.028	---	0.024	---	---	---	0.018
UNC0 Strength [ksi]	113.26	111.64	94.51	95.11	75.53	75.13	64.28	64.03
UNC0 Modulus [Msi]	7.75	7.64	7.47	7.52	7.57	7.53	7.74	7.82
ν of UNC0	---	0.041	---	0.035	---	0.030	---	0.017
$F_{12}^{s0.2\%}$ [ksi]	---	11.29	---	7.76	---	---	---	3.31
F_{12}^{smax} [ksi]	---	16.56	---	---	---	---	---	---
$F_{12}^{s5\%strain}$ [ksi]	---	---	---	13.22	---	---	---	5.54
G_{12}^s [Msi]	---	0.86	---	0.68	---	---	---	0.31
SBS [ksi]	---	21.04	---	17.13	---	11.23	---	8.25

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

Table 2-1: Lamina Summary Data

2.2 Laminate Level Test Summary

Prepreg Material:	Hexcel Corporation - Hexcel 8552 IM7 Unidirectional		**Hexcel 8552 IM7 Unidirectional Tape Laminate Properties Summary**
Material Specification:	NMS 128/2		
Process Specification:	NPS 81228 "M" Cure Cycle		
Fiber:	IM7 unidirectional	**Resin:** Hexcel 8552	
Tg(dry): 406.43 °F	**Tg(wet):** 321.41 °F	**Tg METHOD:**	DMA (SRM 18-94)

	Lot 1	Lot 2	Lot 3		
Date of fiber manufacture	1/26/2007	12/25/2006	2/5/2007	**Date of testing**	1/22/2008 to 3/4/2010
Date of resin manufacture	2/28/2007	1/24/2007	3/1/2007	**Date of data submittal**	4/5/2010
Date of prepreg manufacture	2/28/2007	1/24/2007	3/1/2007		
Date of composite manufacture		9/2007 to 10/2007			

LAMINATE MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT=0.0072 inch)

	Layup:	**25/50/25**		**10/80/10**		**50/40/10**	
	Test Condition	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
OHT Strength [ksi]	**CTD**	57.75	57.28	45.95	45.63	78.75	77.97
	RTD	59.00	58.70	43.65	43.65	86.59	86.63
	ETW	66.97	66.48	38.39	38.34	114.86	113.87
OHC Strength [ksi]	**RTD**	49.37	49.10	38.80	38.40	63.24	63.36
	ETW	35.52	35.29	25.76	25.57	46.42	46.22
UNT Strength [ksi]	**CTD**	99.35	98.79	70.22	68.97	174.18	173.12
	RTD	104.69	104.01	67.01	67.08	175.63	176.22
	ETW	112.46	111.50	54.17	53.44	187.43	187.30
UNT Modulus [Msi]	**CTD**	8.35	8.30	5.52	5.42	13.11	13.02
	RTD	8.39	8.34	5.22	5.23	13.15	13.20
	ETW	7.99	7.92	4.47	4.41	13.14	13.15
UNC Strength [ksi]	**RTD**	87.05	86.95	66.44	67.49	120.84	121.06
	ETW	57.68	57.09	40.61	40.43	79.42	78.79
UNC Modulus [Msi]	**RTD**	7.86	7.86	4.90	4.98	11.90	11.93
	ETW	7.13	7.06	4.10	4.06	11.77	11.66
νUNC	**RTD**	---	0.334	---	0.587	---	0.423
	ETW	---	0.356	---	0.665	---	0.416
FHT Strength [ksi]	**CTD**	64.02	63.52	52.21	52.01	80.70	80.53
	RTD	65.87	65.95	48.38	48.29	91.95	91.93
	ETW	70.29	69.52	42.59	42.24	101.26	100.77
FHC Strength [ksi]	**RTD**	69.19	69.30	54.57	54.25	98.57	98.16
	ETW	51.68	51.61	41.17	40.86	72.79	72.20
SBS1 Strength [ksi]	**RTD**	---	12.13	---	---	---	---
	ETW	---	6.99	---	---	---	---
SSB 2% Offset Strength [ksi]	**RTD**	109.89	112.98	114.02	114.20	113.90	113.93
	ETW	88.14	89.88	86.22	86.87	91.67	91.80
CBS [lb]	**CTD**	---	380.63	---	---	---	---
	RTD	---	356.85	---	---	---	---
	ETW	---	208.68	---	---	---	---
ILT [ksi]	**CTD**	---	11.96	---	---	---	---
	RTD	---	11.04	---	---	---	---
	ETW	---	6.46	---	---	---	---
CAI Strength [ksi]	**RTD**	*	*	---	---	---	---

***data has been removed due to testing anomaly as explained in report CAM-RP-2013-020 N/C**

Table 2-2: Laminate Summary Data

2.3 Individual Test Summaries

2.3.1 Longitudinal Tension Properties (LT)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Tension, 1-axis
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[0]6

Resin content: 35.33 % w t **Comp. density:** 1.58 [g/cc]
Fiber volume: 57.30 % vol
Ply count: 6

Test method: ASTM D3039-00^{E1} **Modulus calculation:** linear fit from 1000 to 3000 micro in/in

Normalized by: 0.0072 in CPT

		CTD (B)		RTD (A)		ETW (D)			
Test Temperature [°F]		-65F		70F		250F			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		HFIJXXXXB		HFIJXXXXA		HFIJXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_1^{tu} (ksi)	**Mean**	357.39	353.70	362.69	371.08	333.50	327.96		
	Minimum	325.69	322.58	325.68	340.31	244.53	241.83		
	Maximum	379.97	378.95	392.32	401.22	373.23	366.86		
	C.V.(%)	3.53	3.70	4.43	4.10	11.64	10.73		
	No. Specimens	22		18		18			
	No. Prepreg Lots	3		3		3			
E_1^t (Msi)	**Mean**	22.57	22.33	22.99	23.51	24.00	23.77		
	Minimum	21.85	21.74	20.71	22.78	23.22	22.69		
	Maximum	23.22	22.97	23.94	24.38	25.58	26.17		
	C.V.(%)	1.72	1.65	3.53	2.27	2.32	2.92		
	No. Specimens	22		18		29			
	No. Prepreg Lots	3		3		3			
ν_{12}^t	**Mean**	0.270		0.316		0.393			
	No. Specimens	22		18		25			
	No. Prepreg Lots	3		3		3			

2.3.2 Transverse Tension Properties (TT)

Material:	HEXCEL 8552 - IM7 UNI PREPREG							**Tension, 2-axis**	
								Gr/ Ep	
Resin content:	32.59 % w t	**Comp. density:**	1.58 [g/cc]					**HEXCEL 8552 - IM7 UNI PREPREG**	
Fiber volume:	59.92 % vol							**[90]11**	
Ply count:	11								
Test method:	ASTM D3039-00	**Modulus calculation:**	linear fit from 1000 to 3000 micro in/in						
Normalized by:	NA								
		CTD (B)		**RTD (A)**		**ETW(D)**			
Test Temperature [°F]		-65F		70F		250F			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		HFIUXXXXB		HFIUXXXXA		HFIUXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		9.60		9.29		3.49		
	Minimum		7.88		7.40		3.22		
	Maximum		11.19		10.80		3.91		
F_2^{tu} (ksi)	**C.V.(%)**		8.30		9.47		6.28		
	No. Specimens	21		20		19			
	No. Prepreg Lots	3		3		3			
	Mean		1.46		1.30		0.81		
	Minimum		1.42		1.21		0.76		
	Maximum		1.53		1.40		0.89		
E_2^t (Msi)	**C.V.(%)**		2.04		3.37		5.15		
	No. Specimens	21		20		19			
	No. Prepreg Lots	3		3		3			

2.3.3 Longitudinal Compression Properties (LC)

Material:	HEXCEL 8552 - IM7 UNI PREPREG							**Compression, 1-axis** Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [0]14	
Resin content:	31.40 % wt	**Comp. density:**	1.58 [g/cc]						
Fiber volume:	61.08 % vol								
Ply count:	14								
Test method:	ASTM D6641M-01^{E1}	**Modulus calculation:**	linear fit from 1000 to 3000 micro in/in						
Normalized by:	0.0072 in CPT								
		CTD (B)		**RTD (A)**		**ETD (C)**		**ETW (D)**	
Test Temperature [°F]		-65F		70F		250F		250F	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		HFILXXXXB		HFILXXXXA		HFILXXXXC		HFILXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	20.68	20.53	20.04	20.44	20.25	20.00	20.37	20.65
	Minimum	17.80	19.05	18.19	19.80	18.37	19.37	15.61	17.67
	Maximum	22.39	21.29	22.43	20.89	22.12	20.92	24.76	26.64
E_1^c (Msi)	**C.V.(%)**	6.40	2.94	6.81	1.55	5.76	2.31	9.00	8.49
	No. Specimens	20		15		17		35	
	No. Prepreg Lots	3		3		3		3	
ν_{12}^c	**Mean**	0.362		0.356		0.374		0.383	
	No. Specimens	20		15		17		35	
	No. Prepreg Lots	3		3		3		3	

2.3.4 Transverse Compression Properties (TC)

Material:	HEXCEL 8552 - IM7 UNI PREPREG							**Compression, 2-axis** Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [90]14	
Resin content:	32.31 % w t	**Comp. density:**	1.59 [g/cc]						
Fiber volume:	60.38 % vol								
Ply count:	14								
Test method:	ASTM D6641-01e1	**Modulus calculation:**	linear fit from 1000 to 3000 micro in/in						
Normalized by:	NA								
		CTD (B)		**RTD (A)**		**ETW (D)**			
Test Temperature [°F]		-65F		70F		250F			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		HFIZXXXXB		HFIZXXXXA		HFIZXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_2^{cu} (ksi)	**Mean**		55.31		41.44		19.02		
	Minimum		50.41		38.79		16.78		
	Maximum		61.39		46.40		20.70		
	C.V.(%)		5.19		4.50		5.47		
	No. Specimens		20		20		25		
	No. Prepreg Lots		3		3		3		
E_2^c (Msi)	**Mean**		1.53		1.41		1.18		
	Minimum		1.26		1.25		1.03		
	Maximum		1.70		1.66		1.35		
	C.V.(%)		7.64		6.63		7.99		
	No. Specimens		20		20		9		
	No. Prepreg Lots		3		3		3		
ν_{21}^c	**Mean**		0.028		0.024		0.018		
	No. Specimens		20		20		9		
	No. Prepreg Lots		3		3		3		

2.3.5 In-Plane Shear Properties (IPS)

Material:	HEXCEL 8552 - IM7 UNI PREPREG							**In-Plane Shear** Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [+45/-45]3S	
Resin content:	33.36 % wt	**Comp. density:** 1.57 [g/cc]							
Fiber volume:	58.93 % vol								
Ply count:	12								
Test method:	ASTM D3518-94								
		Modulus calculation: linear fit from 2000 to 6000 micro in/in							
Normalized by:	NA								
		CTD (B)		**RTD (A)**		**ETW (D)**			
Test Temperature [°F]		-65F		70F		250F			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		HFINXXXXB		HFINXXXXA		HFINXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
$F_{12}^{s5\% \text{ strain}}$ (ksi)	**Mean**				13.22		5.54		
	Minimum				12.85		5.18		
	Maximum				13.61		5.95		
	C.V.(%)				1.60		3.38		
	No. Specimens			12		19			
	No. Prepreg Lots			3		3			
F_{12}^{smax} (ksi)	**Mean**		16.56						
	Minimum		14.89						
	Maximum		17.63						
	C.V.(%)		4.38						
	No. Specimens	21							
	No. Prepreg Lots	3							
$F_{12}^{s0.2\%}$ (ksi)	**Mean**		11.29		7.76		3.31		
	Minimum		10.78		7.48		3.05		
	Maximum		11.66		8.28		3.63		
	C.V.(%)		2.10		2.81		4.63		
	No. Specimens	21		16		20			
	No. Prepreg Lots	3		3		3			
G_{12}^{s} (Msi)	**Mean**		0.86		0.68		0.31		
	Minimum		0.81		0.65		0.28		
	Maximum		0.89		0.73		0.34		
	C.V.(%)		2.90		3.27		4.51		
	No. Specimens	21		16		20			
	No. Prepreg Lots	3		3		3			

Note: All CTD specimens failed to reach 50,000 microstrain

2.3.6 “33/0/67” Unnotched Compression 0 Properties (UNC0)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Resin content: 33.92 % wt **Comp. density:** 1.58 [g/cc]
Fiber volume: 58.79 % vol
Ply count: 15

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

Normalized by: 0.0072 in CPT

Unnotched Compression 0
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[90,0,90]5

		CTD (B)		RTD (A)		ETD (C)		ETW (D)	
Test Temperature [°F]		-65F		70F		250F		250 F	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		HFIRXXXXB		HFIRXXXXA		HFIRXXXXC		HFIRXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Nomalized**	**Measured**	**Normalized**	**Measured**
	Mean	113.26	111.64	94.51	95.11	75.53	75.13	64.28	64.03
	Minimum	105.46	104.58	84.82	89.79	66.78	66.57	53.94	52.06
	Maximum	121.75	118.90	99.74	98.54	81.34	81.64	70.95	74.96
UNC0	**C.V.(%)**	4.19	4.02	5.91	3.22	6.61	6.81	8.23	9.70
Strength (ksi)									
	No. Specimens	9		9		9		17	
	No. Prepreg Lots	2		2		2		2	
	Mean	7.75	7.64	7.47	7.52	7.57	7.53	7.74	7.82
	Minimum	7.47	7.43	7.04	7.32	7.11	7.11	7.41	7.30
	Maximum	8.03	7.85	7.60	7.73	7.88	7.84	8.12	8.22
UNC0	**C.V.(%)**	3.08	2.36	2.62	1.53	3.41	3.12	3.04	3.88
Modulus (Msi)									
	No. Specimens	9		9		9		8	
	No. Prepreg Lots	2		2		2		2	
	Mean	0.041		0.035		0.030		0.017	
vUNC0	**No. Specimens**	9		9		9		8	
	No. Prepreg Lots	2		2		2		2	

Batch A Cure Cycle 1 and 2 and Batch C Cure Cycle 2 has improper layup so data was removed

2.3.7 “50/0/50” Unnotched Tension 0 Properties (UNT0)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Unnotched Tension 0** **Gr/ Ep** **HEXCEL 8552 - IM7 UNI PREPREG** **[0,90]2S**	
Resin content:	33.18 % wt	**Comp. density:** 1.58 [g/cc]					
Fiber volume:	59.21 % vol						
Ply count:	8						
Test method:	ASTM D3039M-00^{E1}	**Modulus calculation:** linear fit from 1000 to 3000 micro in/in					
Normalized by:	0.0072 in CPT						
		CTD (B)		**RTD (A)**		**ETW (D)**	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFIPXXXXB		HFIPXXXXA		HFIPXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	152.58	149.90	171.38	169.16	179.23	175.98
	Minimum	142.06	138.38	143.99	150.39	165.98	164.55
	Maximum	159.85	156.68	182.90	182.06	189.18	189.34
UNT0	**C.V.(%)**	3.39	3.61	5.43	4.18	3.75	3.67
Strength (ksi)							
	No. Specimens	19		18		18	
	No. Prepreg Lots	3		3		3	
	Mean	11.92	11.71	11.99	11.85	11.94	11.74
	Minimum	11.55	11.25	11.50	11.33	11.60	11.29
	Maximum	12.15	11.91	12.34	12.46	12.35	12.26
UNT0	**C.V.(%)**	1.24	1.61	1.76	2.50	1.76	2.09
Modulus (Msi)							
	No. Specimens	19		18		19	
	No. Prepreg Lots	3		3		3	

2.3.8 Lamina Short Beam Strength Properties (SBS)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Resin content: 31.04 % wt **Comp. density:** 1.58 [g/cc]
Fiber volume: 61.15 % vol
Ply count: 34

Test method: ASTM D2344-00^{E1}

Normalized by: N/A

Short Beam Strength
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[0]34

		CTD (B)		RTD (A)		ETD (C)		ETW (D)	
Test Temperature [°F]		-65F		70F		250F		250F	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		HFIQXXXXB		HFIQXXXXA		HFIQXXXXC		HFIQXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		21.04		17.13		11.23		8.25
	Minimum		19.68		16.20		10.96		7.86
	Maximum		22.58		17.78		11.77		8.82
SBS	**C.V.(%)**		3.05		2.51		1.94		2.93
Strength (ksi)									
	No. Specimens	19		18		19		19	
	No. Prepreg Lots	3		3		3		3	

2.3.9 “25/50/25” Unnotched Tension 1 Properties (UNT1)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Unnotched Tension 1
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[45,0,-45,90]2s

Resin content: 34.85 % wt
Fiber volume: 57.71 % vol
Ply count: 16
Comp. density: 1.58 g[cc]

Test method: ASTM D3039M-00^{e1}
Modulus calculation: linear fit from 1000 to 3000 micro in/in

Normalized by: 0.0072 in CPT

		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFIAXXXXB		HFIAXXXXA		HFIAXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	99.35	98.79	104.69	104.01	112.46	111.50
	Minimum	91.60	93.70	89.56	96.38	101.64	104.09
	Maximum	105.84	104.20	113.71	111.12	119.29	119.12
UNT1	**C.V.(%)**	3.46	2.78	6.95	3.90	4.99	3.50
Strength (ksi)							
	No. Specimens	16		16		16	
	No. Prepreg Lots	3		3		3	
	Mean	8.35	8.30	8.39	8.34	7.99	7.92
	Minimum	7.29	7.91	7.28	7.90	7.07	7.15
	Maximum	8.75	8.52	8.98	8.69	8.51	8.29
UNT1	**C.V.(%)**	3.70	1.74	5.73	2.68	5.16	3.86
Modulus (Msi)							
	No. Specimens	16		16		17	
	No. Prepreg Lots	3		3		3	

Batch B Cure Cycle 2 has improper layup so data was removed

2.3.10 "10/80/10" Unnotched Tension 2 Properties (UNT2)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Unnotched Tension 2** Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,-45,0,45,-45,90,45,-45,45,-45]S	
Resin content:	33.27 % w t	**Comp. density:** 1.58 [g/cc]					
Fiber volume:	59.09 % vol						
Ply count:	20						
Test method:	ASTM D3039M-00^{E1}	**Modulus calculation:** linear fit from 1000 to 3000 micro in/in					
Normalized by:	0.0072 in CPT						
		CTD (B)		**RTD (A)**		**ETW (D)**	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFIBXXXXB		HFIBXXXXA		HFIBXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	70.22	68.97	67.01	67.08	54.17	53.44
	Minimum	66.60	65.98	57.64	62.42	50.96	50.23
	Maximum	75.29	72.93	71.95	69.98	56.23	56.42
UNT2 Strength (ksi)	**C.V.(%)**	2.54	2.33	5.69	3.17	2.49	2.90
	No. Specimens	17		18		18	
	No. Prepreg Lots	3		3		3	
	Mean	5.52	5.42	5.22	5.23	4.47	4.41
	Minimum	5.31	5.14	4.70	4.95	4.33	4.28
	Maximum	5.77	5.62	5.72	5.54	4.65	4.51
UNT2 Modulus (Msi)	**C.V.(%)**	2.03	2.26	5.27	3.31	2.13	1.93
	No. Specimens	17		18		18	
	No. Prepreg Lots	3		3		3	

2.3.11 "50/40/10" Unnotched Tension 3 Properties (UNT3)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Unnotched Tension 3
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[0,45,0,90,0,-45,0,45,0,-45]S

Resin content: 33.99 % wt **Comp. density:** 1.58 [g/cc]
Fiber volume: 58.69 % vol
Ply count: 20

Test method: ASTM D3039M-00^{E1} **Modulus calculation:** linear fit from 1000 to 3000 micro in/in

Normalized by: 0.0072 in CPT

		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFICXXXXB		HFICXXXXA		HFICXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	174.18	173.12	175.63	176.22	187.43	187.30
	Minimum	159.91	160.82	159.04	158.49	161.56	172.30
	Maximum	188.80	187.85	188.00	190.86	203.39	199.33
UNT3 Strength (ksi)	**C.V.(%)**	4.47	4.74	4.78	4.21	5.84	4.33
	No. Specimens	19		22		19	
	No. Prepreg Lots	3		3		3	
	Mean	13.11	13.02	13.15	13.20	13.14	13.15
	Minimum	12.57	12.36	11.50	11.40	11.69	12.48
	Maximum	13.60	13.41	15.13	14.84	14.41	13.90
UNT3 Modulus (Msi)	**C.V.(%)**	1.98	2.17	6.04	5.63	4.65	2.68
	No. Specimens	19		22		22	
	No. Prepreg Lots	3		3		3	

2.3.12 "25/50/25" Unnotched Compression 1 Properties (UNC1)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Unnotched Compression 1
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[45,0,-45,90]2S

Resin content: 32.19 % w t
Comp. density: 1.58 [g/cc]
Fiber volume: 60.20 % vol
Ply count: 16

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

Normalized by: 0.0072 in CPT

		RTD (A)		ETW (D)			
Test Temperature [°F]		70F		250 F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFIWXXXXA		HFIWXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	87.05	86.95	57.68	57.09		
	Minimum	68.07	73.46	48.72	48.54		
	Maximum	97.04	96.78	72.23	70.98		
UNC1	**C.V.(%)**	9.32	7.51	11.02	10.87		
Strength (ksi)							
	No. Specimens	16		30			
	No. Prepreg Lots	3		3			
	Mean	7.86	7.86	7.13	7.06		
	Minimum	6.89	7.20	6.85	6.79		
	Maximum	8.41	8.61	7.34	7.38		
UNC1	**C.V.(%)**	4.75	4.86	1.80	2.28		
Modulus (Msi)							
	No. Specimens	16		16			
	No. Prepreg Lots	3		3			
	Mean	0.334		0.356			
νUNC1	**No. Specimens**	16		16			
	No. Prepreg Lots	3		3			

Data for Batch B Cure Cycle 1 is excluded from mechanical and chemical properties due to improper layup.

2.3.13 "10/80/10" Unnotched Compression 2 Properties (UNC2)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Unnotched Compression 2** Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,-45,0,45,-45,90,45,-45,45,-45]S	
Resin content:	31.17 % w t	**Comp. density** 1.58 [g/cc]					
Fiber volume:	61.11 % vol						
Ply count:	20						
Test method:	ASTM D6641-01^{E1}	**Modulus calculation:** linear fit from 1000 to 3000 micro in/in					
Normalized by:	0.0072 in CPT						
		RTD (A)		**ETW**			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		DRY		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFIXXXXXA		HFIXXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	66.44	67.49	40.61	40.43		
	Minimum	57.29	60.87	31.19	31.31		
	Maximum	72.61	73.01	50.34	49.44		
UNC2	**C.V.(%)**	7.36	5.53	10.91	10.71		
Strength (ksi)							
	No. Specimens	16		31			
	No. Prepreg Lots	3		3			
	Mean	4.90	4.98	4.10	4.06		
	Minimum	4.35	4.58	3.96	3.85		
	Maximum	5.35	5.33	4.25	4.18		
UNC2	**C.V.(%)**	6.10	4.84	2.21	2.72		
Modulus (Msi)							
	No. Specimens	16		16			
	No. Prepreg Lots	3		3			
	Mean	0.587		0.665			
vUNC2	**No. Specimens**	16		16			
	No. Prepreg Lots	3		3			

Data for Batch C Cure Cycle 1 is excluded from mechanical and chemical properties due to improper layup.

2.3.14 "50/40/10" Unnotched Compression 3 Properties (UNC3)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Unnotched Compression 3** Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,90,0,-45,0,45,0,-45,0]S	
Resin content:	32.71 % wt	**Comp. density** 1.58 [g/cc]					
Fiber volume:	59.78 % vol						
Ply count	20						
Test method:	ASTM D6641-01^{E1}						
Normalized by:	0.0072 in CPT	**Modulus calculation:** linear fit from 1000 to 3000 micro in/in					
		RTD (A)		**ETW (D)**			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFIYXXXXA		HFIYXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	120.84	121.06	79.42	78.79		
	Minimum	108.20	111.74	68.05	67.56		
	Maximum	136.09	137.70	96.63	94.50		
UNC3 Strength (ksi)	**C.V.(%)**	5.86	5.53	10.31	9.99		
	No. Specimens	16		27			
	No. Prepreg Lots	3		3			
	Mean	11.90	11.93	11.77	11.66		
	Minimum	10.32	11.20	11.24	11.22		
	Maximum	12.58	12.74	12.22	11.96		
UNC3 Modulus (Msi)	**C.V.(%)**	4.35	3.38	2.35	2.09		
	No. Specimens	17		15			
	No. Prepreg Lots	3		3			
	Mean	0.423		0.416			
νUNC3	**No. Specimens**	17		15			
	No. Prepreg Lots	3		3			

2.3.15 Laminate Short Beam Strength Properties (SBS1)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Laminate Short Beam Strength** Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,-45,90]3S	
Resin content:	see FHC1	**Comp. density:** see FHC1					
Fiber volume:	see FHC1						
Ply count:	24						
Test method:	ASTM D2344-00^{E1}						
Normalized by:	NA						
		RTD (A)		**ETW (D)**			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFlqXXXXA		HFlqXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		12.13		6.99		
	Minimum		9.55		6.63		
	Maximum		12.98		7.70		
SBS1 (ksi)	**C.V.(%)**		6.85		3.65		
	No. Specimens		21		19		
	No. Prepreg Lots		3		3		

2.3.16 "25/50/25" Open Hole Tension 1 Properties (OHT1)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Open Hole Tension 1
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[45,0,-45,90]2S

Resin content: 34.67 % wt **Comp. density:** 1.57 [g/cc]
Fiber volume: 57.80 % vol
Ply count: 16

Test method: ASTM D5766M-02a

Normalized by: 0.0072 in CPT

		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFIDXXXXB		HFIDXXXXA		HFIDXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	57.75	57.28	59.00	58.70	66.97	66.48
	Minimum	53.64	53.27	54.12	53.32	62.15	62.21
	Maximum	62.52	61.67	64.61	64.44	72.59	73.23
OHT1	**C.V.(%)**	4.21	3.95	3.98	4.07	4.26	4.29
Strength (ksi)							
	No. Specimens	19		19		20	
	No. Prepreg Lots	3		3		3	

2.3.17 "10/80/10" Open Hole Tension 2 Properties (OHT2)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Open Hole Tension 2** Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,-45,0,45,-45,90,45,-45,45,-45]S	
Resin content:	33.32 % w t	**Comp. densit** 1.58 [g/cc]					
Fiber volume:	59.36 % vol						
Ply count	20						
Test method:	ASTM D5766-02a						
Normalized by:	0.0072 in CPT						
		CTD (B)		**RTD (A)**		**ETW (D)**	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFIEXXXXB		HFIEXXXXA		HFIEXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	45.95	45.63	43.65	43.65	38.39	38.34
	Minimum	44.04	43.88	39.91	41.05	36.27	36.18
	Maximum	47.20	47.02	45.96	45.86	40.71	40.04
OHT2	**C.V.(%)**	1.92	2.16	3.28	2.77	3.10	3.11
Strength (ksi)							
	No. Specimens	19		19		18	
	No. Prepreg Lots	3		3		3	

2.3.18 "50/40/10" Open Hole Tension 3 Properties (OHT3)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Open Hole Tension 3**	
						Gr/ Ep	
Resin content:	33.10 % wt	**Comp. density**	1.58 [g/cc]			**HEXCEL 8552 - IM7 UNI PREPREG**	
Fiber volume:	59.55 % vol					**[0,45,0,90,0,-45,0,45,0,-45]S**	
Ply count:	20						
Test method:	ASTM D5766-02a						
Normalized by:	0.0072 in CPT						
		CTD (B)		**RTD (A)**		**ETW (D)**	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFIFXXXXB		HFIFXXXXA		HFIFXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	78.75	77.97	86.59	86.63	114.86	113.87
	Minimum	72.41	70.75	78.90	79.07	105.04	102.24
	Maximum	84.29	84.38	95.17	94.49	129.75	128.78
OHT3	**C.V.(%)**	5.03	6.01	5.46	5.72	5.95	6.37
Strength (ksi)							
	No. Specimens	19		19		20	
	No. Prepreg Lots	3		3		3	

2.3.19 "25/50/25" Filled-Hole Tension 1 Properties (FHT1)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Filled-Hole Tension 1
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[45,0,-45,90]2S

Resin content: 33.40 % w t
Comp. density: 1.58 [g/cc]
Fiber volume: 59.21 % vol
Ply count: 16

Test method: ASTM D6742M-02

Normalized by: 0.0072 in CPT

		CTD (B)		RTD (A)		ETW(D)	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFI4XXXXB		HFI4XXXXA		HFI4XXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	64.02	63.52	65.87	65.95	70.29	69.52
	Minimum	58.00	57.30	59.20	59.60	65.17	64.29
	Maximum	69.40	68.01	72.34	72.19	74.40	74.58
FHT1 Strength (ksi)	**C.V.(%)**	4.39	4.86	4.95	5.41	3.24	3.90
	No. Specimens	19		19		22	
	No. Prepreg Lots	3		3		3	

2.3.20 "10/80/10" Filled-Hole Tension 2 Properties (FHT2)

Material:	HEXCEL 8552 - IM7 UNI PREPREG		**Filled-Hole Tension 2** **Gr/ Ep** **HEXCEL- IM7 UNI PREPREG** **[45,-45,0,45,-45,90,45,-45,45,-45]S**
Resin content:	31.60 % wt	**Comp. density:** 1.59 [g/cc]	
Fiber volume:	60.96 % vol		
Ply count:	20		
Test method:	ASTM D6742M-02		
Normalized by:	0.0072 in CPT		

		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFI5XXXXB		HFI5XXXXA		HFI5XXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	52.21	52.01	48.38	48.29	42.59	42.24
	Minimum	48.54	50.23	44.59	45.72	41.22	40.75
	Maximum	54.64	54.73	50.68	50.24	43.75	43.54
FHT2 Strength (ksi)	**C.V.(%)**	3.13	2.54	3.39	2.75	1.81	2.04
	No. Specimens	16		16		16	
	No. Prepreg Lots	3		3		3	

Data for Batch B Cure Cycle 2 is excluded from mechanical and chemical properties due to improper layup.

2.3.21 "50/40/10" Filled-Hole Tension 3 Properties (FHT3)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Resin content: 32.95 % w t **Comp. density:** 1.58 [g/cc]
Fiber volume: 59.67 % vol
Ply count: 20

Test method: ASTM D6742M-02

Normalized by: 0.0072 in CPT

Filled-Hole Tension 3
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[0,45,0,90,0,-45,0,45,0-45]S

		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFI6XXXXB		HFI6XXXXA		HFI6XXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
FHT3 Strength (ksi)	**Mean**	80.70	80.53	91.95	91.93	101.26	100.77
	Minimum	70.25	71.22	79.15	77.08	93.92	92.01
	Maximum	88.15	88.23	102.16	102.61	108.11	107.29
	C.V.(%)	5.69	6.13	7.20	7.91	3.90	3.82
	No. Specimens	19		19		19	
	No. Prepreg Lots	3		3		3	

2.3.22 "25/50/25" Open Hole Compression 1 Properties (OHC1)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Open Hole Compression 1 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,-45,90]3S**	
Resin content:	34.31 % w t	**Comp. density:** 1.58 [g/cc]					
Fiber volume:	58.26 % vol						
Ply count:	24						
Test method:	ASTM D6484M-04						
Normalized by:	0.0072 in CPT						
		RTD (A)		**ETW (D)**			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFIGXXXXA		HFIGXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	49.08	48.89	35.52	35.29		
	Minimum	43.91	45.15	33.08	33.59		
	Maximum	50.99	51.28	38.96	37.50		
OHC1	**C.V.(%)**	3.65	2.96	4.07	3.25		
Strength (ksi)							
	No. Specimens	19		19			
	No. Prepreg Lots	3		3			

2.3.23 "10/80/10" Open Hole Compression 2 Properties (OHC2)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Open Hole Compression 2**	
Resin content:	33.83 % wt	**Comp. density:**	1.58 [g/cc]			**Gr/ Ep**	
Fiber volume:	58.86 % vol					**HEXCEL 8552 - IM7 UNI PREPREG**	
Ply count:	20					**[45,-45,0,45,-45,90,45,-45,45,-45]S**	
Test method:	ASTM D6484M-04						
Normalized by:	0.0072 in CPT						
		RTD (A)		**ETW (D)**			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFIHXXXXA		HFIHXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	38.80	38.40	25.76	25.57		
	Minimum	36.25	35.93	22.36	22.24		
	Maximum	41.33	40.85	27.57	27.56		
OHC2	**C.V.(%)**	3.29	3.41	5.02	4.40		
Strength (ksi)							
	No. Specimens	18		20			
	No. Prepreg Lots	3		3			

2.3.24 "50/40/10" Open Hole Compression 3 Properties (OHC3)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Open Hole Compression 3**	
						Gr/ Ep	
Resin content:	32.13 % wt		**Comp. density:** 1.58 [g/cc]			**HEXCEL 8552 - IM7 UNI PREPREG**	
Fiber volume:	60.38 % vol					**[0,45,0,90,0,-45,0,45,0,-45]S**	
Ply count:	20						
Test method:	ASTM D6484M-04						
Normalized by:	0.0072 in CPT						
		RTD (A)		**ETW (D)**			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFIIXXXXA		HFIIXXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	63.24	63.36	46.42	46.22		
	Minimum	56.63	59.06	42.01	42.66		
	Maximum	69.28	69.24	50.50	51.35		
OHC3	**C.V.(%)**	4.54	4.28	4.55	4.76		
Strength (ksi)							
	No. Specimens	19		20			
	No. Prepreg Lots	3		3			

2.3.25 "25/50/25" Filled-Hole Compression 1 Properties (FHC1)

Material:	HEXCEL 8552 - IM7 UNI PREPREG			**Filled-Hole Compression 1**			
				Gr/ Ep			
Resin content:	34.54 % wt	**Comp. density:**	1.58 [g/cc]	**HEXCEL 8552 - IM7 UNI PREPREG**			
Fiber volume:	58.15 % vol			**[45,0,-45,90]3S**			
Ply count:	24						
Test method:	ASTM D6742M-02						
Normalized by:	0.0072 in CPT						
			RTD (A)		**ETW (D)**		
Test Temperature [°F]			70F		250F		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFI7XXXXA		HFI7XXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		69.19	69.30	51.68	51.61		
	Minimum		62.34	62.44	47.70	47.93		
	Maximum		76.17	76.20	55.60	54.57		
FHC1 Strength (ksi)	**C.V.(%)**		5.34	5.56	4.41	3.85		
	No. Specimens		20		19			
	No. Prepreg Lots		3		3			

2.3.26 "10/80/10" Filled-Hole Compression 2 Properties (FHC2)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Filled-Hole Compression 2
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[45,-45,0,45,-45,90,45,-45,45,-45]S

Resin content: 33.55 % wt **Comp. density:** 1.58 [g/cc]
Fiber volume: 58.91 % vol
Ply count: 20

Test method: ASTM D6742M-02

Normalized by: 0.0072 in CPT

		RTD (A)		ETW (D)			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFI8XXXXA		HFI8XXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	54.57	54.25	41.17	40.86		
	Minimum	50.41	50.57	37.36	37.86		
	Maximum	57.71	57.54	43.99	43.20		
FHC2 Strength (ksi)	**C.V.(%)**	4.13	3.17	4.39	3.66		
	No. Specimens	19		19			
	No. Prepreg Lots	3		3			

2.3.27 "50/40/10" Filled-Hole Compression 3 Properties (FHC3)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Filled-Hole Compression 3
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[0,45,0,90,0,-45,0,45,0,-45]S

Resin content: 34.22 % w t **Comp. density:** 1.58 [g/cc]
Fiber volume: 58.37 % vol
Ply count 20

Test method: ASTM D6742M-02

Normalized by: 0.0072 in CPT

		RTD (A)		ETW (D)			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFI9XXXXA		HFI9XXXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	98.57	98.16	72.79	72.20		
	Minimum	89.45	87.81	69.47	68.99		
	Maximum	106.54	104.25	78.09	77.22		
FHC3	**C.V.(%)**	4.61	4.25	3.03	3.14		
Strength (ksi)							
	No. Specimens	18		19			
	No. Prepreg Lots	3		3			

2.3.28 "25/50/25" Single Shear Bearing 1 Properties (SSB1)

Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Laminate Bearing 1** **Gr/ Ep** **HEXCEL 8552 - IM7 UNI PREPREG** **[45,0,-45,90]2S**	
Resin content:	32.95 % w t	**Comp. density:**	1.58 [g/cc]				
Fiber volume:	59.62 % vol						
Ply count:	16						
Test method:	ASTM D5961M-05^{e1}						
Normalized by:	0.0072 in CPT						
			RTD (A)		**ETW (D)**		
Test Temperature [°F]			70F		250F		
Moisture Conditioning			dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code			HFI1XXXXA		HFI1XXXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	
		Mean	109.89	112.98	88.14	89.88	
		Minimum	99.31	106.30	69.19	68.62	
		Maximum	119.86	118.98	101.13	99.81	
SSB1		**C.V.(%)**	5.51	3.56	10.10	9.49	
2% offset Strength							
(ksi)		**No. Specimens**	19		21		
		No. Prepreg Lots	3		3		

Ultimate Strength not obtained

2.3.29 "10/80/10" Single Shear Bearing 2 Properties (SSB2)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Laminate Bearing 2
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[45,-45,0,45,-45,90,45,-45,45,-45]S

Resin content: 32.91 % w t **Comp. density:** 1.58 [g/cc]
Fiber volume: 59.60 % vol
Ply count: 20

Test method: ASTM D5961M-05^{e1}

Normalized by: 0.0072 in CPT

		RTD (A)		ETW (D)		
Test Temperature [°F]		70F		250F		
Moisture Conditioning		dry		equilibrium		
Equilibrium at T, RH				160 F,85%		
Source code		HFI2XXXXA		HFI2XXXXD		
		Normalized	**Measured**	**Normalized**	**Measured**	
	Mean	114.02	114.20	86.22	86.87	
	Minimum	100.30	104.42	78.40	77.48	
	Maximum	121.80	122.56	94.73	97.23	
SSB2	**C.V.(%)**	4.88	3.86	6.52	6.21	
2% offset Strength						
(ksi)	**No. Specimens**	19		19		
	No. Prepreg Lots	3		3		

Physical testing not available for Batch A Cure Cycle 1
Ultimate Strength not obtained

2.3.30 "50/40/10" Single Shear Bearing 3 Properties (SSB3)

Material: HEXCEL 8552 - IM7 UNI PREPREG

Laminate Bearing 3
Gr/ Ep
HEXCEL 8552 - IM7 UNI PREPREG
[0,45,0,90,0,-45,0,45,0,-45]S

Resin content: 33.25 % w t **Comp. density:** 1.58 [g/cc]
Fiber volume: 59.35 % vol
Ply count: 20

Test method: ASTM D5961M-05^{e1}

Normalized by: 0.0072 in CPT

		RTD (A)		ETW (D)		
Test Temperature [°F]		70F		250F		
Moisture Conditioning		dry		equilibrium		
Equilibrium at T, RH				160 F,85%		
Source code		HFI3XXXXA		HFI3XXXXD		
		Normalized	**Measured**	**Normalized**	**Measured**	
	Mean	113.90	113.93	91.67	91.80	
	Minimum	104.32	104.57	79.33	81.00	
	Maximum	121.80	122.04	102.78	101.30	
SSB3	**C.V.(%)**	5.01	3.79	7.15	6.83	
2% offset Strength						
(ksi)	**No. Specimens**	19		19		
	No. Prepreg Lots	3		3		

Ultimate Strength not obtained

2.3.31 “25/50/25” Compression After Impact 1 Properties (CAI1)

Data has been removed due to testing anomaly as explained in report CAM-RP-2013-020 N/C

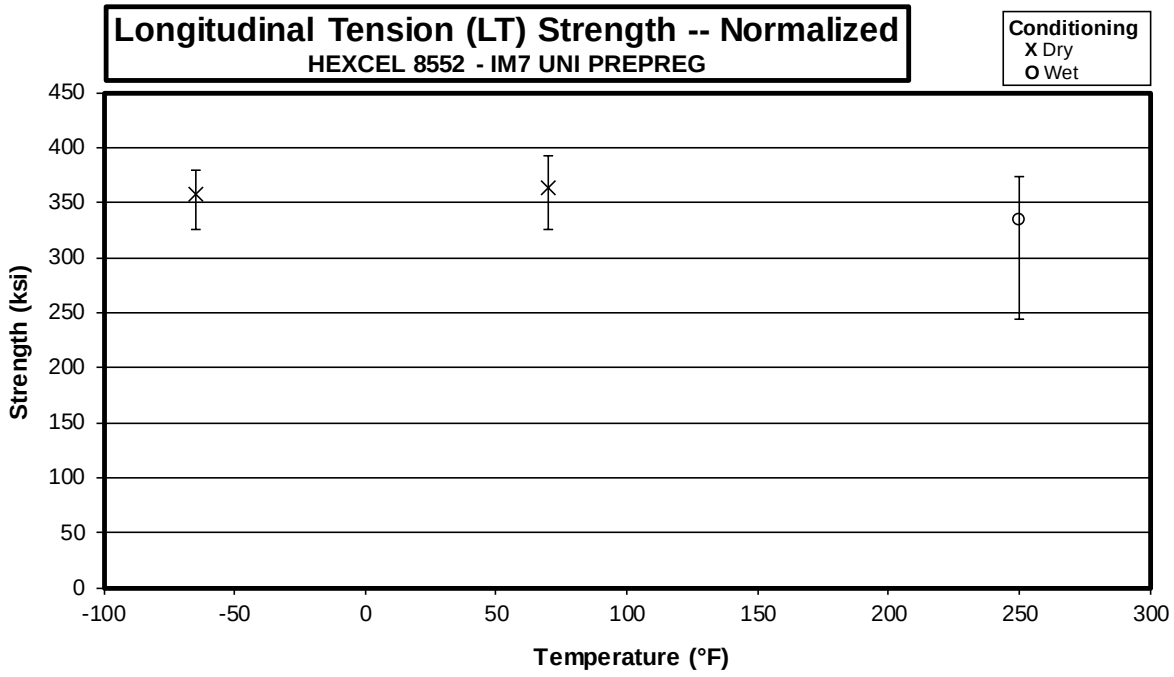
2.3.32 Interlaminar Tension Properties (ILT)

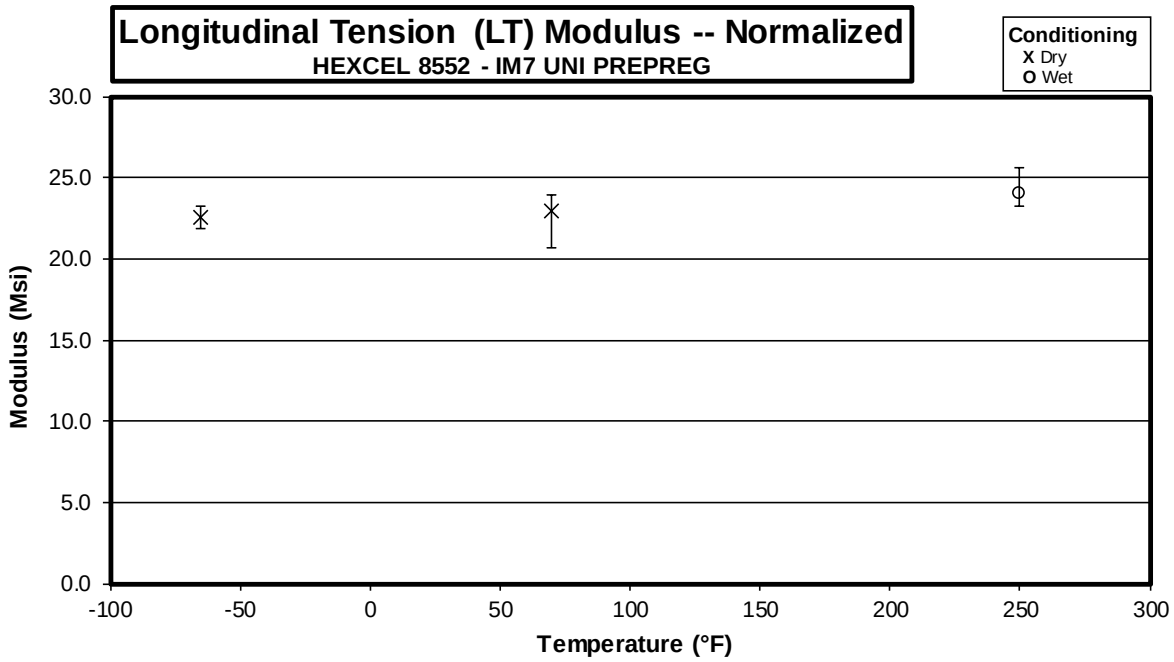
Material:	HEXCEL 8552 - IM7 UNI PREPREG					**Interlaminar Tension** Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [0]22	
Resin content:	35.38 % wt	**Comp. density:** 1.57 [g/cc]					
Fiber volume:	57.17 % vol						
Ply count:	22						
Test method:	ASTM D6415-99[E1]						
Normalized by:	NA						
		CTD (B)		**RTD (A)**		**ETW (D)**	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFIMXXXXB		HFIMXXXXA		HFIMXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
CBS Strength (lb)	**Mean**		380.63		356.85		208.68
	Minimum		247.30		309.81		202.50
	Maximum		466.69		433.11		212.63
	C.V.(%)		20.79		11.80		1.79
	No. Specimens	8		7		7	
	No. Prepreg Lots	1		1		1	
ILT Strength (ksi)	**Mean**		11.96		11.04		6.46
	Minimum		7.64		9.99		6.19
	Maximum		14.71		13.25		6.71
	C.V.(%)		20.68		10.41		3.08
	No. Specimens	8		7		7	
	No. Prepreg Lots	1		1		1	

3. Individual Test Charts

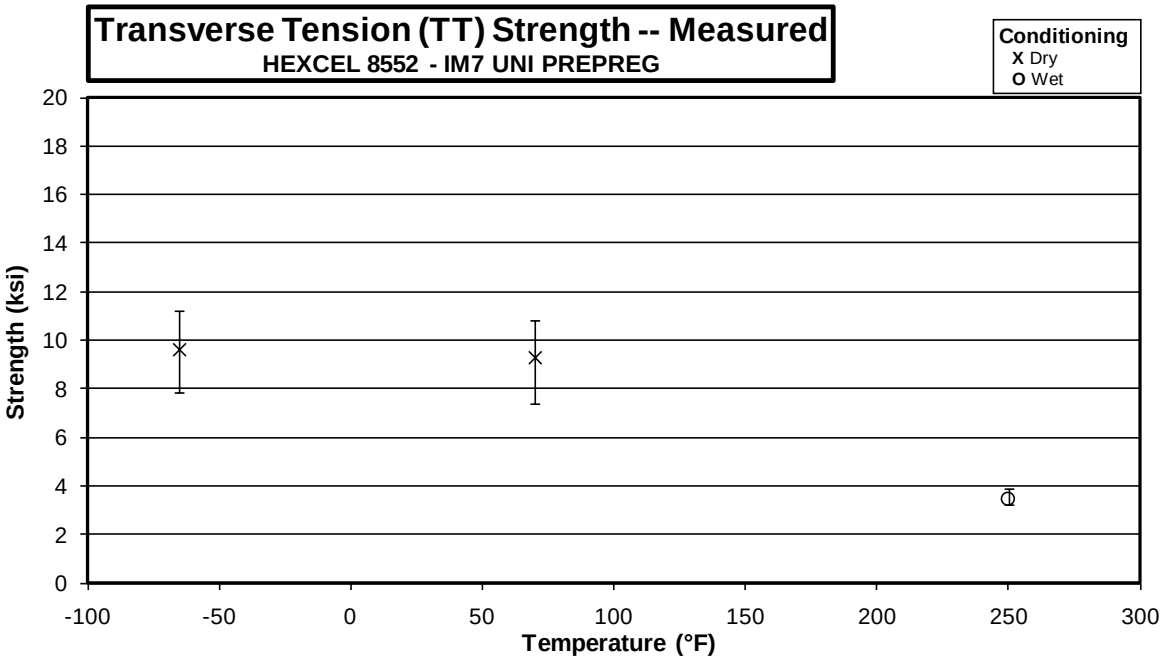
These charts combine all three batches of data and plot the minimum and maximum modulus and strength range based on the test temperature.

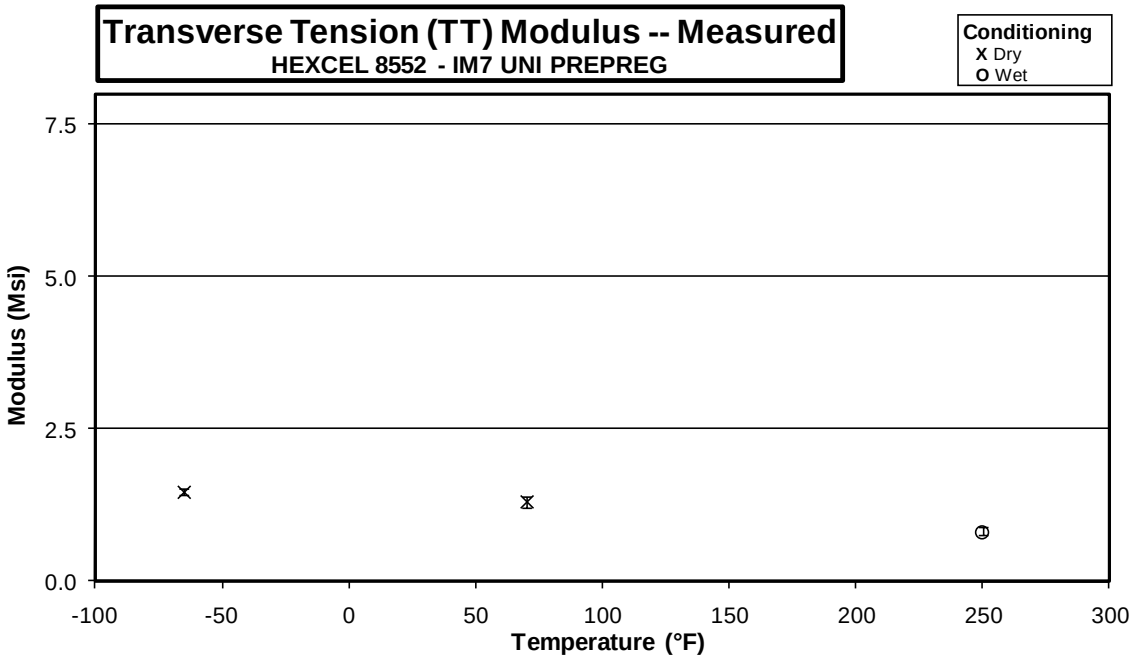
3.1 Longitudinal Tension Properties (LT)



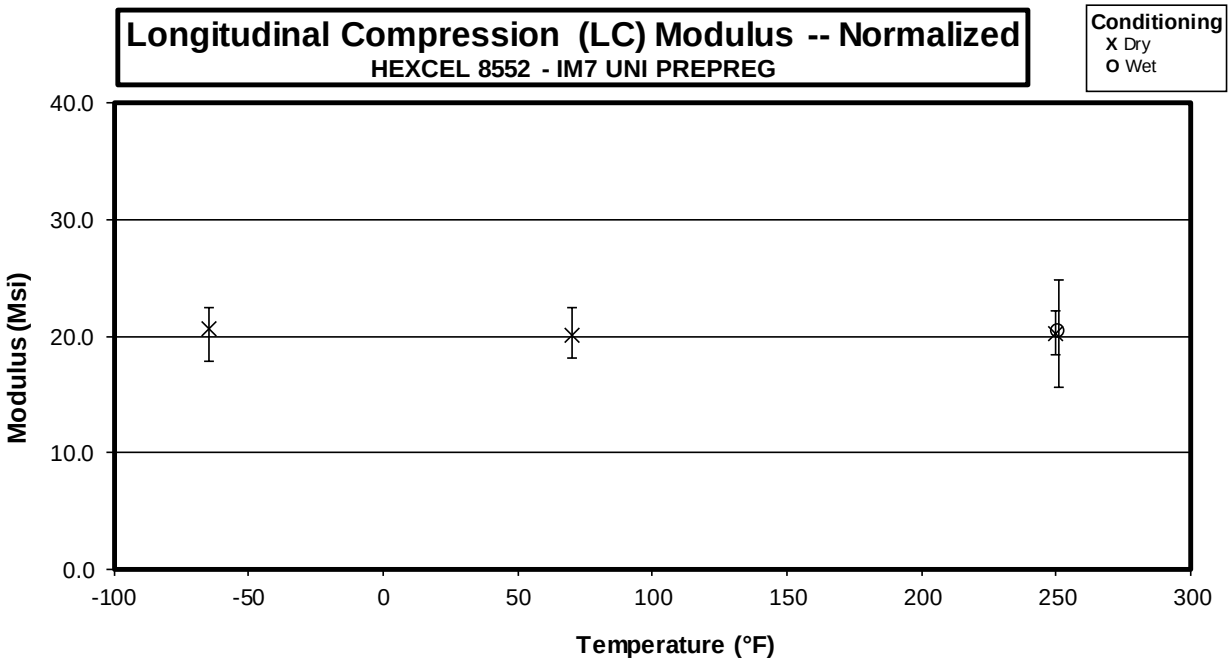


3.2 Transverse Tension Properties (TT)

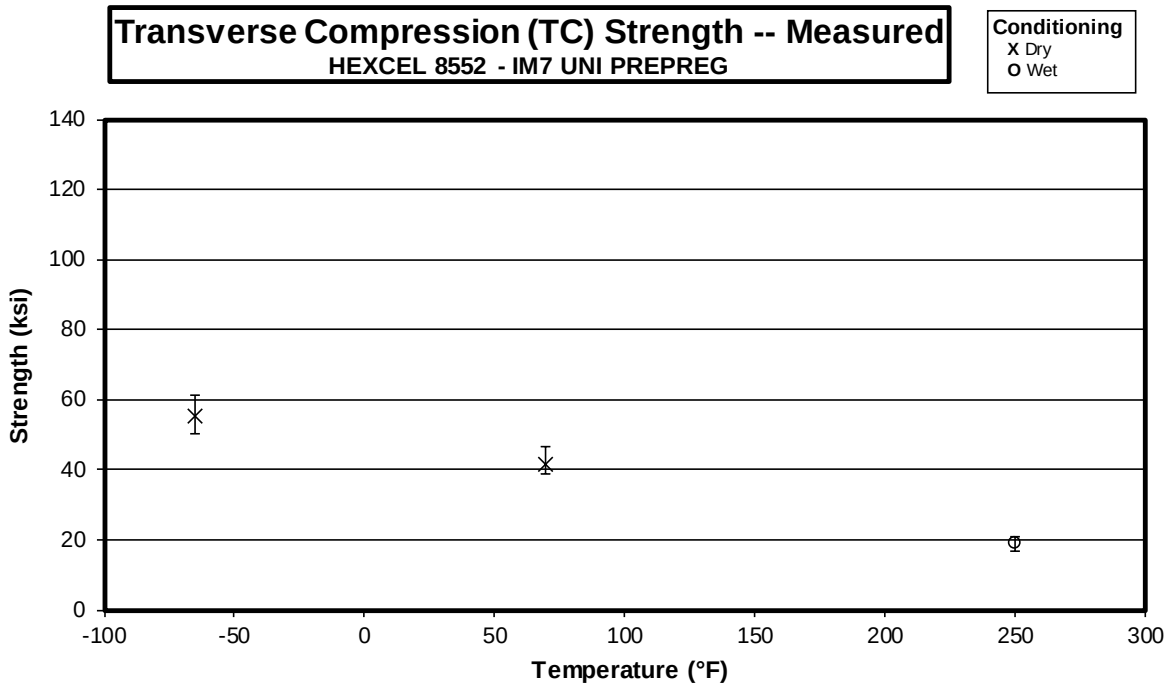


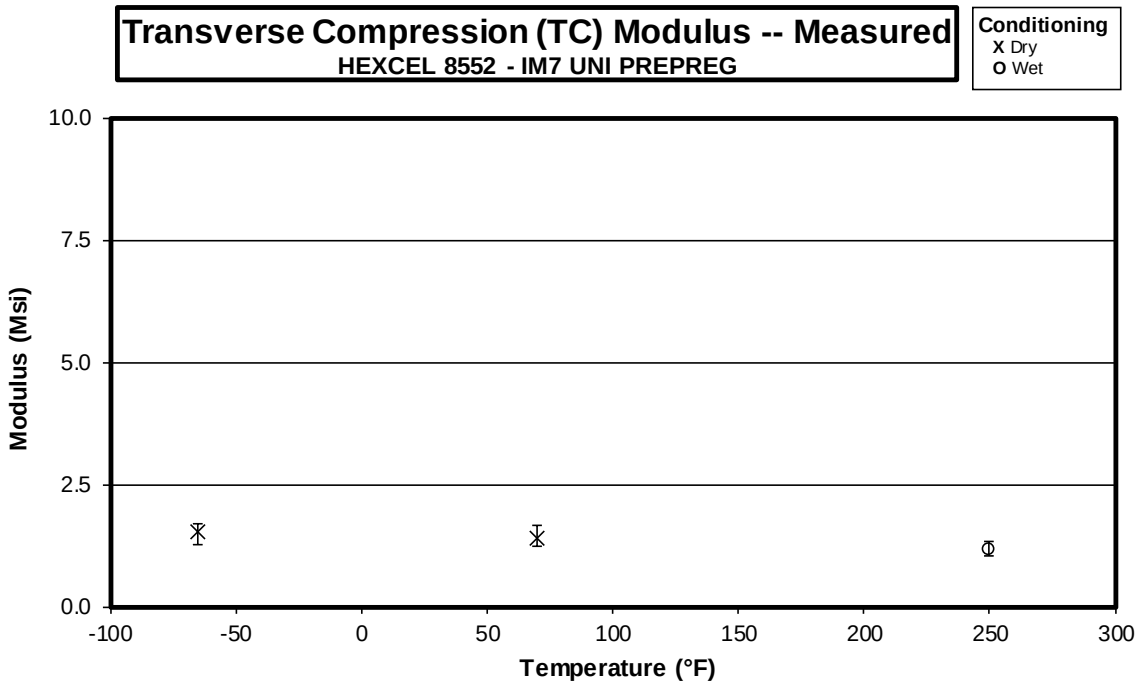


3.3 Longitudinal Compression Properties (LC)

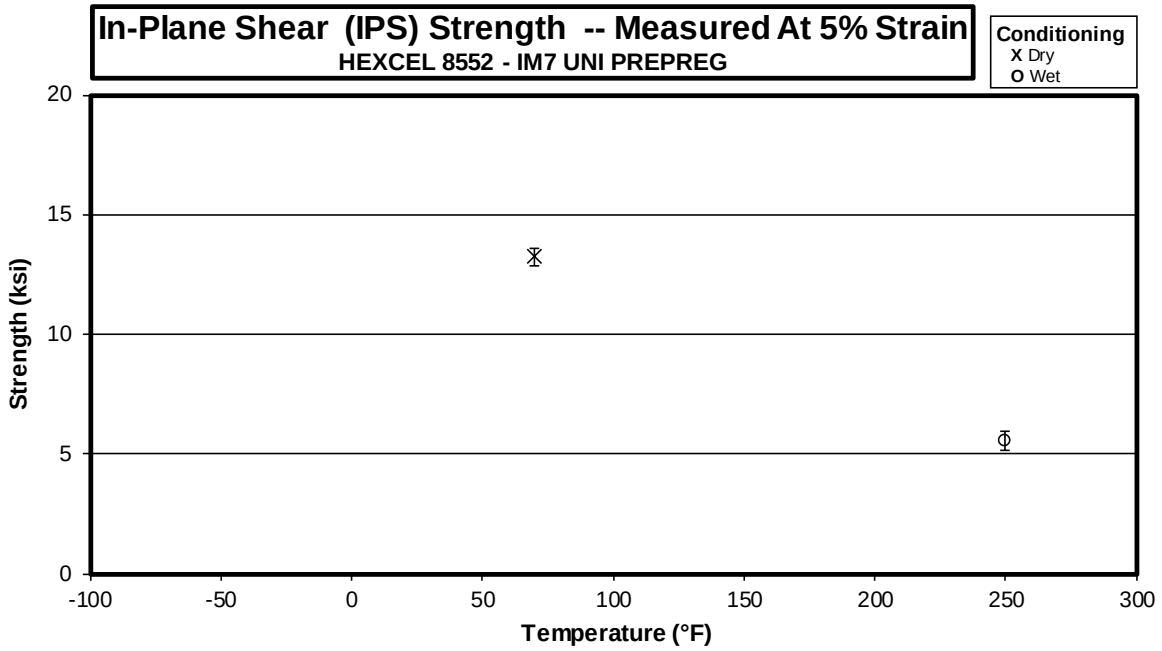


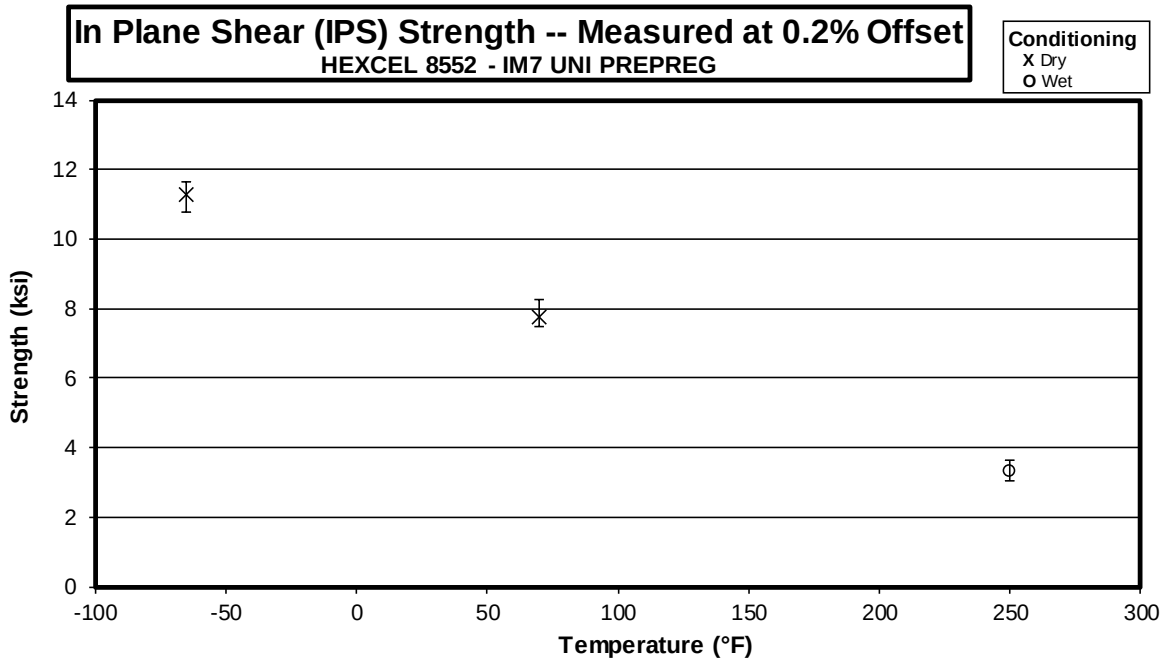
3.4 Transverse Compression Properties (TC)

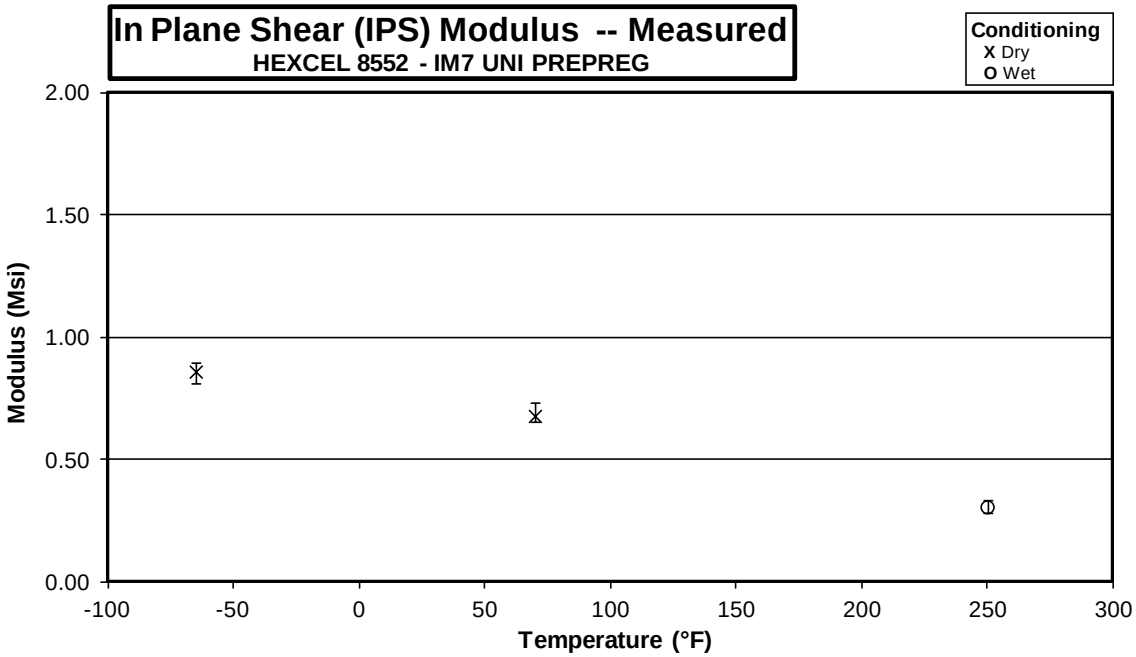




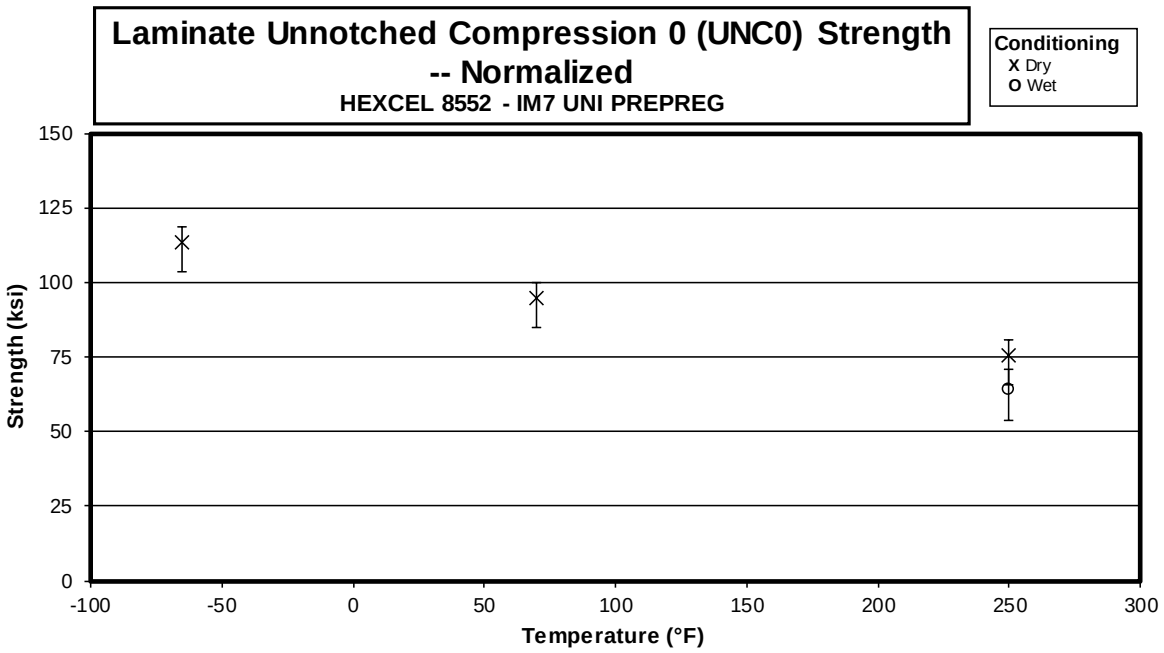
3.5 In-Plane Shear Properties (IPS)

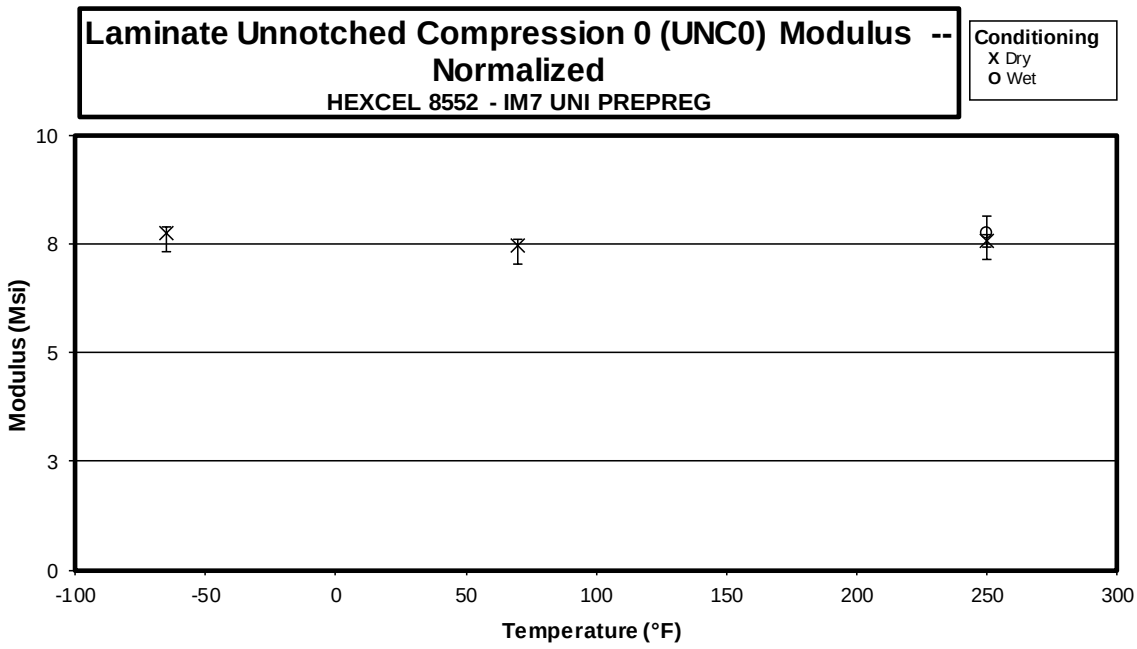




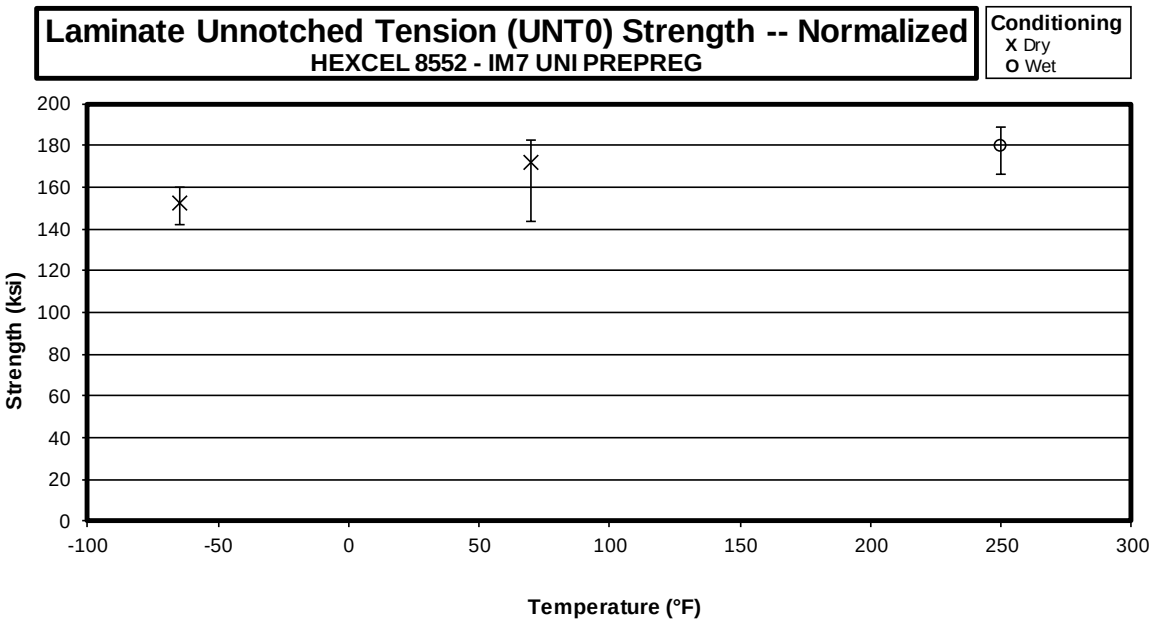

In Plane Shear (IPS) Modulus -- Measured
HEXCEL 8552 - IM7 UNI PREPREG
Conditioning
X Dry
O Wet
Modulus (Msi)
2.00
1.50
1.00
0.50
0.00
-100
-50
0
50
100
150
200
250
300
Temperature (°F)

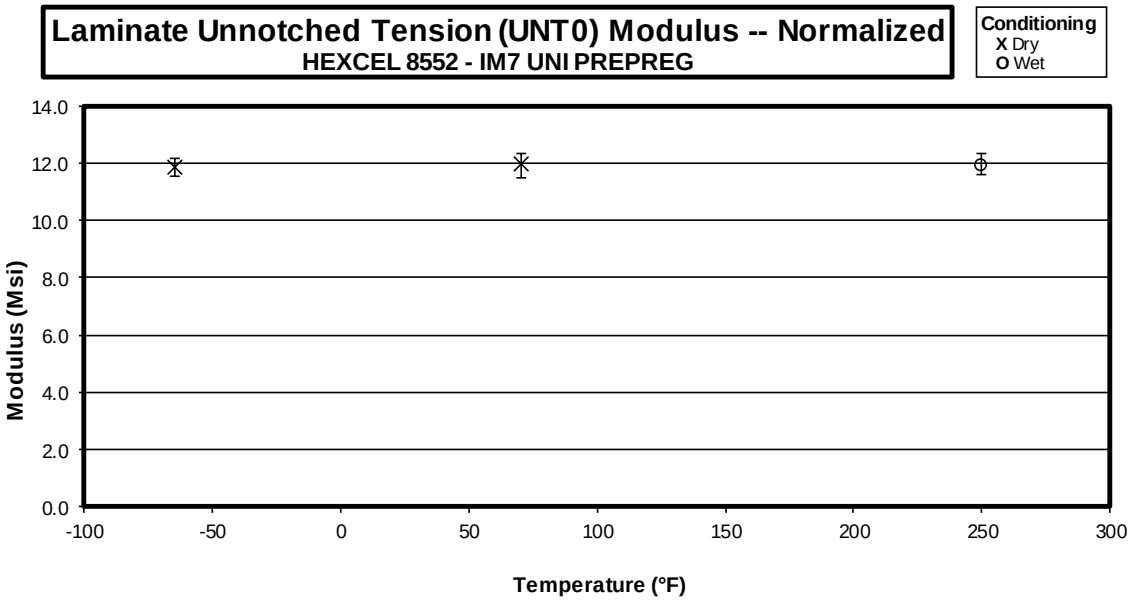
3.6 "33/0/67" Unnotched Compression 0 Properties (UNC0)



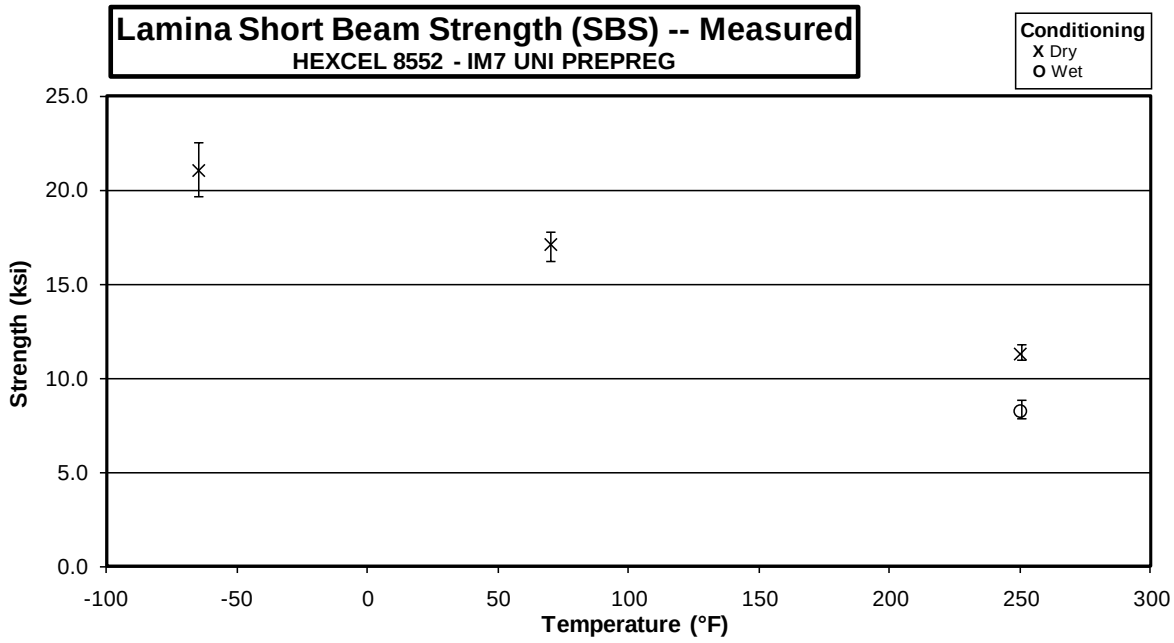


3.7 "50/0/50" Unnotched Tension 0 Properties (UNT0)

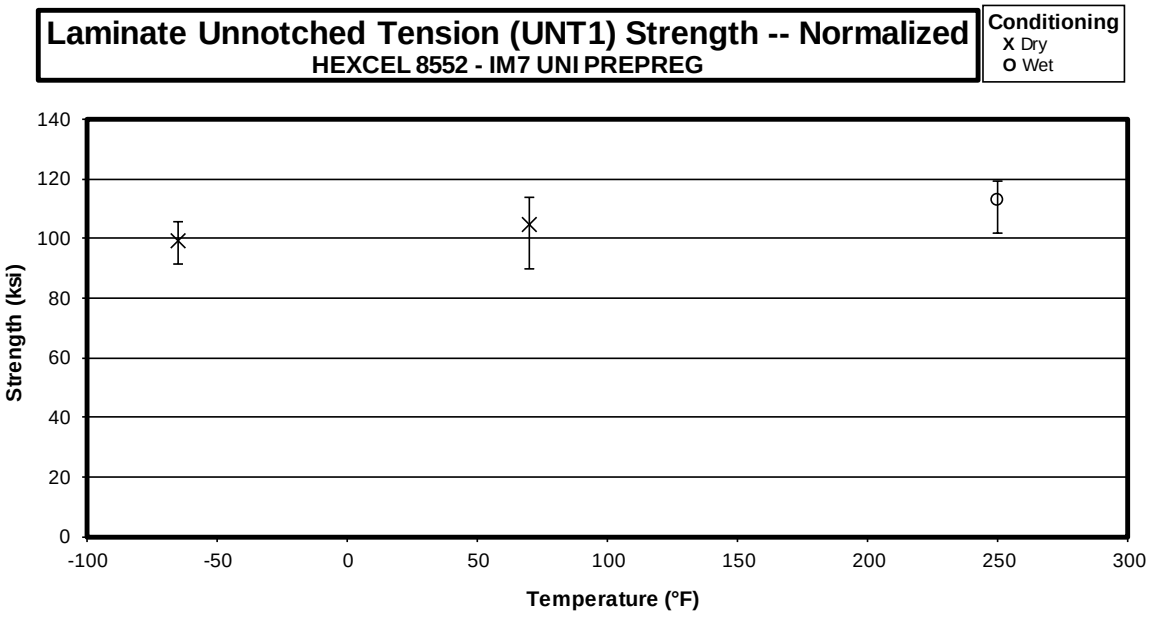


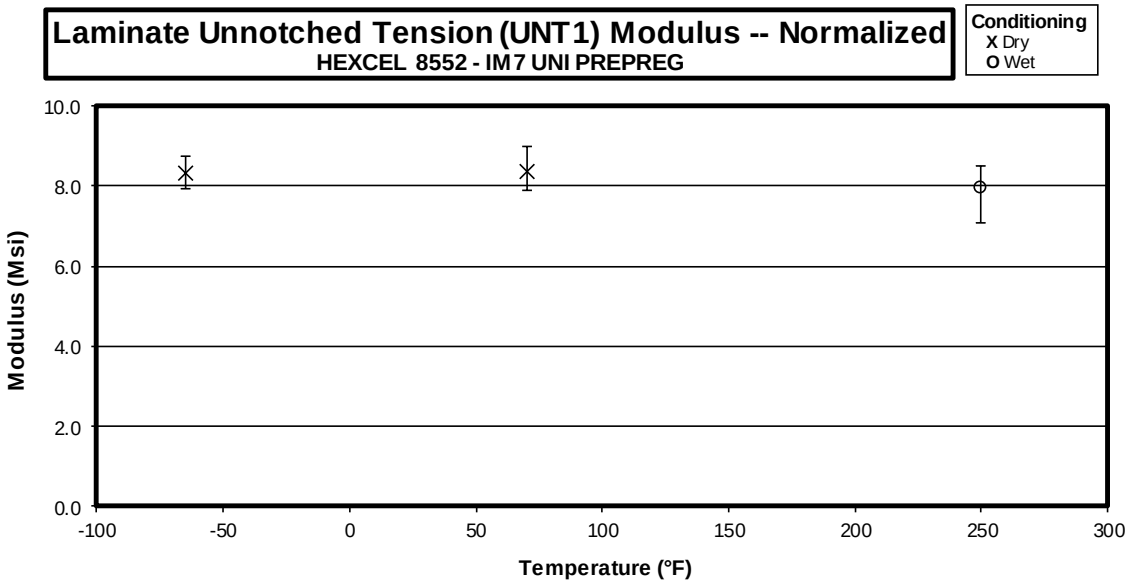


3.8 Lamina Short Beam Strength Properties (SBS)

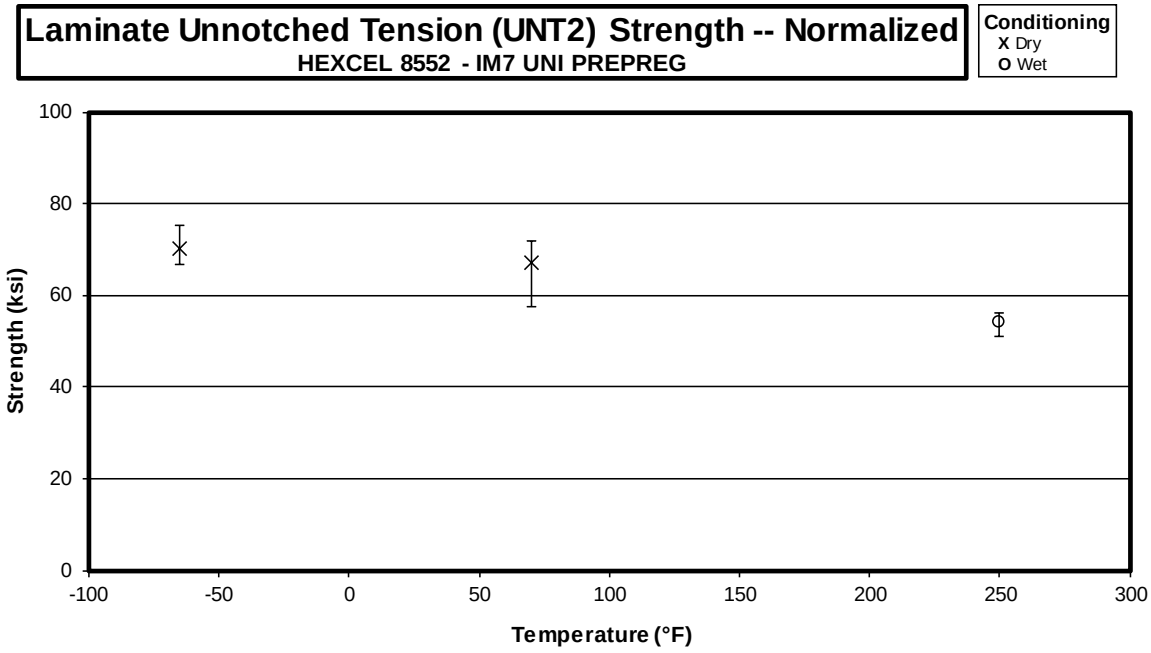


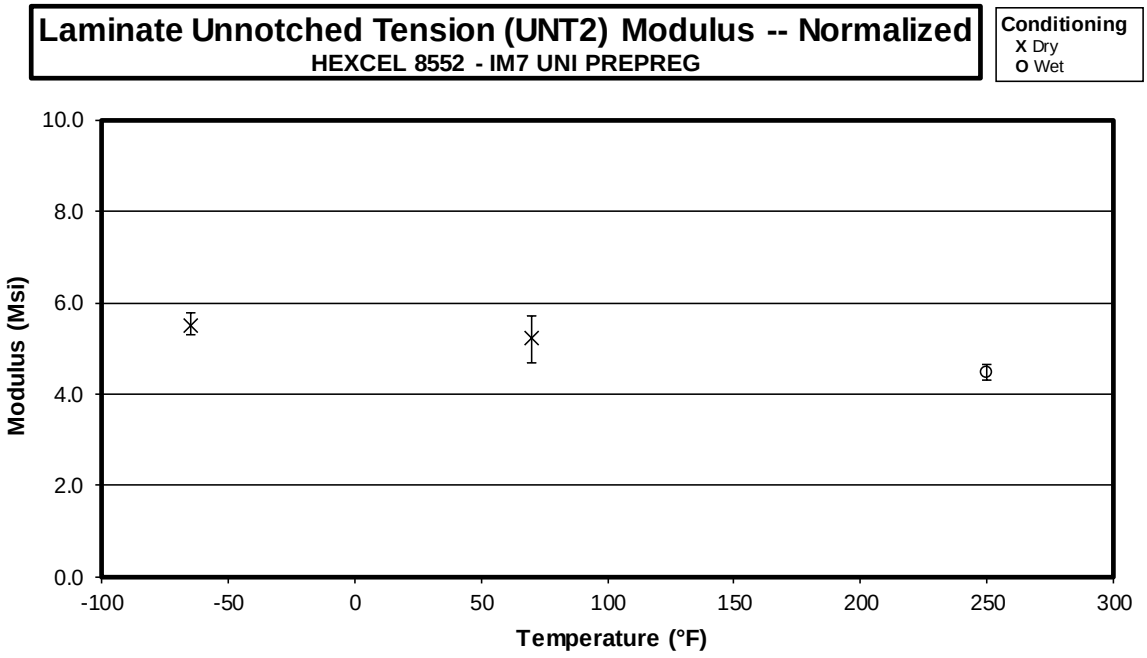
3.9 "25/50/25" Unnotched Tension 1 Properties (UNT1)



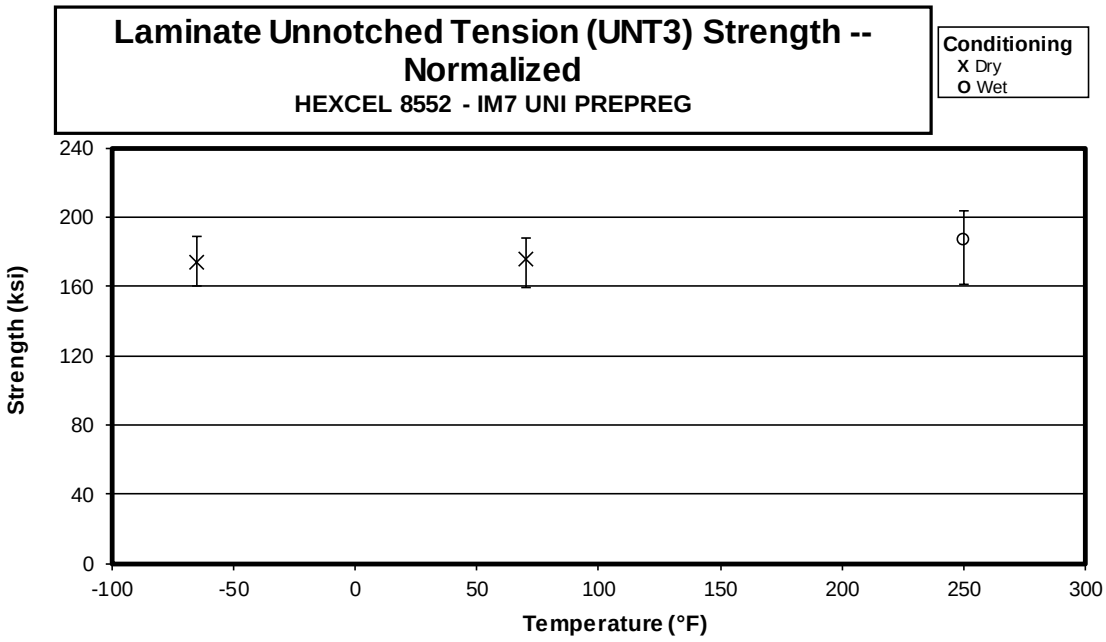


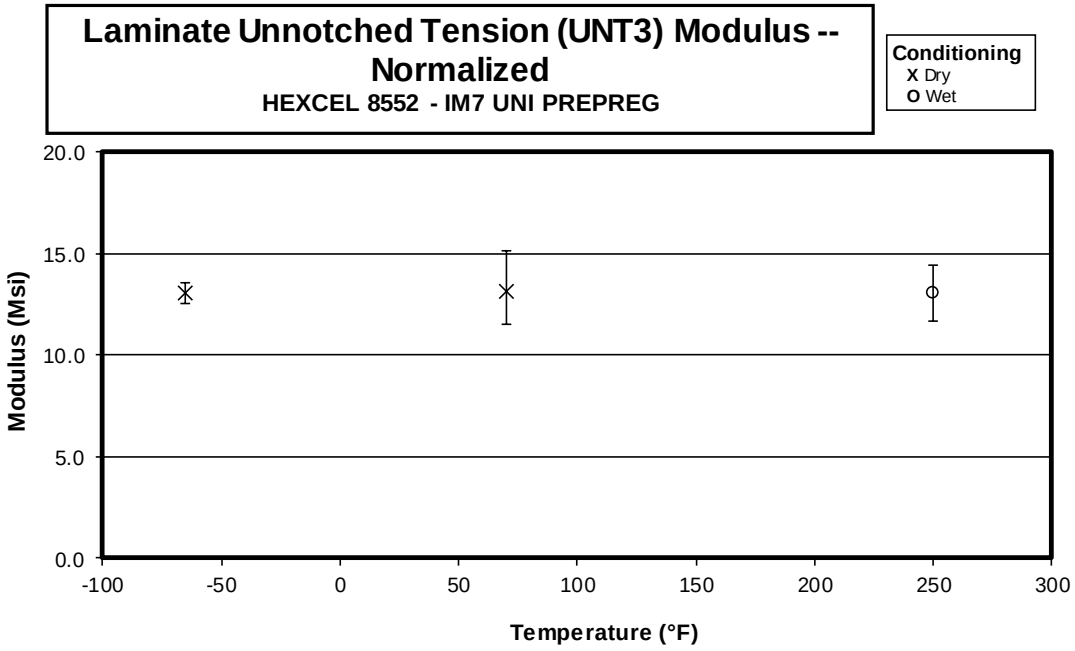
3.10 "10/80/10" Unnotched Tension 2 Properties (UNT2)



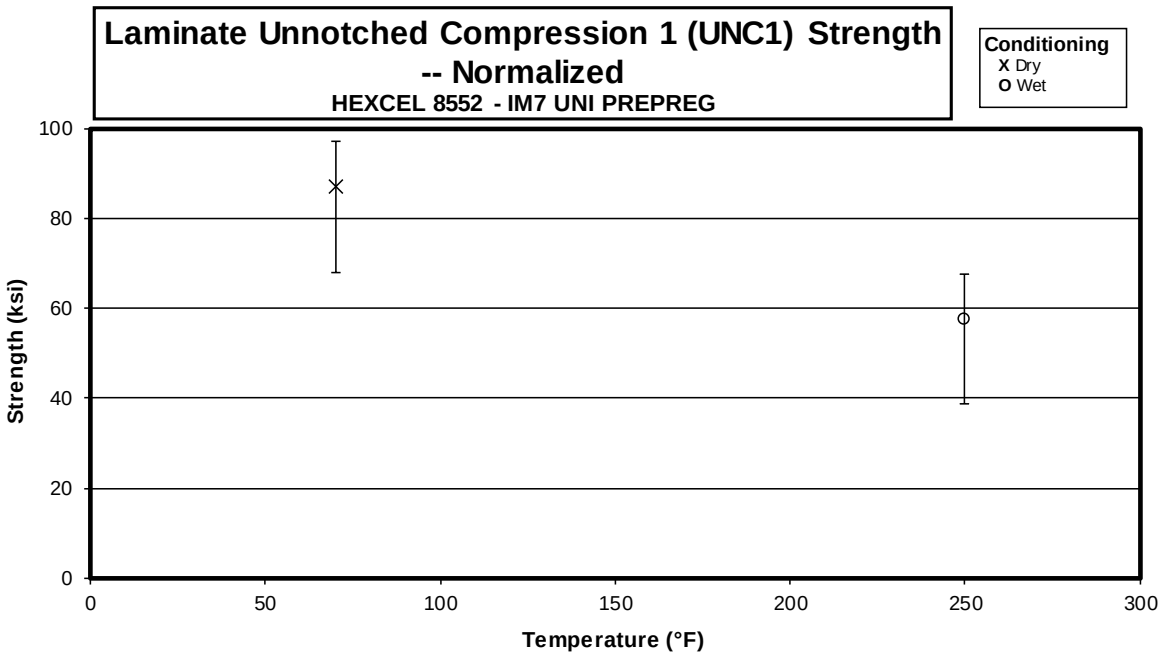


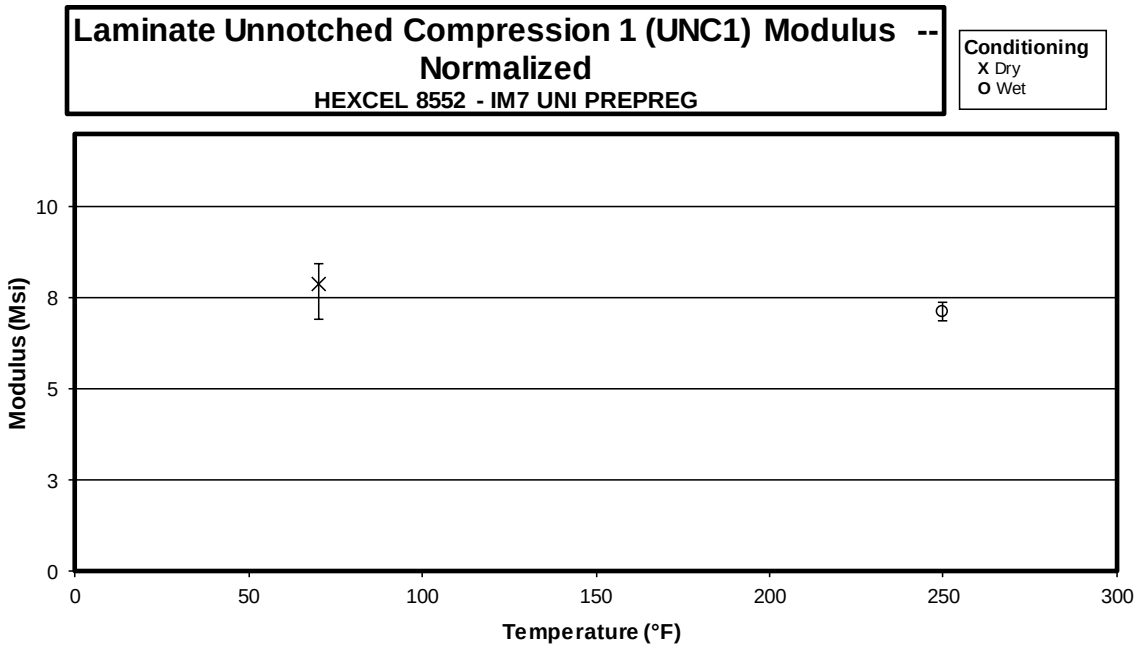
3.11 "50/40/10" Unnotched Tension 3 Properties (UNT3)



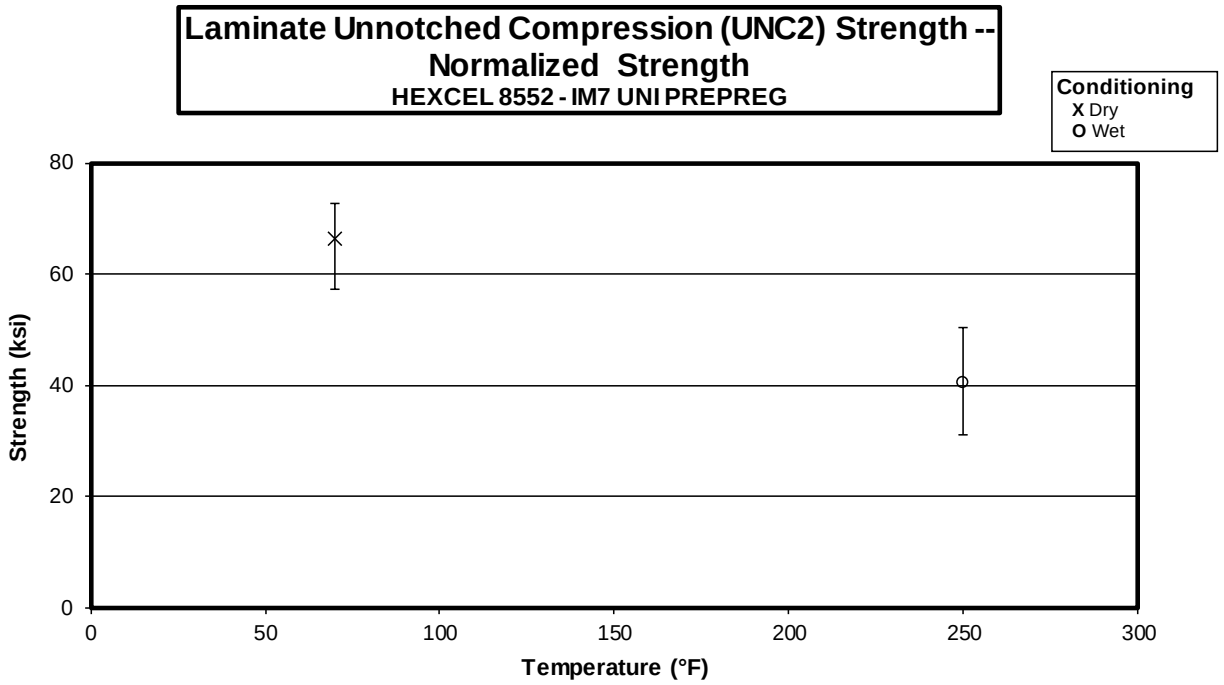


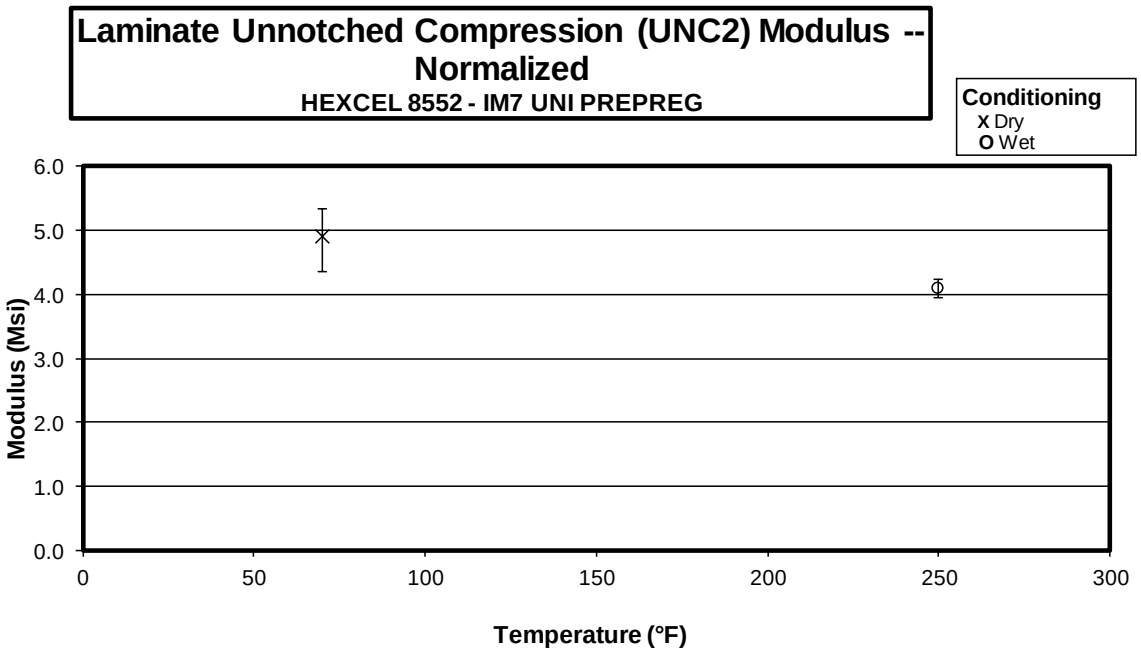
3.12 "25/50/25" Unnotched Compression 1 Properties (UNC1)



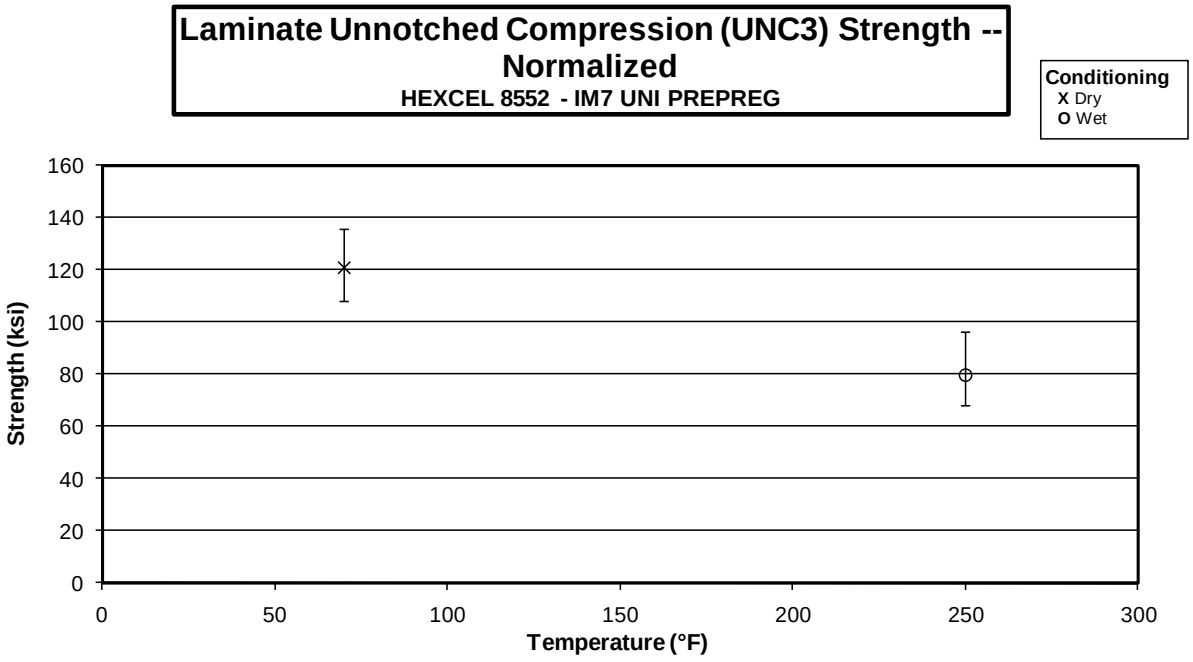


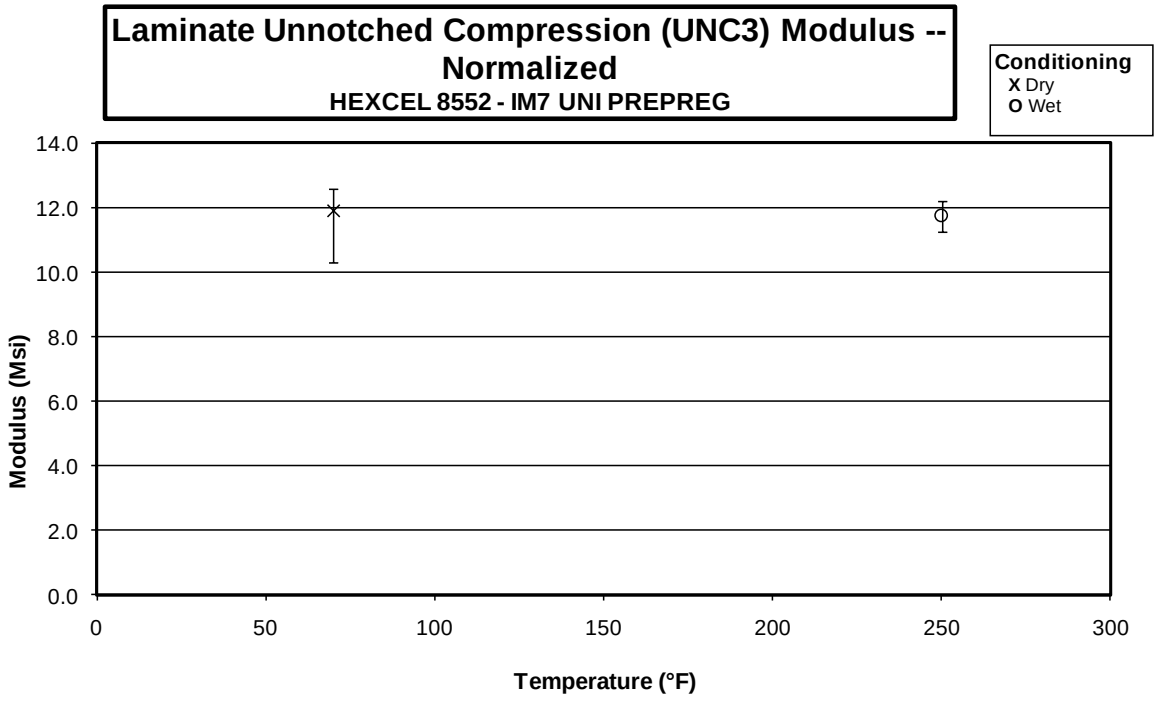
3.13 "10/80/10" Unnotched Compression 2 Properties (UNC2)



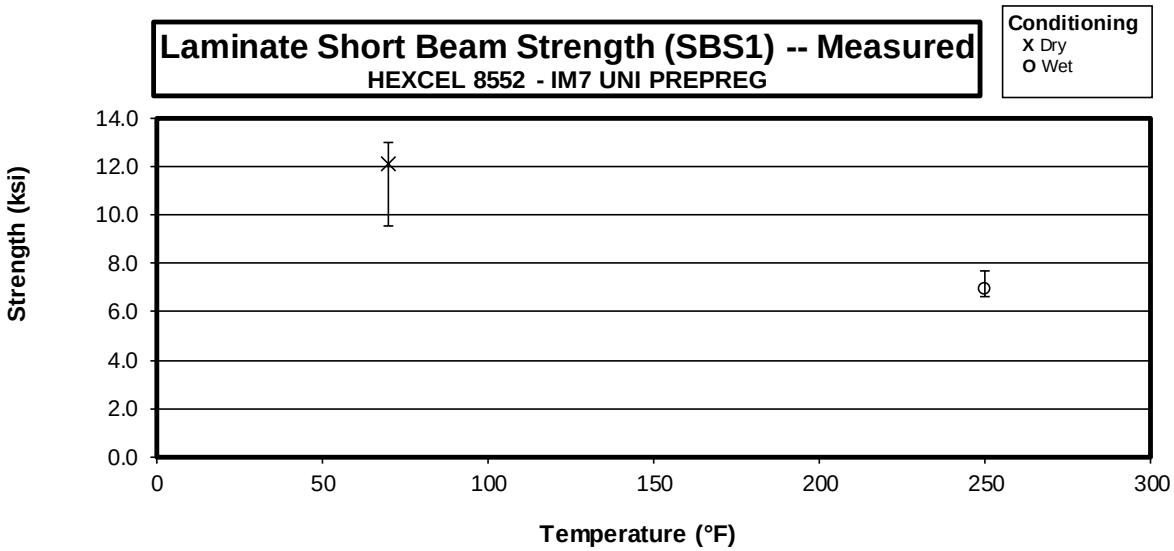


3.14 "50/40/10" Unnotched Compression 3 Properties (UNC3)

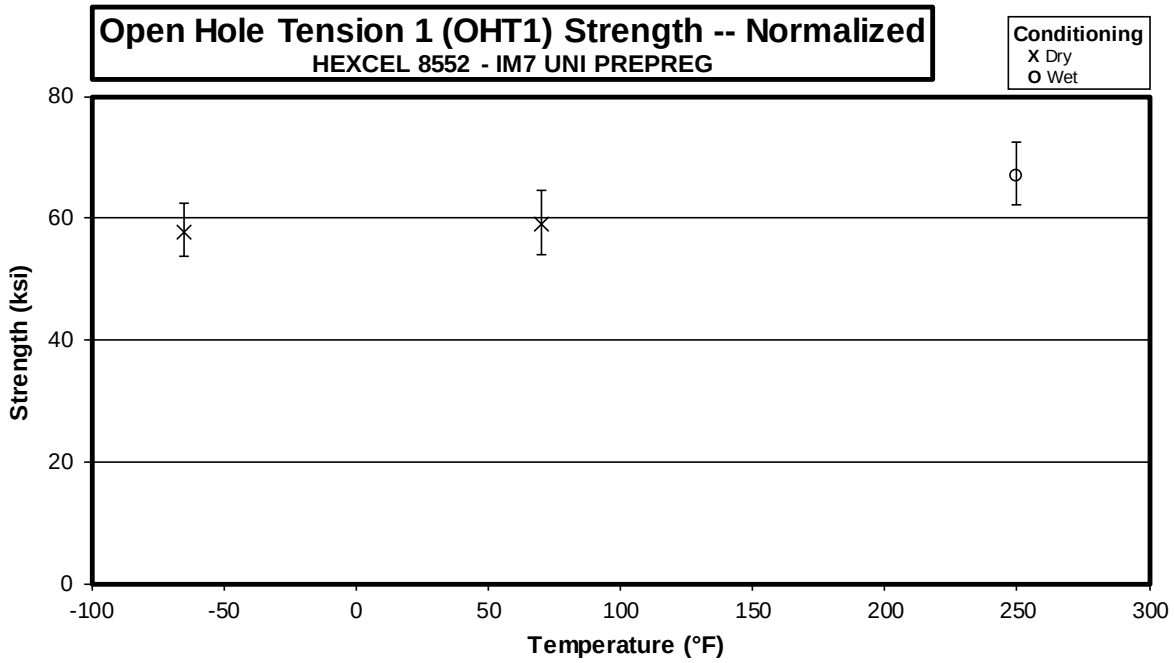




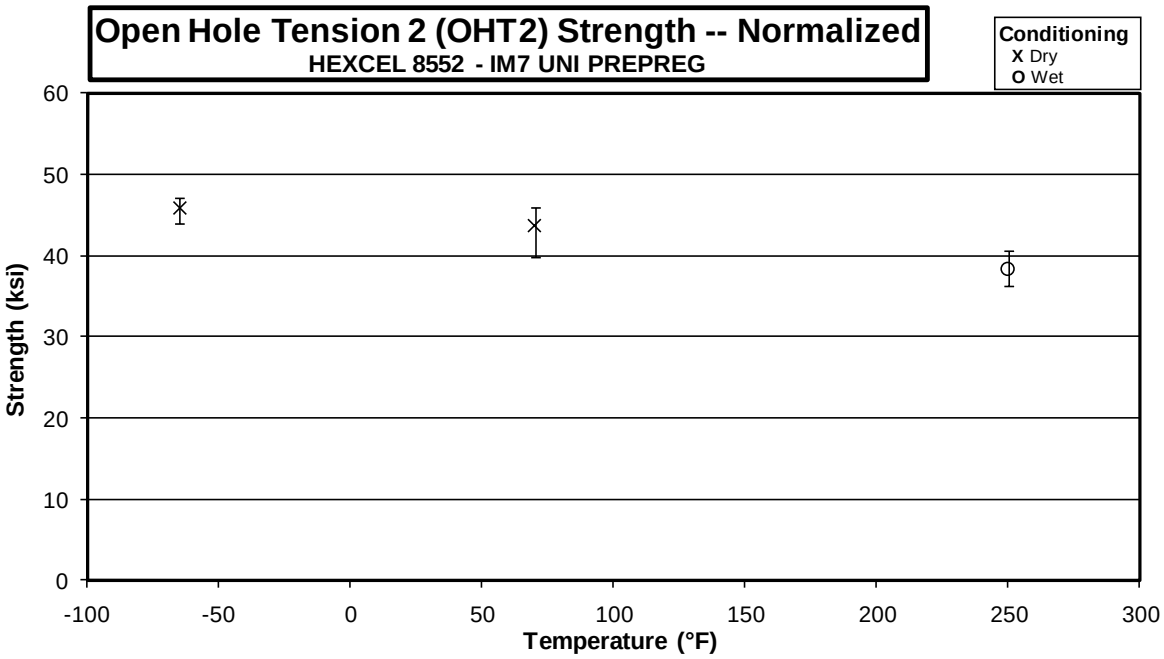
3.15 Laminate Short Beam Shear Properties (SBS1)



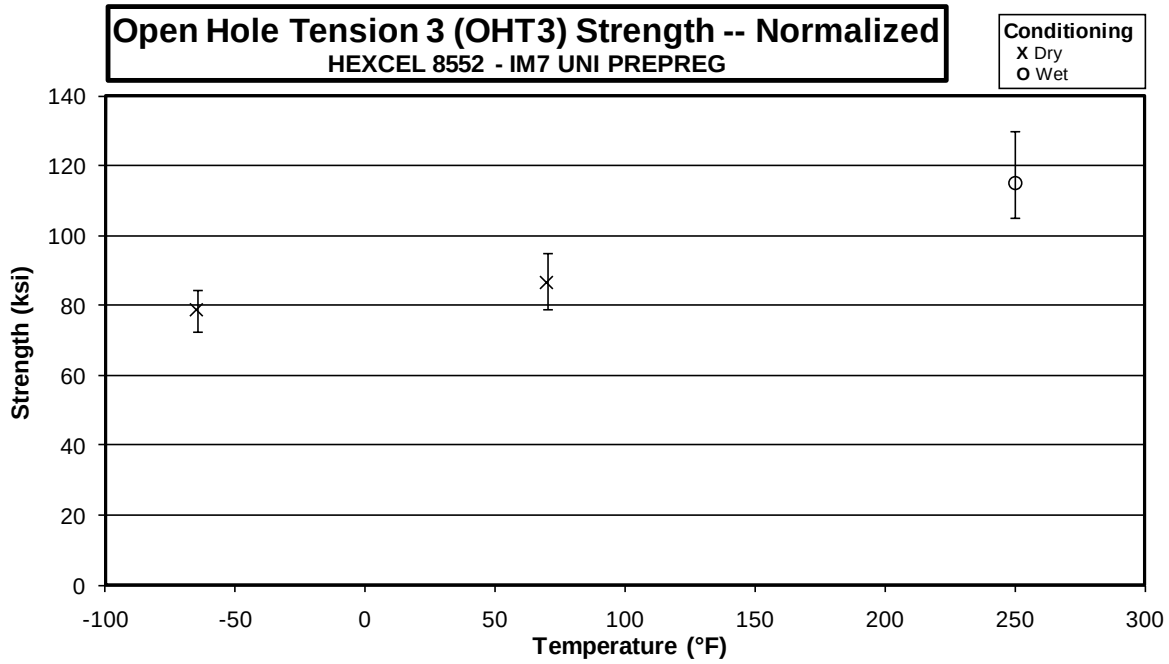
3.16 "25/50/25" Open Hole Tension 1 Properties (OHT1)



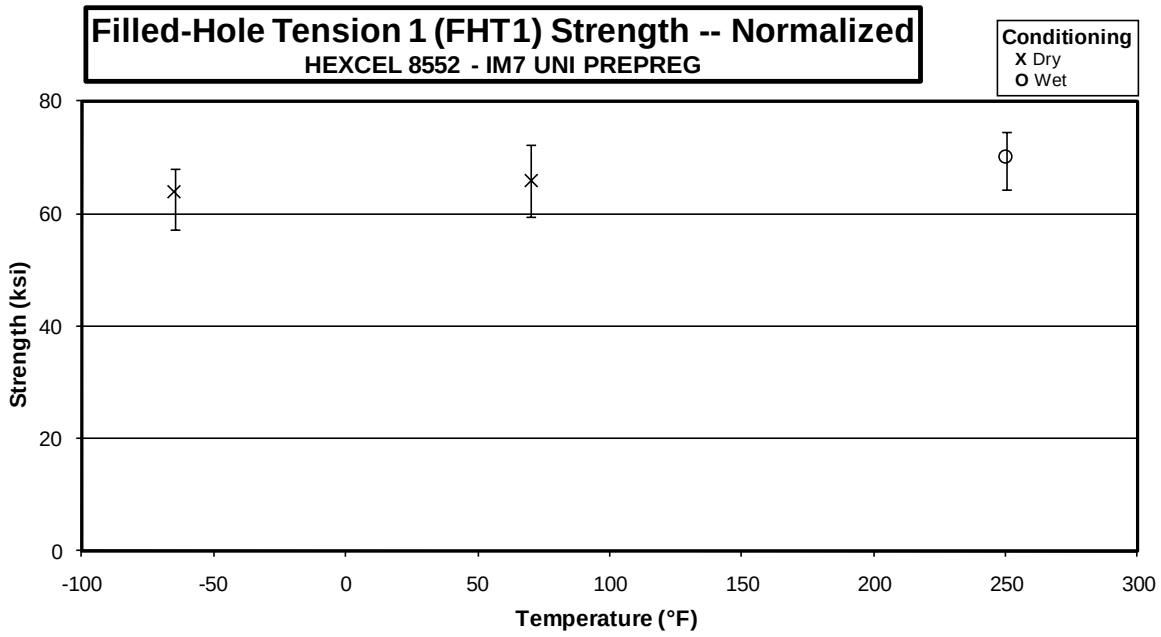
3.17 "10/80/10" Open Hole Tension 2 Properties (OHT2)



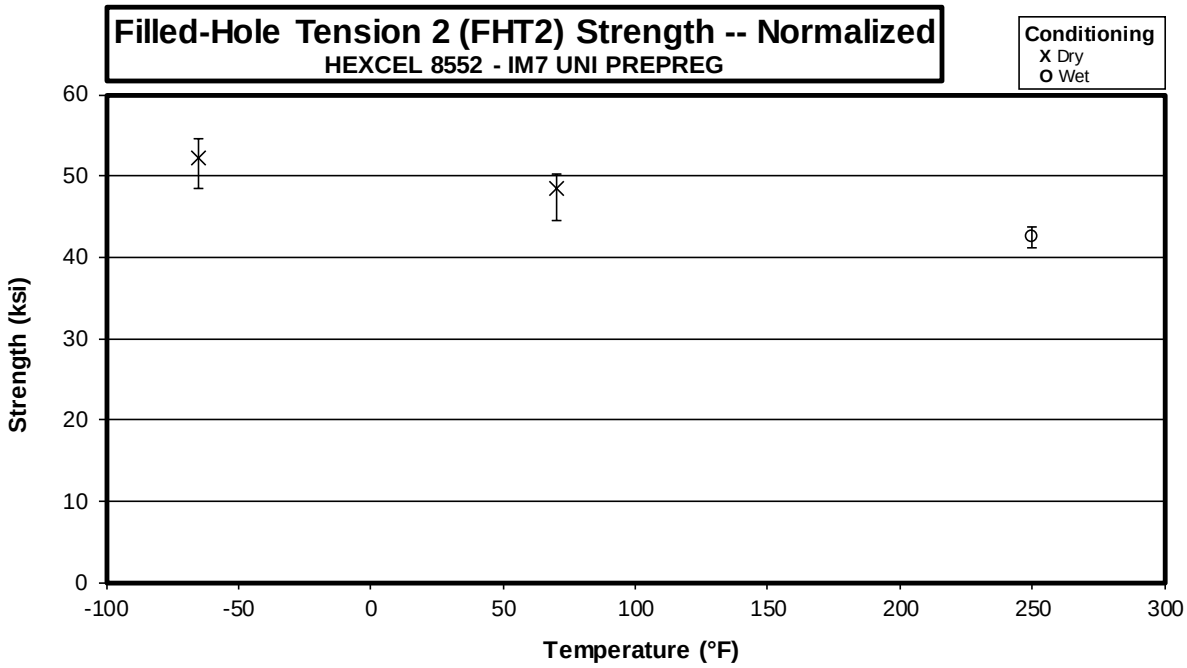
3.18 "50/40/10" Open Hole Tension 3 Properties (OHT3)



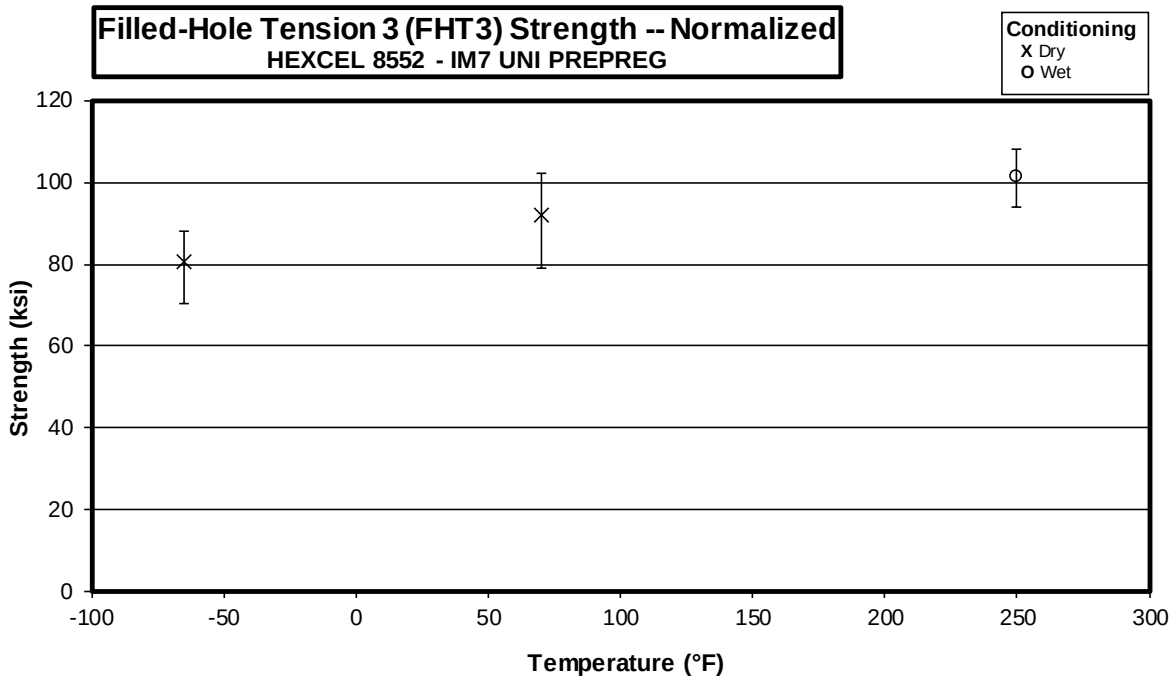
3.19 "25/50/25" Filled-Hole Tension 1 Properties (FHT1)



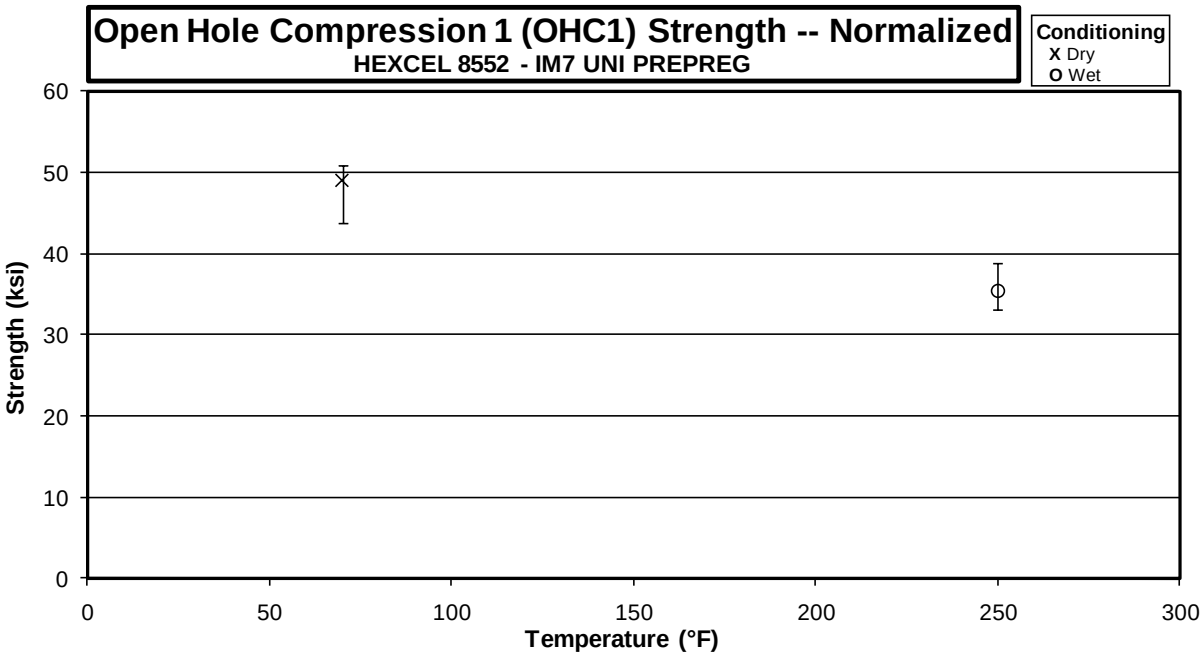
3.20 "10/80/10" Filled-Hole Tension 2 Properties (FHT2)



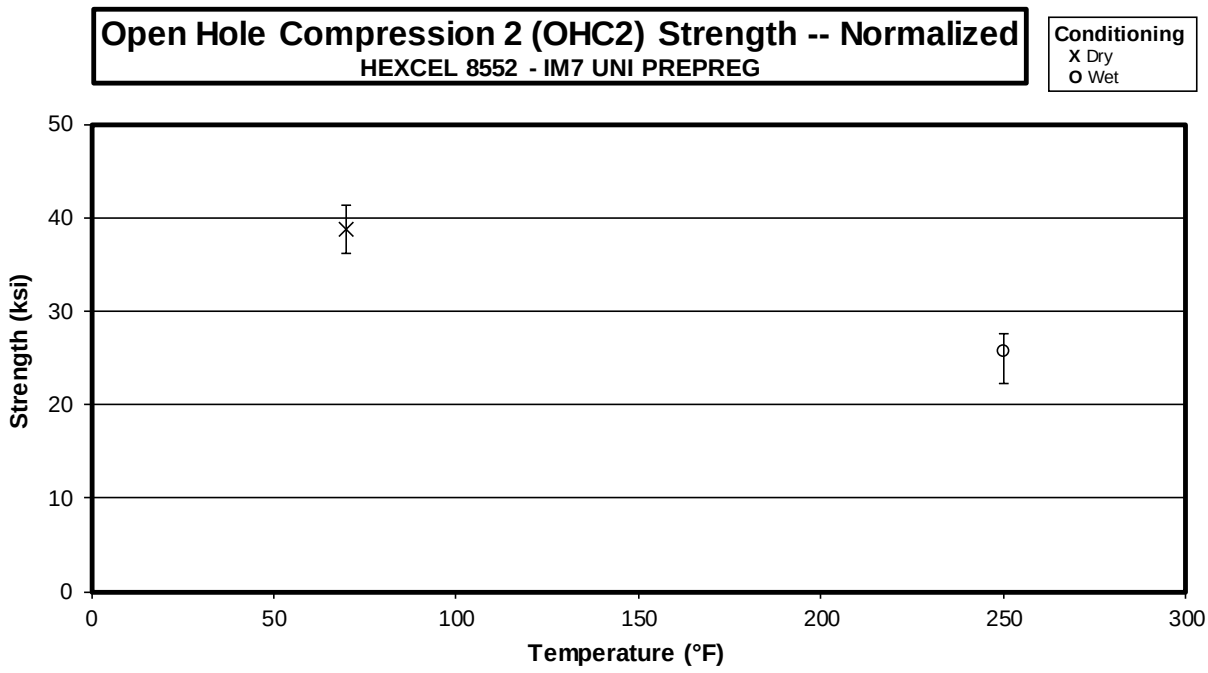
3.21 "50/40/10" Filled-Hole Tension 3 Properties (FHT3)



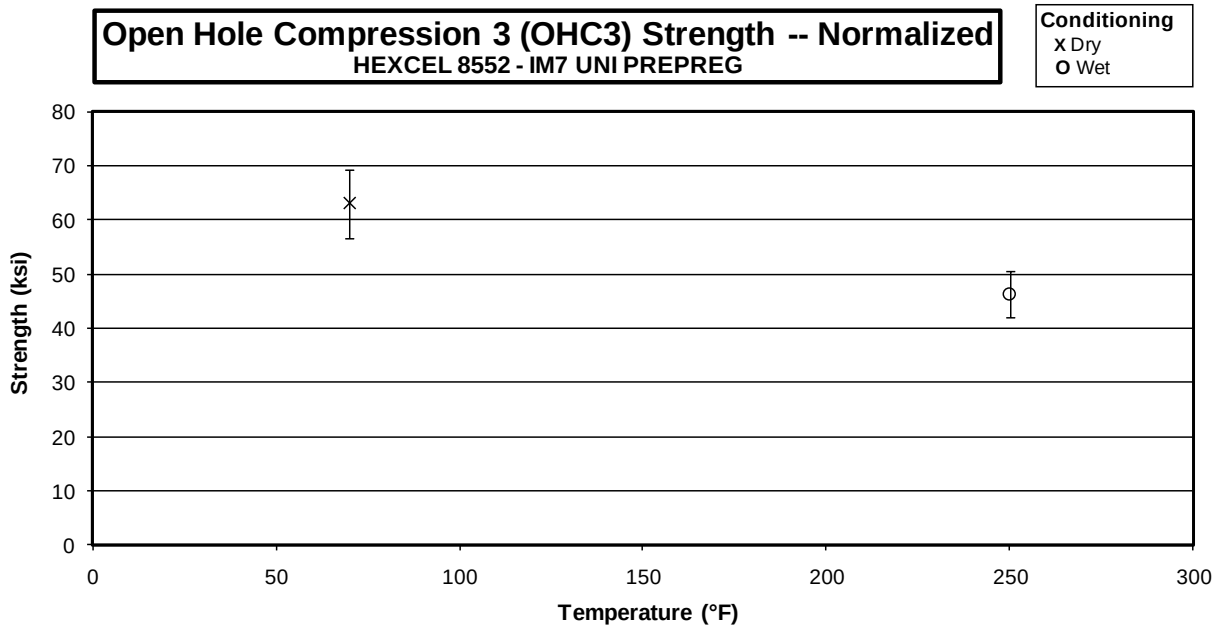
3.22 "25/50/25" Open Hole Compression 1 Properties (OHC1)



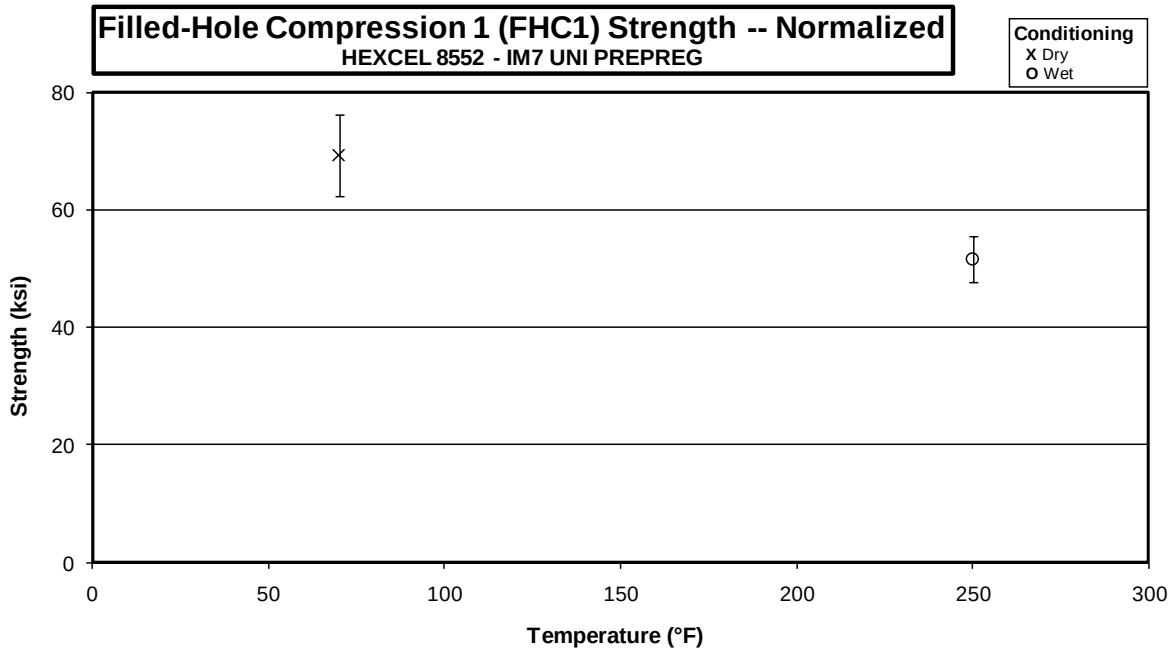
3.23 "10/80/10" Open Hole Compression 2 Properties (OHC2)



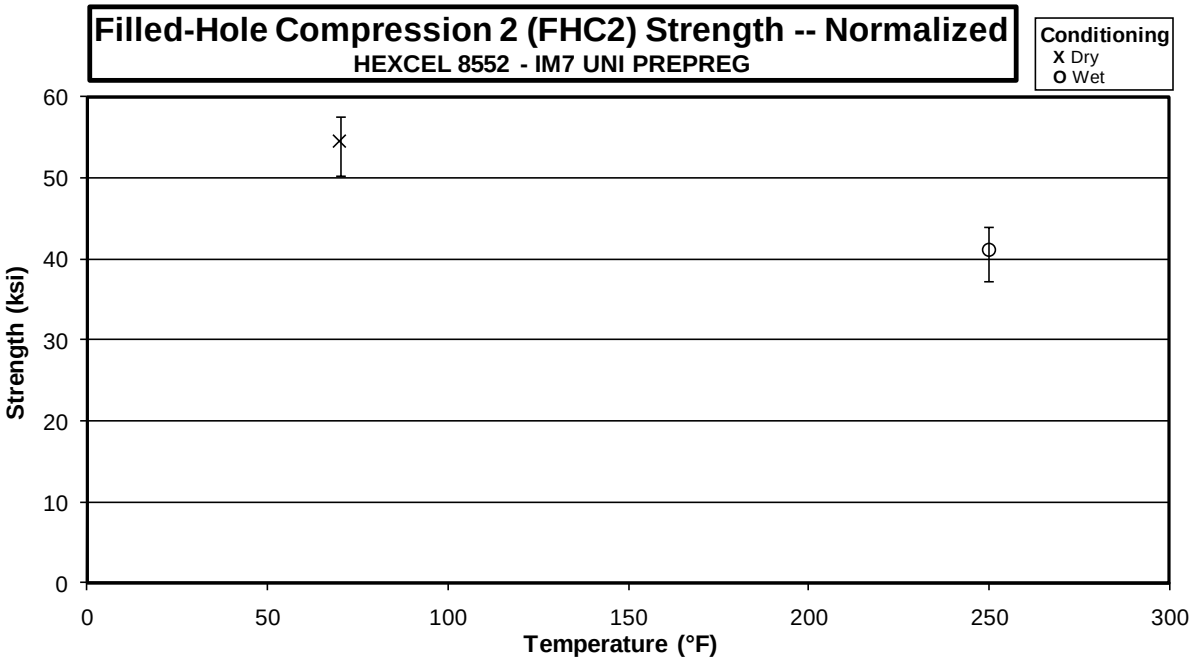
3.24 "50/40/10" Open Hole Compression 3 Properties (OHC3)



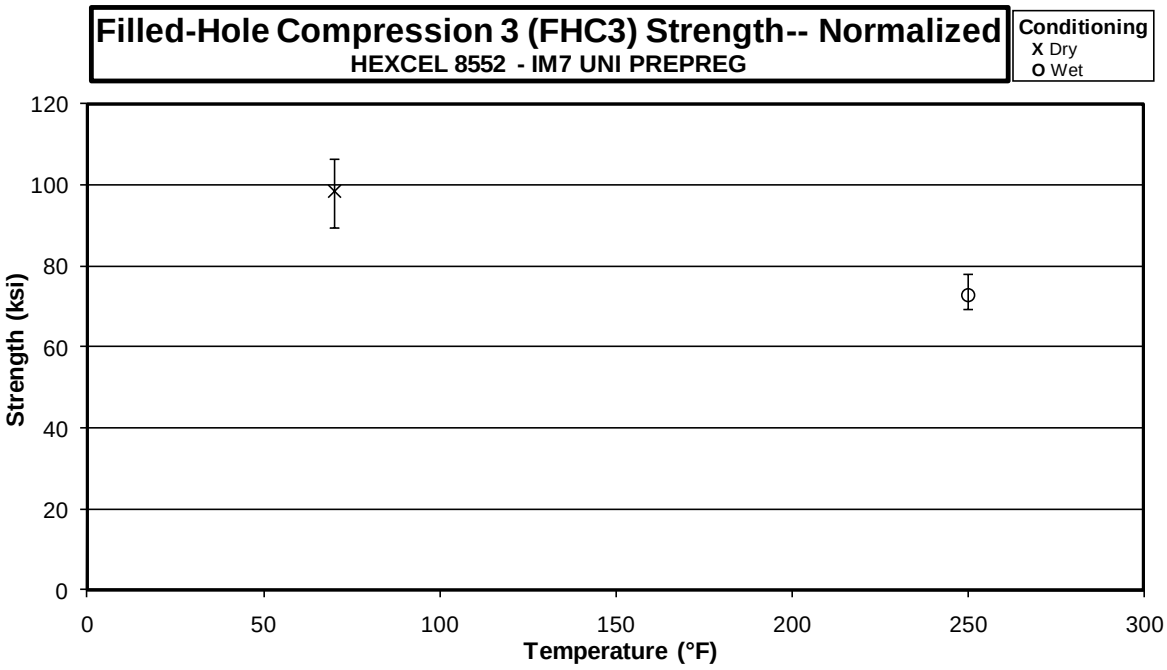
3.25 "25/50/25" Filled-Hole Compression 1 Properties (FHC1)



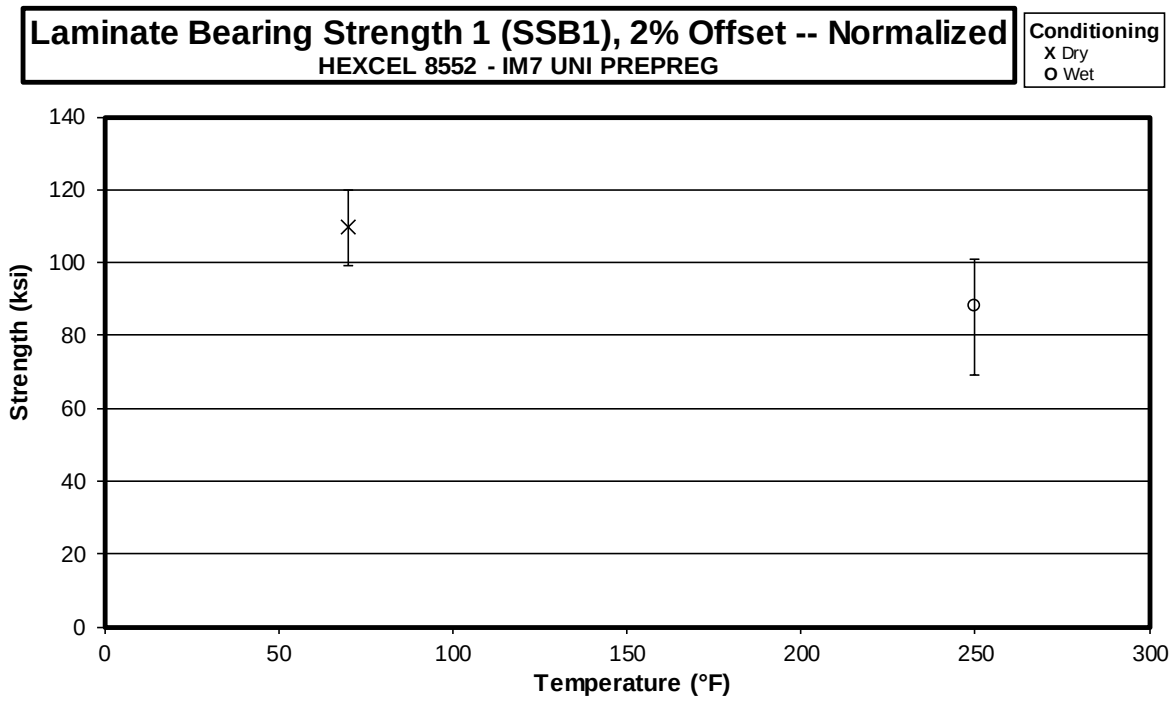
3.26 "10/80/10" Filled-Hole Compression 2 Properties (FHC2)



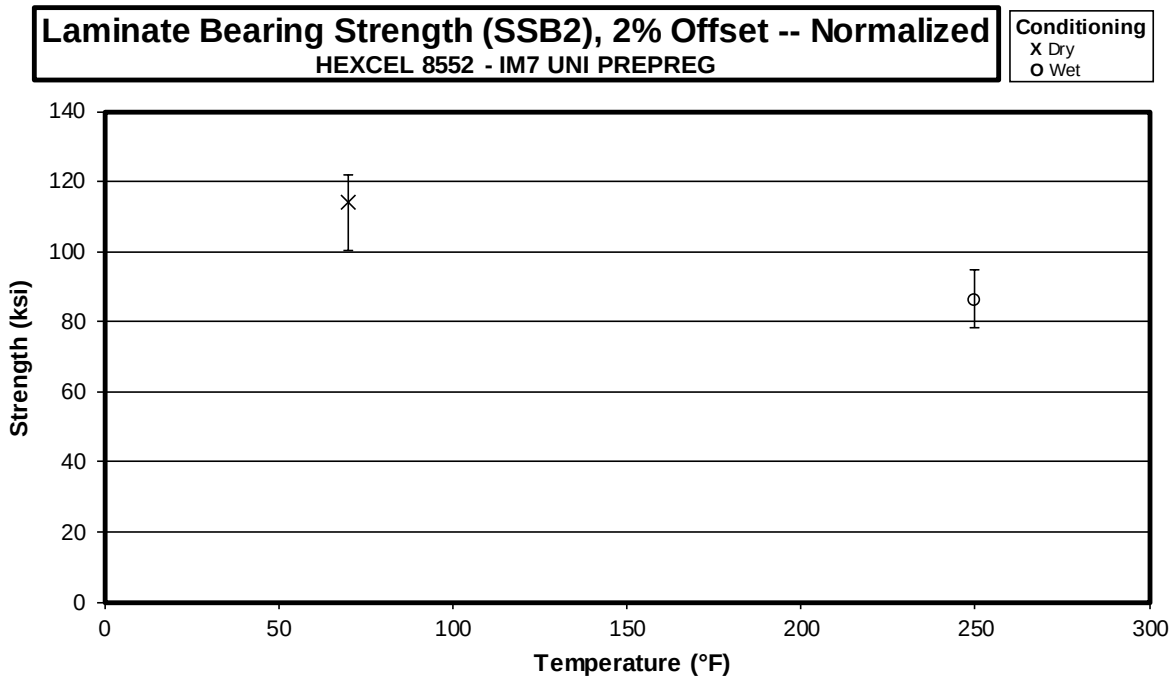
3.27 "50/40/10" Filled-Hole Compression 3 Properties (FHC3)



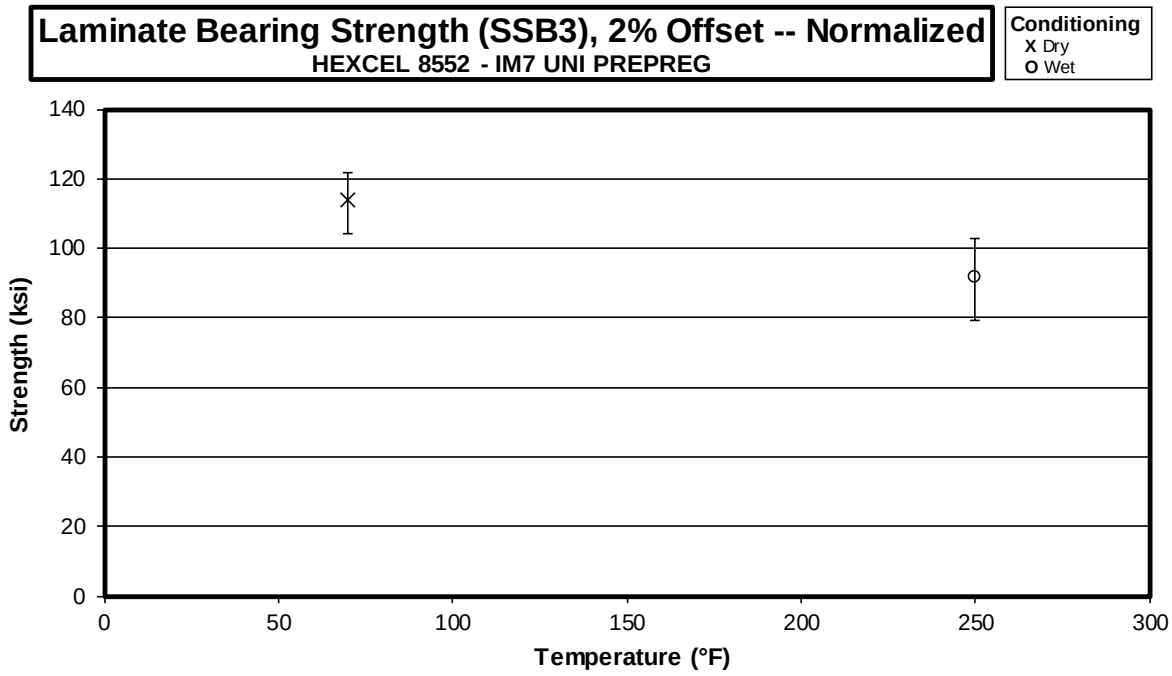
3.28 “25/50/25” Single Shear Bearing Strength1 Properties (SSB1)



3.29 "10/80/10" Single Shear Bearing Strength 2 Properties (SSB2)



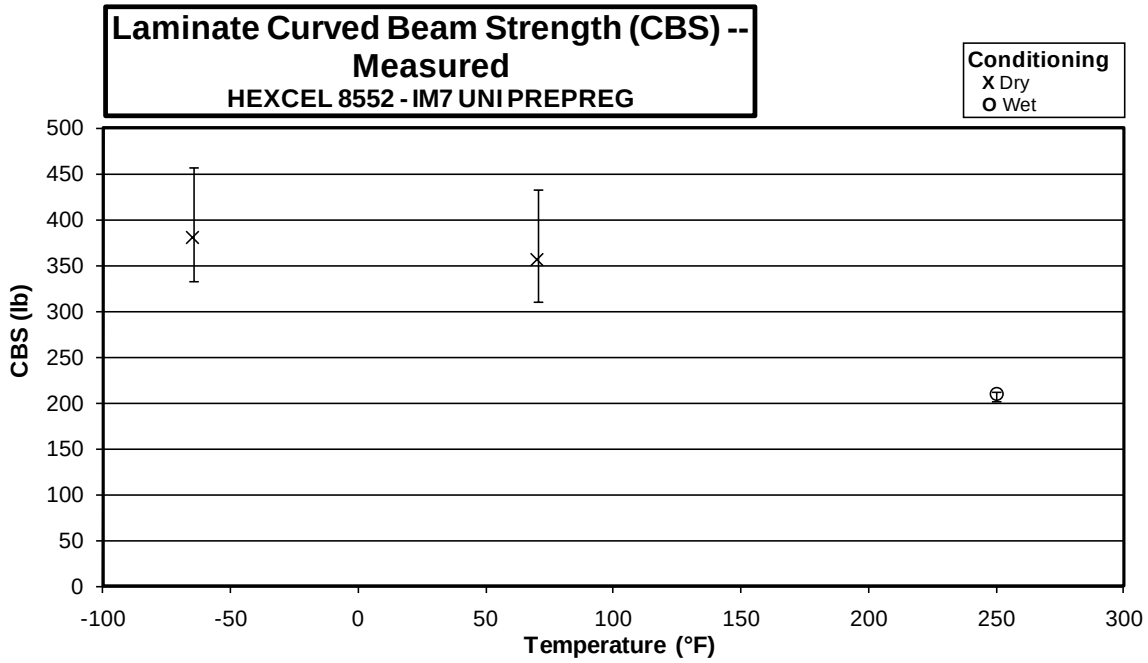
3.30 "50/40/10" Single Shear Bearing 3 Properties (SSB3)

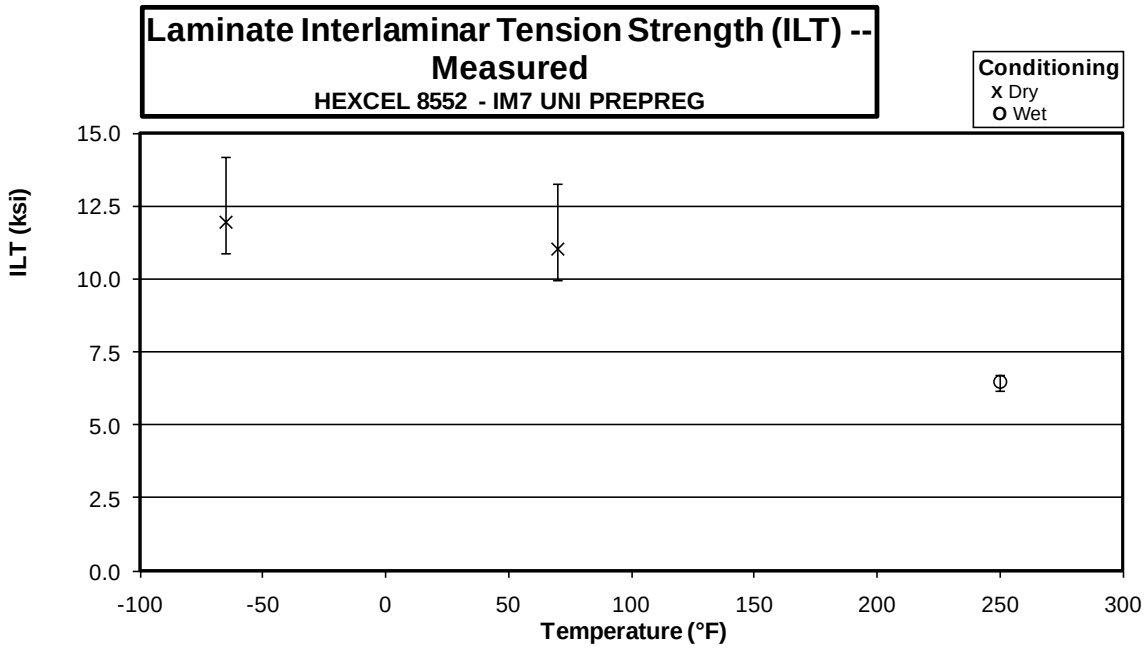


3.31 “25/50/25” Compression After Impact 1 Properties (CAI1)

Data has been removed due to testing anomaly as explained in report CAM-RP-2013-020 N/C

3.32 Interlaminar Tension Properties (ILT)





4. Raw Data

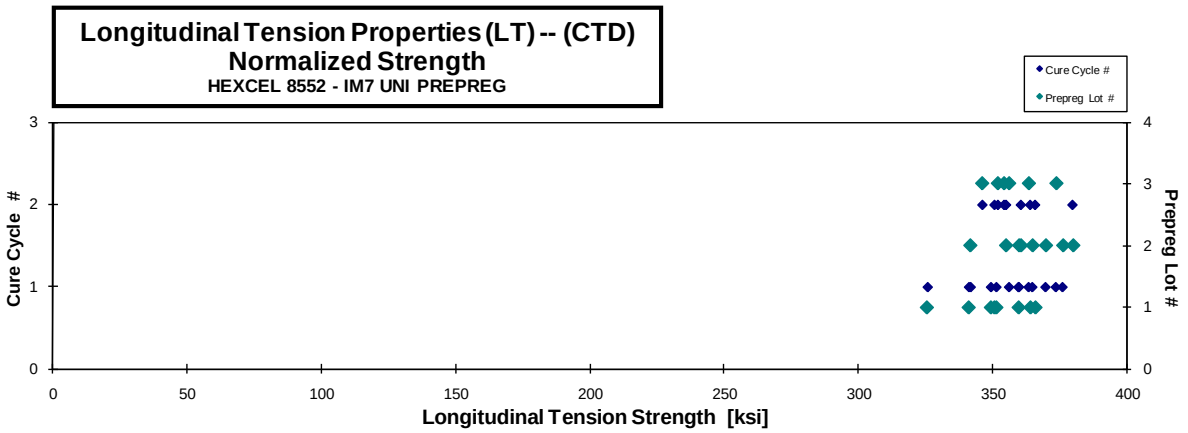
4.1 Longitudinal Tension Properties (LT)

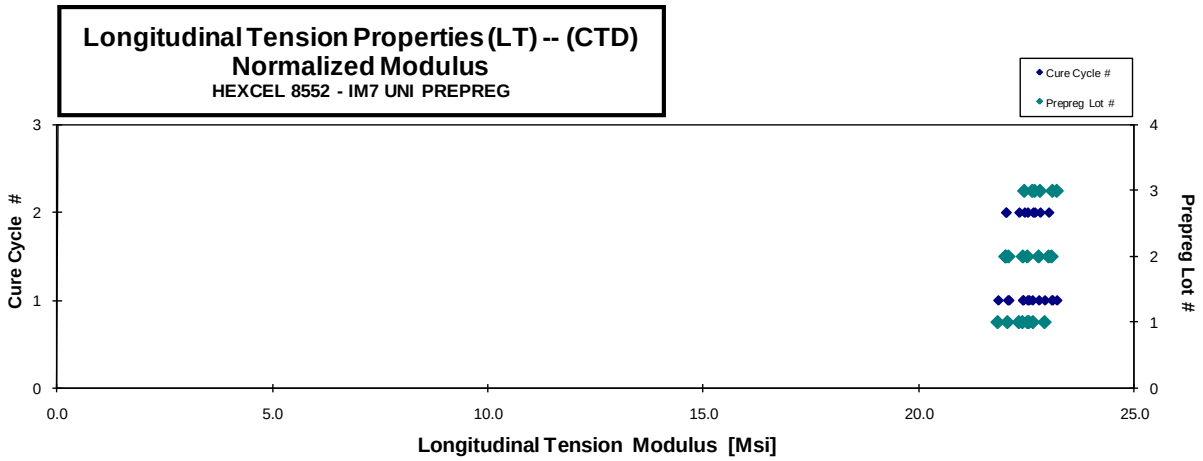
Longitudinal Tension Properties (LT) -- (CTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIJA116B	A	M1	1	1	322.580	22.211	0.213	0.044	6	LGM/SGM	0.0073	325.692	22.425
HFIJA117B	A	M1	1	1	344.115	21.742	0.260	0.044	6	LGM/SGM	0.0073	349.426	22.078
HFIJA118B	A	M1	1	1	347.430	22.315	0.223	0.044	6	XGM	0.0073	351.451	22.573
HFIJA119B	A	M1	1	1	357.922	22.822	0.241	0.043	6	XGM	0.0072	359.717	22.937
HFIJA11AB	A	M1	1	1	340.005	21.777	0.271	0.043	6	LGM/SGM	0.0072	341.186	21.852
HFIJA216B	A	M2	1	2	345.794	22.348	0.292	0.044	6	LGM/SGM	0.0073	350.730	22.667
HFIJA217B	A	M2	1	2	357.079	21.911	0.270	0.044	6	LGM/SGM	0.0073	364.105	22.342
HFIJA218B	A	M2	1	2	362.177	22.309	0.260	0.044	6	LGM/SGM	0.0073	365.950	22.541
HFIJB116B	B	M1	2	1	372.292	22.689	0.249	0.043	6	XGM	0.0072	369.851	22.540
HFIJB117B	B	M1	2	1	363.978	22.690	0.270	0.043	6	XGM	0.0071	359.906	22.436
HFIJB118B	B	M1	2	1	372.635	22.583	0.273	0.044	6	XGM	0.0073	376.229	22.801
HFIJB119B	B	M1	2	1	361.972	22.914	0.287	0.044	6	XGM	0.0073	364.904	23.099
HFIJB11AB	B	M1	2	1	336.611	21.767	0.263	0.044	6	LGM/SGM	0.0073	341.805	22.103
HFIJB216B	B	M2	2	2	356.433	22.119	0.282	0.043	6	XGM	0.0072	355.058	22.034
HFIJB217B	B	M2	2	2	378.947	22.968	0.260	0.043	6	LGM/SGM	0.0072	379.970	23.030
HFIJB218B	B	M2	2	2	357.856	21.870	0.259	0.044	6	XGM	0.0073	360.617	22.039
HFIJC116B	C	M1	3	1	351.051	22.324	0.265	0.044	6	XGM	0.0073	356.197	22.651
HFIJC117B	C	M1	3	1	350.530	22.293	0.299	0.045	6	XGM	0.0075	363.513	23.119
HFIJC118B	C	M1	3	1	363.478	22.583	0.297	0.044	6	XGM	0.0074	373.715	23.219
HFIJC216B	C	M2	3	2	342.104	22.203	0.316	0.044	6	SGM/LGM	0.0073	346.196	22.468
HFIJC217B	C	M2	3	2	346.534	22.476	0.299	0.044	6	XGM	0.0073	352.015	22.832
HFIJC218B	C	M2	3	2	349.867	22.421	0.295	0.044	6	XGM	0.0073	354.321	22.706

Average	**353.700**	**22.333**	**0.270**	**$Average_{norm}$**	**0.0073**	**357.389**	**22.568**
Standard Dev.	**13.087**	**0.368**	**0.025**	**$Standard\ Dev._{norm}$**		**12.620**	**0.387**
Coeff. of Var. [%]	**3.700**	**1.646**	**9.317**	**Coeff. of Var. [%]$_{norm}$**		**3.531**	**1.717**
Min.	**322.580**	**21.742**	**0.213**	**Min.**	**0.0071**	**325.692**	**21.852**
Max.	**378.947**	**22.968**	**0.316**	**Max.**	**0.0075**	**379.970**	**23.219**
Number of Spec.	**22**	**22**	**22**	**Number of Spec.**	**22**	**22**	**22**


Longitudinal Tension Properties (LT) -- (CTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
50
100
150
200
250
300
350
400
Longitudinal Tension Strength [ksi]


Longitudinal Tension Properties (LT) -- (CTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
Longitudinal Tension Modulus [Msi]

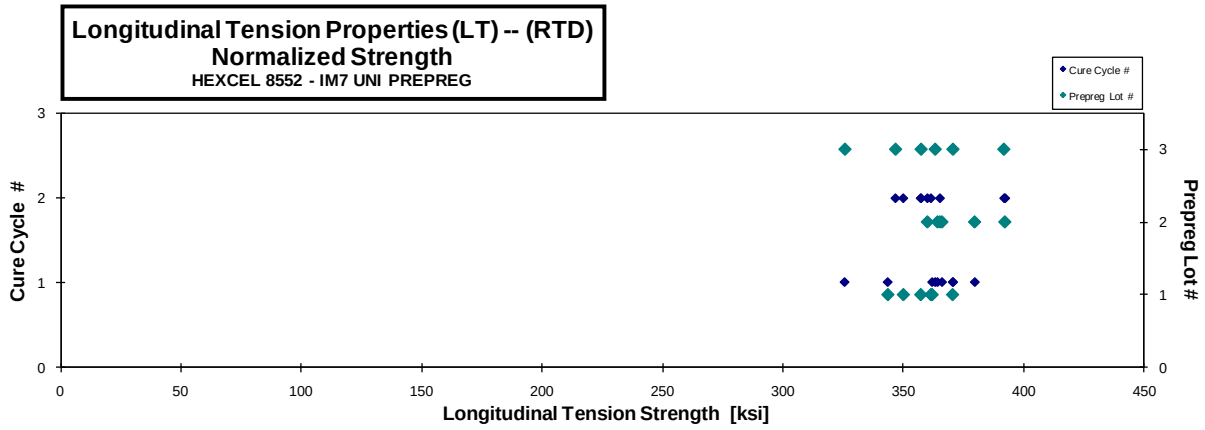
Longitudinal Tension Properties (LT) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

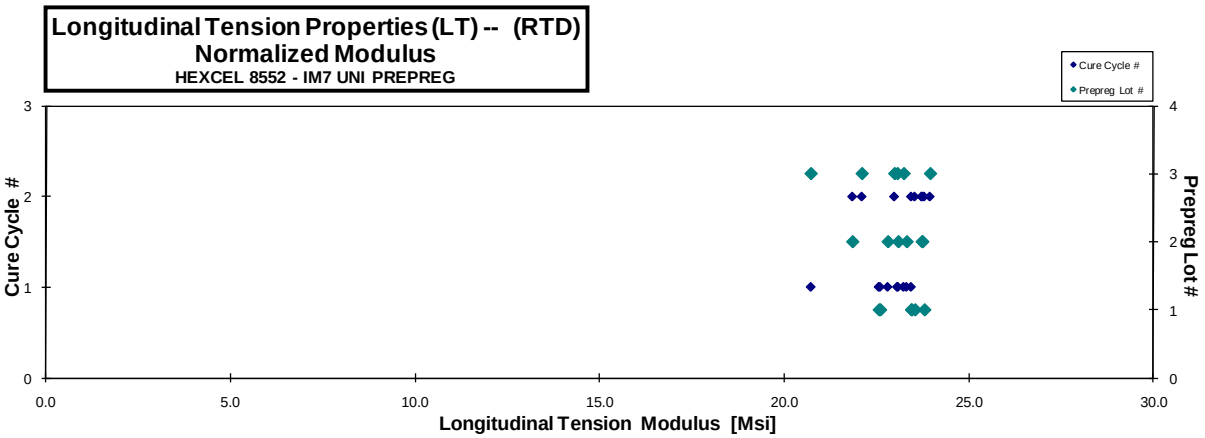
normalizing t_{ply} [in]: 0.0072

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]
HFIJA111A	A	M1	1	1	363.189	23.841	0.300	0.041	6	XGM	0.0068	343.573	22.553
HFIJA112A	A	M1	1	1	374.161	23.658	0.283	0.043	6	XGM	0.0071	370.552	23.430
HFIJA113A	A	M1	1	1	368.425	22.987	0.312	0.042	6	XGM	0.0071	362.029	22.588
HFIJA211A	A	M2	1	2	370.513	24.377	0.356	0.042	6	XGM	0.0070	361.507	23.785
HFIJA212A	A	M2	1	2	340.311	22.783	0.306	0.044	6	XGM	0.0074	350.027	23.433
HFIJA213A	A	M2	1	2	348.015	22.918	0.325	0.044	6	XGM	0.0074	357.280	23.528
HFIJB111A	B	M1	2	1	389.234	24.235	0.316	0.041	6	XGM	0.0068	366.109	22.795
HFIJB112A	B	M1	2	1	381.337	23.404	0.308	0.043	6	XGM	0.0072	379.719	23.305
HFIJB113A	B	M1	2	1	361.174	22.881	0.308	0.044	6	XGM	0.0073	364.239	23.076
HFIJB211A	B	M2	2	2	401.224	24.332	0.315	0.039	6	XGM	0.0065	360.049	21.835
HFIJB212A	B	M2	2	2	391.416	23.661	0.326	0.043	6	XGM	0.0072	392.322	23.716
HFIJB213A	B	M2	2	2	359.564	23.361	0.319	0.044	6	XGM	0.0073	365.251	23.731
HFIJC111A	C	M1	3	1	368.314	23.417	0.315	0.038	6	XGM	0.0064	325.685	20.707
HFIJC112A	C	M1	3	1	378.487	24.196	0.354	0.041	6	XGM	0.0069	363.301	23.225
HFIJC112A	C	M1	3	1	367.440	22.850	0.314	0.044	6	XGM	0.0073	370.700	23.053
HFIJC211A	C	M2	3	2	372.821	23.749	0.306	0.040	6	XGM	0.0067	346.787	22.090
HFIJC212A	C	M2	3	2	359.372	23.098	0.306	0.043	6	XGM	0.0072	357.431	22.973
HFIJC213A	C	M2	3	2	384.495	23.488	0.312	0.044	6	XGM	0.0073	391.912	23.941

	Strength [ksi]	Modulus [Msi]	Poisson's Ratio
Average	371.083	23.513	0.316
Standard Dev.	15.227	0.533	0.017
Coeff. of Var. [%]	4.103	2.267	5.450
Min.	340.311	22.783	0.283
Max.	401.224	24.377	0.356
Number of Spec.	18	18	18

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	0.0070	362.693	22.987
$Standard\ Dev._{norm}$		16.057	0.812
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.427	3.532
Min.	0.0064	325.685	20.707
Max.	0.0074	392.322	23.941
Number of Spec.	18	18	18


Longitudinal Tension Properties (LT) -- (RTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Strength [ksi]
0
50
100
150
200
250
300
350
400
450


Longitudinal Tension Properties (LT) -- (RTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Modulus [Msi]
0.0
5.0
10.0
15.0
20.0
25.0
30.0

Longitudinal Tension Properties (LT) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

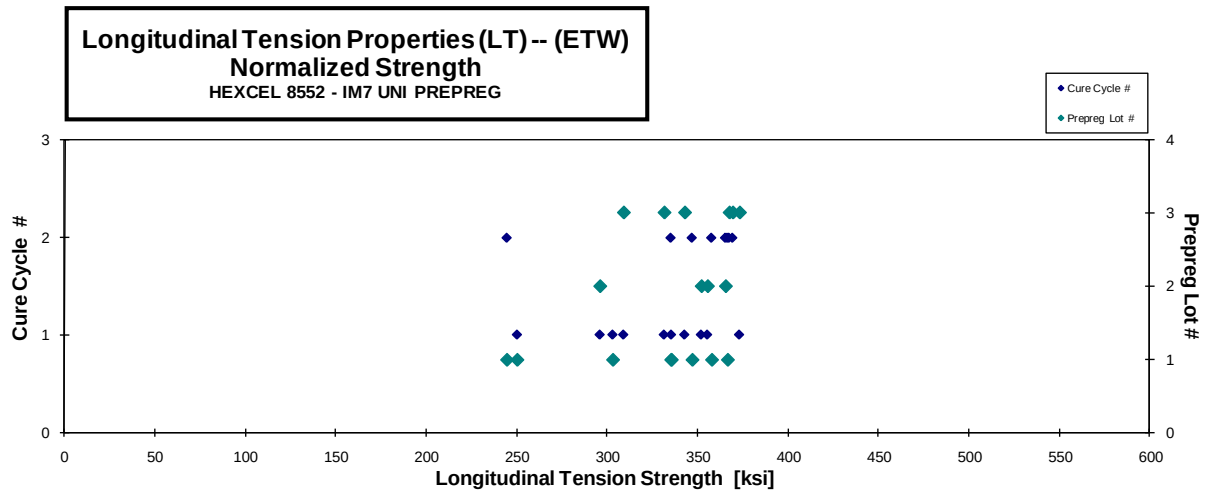
normalizing t_{ply} [in]: 0.0072

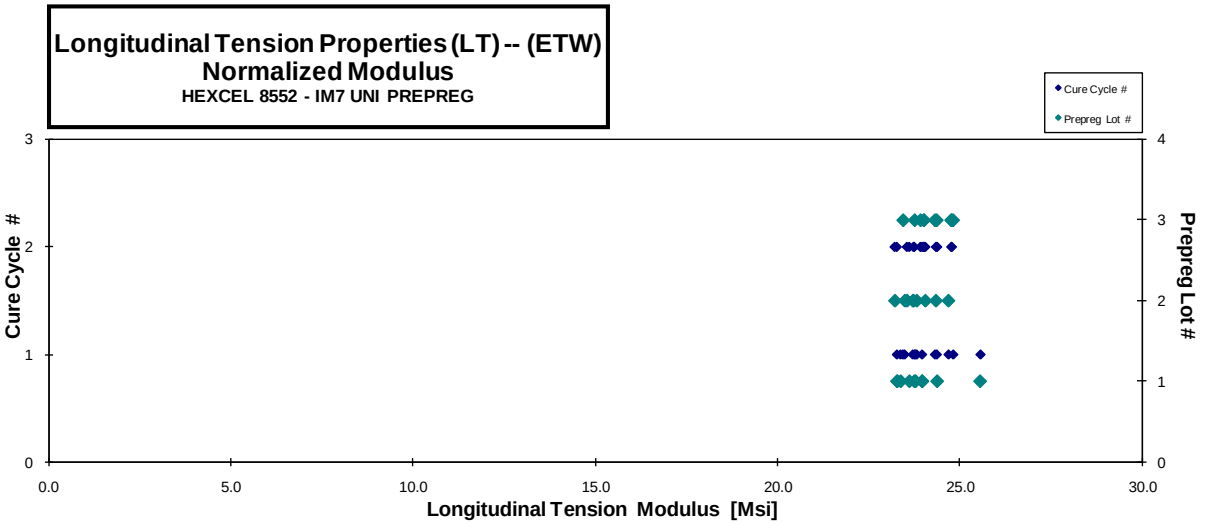
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFIJA11BD	A	M1	1	1	331.955	23.036	0.431	0.044	6	SGM	0.0073	335.541	23.285
HFIJA11CD	A	M1	1	1	301.489	23.846	0.435	0.043	6	XGM	0.0072	303.117	23.975
HFIJA11DD[1]	A	M1	1	1		23.922	0.400	0.043	6	SGM / SIT	0.0072		23.793
HFIJA11FD[1]	A	M1	1	1		23.564	0.396	0.043	6	SGM / SIT	0.0071		23.382
HFIJA11GD	A	M1	1	1	256.064	26.174	0.470	0.042	6	XGM	0.0070	250.235	25.578
HFIJA21BD	A	M2	1	2	351.042	23.311	0.428	0.044	6	XGM	0.0073	357.814	23.761
HFIJA21CD	A	M2	1	2	330.067	24.009	0.217	0.044	6	XGM	0.0073	335.288	24.389
HFIJA21DD	A	M2	1	2	241.828	23.023	0.189	0.044	6	SGM	0.0073	244.533	23.281
HFIJA21ED	A	M2	1	2	337.005	23.286	0.359	0.044	6	XGM	0.0074	347.016	23.977
HFIJA21FD	A	M2	1	2	352.193	22.694	0.334	0.045	6	SGM	0.0075	366.596	23.622
HFIJB11BD[2]	B	M1	2	1	292.200			0.044	6	XGM	0.0073	296.033	
HFIJB11CD[1]	B	M1	2	1		24.475	0.443	0.044	6	XGM / SIT	0.0073		24.702
HFIJB11DD[1&2]	B	M1	2	1		23.469		0.043	6	SGM/SIT	0.0072		23.496
HFIJB11ED	B	M1	2	1	343.230	23.122	0.353	0.044	6	XGM	0.0074	352.102	23.719
HFIJB11FD	B	M1	2	1	345.534	23.158	0.365	0.044	6	XGM	0.0074	355.532	23.828
HFIJB21BD[1]	B	M2	2	2		23.704	0.477	0.043	6	SIT	0.0072		23.558
HFIJB21CD[1]	B	M2	2	2		24.072	0.491	0.043	6	XGM / SIT	0.0071		23.738
HFIJB21DD[1&2]	B	M2	2	2		24.203		0.043	6	SGM / SIT	0.0072		24.063
HFIJB21ED[1]	B	M2	2	2		24.319	0.426	0.043	6	SGM / SIT	0.0072		24.356
HFIJB21FD	B	M2	2	2	360.612	22.912	0.364	0.044	6	XGM	0.0073	365.481	23.222
HFIJC11BD	C	M1	3	1	341.059	24.199	0.430	0.043	6	DGM	0.0072	342.901	24.329
HFIJC11CD	C	M1	3	1	331.939	24.406	0.432	0.043	6	XGM	0.0072	331.555	24.378
HFIJC11DD[2]	C	M1	3	1	308.746	23.422		0.043	6	XGM	0.0072	309.103	23.449
HFIJC11ED[1]	C	M1	3	1		24.622	0.412	0.044	6	SGM / SIT	0.0073		24.831
HFIJC11FD	C	M1	3	1	366.864	23.363	0.363	0.044	6	XGM	0.0073	373.234	23.769
HFIJC21BD[1]	C	M2	3	2		23.810	0.409	0.043	6	SGM / SIT	0.0072		23.930
HFIJC21CD[1]	C	M2	3	2		23.857	0.440	0.044	6	SGM / SIT	0.0073		24.023
HFIJC21DD[1&2]	C	M2	3	2		24.376		0.044	6	SGM / SIT	0.0073		24.790
HFIJC21ED	C	M2	3	2	359.071	23.347	0.380	0.044	6	XGM	0.0074	369.461	24.023
HFIJC21FD	C	M2	3	2	352.438	23.761	0.382	0.045	6	XGM	0.0075	367.531	24.778

HIGH FREQUENCY OF UNACCEPTABLE FAILURES, ADHESIVE USED TO BOND TABS APPEARS TO BE INADEQUATE
[1]COUPONS EXPERIENCED AN UN ACCEPTABLE FAILURE AND THE STRENGTH WAS REMOVED
[2]MODULUS AND/OR POISSONS RATIO WAS REMOVED DUE TO NON-LINEARITY

Average	**327.963**	**23.775**	**0.393**
Standard Dev.	**35.176**	**0.693**	**0.070**
Coeff. of Var. [%]	**10.726**	**2.917**	**17.820**
Min.	**241.828**	**22.694**	**0.189**
Max.	**366.864**	**26.174**	**0.491**
Number of Spec.	**18**	**29**	**25**

$Average_{norm}$	**0.0073**	**333.504**	**24.001**
Standard $Dev._{norm}$		**38.823**	**0.557**
Coeff. of Var. $[\%]_{norm}$		**11.641**	**2.321**
Min.	**0.0070**	**244.533**	**23.222**
Max.	**0.0075**	**373.234**	**25.578**
Number of Spec.	**30**	**18**	**29**


Longitudinal Tension Properties (LT) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Strength [ksi]
0
50
100
150
200
250
300
350
400
450
500
550
600
0
1
2
3
4

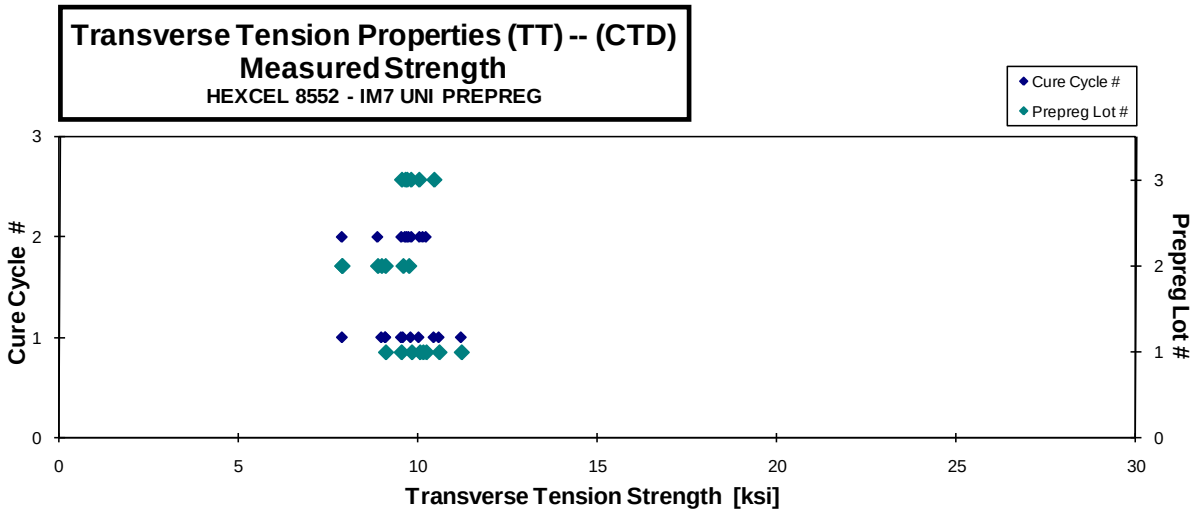

Longitudinal Tension Properties (LT) -- (ETW)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Tension Modulus [Msi]
0.0
5.0
10.0
15.0
20.0
25.0
30.0
0
1
2
3
4

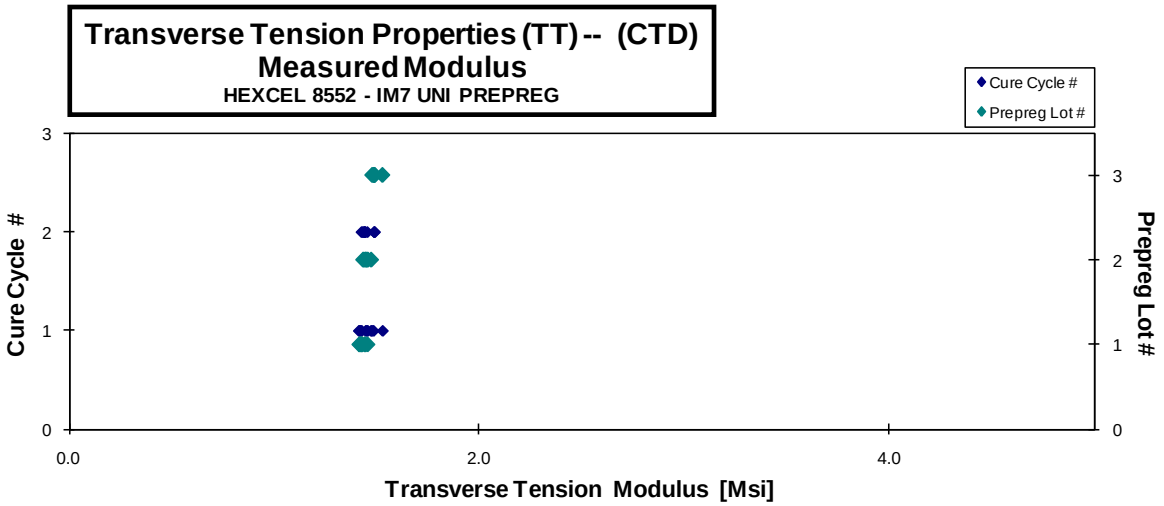
4.2 Transverse Tension Properties (TT)

Transverse Tension Properties (TT) -- (CTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIUA116B	A	M1	1	1	9.090	1.431	0.081	11	0.0074	LGM
HFIUA117B	A	M1	1	1	9.524	1.421	0.081	11	0.0074	LAT
HFIUA118B	A	M1	1	1	11.192	1.425	0.082	11	0.0075	LAB
HFIUA119B	A	M1	1	1	10.574	1.417	0.082	11	0.0075	LAT/LWB
HFIUA215B	A	M2	1	2	9.812	1.446	0.081	11	0.0073	LGM
HFIUA216B	A	M2	1	2	10.127	1.445	0.081	11	0.0074	LGM/LAT
HFIUA217B	A	M2	1	2	10.039	1.458	0.081	11	0.0073	LGM
HFIUA218B	A	M2	1	2	10.215	1.430	0.082	11	0.0075	LGM
HFIUB115B	B	M1	2	1	9.082	1.460	0.078	11	0.0071	LAB
HFIUB116B	B	M1	2	1	8.976	1.476	0.078	11	0.0071	LAB
HFIUB117B	B	M1	2	1	7.881	1.450	0.078	11	0.0071	LAB
HFIUB118B	B	M1	2	1	9.574	1.455	0.080	11	0.0072	LGM
HFIUB215B	B	M2	2	2	7.876	1.441	0.079	11	0.0072	LWT
HFIUB216B	B	M2	2	2	9.734	1.448	0.079	11	0.0072	LWT
HFIUB217B	B	M2	2	2	8.869	1.436	0.078	11	0.0071	LAT
HFIUC115B	C	M1	3	1	9.790	1.488	0.081	11	0.0074	LWB
HFIUC116B	C	M1	3	1	10.432	1.532	0.076	11	0.0069	LAT
HFIUC117B	C	M1	3	1	10.014	1.481	0.080	11	0.0072	LAB
HFIUC215B	C	M2	3	2	9.632	1.491	0.080	11	0.0073	LWT
HFIUC216B	C	M2	3	2	9.535	1.491	0.080	11	0.0073	LWT
HFIUC217B	C	M2	3	2	9.681	1.494	0.079	11	0.0072	LGM

Average	**9.602**	**1.458**	**Average**	**0.0073**
Standard Dev.	**0.797**	**0.030**	**Standard Dev.**	
Coeff. of Var. [%]	**8.297**	**2.037**	**Coeff. of Var. [%]**	
Min.	**7.876**	**1.417**	**Min.**	**0.0069**
Max.	**11.192**	**1.532**	**Max.**	**0.0075**
Number of Spec.	**21**	**21**	**Number of Spec.**	**21**

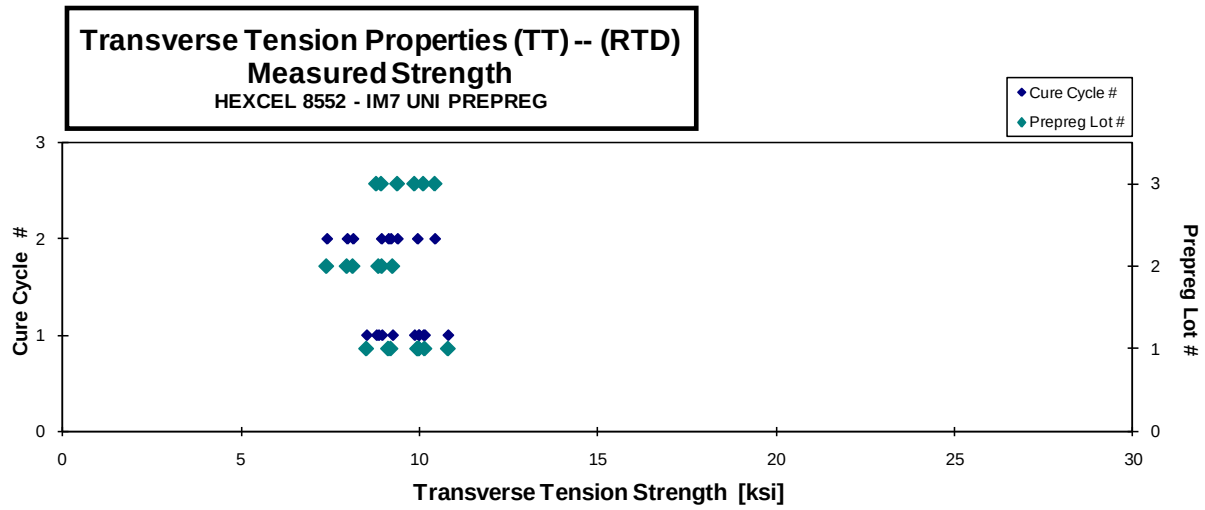

Transverse Tension Properties (TT) -- (CTD)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
5
10
15
20
25
30
Transverse Tension Strength [ksi]

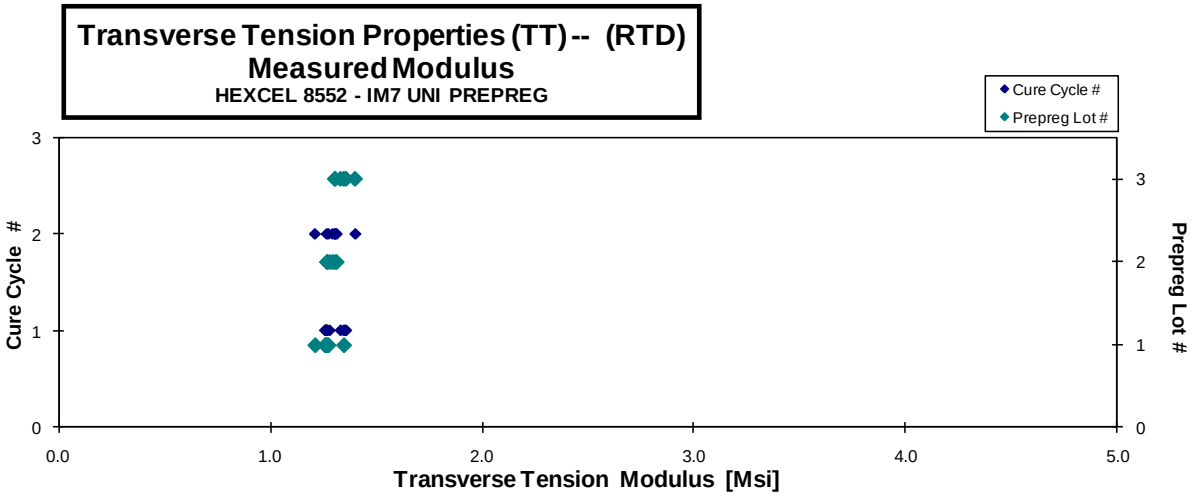

Transverse Tension Properties (TT) -- (CTD)
Measured Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
2.0
4.0
Transverse Tension Modulus [Msi]

Transverse Tension Properties (TT) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIUA111A	A	M1	1	1	9.972	1.350	0.075	11	0.0068	LAT
HFIUA112A	A	M1	1	1	10.801	1.263	0.083	11	0.0076	LWT
HFIUA113A	A	M1	1	1	8.514	1.271	0.083	11	0.0075	LGM
HFIUA114A	A	M1	1	1	9.987	1.262	0.081	11	0.0074	LAB
HFIUA115A	A	M1	1	1	10.145	1.262	0.082	11	0.0074	LAT
HFIUA212A	A	M2	1	2	9.127	1.276	0.082	11	0.0075	LGM
HFIUA213A	A	M2	1	2	9.942	1.214	0.082	11	0.0075	LGM
HFIUA214A	A	M2	1	2	9.195	1.268	0.081	11	0.0073	LGM
HFIUB112A	B	M1	2	1	8.853	1.269	0.079	11	0.0072	LGM
HFIUB113A	B	M1	2	1	8.946	1.270	0.080	11	0.0072	LWB
HFIUB114A	B	M1	2	1	9.246	1.282	0.078	11	0.0071	LWB
HFIUB212A	B	M2	2	2	7.397	1.295	0.080	11	0.0073	LGM
HFIUB213A	B	M2	2	2	7.967	1.307	0.079	11	0.0072	LAB
HFIUB214A	B	M2	2	2	8.132	1.315	0.078	11	0.0071	LAT
HFIUC111A	C	M1	3	1	9.860	1.359	0.078	11	0.0071	LGM
HFIUC112A	C	M1	3	1	8.791	1.333	0.080	11	0.0073	LAT
HFIUC113A	C	M1	3	1	10.109	1.348	0.080	11	0.0072	LAT
HFIUC211A	C	M2	3	2	8.929	1.401	0.075	11	0.0068	LGM
HFIUC212A	C	M2	3	2	10.430	1.307	0.081	11	0.0074	LGM
HFIUC213A	C	M2	3	2	9.381	1.307	0.080	11	0.0073	LAT

Average	**9.286**	**1.298**	**Average**	**0.0073**
Standard Dev.	**0.879**	**0.044**	**Standard Dev.**	
Coeff. of Var. [%]	**9.470**	**3.365**	**Coeff. of Var. [%]**	
Min.	**7.397**	**1.214**	**Min.**	**0.0068**
Max.	**10.801**	**1.401**	**Max.**	**0.0076**
Number of Spec.	**20**	**20**	**Number of Spec.**	**20**

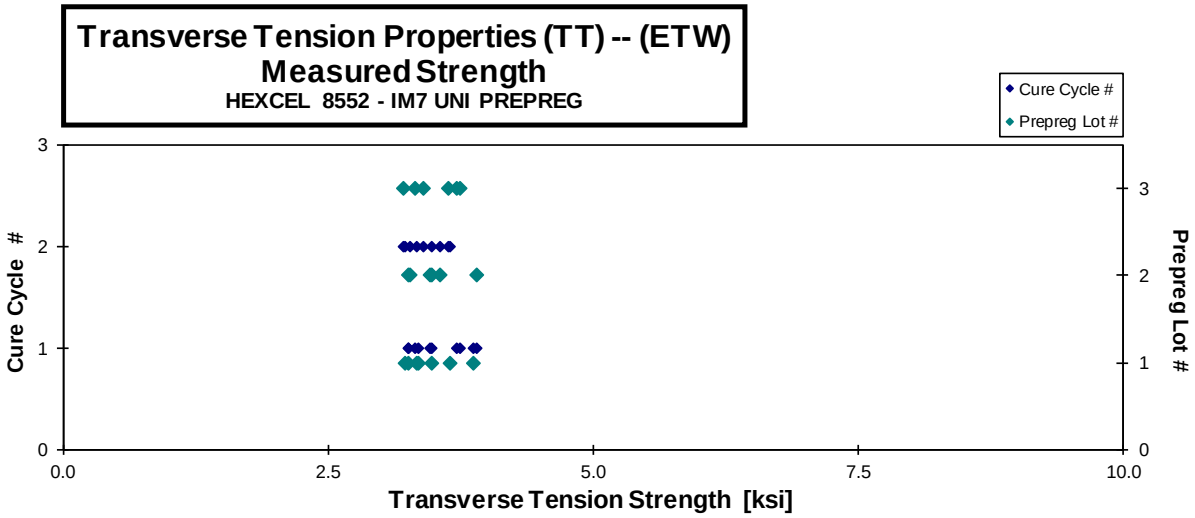

Transverse Tension Properties (TT) -- (RTD)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
5
10
15
20
25
30
Transverse Tension Strength [ksi]

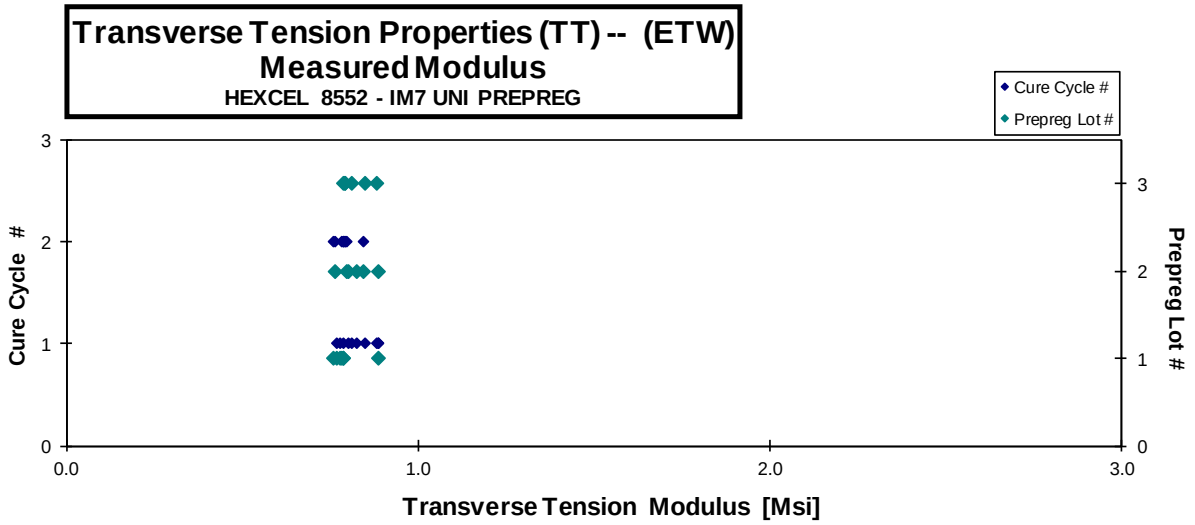

Transverse Tension Properties (TT) -- (RTD)
Measured Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
1.0
2.0
3.0
4.0
5.0
Transverse Tension Modulus [Msi]

Transverse Tension Properties (TT) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIUA11AD	A	M1	1	1	3.879	0.891	0.076	11	0.0069	LGM
HFIUA11BD	A	M1	1	1	3.265	0.791	0.082	11	0.0074	LGM
HFIUA11CD	A	M1	1	1	3.362	0.769	0.081	11	0.0074	LGM
HFIUA11DD	A	M1	1	1	3.486	0.778	0.080	11	0.0073	LGM
HFIUA219D	A	M2	1	2	3.337	0.786	0.081	11	0.0074	LGM
HFIUA21BD	A	M2	1	2	3.236	0.759	0.083	11	0.0075	LGM
HFIUA21CD	A	M2	1	2	3.649	0.789	0.082	11	0.0075	LGM
HFIUB119D	B	M1	2	1	3.464	0.804	0.080	11	0.0073	LGM
HFIUB11AD	B	M1	2	1	3.269	0.828	0.076	11	0.0069	LGM
HFIUB11BD	B	M1	2	1	3.915	0.890	0.072	11	0.0065	LGM
HFIUB218D	B	M2	2	2	3.566	0.798	0.079	11	0.0072	LGM
HFIUB219D	B	M2	2	2	3.277	0.765	0.080	11	0.0073	LGM
HFIUB21BD	B	M2	2	2	3.478	0.846	0.073	11	0.0067	LGM
HFIUC118D	C	M1	3	1	3.756	0.850	0.080	11	0.0073	LGM
HFIUC119D	C	M1	3	1	3.323	0.811	0.081	11	0.0074	LGM
HFIUC11AD	C	M1	3	1	3.721	0.884	0.075	11	0.0068	LGM
HFIUC218D	C	M2	3	2	3.633	0.793	0.080	11	0.0073	LGM
HFIUC219D	C	M2	3	2	3.223	0.796	0.081	11	0.0074	LGM
HFIUC21BD	C	M2	3	2	3.408	0.789	0.081	11	0.0074	LGM

Average	**3.487**	**0.811**	**Average**	**0.0072**
Standard Dev.	**0.219**	**0.042**	**Standard Dev.**	
Coeff. of Var. [%]	**6.281**	**5.149**	**Coeff. of Var. [%]**	
Min.	**3.223**	**0.759**	**Min.**	**0.0065**
Max.	**3.915**	**0.891**	**Max.**	**0.0075**
Number of Spec.	**19**	**19**	**Number of Spec.**	**19**


Transverse Tension Properties (TT) -- (ETW)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
2.5
5.0
7.5
10.0
Transverse Tension Strength [ksi]


Transverse Tension Properties (TT) -- (ETW)
Measured Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
1.0
2.0
3.0
Transverse Tension Modulus [Msi]

4.3 Longitudinal Compression Properties (LC)

Longitudinal Compression Properties (LC) -- (CTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

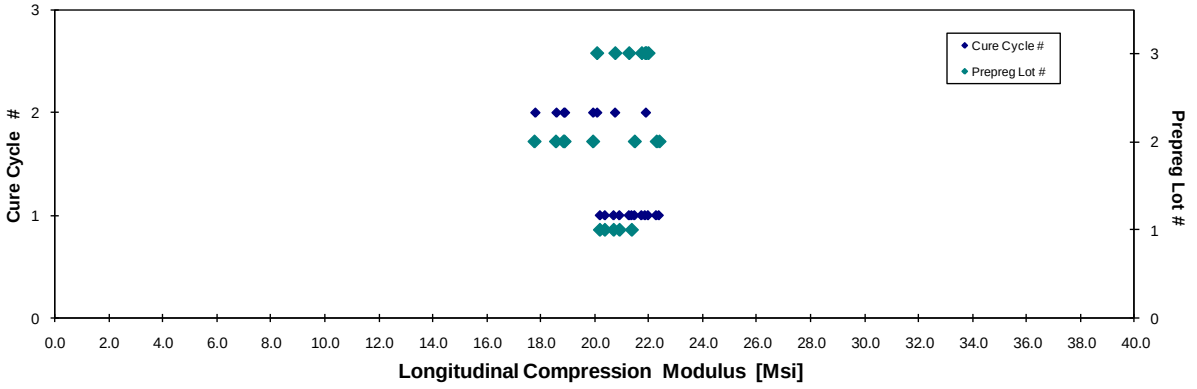
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
HFILA115B[1]	A	M1	1	1	20.088	0.451	0.104	14	0.0074	20.709
HFILA116B[1]	A	M1	1	1	20.307	0.404	0.104	14	0.0074	20.925
HFILA117B	A	M1	1	1	21.024	0.287	0.102	14	0.0073	21.375
HFILA118B	A	M1	1	1	20.317	0.335	0.101	14	0.0072	20.384
HFILA119B[1]	A	M1	1	1	20.148	0.364	0.101	14	0.0072	20.201
HFILA215B*	A	M2	1	2				14		
HFILA216B*	A	M2	1	2				14		
HFILA217B*	A	M2	1	2				14		
HFILB115B	B	M1	2	1	20.258	0.362	0.107	14	0.0076	21.484
HFILB116B	B	M1	2	1	20.915	0.335	0.108	14	0.0077	22.392
HFILB117B	B	M1	2	1	20.967	0.289	0.107	14	0.0077	22.291
HFILB215B	B	M2	2	2	21.136	0.331	0.095	14	0.0068	19.952
HFILB216B	B	M2	2	2	19.971	0.466	0.094	14	0.0067	18.584
HFILB217B	B	M2	2	2	19.049	0.305	0.094	14	0.0067	17.796
HFILB218B	B	M2	2	2	20.368	0.447	0.093	14	0.0067	18.866
HFILB219B	B	M2	2	2	20.413	0.354	0.093	14	0.0067	18.901
HFILC115B	C	M1	3	1	20.998	0.411	0.105	14	0.0075	21.873
HFILC116B	C	M1	3	1	21.288	0.351	0.104	14	0.0074	21.989
HFILC117B	C	M1	3	1	21.291	0.355	0.103	14	0.0074	21.745
HFILC118B	C	M1	3	1	20.974	0.378	0.102	14	0.0073	21.280
HFILC215B	C	M2	3	2	21.130	0.372	0.105	14	0.0075	21.916
HFILC216B	C	M2	3	2	19.562	0.301	0.104	14	0.0074	20.099
HFILC217B	C	M2	3	2	20.370	0.332	0.103	14	0.0073	20.767

*Specimens have uneven grip marks so values are removed

[1] Modulus is an average of two strain gages

Average	**20.529**	**0.362**	**$Average_{norm}$**	**0.0072**	**20.676**
Standard Dev.	**0.603**	**0.052**	**$Standard\ Dev._{norm}$**		**1.323**
Coeff. of Var. [%]	**2.935**	**14.482**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.396**
Min.	**19.049**	**0.287**	**Min.**	**0.0067**	**17.796**
Max.	**21.291**	**0.466**	**Max.**	**0.0077**	**22.392**
Number of Spec.	**20**	**20**	**Number of Spec.**	**20**	**20**

Longitudinal Compression Properties (LC) -- (CTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



Longitudinal Compression Properties (LC) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

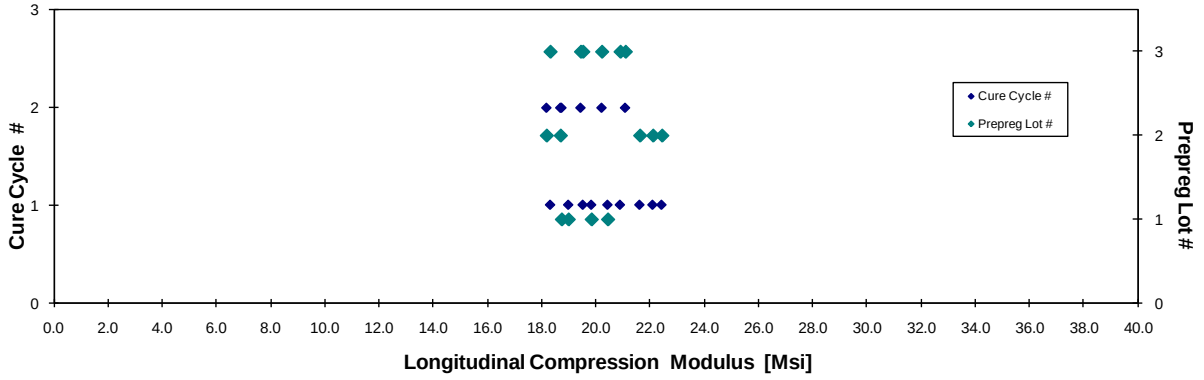
normalizing t_{ply} [in]: 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
HFILA111A*	A	M1	1	1				14		
HFILA112A	A	M1	1	1	20.248	0.352	0.095	14	0.0068	18.993
HFILA113A	A	M1	1	1	19.799	0.366	0.101	14	0.0072	19.839
HFILA114A	A	M1	1	1	19.957	0.372	0.103	14	0.0074	20.439
HFILA211A*	A	M2	1	2				14		
HFILA212A*	A	M2	1	2				14		
HFILA213A	A	M2	1	2	20.235	0.360	0.093	14	0.0067	18.742
HFILB111A	B	M1	2	1	20.667	0.423	0.108	14	0.0077	22.099
HFILB112A	B	M1	2	1	20.777	0.335	0.109	14	0.0078	22.429
HFILB113A	B	M1	2	1	20.230	0.310	0.108	14	0.0077	21.618
HFILB211A*	B	M2	2	2				14		
HFILB212A	B	M2	2	2	20.534	0.335	0.089	14	0.0064	18.188
HFILB213A	B	M2	2	2	20.256	0.310	0.093	14	0.0066	18.702
HFILC111A	C	M1	3	1	20.888	0.332	0.088	14	0.0063	18.325
HFILC112A	C	M1	3	1	20.446	0.369	0.096	14	0.0069	19.526
HFILC113A	C	M1	3	1	20.737	0.393	0.102	14	0.0073	20.898
HFILC211A	C	M2	3	2	20.745	0.358	0.094	14	0.0067	19.445
HFILC212A	C	M2	3	2	20.430	0.365	0.100	14	0.0071	20.221
HFILC213A	C	M2	3	2	20.658	0.365	0.103	14	0.0074	21.088

*Specimens have thickness taper on edge of coupon, so values were removed.

Average	**20.440**	**0.356**	**$Average_{norm}$**	**0.0071**	**20.037**
Standard Dev.	**0.317**	**0.029**	**$Standard\ Dev._{norm}$**		**1.365**
Coeff. of Var. [%]	**1.549**	**8.278**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.810**
Min.	**19.799**	**0.310**	**Min.**	**0.0063**	**18.188**
Max.	**20.888**	**0.423**	**Max.**	**0.0078**	**22.429**
Number of Spec.	**15**	**15**	**Number of Spec.**	**15**	**15**

Longitudinal Compression Properties (LC) -- (RTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



Longitudinal Compression Properties (LC) -- (ETD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

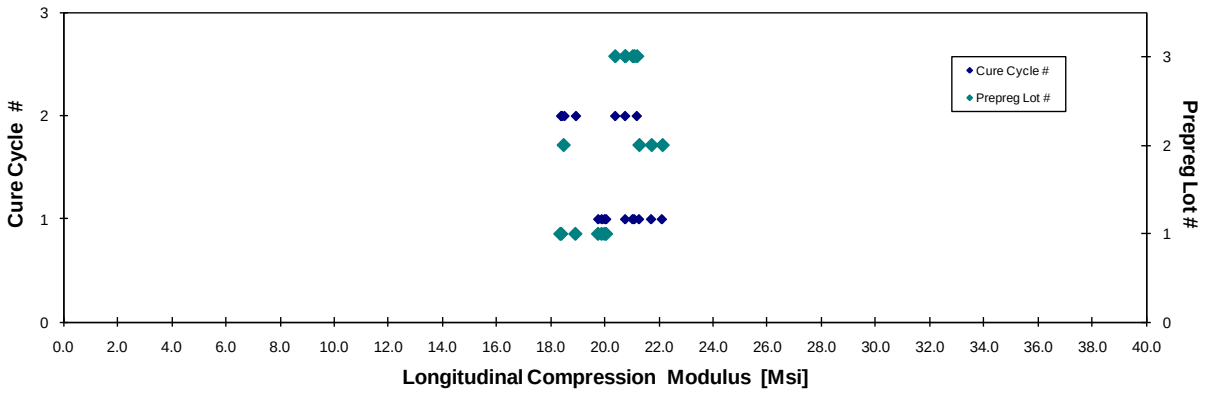
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
HFILA1ROC[1]	A	M1	1	1	19.773	0.385	0.101	14	0.0072	19.883
HFILA1RPC[1]	A	M1	1	1	19.556	0.372	0.102	14	0.0073	19.753
HFILA1RQC	A	M1	1	1	19.564	0.369	0.103	14	0.0074	19.990
HFILA1RRC	A	M1	1	1	19.375	0.394	0.104	14	0.0075	20.048
HFILA218C	A	M2	1	2	19.534	0.396	0.095	14	0.0068	18.404
HFILA219C	A	M2	1	2	19.663	0.373	0.094	14	0.0067	18.369
HFILA21DC	A	M2	1	2	19.759	0.354	0.097	14	0.0069	18.923
HFILB118C	B	M1	2	1	20.919	0.401	0.107	14	0.0076	22.123
HFILB119C	B	M1	2	1	20.483	0.391	0.107	14	0.0076	21.722
HFILB11DC	B	M1	2	1	19.776	0.338	0.108	14	0.0077	21.271
HFILB21DC	B	M2	2	2	19.877	0.357	0.094	14	0.0067	18.493
HFILB2RMC*	B	M2	2	2			0.084	14		
HFILB2RNC*	B	M2	2	2			0.090	14		
HFILC11DC	C	M1	3	1	20.062	0.381	0.104	14	0.0074	20.756
HFILC114C	C	M1	3	1	20.358	0.360	0.104	14	0.0074	21.031
HFILC1RPC	C	M1	3	1	20.297	0.376	0.105	14	0.0075	21.092
HFILC21DC	C	M2	3	2	19.978	0.357	0.105	14	0.0075	20.754
HFILC218C	C	M2	3	2	20.084	0.366	0.102	14	0.0073	20.386
HFILC219C	C	M2	3	2	20.913	0.396	0.102	14	0.0073	21.190

*Specimens have thickness taper on edge of coupon, so values were removed.

[1] Modulus is an average of two strain gages

Average	**19.998**	**0.374**	**$Average_{norm}$**	**0.0073**	**20.246**
Standard Dev.	**0.463**	**0.018**	**$Standard\ Dev._{norm}$**		**1.165**
Coeff. of Var. [%]	**2.313**	**4.781**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**5.757**
Min.	**19.375**	**0.338**	**Min.**	**0.0067**	**18.369**
Max.	**20.919**	**0.401**	**Max.**	**0.0077**	**22.123**
Number of Spec.	**17**	**17**	**Number of Spec.**	**17**	**17**

Longitudinal Compression Properties (LC) -- (ETD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



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

HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]
0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus	Poisson's	Avg. Specimen	# Plies in Laminate	Avg. t_{ply} [in]	$Modulus_{norm}$ [Msi]
HFILA11GD[1]	A	M1	1	1	19.933	0.379	0.100	14	0.0071	19.758
HFILA11HD	A	M1	1	1	20.124	0.409	0.094	14	0.0067	18.723
HFILA11ID	A	M1	1	1	19.455	0.335	0.103	14	0.0074	19.863
HFILA21ED	A	M2	1	2	19.539	0.351	0.097	14	0.0069	18.793
HFILA21FD	A	M2	1	2	19.888	0.342	0.097	14	0.0069	19.040
HFILA21GD	A	M2	1	2	19.229	0.344	0.094	14	0.0067	17.865
HFILB11ED*	B	M1	2	1	20.777	0.346	0.106	14	0.0076	21.880
HFILB11FD*	B	M1	2	1	20.158	0.336	0.101	14	0.0072	20.188
HFILB11GD*	B	M1	2	1	21.348	0.359	0.095	14	0.0068	20.077
HFILB21ED	B	M2	2	2	20.248	0.341	0.094	14	0.0067	18.899
HFILB21FD	B	M2	2	2	20.131	0.341	0.095	14	0.0068	18.973
HFILB21GD	B	M2	2	2	26.641	0.412	0.093	14	0.0066	24.518
HFILC11ED	C	M1	3	1	20.987	0.322	0.105	14	0.0075	21.833
HFILC11FD	C	M1	3	1	20.445	0.329	0.103	14	0.0074	20.939
HFILC11GD	C	M1	3	1	24.827	0.466	0.098	14	0.0070	24.195
HFILC11HD	C	M1	3	1	20.498	0.362	0.093	14	0.0066	18.847
HFILC11ID	C	M1	3	1	17.674	0.355	0.089	14	0.0064	15.614
HFILC21ED	C	M2	3	2	20.085	0.310	0.105	14	0.0075	20.925
HFILC21FD	C	M2	3	2	20.112	0.352	0.103	14	0.0074	20.558
HFILC21GD	C	M2	3	2	19.741	0.324	0.099	14	0.0071	19.330
HFILA11JD[1]	A	M1	1	1	19.858	0.392	0.105	14	0.0075	20.744
HFILA11KD[1]	A	M1	1	1	19.580	0.416	0.106	14	0.0075	20.499
HFILA1RMD	A	M1	1	1	19.955	0.529	0.101	14	0.0072	20.070
HFILA1RND	A	M1	1	1	20.050	0.412	0.101	14	0.0072	20.120
HFILA21HD*	A	M2	1	2				14		
HFILA214D	A	M2	1	2	26.053	0.509	0.096	14	0.0068	24.761
HFILB11HD	B	M1	2	1	20.996	0.379	0.107	14	0.0076	22.187
HFILB11ID	B	M1	2	1	20.077	0.399	0.109	14	0.0078	21.687
HFILB114D	B	M1	2	1	19.972	0.390	0.108	14	0.0077	21.349
HFILB21ID*	B	M2	2	2				14		
HFILB214D	B	M2	2	2	20.822	0.376	0.095	14	0.0068	19.586
HFILC1RMD	C	M1	3	1	21.213	0.451	0.096	14	0.0069	20.261
HFILC1RND	C	M1	3	1	20.134	0.403	0.101	14	0.0072	20.220
HFILC1ROD	C	M1	3	1	20.821	0.446	0.105	14	0.0075	21.692
HFILC21HD	C	M2	3	2	20.601	0.370	0.092	14	0.0066	18.778
HFILC21ID	C	M2	3	2	20.282	0.402	0.094	14	0.0067	18.897
HFILC214D	C	M2	3	2	20.436	0.413	0.104	14	0.0075	21.159

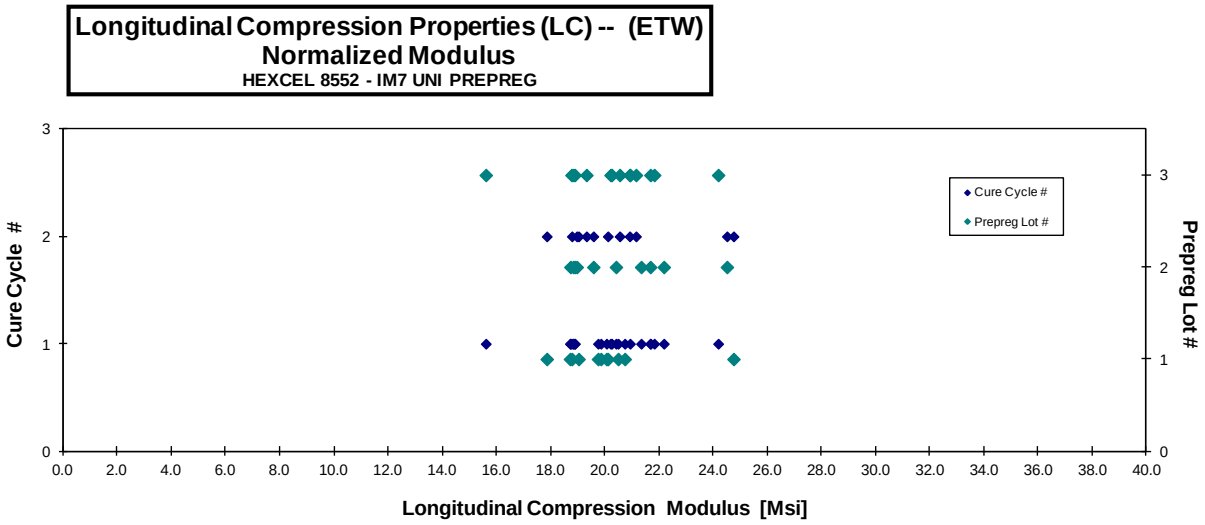
*Specimens have thickness taper on edge of coupon, so values were removed.

[1] Modulus is an average of two strain gages

HFILB21HD STRAIN GAGE WENT BAD HENCE THE MODULUS AND POISSONS RATIO WAS REMOVED

Shaded portion was originally tested with improper strain gage adhesive

Average	**20.648**	**0.383**	**0.099**	**$Average_{norm}$**	**0.0071**	**20.367**
Standard Dev.	**1.754**	**0.051**	**0.005**	**$Standard\ Dev._{norm}$**		**1.834**
Coeff. of Var. [%]	**8.494**	**13.446**	**5.383**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**9.005**
Min.	**17.674**	**0.310**	**0.089**	**Min.**	**0.0064**	**15.614**
Max.	**26.641**	**0.529**	**0.109**	**Max.**	**0.0078**	**24.761**
Number of Spec.	**35**	**35**	**35**	**Number of Spec.**	**35**	**35**


Longitudinal Compression Properties (LC) -- (ETW)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Longitudinal Compression Modulus [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
30.0
32.0
34.0
36.0
38.0
40.0
0
1
2
3

4.4 Transverse Compression Properties (TC)

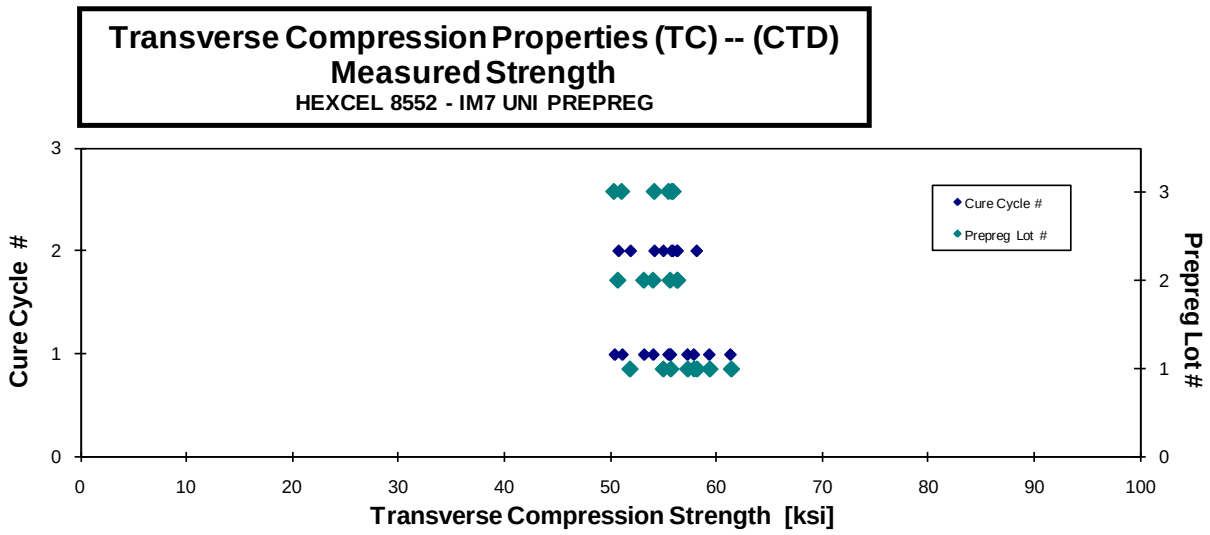
Transverse Compression Properties (TC) -- (CTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

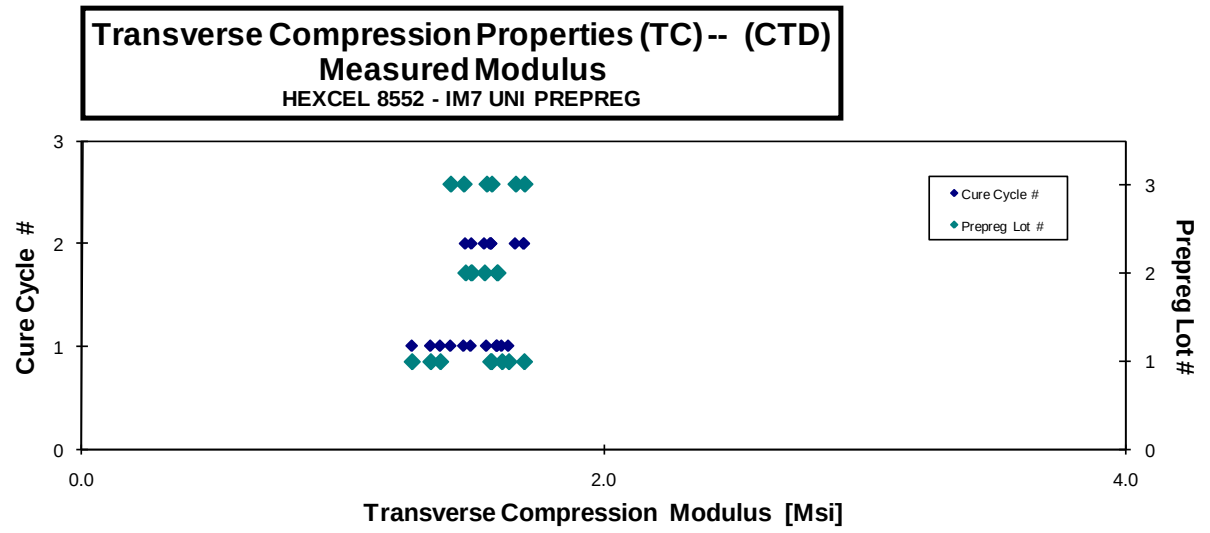
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIZA116B[1]	A	M1	1	1	59.383	1.609	0.027	0.099	14	0.0071	HAT/HIT
HFIZA117B[1]	A	M1	1	1	61.395	1.373	0.021	0.099	14	0.0071	HGM
HFIZA118B	A	M1	1	1	55.734	1.264	0.028	0.100	14	0.0071	HGM/HIB
HFIZA119B	A	M1	1	1	57.917	1.336	0.027	0.100	14	0.0072	HGM/HIB/HIT
HFIZA11AB[1]	A	M1	1	1	57.316	1.635	0.031	0.100	14	0.0072	HAT
HFIZA217B	A	M2	1	2	55.031	1.565	0.025	0.100	14	0.0071	HGM
HFIZA218B	A	M2	1	2	51.915	1.569	0.032	0.100	14	0.0072	HGM
HFIZA219B	A	M2	1	2	58.191	1.694	0.030	0.101	14	0.0072	HGM
HFIZB115B	B	M1	2	1	53.205	1.592	0.027	0.102	14	0.0073	HGM
HFIZB116B*	B	M1	2	1	55.667	1.590	0.031	0.101	14	0.0072	HGM/HAB/HIB
HFIZB117B*	B	M1	2	1	54.068	1.490	0.028	0.101	14	0.0072	HGM/HIT/HIB
HFIZB216B	B	M2	2	2	56.320	1.494	0.026	0.099	14	0.0071	HGM
HFIZB217B	B	M2	2	2	56.367	1.543	0.029	0.099	14	0.0071	HGM
HFIZB218B	B	M2	2	2	50.774	1.470	0.029	0.100	14	0.0071	HGM
HFIZC117B	C	M1	3	1	55.515	1.551	0.028	0.102	14	0.0073	HGM
HFIZC118B	C	M1	3	1	51.129	1.463	0.018	0.102	14	0.0073	HGM
HFIZC119B	C	M1	3	1	50.408	1.413	0.031	0.103	14	0.0073	HGM
HFIZC216B	C	M2	3	2	54.186	1.662	0.027	0.101	14	0.0072	HAT
HFIZC217B	C	M2	3	2	55.937	1.696	0.032	0.100	14	0.0072	HAT
HFIZC218B	C	M2	3	2	55.812	1.570	0.029	0.102	14	0.0073	HAT

* Bad failures occured secondary to the first failure

[1] Modulus is an average of two strain gage values

Average	**55.313**	**1.529**	**0.028**	**Average**	**0.0072**
Standard Dev.	**2.873**	**0.117**	**0.004**	**Standard Dev.**	
Coeff. of Var. [%]	**5.194**	**7.641**	**12.744**	**Coeff. of Var. [%]**	
Min.	**50.408**	**1.264**	**0.018**	**Min.**	**0.0071**
Max.	**61.395**	**1.696**	**0.032**	**Max.**	**0.0073**
Number of Spec.	**20**	**20**	**20**	**Number of Spec.**	**20**


Transverse Compression Properties (TC) -- (CTD)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
10
20
30
40
50
60
70
80
90
100
Transverse Compression Strength [ksi]


Transverse Compression Properties (TC) -- (CTD)
Measured Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
2.0
4.0
Transverse Compression Modulus [Msi]

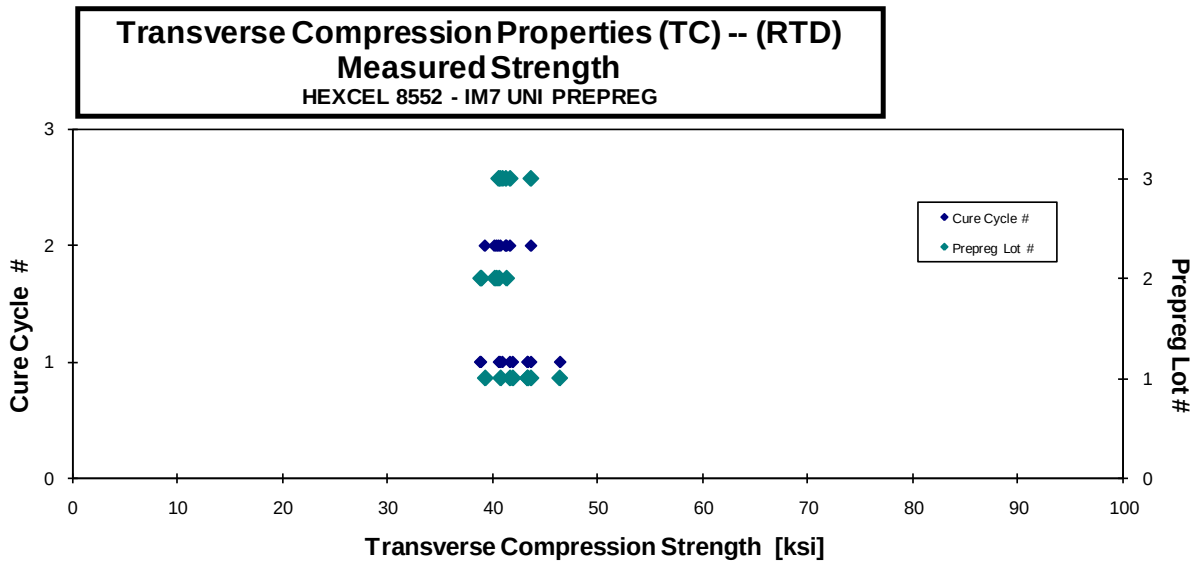
Transverse Compression Properties (TC) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

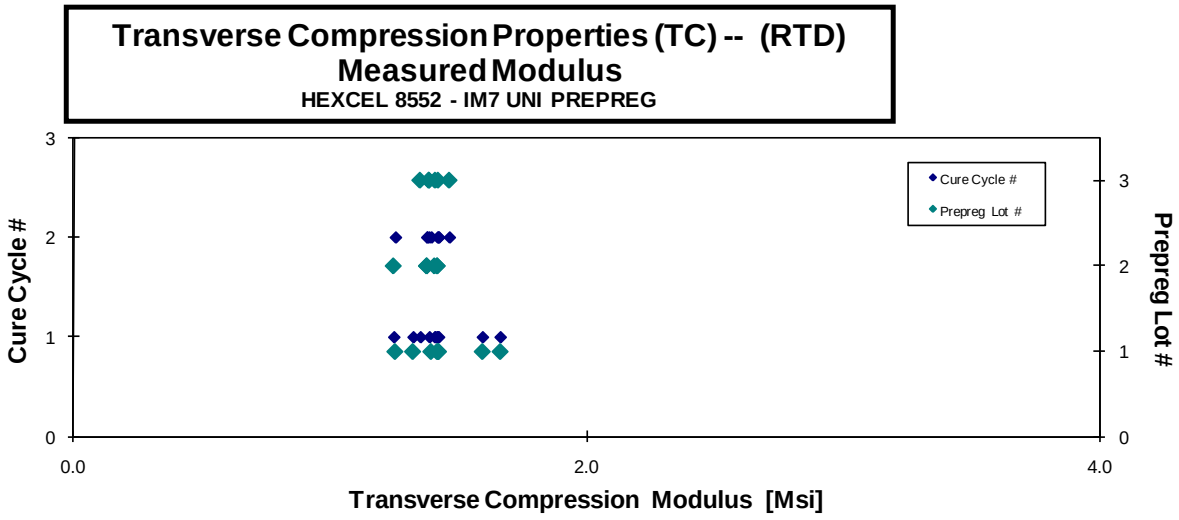
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIZA111A[1]	A	M1	1	1	46.403	1.664	0.022	0.089	14	0.0063	BAB
HFIZA112A[1]	A	M1	1	1	43.300	1.594	0.025	0.094	14	0.0067	BAB
HFIZA113A	A	M1	1	1	43.323	1.324	0.023	0.099	14	0.0071	BAB
HFIZA114A	A	M1	1	1	43.633	1.423	0.024	0.101	14	0.0072	BAB
HFIZA115A	A	M1	1	1	41.892	1.419	0.022	0.101	14	0.0072	BAB
HFIZA212A	A	M2	1	2	39.235	1.424	0.025	0.097	14	0.0069	HGM
HFIZA213A	A	M2	1	2	40.716	1.395	0.024	0.101	14	0.0072	BGM
HFIZA214A	A	M2	1	2	41.630	1.255	0.022	0.103	14	0.0074	HGM
HFIZB112A	B	M1	2	1	38.789	1.419	0.022	0.098	14	0.0070	BGM
HFIZB113A	B	M1	2	1	40.581	1.408	0.025	0.102	14	0.0073	BGM
HFIZB114A	B	M1	2	1	38.857	1.249	0.020	0.103	14	0.0073	BGM
HFIZB213A*	B	M2	2	2	40.340	1.378	0.023	0.102	14	0.0073	HGM / HIT
HFIZB214A*	B	M2	2	2	41.291	1.419	0.026	0.101	14	0.0072	HGM / HIT
HFIZB215A	B	M2	2	2	40.150	1.379	0.022	0.100	14	0.0072	HGM
HFIZC112A	C	M1	3	1	40.681	1.352	0.022	0.099	14	0.0071	HGM
HFIZC113A	C	M1	3	1	40.902	1.411	0.023	0.103	14	0.0074	HGM
HFIZC114A	C	M1	3	1	41.630	1.387	0.025	0.104	14	0.0074	HAT
HFIZC213A	C	M2	3	2	41.218	1.465	0.025	0.103	14	0.0073	HAB
HFIZC214A	C	M2	3	2	43.627	1.386	0.027	0.103	14	0.0074	BGM
HFIZC215A	C	M2	3	2	40.524	1.422	0.023	0.102	14	0.0073	BAT

* Bad failures occured secondary to the first failure

[1] Modulus is an average of two strain gage values

Average	**41.436**	**1.409**	**0.024**	**Average**	**0.0072**
Standard Dev.	**1.864**	**0.093**	**0.002**	**Standard Dev.**	
Coeff. of Var. [%]	**4.497**	**6.634**	**7.615**	**Coeff. of Var. [%]**	
Min.	**38.789**	**1.249**	**0.020**	**Min.**	**0.0063**
Max.	**46.403**	**1.664**	**0.027**	**Max.**	**0.0074**
Number of Spec.	**20**	**20**	**20**	**Number of Spec.**	**20**


Transverse Compression Properties (TC) -- (RTD)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3

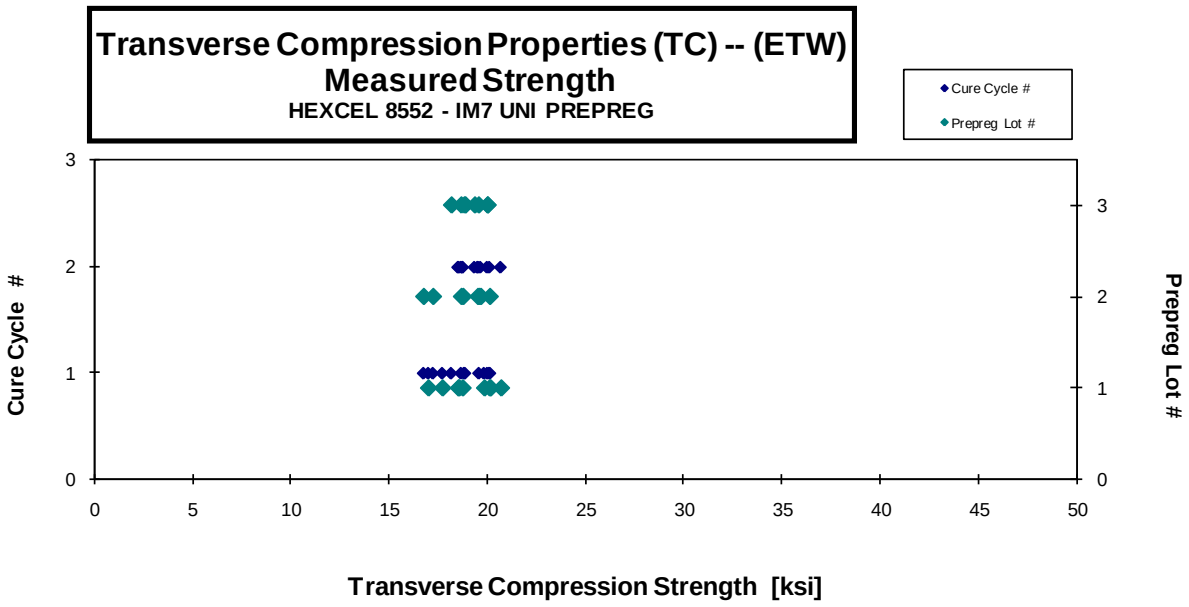

Transverse Compression Properties (TC) -- (RTD)
Measured Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Transverse Compression Modulus [Msi]
0.0
2.0
4.0
0
1
2
3

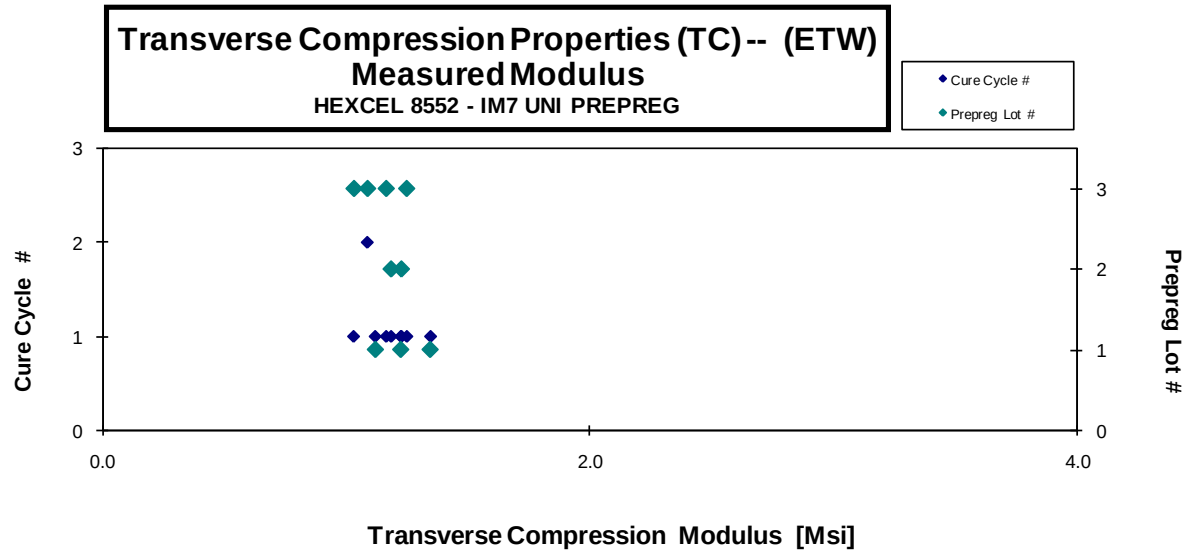
Transverse Compression Properties (TC) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

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	Avg. t_{ply} [in]	Failure Mode
HFIZA11BD	A	M1	1	1	20.168			0.099	14	0.0071	HGM
HFIZA11CD	A	M1	1	1	20.118			0.100	14	0.0071	HGM
HFIZA11DD	A	M1	1	1	17.022			0.100	14	0.0072	HGM
HFIZA11ED	A	M1	1	1	19.857			0.102	14	0.0073	HGM
HFIZA11FD	A	M1	1	1	17.733			0.102	14	0.0073	HGM
HFIZA21AD	A	M2	1	2	18.535			0.101	14	0.0072	HGM
HFIZA21BD	A	M2	1	2	18.757			0.101	14	0.0072	HGM
HFIZA21CD	A	M2	1	2	18.574			0.100	14	0.0072	HGM
HFIZA21ED	A	M2	1	2	20.702			0.102	14	0.0073	HGM
HFIZB119D	B	M1	2	1	17.259			0.101	14	0.0072	HGM
HFIZB11AD	B	M1	2	1	16.779			0.101	14	0.0072	HGM
HFIZB11BD	B	M1	2	1	18.688			0.100	14	0.0072	HGM
HFIZB11CD	B	M1	2	1	19.599			0.101	14	0.0072	HGM
HFIZB219D	B	M2	2	2	19.524			0.100	14	0.0071	HGM
HFIZB21AD	B	M2	2	2	19.676			0.100	14	0.0071	HGM
HFIZB21BD	B	M2	2	2	18.781			0.100	14	0.0071	HGM
HFIZB21CD	B	M2	2	2	20.132			0.100	14	0.0072	HGM
HFIZC11AD	C	M1	3	1	18.895			0.103	14	0.0073	HGM
HFIZC11BD	C	M1	3	1	18.186			0.102	14	0.0073	HGM
HFIZC11CD	C	M1	3	1	18.838			0.102	14	0.0073	HGM
HFIZC11FD	C	M1	3	1	20.021			0.104	14	0.0074	HGM
HFIZC21AD	C	M2	3	2	18.681			0.102	14	0.0073	HGM
HFIZC21BD	C	M2	3	2	19.567			0.102	14	0.0073	HGM
HFIZC21CD	C	M2	3	2	19.370			0.100	14	0.0072	HGM
HFIZC21DD	C	M2	3	2	20.011			0.101	14	0.0072	HGM
HFIZA215D*	A	M1	1	1		1.224	0.018	0.103	14	0.0074	HGM
HFIZA211D*	A	M1	1	1		1.346	0.018	0.087	14	0.0062	HGM
HFIZA216D*	A	M1	1	1		1.119	0.017	0.101	14	0.0072	HGM
HFIZB111D*	B	M1	2	1		1.184	0.017	0.091	14	0.0065	HGM
HFIZB118D*	B	M1	2	1		1.227	0.016	0.100	14	0.0072	HGM
HFIZC111D*	C	M1	3	1		1.249	0.018	0.092	14	0.0066	HGM
HFIZC115D*	C	M1	3	1		1.164	0.018	0.104	14	0.0074	HGM
HFIZC116D*	C	M1	3	1		1.031	0.017	0.103	14	0.0073	HGM
HFIZC219D*	C	M2	3	2		1.087	0.020	0.102	14	0.0073	HGM

* Modulus only coupons

Average	**19.019**	**1.181**	**0.018**	**Average**	**0.0072**
Standard Dev.	**1.041**	**0.094**	**0.001**	**Standard Dev.**	
Coeff. of Var. [%]	**5.474**	**7.994**	**7.577**	**Coeff. of Var. [%]**	
Min.	**16.779**	**1.031**	**0.016**	**Min.**	**0.0062**
Max.	**20.702**	**1.346**	**0.020**	**Max.**	**0.0074**
Number of Spec.	**25**	**9**	**9**	**Number of Spec.**	**34**


Transverse Compression Properties (TC) -- (ETW)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
5
10
15
20
25
30
35
40
45
50
Transverse Compression Strength [ksi]


Transverse Compression Properties (TC) -- (ETW)
Measured Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
2.0
4.0
Transverse Compression Modulus [Msi]

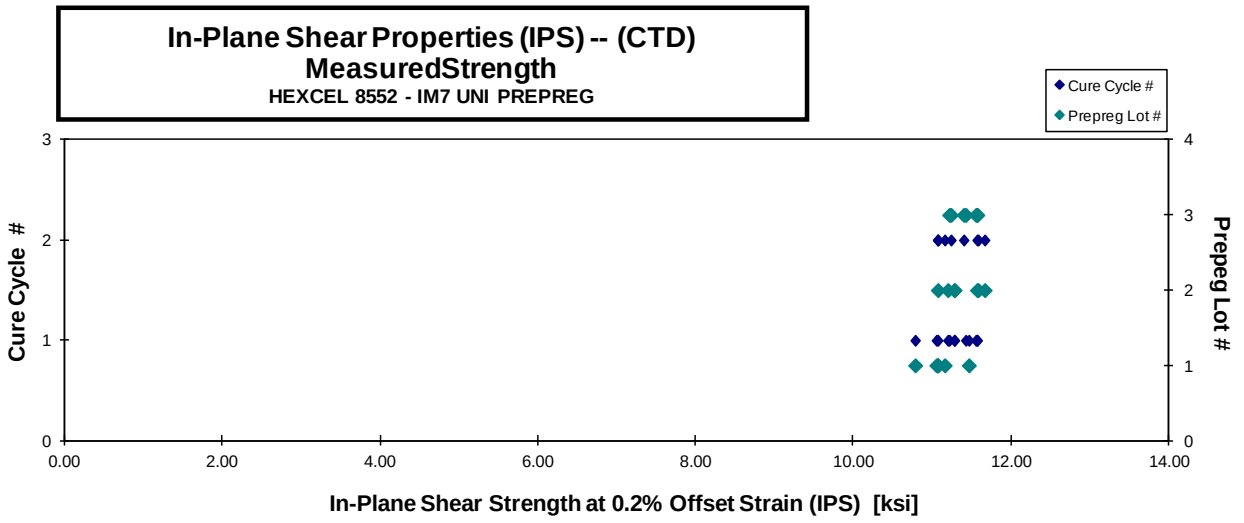
4.5 In-Plane Shear Properties (IPS)

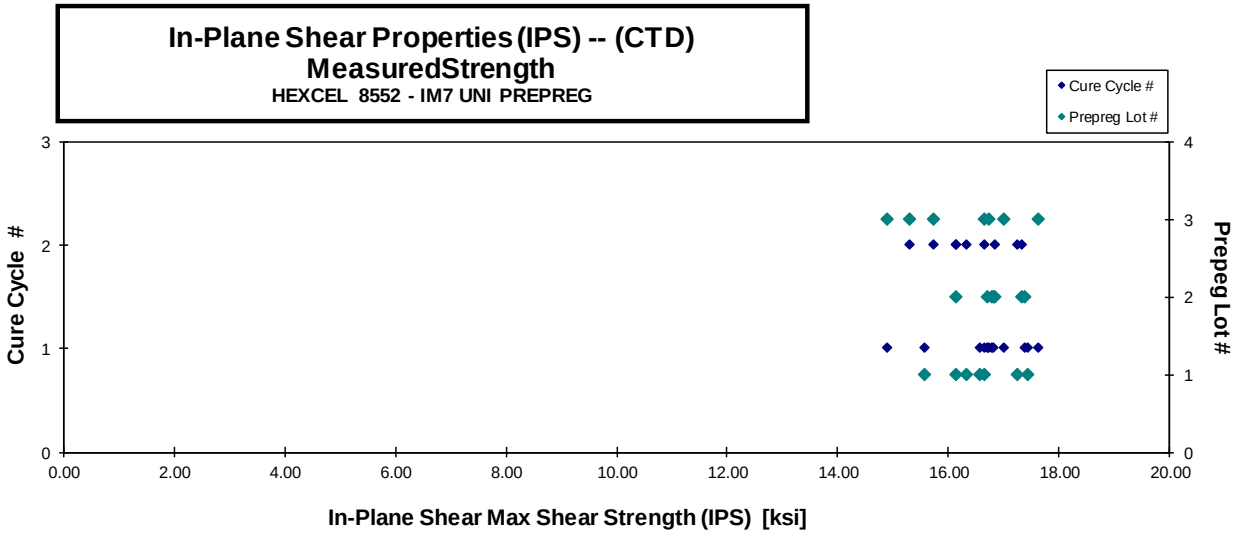
In-Plane Shear Properties (IPS) -- (CTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

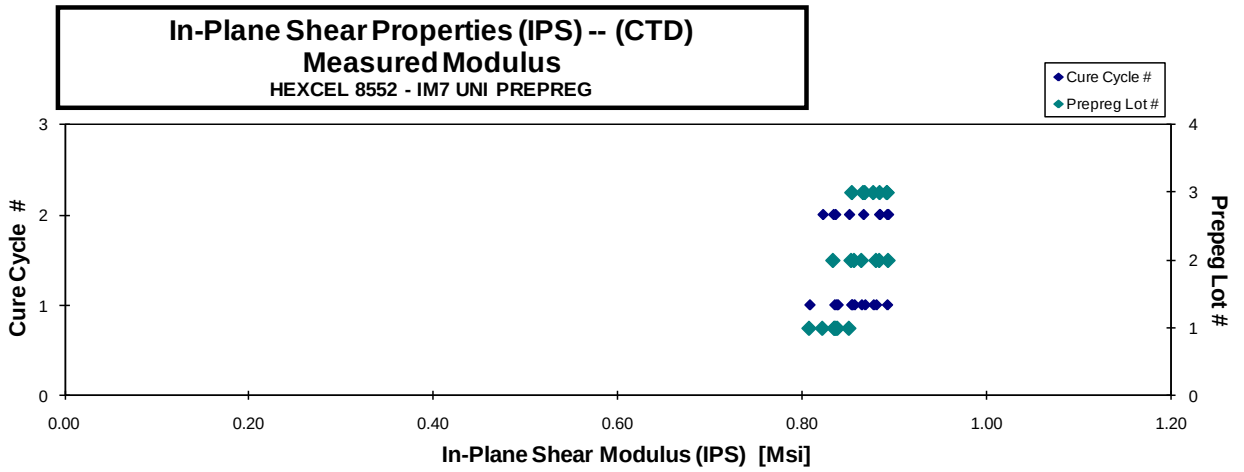
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	0.2% Offset Strength [ksi]	Max Shear Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
HFINA11FB	A	M1	1	1	11.066	16.647	0.835	0.088	12	0.0073
HFINA11GB	A	M1	1	1	11.048	16.561	0.837	0.088	12	0.0073
HFINA11AB	A	M1	1	1	11.460	15.567	0.839	0.082	12	0.0068
HFINA1RMB	A	M1	1	1	10.779	17.427	0.808	0.088	12	0.0074
HFINA21EB	A	M2	1	2	11.063	16.142	0.836	0.088	12	0.0074
HFINA21FB	A	M2	1	2	11.154	16.314	0.851	0.088	12	0.0073
HFINA21AB	A	M2	1	2	11.065	17.242	0.822	0.089	12	0.0074
HFINB11FB	B	M1	2	1	11.277	16.823	0.854	0.087	12	0.0072
HFINB11AB	B	M1	2	1	11.275	16.705	0.865	0.083	12	0.0069
HFINB114B	B	M1	2	1	11.194	17.386	0.857	0.087	12	0.0072
HFINB21EB	B	M2	2	1	11.564	16.772	0.881	0.086	12	0.0072
HFINB21FB	B	M2	2	2	11.661	16.831	0.884	0.087	12	0.0072
HFINB219B	B	M2	2	2	11.067	17.316	0.834	0.088	12	0.0073
HFINB21AB	B	M2	2	2	11.578	16.130	0.894	0.081	12	0.0068
HFINC11EB	C	M1	3	1	11.549	16.732	0.893	0.085	12	0.0071
HFINC11FB	C	M1	3	1	11.420	16.988	0.878	0.086	12	0.0072
HFINC11AB	C	M1	3	1	11.565	14.892	0.869	0.080	12	0.0067
HFINC114B	C	M1	3	1	11.211	17.632	0.855	0.086	12	0.0071
HFINC21EB	C	M2	3	2	11.233	16.658	0.867	0.087	12	0.0073
HFINC21FB	C	M2	3	2	11.564	15.301	0.893	0.082	12	0.0068
HFINC219B	C	M2	3	2	11.395	15.723	0.885	0.081	12	0.0067

All specimens failed to reach 50,000 micro strain.

Average	**11.29**	**16.56**	**0.86**	**Average**	**0.0071**
Standard Dev.	**0.24**	**0.73**	**0.02**	**Standard Dev.**	
Coeff. of Var. [%]	**2.10**	**4.38**	**2.90**	**Coeff. of Var. [%]**	
Min.	**10.78**	**14.89**	**0.81**	**Min.**	**0.0067**
Max.	**11.66**	**17.63**	**0.89**	**Max.**	**0.0074**
Number of Spec.	**21**	**21**	**21**	**Number of Spec.**	**21**


In-Plane Shear Properties (IPS) -- (CTD)
MeasuredStrength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
In-Plane Shear Strength at 0.2% Offset Strain (IPS) [ksi]


In-Plane Shear Properties (IPS) -- (CTD)
MeasuredStrength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
In-Plane Shear Max Shear Strength (IPS) [ksi]


In-Plane Shear Properties (IPS) -- (CTD)
Measured Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.00
0.20
0.40
0.60
0.80
1.00
1.20
In-Plane Shear Modulus (IPS) [Msi]

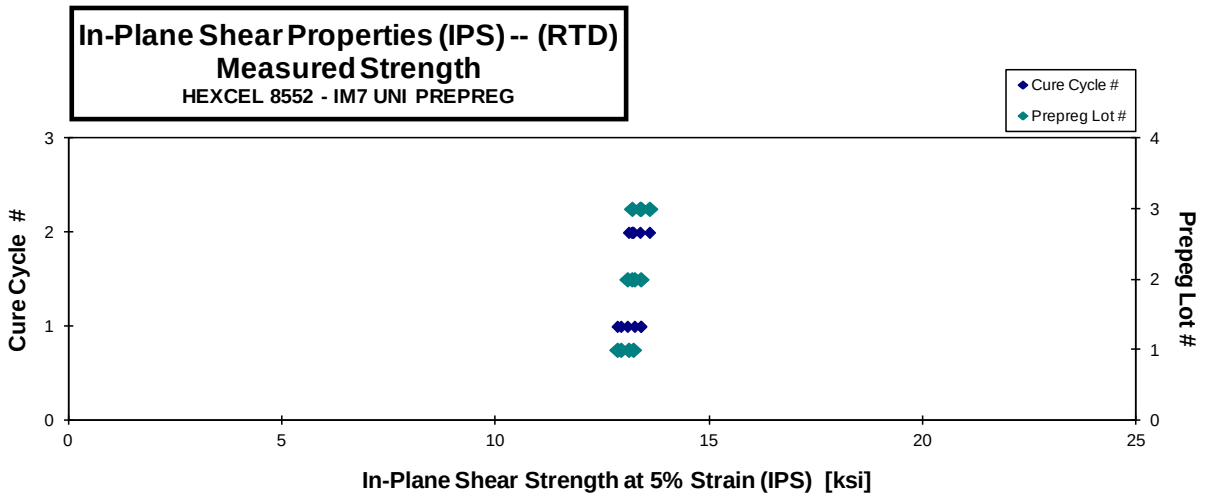
In-Plane Shear Properties (IPS) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

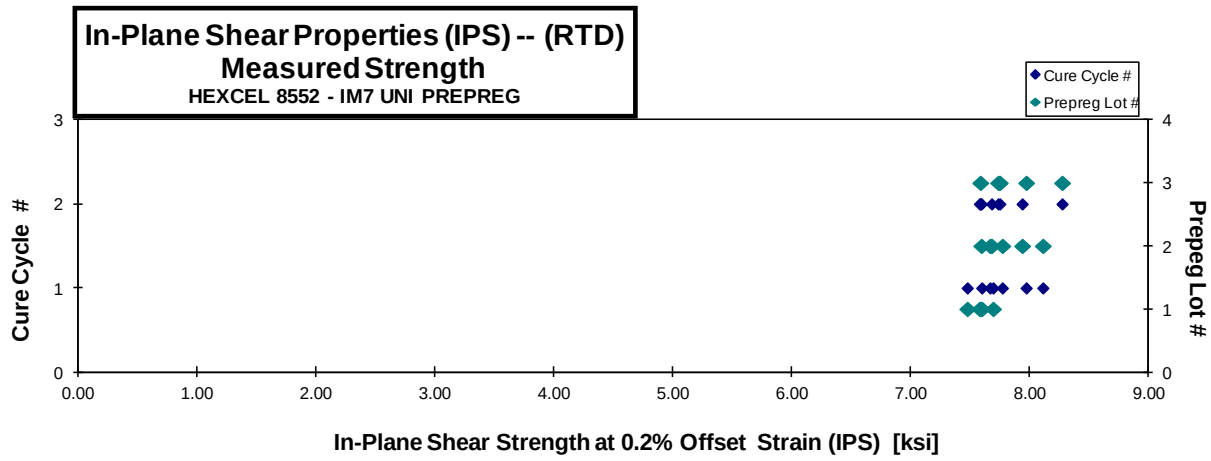
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength at 5% Strain [ksi]	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
HFINA111A**	A	M1	1	1						
HFINA112A*	A	M1	1	1		7.698	0.668	0.090	12	0.0075
HFINA113A	A	M1	1	1	12.855	7.481	0.652	0.089	12	0.0074
HFINA114A	A	M1	1	1	12.939	7.603	0.663	0.088	12	0.0073
HFINA115A**	A	M1	1	1						
HFINA211A**	A	M2	1	2						
HFINA212A	A	M2	1	2	13.228	7.585	0.653	0.089	12	0.0074
HFINA213A	A	M2	1	2	13.121	7.589	0.662	0.088	12	0.0073
HFINB111A	B	M1	2	1	13.259	8.117	0.735	0.082	12	0.0068
HFINB112A	B	M1	2	1	13.092	7.672	0.674	0.088	12	0.0073
HFINB113A	B	M1	2	1	13.405	7.776	0.680	0.088	12	0.0073
HFINB211A*	B	M2	2	2		7.600	0.669	0.088	12	0.0074
HFINB212A*	B	M2	2	2		7.943	0.713	0.084	12	0.0070
HFINB213A	B	M2	2	2	13.197	7.686	0.678	0.088	12	0.0073
HFINC111A**	C	M1	3	1						
HFINC112A	C	M1	3	1	13.407	7.977	0.684	0.088	12	0.0073
HFINC113A**	C	M1	3	1						
HFINC211A	C	M2	3	2	13.609	7.755	0.669	0.089	12	0.0074
HFINC212A	C	M2	3	2	13.200	7.741	0.681	0.088	12	0.0073
HFINC213A*	C	M2	3	2		8.279	0.698	0.087	12	0.0072
HFINC214A	C	M2	3	2	13.387	7.591	0.660	0.087	12	0.0073

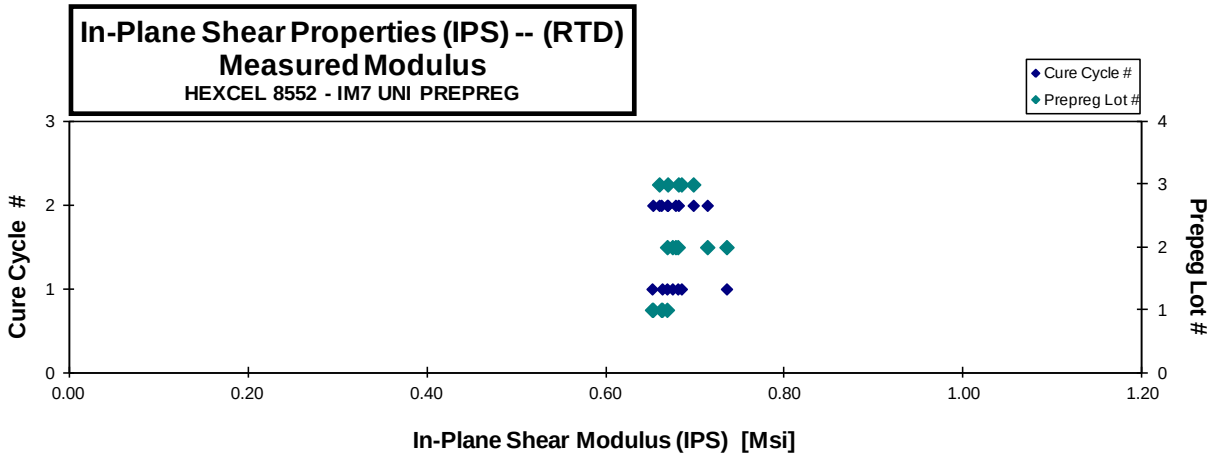
*specimens failed to reach 50,000 micro strain

** data was omitted due to Biaxial Extensometer slippage

Average	**13.225**	**7.756**	**0.677**	**Average**	**0.0073**
Standard Dev.	**0.211**	**0.218**	**0.022**	**Standard Dev.**	
Coeff. of Var. [%]	**1.595**	**2.808**	**3.272**	**Coeff. of Var. [%]**	
Min.	**12.855**	**7.481**	**0.652**	**Min.**	**0.0068**
Max.	**13.609**	**8.279**	**0.735**	**Max.**	**0.0075**
Number of Spec.	**12**	**16**	**16**	**Number of Spec.**	**16**


In-Plane Shear Properties (IPS) -- (RTD)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
0
1
2
3
4
0
5
10
15
20
25
In-Plane Shear Strength at 5% Strain (IPS) [ksi]


In-Plane Shear Properties (IPS) -- (RTD)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
0
1
2
3
4
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
In-Plane Shear Strength at 0.2% Offset Strain (IPS) [ksi]


In-Plane Shear Properties (IPS) -- (RTD)
Measured Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
0
1
2
3
4
0.00
0.20
0.40
0.60
0.80
1.00
1.20
In-Plane Shear Modulus (IPS) [Msi]

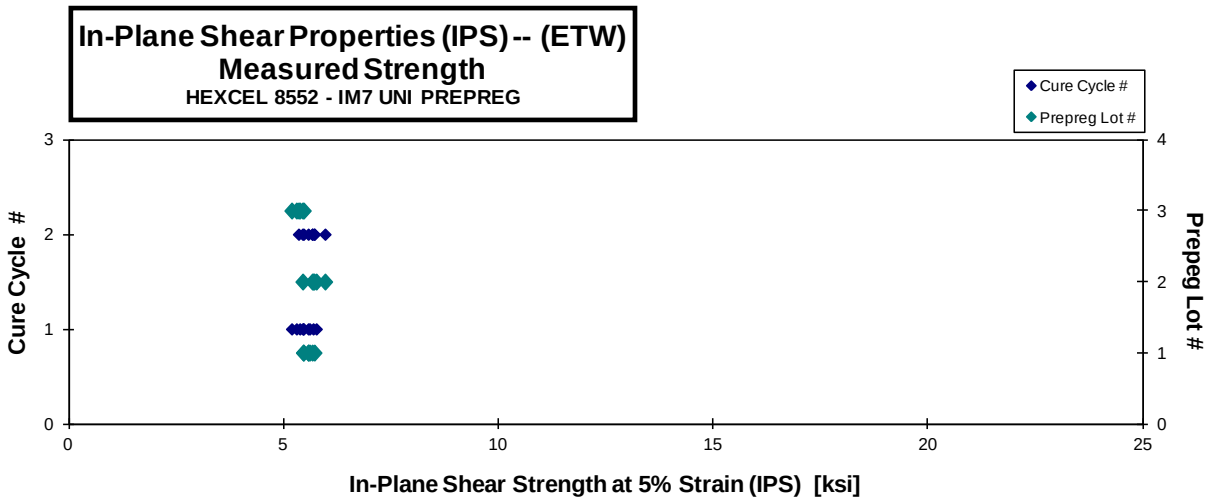
In-Plane Shear Properties (IPS) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

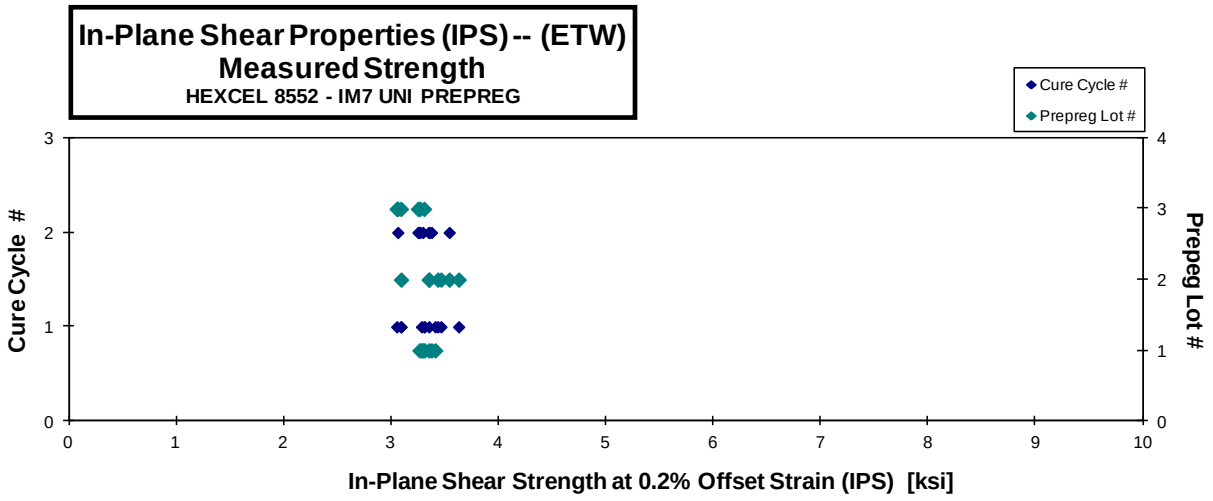
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength at 5% Strain [ksi]	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
HFINA11BD	A	M1	1	1	5.451	3.408	0.308	0.081	12	0.0067
HFINA11CD	A	M1	1	1	5.563	3.349	0.317	0.089	12	0.0075
HFINA11DD	A	M1	1	1	5.597	3.281	0.304	0.089	12	0.0075
HFINA11ED	A	M1	1	1	5.447	3.308	0.313	0.088	12	0.0073
HFINA21BD	A	M2	1	2	5.706	3.262	0.311	0.089	12	0.0074
HFINA21CD	A	M2	1	2	5.657	3.373	0.315	0.088	12	0.0073
HFINA21DD	A	M2	1	2	5.563	3.292	0.313	0.088	12	0.0073
HFINB11BD	B	M1	2	1	5.751	3.627	0.321	0.082	12	0.0068
HFINB11CD	B	M1	2	1	5.678	3.462	0.311	0.087	12	0.0073
HFINB11DD*	B	M1	2	1		3.432	0.315	0.087	12	0.0072
HFINB11ED	B	M1	2	1	5.434	3.090	0.303	0.086	12	0.0072
HFINB21BD	B	M2	2	2	5.954	3.539	0.336	0.083	12	0.0069
HFINB21CD	B	M2	2	2	5.657	3.350	0.305	0.088	12	0.0073
HFINB21DD	B	M2	2	2	5.700	3.349	0.307	0.087	12	0.0073
HFINC11BD	C	M1	3	1	5.289	3.304	0.308	0.082	12	0.0069
HFINC11CD	C	M1	3	1	5.366	3.088	0.283	0.087	12	0.0073
HFINC11DD	C	M1	3	1	5.178	3.050	0.286	0.086	12	0.0072
HFINC21BD	C	M2	3	2	5.431	3.248	0.282	0.089	12	0.0074
HFINC21CD	C	M2	3	2	5.456	3.265	0.283	0.088	12	0.0073
HFINC21DD	C	M2	3	2	5.338	3.060	0.299	0.087	12	0.0072

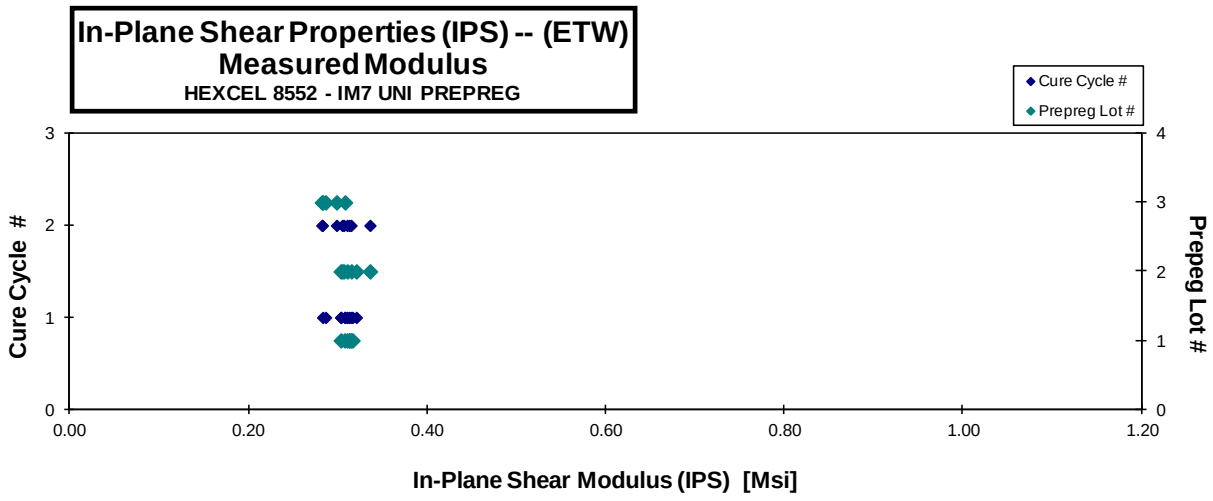
ALL SPECIMENS: SHEAR MODULUS STRAIN RANGE CUTS INTO NON-LINEAR REGION

* Unable to reach 50,000 microstrain

Average	**5.538**	**3.307**	**0.306**	**Average**	**0.0072**
Standard Dev.	**0.187**	**0.153**	**0.014**	**Standard Dev.**	
Coeff. of Var. [%]	**3.384**	**4.631**	**4.513**	**Coeff. of Var. [%]**	
Min.	**5.178**	**3.050**	**0.282**	**Min.**	**0.0067**
Max.	**5.954**	**3.627**	**0.336**	**Max.**	**0.0075**
Number of Spec.	**19**	**20**	**20**	**Number of Spec.**	**20**


In-Plane Shear Properties (IPS) -- (ETW)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Strength at 5% Strain (IPS) [ksi]


In-Plane Shear Properties (IPS) -- (ETW)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Strength at 0.2% Offset Strain (IPS) [ksi]


In-Plane Shear Properties (IPS) -- (ETW)
Measured Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
In-Plane Shear Modulus (IPS) [Msi]

4.6 "33/0/67" Unnotched Compression 0 Properties (UNC0)

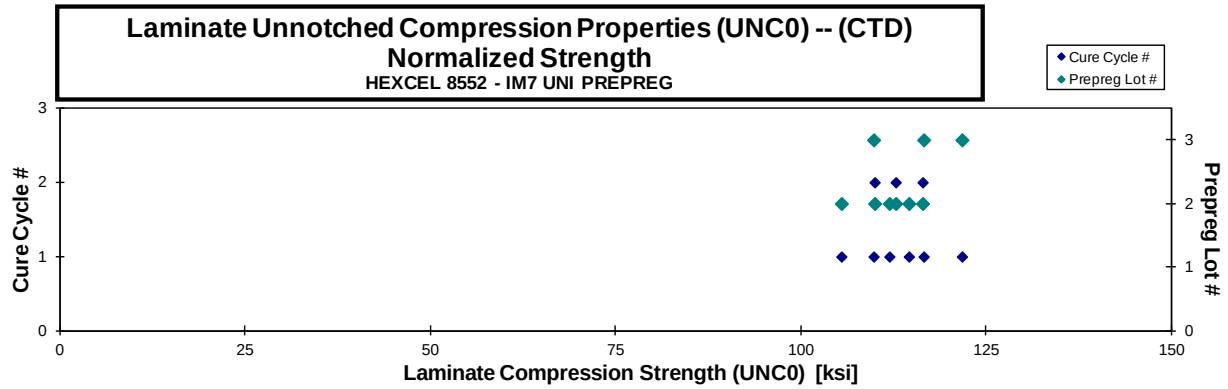
Laminate Unnotched Compression Properties (UNC0) -- (CTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

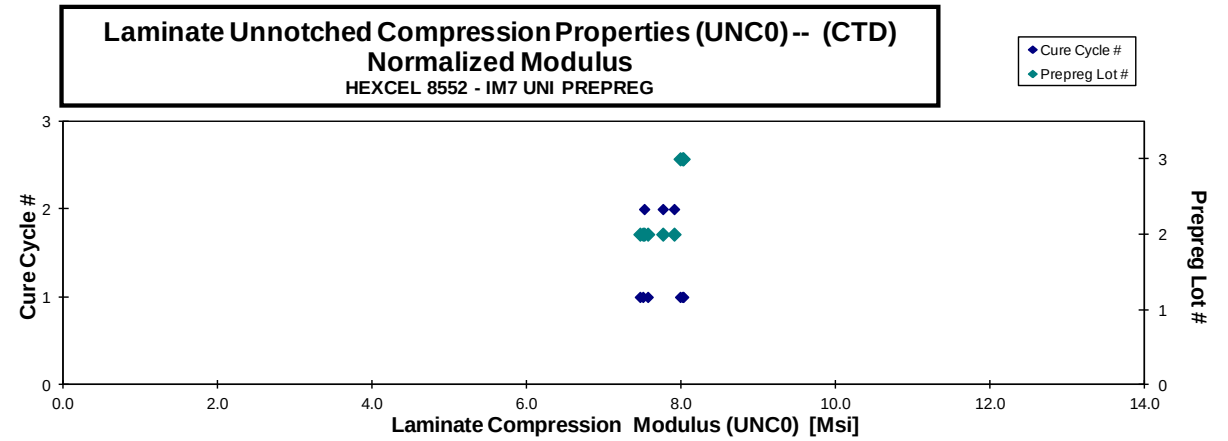
normalizing t_{ply} [in]: 0.0072

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]
HFIRB115B	B	M1	2	1	110.782	7.426	0.060	0.109	15	BGM	0.0073	111.944	7.504
HFIRB116B	B	M1	2	1	104.576	7.503	0.038	0.109	15	BGM	0.0073	105.464	7.567
HFIRB117B	B	M1	2	1	114.578	7.466	0.030	0.108	15	BGM	0.0072	114.578	7.466
HFIRB215B	B	M2	2	2	111.952	7.849	0.045	0.109	15	BGM	0.0073	112.799	7.908
HFIRB216B	B	M2	2	2	108.713	7.436	0.033	0.109	15	BGM	0.0073	109.954	7.521
HFIRB217B	B	M2	2	2	115.841	7.723	0.041	0.109	15	BGM/BAB	0.0072	116.431	7.762
HFIRC115B	C	M1	3	1	112.448	7.704	0.047	0.112	15	BGM	0.0075	116.578	7.987
HFIRC116B	C	M1	3	1	118.903	7.839	0.033	0.111	15	HAT	0.0074	121.747	8.027
HFIRC117B	C	M1	3	1	106.963	7.809	0.044	0.111	15	BAT	0.0074	109.819	8.017

Batch A Cure Cycle 1 and 2 and Batch C Cure Cycle 2 has improper layup so data was removed

Average	111.640	7.639	0.041	$Average_{norm}$	0.0073	113.257	7.751
Standard Dev.	4.484	0.180	0.009	$Standard\ Dev._{norm}$		4.748	0.239
Coeff. of Var. [%]	4.017	2.357	22.360	Coeff. of Var. $[\%]_{norm}$		4.192	3.083
Min.	104.576	7.426	0.030	Min.	0.0072	105.464	7.466
Max.	118.903	7.849	0.060	Max.	0.0075	121.747	8.027
Number of Spec.	9	9	9	Number of Spec.	9	9	9





Laminate Unnotched Compression Properties (UNC0) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

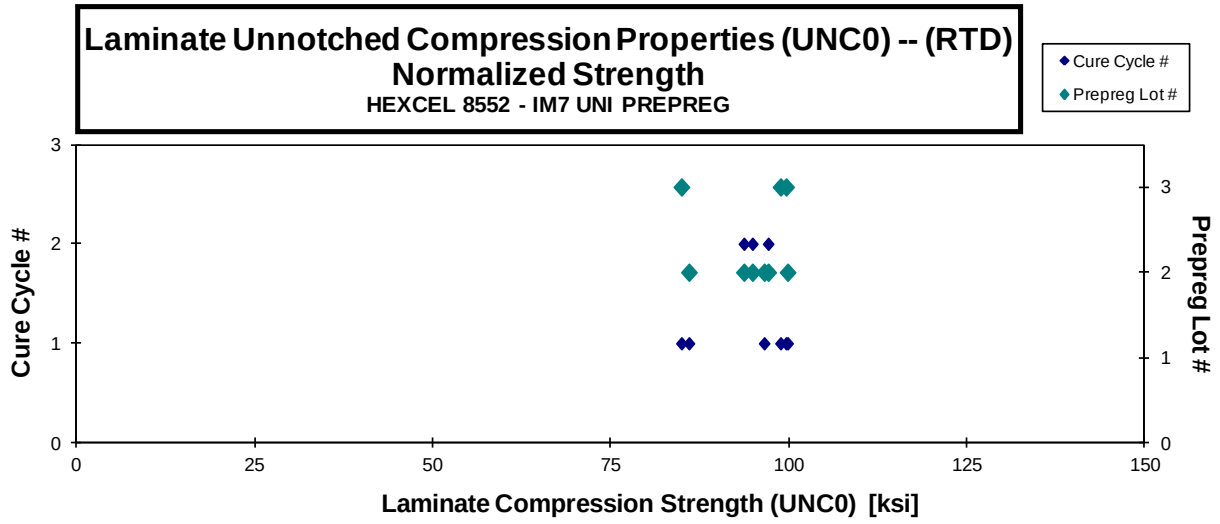
normalizing t_{ply} [in]: 0.0072

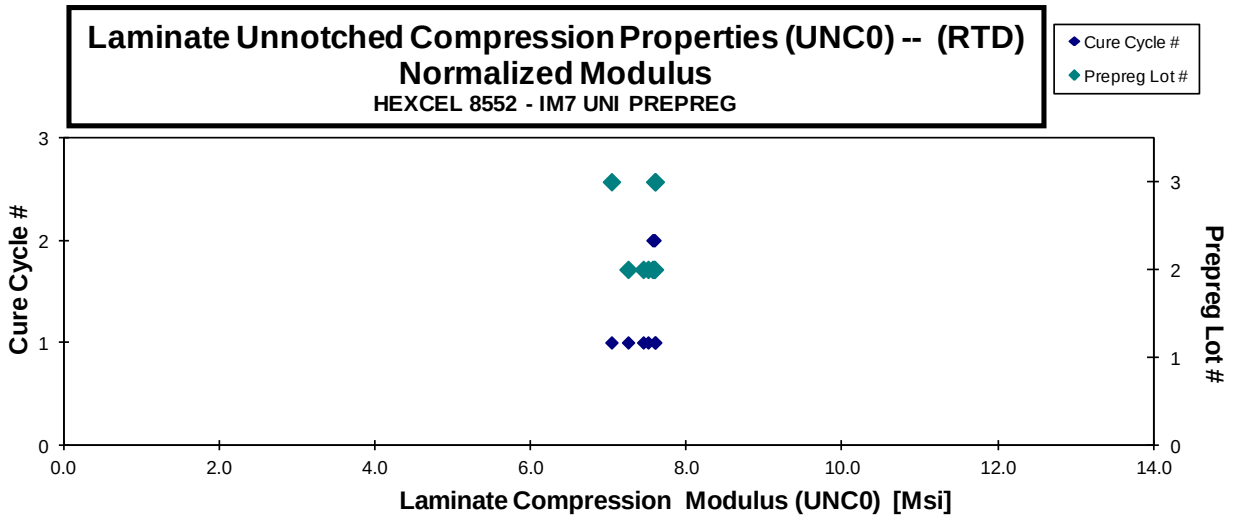
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFIRB111A	B	M1	2	1	91.558	7.732	0.035	0.101	15	BGM	0.0068	85.878	7.253
HFIRB112A	B	M1	2	1	97.669	7.541	0.037	0.107	15	BGM	0.0071	96.449	7.447
HFIRB113A	B	M1	2	1	98.542	7.419	0.035	0.109	15	BGM	0.0073	99.743	7.509
HFIRB211A	B	M2	2	2	96.791	7.564	0.036	0.108	15	BAT	0.0072	97.015	7.582
HFIRB212A	B	M2	2	2	93.387	7.550	0.037	0.108	15	BGM	0.0072	93.603	7.567
HFIRB213A	B	M2	2	2	94.371	7.559	0.034	0.108	15	BGM	0.0072	94.794	7.592
HFIRC111A	C	M1	3	1	89.785	7.451	0.032	0.102	15	BGM	0.0068	84.825	7.039
HFIRC112A	C	M1	3	1	98.082	7.544	0.033	0.109	15	BAT	0.0072	98.747	7.595
HFIRC113A	C	M1	3	1	95.814	7.319	0.039	0.112	15	BGM	0.0075	99.525	7.602

Batch A Cure Cycle 1 and 2 and Batch C Cure Cycle 2 has improper layup so data was removed

Average	95.111	7.520	0.035
Standard Dev.	3.061	0.115	0.002
Coeff. of Var. [%]	3.218	1.530	6.397
Min.	89.785	7.319	0.032
Max.	98.542	7.732	0.039
Number of Spec.	9	9	9

$Average_{norm}$	0.0071	94.509	7.465
$Standard\ Dev._{norm}$		5.587	0.195
Coeff. of Var. $[\%]_{norm}$		5.912	2.615
Min.	0.0068	84.825	7.039
Max.	0.0075	99.743	7.602
Number of Spec.	9	9	9





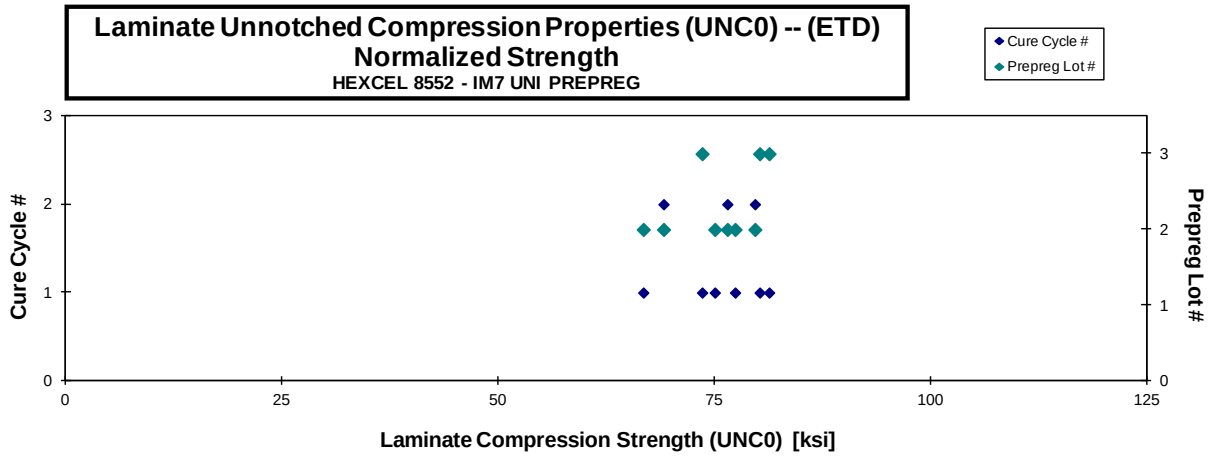
Laminate Unnotched Compression Properties (UNC0) -- (ETD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

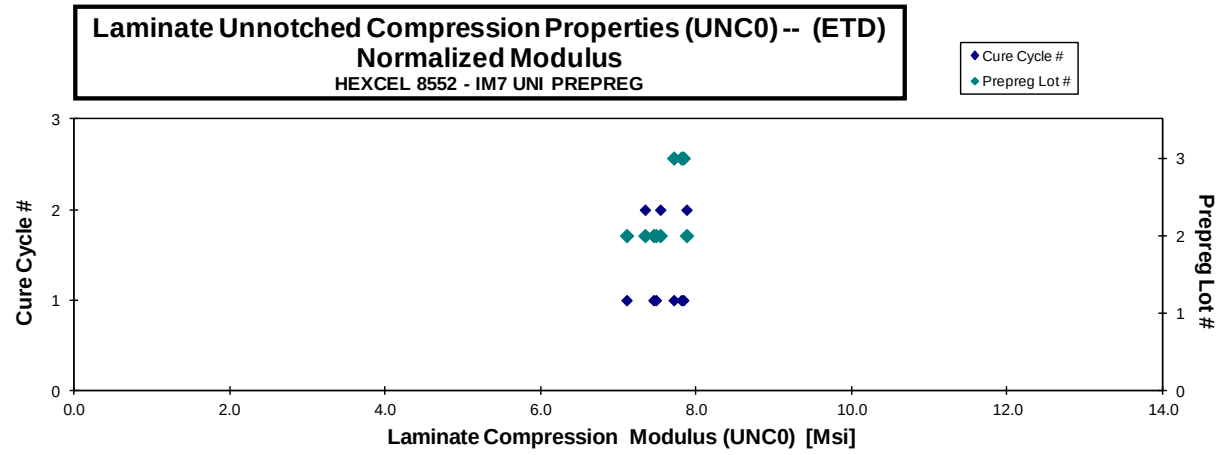
normalizing t_{ply} [in]: 0.0072

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]
HFIRB11CC	B	M1	2	1	75.164	7.462	0.032	0.108	15	BAB	0.0072	75.059	7.452
HFIRB11DC	B	M1	2	1	66.566	7.458	0.031	0.108	15	HGM	0.0072	66.781	7.483
HFIRB118C	B	M1	2	1	77.437	7.109	0.032	0.108	15	HAB	0.0072	77.401	7.105
HFIRB219C	B	M2	2	2	78.236	7.400	0.025	0.110	15	BAB	0.0073	79.697	7.538
HFIRB21DC	B	M2	2	2	81.637	7.834	0.025	0.101	15	BAT	0.0067	76.509	7.342
HFIRB218C	B	M2	2	2	68.787	7.838	0.031	0.109	15	BGM	0.0072	69.127	7.876
HFIRC11DC	C	M1	3	1	71.555	7.594	0.034	0.111	15	BGM	0.0074	73.587	7.810
HFIRC1RMC	C	M1	3	1	79.904	7.697	0.033	0.110	15	BGM	0.0073	81.341	7.835
HFIRC1RNC	C	M1	3	1	76.899	7.390	0.022	0.113	15	BGM	0.0075	80.246	7.712

Batch A Cure Cycle 1 and 2 and Batch C Cure Cycle 2 has improper layup so data was removed

Average	75.132	7.531	0.030	$Average_{norm}$	0.0072	75.528	7.573
Standard Dev.	5.118	0.235	0.004	$Standard\ Dev._{norm}$		4.992	0.258
Coeff. of Var. [%]	6.813	3.123	14.554	$Coeff.\ of\ Var.\ [\%]_{norm}$		6.610	3.407
Min.	66.566	7.109	0.022	Min.	0.0067	66.781	7.105
Max.	81.637	7.838	0.034	Max.	0.0075	81.341	7.876
Number of Spec.	9	9	9	Number of Spec.	9	9	9





Laminate Unnotched Compression Properties (UNC0) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIRB11ED	B	M1	2	1	64.567			0.110	15	BGM	0.0073	65.543	
HFIRB11FD	B	M1	2	1	61.927			0.110	15	BGM	0.0073	62.978	
HFIRB11GD	B	M1	2	1	64.966			0.107	15	BGM	0.0072	64.645	
HFIRB11HD	B	M1	2	1	74.964			0.102	15	BGM	0.0068	70.950	
HFIRB21ED	B	M2	2	2	52.845			0.110	15	HAT	0.0073	53.938	
HFIRB21FD	B	M2	2	2	57.458			0.109	15	BGM	0.0073	58.229	
HFIRB21GD	B	M2	2	2	62.622			0.108	15	BGM	0.0072	62.786	
HFIRC11ED	C	M1	3	1	52.059			0.113	15	BAT	0.0075	54.357	
HFIRC11FD	C	M1	3	1	60.193			0.113	15	BGM	0.0075	63.045	
HFIRC11GD	C	M1	3	1	59.456			0.110	15	BGM	0.0073	60.649	
HFIRB11ID*	B	M1	2	1				0.099	15	BAT			
HFIRB114D	B	M1	2	1	69.360	7.748	0.019	0.110	15	BAB	0.0073	70.795	7.908
HFIRB1RMD	B	M1	2	1	69.098	7.898	0.020	0.107	15	BAT	0.0071	68.245	7.801
HFIRB21HD[1]	B	M2	2	2		7.963	0.015	0.103	15	HIT	0.0069		7.614
HFIRB21ID	B	M2	2	2	70.790	8.216	0.019	0.103	15	HAB	0.0068	67.185	7.797
HFIRB214D	B	M2	2	2	67.719	8.128	0.013	0.108	15	BGM	0.0072	67.635	8.118
HFIRC11HD	C	M1	3	1	65.131	7.745	0.011	0.103	15	BAB	0.0069	62.327	7.412
HFIRC114D	C	M1	3	1	67.033	7.531	0.021	0.112	15	BAT	0.0075	69.588	7.818
HFIRC118D	C	M1	3	1	68.351	7.298	0.021	0.110	15	BAB	0.0074	69.827	7.456

Modulus not reported due to improper strain gage adhesive used

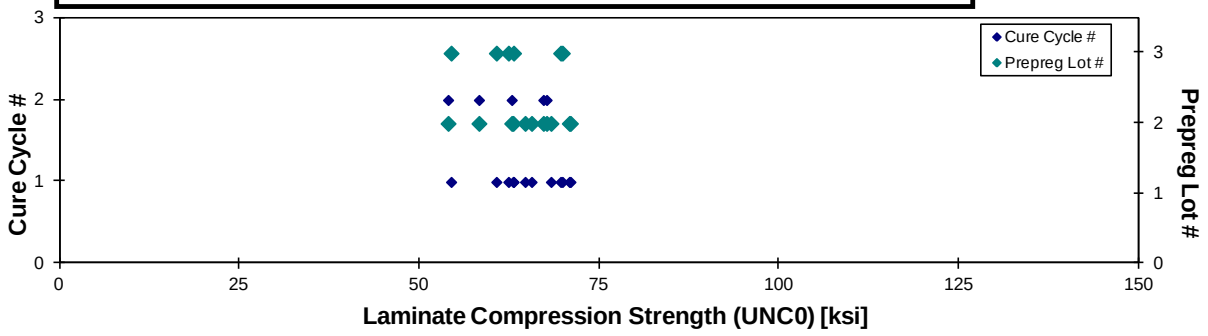
Batch A Cure Cycle 1 and 2 and Batch C Cure Cycle 2 has improper layup so data was removed

* Specimens have uneven grip marks so data is not reported

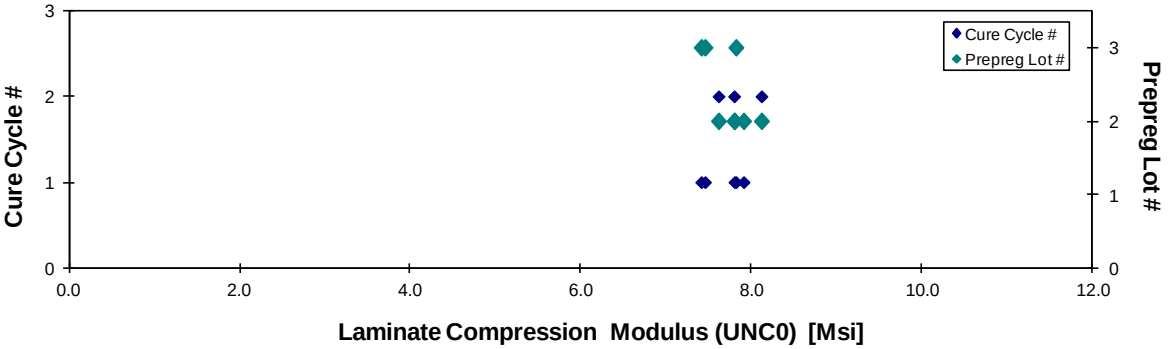
[1] Strength not reported due to unacceptable failure mode.

Average	**64.032**	**7.816**	**0.017**	**$Average_{norm}$**	**0.0072**	**64.278**	**7.740**
Standard Dev.	**6.208**	**0.303**	**0.004**	**$Standard\ Dev._{norm}$**		**5.289**	**0.236**
Coeff. of Var. [%]	**9.696**	**3.882**	**22.032**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**8.228**	**3.043**
Min.	**52.059**	**7.298**	**0.011**	**Min.**	**0.0068**	**53.938**	**7.412**
Max.	**74.964**	**8.216**	**0.021**	**Max.**	**0.0075**	**70.950**	**8.118**
Number of Spec.	**17**	**8**	**8**	**Number of Spec.**	**18**	**17**	**8**

Laminate Unnotched Compression Properties (UNC0) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Compression Properties (UNC0) -- (ETW)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



4.7 "50/0/50" Unnotched Tension 0 Properties (UNT0)

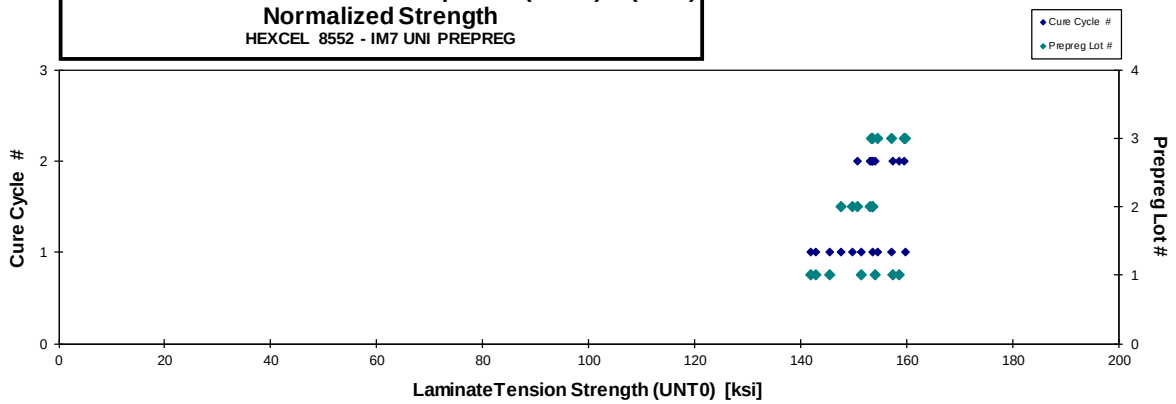
Laminate Unnotched Tension Properties (UNT0) -- (CTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

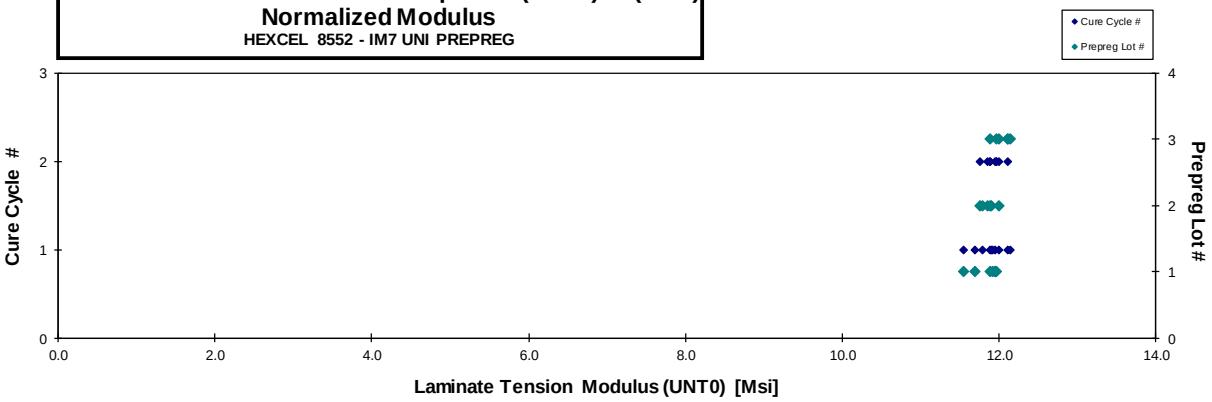
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFIPA116B	A	M1	1	1	140.452	11.491	0.059	8	LGM	0.0073	142.931	11.694
HFIPA117B	A	M1	1	1	138.380	11.251	0.059	8	LGM	0.0074	142.064	11.551
HFIPA118B	A	M1	1	1	149.109	11.735	0.059	8	LGM	0.0073	151.439	11.919
HFIPA119B	A	M1	1	1	138.826	11.390	0.060	8	LGM	0.0076	145.615	11.947
HFIPA216B	A	M2	1	2	153.285	11.488	0.060	8	LGM	0.0075	158.607	11.887
HFIPA217B	A	M2	1	2	148.863	11.543	0.060	8	LGM	0.0075	154.204	11.958
HFIPA218B	A	M2	1	2	153.556	11.680	0.059	8	LGM	0.0074	157.333	11.968
HFIPB116B	B	M1	2	1	149.540	11.876	0.058	8	LGM	0.0072	149.929	11.907
HFIPB117B	B	M1	2	1	154.720	11.886	0.057	8	LGM	0.0071	153.556	11.797
HFIPB118B	B	M1	2	1	146.994	11.837	0.058	8	LWB	0.0072	147.675	11.892
HFIPB216B	B	M2	2	2	150.463	11.832	0.058	8	LWB	0.0072	150.767	11.856
HFIPB217B	B	M2	2	2	152.509	11.686	0.058	8	LGM	0.0072	153.523	11.763
HFIPB218B	B	M2	2	2	150.815	11.835	0.058	8	LAB	0.0073	153.040	12.010
HFIPC116B	C	M1	3	1	154.979	11.838	0.058	8	LGM	0.0073	157.176	12.006
HFIPC117B	C	M1	3	1	156.681	11.909	0.059	8	LGM	0.0073	159.854	12.151
HFIPC118B	C	M1	3	1	148.810	11.670	0.060	8	LGM	0.0075	154.579	12.122
HFIPC216B	C	M2	3	2	151.797	11.830	0.058	8	LGM	0.0073	153.554	11.967
HFIPC217B	C	M2	3	2	152.579	11.818	0.058	8	LGM	0.0072	153.462	11.886
HFIPC218B	C	M2	3	2	155.700	11.820	0.059	8	LGM	0.0074	159.664	12.121

Average	149.898	11.706	$Average_{norm}$	0.0073	152.578	11.916
Standard Dev.	5.417	0.189	$Standard\ Dev._{norm}$		5.172	0.147
Coeff. of Var. [%]	3.614	1.612	$Coeff.\ of\ Var.\ [\%]_{norm}$		3.389	1.236
Min.	138.380	11.251	Min.	0.0071	142.064	11.551
Max.	156.681	11.909	Max.	0.0076	159.854	12.151
Number of Spec.	19	19	Number of Spec.	19	19	19

Laminate Unnotched Tension Properties (UNT0) -- (CTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT0) -- (CTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

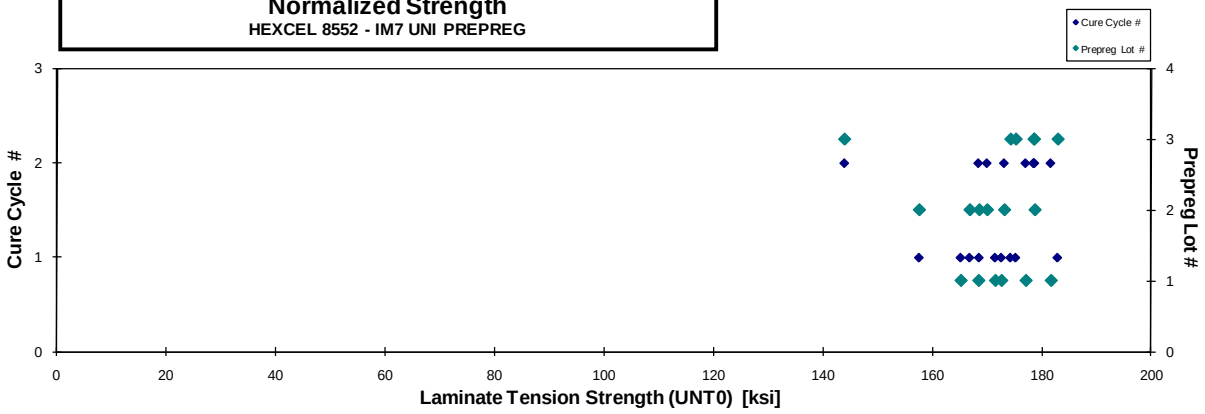
normalizing t_{ply} [in]: 0.0072

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]
HFIPA111A*	A	M1	1	1								
HFIPA112A	A	M1	1	1	160.028	11.338	0.059	8	LWT/LWB	0.0074	165.214	11.706
HFIPA113A	A	M1	1	1	165.993	11.753	0.060	8	LGM	0.0075	172.621	12.222
HFIPA114A	A	M1	1	1	170.162	12.003	0.058	8	LWT/LAB	0.0073	171.491	12.097
HFIPA211A	A	M2	1	2	170.274	11.629	0.057	8	LAT/LAB	0.0071	168.451	11.504
HFIPA212A	A	M2	1	2	166.740	11.334	0.061	8	LGM	0.0076	177.065	12.036
HFIPA213A	A	M2	1	2	177.388	11.745	0.059	8	LWB/LWT	0.0074	181.648	12.027
HFIPB111A	B	M1	2	1	167.506	12.347	0.054	8	LGM	0.0068	157.619	11.618
HFIPB112A	B	M1	2	1	164.698	11.723	0.058	8	LWT/LAB	0.0073	166.842	11.875
HFIPB113A	B	M1	2	1	169.650	12.020	0.057	8	LWT/LWB	0.0072	168.570	11.943
HFIPB211A	B	M2	2	2	165.886	11.892	0.059	8	LGM	0.0074	170.014	12.188
HFIPB212A	B	M2	2	2	169.856	11.745	0.059	8	LGM	0.0073	173.149	11.973
HFIPB213A	B	M2	2	2	177.983	12.004	0.058	8	LWB	0.0072	178.704	12.052
HFIPC111A	C	M1	3	1	168.776	11.646	0.059	8	LWT	0.0074	174.295	12.027
HFIPC112A	C	M1	3	1	169.224	11.688	0.060	8	LWT	0.0075	175.247	12.104
HFIPC113A	C	M1	3	1	182.062	12.029	0.058	8	LGM	0.0072	182.904	12.084
HFIPC211A	C	M2	3	2	150.387	12.455	0.055	8	LGM	0.0069	143.990	11.926
HFIPC212A	C	M2	3	2	173.159	11.766	0.059	8	LGM	0.0074	178.570	12.134
HFIPC213A	C	M2	3	2	175.088	12.104	0.059	8	LGM	0.0073	178.533	12.342

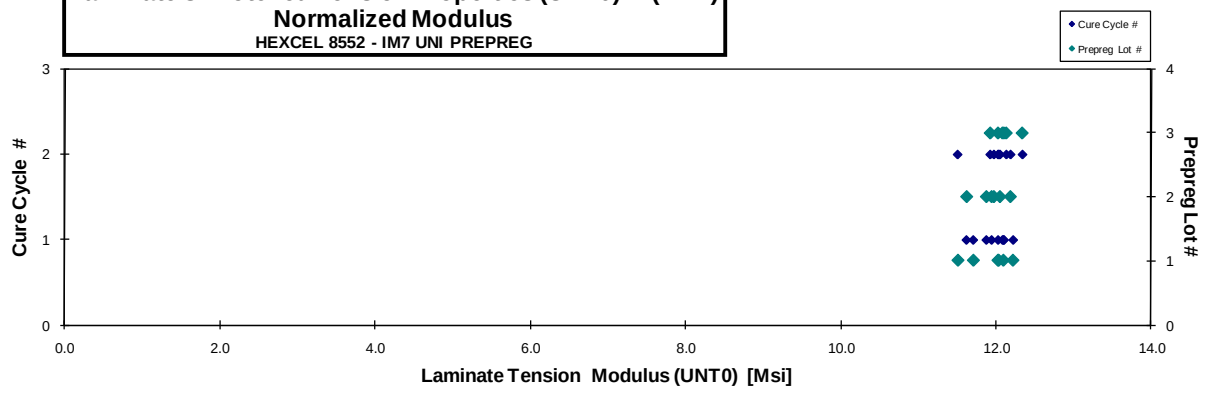
*Data from was removed due to thickness taper due to pinching on edge of panel during bagging.

Average	169.159	11.846	$Average_{norm}$	0.0073	171.385	11.992
Standard Dev.	7.077	0.296	$Standard\ Dev._{norm}$		9.304	0.211
Coeff. of Var. [%]	4.183	2.496	$Coeff.\ of\ Var.\ [\%]_{norm}$		5.429	1.757
Min.	150.387	11.334	Min.	0.0068	143.990	11.504
Max.	182.062	12.455	Max.	0.0076	182.904	12.342
Number of Spec.	18	18	Number of Spec.	18	18	18

Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



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Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

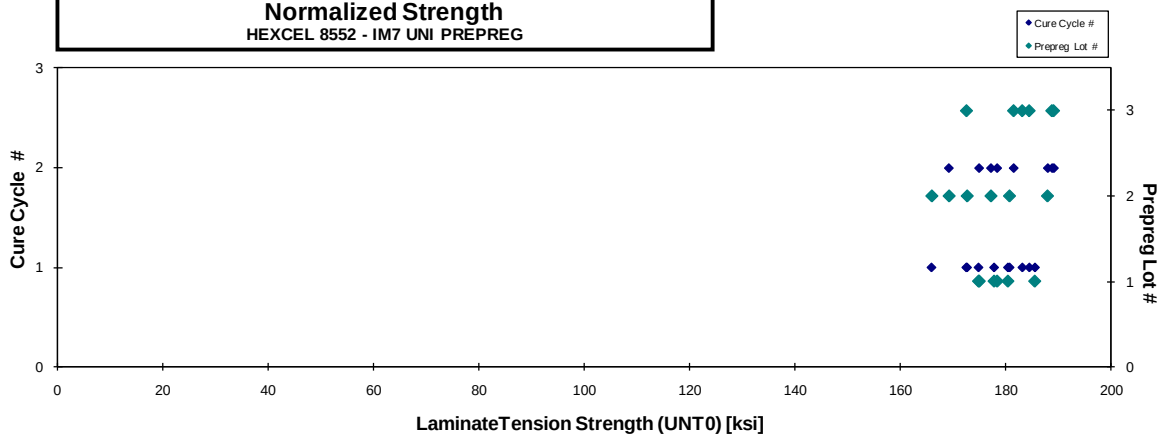
normalizing t_{ply} [in]: 0.0072

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]
HFIPA111A*	A	M1	1	1								
HFIPA112A	A	M1	1	1	160.028	11.338	0.059	8	LWT/LWB	0.0074	165.214	11.706
HFIPA113A	A	M1	1	1	165.993	11.753	0.060	8	LGM	0.0075	172.621	12.222
HFIPA114A	A	M1	1	1	170.162	12.003	0.058	8	LWT/LAB	0.0073	171.491	12.097
HFIPA211A	A	M2	1	2	170.274	11.629	0.057	8	LAT/LAB	0.0071	168.451	11.504
HFIPA212A	A	M2	1	2	166.740	11.334	0.061	8	LGM	0.0076	177.065	12.036
HFIPA213A	A	M2	1	2	177.388	11.745	0.059	8	LWB/LWT	0.0074	181.648	12.027
HFIPB111A	B	M1	2	1	167.506	12.347	0.054	8	LGM	0.0068	157.619	11.618
HFIPB112A	B	M1	2	1	164.698	11.723	0.058	8	LWT/LAB	0.0073	166.842	11.875
HFIPB113A	B	M1	2	1	169.650	12.020	0.057	8	LWT/LWB	0.0072	168.570	11.943
HFIPB211A	B	M2	2	2	165.886	11.892	0.059	8	LGM	0.0074	170.014	12.188
HFIPB212A	B	M2	2	2	169.856	11.745	0.059	8	LGM	0.0073	173.149	11.973
HFIPB213A	B	M2	2	2	177.983	12.004	0.058	8	LWB	0.0072	178.704	12.052
HFIPC111A	C	M1	3	1	168.776	11.646	0.059	8	LWT	0.0074	174.295	12.027
HFIPC112A	C	M1	3	1	169.224	11.688	0.060	8	LWT	0.0075	175.247	12.104
HFIPC113A	C	M1	3	1	182.062	12.029	0.058	8	LGM	0.0072	182.904	12.084
HFIPC211A	C	M2	3	2	150.387	12.455	0.055	8	LGM	0.0069	143.990	11.926
HFIPC212A	C	M2	3	2	173.159	11.766	0.059	8	LGM	0.0074	178.570	12.134
HFIPC213A	C	M2	3	2	175.088	12.104	0.059	8	LGM	0.0073	178.533	12.342

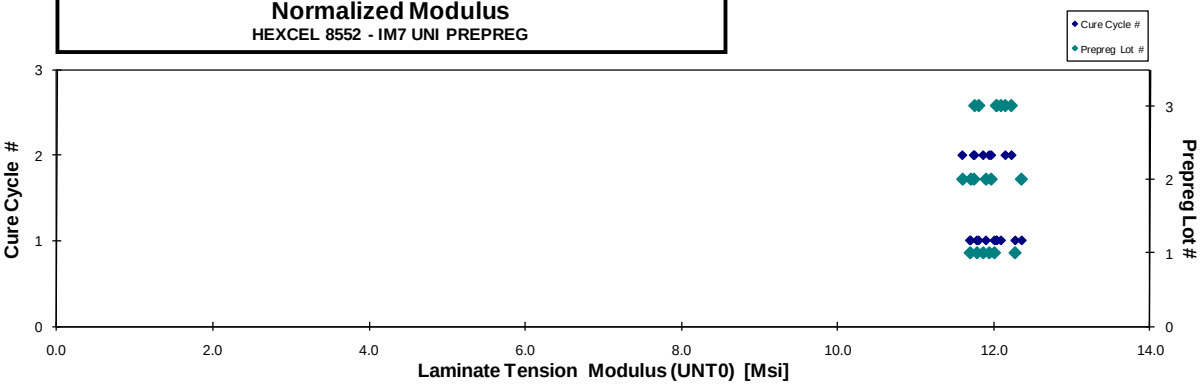
*Data from was removed due to thickness taper due to pinching on edge of panel during bagging.

Average	169.159	11.846	$Average_{norm}$	0.0073	171.385	11.992
Standard Dev.	7.077	0.296	$Standard\ Dev._{norm}$		9.304	0.211
Coeff. of Var. [%]	4.183	2.496	$Coeff.\ of\ Var.\ [\%]_{norm}$		5.429	1.757
Min.	150.387	11.334	Min.	0.0068	143.990	11.504
Max.	182.062	12.455	Max.	0.0076	182.904	12.342
Number of Spec.	18	18	Number of Spec.	18	18	18

Laminate Unnotched Tension Properties (UNT0) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT0) -- (ETW)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



4.8 "25/50/25" Unnotched Tension 1 Properties (UNT1)

Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

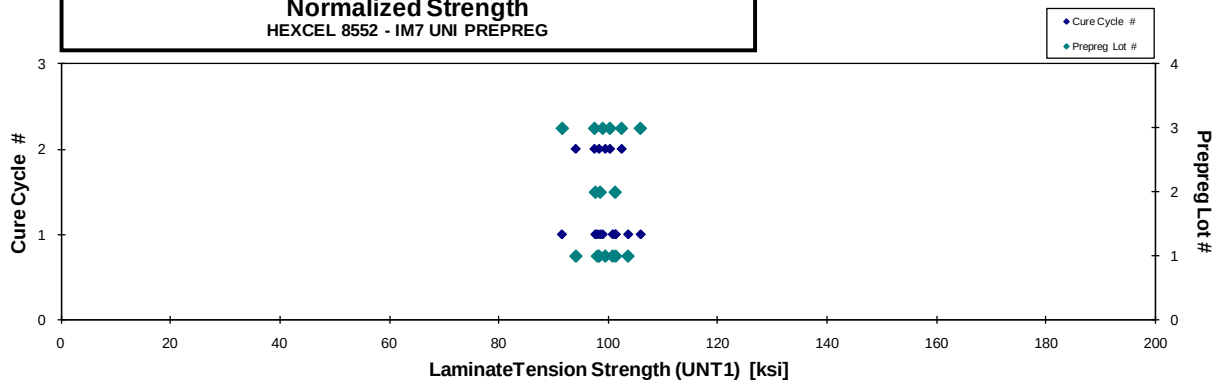
normalizing t_{ply} [in]: 0.0072

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]
HFIAA116B	A	M1	1	1	98.622	8.511	0.118	16	LGM / AGM	0.0074	101.333	8.745
HFIAA117B	A	M1	1	1	99.922	8.181	0.116	16	AGM	0.0073	100.789	8.252
HFIAA118B	A	M1	1	1	102.825	8.274	0.116	16	AWT	0.0073	103.584	8.335
HFIAA119B	A	M1	1	1	95.738	8.311	0.118	16	AGM	0.0074	98.009	8.508
HFIAA215B	A	M2	1	2	98.424	8.242	0.116	16	LGM	0.0073	99.449	8.328
HFIAA216B	A	M2	1	2	97.607	8.342	0.116	16	LGM	0.0073	98.313	8.402
HFIAA217B	A	M2	1	2	93.700	8.231	0.116	16	LWB	0.0072	94.093	8.265
HFIAB115B	B	M1	2	1	97.175	8.253	0.116	16	AGM	0.0072	97.639	8.293
HFIAB116B	B	M1	2	1	97.723	8.290	0.116	16	AWT	0.0073	98.514	8.357
HFIAB117B	B	M1	2	1	101.304	8.519	0.115	16	AGM	0.0072	101.245	8.514
HFIAC115B	C	M1	3	1	96.981	8.237	0.118	16	AGM / DGM	0.0073	98.974	8.406
HFIAC116B	C	M1	3	1	104.197	8.331	0.117	16	AGM	0.0073	105.840	8.462
HFIAC111B	C	M1	3	1	99.363	7.913	0.106	16	AGM	0.0066	91.601	7.295
HFIAC215B	C	M2	3	2	95.780	8.362	0.117	16	AGM	0.0073	97.485	8.511
HFIAC216B	C	M2	3	2	100.348	8.450	0.115	16	AWT	0.0072	100.290	8.446
HFIAC217B	C	M2	3	2	100.956	8.414	0.117	16	AWB	0.0073	102.402	8.535

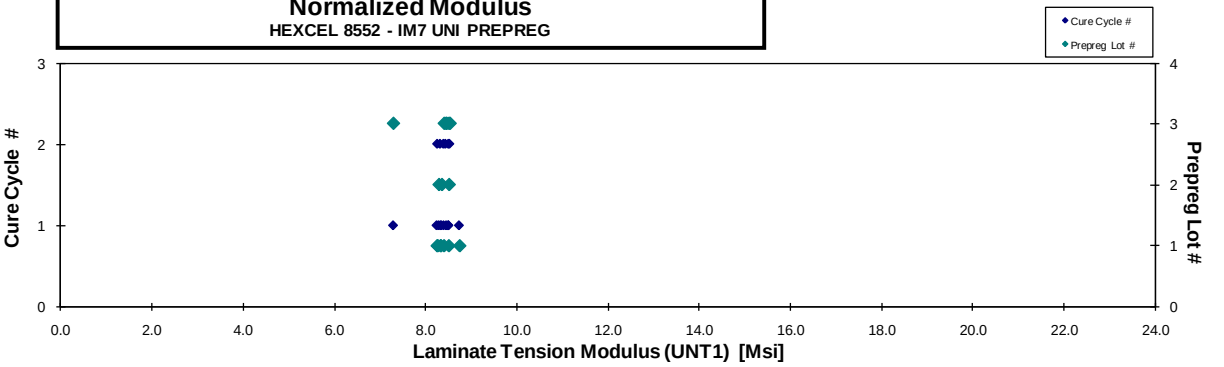
Data for HFIAB21XB was removed due to unbalanced layup.

Average	**98.792**	**8.304**	**Average$_{norm}$**	**0.0072**	**99.348**	**8.353**
Standard Dev.	**2.750**	**0.145**	**Standard Dev.$_{norm}$**		**3.442**	**0.309**
Coeff. of Var. [%]	**2.784**	**1.742**	**Coeff. of Var. [%]$_{norm}$**		**3.464**	**3.696**
Min.	**93.700**	**7.913**	**Min.**	**0.0066**	**91.601**	**7.295**
Max.	**104.197**	**8.519**	**Max.**	**0.0074**	**105.840**	**8.745**
Number of Spec.	**16**	**16**	**Number of Spec.**	**16**	**16**	**16**

Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



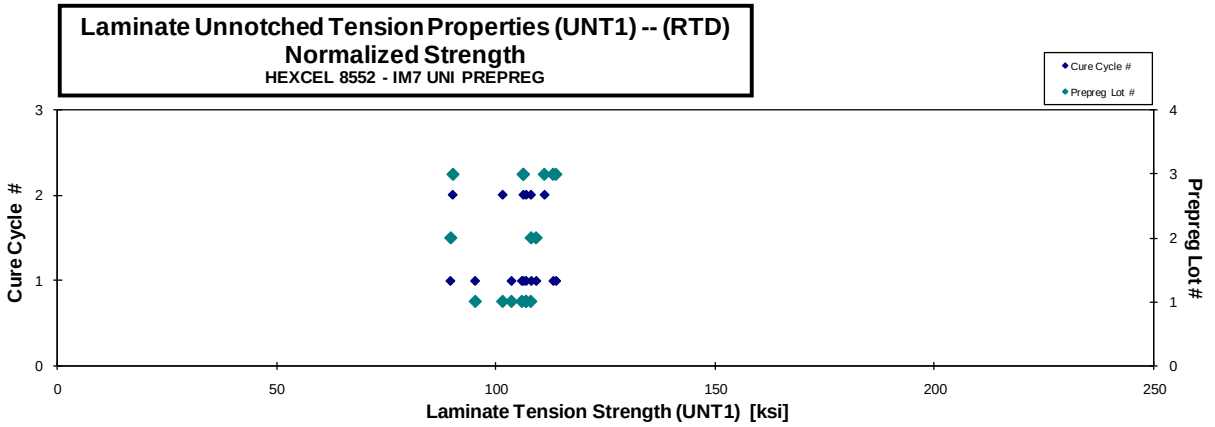
Laminate Unnotched Tension Properties (UNT1) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

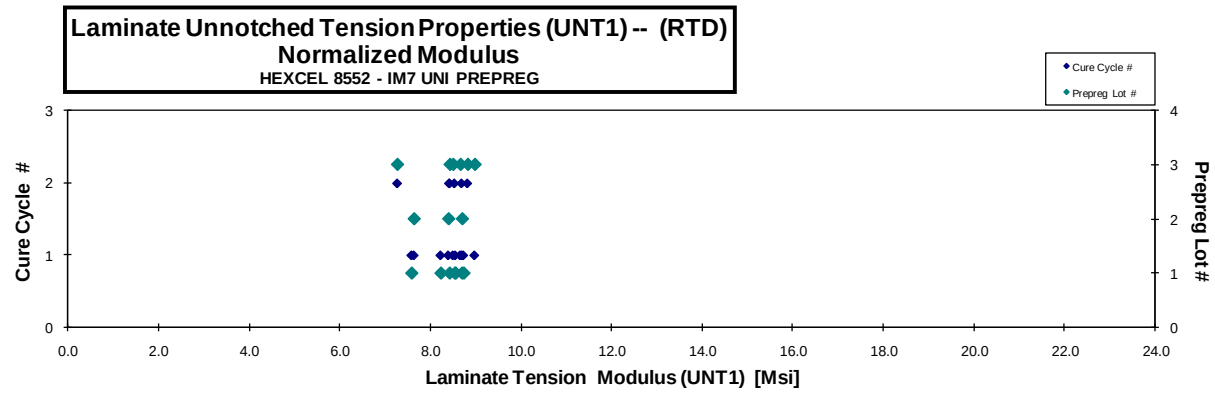
normalizing t_{ply} [in]: 0.0072

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]
HFIAA111A	A	M1	1	1	102.024	8.116	0.117	16	AWT	0.0073	103.515	8.235
HFIAA112A	A	M1	1	1	101.477	8.093	0.108	16	AGM	0.0068	95.194	7.592
HFIAA113A	A	M1	1	1	103.733	8.310	0.119	16	AGM	0.0074	106.855	8.560
HFIAA114A	A	M1	1	1	103.511	8.543	0.118	16	AWB	0.0074	105.892	8.739
HFIAA212A	A	M2	1	2	105.753	8.366	0.118	16	AWT	0.0074	107.956	8.541
HFIAA213A	A	M2	1	2	104.779	8.528	0.118	16	AGM	0.0073	106.871	8.698
HFIAA214A	A	M2	1	2	101.098	8.393	0.116	16	AGM	0.0072	101.493	8.426
HFIAB111A	B	M1	2	1	96.381	8.227	0.107	16	AGM	0.0067	89.563	7.645
HFIAB112A	B	M1	2	1	107.280	8.554	0.117	16	AGM	0.0073	109.174	8.705
HFIAB113A	B	M1	2	1	106.160	8.257	0.117	16	AWT	0.0073	108.049	8.404
HFIAC112A	C	M1	3	1	110.004	8.691	0.119	16	AWB	0.0074	113.712	8.984
HFIAC113A	C	M1	3	1	102.238	8.186	0.120	16	AWT	0.0075	106.246	8.507
HFIAC114A	C	M1	3	1	111.125	8.519	0.117	16	AWB	0.0073	113.070	8.668
HFIAC211A	C	M2	3	2	97.791	7.900	0.106	16	AWB	0.0066	90.080	7.277
HFIAC212A	C	M2	3	2	108.416	8.618	0.118	16	AGM	0.0074	111.066	8.828
HFIAC213A	C	M2	3	2	102.436	8.133	0.119	16	AGM	0.0075	106.230	8.435

Data for HFIAB 21XA was removed due to unbalanced lay up.

	Strength [ksi]	Modulus [Msi]		$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
Average	104.013	8.340	$Average_{norm}$	104.685	8.390
Standard Dev.	4.054	0.224	$Standard\ Dev._{norm}$	7.276	0.480
Coeff. of Var. [%]	3.898	2.682	$Coeff.\ of\ Var.\ [\%]_{norm}$	6.950	5.727
Min.	96.381	7.900	Min.	89.563	7.277
Max.	111.125	8.691	Max.	113.712	8.984
Number of Spec.	16	16	Number of Spec.	16	16





Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

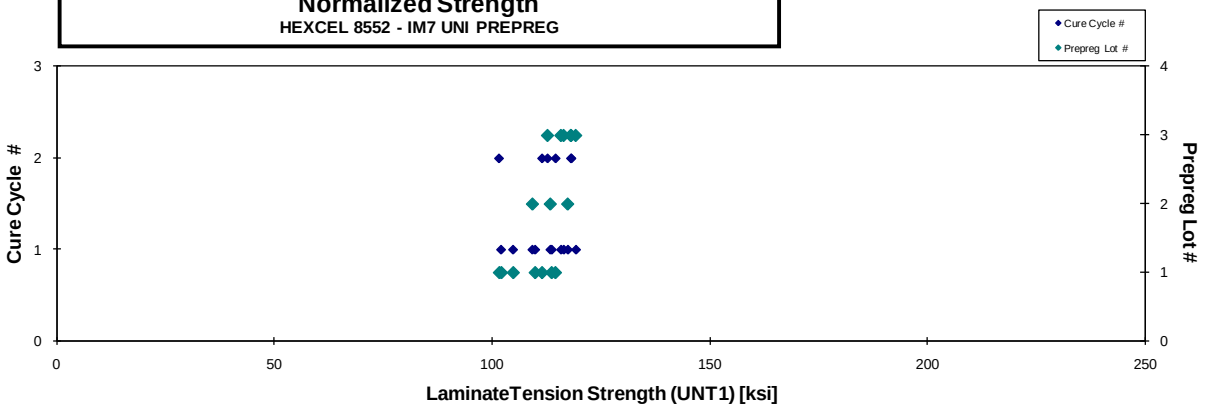
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFIAA11AD**	A	M1	1	1		7.968	0.117	16	*	0.0073		8.098
HFIAA11BD	A	M1	1	1	109.007	7.825	0.108	16	AGM/AWB	0.0067	102.115	7.330
HFIAA11CD	A	M1	1	1	111.481	7.933	0.118	16	AGM	0.0073	113.739	8.094
HFIAA11DD	A	M1	1	1	107.732	8.074	0.118	16	AGM	0.0073	109.929	8.238
HFIAA11FD	A	M1	1	1	104.093	7.898	0.116	16	AGM	0.0073	104.861	7.956
HFIAA218D	A	M2	1	2	112.321	7.906	0.118	16	DGM	0.0073	114.612	8.067
HFIAA219D	A	M2	1	2	109.153	7.460	0.118	16	DGM	0.0074	111.521	7.622
HFIAA21AD	A	M2	1	2	108.151	7.522	0.108	16	DGM/AWT/AWB	0.0068	101.642	7.069
HFIAB118D	B	M1	2	1	111.994	8.292	0.117	16	DGM/AGM	0.0073	113.420	8.398
HFIAB119D	B	M1	2	1	115.193	8.207	0.117	16	DGM	0.0073	117.443	8.367
HFIAB11AD	B	M1	2	1	106.398	7.155	0.118	16	DGM/AWB	0.0074	109.292	7.350
HFIAC118D	C	M1	3	1	111.908	8.128	0.119	16	DGM	0.0075	115.875	8.416
HFIAC119D	C	M1	3	1	119.118	8.105	0.115	16	DGM	0.0072	119.290	8.117
HFIAC11AD	C	M1	3	1	112.566	7.754	0.119	16	DGM	0.0075	116.491	8.024
HFIAC218D	C	M2	3	2	115.435	7.926	0.118	16	DGM	0.0074	118.224	8.117
HFIAC219D	C	M2	3	2	114.366	8.241	0.119	16	DGM	0.0074	118.155	8.514
HFIAC21AD	C	M2	3	2	115.103	8.187	0.113	16	LWT/DGM	0.0071	112.772	8.021

**SPECIMEN SLIPPED DURING TESTING, STRENGTH NOT REPORTED

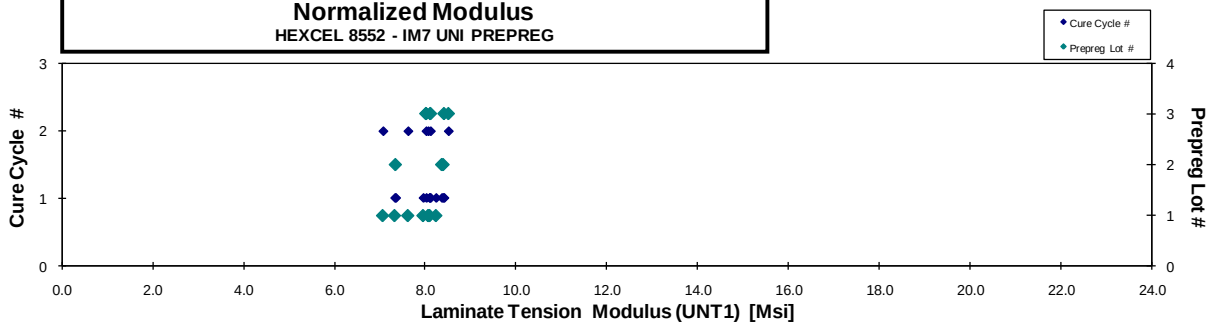
Data for HFIAB 21XD was removed due to unbalanced lay up.

Average	**111.501**	**7.916**	**Average$_{norm}$**	**0.0073**	**112.461**	**7.988**
Standard Dev.	**3.904**	**0.305**	**Standard Dev.$_{norm}$**		**5.606**	**0.412**
Coeff. of Var. [%]	**3.501**	**3.857**	**Coeff. of Var. [%]$_{norm}$**		**4.985**	**5.162**
Min.	**104.093**	**7.155**	**Min.**	**0.0067**	**101.642**	**7.069**
Max.	**119.118**	**8.292**	**Max.**	**0.0075**	**119.290**	**8.514**
Number of Spec.	**16**	**17**	**Number of Spec.**	**17**	**16**	**17**

Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



4.9 "10/80/10" Unnotched Tension 2 Properties (UNT2)

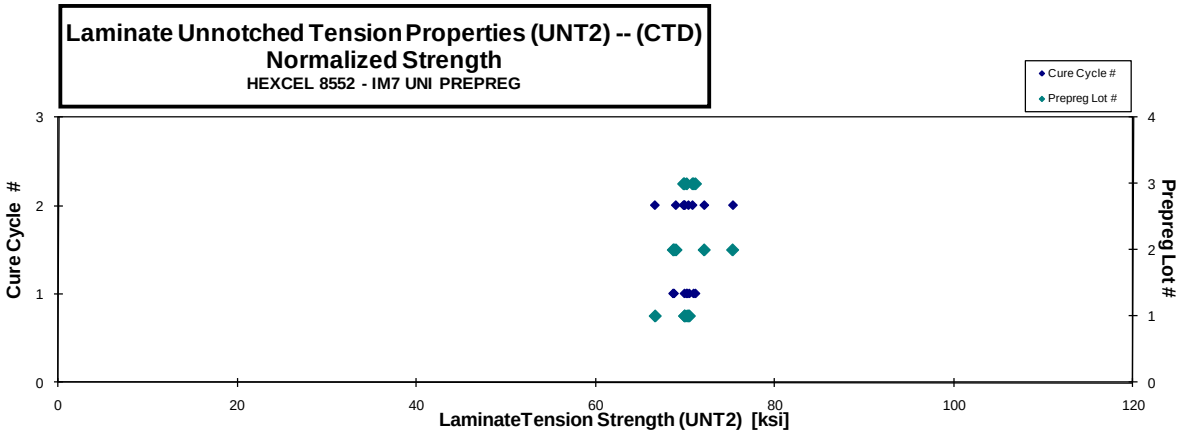
Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

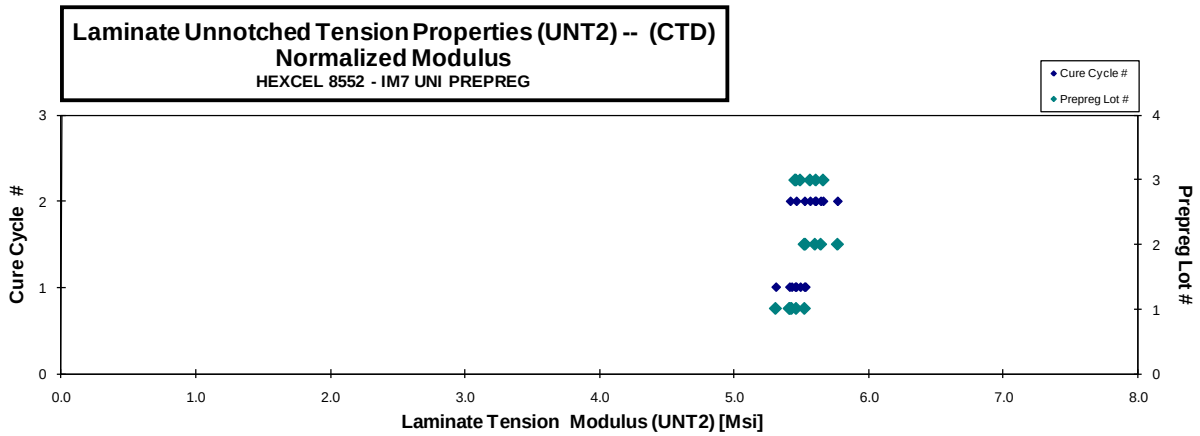
normalizing t_{ply} [in]: 0.0072

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]
HFIBA117B	A	M1	1	1	68.999	5.320	0.147	20	AGM	0.0073	70.196	5.412
HFIBA118B	A	M1	1	1	67.700	5.143	0.149	20	AGM	0.0074	69.902	5.310
HFIBA119B	A	M1	1	1	68.762	5.300	0.148	20	AGM	0.0074	70.433	5.429
HFIBA11AB*	A	M1	1	1								
HFIBA216B	A	M2	1	2	65.977	5.366	0.145	20	AWB	0.0073	66.603	5.417
HFIBA217B	A	M2	1	2	69.702	5.413	0.145	20	AWB	0.0073	70.340	5.463
HFIBA218B	A	M2	1	2	68.153	5.384	0.148	20	AGM	0.0074	69.927	5.524
HFIBB1X3B**	B	M1	2	1	69.069	5.565	0.143	20	AGM	0.0072	68.637	5.530
HFIBB1X4B**	B	M1	2	1	69.980	5.623	0.141	20	AWB	0.0071	68.733	5.523
HFIBB217B	B	M2	2	2	70.872	5.548	0.147	20	AGM	0.0073	72.102	5.645
HFIBB218B	B	M2	2	2	66.597	5.412	0.149	20	AWT	0.0075	68.933	5.602
HFIBB219B	B	M2	2	2	72.926	5.588	0.149	20	AWT	0.0074	75.289	5.769
HFIBC116B	C	M1	3	1	68.989	5.402	0.146	20	AWB	0.0073	70.139	5.492
HFIBC117B	C	M1	3	1	69.926	5.385	0.146	20	AWB	0.0073	70.914	5.461
HFIBC118B	C	M1	3	1	69.297	5.315	0.148	20	AGM	0.0074	71.118	5.454
HFIBC216B	C	M2	3	2	68.195	5.431	0.148	20	AWB	0.0074	69.884	5.565
HFIBC217B	C	M2	3	2	69.646	5.518	0.146	20	AGM	0.0073	70.790	5.608
HFIBC218B	C	M2	3	2	67.780	5.499	0.148	20	AGM	0.0074	69.796	5.662

*Data was removed due to thickness taper due to pinching on edge of panel during bagging.
**Panel was not replaced because of insufficient material. Specimens were taken from UNC2 panel.

Average	**68.975**	**5.424**	**$Average_{norm}$**	**0.0073**	**70.220**	**5.522**
Standard Dev.	**1.605**	**0.123**	**Standard $Dev._{norm}$**		**1.783**	**0.112**
Coeff. of Var. [%]	**2.328**	**2.263**	**Coeff. of Var. $[\%]_{norm}$**		**2.539**	**2.030**
Min.	**65.977**	**5.143**	**Min.**	**0.0071**	**66.603**	**5.310**
Max.	**72.926**	**5.623**	**Max.**	**0.0075**	**75.289**	**5.769**
Number of Spec.	**17**	**17**	**Number of Spec.**	**17**	**17**	**17**


Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
LaminateTension Strength (UNT2) [ksi]


Laminate Unnotched Tension Properties (UNT2) -- (CTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Laminate Tension Modulus (UNT2) [Msi]

Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

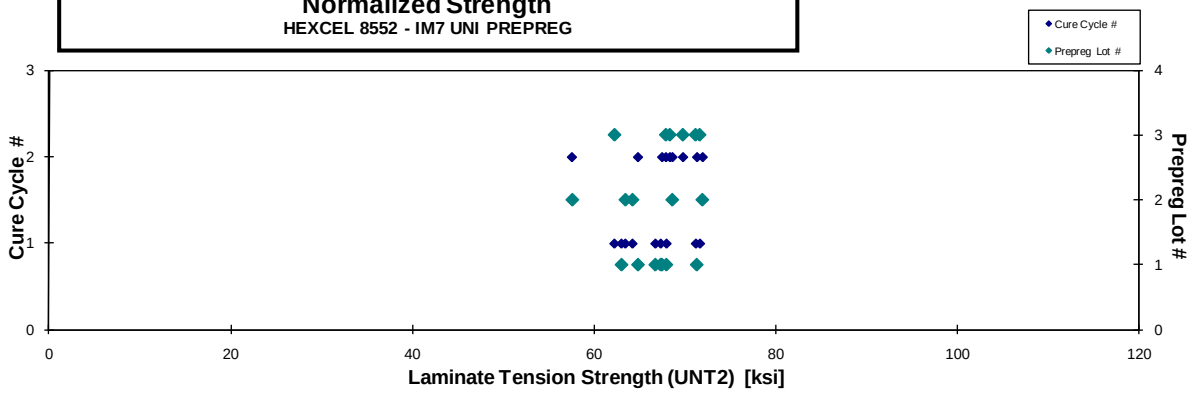
normalizing t_{ply} [in]: 0.0072

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]
HFIBA111A	A	M1	1	1	65.315	5.006	0.139	20	DGM	0.0070	63.055	4.832
HFIBA113A	A	M1	1	1	66.335	5.060	0.148	20	DGM	0.0074	67.993	5.186
HFIBA114A	A	M1	1	1	66.255	5.156	0.146	20	DGM	0.0073	67.359	5.242
HFIBA115A	A	M1	1	1	65.636	4.951	0.147	20	DGM	0.0073	66.776	5.037
HFIBA211A	A	M2	1	2	67.895	5.150	0.138	20	DWT	0.0069	64.870	4.920
HFIBA212A	A	M2	1	2	69.978	5.196	0.147	20	DGM	0.0073	71.339	5.297
HFIBA213A	A	M2	1	2	66.443	5.106	0.146	20	DWB	0.0073	67.512	5.188
HFIBB1X1A*	B	M1	2	1	67.953	5.536	0.135	20	DGM	0.0067	63.486	5.172
HFIBB1X2A*	B	M1	2	1	63.968	5.241	0.145	20	DGM	0.0072	64.264	5.265
HFIBB211A	B	M2	2	2	62.419	5.092	0.133	20	DGM	0.0066	57.637	4.701
HFIBB212A	B	M2	2	2	69.711	5.539	0.149	20	DGM	0.0074	71.954	5.718
HFIBB213A	B	M2	2	2	66.311	5.243	0.149	20	DGM	0.0075	68.644	5.427
HFIBC111A	C	M1	3	1	66.102	5.146	0.136	20	DGM	0.0068	62.285	4.849
HFIBC112A	C	M1	3	1	69.586	5.316	0.148	20	DGM	0.0074	71.656	5.474
HFIBC113A	C	M1	3	1	69.367	5.146	0.148	20	DGM	0.0074	71.205	5.282
HFIBC211A	C	M2	3	2	69.692	5.394	0.140	20	DWB/DGM	0.0070	67.934	5.258
HFIBC212A	C	M2	3	2	66.268	5.421	0.149	20	DGM	0.0074	68.369	5.593
HFIBC213A	C	M2	3	2	68.155	5.398	0.147	20	DGM	0.0074	69.804	5.529

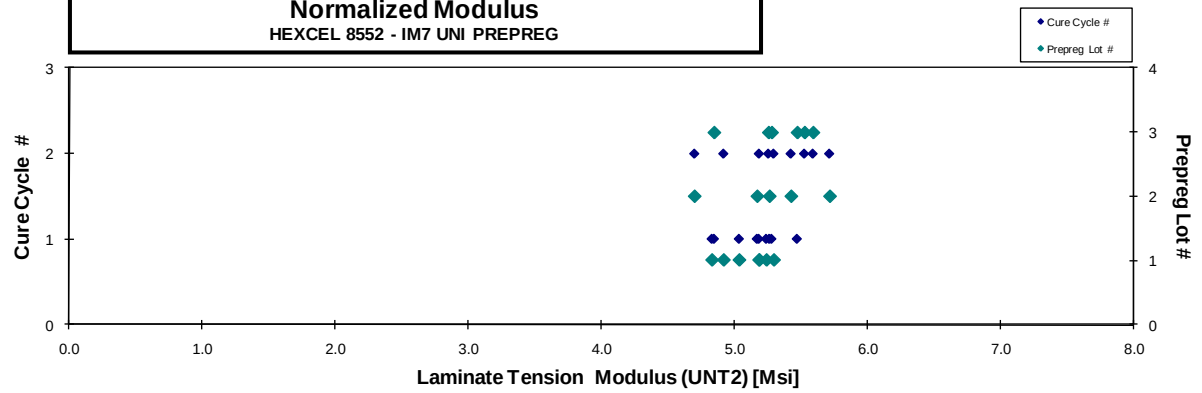
*Panel was not replaced because of inssuficient material. Specimens were taken from UNC2 panel.

Average	67.077	5.228		Average$_{norm}$	0.0072	67.008	5.221
Standard Dev.	2.124	0.173		Standard Dev.$_{norm}$		3.814	0.275
Coeff. of Var. [%]	3.167	3.305		Coeff. of Var. [%]$_{norm}$		5.692	5.271
Min.	62.419	4.951		Min.	0.0066	57.637	4.701
Max.	69.978	5.539		Max.	0.0075	71.954	5.718
Number of Spec.	18	18		Number of Spec.	18	18	18

Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

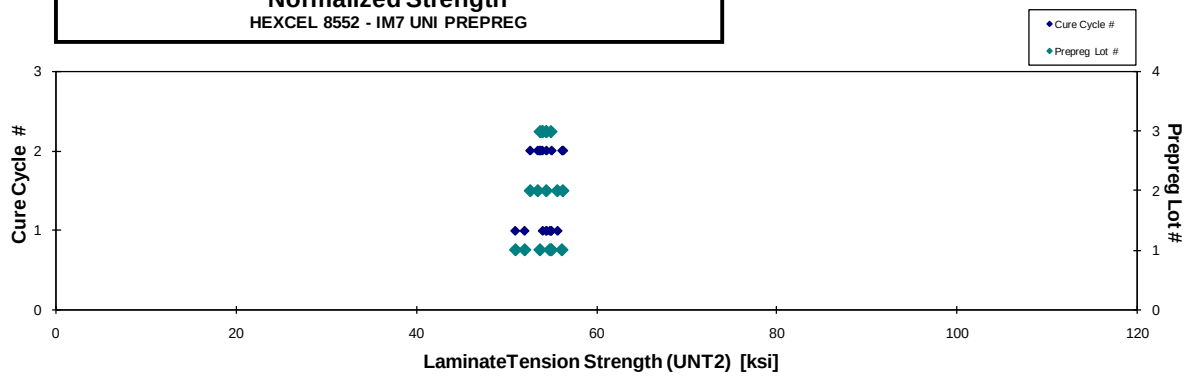
normalizing t_{ply} [in]: 0.0072

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]
HFIBA11DD	A	M1	1	1	53.540	4.284	0.148	20	DGM	0.0074	54.928	4.395
HFIBA11ED	A	M1	1	1	54.012	4.422	0.146	20	DGM	0.0073	54.775	4.484
HFIBA11FD	A	M1	1	1	50.226	4.323	0.146	20	DGM	0.0073	50.965	4.387
HFIBA11GD	A	M1	1	1	51.145	4.285	0.146	20	DGM	0.0073	51.985	4.356
HFIBA21BD	A	M2	1	2	54.794	4.473	0.148	20	DGM	0.0074	56.126	4.582
HFIBA21CD	A	M2	1	2	52.714	4.318	0.147	20	DGM	0.0073	53.685	4.398
HFIBA21DD	A	M2	1	2	54.527	4.454	0.145	20	DGM	0.0073	54.963	4.489
HFIBB1X5D*	B	M1	2	1	56.418	4.466	0.142	20	DGM	0.0071	55.615	4.402
HFIBB1X6D*	B	M1	2	1	54.904	4.427	0.143	20	DGM	0.0071	54.390	4.385
HFIBB21ED	B	M2	2	2	52.034	4.479	0.146	20	DGM	0.0073	52.606	4.528
HFIBB21FD	B	M2	2	2	55.349	4.482	0.146	20	DGM	0.0073	56.233	4.553
HFIBB21GD	B	M2	2	2	52.600	4.487	0.146	20	DGM	0.0073	53.440	4.559
HFIBC11CD	C	M1	3	1	52.726	4.307	0.147	20	DGM	0.0074	53.983	4.409
HFIBC11DD	C	M1	3	1	54.608	4.394	0.145	20	DGM	0.0072	54.905	4.418
HFIBC11ED	C	M1	3	1	53.866	4.284	0.145	20	DGM	0.0073	54.390	4.325
HFIBC21BD	C	M2	3	2	52.347	4.509	0.148	20	DGM	0.0074	53.940	4.646
HFIBC21CD	C	M2	3	2	52.559	4.473	0.147	20	DGM	0.0074	53.703	4.570
HFIBC21DD	C	M2	3	2	53.588	4.510	0.146	20	DGM	0.0073	54.394	4.577

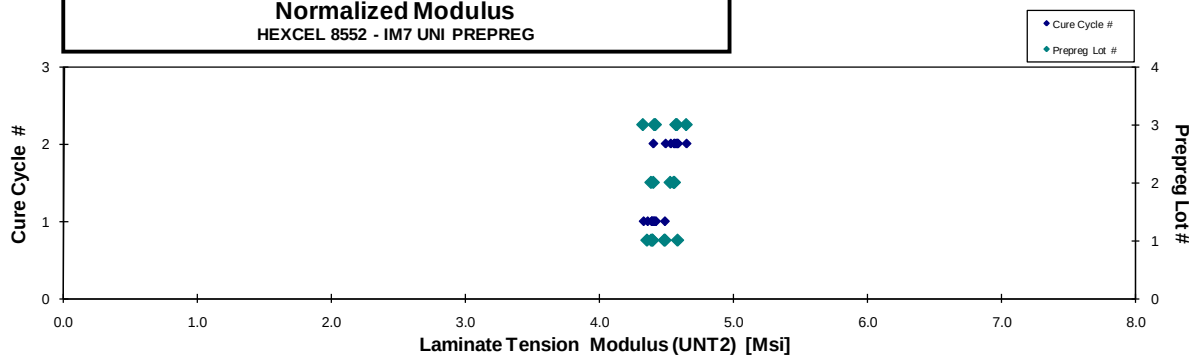
*Panel was not replaced because of inssuficient material. Specimens were taken from UNC2 panel.

Average	**53.442**	**4.410**		**$Average_{norm}$**	**0.0073**	**54.168**	**4.470**
Standard Dev.	**1.550**	**0.085**		**$Standard\ Dev._{norm}$**		**1.350**	**0.095**
Coeff. of Var. [%]	**2.901**	**1.930**		**Coeff. of Var. $[\%]_{norm}$**		**2.492**	**2.127**
Min.	**50.226**	**4.284**		**Min.**	**0.0071**	**50.965**	**4.325**
Max.	**56.418**	**4.510**		**Max.**	**0.0074**	**56.233**	**4.646**
Number of Spec.	**18**	**18**		**Number of Spec.**	**18**	**18**	**18**

Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG



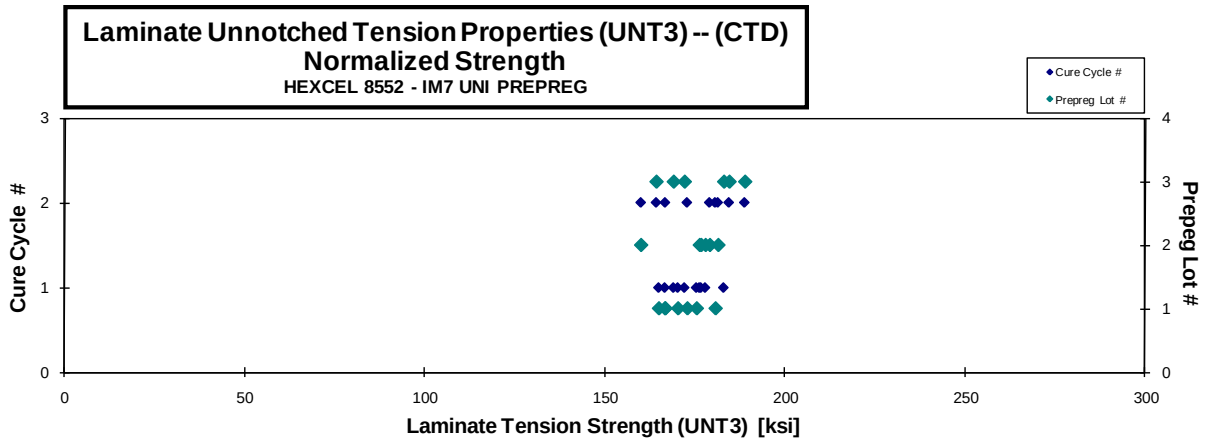
4.10 "50/40/10" Unnotched Tension 3 Properties (UNT3)

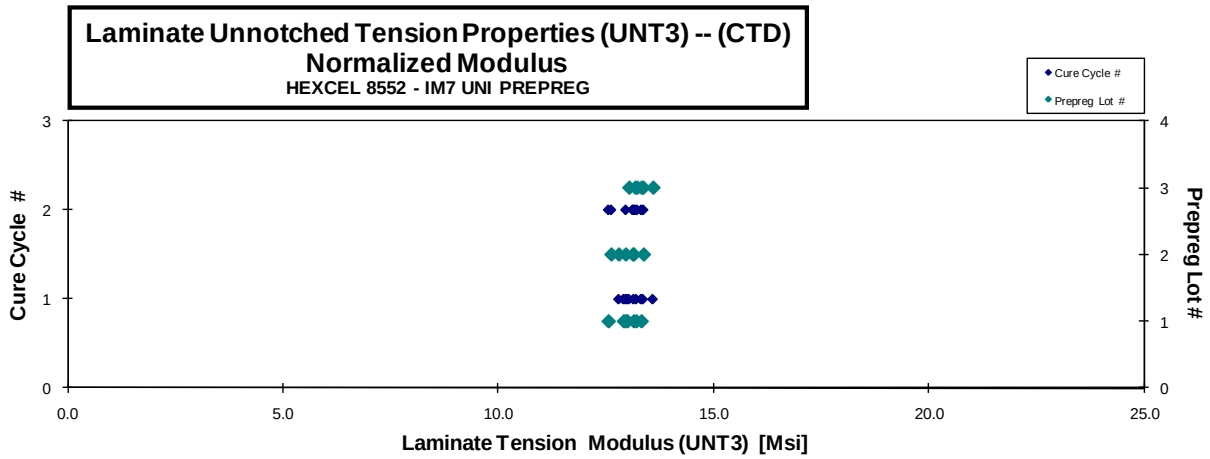
Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFICA116B	A	M1	1	1	173.739	12.884	0.145	20	AWT	0.0073	175.368	13.005
HFICA117B	A	M1	1	1	165.963	13.282	0.145	20	DWT /LWT / LAB	0.0072	166.559	13.329
HFICA118B	A	M1	1	1	166.866	12.669	0.147	20	LAB / DAB	0.0073	170.188	12.921
HFICA119B	A	M1	1	1	161.608	12.952	0.147	20	LWB	0.0073	164.863	13.213
HFICA215B	A	M2	1	2	163.835	12.356	0.146	20	DGM /LAT / AWT	0.0073	166.660	12.569
HFICA216B	A	M2	1	2	170.370	12.971	0.146	20	DGM /AWB /AAT	0.0073	172.776	13.154
HFICA217B	A	M2	1	2	178.529	12.824	0.146	20	DGM /LAB /AWT	0.0073	180.595	12.972
HFICB115B	B	M1	2	1	177.874	13.058	0.143	20	LWT / DGM	0.0072	176.638	12.967
HFICB116B	B	M1	2	1	178.969	13.237	0.143	20	LAT /LAB / DGM	0.0072	177.829	13.153
HFICB117B	B	M1	2	1	176.503	12.829	0.144	20	LAT / LWB	0.0072	176.197	12.807
HFICB214B	B	M2	2	2	178.802	13.116	0.144	20	DGM/LWT/LWB	0.0072	179.029	13.132
HFICB216B	B	M2	2	2	160.819	12.705	0.143	20	LAB / LWT	0.0072	159.907	12.633
HFICB217B	B	M2	2	2	181.762	13.411	0.144	20	LAB	0.0072	181.362	13.381
HFICC115B	C	M1	3	1	169.266	12.837	0.146	20	AGM / DGM	0.0073	172.028	13.047
HFICC116B	C	M1	3	1	180.101	13.162	0.146	20	LAT / LWB	0.0073	182.957	13.370
HFICC117B	C	M1	3	1	166.222	13.379	0.146	20	LWB	0.0073	168.973	13.600
HFICC215B	C	M2	3	2	185.159	13.384	0.143	20	LWT / LWB	0.0072	184.452	13.333
HFICC216B	C	M2	3	2	164.960	13.250	0.143	20	LWT	0.0072	164.177	13.187
HFICC217B	C	M2	3	2	187.845	13.168	0.145	20	LWT / LWB	0.0072	188.802	13.235

Average	**173.115**	**13.025**	**Average$_{norm}$**	**0.0072**	**174.177**	**13.106**
Standard Dev.	**8.207**	**0.282**	**Standard Dev.$_{norm}$**		**7.790**	**0.260**
Coeff. of Var. [%]	**4.741**	**2.166**	**Coeff. of Var. [%]$_{norm}$**		**4.472**	**1.985**
Min.	**160.819**	**12.356**	**Min.**	**0.0072**	**159.907**	**12.569**
Max.	**187.845**	**13.411**	**Max.**	**0.0073**	**188.802**	**13.600**
Number of Spec.	**19**	**19**	**Number of Spec.**	**19**	**19**	**19**


Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
0
1
2
3
4
0
50
100
150
200
250
300
Laminate Tension Strength (UNT3) [ksi]

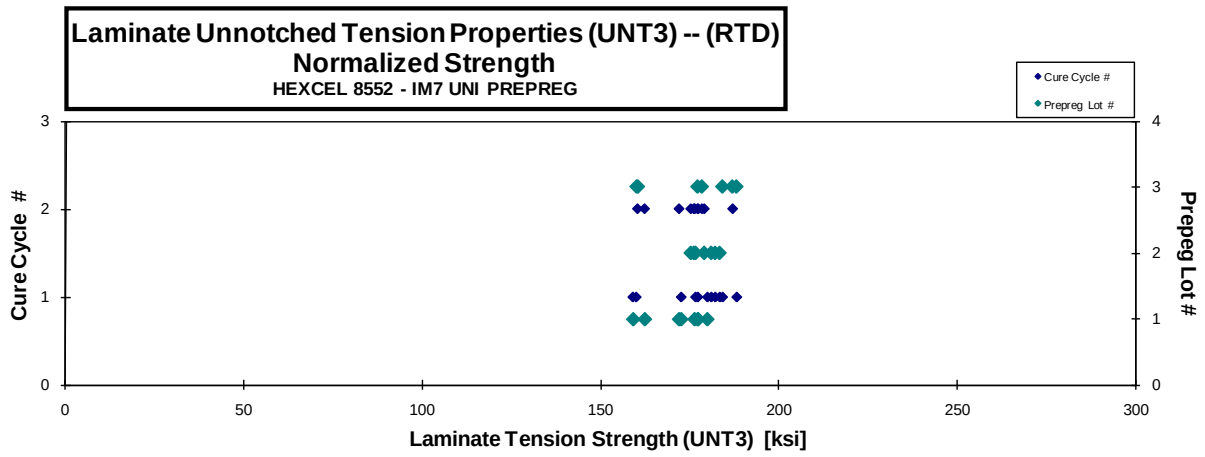

Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
Laminate Tension Modulus (UNT3) [Msi]

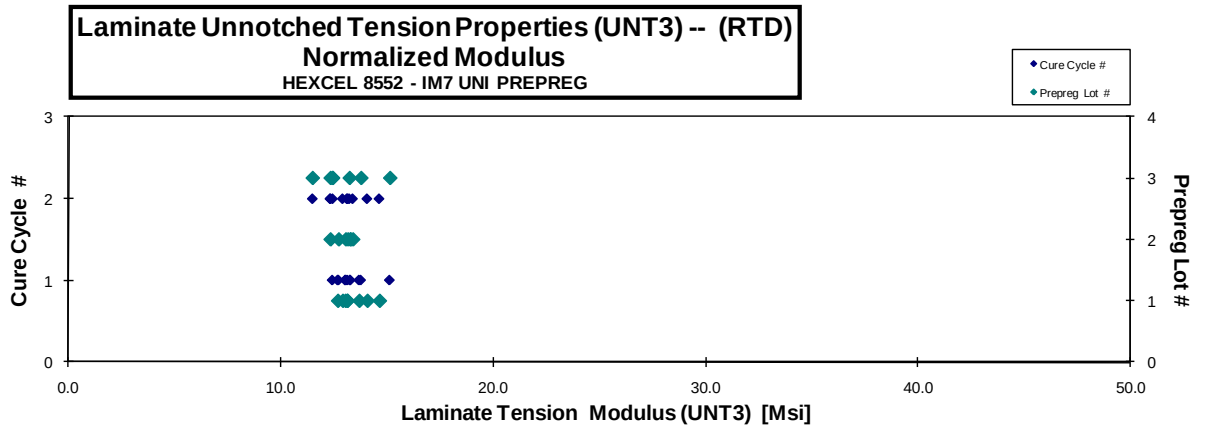
Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFICA112A	A	M1	1	1	170.864	13.556	0.145	20	DGM / LGM	0.0073	172.525	13.688
HFICA113A	A	M1	1	1	172.992	12.827	0.147	20	DGM / LGM	0.0074	177.157	13.136
HFICA114A	A	M1	1	1	178.974	12.978	0.145	20	DGM / LWT	0.0072	179.844	13.041
HFICA115A	A	M1	1	1	158.489	12.642	0.145	20	LAB	0.0072	159.040	12.686
HFICA211A	A	M2	1	2	170.462	14.775	0.137	20	LAT / LWB	0.0069	162.294	14.067
HFICA212A	A	M2	1	2	172.953	14.363	0.147	20	DGM / LAT	0.0073	176.276	14.639
HFICA213A	A	M2	1	2	167.997	12.824	0.147	20	LGM	0.0074	171.905	13.122
HFICA214A	A	M2	1	2	175.427	12.782	0.146	20	DGM / LWT	0.0073	177.274	12.916
HFICB111A	B	M1	2	1	190.858	13.423	0.137	20	DGM / LAT	0.0068	180.917	12.724
HFICB112A	B	M1	2	1	181.054	12.986	0.145	20	DGM / LAT	0.0072	182.018	13.055
HFICB113A	B	M1	2	1	175.890	13.232	0.145	20	DGM / LAT/ LAB	0.0072	176.521	13.279
HFICB114A	B	M1	2	1	183.397	13.273	0.144	20	AGM / AWB	0.0072	183.269	13.264
HFICB211A	B	M2	2	2	185.538	13.003	0.137	20	DGM /LWT / LWB	0.0068	176.025	12.336
HFICB212A	B	M2	2	2	174.416	13.331	0.145	20	DGM / AGM	0.0072	175.183	13.390
HFICB213A	B	M2	2	2	177.385	13.042	0.145	20	DGM / AGM	0.0073	178.946	13.157
HFICC111A	C	M1	3	1	166.230	12.920	0.139	20	LWT / LAB / DGM	0.0069	159.977	12.434
HFICC112A	C	M1	3	1	182.653	13.380	0.148	20	AGM / DGM	0.0074	188.001	13.772
HFICC113A	C	M1	3	1	180.532	14.836	0.147	20	AGM / DGM	0.0073	184.064	15.127
HFICC211A	C	M2	3	2	170.513	13.121	0.135	20	LWB/AWB/LAT	0.0068	160.330	12.337
HFICC212A	C	M2	3	2	176.813	13.211	0.144	20	DGM /LWT /LWB	0.0072	177.079	13.231
HFICC213A	C	M2	3	2	176.746	11.400	0.145	20	DGM / LGM	0.0073	178.280	11.499
HFICC214A	C	M2	3	2	186.723	12.437	0.144	20	DGM / LGM	0.0072	186.852	12.446

Average	**176.223**	**13.197**	**$Average_{norm}$**	**0.0072**	**175.626**	**13.152**
Standard Dev.	**7.423**	**0.743**	**$Standard\ Dev._{norm}$**		**8.388**	**0.795**
Coeff. of Var. [%]	**4.212**	**5.626**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**4.776**	**6.043**
Min.	**158.489**	**11.400**	**Min.**	**0.0068**	**159.040**	**11.499**
Max.	**190.858**	**14.836**	**Max.**	**0.0074**	**188.001**	**15.127**
Number of Spec.	**22**	**22**	**Number of Spec.**	**22**	**22**	**22**





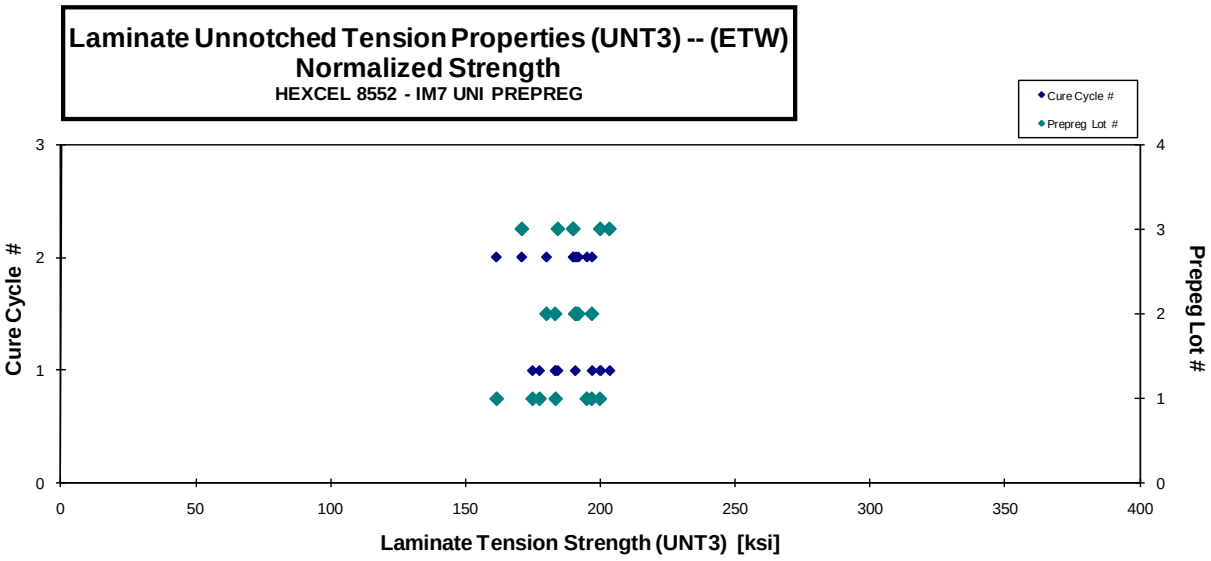
Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

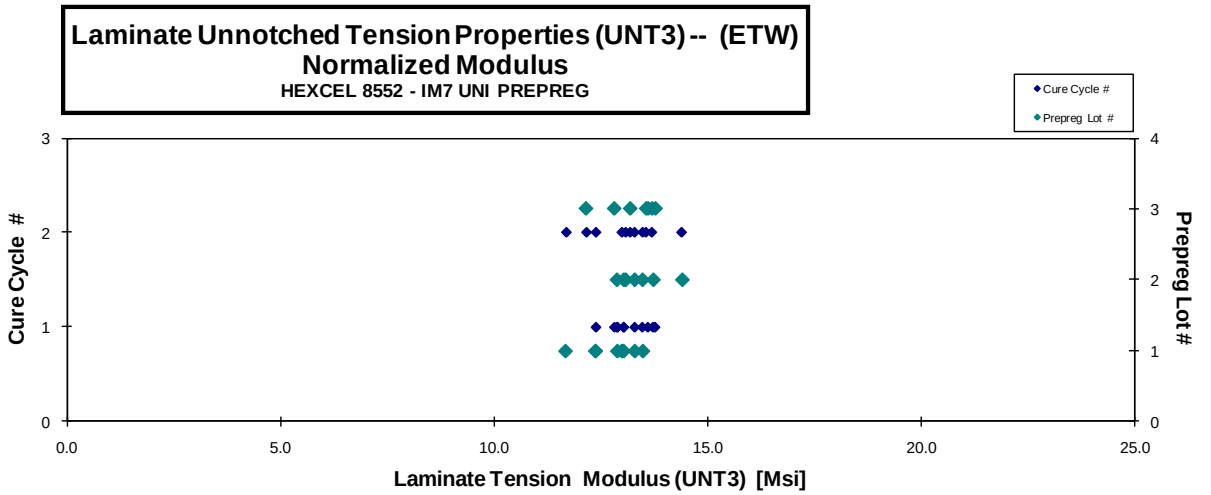
normalizing t_{ply} [in]: 0.0072

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]
HFICA11AD	A	M1	1	1	195.340	13.192	0.135	20	LWB/LWT	0.0068	183.448	12.389
HFICA11CD	A	M1	1	1	172.304	13.105	0.146	20	LGM/AGM	0.0073	174.896	13.302
HFICA11DD	A	M1	1	1	195.017	12.585	0.148	20	DGM/AGM	0.0074	199.847	12.897
HFICA11ED	A	M1	1	1	175.968	12.931	0.145	20	DGM/LWB/LWT	0.0073	177.476	13.042
HFICA21AD	A	M1	1	2		12.979	0.137	20	LIT	0.0069		12.388
HFICA219D	A	M2	1	2	189.435	13.106	0.148	20	LGM	0.0074	194.982	13.490
HFICA21BD	A	M2	1	2	172.460	12.478	0.135	20	LWT / LWB	0.0067	161.561	11.690
HFICA21CD	A	M2	1	2	193.503	12.780	0.146	20	DGM/LWT / LWB	0.0073	196.840	13.000
HFICB118D*	B	M1	2	1		13.473	0.144	20	*	0.0072		13.482
HFICB119D	B	M1	2	1	182.419	13.673	0.145	20	LAT/LAB/DGM	0.0072	183.242	13.735
HFICB11AD	B	M1	2	1	190.108	13.006	0.144	20	AGM	0.0072	190.680	13.045
HFICB11BD	B	M1	2	1	196.122	12.837	0.145	20	AGM	0.0072	196.893	12.887
HFICB218D	B	M2	2	2	185.097	13.903	0.149	20	DGM/AGM	0.0075	191.824	14.409
HFICB219D	B	M2	2	2	189.991	13.228	0.145	20	DGM/LAT	0.0072	191.002	13.299
HFICB21AD	B	M2	2	2	180.302	13.108	0.144	20	AGM/DGM	0.0072	180.051	13.090
HFICC118D	C	M1	3	1	199.333	13.508	0.147	20	LWB/LGM	0.0073	203.394	13.783
HFICC119D	C	M1	3	1	191.362	13.319	0.139	20	LWB/DGM	0.0069	184.252	12.824
HFICC11AD	C	M1	3	1	195.315	13.294	0.147	20	DGM/LWT	0.0074	199.995	13.612
HFICC218D*	C	M1	3	2		13.544	0.144	20	*	0.0072		13.568
HFICC219D	C	M2	3	2	187.265	13.008	0.146	20	DGM/AGM	0.0073	189.953	13.195
HFICC21BD	C	M2	3	2	180.648	12.859	0.136	20	LAT/LAB	0.0068	170.905	12.165
HFICC21CD	C	M2	3	2	186.654	13.470	0.147	20	DGM/LWB	0.0073	189.916	13.706

* Specimen had a bad failure so strength was excluded

Average	**187.297**	**13.154**	**$Average_{norm}$**	**0.0072**	**187.429**	**13.136**
Standard Dev.	**8.102**	**0.352**	**$Standard\ Dev._{norm}$**		**10.938**	**0.611**
Coeff. of Var. [%]	**4.326**	**2.676**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**5.836**	**4.652**
Min.	**172.304**	**12.478**	**Min.**	**0.0067**	**161.561**	**11.690**
Max.	**199.333**	**13.903**	**Max.**	**0.0075**	**203.394**	**14.409**
Number of Spec.	**19**	**22**	**Number of Spec.**	**22**	**19**	**22**


Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepeg Lot #
Laminate Tension Strength (UNT3) [ksi]
0
50
100
150
200
250
300
350
400


Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Tension Modulus (UNT3) [Msi]
0.0
5.0
10.0
15.0
20.0
25.0

4.11 "25/50/25" Unnotched Compression 1 Properties (UNC1)

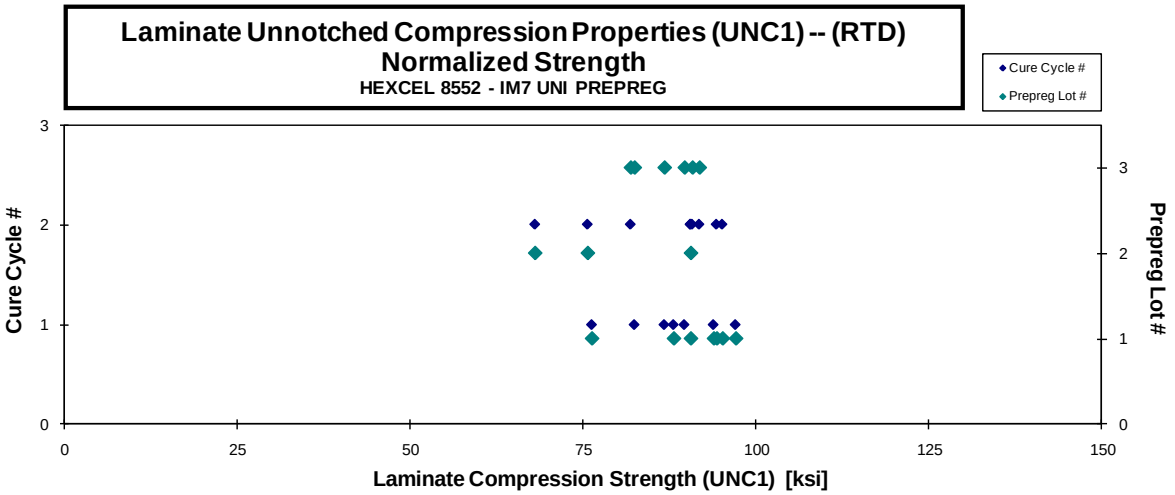
Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

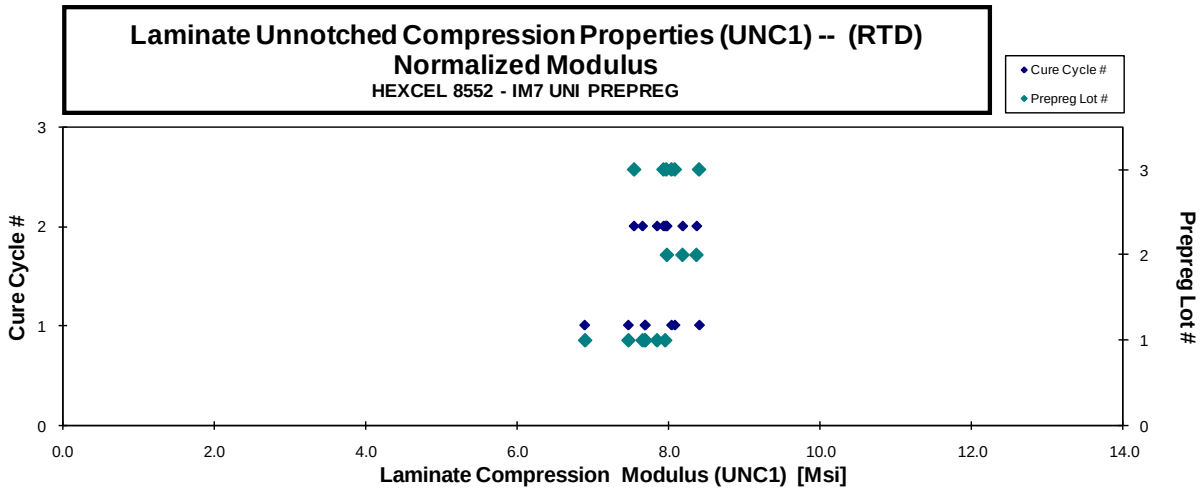
normalizing t_{ply} [in]: 0.0072

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]
HFIWA111A	A	M1	1	1	82.117	7.418	0.290	0.107	16	BGM	0.0067	76.272	6.890
HFIWA112A	A	M1	1	1	96.785	7.671	0.320	0.116	16	BGM	0.0072	97.037	7.690
HFIWA113A*	A	M1	1	1	90.832	7.440	0.310	0.119	16	BGM	0.0074	93.855	7.688
HFIWA114A*	A	M1	1	1	84.912	7.199	0.304	0.120	16	BGM	0.0075	88.081	7.467
HFIWA211A	A	M2	1	2	91.192	7.711	0.338	0.114	16	BGM	0.0071	90.532	7.655
HFIWA212A	A	M2	1	2	92.530	7.739	0.367	0.118	16	BGM	0.0074	95.127	7.957
HFIWA213A	A	M2	1	2	91.329	7.602	0.354	0.119	16	BGM	0.0074	94.289	7.848
HFIWB211A	B	M2	2	2	73.465	8.612	0.314	0.107	16	BGM	0.0067	68.065	7.979
HFIWB212A	B	M2	2	2	91.759	8.485	0.348	0.114	16	BGM	0.0071	90.538	8.372
HFIWB213A	B	M2	2	2	74.784	8.092	0.336	0.117	16	BGM	0.0073	75.660	8.187
HFIWC111A	C	M1	3	1	88.972	8.245	0.314	0.112	16	BGM	0.0070	86.745	8.039
HFIWC112A	C	M1	3	1	86.634	8.125	0.341	0.119	16	BGM	0.0075	89.642	8.407
HFIWC113A	C	M1	3	1	79.952	7.841	0.349	0.119	16	BGM	0.0074	82.427	8.084
HFIWC211A	C	M2	3	2	85.577	7.884	0.339	0.110	16	BGM	0.0069	81.875	7.543
HFIWC212A	C	M2	3	2	91.348	7.933	0.356	0.116	16	BGM	0.0072	91.797	7.972
HFIWC213A	C	M2	3	2	89.030	7.781	0.360	0.117	16	BGM	0.0073	90.782	7.934

Batch B Cure Cycle 1 has improper layup so results were removed
*Modulus is an average of two strain gage values

Average	**86.951**	**7.861**	**0.334**	**$Average_{norm}$**	**0.0072**	**87.045**	**7.857**
Standard Dev.	**6.529**	**0.382**	**0.022**	**Standard $Dev._{norm}$**		**8.111**	**0.373**
Coeff. of Var. [%]	**7.508**	**4.861**	**6.705**	**Coeff. of Var. $[\%]_{norm}$**		**9.318**	**4.749**
Min.	**73.465**	**7.199**	**0.290**	**Min.**	**0.0067**	**68.065**	**6.890**
Max.	**96.785**	**8.612**	**0.367**	**Max.**	**0.0075**	**97.037**	**8.407**
Number of Spec.	**16**	**16**	**16**	**Number of Spec.**	**16**	**16**	**16**


Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
25
50
75
100
125
150
Laminate Compression Strength (UNC1) [ksi]


Laminate Unnotched Compression Properties (UNC1) -- (RTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Laminate Compression Modulus (UNC1) [Msi]

Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIWA11DD[1]	A	M1	1	1	54.607	7.001	0.369	0.118	16	BGM	0.0074	55.744	7.147
HFIWA11ED[1]	A	M1	1	1	59.118	6.924	0.356	0.118	16	BGM	0.0074	60.555	7.093
HFIWA11FD	A	M1	1	1	51.227	7.240	0.356	0.116	16	BGM	0.0073	51.605	7.293
HFIWA115D	A	M1	1	1	51.738	6.987	0.362	0.118	16	BGM	0.0074	52.958	7.152
HFIWA214D	A	M2	1	2	64.777	6.971	0.334	0.118	16	BGM	0.0073	66.071	7.111
HFIWA215D	A	M2	1	2	58.623	6.817	0.367	0.117	16	BAB	0.0073	59.284	6.894
HFIWA216D	A	M2	1	2	51.583	6.791	0.375	0.116	16	BGM / DGM	0.0073	52.046	6.852
HFIWB21CD	B	M2	2	1	58.036	7.198	0.379	0.115	16	DGM / BGM	0.0072	57.726	7.159
HFIWB216D	B	M2	2	1	56.134	7.126	0.350	0.115	16	HGM	0.0072	55.874	7.093
HFIWB2RMD	B	M2	2	1	61.874	6.905	0.354	0.117	16	DGM / BGM	0.0073	62.841	7.013
HFIWC11AD	C	M1	3	1	52.051	7.024	0.359	0.117	16	DGM	0.0073	52.804	7.126
HFIWC11BD	C	M1	3	1	56.854	7.040	0.356	0.117	16	BGM	0.0073	57.520	7.122
HFIWC11CD	C	M1	3	1	50.531	7.184	0.317	0.116	16	BGM	0.0073	51.065	7.260
HFIWC21AD	C	M2	3	2	49.367	7.204	0.339	0.115	16	DGM	0.0072	49.345	7.201
HFIWC21BD	C	M2	3	2	50.270	7.375	0.361	0.115	16	BAT	0.0072	50.059	7.344
HFIWC21CD	C	M2	3	2	48.540	7.136	0.369	0.116	16	BGM	0.0072	48.716	7.161
HFIWA118D	A	M1	1	1	70.392			0.117	16	BGM	0.0073	71.543	
HFIWA119D	A	M1	1	1	70.983			0.117	16	BGM	0.0073	72.226	
HFIWA11AD*	A	M1	1	1	56.125			0.117	16	BGM	0.0073	57.075	
HFIWA11BD*	A	M1	1	1	58.329			0.118	16	BGM	0.0073	59.511	
HFIWA11CD*	A	M1	1	1				0.117	16	HIB	0.0073		
HFIWA217D*	A	M2	1	2	55.250			0.117	16	HAB	0.0073	56.130	
HFIWA218D*	A	M2	1	2	58.901			0.117	16	BGM	0.0073	60.009	
HFIWA219D*	A	M2	1	2	54.659			0.117	16	HGM	0.0073	55.735	
HFIWB217D	B	M2	2	2	54.624			0.115	16	BGM	0.0072	54.339	
HFIWB218D	B	M2	2	2	69.184			0.115	16	HGM	0.0072	69.194	
HFIWB219D	B	M2	2	2	64.638			0.115	16	BGM	0.0072	64.563	
HFIWB21AD	B	M2	2	2	62.823			0.115	16	HAT	0.0072	62.569	
HFIWB21BD	B	M2	2	2				0.115	16	HIT			
HFIWC117D*	C	M1	3	1				0.117	16	BGM			
HFIWC118D*	C	M1	3	1	55.329			0.117	16	BAB	0.0073	56.065	
HFIWC119D	C	M1	3	1	55.844			0.117	16	HAB	0.0073	56.636	
HFIWC217D*	C	M2	3	2	50.176			0.116	16	HAT	0.0072	50.452	
HFIWC218D*	C	M2	3	2				0.117	16	HAB			
HFIWC219D*	C	M2	3	2				0.117	16	HAT			

Compressive Strength is not reported for HFIWB 116D as unacceptable failure mode was observed

STRENGTH WAS NOT REPORTED FOR SPECIMENS HFIWA11CD and HFIWB21BD DUE TO AN UNACCEPTABLE FAILURE MODE.

Shaded specimens had modulus removed due to improper strain gage adhesive used

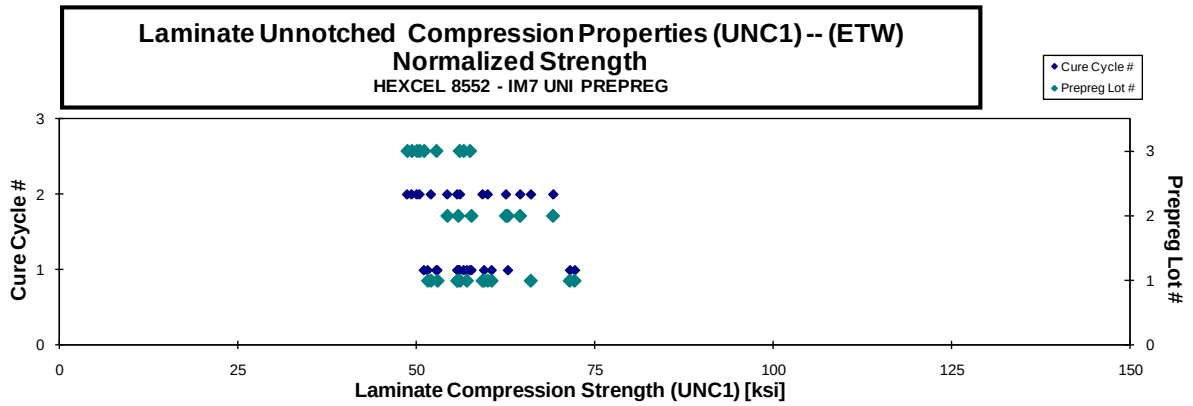
Batch B Cure Cycle 1 has improper layup so results were removed

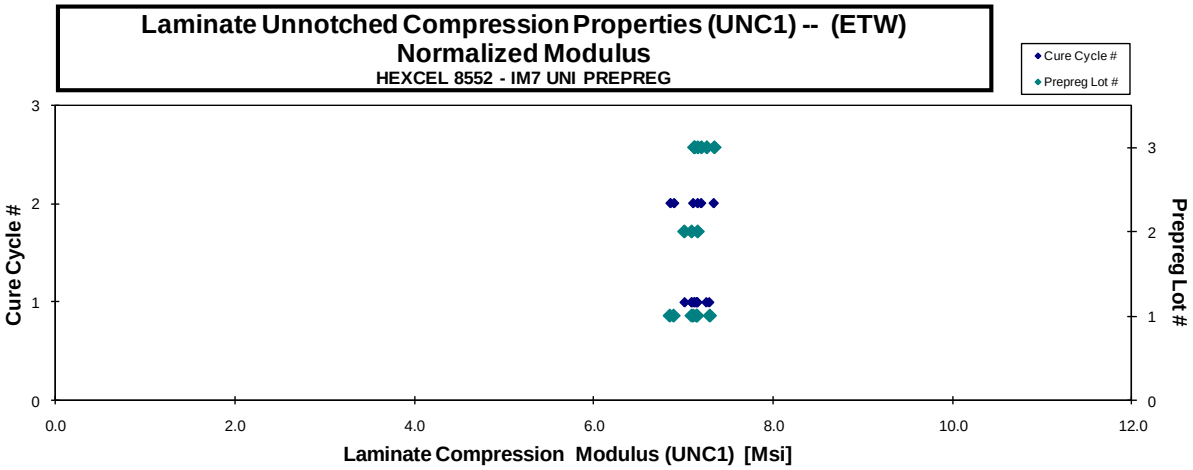
*** Specimens have uneven grip marks due to thickness variation**

[1] Modulus is an average of two strain gage values

Average	**57.086**	**7.058**	**0.356**
Standard Dev.	**6.207**	**0.161**	**0.016**
Coeff. of Var. [%]	**10.872**	**2.282**	**4.424**
Min.	**48.540**	**6.791**	**0.317**
Max.	**70.983**	**7.375**	**0.379**
Number of Spec.	**30**	**16**	**16**

$Average_{norm}$	**0.0073**	**57.675**	**7.126**
$Standard\ Dev._{norm}$		**6.355**	**0.128**
Coeff. of Var. $[\%]_{norm}$		**11.019**	**1.801**
Min.	**0.0072**	**48.716**	**6.852**
Max.	**0.0074**	**72.226**	**7.344**
Number of Spec.	**31**	**30**	**16**


Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
25
50
75
100
125
150
Laminate Compression Strength (UNC1) [ksi]


Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
2.0
4.0
6.0
8.0
10.0
12.0
Laminate Compression Modulus (UNC1) [Msi]

4.12 "10/80/10" Unnotched Compression 2 Properties (UNC2)

Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

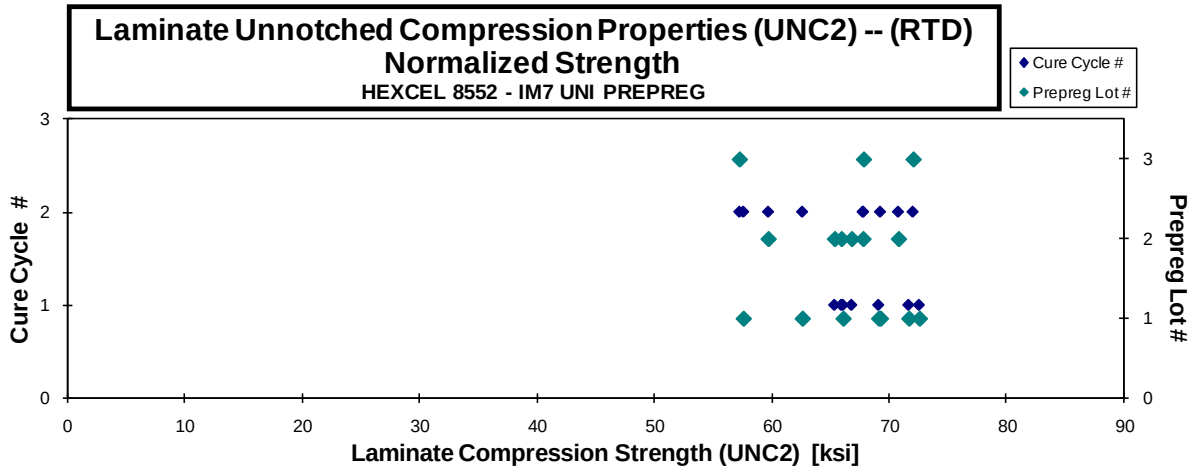
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HFIXA111A[1]	A	M1	1	1	73.013	4.789	0.535	0.136	20	BGM	0.0068	69.151	4.536
HFIXA112A[1]	A	M1	1	1	71.811	4.938	0.566	0.144	20	BGM	0.0072	71.720	4.932
HFIXA113A	A	M1	1	1	64.461	4.672	0.562	0.148	20	BGM	0.0074	66.125	4.793
HFIXA114A	A	M1	1	1	70.533	4.578	0.581	0.148	20	BGM	0.0074	72.615	4.713
HFIXA211A	A	M2	1	2	60.868	4.598	0.563	0.136	20	BGM	0.0068	57.627	4.353
HFIXA212A	A	M2	1	2	63.297	5.027	0.608	0.143	20	BGM	0.0071	62.652	4.976
HFIXA213A	A	M2	1	2	68.035	4.955	0.612	0.147	20	BGM	0.0073	69.302	5.047
HFIXB111A	B	M1	2	1	67.082	5.303	0.664	0.144	20	BGM	0.0072	66.849	5.284
HFIXB112A	B	M1	2	1	65.716	5.328	0.675	0.145	20	BGM	0.0072	65.975	5.349
HFIXB113A	B	M1	2	1	64.557	5.251	0.662	0.146	20	BGM	0.0073	65.394	5.319
HFIXB211A*	B	M2	2	2	64.745	5.202	0.546	0.133	20	BGM	0.0066	59.747	4.800
HFIXB212A	B	M2	2	2	69.508	5.141	0.587	0.141	20	BGM	0.0070	67.818	5.016
HFIXB213A	B	M2	2	2	70.542	4.844	0.563	0.145	20	BGM	0.0072	70.836	4.864
HFIXC211A*	C	M2	3	2	63.253	4.847	0.514	0.130	20	BGM	0.0065	57.294	4.390
HFIXC212A	C	M2	3	2	70.328	5.092	0.574	0.139	20	BGM	0.0069	67.862	4.914
HFIXC213A	C	M2	3	2	72.077	5.046	0.572	0.144	20	BGM	0.0072	72.085	5.046

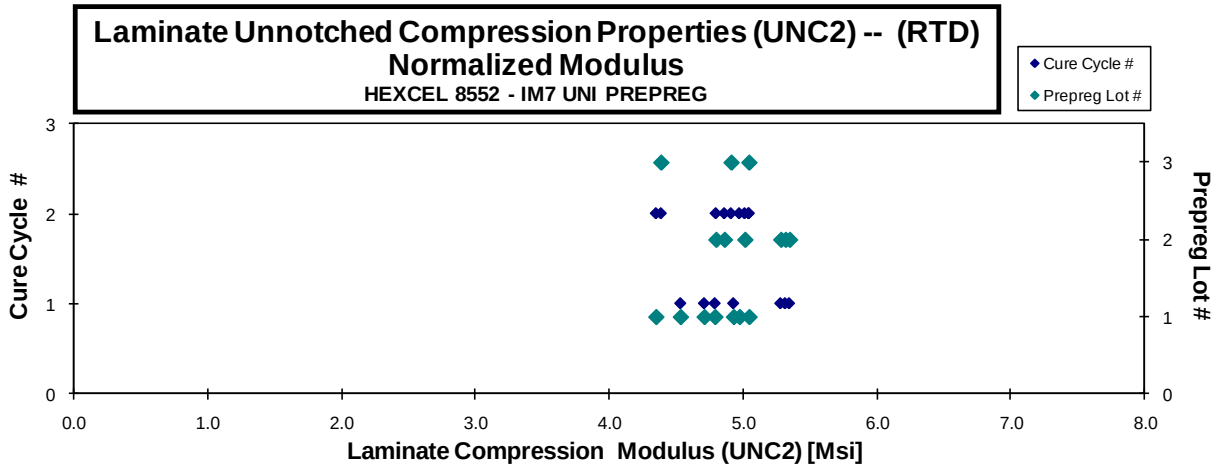
For batch C, cure cycle 1 panel has wrong layup, has two -45 degree plies at beginning of layup.

***Specimens have thickness taper at edge of coupon**

[1] **Modulus is an average of two strain gage values**

Average	**67.489**	**4.976**	**0.587**	**$Average_{norm}$**	**0.0071**	**66.441**	**4.896**
Standard Dev.	**3.735**	**0.241**	**0.047**	**$Standard\ Dev._{norm}$**		**4.890**	**0.299**
Coeff. of Var. [%]	**5.534**	**4.842**	**7.960**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.360**	**6.100**
Min.	**60.868**	**4.578**	**0.514**	**Min.**	**0.0065**	**57.294**	**4.353**
Max.	**73.013**	**5.328**	**0.675**	**Max.**	**0.0074**	**72.615**	**5.349**
Number of Spec.	**16**	**16**	**16**	**Number of Spec.**	**16**	**16**	**16**


Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
10
20
30
40
50
60
70
80
90
Laminate Compression Strength (UNC2) [ksi]


Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Laminate Compression Modulus (UNC2) [Msi]

Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIXA11DD[1]	A	M1	1	1	37.314	3.847	0.641	0.148	20	DGM	0.0074	38.415	3.961
HFIXA11ED	A	M1	1	1	34.936	3.910	0.642	0.149	20	DGM	0.0074	36.137	4.045
HFIXA11FD	A	M1	1	1	41.150	4.149	0.673	0.147	20	DGM	0.0074	42.008	4.235
HFIXA115D	A	M1	1	1	40.617	3.860	0.659	0.148	20	DGM	0.0074	41.735	3.967
HFIXA21AD	A	M2	1	2	36.826	3.967	0.670	0.146	20	DGM	0.0073	37.256	4.013
HFIXA21BD	A	M2	1	2	36.576	4.173	0.698	0.146	20	BGM	0.0073	37.037	4.225
HFIXA21CD	A	M2	1	2	34.595	4.077	0.685	0.146	20	DGM	0.0073	35.156	4.143
HFIXB119D	B	M1	2	1	41.295	4.131	0.690	0.143	20	DGM	0.0072	41.094	4.111
HFIXB11AD	B	M1	2	1	41.878	4.145	0.671	0.143	20	DGM	0.0072	41.723	4.130
HFIXB114D	B	M1	2	1	42.303	4.182	0.695	0.146	20	DGM	0.0073	42.949	4.246
HFIXB21BD	B	M2	2	2	35.933	4.115	0.654	0.143	20	BGM/DGM	0.0071	35.622	4.080
HFIXB21CD	B	M2	2	2	34.825	4.005	0.646	0.143	20	DGM	0.0072	34.692	3.990
HFIXB214D	B	M2	2	2	38.605	4.038	0.669	0.145	20	DGM	0.0073	38.941	4.073
HFIXC21AD	C	M2	3	2	31.309	4.077	0.655	0.143	20	DGM	0.0072	31.189	4.062
HFIXC21BD	C	M2	3	2	35.807	4.158	0.661	0.143	20	DGM	0.0072	35.608	4.135
HFIXC214D	C	M2	3	2	42.616	4.108	0.631	0.145	20	DGM	0.0072	42.828	4.129
HFIXA118D*	A	M1	1	1	49.443			0.147	20	BGM	0.0073	50.336	
HFIXA119D*	A	M1	1	1	44.763			0.146	20	BGM	0.0073	45.530	
HFIXA11AD*	A	M1	1	1	46.375			0.146	20	BGM	0.0073	47.131	
HFIXA11BD*	A	M1	1	1	42.111			0.146	20	BGM	0.0073	42.794	
HFIXA217D*	A	M2	1	2	37.693			0.145	20	BGM	0.0072	37.855	
HFIXA218D*	A	M2	1	2	42.187			0.145	20	BGM	0.0073	42.480	
HFIXA219D*	A	M2	1	2	42.274			0.146	20	BGM	0.0073	42.910	
HFIXB116D*	B	M1	2	1	37.228			0.137	20	BAB	0.0069	35.444	
HFIXB117D*	B	M1	2	1	40.263			0.142	20	BGM	0.0071	39.597	
HFIXB118D*	B	M1	2	1	40.542			0.142	20	BGM	0.0071	40.068	
HFIXB217D*	B	M2	2	2	47.639			0.143	20	BGM	0.0071	47.303	
HFIXB218D*	B	M2	2	2	45.032			0.143	20	BGM	0.0071	44.657	
HFIXB219D*	B	M2	2	2	46.851			0.143	20	BGM	0.0072	46.575	
HFIXC217D*	C	M2	3	2	40.333			0.143	20	BGM	0.0071	40.007	
HFIXC218D*	C	M2	3	2				0.142	20	BGM / CIB	0.0071		
HFIXC219D*	C	M2	3	2	43.987			0.144	20	BGM	0.0072	43.921	

HFIXC218D: STRENGTH REMOVED DUE TO A BAD FAILURE MODE

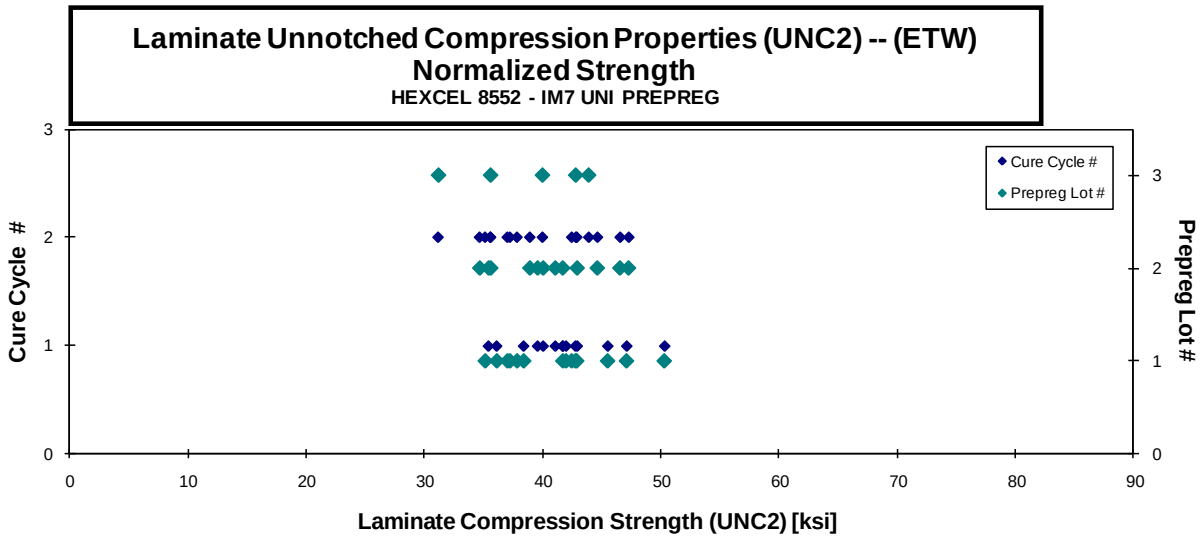
For batch C, cure cycle 1 panel has wrong layup, has two -45 degree plies at beginning of layu

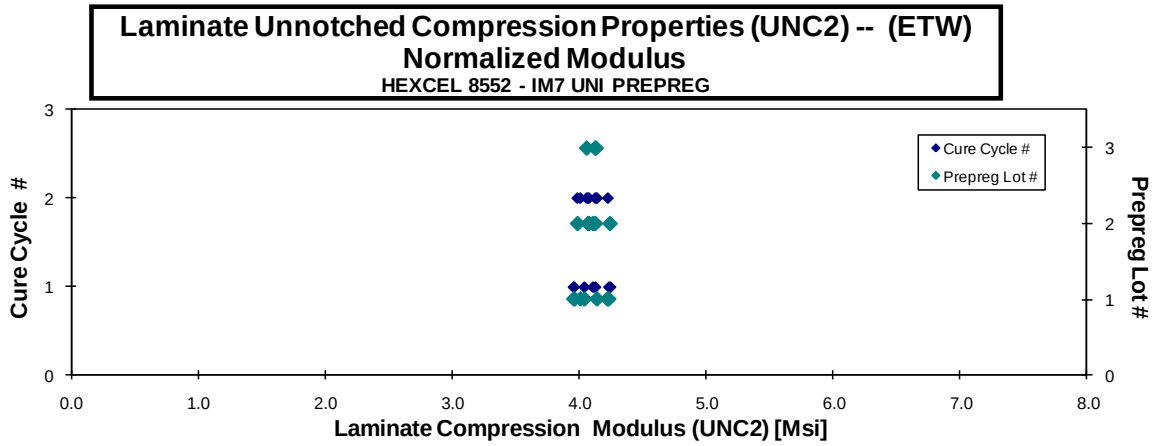
*** Modulus removed due to improper strain gage adhesvie used**

[1] Modulus is an average of two strain gage values

Average	**40.429**	**4.059**	**0.665**
Standard Dev.	**4.330**	**0.111**	**0.020**
Coeff. of Var. [%]	**10.710**	**2.723**	**3.029**
Min.	**31.309**	**3.847**	**0.631**
Max.	**49.443**	**4.182**	**0.698**
Number of Spec.	**31**	**16**	**16**

$Average_{norm}$	**0.0072**	**40.613**	**4.096**
Standard $Dev._{norm}$		**4.430**	**0.090**
Coeff. of Var. $[\%]_{norm}$		**10.907**	**2.206**
Min.	**0.0069**	**31.189**	**3.961**
Max.	**0.0074**	**50.336**	**4.246**
Number of Spec.	**32**	**31**	**16**


Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
10
20
30
40
50
60
70
80
90
Laminate Compression Strength (UNC2) [ksi]


Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Laminate Compression Modulus (UNC2) [Msi]

4.13 "50/40/10" Unnotched Compression 3 Properties (UNC3)

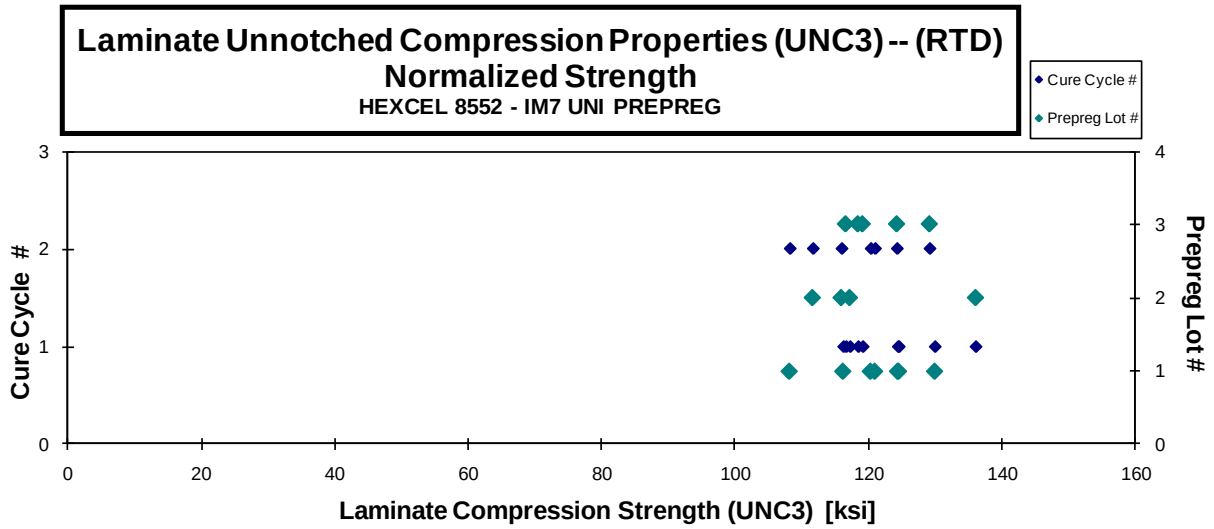
Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

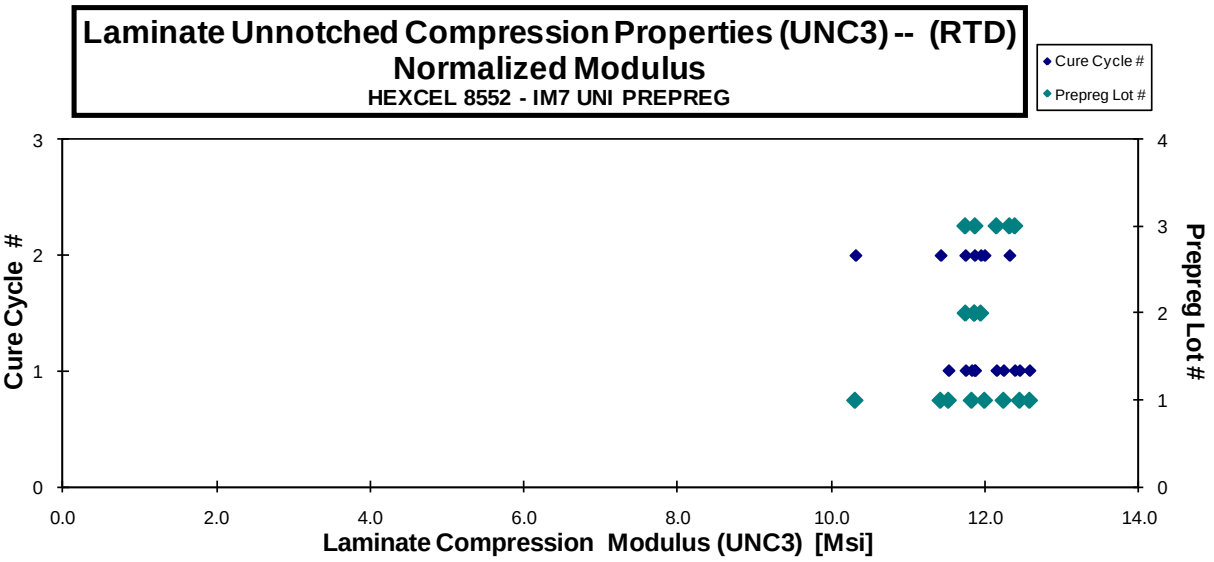
normalizing t_{ply} [in]: 0.0072

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]
HFIYA112A[1]	A	M1	1	1		12.739	0.452	0.141	20	END CRUSH	0.0070		12.451
HFIYA113A[1]	A	M1	1	1	128.027	11.653	0.394	0.146	20	BGM	0.0073	129.969	11.830
HFIYA114A	A	M1	1	1	121.763	11.980	0.382	0.147	20	BGM	0.0074	124.426	12.242
HFIYA115A	A	M1	1	1	122.888	11.373	0.404	0.146	20	BGM	0.0073	124.566	11.528
HFIYA116A[1]	A	M1	1	1	115.332	12.483	0.433	0.145	20	BGM	0.0073	116.227	12.579
HFIYA211A	A	M2	1	2	117.385	11.196	0.384	0.133	20	BGM	0.0066	108.201	10.320
HFIYA212A	A	M2	1	2	123.466	11.659	0.443	0.141	20	BGM	0.0071	120.994	11.426
HFIYA213A	A	M2	1	2	118.442	11.807	0.453	0.146	20	BGM	0.0073	120.348	11.997
HFIYB111A*	B	M1	2	1									
HFIYB112A	B	M1	2	1	122.753	12.304	0.430	0.138	20	BGM	0.0069	117.226	11.750
HFIYB113A	B	M1	2	1	137.699	12.005	0.412	0.142	20	BGM	0.0071	136.089	11.865
HFIYB2C1A*	B	M2	2	2					20	BGM			
HFIYB2C2A	B	M2	2	2	116.554	11.926	0.439	0.143	20	BGM	0.0072	115.974	11.866
HFIYB2C3A	B	M2	2	2	112.003	11.984	0.450	0.144	20	BGM	0.0072	111.666	11.947
HFIYC111A	C	M1	3	1	118.911	12.436	0.438	0.143	20	BGM	0.0072	118.456	12.389
HFIYC112A	C	M1	3	1	111.743	11.642	0.412	0.150	20	BGM	0.0075	116.631	12.151
HFIYC113A	C	M1	3	1	116.408	11.601	0.422	0.147	20	BGM	0.0074	119.143	11.873
HFIYC211A*	C	M2	3	2									
HFIYC212A	C	M2	3	2	126.639	11.970	0.399	0.141	20	BGM	0.0071	124.279	11.747
HFIYC213A	C	M2	3	2	127.022	12.114	0.436	0.146	20	BGM	0.0073	129.183	12.320

*Specimens have thickness taper at end of specimen
[1] Modulus is an average of two strain gage values

	Strength [ksi]	Modulus [Msi]	Poisson's Ratio		t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
Average	**121.065**	**11.934**	**0.423**	**Average$_{norm}$**	**0.0072**	**120.836**	**11.899**
Standard Dev.	**6.699**	**0.404**	**0.024**	**Standard Dev.$_{norm}$**		**7.083**	**0.518**
Coeff. of Var. [%]	**5.533**	**3.383**	**5.596**	**Coeff. of Var. [%]$_{norm}$**		**5.862**	**4.350**
Min.	**111.743**	**11.196**	**0.382**	**Min.**	**0.0066**	**108.201**	**10.320**
Max.	**137.699**	**12.739**	**0.453**	**Max.**	**0.0075**	**136.089**	**12.579**
Number of Spec.	**16**	**17**	**17**	**Number of Spec.**	**17**	**16**	**17**


Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
160
Laminate Compression Strength (UNC3) [ksi]


Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Laminate Compression Modulus (UNC3) [Msi]

Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIYA111D*	A	M1	1	1				0.132	20	BAT			
HFIYA117D[1&4]	A	M1	1	1		11.218	0.420	0.144	20	BAT/HIT	0.0072		11.243
HFIYA21BD[1]	A	M2	1	2		11.351	0.414	0.146	20	HAT / HIT	0.0073		11.498
HFIYA21CD[1]	A	M2	1	2		11.407	0.434	0.146	20	ENDCRUSH	0.0073		11.584
HFIYA214D[1]	A	M2	1	2		11.597	0.450	0.148	20	ENDCRUSH	0.0074		11.905
HFIYB118D	B	M1	2	1	78.090	11.699	0.415	0.142	20	DGM / BGM	0.0071	77.077	11.547
HFIYB11CD	B	M1	2	1	88.909	11.821	0.399	0.144	20	BGM	0.0072	88.899	11.820
HFIYB114D[1]	B	M1	2	1		11.946	0.427	0.144	20	HAB / HIB	0.0072		11.974
HFIYB2CBD	B	M2	2	2	75.171	11.835	0.403	0.140	20	BAT	0.0070	73.266	11.535
HFIYB2CCD*	B	M2	2	2				0.130	20	BAT			
HFIYB2C4D[1]	B	M2	2	2		11.555	0.426	0.144	20	ENDCRUSH	0.0072		11.537
HFIYC11BD	C	M1	3	1	90.400	11.493	0.423	0.148	20	BAT	0.0074	92.744	11.791
HFIYC11CD[1]	C	M1	3	1		11.639	0.417	0.147	20	HIT	0.0074		11.899
HFIYC114D[1]	C	M1	3	1		11.479	0.408	0.148	20	HIT	0.0074		11.797
HFIYC21CD	C	M2	3	2	88.788	11.949	0.402	0.146	20	BAB	0.0073	89.877	12.095
HFIYC214D	C	M2	3	2	94.499	11.953	0.416	0.147	20	BAB	0.0074	96.632	12.223
HFIYC215D	C	M2	3	2	93.549	11.958	0.389	0.146	20	BAB	0.0073	94.978	12.140
HFIYA119D[2]	A	M1	1	1	70.041			0.145	20	HAB	0.0072	70.479	
HFIYA11AD[2]	A	M1	1	1	67.563			0.145	20	HAT	0.0073	68.048	
HFIYA11BD[2]	A	M1	1	1	76.395			0.146	20	HAT	0.0073	77.314	
HFIYA11CD[2]	A	M1	1	1	74.707			0.146	20	HAB	0.0073	75.883	
HFIYA217D[3]	A	M2	1	2	83.165			0.146	20	HGM	0.0073	84.272	
HFIYA218D[1&3]	A	M2	1	2				0.146	20	HIB	0.0073		
HFIYA219D[3]	A	M2	1	2	68.257			0.145	20	HAT	0.0073	68.881	
HFIYA21AD[2]	A	M2	1	2	77.754			0.146	20	HAB	0.0073	78.663	
HFIYB117D[2]	B	M1	2	1	78.394			0.142	20	BAB	0.0071	77.314	
HFIYB119D[2]	B	M1	2	1	74.240			0.143	20	BAB	0.0071	73.647	
HFIYB11AD[2]	B	M1	2	1	75.914			0.143	20	BAT	0.0072	75.510	
HFIYB11BD[2]	B	M1	2	1	85.654			0.144	20	BAB	0.0072	85.515	
HFIYB2C7D[3]	B	M2	2	2	83.154			0.144	20	BGM	0.0072	83.125	
HFIYB2C8D[3]	B	M2	2	2	71.529			0.145	20	BGM	0.0072	71.968	
HFIYB2C9D[3]*	B	M2	2	2				0.146	20	BAT			
HFIYB2CAD[3]	B	M2	2	2	87.745			0.145	20	BAT	0.0073	88.629	
HFIYC117D[2]	C	M1	3	1	78.159			0.150	20	HAB	0.0075	81.162	
HFIYC118D[2]	C	M1	3	1	68.776			0.148	20	HAT	0.0074	70.639	
HFIYC11AD[2]	C	M1	3	1	72.324			0.148	20	HAB	0.0074	74.132	
HFIYC217D[2]	C	M2	3	2	72.290			0.145	20	HAB	0.0072	72.650	
HFIYC218D[2]	C	M2	3	2	78.362			0.145	20	HAB	0.0072	78.707	
HFIYC21BD[2]	C	M2	3	2	73.619			0.145	20	HAT	0.0073	74.292	

*Specimens have thickness taper on edge of specimen

[1]Compressive strength is not reported as un accpetable failure modes were observed

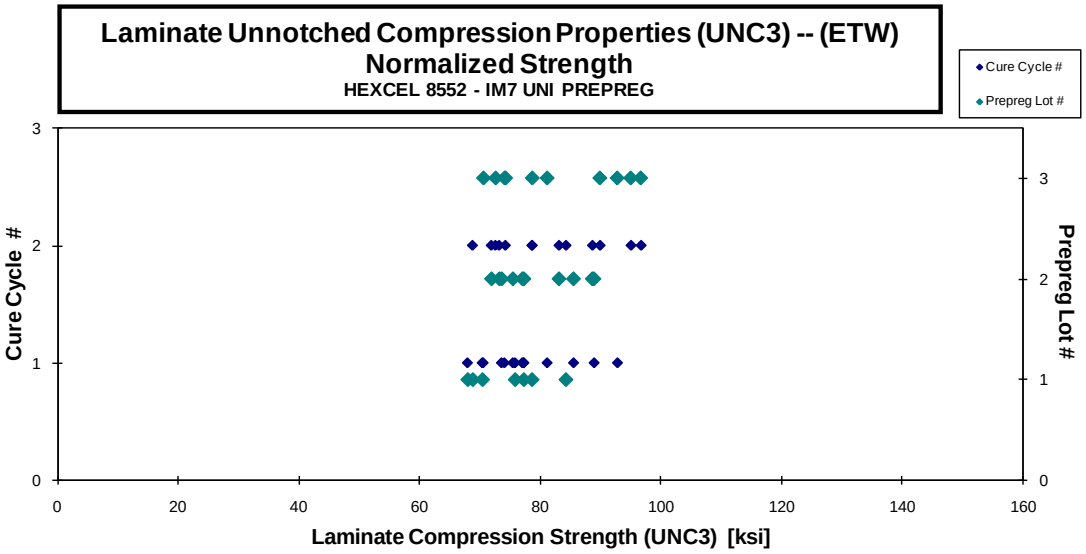
[2]Specimens were not gaged

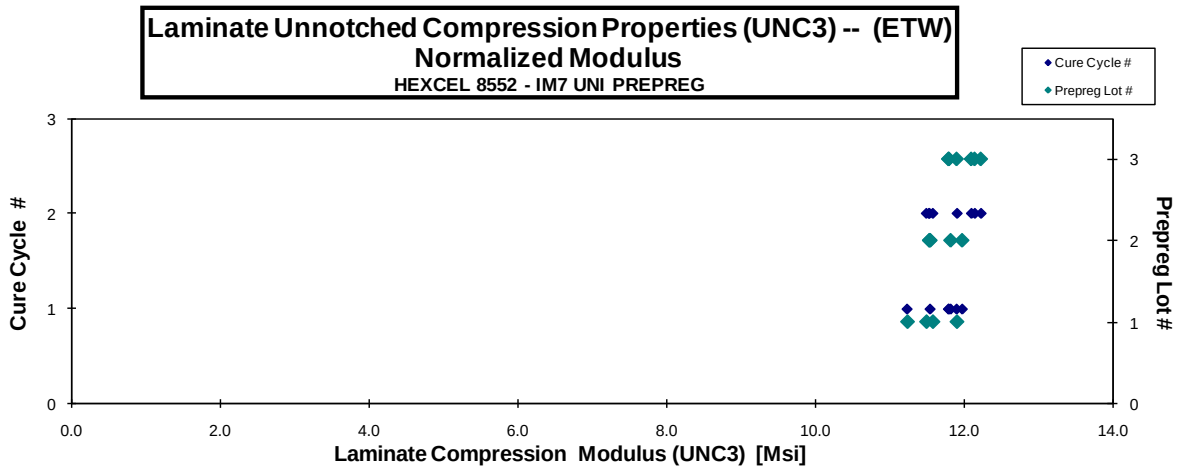
[3]Modulus removed due to improper strain gage adhesive used/faulty gage

[4] Modulus is an average of two strain gage values

Average	**78.794**	**11.660**	**0.416**
Standard Dev.	**7.872**	**0.243**	**0.015**
Coeff. of Var. [%]	**9.991**	**2.087**	**3.623**
Min.	**67.563**	**11.218**	**0.389**
Max.	**94.499**	**11.958**	**0.450**
Number of Spec.	**27**	**15**	**15**

$Average_{norm}$	**0.0073**	**79.419**	**11.772**
Standard $Dev._{norm}$		**8.192**	**0.277**
Coeff. of Var. $[\%]_{norm}$		**10.315**	**2.352**
Min.	**0.0070**	**68.048**	**11.243**
Max.	**0.0075**	**96.632**	**12.223**
Number of Spec.	**36**	**27**	**15**


Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Strength (UNC3) [ksi]
0
20
40
60
80
100
120
140
160
0
1
2
3


Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Normalized Modulus
HEXCEL 8552 - IM7 UNI PREPREG
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Compression Modulus (UNC3) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
0
1
2
3

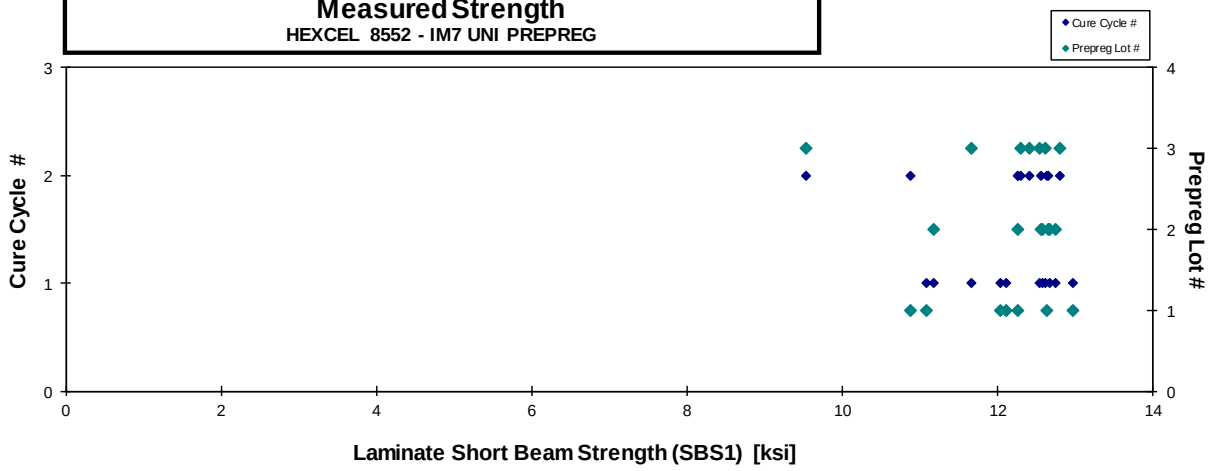
4.14 Laminate Short Beam Strength Properties (SBS1)

Laminate Short Beam Strength Properties (SBS1) -- (RTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

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
HFlqA171A	A	M1	1	1	11.089	0.161	24	0.0067	INTERLAMINAR SHEAR
HFlqA172A	A	M1	1	1	12.055	0.174	24	0.0073	INTERLAMINAR SHEAR
HFlqA173A	A	M1	1	1	12.983	0.179	24	0.0075	INTERLAMINAR SHEAR
HFlqA174A	A	M1	1	1	12.125	0.178	24	0.0074	INTERLAMINAR SHEAR
HFlqA271A	A	M2	1	2	12.646	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqA272A	A	M2	1	2	10.879	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqA273A	A	M2	1	2	12.271	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqB171A	B	M1	2	1	12.748	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqB172A	B	M1	2	1	12.594	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB173A	B	M1	2	1	11.193	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB174A	B	M1	2	1	12.687	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB271A	B	M2	2	2	12.562	0.174	24	0.0072	INTERLAMINAR SHEAR
HFlqB272A	B	M2	2	2	12.662	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB273A	B	M2	2	2	12.269	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqC171A	C	M1	3	1	11.670	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqC172A	C	M1	3	1	12.620	0.174	24	0.0073	INTERLAMINAR SHEAR
HFlqC173A	C	M1	3	1	12.560	0.174	24	0.0073	INTERLAMINAR SHEAR
HFlqC271A	C	M2	3	2	12.420	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqC272A	C	M2	3	2	9.550	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqC273A	C	M2	3	2	12.318	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqC274A	C	M2	3	2	12.804	0.172	24	0.0072	INTERLAMINAR SHEAR

Average	**12.129**	**Average**	**0.0072**
Standard Dev.	**0.831**	**Standard Dev.**	
Coeff. of Var. [%]	**6.851**	**Coeff. of Var. [%]**	
Min.	**9.550**	**Min.**	**0.0067**
Max.	**12.983**	**Max.**	**0.0075**
Number of Spec.	**21**	**Number of Spec.**	**21**

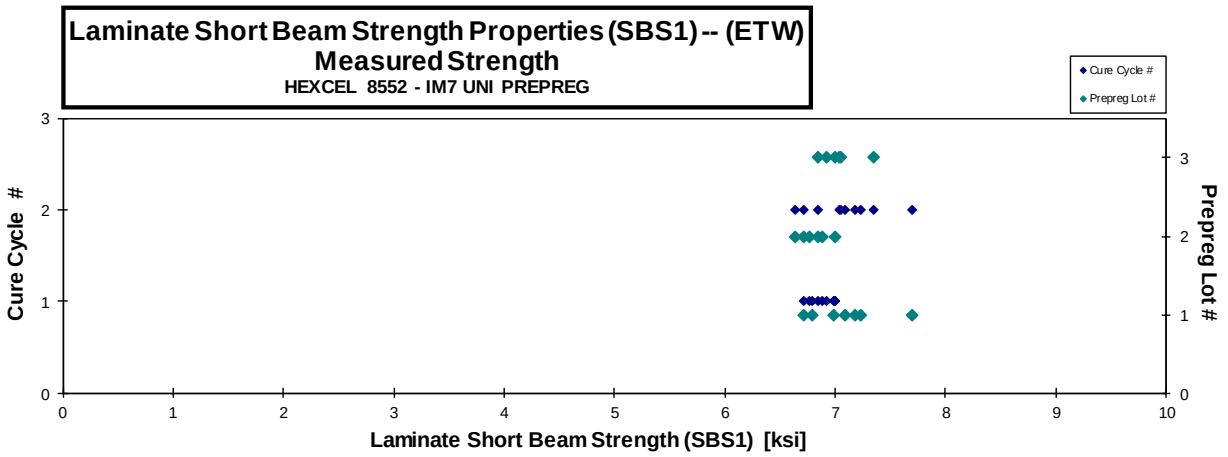
Laminate Short Beam Strength Properties (SBS1) -- (RTD)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Short Beam Strength Properties (SBS1) -- (ETW)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG

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
HFlqA177D	A	M1	1	1	6.721	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqA178D	A	M1	1	1	6.792	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqA17AD	A	M1	1	1	6.993	0.175	24	0.0073	INTERLAMINAR SHEAR
HFlqA276D	A	M2	1	2	7.699	0.174	24	0.0072	INTERLAMINAR SHEAR
HFlqA277D	A	M2	1	2	7.182	0.174	24	0.0073	INTERLAMINAR SHEAR
HFlqA278D	A	M2	1	2	7.240	0.175	24	0.0073	INTERLAMINAR SHEAR
HFlqA279D	A	M2	1	2	7.095	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqB178D	B	M1	2	1	7.008	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB179D	B	M1	2	1	6.885	0.174	24	0.0072	INTERLAMINAR SHEAR
HFlqB17AD	B	M1	2	1	6.772	0.175	24	0.0073	INTERLAMINAR SHEAR
HFlqB276D	B	M2	2	2	6.635	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB277D	B	M2	2	2	6.846	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqB278D	B	M2	2	2	6.719	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqC176D	C	M1	3	1	6.996	0.174	24	0.0072	INTERLAMINAR SHEAR
HFlqC177D	C	M1	3	1	6.922	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqC178D	C	M1	3	1	6.853	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqC276D	C	M2	3	2	7.355	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqC277D	C	M2	3	2	7.060	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqC278D	C	M2	3	2	7.047	0.173	24	0.0072	INTERLAMINAR SHEAR

Average	**6.991**	**Average**	**0.0072**
Standard Dev.	**0.255**	**Standard Dev.**	
Coeff. of Var. [%]	**3.646**	**Coeff. of Var. [%]**	
Min.	**6.635**	**Min.**	**0.0072**
Max.	**7.699**	**Max.**	**0.0073**
Number of Spec.	**19**	**Number of Spec.**	**19**

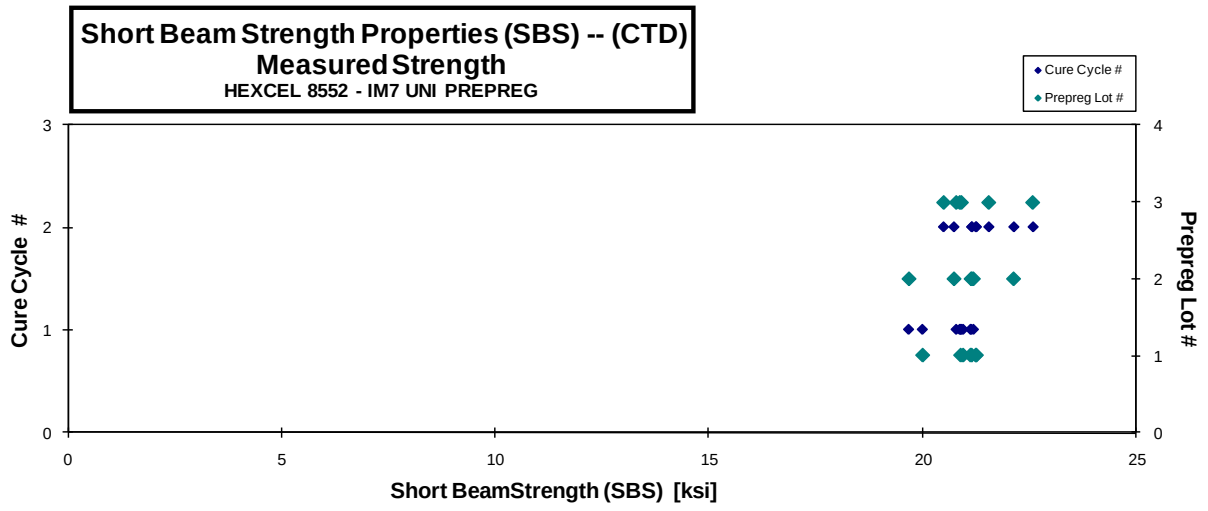


4.15 -Lamina Short Beam Strength Properties (SBS)

Short Beam Strength Properties (SBS) -- (CTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

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
HFIQA113B	A	M1	1	1	20.889	0.238	34	0.0070	INTERLAMINAR SHEAR
HFIQA118B	A	M1	1	1	20.948	0.237	34	0.0070	INTERLAMINAR SHEAR
HFIQA11CB	A	M1	1	1	20.000	0.239	34	0.0070	INTERLAMINAR SHEAR
HFIQA11HB	A	M1	1	1	21.120	0.241	34	0.0071	INTERLAMINAR SHEAR
HFIQA214B	A	M2	1	2	21.244	0.255	34	0.0075	INTERLAMINAR SHEAR
HFIQA215B	A	M2	1	2	21.257	0.258	34	0.0076	INTERLAMINAR SHEAR
HFIQA216B	A	M2	1	2	21.148	0.257	34	0.0075	INTERLAMINAR SHEAR
HFIQB11DB	B	M1	2	1	19.680	0.253	34	0.0074	INTERLAMINAR SHEAR
HFIQB11EB	B	M1	2	1	21.135	0.257	34	0.0075	INTERLAMINAR SHEAR
HFIQB11FB	B	M1	2	1	21.188	0.255	34	0.0075	INTERLAMINAR SHEAR
HFIQB217B	B	M2	2	2	20.735	0.247	34	0.0073	INTERLAMINAR SHEAR
HFIQB21DB	B	M2	2	2	21.155	0.248	34	0.0073	INTERLAMINAR SHEAR
HFIQB21GB	B	M2	2	2	22.130	0.244	34	0.0072	INTERLAMINAR SHEAR
HFIQC114B	C	M1	3	1	20.907	0.253	34	0.0074	INTERLAMINAR SHEAR
HFIQC115B	C	M1	3	1	20.787	0.259	34	0.0076	INTERLAMINAR SHEAR
HFIQC116B	C	M1	3	1	20.868	0.259	34	0.0076	INTERLAMINAR SHEAR
HFIQC215B	C	M2	3	2	20.492	0.251	34	0.0074	INTERLAMINAR SHEAR
HFIQC216B	C	M2	3	2	21.548	0.250	34	0.0074	INTERLAMINAR SHEAR
HFIQC21DB	C	M2	3	2	22.577	0.256	34	0.0075	INTERLAMINAR SHEAR

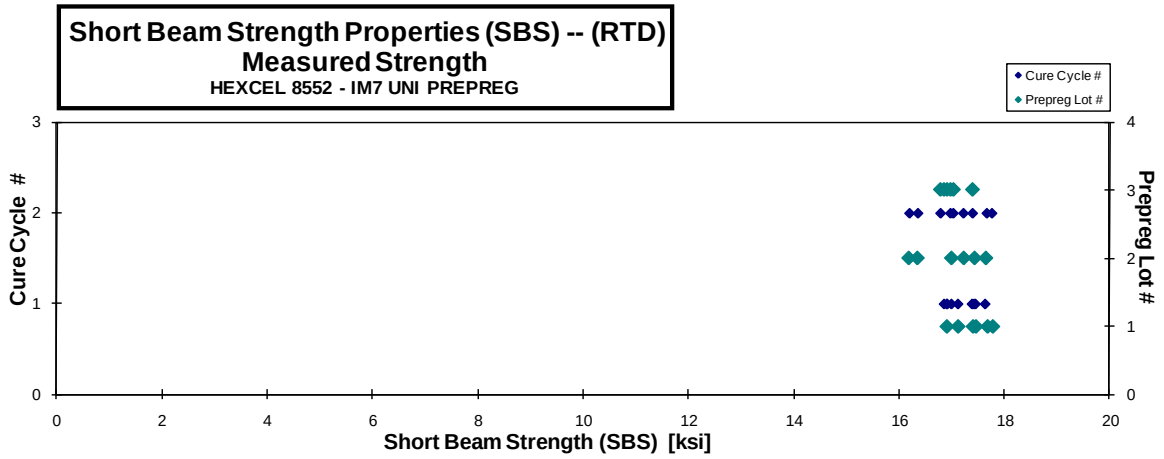
Average	**21.043**	**Average**	**0.0074**
Standard Dev.	**0.642**	**Standard Dev.**	
Coeff. of Var. [%]	**3.053**	**Coeff. of Var. [%]**	
Min.	**19.680**	**Min.**	**0.0070**
Max.	**22.577**	**Max.**	**0.0076**
Number of Spec.	**19**	**Number of Spec.**	**19**



Short Beam Strength Properties (SBS) -- (RTD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

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
HFIQA112A	A	M1	1	1	17.128	0.224	34	0.0066	INTERLAMINAR SHEAR
HFIQA119A	A	M1	1	1	17.463	0.228	34	0.0067	INTERLAMINAR SHEAR
HFIQA11BA	A	M1	1	1	16.916	0.223	34	0.0066	INTERLAMINAR SHEAR
HFIQA211A	A	M2	1	2	17.780	0.225	34	0.0066	INTERLAMINAR SHEAR
HFIQA21BA	A	M2	1	2	17.682	0.227	34	0.0067	INTERLAMINAR SHEAR
HFIQA21HA	A	M2	1	2	17.409	0.229	34	0.0067	INTERLAMINAR SHEAR
HFIQB113A	B	M1	2	1	17.649	0.231	34	0.0068	INTERLAMINAR SHEAR
HFIQB117A	B	M1	2	1	17.436	0.234	34	0.0069	INTERLAMINAR SHEAR
HFIQB11BA	B	M1	2	1	17.002	0.230	34	0.0068	INTERLAMINAR SHEAR
HFIQB213A	B	M2	2	2	17.233	0.243	34	0.0071	INTERLAMINAR SHEAR
HFIQB218A	B	M2	2	2	16.360	0.237	34	0.0070	INTERLAMINAR SHEAR
HFIQB21CA	B	M2	2	2	16.198	0.240	34	0.0071	INTERLAMINAR SHEAR
HFIQC112A	C	M1	3	1	16.861	0.225	34	0.0066	INTERLAMINAR SHEAR
HFIQC119A	C	M1	3	1	16.919	0.223	34	0.0066	INTERLAMINAR SHEAR
HFIQC11HA	C	M1	3	1	17.398	0.227	34	0.0067	INTERLAMINAR SHEAR
HFIQC21EA	C	M2	3	2	16.984	0.261	34	0.0077	INTERLAMINAR SHEAR
HFIQC21FA	C	M2	3	2	17.039	0.262	34	0.0077	INTERLAMINAR SHEAR
HFIQC21GA	C	M2	3	2	16.794	0.258	34	0.0076	INTERLAMINAR SHEAR

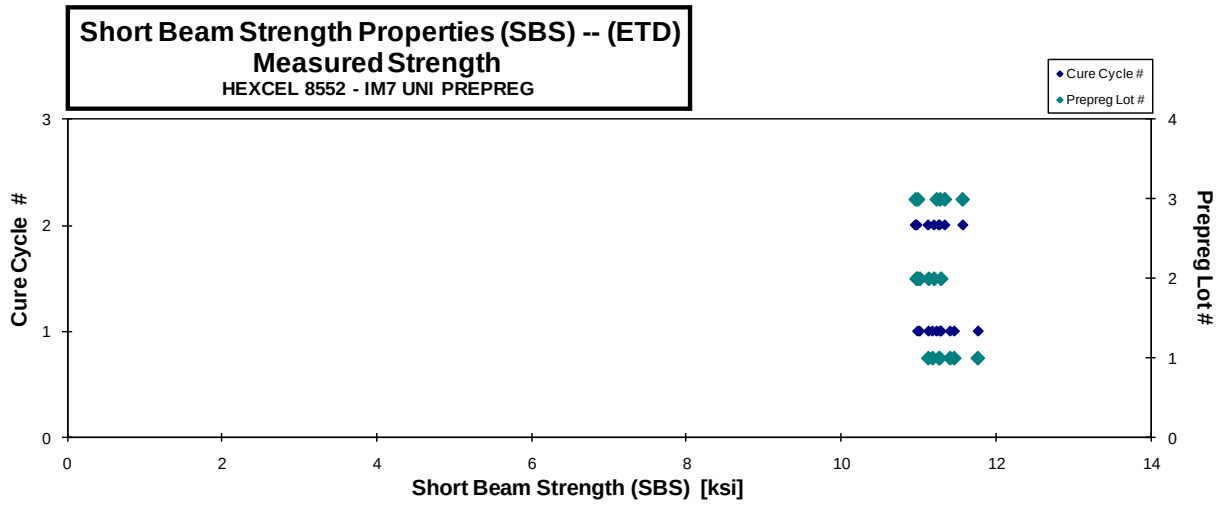
Average	**17.125**	**Average**	**0.0069**
Standard Dev.	**0.430**	**Standard Dev.**	
Coeff. of Var. [%]	**2.511**	**Coeff. of Var. [%]**	
Min.	**16.198**	**Min.**	**0.0066**
Max.	**17.780**	**Max.**	**0.0077**
Number of Spec.	**18**	**Number of Spec.**	**18**



Short Beam Strength Properties (SBS) -- (ETD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFIQA114C	A	M1	1	1	11.181	0.247	34	0.0073	INTERLAMINAR SHEAR
HFIQA117C	A	M1	1	1	11.775	0.245	34	0.0072	INTERLAMINAR SHEAR
HFIQA11DC	A	M1	1	1	11.465	0.248	34	0.0073	INTERLAMINAR SHEAR
HFIQA11GC	A	M1	1	1	11.411	0.248	34	0.0073	INTERLAMINAR SHEAR
HFIQA212C	A	M2	1	2	11.125	0.237	34	0.0070	INTERLAMINAR SHEAR
HFIQA21CC	A	M2	1	2	11.264	0.237	34	0.0070	INTERLAMINAR SHEAR
HFIQA21GC	A	M2	1	2	11.273	0.238	34	0.0070	INTERLAMINAR SHEAR
HFIQB112C	B	M1	2	1	11.293	0.220	34	0.0065	INTERLAMINAR SHEAR
HFIQB118C	B	M1	2	1	11.015	0.224	34	0.0066	INTERLAMINAR SHEAR
HFIQB11IC	B	M1	2	1	11.132	0.222	34	0.0065	INTERLAMINAR SHEAR
HFIQB219C	B	M2	2	2	11.201	0.224	34	0.0066	INTERLAMINAR SHEAR
HFIQB21BC	B	M2	2	2	10.980	0.228	34	0.0067	INTERLAMINAR SHEAR
HFIQB21IC	B	M2	2	2	10.970	0.222	34	0.0065	INTERLAMINAR SHEAR
HFIQC117C	C	M1	3	1	10.989	0.252	34	0.0074	INTERLAMINAR SHEAR
HFIQC11EC	C	M1	3	1	11.235	0.248	34	0.0073	INTERLAMINAR SHEAR
HFIQC11FC	C	M1	3	1	11.279	0.247	34	0.0073	INTERLAMINAR SHEAR
HFIQC214C	C	M2	3	2	11.576	0.245	34	0.0072	INTERLAMINAR SHEAR
HFIQC217C	C	M2	3	2	11.341	0.245	34	0.0072	INTERLAMINAR SHEAR
HFIQC21CC	C	M2	3	2	10.958	0.247	34	0.0073	INTERLAMINAR SHEAR

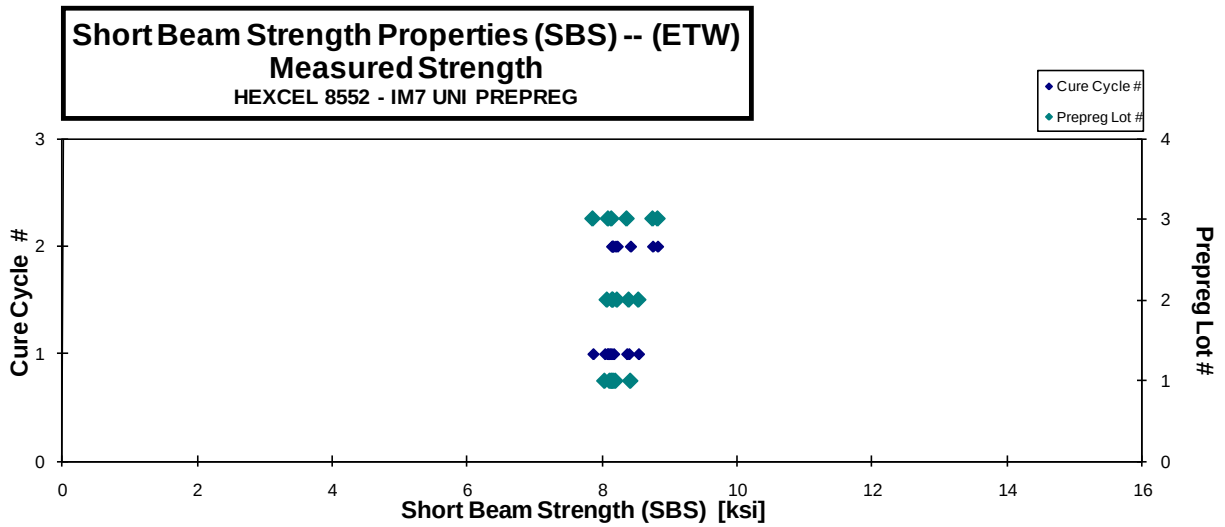
Average	**11.235**	**Average**	**0.0070**
Standard Dev.	**0.218**	**Standard Dev.**	
Coeff. of Var. [%]	**1.944**	**Coeff. of Var. [%]**	
Min.	**10.958**	**Min.**	**0.0065**
Max.	**11.775**	**Max.**	**0.0074**
Number of Spec.	**19**	**Number of Spec.**	**19**



Short Beam Shear Properties (SBS) -- (ETW)
Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG

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
HFIQA115D	A	M1	1	1	8.113	0.251	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQA116D	A	M1	1	1	8.038	0.249	34	0.0073	COMPRESSION / INTERLAMINAR SHEAR
HFIQA11ED	A	M1	1	1	8.169	0.253	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQA11FD	A	M1	1	1	8.137	0.252	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQA21DD	A	M2	1	2	8.419	0.244	34	0.0072	COMPRESSION / INTERLAMINAR SHEAR
HFIQA21ED	A	M2	1	2	8.151	0.247	34	0.0073	COMPRESSION / INTERLAMINAR SHEAR
HFIQA21FD	A	M2	1	2	8.198	0.246	34	0.0072	COMPRESSION / INTERLAMINAR SHEAR
HFIQB115D	B	M1	2	1	8.538	0.244	34	0.0072	COMPRESSION / INTERLAMINAR SHEAR
HFIQB116D	B	M1	2	1	8.395	0.241	34	0.0071	COMPRESSION / INTERLAMINAR SHEAR
HFIQB11CD	B	M1	2	1	8.074	0.244	34	0.0072	COMPRESSION / INTERLAMINAR SHEAR
HFIQB214D	B	M2	2	2	8.161	0.251	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQB21ED	B	M2	2	2	8.151	0.251	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQB21FD	B	M2	2	2	8.222	0.250	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQC113D	C	M1	3	1	8.091	0.241	34	0.0071	COMPRESSION / INTERLAMINAR SHEAR
HFIQC118D	C	M1	3	1	7.863	0.240	34	0.0071	COMPRESSION / INTERLAMINAR SHEAR
HFIQC11DD	C	M1	3	1	8.364	0.242	34	0.0071	COMPRESSION / INTERLAMINAR SHEAR
HFIQC213D	C	M2	3	2	8.820	0.236	34	0.0069	COMPRESSION / INTERLAMINAR SHEAR
HFIQC218D	C	M2	3	2	8.748	0.237	34	0.0070	COMPRESSION / INTERLAMINAR SHEAR
HFIQC21BD	C	M2	3	2	8.140	0.236	34	0.0069	COMPRESSION / INTERLAMINAR SHEAR

Average	**8.252**	**Average**	**0.0072**
Standard Dev.	**0.242**	**Standard Dev.**	
Coeff. of Var. [%]	**2.927**	**Coeff. of Var. [%]**	
Min.	**7.863**	**Min.**	**0.0069**
Max.	**8.820**	**Max.**	**0.0074**
Number of Spec.	**19**	**Number of Spec.**	**19**



4.16 "25/50/25" Open Hole Tension 1 Properties (OHT1)

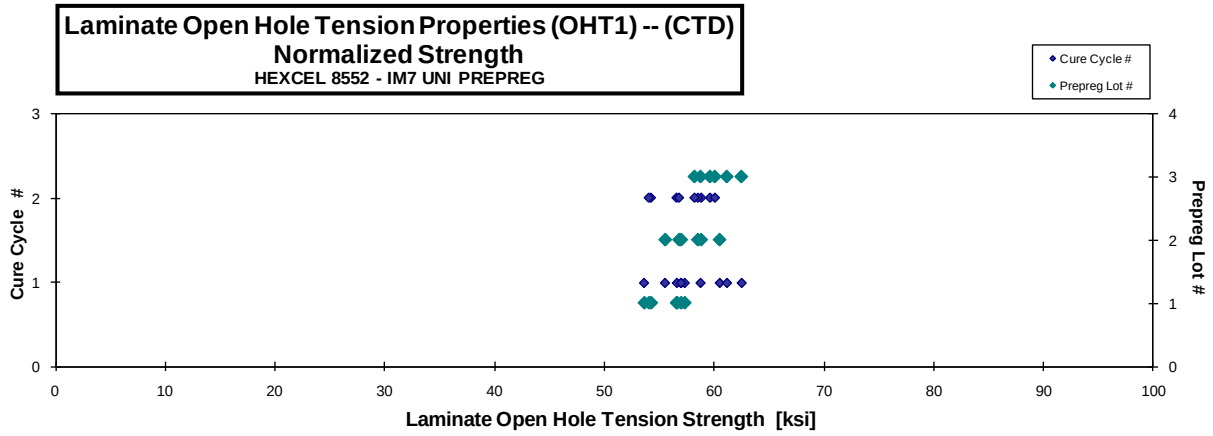
Laminate Open Hole Tension Properties (OHT1) -- (CTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIDA116B	A	M1	1	1	56.265	0.117	16	MGM	0.0073	57.006
HFIDA117B	A	M1	1	1	55.416	0.118	16	MGM	0.0074	56.635
HFIDA118B	A	M1	1	1	57.519	0.115	16	MGM	0.0072	57.344
HFIDA119B	A	M1	1	1	54.997	0.112	16	MGM	0.0070	53.645
HFIDA216B	A	M2	1	2	53.305	0.117	16	MGM	0.0073	54.269
HFIDA217B	A	M2	1	2	55.545	0.117	16	MGM	0.0073	56.598
HFIDA218B	A	M2	1	2	53.271	0.117	16	MGM	0.0073	54.073
HFIDB115B	B	M1	2	1	56.508	0.116	16	MGM	0.0073	57.015
HFIDB116B	B	M1	2	1	55.718	0.115	16	MGM	0.0072	55.549
HFIDB117B	B	M1	2	1	58.780	0.119	16	MGM	0.0074	60.531
HFIDB216B	B	M2	2	2	59.065	0.115	16	MGM	0.0072	58.843
HFIDB217B	B	M2	2	2	58.040	0.116	16	MGM	0.0073	58.544
HFIDB218B	B	M2	2	2	57.482	0.114	16	MGM	0.0071	56.825
HFIDC116B	C	M1	3	1	60.750	0.116	16	MGM	0.0073	61.190
HFIDC117B	C	M1	3	1	61.668	0.117	16	MGM	0.0073	62.524
HFIDC118B	C	M1	3	1	58.242	0.116	16	MGM	0.0073	58.781
HFIDC216B	C	M2	3	2	58.836	0.117	16	MGM	0.0073	59.645
HFIDC217B	C	M2	3	2	59.173	0.117	16	MGM	0.0073	60.089
HFIDC218B	C	M2	3	2	57.662	0.116	16	MGM	0.0073	58.229

Average	57.276	
Standard Dev.	2.262	
Coeff. of Var. [%]	3.950	
Min.	53.271	
Max.	61.668	
Number of Spec.	19	

$Average_{norm}$	0.0073	57.754
$Standard\ Dev._{norm}$		2.433
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.213
Min.	0.0070	53.645
Max.	0.0074	62.524
Number of Spec.	19	19



Laminate Open Hole Tension Properties (OHT1) -- (RTD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

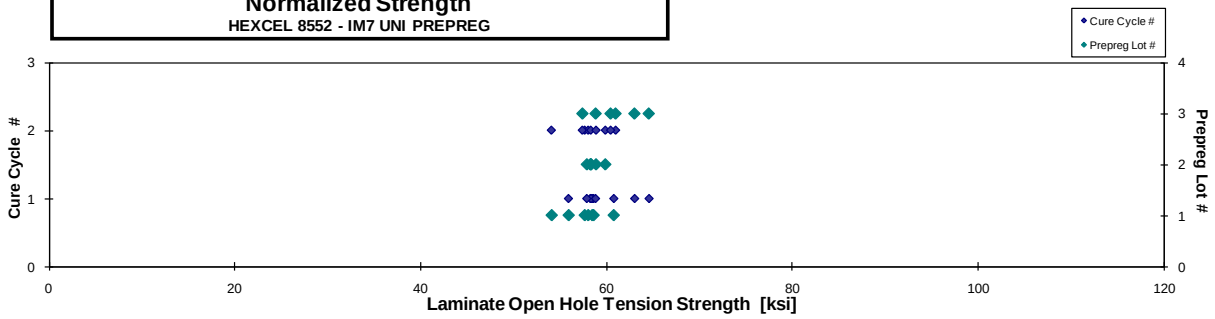
normalizing t_{ply} [in]: 0.0072

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]
HFIDA111A	A	M1	1	1	57.333	0.112	16	MGM	0.0070	55.956
HFIDA112A	A	M1	1	1	57.225	0.118	16	MGM	0.0074	58.649
HFIDA113A	A	M1	1	1	57.430	0.117	16	MGM	0.0073	58.502
HFIDA114A	A	M1	1	1	59.787	0.117	16	MGM	0.0073	60.825
HFIDA211A	A	M2	1	2	53.318	0.117	16	MGM	0.0073	54.120
HFIDA212A	A	M2	1	2	56.126	0.118	16	MGM	0.0074	57.693
HFIDA213A	A	M2	1	2	56.851	0.118	16	MGM	0.0074	58.068
HFIDB111A	B	M1	2	1	58.569	0.115	16	MGM	0.0072	58.298
HFIDB112A	B	M1	2	1	57.566	0.117	16	MGM	0.0073	58.382
HFIDB113A	B	M1	2	1	57.722	0.116	16	MGM	0.0072	57.922
HFIDB211A	B	M2	2	2	59.861	0.112	16	MGM	0.0070	58.345
HFIDB212A	B	M2	2	2	58.439	0.116	16	MGM	0.0073	58.912
HFIDB213A	B	M2	2	2	60.377	0.114	16	MGM	0.0071	59.915
HFIDC111A	C	M1	3	1	59.887	0.113	16	MGM	0.0071	58.865
HFIDC112A	C	M1	3	1	62.217	0.117	16	MGM	0.0073	63.063
HFIDC113A	C	M1	3	1	64.442	0.116	16	MGM	0.0072	64.610
HFIDC211A	C	M2	3	2	58.071	0.114	16	MGM	0.0071	57.440
HFIDC212A	C	M2	3	2	59.987	0.117	16	MGM	0.0073	61.020
HFIDC213A	C	M2	3	2	60.004	0.116	16	MGM	0.0073	60.481

Average	58.695	
Standard Dev.	2.390	
Coeff. of Var. [%]	4.072	
Min.	53.318	
Max.	64.442	
Number of Spec.	19	

$Average_{norm}$	0.00724	59.003
$Standard\ Dev._{norm}$		2.350
Coeff. of Var. $[\%]_{norm}$		3.982
Min.	0.0070	54.120
Max.	0.0074	64.610
Number of Spec.	19	19

Laminate Open Hole Tension Properties (OHT1) -- (RTD) Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



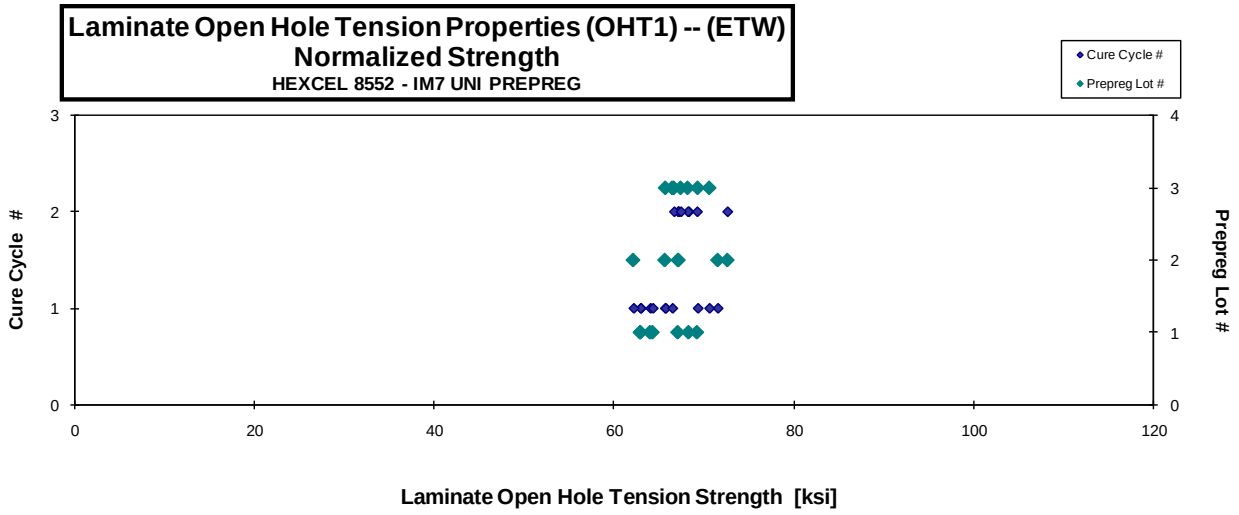
Laminate Open Hole Tension Properties (OHT1) -- (ETW) Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIDA11BD	A	M1	1	1	63.475	0.116	16	AGM	0.0073	64.017
HFIDA11CD	A	M1	1	1	62.272	0.116	16	AGM	0.0073	62.966
HFIDA11DD	A	M1	1	1	62.206	0.117	16	AGM	0.0073	62.926
HFIDA11ED	A	M1	1	1	63.863	0.116	16	AGM	0.0072	64.297
HFIDA21BD	A	M2	1	2	66.003	0.117	16	AGM	0.0073	67.092
HFIDA21CD	A	M2	1	2	67.056	0.117	16	MGM	0.0073	68.288
HFIDA21DD	A	M2	1	2	67.795	0.118	16	AGM	0.0074	69.218
HFIDB119D	B	M1	2	1	63.402	0.113	16	AGM	0.0071	62.154
HFIDB11AD	B	M1	2	1	65.212	0.116	16	AGM	0.0072	65.656
HFIDB11BD	B	M1	2	1	71.042	0.116	16	MGM	0.0072	71.515
HFIDB21BD	B	M2	2	2	73.233	0.114	16	AGM	0.0071	72.587
HFIDB21CD	B	M2	2	2	67.200	0.115	16	AGM	0.0072	67.152
HFIDB21DD	B	M2	2	2	67.239	0.115	16	AGM	0.0072	67.141
HFIDC11BD	C	M1	3	1	65.357	0.116	16	AGM	0.0072	65.716
HFIDC11CD	C	M1	3	1	69.942	0.116	16	AGM	0.0073	70.579
HFIDC11DD	C	M1	3	1	68.968	0.116	16	AGM	0.0072	69.297
HFIDC11FD	C	M1	3	1	65.533	0.117	16	MGM	0.0073	66.472
HFIDC21BD	C	M2	3	2	67.346	0.117	16	AGM	0.0073	68.184
HFIDC21CD	C	M2	3	2	65.625	0.117	16	AGM	0.0073	66.660
HFIDC21DD	C	M2	3	2	66.795	0.116	16	AGM	0.0073	67.413

Average	66.478	
Standard Dev.	2.853	
Coeff. of Var. [%]	4.292	
Min.	62.206	
Max.	73.233	
Number of Spec.	20	

$Average_{norm}$	0.0073	66.966
$Standard\ Dev._{norm}$		2.850
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.255
Min.	0.0071	62.154
Max.	0.0074	72.587
Number of Spec.	20	20



4.17 "10/80/10" Open Hole Tension 2 Properties (OHT2)

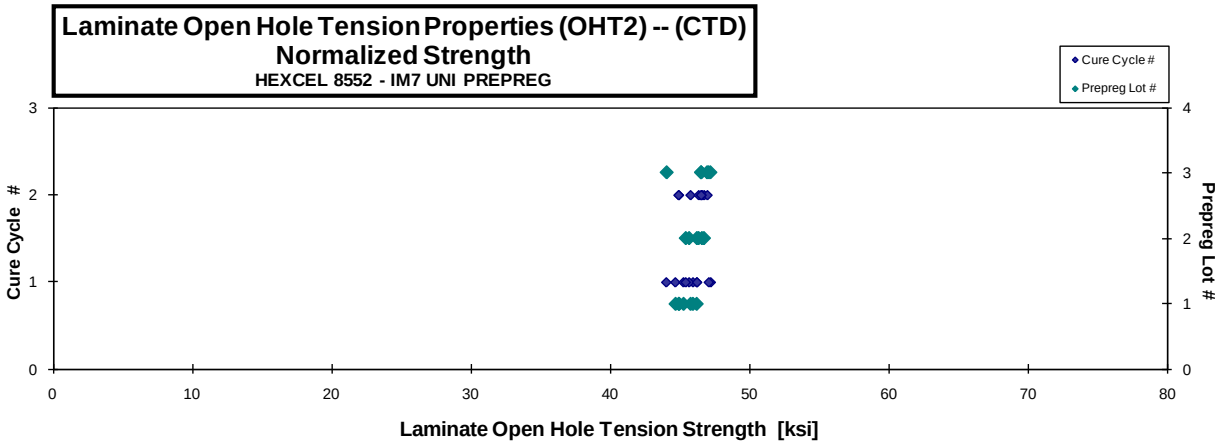
Laminate Open Hole Tension Properties (OHT2) -- (CTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFIEA115B	A	M1	1	1	44.404	0.145	20	AGM	0.0072	44.686
HFIEA116B	A	M1	1	1	45.649	0.146	20	AGM	0.0073	46.209
HFIEA117B	A	M1	1	1	44.586	0.146	20	AGM	0.0073	45.262
HFIEA118B	A	M1	1	1	45.233	0.146	20	AGM	0.0073	45.940
HFIEA215B	A	M2	1	2	43.883	0.147	20	AGM	0.0074	44.940
HFIEA216B	A	M2	1	2	44.158	0.146	20	AGM	0.0073	44.920
HFIEA217B	A	M2	1	2	44.366	0.149	20	AGM	0.0074	45.768
HFIEB115B	B	M1	2	1	45.728	0.144	20	AGM	0.0072	45.664
HFIEB116B	B	M1	2	1	46.353	0.144	20	AGM	0.0072	46.224
HFIEB117B	B	M1	2	1	45.119	0.145	20	AGM	0.0072	45.422
HFIEB215B	B	M2	2	2	46.586	0.144	20	AGM	0.0072	46.586
HFIEB216B	B	M2	2	2	46.601	0.143	20	AGM	0.0072	46.347
HFIEB217B	B	M2	2	2	46.631	0.144	20	AGM	0.0072	46.734
HFIEC115B	C	M1	3	1	45.492	0.139	20	AGM	0.0070	44.045
HFIEC116B	C	M1	3	1	46.661	0.146	20	AGM	0.0073	47.196
HFIEC117B	C	M1	3	1	47.025	0.144	20	AGM	0.0072	47.063
HFIEC215B	C	M2	3	2	46.563	0.145	20	AGM	0.0073	46.962
HFIEC216B	C	M2	3	2	46.288	0.145	20	AGM	0.0072	46.535
HFIEC217B	C	M2	3	2	45.652	0.147	20	AGM	0.0073	46.524

Average	45.630	
Standard Dev.	0.987	
Coeff. of Var. [%]	2.164	
Min.	43.883	
Max.	47.025	
Number of Spec.	19	

$Average_{norm}$	0.0073	45.949
$Standard\ Dev._{norm}$		0.881
$Coeff.\ of\ Var.\ [\%]_{norm}$		1.918
Min.	0.0070	44.045
Max.	0.0074	47.196
Number of Spec.	19	19



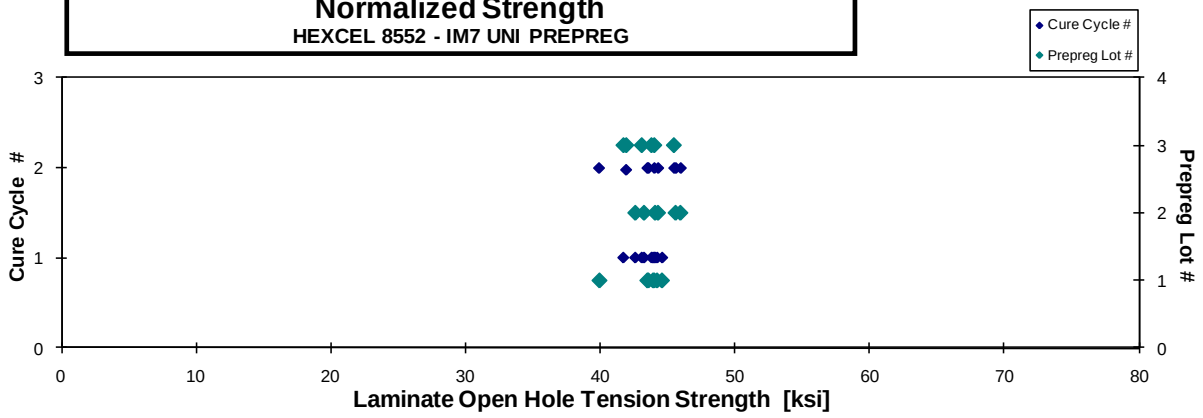
Laminate Open Hole Tension Properties (OHT2) -- (RTD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIEA111A	A	M1	1	1	44.383	0.142	20	AGM	0.0071	43.915
HFIEA112A	A	M1	1	1	43.792	0.147	20	AGM	0.0073	44.583
HFIEA113A	A	M1	1	1	43.592	0.145	20	AGM	0.0073	44.006
HFIEA114A	A	M1	1	1	43.843	0.145	20	AGM	0.0073	44.218
HFIEA211A	A	M2	1	2	41.048	0.140	20	AGM	0.0070	39.912
HFIEA212A	A	M2	1	2	42.213	0.149	20	AGM	0.0074	43.571
HFIEA213A	A	M2	1	2	42.685	0.147	20	AGM	0.0073	43.490
HFIEB111A	B	M1	2	1	42.668	0.144	20	AGM	0.0072	42.589
HFIEB112A	B	M1	2	1	43.774	0.145	20	AGM	0.0072	44.068
HFIEB113A	B	M1	2	1	43.345	0.144	20	AGM	0.0072	43.240
HFIEB211A	B	M2	2	2	45.471	0.140	20	AGM	0.0070	44.286
HFIEB212A	B	M2	2	2	45.720	0.145	20	AGM	0.0072	45.958
HFIEB213A	B	M2	2	2	45.864	0.143	20	AGM	0.0072	45.598
HFIEC111A	C	M1	3	1	42.805	0.140	20	AGM	0.0070	41.705
HFIEC112A	C	M1	3	1	42.882	0.145	20	AGM	0.0072	43.071
HFIEC113A	C	M1	3	1	43.976	0.143	20	AGM	0.0072	43.798
HFIEC211A	C	M2	3	2	43.083	0.140	20	AGM	0.0070	41.916
HFIEC212A	C	M2	3	2	44.403	0.147	20	AGM	0.0074	45.472
HFIEC213A	C	M2	3	2	43.720	0.145	20	AGM	0.0072	44.009

Average	43.646		$Average_{norm}$	0.0072	43.653
Standard Dev.	1.207		$Standard\ Dev._{norm}$		1.433
Coeff. of Var. [%]	2.766		$Coeff.\ of\ Var.\ [\%]_{norm}$		3.284
Min.	41.048		Min.	0.0070	39.912
Max.	45.864		Max.	0.0074	45.958
Number of Spec.	19		Number of Spec.	19	19

Laminate Open Hole Tension Properties (OHT2) -- (RTD) Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



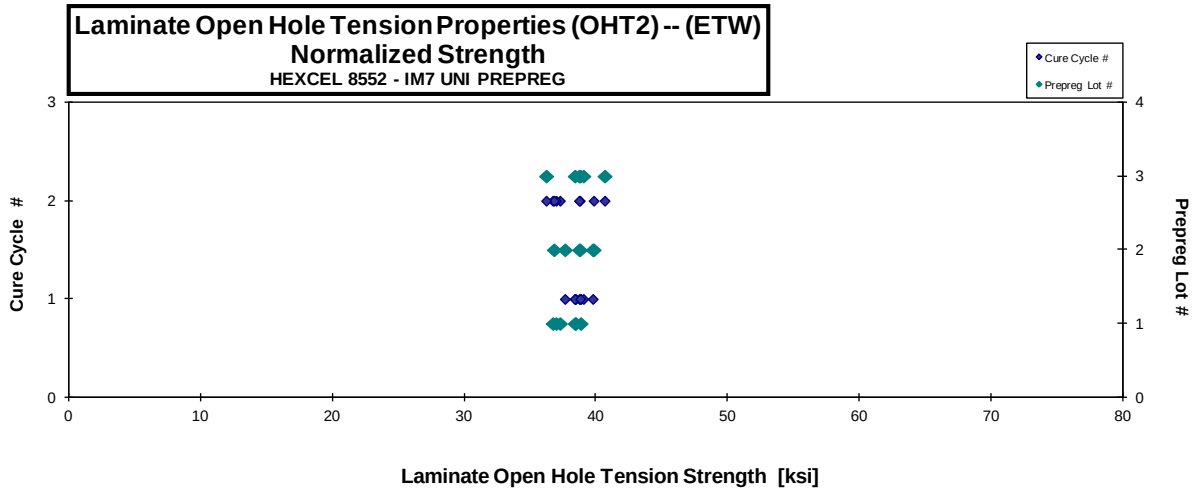
Laminate Open Hole Tension Properties (OHT2) -- (ETW)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIEA11AD	A	M1	1	1	38.273	0.145	20	AGM	0.0072	38.499
HFIEA11BD	A	M1	1	1	37.898	0.146	20	AGM	0.0073	38.451
HFIEA11CD	A	M1	1	1	38.398	0.146	20	AGM	0.0073	38.891
HFIEA219DD	A	M2	1	2	36.182	0.146	20	AGM	0.0073	36.773
HFIEA21AD	A	M2	1	2	36.377	0.148	20	AGM	0.0074	37.316
HFIEA21BD	A	M2	1	2	36.605	0.146	20	AGM	0.0073	37.020
HFIEB119D	B	M1	2	1	38.837	0.140	20	AGM	0.0070	37.691
HFIEB11AD	B	M1	2	1	39.577	0.145	20	LGM	0.0072	39.810
HFIEB11BD	B	M1	2	1	39.010	0.143	20	LGM	0.0072	38.789
HFIEB218D	B	M2	2	2	37.223	0.143	20	AGM	0.0071	36.861
HFIEB219D	B	M2	2	2	38.589	0.145	20	AGM	0.0072	38.825
HFIEB21AD	B	M2	2	2	40.019	0.143	20	AGM	0.0072	39.875
HFIEC118D	C	M1	3	1	39.249	0.143	20	AGM	0.0072	39.095
HFIEC119D	C	M1	3	1	38.575	0.144	20	AGM	0.0072	38.445
HFIEC11AD	C	M1	3	1	38.907	0.144	20	AGM	0.0072	38.853
HFIEC218D	C	M2	3	2	39.152	0.143	20	AGM	0.0071	38.771
HFIEC219D	C	M2	3	2	37.182	0.140	20	AGM	0.0070	36.270
HFIEC21AD	C	M2	3	2	40.037	0.146	20	AGM	0.0073	40.709

Average	38.338	
Standard Dev.	1.192	
Coeff. of Var. [%]	3.110	
Min.	36.182	
Max.	40.037	
Number of Spec.	18	

$Average_{norm}$	0.0072	38.386
$Standard\ Dev._{norm}$		1.189
$Coeff.\ of\ Var.\ [\%]_{norm}$		3.098
Min.	0.0070	36.270
Max.	0.0074	40.709
Number of Spec.	18	18



4.18 "50/40/10" Open Hole Tension 3 Properties (OHT3)

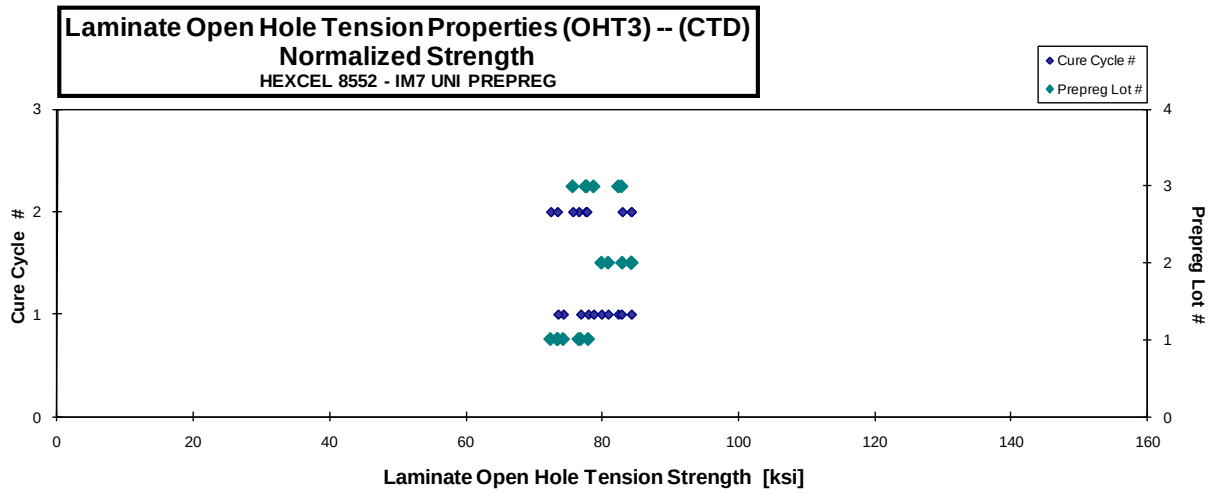
Laminate Open Hole Tension Properties (OHT3) -- (CTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIFA116B	A	M1	1	1	72.748	0.147	20	AGM / LGM	0.0074	74.264
HFIFA117B	A	M1	1	1	71.330	0.148	20	AGM / LGM	0.0074	73.476
HFIFA118B	A	M1	1	1	74.260	0.149	20	AGM / LGM	0.0075	76.839
HFIFA119B	A	M1	1	1	75.999	0.148	20	AGM / LGM	0.0074	77.935
HFIFA215B	A	M2	1	2	70.749	0.147	20	AGM / LGM	0.0074	72.412
HFIFA216B	A	M2	1	2	74.477	0.148	20	AGM / LGM	0.0074	76.537
HFIFA217B	A	M2	1	2	70.910	0.149	20	AGM / LGM	0.0075	73.389
HFIFB115B	B	M1	2	1	84.181	0.144	20	LGM / AGM	0.0072	84.288
HFIFB116B	B	M1	2	1	80.126	0.144	20	AGM	0.0072	79.894
HFIFB117B	B	M1	2	1	80.709	0.144	20	LGM / AGM	0.0072	80.868
HFIFB214B	B	M2	2	2	82.090	0.146	20	LGM / AGM	0.0073	82.945
HFIFB215B	B	M2	2	2	83.543	0.145	20	LGM / AGM	0.0073	84.269
HFIFB216B	B	M2	2	2	84.377	0.144	20	AGM	0.0072	84.279
HFIFC115B	C	M1	3	1	82.716	0.143	20	LGM/AGM	0.0072	82.362
HFIFC116B	C	M1	3	1	83.049	0.144	20	LGM	0.0072	82.828
HFIFC117B	C	M1	3	1	78.341	0.145	20	AGM	0.0072	78.731
HFIFC215B	C	M2	3	2	76.176	0.143	20	AGM/LGM	0.0072	75.664
HFIFC216B	C	M2	3	2	77.746	0.144	20	AGM	0.0072	77.566
HFIFC217B	C	M2	3	2	77.844	0.144	20	LGM	0.0072	77.727

Average	77.967	
Standard Dev.	4.683	
Coeff. of Var. [%]	6.006	
Min.	70.749	
Max.	84.377	
Number of Spec.	19	

$Average_{norm}$	0.0073	78.751
$Standard\ Dev._{norm}$		3.964
$Coeff.\ of\ Var.\ [\%]_{norm}$		5.033
Min.	0.0072	72.412
Max.	0.0075	84.288
Number of Spec.	19	19



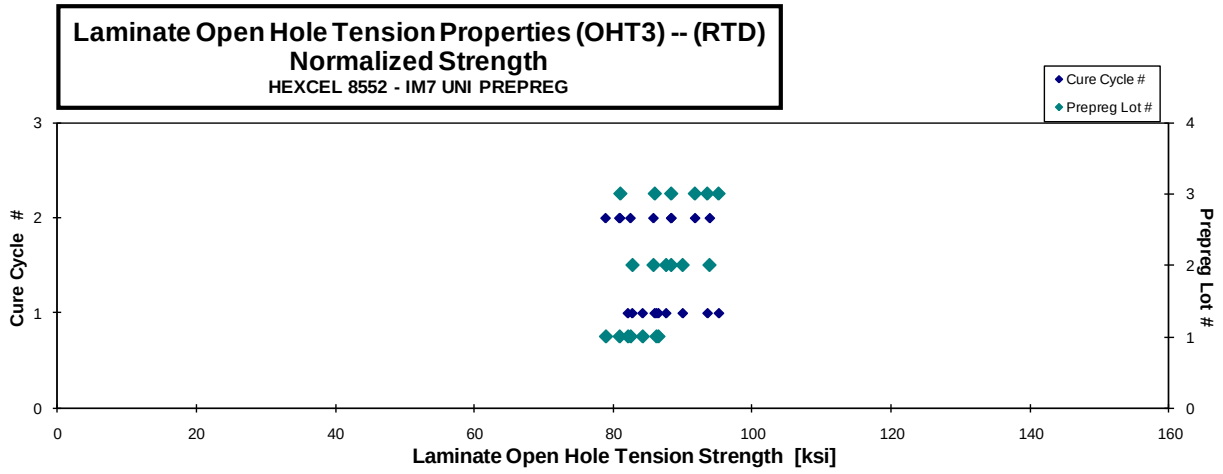
Laminate Open Hole Tension Properties (OHT3) -- (RTD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIFA111A	A	M1	1	1	81.536	0.145	20	LGM/AGM	0.0073	82.103
HFIFA112A	A	M1	1	1	81.570	0.149	20	LGM	0.0074	84.213
HFIFA113A	A	M1	1	1	84.147	0.148	20	LGM	0.0074	86.484
HFIFA114A	A	M1	1	1	83.870	0.148	20	LGM/AGM	0.0074	86.200
HFIFA211A	A	M2	1	2	80.490	0.141	20	LGM/AGM	0.0071	78.897
HFIFA212A	A	M2	1	2	79.778	0.149	20	LGM	0.0074	82.475
HFIFA213A	A	M2	1	2	79.068	0.147	20	LGM	0.0074	80.880
HFIFB111A	B	M1	2	1	89.781	0.133	20	AGM	0.0066	82.735
HFIFB112A	B	M1	2	1	88.390	0.147	20	AGM	0.0073	89.976
HFIFB113A	B	M1	2	1	88.177	0.143	20	AGM / LGM	0.0072	87.595
HFIFB211A	B	M2	2	2	89.962	0.141	20	AGM / LGM	0.0071	88.328
HFIFB212A	B	M2	2	2	93.126	0.145	20	AGM / LGM	0.0073	93.859
HFIFB213A	B	M2	2	2	85.187	0.145	20	AGM	0.0072	85.768
HFIFC111A	C	M1	3	1	89.951	0.138	20	LGM / AGM	0.0069	85.953
HFIFC112A	C	M1	3	1	94.489	0.145	20	LGM / AGM	0.0073	95.167
HFIFC113A	C	M1	3	1	94.135	0.143	20	LGM / AGM	0.0072	93.536
HFIFC211A	C	M2	3	2	83.280	0.140	20	LGM / AGM	0.0070	80.977
HFIFC212A	C	M2	3	2	87.504	0.145	20	LGM / AGM	0.0073	88.324
HFIFC213A	C	M2	3	2	91.470	0.144	20	LGM / AGM	0.0072	91.746

Average	86.627	
Standard Dev.	4.958	
Coeff. of Var. [%]	5.724	
Min.	79.068	
Max.	94.489	
Number of Spec.	19	

$Average_{norm}$	0.0072	86.590
$Standard\ Dev._{norm}$		4.725
Coeff. of Var. $[\%]_{norm}$		5.457
Min.	0.0066	78.897
Max.	0.0074	95.167
Number of Spec.	19	19

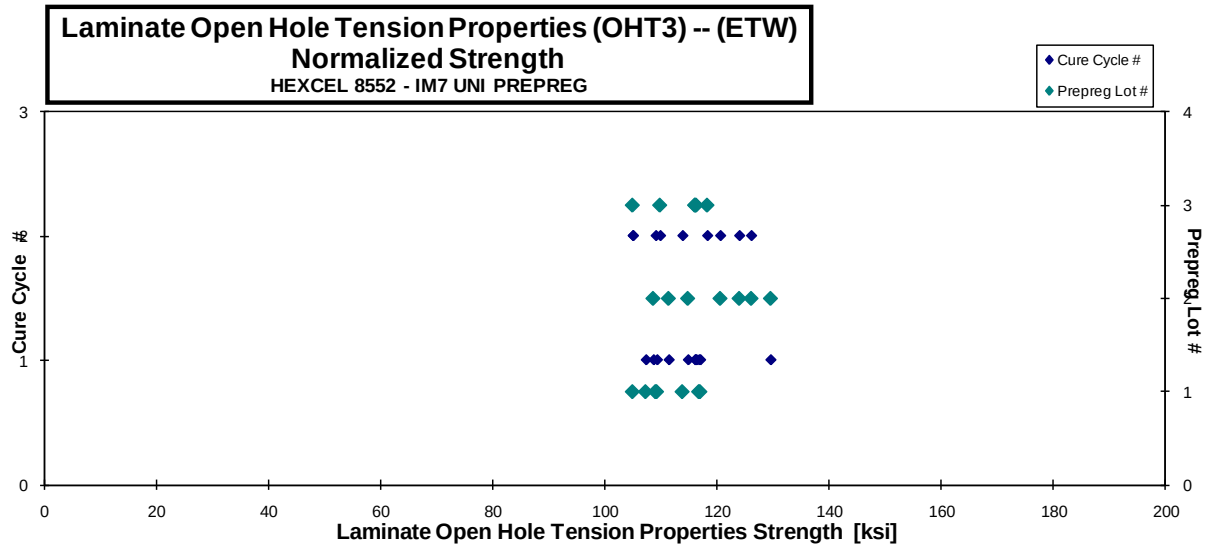


Laminate Open Hole Tension Properties (OHT3) -- (ETW)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIFA11BD	A	M1	1	1	114.518	0.147	20	LGM	0.0074	116.903
HFIFA11CD	A	M1	1	1	107.381	0.147	20	LGM	0.0073	109.370
HFIFA11DD	A	M1	1	1	114.736	0.147	20	LGM	0.0074	117.126
HFIFA11ED	A	M1	1	1	103.774	0.149	20	LGM	0.0075	107.377
HFIFA219D	A	M2	1	2	102.238	0.148	20	LGM	0.0074	105.042
HFIFA21AD	A	M2	1	2	110.569	0.148	20	LGM	0.0074	113.948
HFIFA21BD	A	M2	1	2	106.810	0.147	20	LGM	0.0074	109.146
HFIFB118D	B	M1	2	1	128.781	0.145	20	AGM	0.0073	129.750
HFIFB119D	B	M1	2	1	117.340	0.137	20	LGM/AGM	0.0068	111.486
HFIFB11AD	B	M1	2	1	106.610	0.147	20	LGM/AGM	0.0073	108.732
HFIFB11BD	B	M1	2	1	114.723	0.144	20	LGM/AGM	0.0072	114.935
HFIFB218D	B	M2	2	2	125.681	0.145	20	LGM/AGM	0.0072	126.278
HFIFB219D	B	M2	2	2	119.126	0.146	20	LGM/AGM	0.0073	120.726
HFIFB21AD	B	M2	2	2	121.801	0.147	20	LGM/AGM	0.0073	124.141
HFIFC119D	C	M1	3	1	116.543	0.144	20	AGM	0.0072	116.435
HFIFC11AD	C	M1	3	1	115.517	0.145	20	LGM	0.0072	116.266
HFIFC11BD	C	M1	3	1	117.042	0.143	20	AGM/LGM	0.0071	116.188
HFIFC219D	C	M2	3	2	119.003	0.143	20	AGM	0.0072	118.397
HFIFC21AD	C	M2	3	2	104.988	0.144	20	AGM/LGM	0.0072	105.036
HFIFC21BD	C	M2	3	2	110.152	0.144	20	AGM	0.0072	109.935

Average	113.867	
Standard Dev.	7.248	
Coeff. of Var. [%]	6.365	
Min.	102.238	
Max.	128.781	
Number of Spec.	20	
$Average_{norm}$	0.0073	114.861
$Standard\ Dev._{norm}$		6.830
$Coeff.\ of\ Var.\ [\%]_{norm}$		5.946
Min.	0.0068	105.036
Max.	0.0075	129.750
Number of Spec.	20	20



4.19 "25/50/25" Filled-Hole Tension 1 Properties (FHT1)

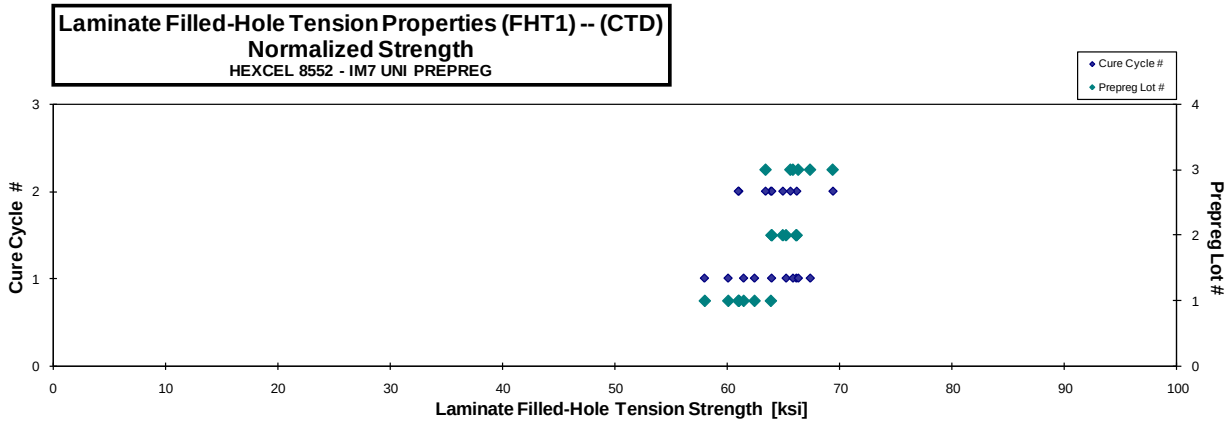
Laminate Filled-Hole Tension Properties (FHT1) -- (CTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFI4A117B	A	M1	1	1	59.027	0.117	16	AGM	0.0073	60.095
HFI4A118B	A	M1	1	1	57.302	0.117	16	AGM	0.0073	57.998
HFI4A119B	A	M1	1	1	60.172	0.118	16	AGM	0.0074	61.469
HFI4A11AB	A	M1	1	1	61.327	0.117	16	AGM	0.0073	62.436
HFI4A215B	A	M2	1	2	62.748	0.117	16	AGM	0.0073	63.891
HFI4A216B	A	M2	1	2	60.030	0.117	16	AGM	0.0073	61.046
HFI4A217B	A	M2	1	2	59.748	0.118	16	AGM	0.0074	61.002
HFI4B115B	B	M1	2	1	65.873	0.114	16	AGM	0.0071	65.244
HFI4B116B	B	M1	2	1	67.053	0.114	16	AGM	0.0071	66.151
HFI4B117B	B	M1	2	1	64.288	0.115	16	AGM	0.0072	63.953
HFI4B215B	B	M2	2	2	65.191	0.115	16	AGM	0.0072	64.955
HFI4B216B	B	M2	2	2	64.500	0.114	16	AGM	0.0071	63.968
HFI4B217B	B	M2	2	2	66.214	0.115	16	AGM	0.0072	66.185
HFI4C115B	C	M1	3	1	65.035	0.117	16	AGM	0.0073	65.853
HFI4C116B	C	M1	3	1	65.600	0.118	16	AGM	0.0074	67.384
HFI4C117B	C	M1	3	1	66.666	0.115	16	AGM	0.0072	66.328
HFI4C215B	C	M2	3	2	62.871	0.116	16	AGM	0.0073	63.417
HFI4C216B	C	M2	3	2	65.150	0.116	16	AGM	0.0073	65.630
HFI4C217B	C	M2	3	2	68.013	0.118	16	AGM	0.0073	69.401

Average	63.516	
Standard Dev.	3.085	
Coeff. of Var. [%]	4.856	
Min.	57.302	
Max.	68.013	
Number of Spec.	19	

$Average_{norm}$	0.0073	64.021
$Standard\ Dev._{norm}$		2.810
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.390
Min.	0.0071	57.998
Max.	0.0074	69.401
Number of Spec.	19	19



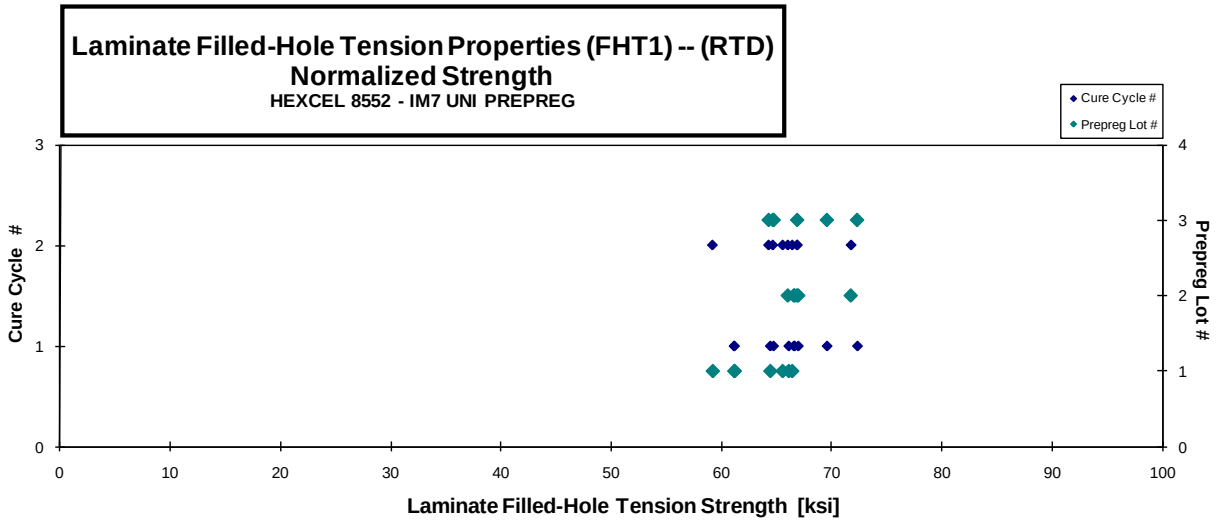
Laminate Filled-Hole Tension Properties (FHT1) -- (RTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFI4A112A	A	M1	1	1	64.899	0.117	16	AGM	0.0073	66.120
HFI4A113A	A	M1	1	1	60.163	0.117	16	AGM	0.0073	61.190
HFI4A114A	A	M1	1	1	59.596	0.118	16	AGM	0.0074	61.165
HFI4A115A	A	M1	1	1	63.146	0.118	16	AGM	0.0073	64.444
HFI4A211A	A	M2	1	2	60.980	0.112	16	AGM	0.0070	59.198
HFI4A212A	A	M2	1	2	64.939	0.118	16	AGM	0.0074	66.433
HFI4A214A	A	M2	1	2	64.451	0.117	16	AGM	0.0073	65.561
HFI4B111A	B	M1	2	1	70.013	0.110	16	AGM	0.0068	66.579
HFI4B112A	B	M1	2	1	66.645	0.116	16	AGM	0.0072	66.982
HFI4B113A	B	M1	2	1	67.424	0.114	16	AGM	0.0071	66.644
HFI4B211A	B	M2	2	2	69.067	0.110	16	AGM	0.0069	66.030
HFI4B212A	B	M2	2	2	66.498	0.116	16	AGM	0.0072	66.863
HFI4B214A	B	M2	2	2	72.193	0.115	16	AGM	0.0072	71.764
HFI4C111A	C	M1	3	1	67.382	0.111	16	AGM	0.0069	64.740
HFI4C113A	C	M1	3	1	71.250	0.117	16	AGM	0.0073	72.343
HFI4C114A	C	M1	3	1	68.599	0.117	16	AGM	0.0073	69.591
HFI4C211A	C	M2	3	2	67.144	0.111	16	AGM	0.0069	64.667
HFI4C212A	C	M2	3	2	62.523	0.118	16	AGM	0.0074	64.287
HFI4C213A	C	M2	3	2	66.195	0.116	16	AGM	0.0073	66.885

Average	65.953	
Standard Dev.	3.569	
Coeff. of Var. [%]	5.412	
Min.	59.596	
Max.	72.193	
Number of Spec.	19	

$Average_{norm}$	0.0072	65.868
$Standard\ Dev._{norm}$		3.259
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.948
Min.	0.0068	59.198
Max.	0.0074	72.343
Number of Spec.	19	19



Laminate Filled-Hole Tension Properties (FHT1) -- (ETW)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

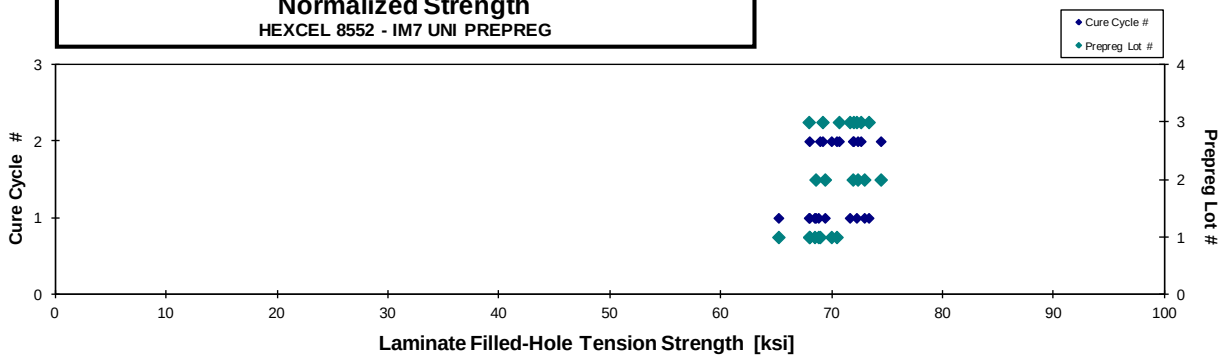
normalizing t_{ply} [in]: 0.0072

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]
HFI4A11BD	A	M1	1	1	67.367	0.118	16	MGM	0.0074	68.770
HFI4A11CD	A	M1	1	1	66.790	0.117	16	MGM	0.0073	67.959
HFI4A11DD	A	M1	1	1	67.424	0.117	16	MGM	0.0073	68.429
HFI4A11FD	A	M1	1	1	64.289	0.117	16	MGM	0.0073	65.172
HFI4A218D	A	M2	1	2	69.017	0.117	16	MGM	0.0073	69.945
HFI4A21AD	A	M2	1	2	67.726	0.117	16	MGM	0.0073	68.911
HFI4A21BD	A	M2	1	2	69.612	0.117	16	MGM	0.0073	70.418
HFI4A21CD	A	M2	1	2	67.440	0.116	16	MGM	0.0073	67.958
HFI4B118D	B	M1	2	1	69.282	0.115	16	MGM	0.0072	69.362
HFI4B11AD	B	M1	2	1	68.161	0.116	16	MGM	0.0072	68.526
HFI4B11BD	B	M1	2	1	73.843	0.114	16	MGM	0.0071	72.914
HFI4B218D	B	M2	2	2	74.583	0.115	16	MGM	0.0072	74.400
HFI4B21BD	B	M2	2	2	72.453	0.115	16	MGM	0.0072	72.316
HFI4B21CD	B	M2	2	2	72.070	0.115	16	MGM	0.0072	71.882
HFI4C118D	C	M1	3	1	71.303	0.117	16	MGM	0.0073	72.211
HFI4C11AD	C	M1	3	1	65.293	0.120	16	MGM	0.0075	67.910
HFI4C11BD	C	M1	3	1	72.470	0.117	16	MGM	0.0073	73.309
HFI4C11CD	C	M1	3	1	70.193	0.118	16	MGM	0.0073	71.604
HFI4C21AD	C	M2	3	2	67.537	0.118	16	MGM	0.0074	69.149
HFI4C21BD	C	M2	3	2	71.258	0.116	16	MGM	0.0073	71.939
HFI4C21CD	C	M2	3	2	71.493	0.117	16	MGM	0.0073	72.600
HFI4C21DD	C	M2	3	2	69.776	0.117	16	MGM	0.0073	70.634

Average	**69.517**	
Standard Dev.	**2.709**	
Coeff. of Var. [%]	**3.897**	
Min.	**64.289**	
Max.	**74.583**	
Number of Spec.	**22**	

$Average_{norm}$	**0.0073**	**70.287**
$Standard\ Dev._{norm}$		**2.278**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.240**
Min.	**0.0071**	**65.172**
Max.	**0.0075**	**74.400**
Number of Spec.	**22**	**22**

Laminate Filled-Hole Tension Properties (FHT1) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



4.20 "10/80/10" Filled-Hole Tension 2 Properties (FHT2)

Laminate Filled-Hole Tension Properties (FHT2) -- (CTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

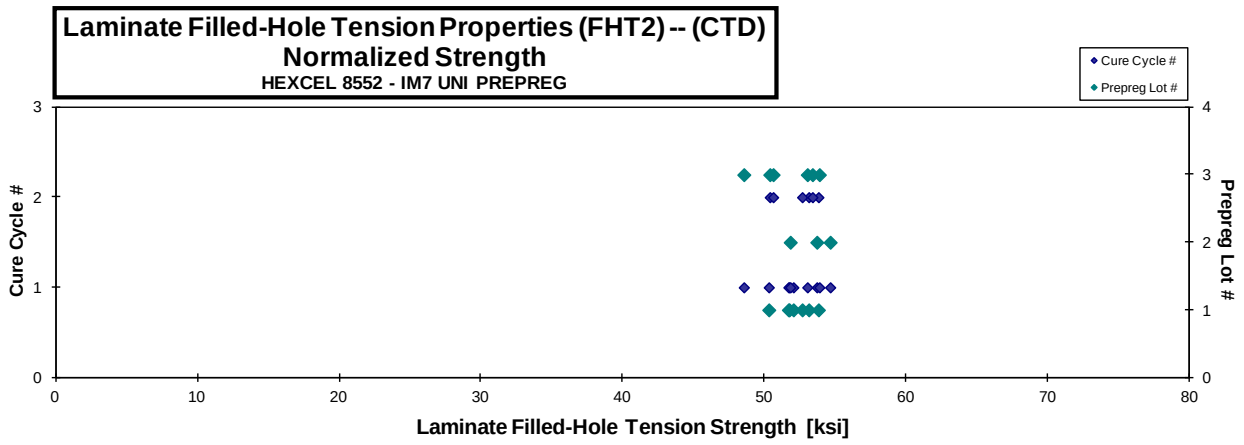
normalizing t_{ply} [in]: 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFI5A115B	A	M1	1	1	51.005	0.146	20	AGM	0.0073	51.749
HFI5A116B	A	M1	1	1	51.396	0.146	20	AGM	0.0073	52.038
HFI5A117B	A	M1	1	1	50.245	0.148	20	AGM	0.0074	51.693
HFI5A118B	A	M1	1	1	51.243	0.141	20	AGM	0.0071	50.306
HFI5A215B	A	M2	1	2	51.790	0.148	20	AGM	0.0074	53.127
HFI5A216B	A	M2	1	2	51.627	0.147	20	AGM	0.0073	52.661
HFI5A217B	A	M2	1	2	52.243	0.148	20	AGM	0.0074	53.809
HFI5B183B	B	M1	2	1	54.728	0.144	20	AGM	0.0072	54.640
HFI5B184B	B	M1	2	1	53.591	0.144	20	AGM	0.0072	53.697
HFI5B185B	B	M1	2	1	51.798	0.144	20	AGM	0.0072	51.822
HFI5C116B	C	M1	3	1	53.211	0.144	20	AGM	0.0072	53.026
HFI5C117B	C	M1	3	1	53.345	0.145	20	AGM	0.0073	53.876
HFI5C118B	C	M1	3	1	50.679	0.138	20	AGM	0.0069	48.544
HFI5C216B	C	M2	3	2	50.227	0.144	20	AGM	0.0072	50.378
HFI5C217B	C	M2	3	2	53.565	0.144	20	AGM	0.0072	53.386
HFI5C218B	C	M2	3	2	51.544	0.141	20	AGM	0.0071	50.613

*Data for Batch B cure cycle 2 has been removed due to improper layup.

Average	52.015	
Standard Dev.	1.319	
Coeff. of Var. [%]	2.535	
Min.	50.227	
Max.	54.728	
Number of Spec.	16	

$Average_{norm}$	0.0072	52.210
$Standard\ Dev._{norm}$		1.636
Coeff. of Var. $[\%]_{norm}$		3.134
Min.	0.0069	48.544
Max.	0.0074	54.640
Number of Spec.	16	16



Laminate Filled-Hole Tension Properties (FHT2) -- (RTD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

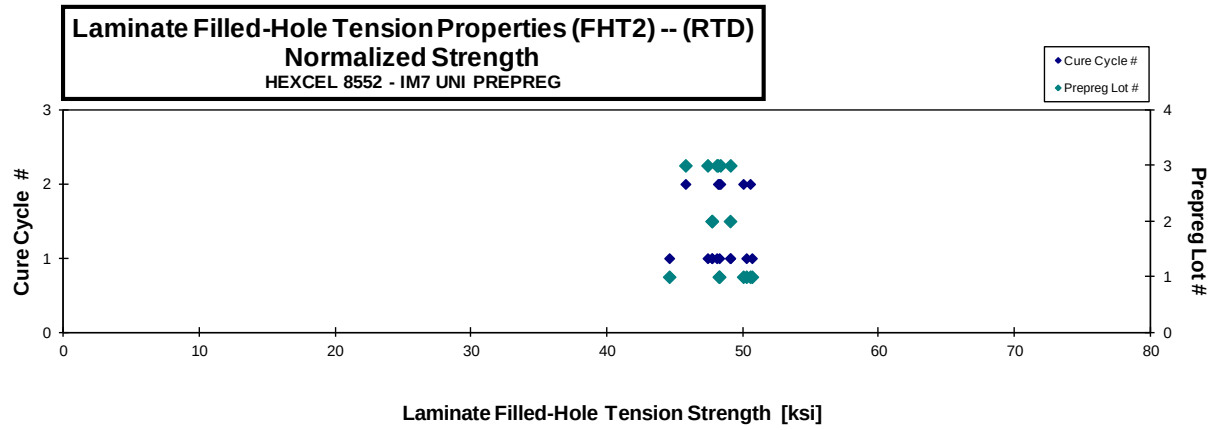
normalizing t_{ply} [in]: 0.0072

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]
HFI5A111A	A	M1	1	1	45.997	0.140	20	AGM	0.0070	44.587
HFI5A112A	A	M1	1	1	47.027	0.148	20	AGM	0.0074	48.268
HFI5A113A	A	M1	1	1	50.242	0.145	20	AGM	0.0073	50.679
HFI5A114A	A	M1	1	1	49.553	0.146	20	AGM	0.0073	50.264
HFI5A211A	A	M2	1	2	49.823	0.145	20	AGM	0.0072	50.036
HFI5A212A	A	M2	1	2	49.363	0.147	20	AGM	0.0074	50.546
HFI5A213A	A	M2	1	2	47.248	0.147	20	AGM	0.0074	48.244
HFI5B181A	B	M1	2	1	48.549	0.142	20	AGM	0.0071	47.723
HFI5B121A	B	M1	2	1	48.010	0.143	20	AGM	0.0072	47.726
HFI5B182A	B	M1	2	1	48.932	0.144	20	AGM	0.0072	49.068
HFI5C111A	C	M1	3	1	49.493	0.140	20	AGM	0.0070	48.084
HFI5C112A	C	M1	3	1	48.053	0.147	20	AGM	0.0074	49.087
HFI5C113A	C	M1	3	1	47.632	0.143	20	AGM	0.0072	47.411
HFI5C211A	C	M2	3	2	48.980	0.142	20	AGM	0.0071	48.350
HFI5C213A	C	M2	3	2	48.012	0.144	20	AGM	0.0072	48.173
HFI5C214A	C	M2	3	2	45.723	0.144	20	AGM	0.0072	45.781

*Data for Batch B cure cycle 2 has been removed due to improper layup.

Average	48.290	
Standard Dev.	1.329	
Coeff. of Var. [%]	2.752	
Min.	45.723	
Max.	50.242	
Number of Spec.	16	

$Average_{norm}$	0.0072	48.377
$Standard\ Dev._{norm}$		1.640
$Coeff.\ of\ Var.\ [\%]_{norm}$		3.390
Min.	0.0070	44.587
Max.	0.0074	50.679
Number of Spec.	16	16



Laminate Filled-Hole Tension Properties (FHT2) -- (ETW)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

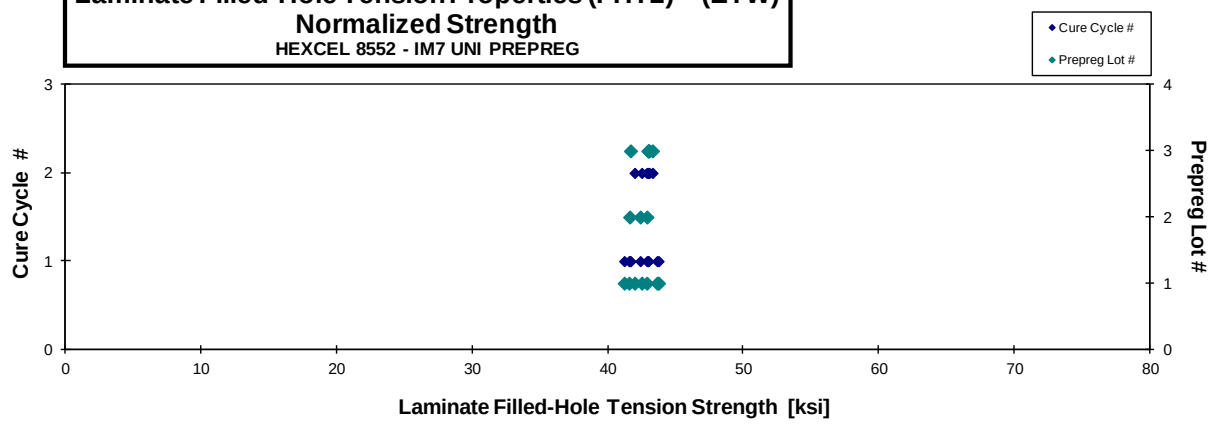
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFI5A11AD	A	M1	1	1	40.752	0.146	20	MGM	0.0073	41.219
HFI5A11BD	A	M1	1	1	41.247	0.145	20	MGM	0.0073	41.572
HFI5A11DD	A	M1	1	1	42.864	0.147	20	MGM	0.0073	43.643
HFI5A11ED	A	M1	1	1	42.513	0.148	20	MGM	0.0074	43.753
HFI5A21AD	A	M2	1	2	41.976	0.147	20	MGM	0.0074	42.885
HFI5A21CD	A	M2	1	2	40.962	0.148	20	MGM	0.0074	41.986
HFI5A21DD	A	M2	1	2	41.571	0.147	20	MGM	0.0074	42.509
HFI5B186D	B	M1	2	1	42.962	0.144	20	MGM	0.0072	42.898
HFI5B122D	B	M1	2	1	41.756	0.144	20	MGM	0.0072	41.621
HFI5B187D	B	M1	2	1	42.322	0.144	20	MGM	0.0072	42.400
HFI5C11BD	C	M1	3	1	43.106	0.144	20	MGM	0.0072	43.002
HFI5C11CD	C	M1	3	1	41.453	0.145	20	MGM	0.0072	41.683
HFI5C11DD	C	M1	3	1	42.816	0.145	20	MGM	0.0072	42.974
HFI5C21BD	C	M2	3	2	42.810	0.145	20	MGM	0.0072	43.067
HFI5C21CD	C	M2	3	2	43.152	0.143	20	MGM	0.0072	42.982
HFI5C21ED	C	M2	3	2	43.538	0.143	20	MGM	0.0072	43.307

*Data for Batch B cure cycle 2 has been removed due to improper layup.

Average	42.238	
Standard Dev.	0.861	
Coeff. of Var. [%]	2.038	
Min.	40.752	
Max.	43.538	
Number of Spec.	16	

$Average_{norm}$	0.0073	42.594
$Standard\ Dev._{norm}$		0.772
$Coeff.\ of\ Var.\ [\%]_{norm}$		1.812
Min.	0.0072	41.219
Max.	0.0074	43.753
Number of Spec.	16	16

Laminate Filled-Hole Tension Properties (FHT2) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



4.21 "50/40/10" Filled-Hole Tension 3 Properties (FHT3)

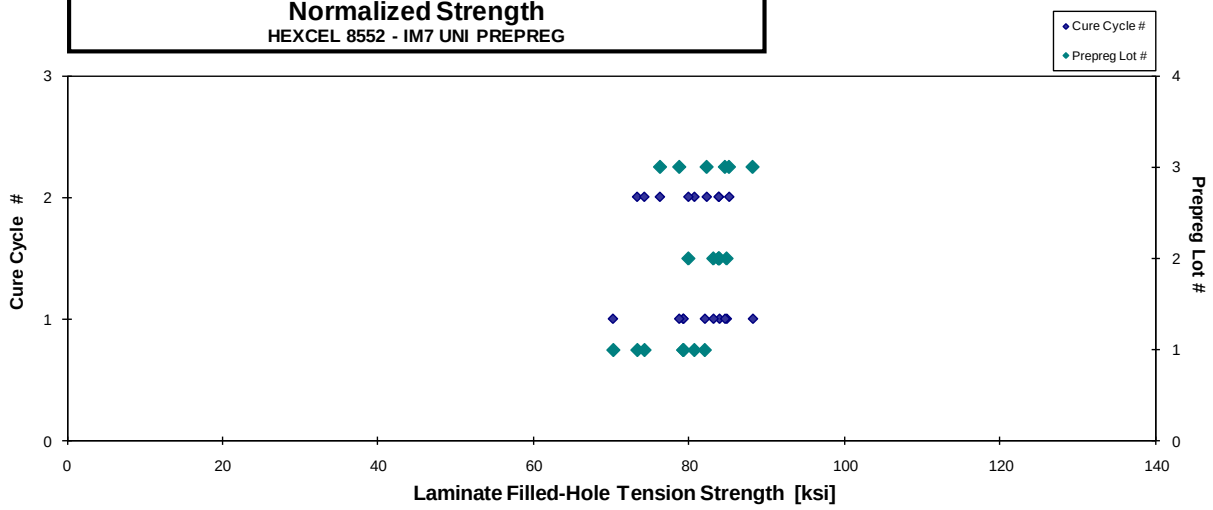
Laminate Filled-Hole Tension Properties (FHT3) -- (CTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFI6A111B	A	M1	1	1	76.916	0.148	20	LGM	0.0074	79.230
HFI6A112B	A	M1	1	1	77.654	0.147	20	LGM	0.0074	79.271
HFI6A113B	A	M1	1	1	79.761	0.148	20	LGM	0.0074	82.013
HFI6A114B	A	M1	1	1	71.758	0.141	20	LGM	0.0070	70.247
HFI6A212B	A	M2	1	2	71.220	0.148	20	LGM	0.0074	73.339
HFI6A213B	A	M2	1	2	72.885	0.147	20	LGM	0.0073	74.260
HFI6A214B	A	M2	1	2	79.149	0.147	20	LGM	0.0073	80.670
HFI6B112B	B	M1	2	1	83.462	0.145	20	LGM	0.0072	83.877
HFI6B113B	B	M1	2	1	85.087	0.144	20	LGM	0.0072	84.811
HFI6B115B	B	M1	2	1	83.583	0.143	20	AGM	0.0072	83.109
HFI6B216B	B	M2	2	2	84.691	0.142	20	AGM	0.0071	83.799
HFI6B217B	B	M2	2	2	79.312	0.145	20	AGM	0.0073	79.899
HFI6B219B	B	M2	2	2	86.562	0.139	20	AGM	0.0070	83.777
HFI6C116B	C	M1	3	1	88.226	0.144	20	LGM	0.0072	88.154
HFI6C117B	C	M1	3	1	83.733	0.145	20	LGM	0.0073	84.595
HFI6C118B	C	M1	3	1	80.774	0.140	20	AGM	0.0070	78.726
HFI6C216B	C	M2	3	2	85.168	0.144	20	AGM	0.0072	85.119
HFI6C217B	C	M2	3	2	82.027	0.144	20	LGM	0.0072	82.245
HFI6C218B	C	M2	3	2	78.179	0.140	20	LGM	0.0070	76.252

Average	80.534		$Average_{norm}$	0.0072	80.705
Standard Dev.	4.936		$Standard\ Dev._{norm}$		4.593
Coeff. of Var. [%]	6.129		$Coeff.\ of\ Var.\ [\%]_{norm}$		5.691
Min.	71.220		Min.	0.0070	70.247
Max.	88.226		Max.	0.0074	88.154
Number of Spec.	19		Number of Spec.	19	19

Laminate Filled-Hole Tension Properties (FHT3) -- (CTD)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



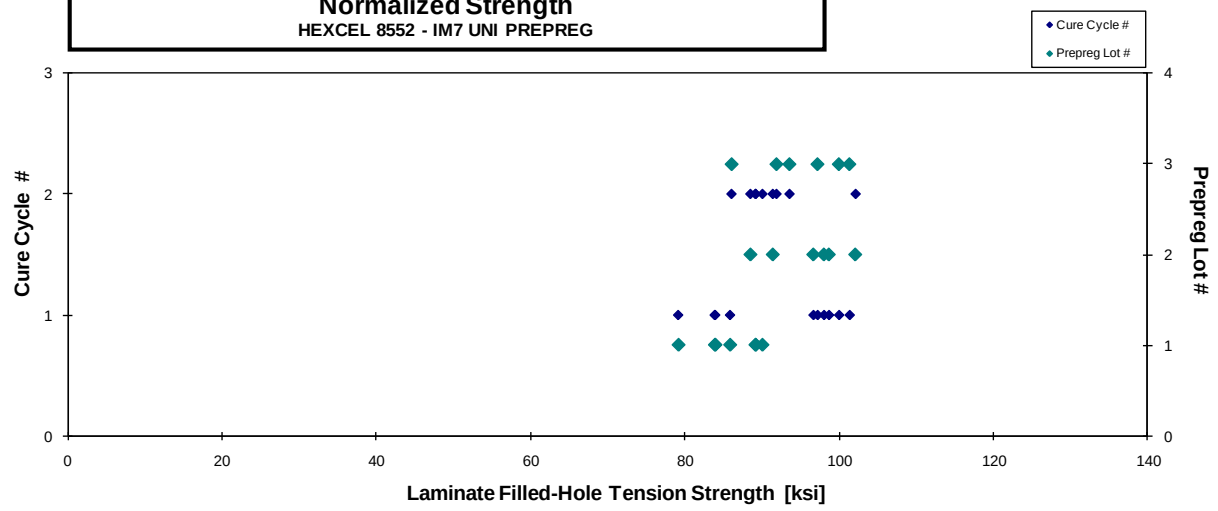
Laminate Filled-Hole Tension Properties (FHT3) -- (RTD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFI6A115A	A	M1	1	1	84.133	0.147	20	LGM	0.0073	85.876
HFI6A116A	A	M1	1	1	82.476	0.147	20	LGM	0.0073	83.956
HFI6A117A	A	M1	1	1	77.075	0.148	20	LGM	0.0074	79.154
HFI6A118A	A	M1	1	1	84.415	0.143	20	LGM	0.0072	83.887
HFI6A215A	A	M2	1	2	87.203	0.147	20	LGM	0.0074	89.212
HFI6A216A	A	M2	1	2	87.870	0.148	20	LGM	0.0074	90.077
HFI6A218A	A	M2	1	2	89.304	0.144	20	LGM	0.0072	89.169
HFI6B116A	B	M1	2	1	99.567	0.143	20	LGM	0.0071	98.714
HFI6B117A	B	M1	2	1	96.382	0.144	20	LGM	0.0072	96.694
HFI6B118A	B	M1	2	1	101.085	0.140	20	LGM	0.0070	98.066
HFI6B212A	B	M2	2	2	91.092	0.145	20	LGM	0.0072	91.419
HFI6B213A	B	M2	2	2	89.175	0.143	20	LGM	0.0071	88.514
HFI6B215A	B	M2	2	2	102.608	0.143	20	LGM	0.0072	102.156
HFI6C112A	C	M1	3	1	96.557	0.145	20	LGM	0.0073	97.238
HFI6C113A	C	M1	3	1	100.427	0.143	20	LGM	0.0072	100.020
HFI6C114A	C	M1	3	1	101.732	0.144	20	LGM	0.0072	101.391
HFI6C211A	C	M2	3	2	90.816	0.136	20	LGM	0.0068	86.065
HFI6C212A	C	M2	3	2	91.339	0.145	20	LGM	0.0072	91.900
HFI6C215A	C	M2	3	2	93.490	0.144	20	LGM	0.0072	93.588

	Strength	$Average_{norm}$	$Strength_{norm}$
Average	91.934	0.0072	91.952
Standard Dev.	7.269		6.624
Coeff. of Var. [%]	7.906		7.204
Min.	77.075	0.0068	79.154
Max.	102.608	0.0074	102.156
Number of Spec.	19	19	19

Laminate Filled-Hole Tension Properties (FHT3) -- (RTD) Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



Laminate Filled-Hole Tension Properties (FHT3) -- (ETW)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

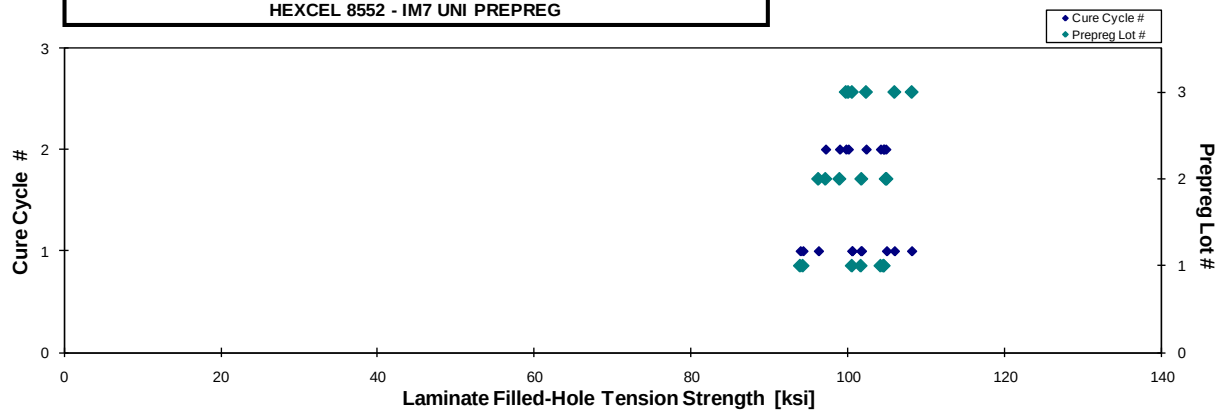
normalizing t_{ply} [in]: 0.0072

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]
HFI6A21AD	A	M2	1	2	101.196	0.149	20	MGM	0.0074	104.558
HFI6A21BD	A	M2	1	2	102.134	0.147	20	MGM	0.0074	104.521
HFI6A21ED	A	M2	1	2	101.429	0.148	20	MGM	0.0074	104.152
HFI6A119D	A	M1	1	1	96.211	0.141	20	MGM	0.0071	94.263
HFI6A11AD	A	M1	1	1	97.394	0.149	20	MGM	0.0074	100.506
HFI6A11BD	A	M1	1	1	92.014	0.147	20	MGM	0.0073	93.921
HFI6A11CD	A	M1	1	1	99.674	0.147	20	MGM	0.0073	101.635
HFI6B11BD	B	M1	2	1	102.156	0.143	20	MGM	0.0072	101.719
HFI6B11CD	B	M1	2	1	96.596	0.143	20	MGM	0.0072	96.239
HFI6B11ED	B	M1	2	1	106.183	0.142	20	MGM	0.0071	104.917
HFI6B21BD	B	M2	2	2	99.756	0.143	20	MGM	0.0071	98.936
HFI6B21CD	B	M2	2	2	97.666	0.143	20	MGM	0.0072	97.146
HFI6B21DD	B	M2	2	2	105.477	0.143	20	MGM	0.0072	104.818
HFI6C11AD	C	M1	3	1	100.274	0.144	20	MGM	0.0072	100.518
HFI6C11CD	C	M1	3	1	105.904	0.144	20	MGM	0.0072	105.916
HFI6C11FD	C	M1	3	1	107.293	0.145	20	MGM	0.0073	108.112
HFI6C21BD	C	M2	3	2	100.091	0.144	20	MGM	0.0072	99.743
HFI6C21CD	C	M2	3	2	100.494	0.143	20	MGM	0.0072	100.041
HFI6C21DD	C	M2	3	2	102.630	0.144	20	MGM	0.0072	102.309

Average	100.767	
Standard Dev.	3.852	
Coeff. of Var. [%]	3.823	
Min.	92.014	
Max.	107.293	
Number of Spec.	19	

$Average_{norm}$	0.0072	101.262
$Standard\ Dev._{norm}$		3.953
$Coeff.\ of\ Var.\ [\%]_{norm}$		3.904
Min.	0.0071	93.921
Max.	0.0074	108.112
Number of Spec.	19	19

Laminate Filled-Hole Tension Properties (FHT3) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



4.22 "25/50/25" Open Hole Compression 1 Properties (OHC1)

Laminate Open Hole Compression Properties (OHC1) -- (RTD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

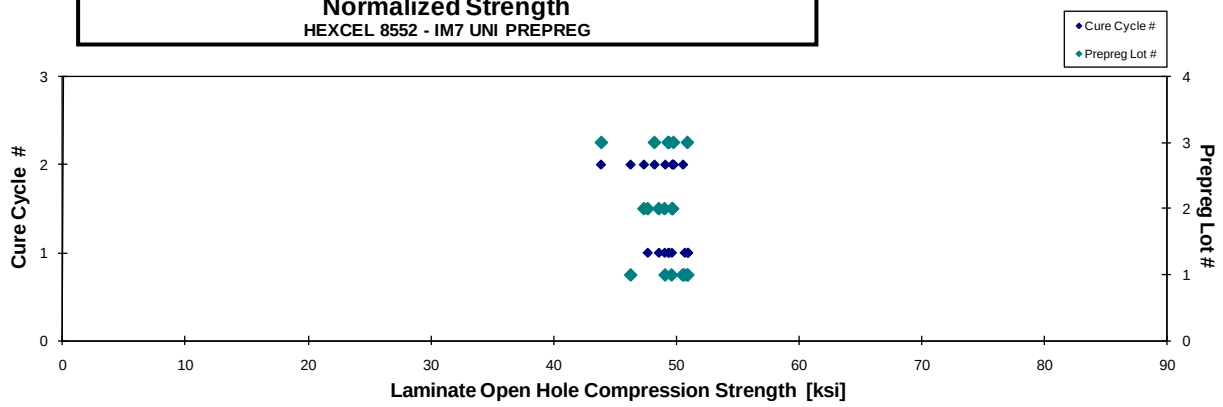
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HFIGA111A	A	M1	1	1	49.352	0.174	24	LGM	0.0072	49.676
HFIGA112A	A	M1	1	1	48.708	0.181	24	LGM	0.0075	50.991
HFIGA113A	A	M1	1	1	49.494	0.178	24	LGM	0.0074	50.993
HFIGA114A	A	M1	1	1	49.152	0.178	24	LGM	0.0074	50.731
HFIGA211A	A	M2	1	2	47.573	0.168	24	LGM	0.0070	46.316
HFIGA212A	A	M2	1	2	46.871	0.181	24	LGM	0.0075	49.145
HFIGA213A	A	M2	1	2	49.658	0.176	24	LGM	0.0073	50.592
HFIGB111A	B	M1	2	1	51.283	0.165	24	LGM	0.0069	49.096
HFIGB112A	B	M1	2	1	47.434	0.174	24	LGM	0.0072	47.717
HFIGB113A	B	M1	2	1	48.741	0.172	24	LGM	0.0072	48.624
HFIGB211A	B	M2	2	2	49.322	0.166	24	LGM	0.0069	47.400
HFIGB212A	B	M2	2	2	49.005	0.175	24	LGM	0.0073	49.756
HFIGB213A	B	M2	2	2	49.499	0.174	24	LGM	0.0072	49.719
HFIGC111A	C	M1	3	1	50.305	0.170	24	LGM	0.0071	49.393
HFIGC112A	C	M1	3	1	51.152	0.172	24	LGM	0.0072	50.974
HFIGC113A	C	M1	3	1	49.517	0.173	24	LGM	0.0072	49.455
HFIGC211A*	C	M2	3	2	45.150	0.168	24	LGM	0.0070	43.909
HFIGC212A	C	M2	3	2	48.727	0.177	24	LGM	0.0074	49.831
HFIGC213A	C	M2	3	2	48.053	0.174	24	LGM	0.0072	48.266

* Data was excluded from results due to a severe taper on both ends of the specimen.

Average	49.102	
Standard Dev.	1.162	
Coeff. of Var. [%]	2.366	
Min.	46.871	
Max.	51.283	
Number of Spec.	18	

$Average_{norm}$	0.0072	49.371
$Standard\ Dev._{norm}$		1.320
$Coeff.\ of\ Var.\ [\%]_{norm}$		2.673
Min.	0.0069	46.316
Max.	0.0075	50.993
Number of Spec.	18	18

Laminate Open Hole Compression Properties (OHC1) -- (RTD) Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



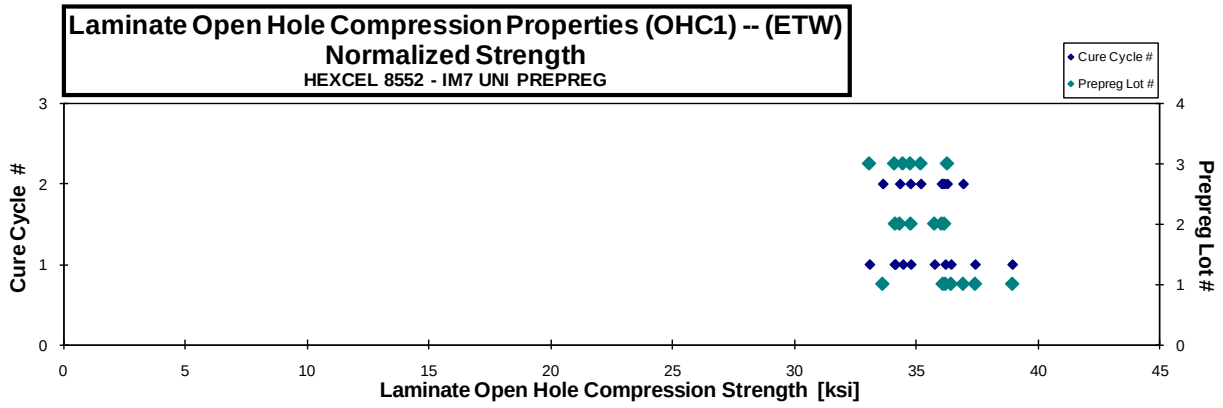
Laminate Open Hole Compression Properties (OHC1) -- (ETW) Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIGA117D	A	M1	1	1	37.501	0.180	24	LGM	0.0075	38.956
HFIGA118D	A	M1	1	1	36.396	0.172	24	LGM	0.0072	36.203
HFIGA119D	A	M1	1	1	36.163	0.179	24	LGM	0.0075	37.426
HFIGA11AD	A	M1	1	1	35.770	0.176	24	LGM	0.0073	36.436
HFIGA216D	A	M2	1	2	35.276	0.177	24	LGM	0.0074	36.102
HFIGA217D	A	M2	1	2	35.697	0.179	24	LGM	0.0074	36.933
HFIGA218D	A	M2	1	2	33.586	0.173	24	LGM	0.0072	33.628
HFIGB116D	B	M1	2	1	34.888	0.172	24	LGM	0.0072	34.781
HFIGB117D	B	M1	2	1	35.442	0.174	24	LGM	0.0073	35.757
HFIGB118D	B	M1	2	1	34.874	0.169	24	LGM	0.0070	34.144
HFIGB216D	B	M2	2	2	36.226	0.173	24	LGM	0.0072	36.163
HFIGB217D	B	M2	2	2	33.749	0.176	24	LGM	0.0073	34.329
HFIGB218D	B	M2	2	2	36.958	0.169	24	LGM	0.0070	36.049
HFIGC116D	C	M1	3	1	34.153	0.173	24	LGM	0.0072	34.110
HFIGC117D	C	M1	3	1	33.898	0.176	24	LGM	0.0073	34.457
HFIGC118D	C	M1	3	1	34.086	0.168	24	LGM	0.0070	33.080
HFIGC216D	C	M2	3	2	36.149	0.173	24	LGM	0.0072	36.278
HFIGC217D	C	M2	3	2	34.019	0.177	24	LGM	0.0074	34.764
HFIGC218D	C	M2	3	2	35.613	0.171	24	LGM	0.0071	35.190

Average	35.287	
Standard Dev.	1.148	
Coeff. of Var. [%]	3.252	
Min.	33.586	
Max.	37.501	
Number of Spec.	19	

$Average_{norm}$	0.0072	35.515
$Standard\ Dev._{norm}$		1.445
$Coeff.\ of\ Var.\ [\%]_{norm}$		4.069
Min.	0.0070	33.080
Max.	0.0075	38.956
Number of Spec.	19	19



4.23 "10/80/10" Open Hole Compression 2 Properties (OHC2)

Laminate Open Hole Compression Properties (OHC2) -- (RTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

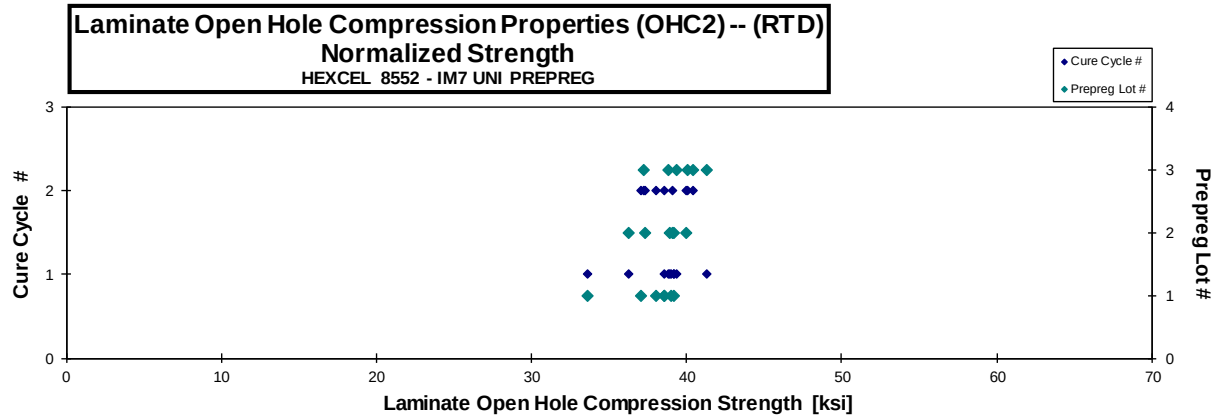
normalizing t_{ply} [in]: 0.0072

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]
HFIHA111A*	A	M1	1	1	35.477	0.136	20	LGM / MGM	0.0068	33.588
HFIHA112A	A	M1	1	1	37.632	0.149	20	LGM	0.0075	38.983
HFIHA113A	A	M1	1	1	37.773	0.147	20	AGM / LGM	0.0073	38.552
HFIHA114A	A	M1	1	1	38.392	0.147	20	LGM	0.0073	39.174
HFIHA212A	A	M2	1	2	35.927	0.149	20	LGM	0.0074	37.062
HFIHA213A	A	M2	1	2	37.419	0.146	20	LGM	0.0073	38.042
HFIHA214A	A	M2	1	2	37.776	0.147	20	LGM	0.0074	38.585
HFIHB111A	B	M1	2	1	36.276	0.144	20	LGM	0.0072	36.255
HFIHB112A	B	M1	2	1	39.054	0.143	20	LGM	0.0072	38.896
HFIHB113A	B	M1	2	1	39.284	0.144	20	LGM / AGM	0.0072	39.166
HFIHB212A	B	M2	2	2	39.428	0.143	20	LGM	0.0071	39.085
HFIHB213A	B	M2	2	2	40.133	0.144	20	LGM	0.0072	39.993
HFIHB214A	B	M2	2	2	37.460	0.144	20	LGM	0.0072	37.338
HFIHC111A	C	M1	3	1	39.165	0.143	20	LGM	0.0071	38.793
HFIHC112A	C	M1	3	1	38.456	0.147	20	LGM	0.0074	39.337
HFIHC113A	C	M1	3	1	40.851	0.146	20	LGM	0.0073	41.333
HFIHC212A	C	M2	3	2	37.306	0.144	20	LGM / AGM	0.0072	37.237
HFIHC213A	C	M2	3	2	39.456	0.148	20	LGM	0.0074	40.456
HFIHC214A	C	M2	3	2	39.482	0.146	20	LGM	0.0073	40.090

*Data from was excluded from results due to thickness variation caused by pinching on edge of panel during bagging.

Average	38.404	
Standard Dev.	1.310	
Coeff. of Var. [%]	3.412	
Min.	35.927	
Max.	40.851	
Number of Spec.	18	

$Average_{norm}$	0.0073	38.799
$Standard\ Dev._{norm}$		1.276
$Coeff.\ of\ Var.\ [\%]_{norm}$		3.290
Min.	0.0071	36.255
Max.	0.0075	41.333
Number of Spec.	18	18



Laminate Open Hole Compression Properties (OHC2) -- (ETW)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

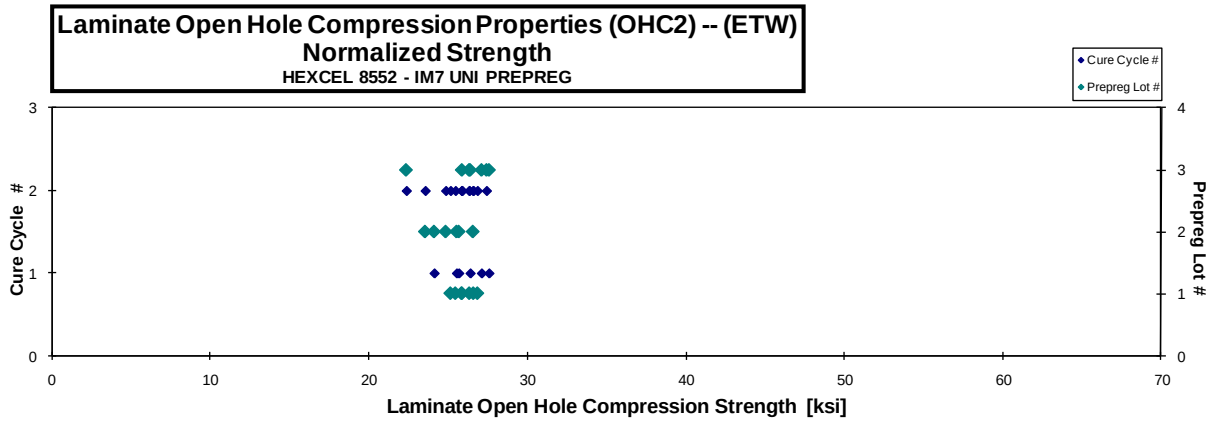
normalizing t_{ply} [in]: 0.0072

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]
HFIHA117D	A	M2	1	2	24.954	0.149	20	LGM	0.0075	25.870
HFIHA118D	A	M2	1	2	25.246	0.143	20	LGM	0.0072	25.143
HFIHA119D	A	M2	1	2	25.126	0.148	20	LGM	0.0074	25.835
HFIHA11CD	A	M2	1	2	25.557	0.148	20	LGM	0.0074	26.326
HFIHA217D	A	M2	1	2	25.927	0.148	20	LGM	0.0074	26.581
HFIHA218D	A	M2	1	2	25.139	0.146	20	LGM	0.0073	25.453
HFIHA21AD	A	M2	1	2	26.064	0.148	20	LGM	0.0074	26.839
HFIHB117D	B	M1	2	1	25.576	0.144	20	LGM	0.0072	25.526
HFIHB118D	B	M1	2	1	24.776	0.140	20	LGM	0.0070	24.114
HFIHB119D	B	M1	2	1	25.648	0.144	20	LGM	0.0072	25.665
HFIHB217D	B	M2	2	2	24.900	0.144	20	LGM	0.0072	24.842
HFIHB218D	B	M2	2	2	24.411	0.139	20	LGM	0.0069	23.549
HFIHB219D	B	M2	2	2	26.302	0.145	20	LGM	0.0073	26.552
HFIHC117D	C	M1	3	1	26.780	0.148	20	LGM	0.0074	27.568
HFIHC118D	C	M1	3	1	27.563	0.142	20	LGM	0.0071	27.098
HFIHC11AD	C	M1	3	1	26.133	0.145	20	LGM	0.0073	26.384
HFIHC217D	C	M2	3	2	27.200	0.145	20	LGM	0.0073	27.411
HFIHC218D*	C	M2	3	2	22.243	0.145	20	LGM	0.0072	22.359
HFIHC219D	C	M2	3	2	25.674	0.145	20	LGM	0.0073	25.864
HFIHC21AD	C	M2	3	2	26.151	0.145	20	LGM	0.0072	26.317

*reviewed data and specimens; found no cause for removal

Average	25.568	
Standard Dev.	1.125	
Coeff. of Var. [%]	4.399	
Min.	22.243	
Max.	27.563	
Number of Spec.	20	

$Average_{norm}$	0.0073	25.765
$Standard\ Dev._{norm}$		1.295
$Coeff.\ of\ Var.\ [\%]_{norm}$		5.025
Min.	0.0069	22.359
Max.	0.0075	27.568
Number of Spec.	20	20



4.24 "50/40/10" Open Hole Compression 3 Properties (OHC3)

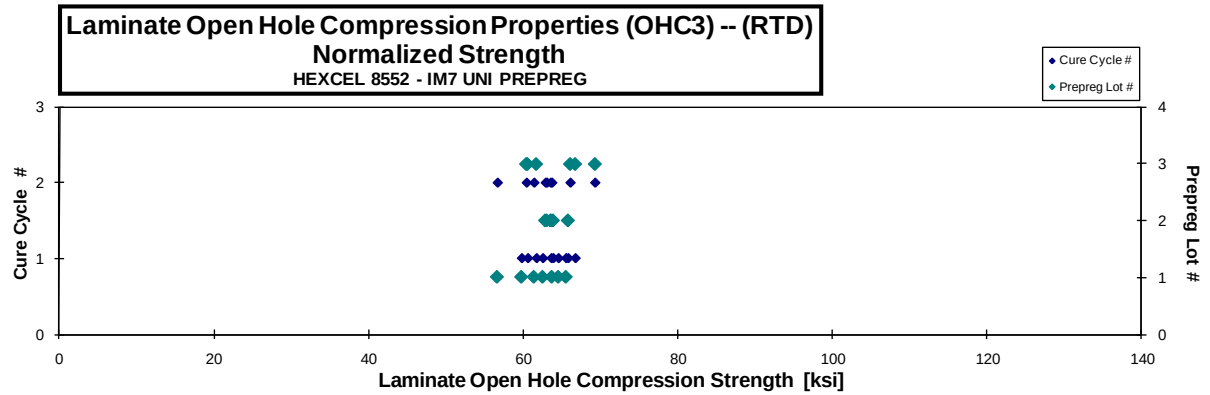
Laminate Open Hole Compression Properties (OHC3) -- (RTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIIA112A	A	M1	1	1	60.942	0.141	20	LGM	0.0071	59.772
HFIIA113A	A	M1	1	1	60.721	0.148	20	LGM	0.0074	62.513
HFIIA114A	A	M1	1	1	64.256	0.147	20	LGM	0.0073	65.520
HFIIA115A	A	M1	1	1	63.061	0.147	20	LGM / AGM	0.0074	64.535
HFIIA211A	A	M2	1	2	59.243	0.138	20	LGM	0.0069	56.631
HFIIA212A	A	M2	1	2	59.063	0.150	20	LGM	0.0075	61.381
HFIIA213A	A	M2	1	2	62.584	0.147	20	LGM	0.0073	63.700
HFIIB111A	B	M1	2	1	67.551	0.140	20	LGM	0.0070	65.799
HFIIB112A	B	M1	2	1	63.679	0.144	20	AGM	0.0072	63.613
HFIIB113A	B	M1	2	1	63.819	0.144	20	LGM	0.0072	63.863
HFIIB211A	B	M2	2	2	65.022	0.139	20	LGM	0.0070	62.862
HFIIB212A	B	M2	2	2	62.890	0.145	20	LGM	0.0073	63.523
HFIIB213A	B	M2	2	2	63.372	0.143	20	LGM	0.0072	63.050
HFIIC111A	C	M1	3	1	64.202	0.138	20	LGM	0.0069	61.690
HFIIC112A	C	M1	3	1	60.008	0.145	20	LGM	0.0073	60.570
HFIIC113A	C	M1	3	1	66.739	0.144	20	LGM	0.0072	66.731
HFIIC211A	C	M2	3	2	62.358	0.139	20	LGM	0.0070	60.402
HFIIC212A	C	M2	3	2	65.106	0.146	20	LGM	0.0073	66.078
HFIIC213A	C	M2	3	2	69.243	0.144	20	LGM	0.0072	69.283

Average	63.361	
Standard Dev.	2.714	
Coeff. of Var. [%]	4.284	
Min.	59.063	
Max.	69.243	
Number of Spec.	19	

$Average_{norm}$	0.0072	63.238
$Standard\ Dev._{norm}$		2.872
Coeff. of Var. $[\%]_{norm}$		4.542
Min.	0.0069	56.631
Max.	0.0075	69.283
Number of Spec.	19	19



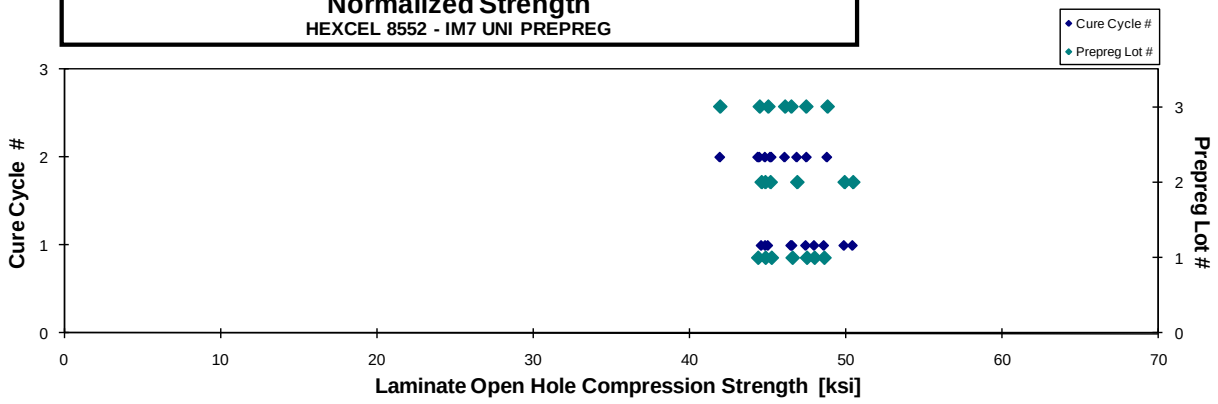
Laminate Open Hole Compression Properties (OHC3) -- (ETW)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFIIA117D	A	M1	1	1	43.892	0.147	20	LGM	0.0074	44.908
HFIIA119D	A	M1	1	1	46.817	0.148	20	LGM	0.0074	48.036
HFIIA11AD	A	M1	1	1	45.668	0.147	20	LGM	0.0074	46.630
HFIIA11BD	A	M1	1	1	47.637	0.147	20	LGM	0.0074	48.657
HFIIA217D	A	M2	1	2	43.825	0.149	20	LGM	0.0074	45.296
HFIIA218D	A	M2	1	2	44.311	0.144	20	LGM	0.0072	44.434
HFIIA219D	A	M2	1	2	46.269	0.148	20	LGM	0.0074	47.549
HFIIB117D	B	M1	2	1	50.124	0.145	20	LGM	0.0073	50.495
HFIIB118D	B	M1	2	1	45.102	0.143	20	LGM	0.0071	44.653
HFIIB119D	B	M1	2	1	48.963	0.147	20	LGM	0.0073	49.949
HFIIB217D	B	M2	2	2	44.869	0.145	20	LGM	0.0073	45.222
HFIIB218D	B	M2	2	2	45.558	0.142	20	LGM	0.0071	44.893
HFIIB21AD	B	M2	2	2	46.396	0.146	20	LGM	0.0073	46.928
HFIIC117D	C	M1	3	1	44.907	0.145	20	LGM	0.0072	45.078
HFIIC118D	C	M1	3	1	48.614	0.141	20	LGM	0.0070	47.499
HFIIC11AD	C	M1	3	1	45.907	0.146	20	LGM	0.0073	46.550
HFIIC216D	C	M2	3	2	42.659	0.142	20	LGM	0.0071	42.007
HFIIC217D	C	M2	3	2	46.524	0.143	20	LGM	0.0071	46.152
HFIIC218D	C	M2	3	2	51.350	0.137	20	LGM	0.0069	48.860
HFIIC21AD	C	M2	3	2	44.945	0.143	20	LGM	0.0071	44.534

	Strength		$Strength_{norm}$
Average	46.217	$Average_{norm}$	46.417
Standard Dev.	2.201	$Standard\ Dev._{norm}$	2.111
Coeff. of Var. [%]	4.762	$Coeff.\ of\ Var.\ [\%]_{norm}$	4.548
Min.	42.659	Min.	42.007
Max.	51.350	Max.	50.495
Number of Spec.	20	Number of Spec.	20

Laminate Open Hole Compression Properties (OHC3) -- (ETW)
Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



4.25 "25/50/25" Filled-Hole Compression 1 Properties (FHC1)

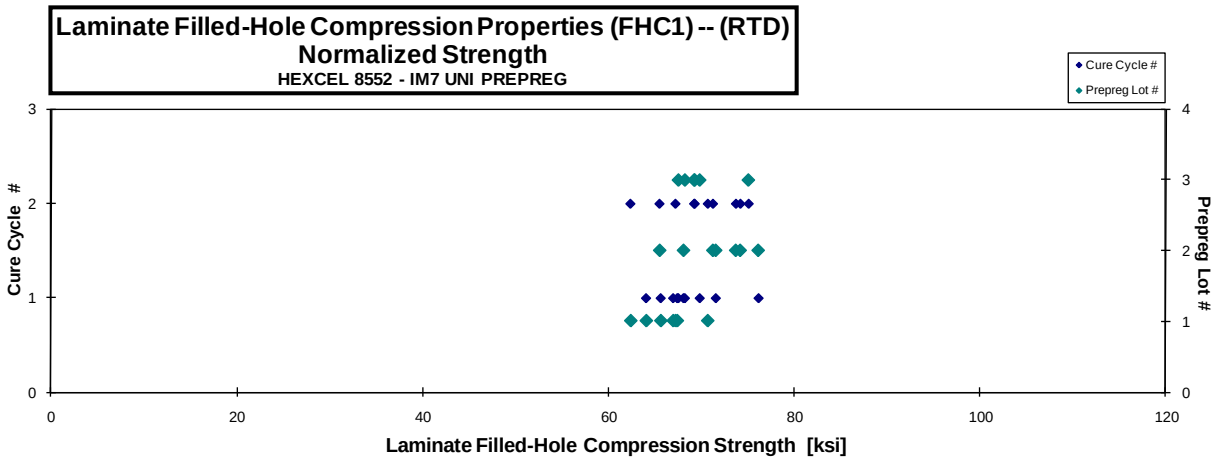
Laminate Filled-Hole Compression Properties (FHC1) -- (RTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFI7A111A	A	M1	1	1	65.463	0.177	24	LGF	0.0074	66.953
HFI7A112A	A	M1	1	1	62.442	0.177	24	MGM	0.0074	64.032
HFI7A113A	A	M1	1	1	64.338	0.176	24	MGF	0.0073	65.610
HFI7A116A	A	M1	1	1	65.893	0.177	24	MGF	0.0074	67.393
HFI7A211A	A	M2	1	2	63.946	0.168	24	MGF	0.0070	62.343
HFI7A212A	A	M2	1	2	66.211	0.175	24	MGF	0.0073	67.201
HFI7A213A	A	M2	1	2	70.538	0.173	24	MGF	0.0072	70.695
HFI7B112A	B	M1	2	1	76.196	0.173	24	MGF	0.0072	76.167
HFI7B113A	B	M1	2	1	72.336	0.171	24	MGF	0.0071	71.555
HFI7B114A	B	M1	2	1	68.620	0.171	24	MGF	0.0071	68.064
HFI7B211A	B	M2	2	2	68.994	0.164	24	MGF	0.0068	65.481
HFI7B212A	B	M2	2	2	72.258	0.176	24	MGF	0.0073	73.728
HFI7B213A	B	M2	2	2	71.491	0.172	24	MGF	0.0072	71.250
HFI7B214A	B	M2	2	2	74.418	0.172	24	MGF	0.0072	74.210
HFI7C111A	C	M1	3	1	69.807	0.169	24	LGF	0.0070	68.218
HFI7C112A	C	M1	3	1	67.037	0.174	24	MGF	0.0073	67.515
HFI7C113A	C	M1	3	1	70.097	0.172	24	MGM	0.0072	69.820
HFI7C211A	C	M2	3	2	71.561	0.167	24	MGF	0.0070	69.277
HFI7C213A	C	M2	3	2	75.282	0.172	24	MGF	0.0072	75.100
HFI7C214A	C	M2	3	2	69.069	0.173	24	LGF	0.0072	69.222

Average	69.300	
Standard Dev.	3.851	
Coeff. of Var. [%]	5.557	
Min.	62.442	
Max.	76.196	
Number of Spec.	20	

$Average_{norm}$	0.0072	69.192
$Standard\ Dev._{norm}$		3.693
Coeff. of Var. $[\%]_{norm}$		5.338
Min.	0.0068	62.343
Max.	0.0074	76.167
Number of Spec.	20	20



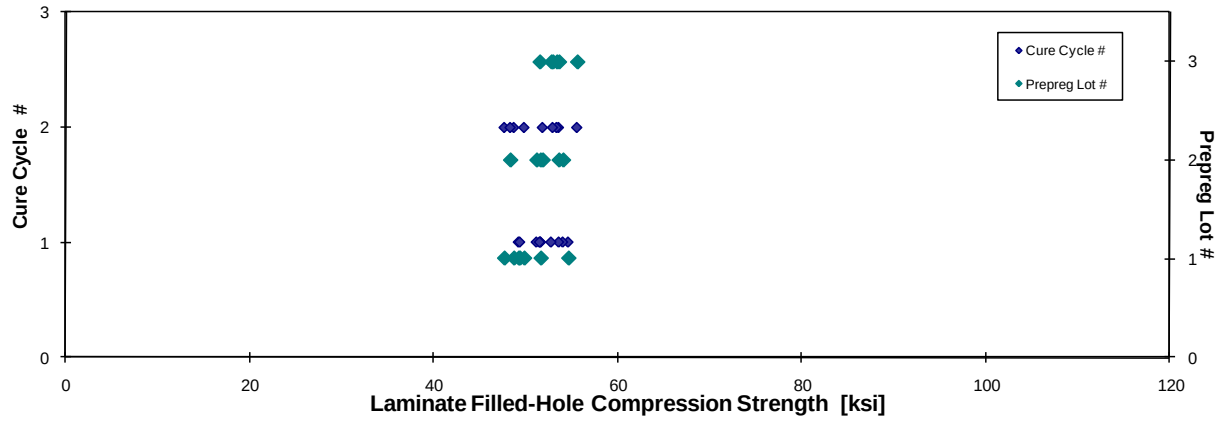
Laminate Filled-Hole Compression Properties (FHC1) -- (ETW) Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFI7A117D	A	M1	1	1	52.767	0.179	24	LGM	0.0075	54.645
HFI7A118D	A	M1	1	1	51.092	0.167	24	LGM	0.0069	49.254
HFI7A119D	A	M1	1	1	50.055	0.178	24	LGM	0.0074	51.653
HFI7A11AD	A	M1	1	1	48.041	0.178	24	LGM	0.0074	49.389
HFI7A216D	A	M2	1	2	49.903	0.173	24	LGM	0.0072	49.855
HFI7A218D	A	M2	1	2	48.614	0.170	24	LGM	0.0071	47.705
HFI7A219D	A	M2	1	2	47.933	0.176	24	LGM	0.0073	48.742
HFI7B116D	B	M1	2	1	54.567	0.171	24	LGM	0.0071	54.067
HFI7B117D	B	M1	2	1	51.569	0.173	24	LGM	0.0072	51.623
HFI7B119D	B	M1	2	1	51.627	0.171	24	LGM	0.0071	51.204
HFI7B216D	B	M2	2	2	53.877	0.172	24	LGM	0.0072	53.612
HFI7B217D	B	M2	2	2	51.456	0.174	24	LGM	0.0073	51.863
HFI7B21AD	B	M2	2	2	51.286	0.163	24	LGM	0.0068	48.352
HFI7C116D	C	M1	3	1	51.701	0.172	24	LGM,LGF	0.0072	51.546
HFI7C119D	C	M1	3	1	52.987	0.175	24	LGM,LGF	0.0073	53.631
HFI7C11AD	C	M1	3	1	53.041	0.172	24	LGM	0.0072	52.790
HFI7C217D	C	M2	3	2	53.076	0.174	24	LGM	0.0072	53.393
HFI7C218D	C	M2	3	2	52.625	0.174	24	LGM,LGO	0.0072	52.965
HFI7C21AD	C	M2	3	2	54.428	0.177	24	LGM	0.0074	55.604

	Strength	$Strength_{norm}$
Average	51.613	51.679
Standard Dev.	1.990	2.279
Coeff. of Var. [%]	3.855	4.410
Min.	47.933	47.705
Max.	54.567	55.604
Number of Spec.	19	19

Laminate Filled-Hole Compression Properties (FHC1) -- (ETW) Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



4.26 "10/80/10" Filled-Hole Compression 2 Properties (FHC2)

Laminate Filled-Hole Compression Properties (FHC2) -- (RTD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

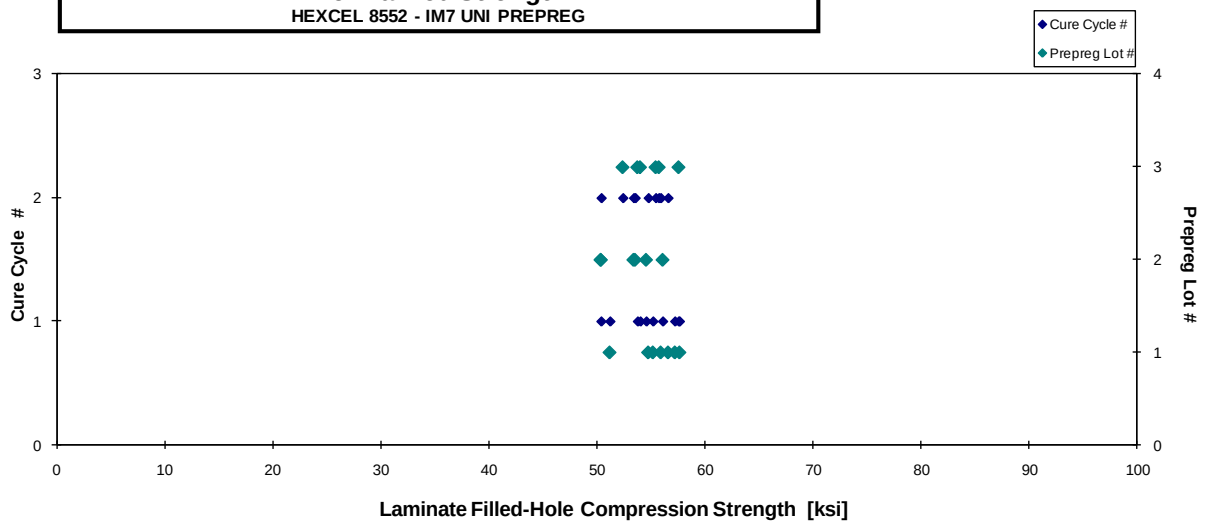
normalizing t_{ply} [in]: 0.0072

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]
HFI8A111A	A	M1	1	1	52.194	0.141	20	MGF	0.0071	51.240
HFI8A112A	A	M1	1	1	56.130	0.148	20	MGF	0.0074	57.708
HFI8A113A	A	M1	1	1	56.315	0.146	20	MGF	0.0073	57.279
HFI8A114A	A	M1	1	1	54.064	0.147	20	MGF	0.0074	55.241
HFI8A212A	A	M2	1	2	55.486	0.147	20	LGF	0.0074	56.649
HFI8A213A	A	M2	1	2	53.907	0.146	20	AGM	0.0073	54.812
HFI8A214A	A	M2	1	2	54.713	0.147	20	MGF	0.0074	55.967
HFI8B111A	B	M1	2	1	51.968	0.140	20	AGM	0.0070	50.410
HFI8B112A	B	M1	2	1	53.821	0.146	20	MGF	0.0073	54.612
HFI8B113A	B	M1	2	1	56.128	0.144	20	MGF	0.0072	56.147
HFI8B211A	B	M2	2	2	54.346	0.142	20	MGF	0.0071	53.591
HFI8B212A	B	M2	2	2	50.572	0.144	20	LGM	0.0072	50.426
HFI8B213A	B	M2	2	2	53.535	0.144	20	AGM	0.0072	53.448
HFI8C111A	C	M1	3	1	54.090	0.144	20	MGF	0.0072	54.059
HFI8C112A	C	M1	3	1	53.683	0.144	20	MGF	0.0072	53.807
HFI8C113A	C	M1	3	1	57.536	0.144	20	MGF	0.0072	57.623
HFI8C211A	C	M2	3	2	52.267	0.144	20	LGF	0.0072	52.442
HFI8C215A	C	M2	3	2	55.097	0.146	20	MGF	0.0073	55.792
HFI8C216A	C	M2	3	2	54.892	0.146	20	MGF	0.0073	55.502

Note: HFI8A211A was not included due to bad failure.

	Strength		$Strength_{norm}$
Average	54.250	$Average_{norm}$	0.0072	54.566
Standard Dev.	1.717	$Standard\ Dev._{norm}$		2.252
Coeff. of Var. [%]	3.166	$Coeff.\ of\ Var.\ [\%]_{norm}$		4.127
Min.	50.572	Min.	0.0070	50.410
Max.	57.536	Max.	0.0074	57.708
Number of Spec.	19	Number of Spec.	19	19

Laminate Filled-Hole Compression Properties (FHC2) -- (RTD) Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



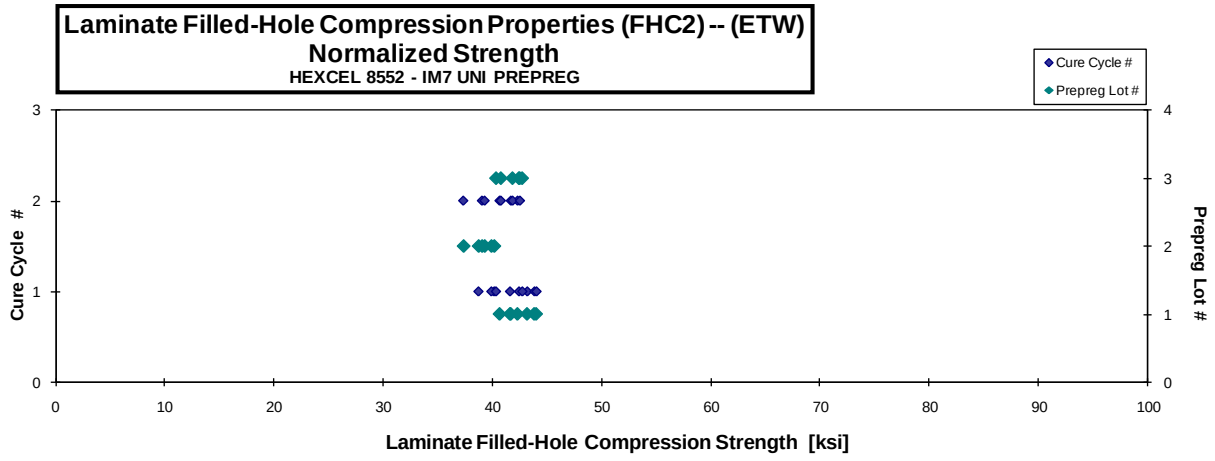
Laminate Filled-Hole Compression Properties (FHC2) -- (ETW)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFI8A11AD	A	M1	1	1	42.022	0.148	20	LGM	0.0074	43.160
HFI8A11BD	A	M1	1	1	43.199	0.146	20	LGM	0.0073	43.809
HFI8A11CD	A	M1	1	1	43.160	0.147	20	LGM,LGO	0.0073	43.994
HFI8A11DD	A	M1	1	1	40.875	0.147	20	LGM	0.0073	41.594
HFI8A217D	A	M2	1	2	40.631	0.148	20	LGM	0.0074	41.670
HFI8A218D	A	M2	1	2	41.624	0.141	20	LGM	0.0070	40.646
HFI8A219D	A	M2	1	2	41.044	0.148	20	LGM	0.0074	42.279
HFI8B116D	B	M1	2	1	40.181	0.144	20	LGM	0.0072	40.167
HFI8B117D	B	M1	2	1	39.512	0.145	20	LGM	0.0073	39.906
HFI8B118D	B	M1	2	1	38.952	0.143	20	LGM	0.0072	38.736
HFI8B217D	B	M2	2	2	37.862	0.142	20	LGM	0.0071	37.358
HFI8B218D	B	M2	2	2	39.184	0.144	20	LGM	0.0072	39.052
HFI8B219D	B	M2	2	2	39.181	0.144	20	LGM	0.0072	39.290
HFI8C117D	C	M1	3	1	42.391	0.144	20	AGM,LGM	0.0072	42.411
HFI8C118D	C	M1	3	1	42.392	0.145	20	AGM,LGM	0.0073	42.711
HFI8C119D	C	M1	3	1	40.212	0.144	20	LGM	0.0072	40.324
HFI8C217D	C	M2	3	2	40.523	0.145	20	LGM	0.0072	40.763
HFI8C21BD	C	M2	3	2	41.263	0.146	20	LGM	0.0073	41.826
HFI8C21CD	C	M2	3	2	42.118	0.145	20	LGM	0.0073	42.493

Average	40.859	
Standard Dev.	1.496	
Coeff. of Var. [%]	3.661	
Min.	37.862	
Max.	43.199	
Number of Spec.	19	

$Average_{norm}$	0.0073	41.168
$Standard\ Dev._{norm}$		1.809
Coeff. of Var. $[\%]_{norm}$		4.394
Min.	0.0070	37.358
Max.	0.0074	43.994
Number of Spec.	19	19



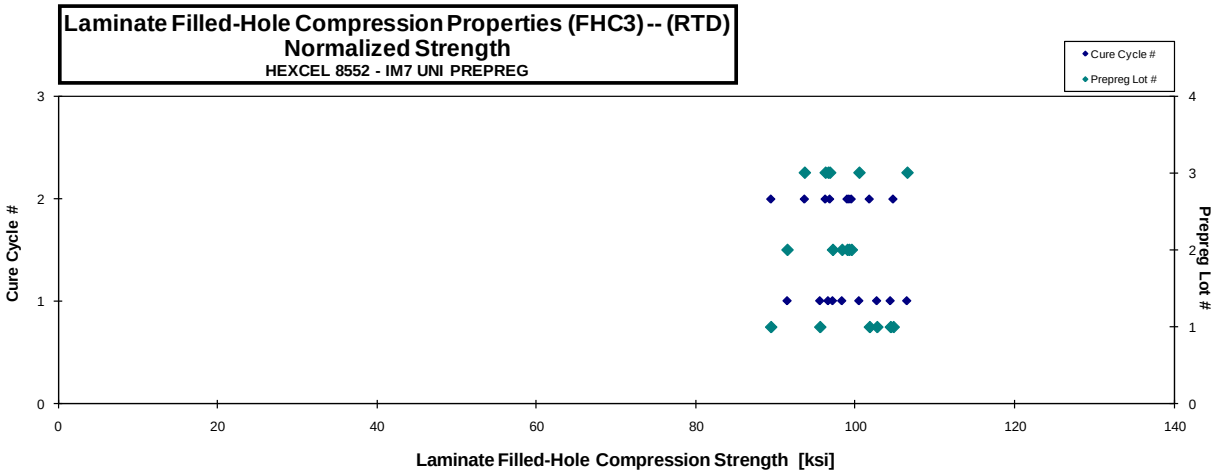
4.27 "50/40/10" Filled-Hole Compression 3 Properties (FHC3)

Laminate Filled-Hole Compression Properties (FHC3) -- (RTD)
Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFI9A113A	A	M1	1	1	100.899	0.147	20	MGF	0.0073	102.756
HFI9A114A	A	M1	1	1	102.545	0.147	20	MGF	0.0073	104.456
HFI9A115A	A	M1	1	1	93.040	0.148	20	MGF	0.0074	95.603
HFI9A212A	A	M2	1	2	98.641	0.149	20	MGF	0.0074	101.826
HFI9A213A	A	M2	1	2	102.738	0.147	20	MGF	0.0073	104.807
HFI9A215A	A	M2	1	2	87.810	0.147	20	MGF	0.0073	89.446
HFI9B111A	B	M1	2	1	94.763	0.139	20	MGF	0.0070	91.494
HFI9B112A	B	M1	2	1	96.989	0.144	20	MGF	0.0072	97.202
HFI9B113A	B	M1	2	1	99.323	0.143	20	MGF	0.0071	98.369
HFI9B211A	B	M2	2	2	101.931	0.140	20	MGF	0.0070	99.264
HFI9B212A	B	M2	2	2	99.865	0.143	20	MGF	0.0071	99.033
HFI9B215A	B	M2	2	2	100.124	0.143	20	MGF	0.0072	99.556
HFI9C111A	C	M1	3	1	99.109	0.140	20	MGF	0.0070	96.631
HFI9C112A	C	M1	3	1	104.248	0.147	20	MGF	0.0074	106.541
HFI9C113A	C	M1	3	1	100.123	0.145	20	MGF	0.0072	100.517
HFI9C213A	C	M2	3	2	95.335	0.145	20	MGF	0.0073	96.284
HFI9C214A	C	M2	3	2	92.969	0.145	20	LGF	0.0073	93.668
HFI9C215A	C	M2	3	2	96.374	0.145	20	MGF	0.0072	96.843

	Strength	$Strength_{norm}$	Avg. t_{ply}
Average	98.157	98.572	0.0072
Standard Dev.	4.176	4.542	
Coeff. of Var. [%]	4.254	4.608	
Min.	87.810	89.446	0.0070
Max.	104.248	106.541	0.0074
Number of Spec.	18	18	18



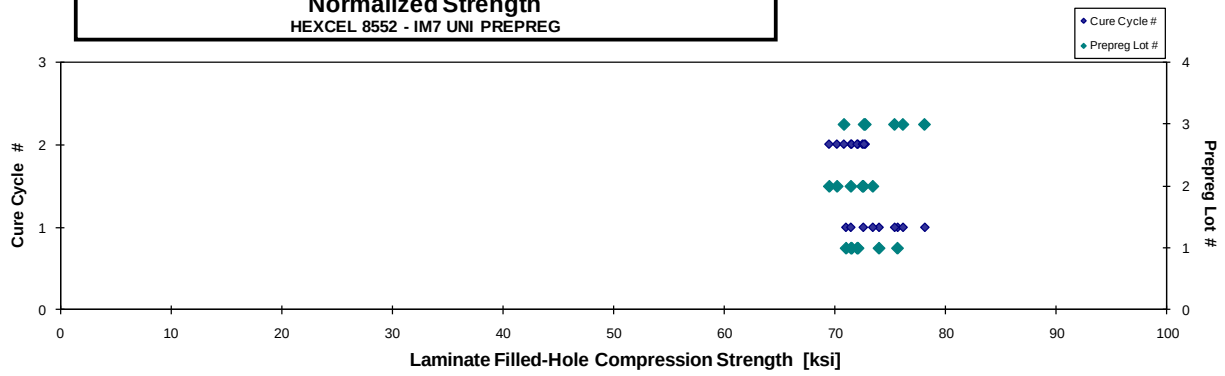
Laminate Filled-Hole Compression Properties (FHC3) -- (ETW) Strength
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

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]
HFI9A117D	A	M1	1	1	69.224	0.148	20	LGM	0.0074	70.995
HFI9A118D	A	M1	1	1	74.689	0.146	20	LGM	0.0073	75.648
HFI9A11AD	A	M1	1	1	71.517	0.149	20	LGM	0.0074	73.976
HFI9A11CD	A	M1	1	2	70.467	0.146	20	LGM	0.0073	71.446
HFI9A216D	A	M2	1	2	70.881	0.146	20	LGM	0.0073	72.070
HFI9A217D	A	M2	1	2	71.904	0.143	20	LGM	0.0072	71.505
HFI9A218D	A	M2	1	2	70.754	0.147	20	LGM	0.0073	72.006
HFI9B116D	B	M1	2	1	71.675	0.144	20	LGM	0.0072	71.435
HFI9B117D	B	M1	2	1	72.240	0.145	20	LGM	0.0072	72.558
HFI9B11AD	B	M1	2	1	73.884	0.143	20	LGM	0.0072	73.413
HFI9B217D	B	M2	2	2	73.508	0.142	20	LGM	0.0071	72.487
HFI9B218D	B	M2	2	2	69.873	0.145	20	LGM	0.0072	70.181
HFI9B219D	B	M2	2	2	69.943	0.143	20	LGM	0.0072	69.474
HFI9C116D	C	M1	3	1	77.225	0.146	20	LGM	0.0073	78.092
HFI9C117D	C	M1	3	1	74.844	0.146	20	LGM	0.0073	76.134
HFI9C118D	C	M1	3	1	75.632	0.144	20	LGM	0.0072	75.378
HFI9C217D	C	M2	3	2	72.003	0.145	20	LGM	0.0073	72.728
HFI9C218D	C	M2	3	2	72.482	0.144	20	LGM	0.0072	72.624
HFI9C219D	C	M2	3	2	68.986	0.148	20	LGM	0.0074	70.806

Average	**72.196**	**$Average_{norm}$**	**0.0073**	**72.787**
Standard Dev.	**2.264**	**Standard $Dev._{norm}$**		**2.205**
Coeff. of Var. [%]	**3.135**	**Coeff. of Var. $[\%]_{norm}$**		**3.029**
Min.	**68.986**	**Min.**	**0.0071**	**69.474**
Max.	**77.225**	**Max.**	**0.0074**	**78.092**
Number of Spec.	**19**	**Number of Spec.**	**19**	**19**

Laminate Filled-Hole Compression Properties (FHC3) -- (ETW) Normalized Strength
HEXCEL 8552 - IM7 UNI PREPREG



4.28 "25/50/25" Single Shear Bearing 1 Properties SSB1

Laminate Bearing Properties (SSB1) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

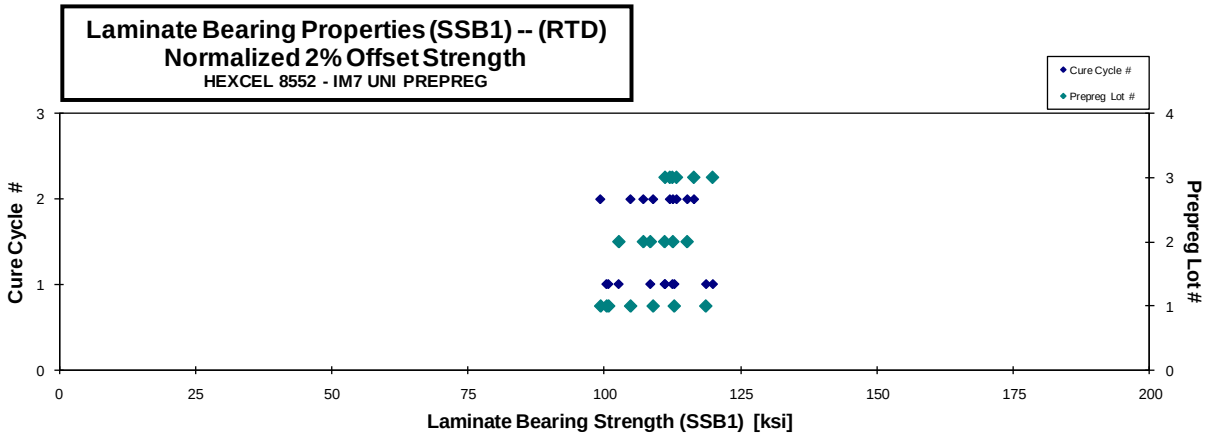
normalizing t_{ply} [in]: 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]
HFI1A112A	A	M1	1	1	106.298	0.109	16	B1I / 2% OFFSET FOR UBS*	0.0068	100.423
HFI1A113A	A	M1	1	1	107.274	0.108	16	B1I / 2% OFFSET FOR UBS*	0.0068	100.771
HFI1A114A	A	M1	1	1	111.618	0.116	16	B1I / 2% OFFSET FOR UBS*	0.0073	112.829
HFI1A115A	A	M1	1	1	116.831	0.117	16	B1I / 2% OFFSET FOR UBS*	0.0073	118.623
HFI1A211A	A	M2	1	2	107.034	0.107	16	B1I / 2% OFFSET FOR UBS*	0.0067	99.307
HFI1A212A	A	M2	1	2	112.704	0.111	16	B1I / 2% OFFSET FOR UBS*	0.0070	108.953
HFI1A213A	A	M2	1	2	107.280	0.113	16	B1I / 2% OFFSET FOR UBS*	0.0070	104.812
HFI1B111A	B	M1	2	1	111.703	0.106	16	B1I / 2% OFFSET FOR UBS*	0.0066	102.653
HFI1B112A	B	M1	2	1	112.467	0.111	16	B1I / 2% OFFSET FOR UBS*	0.0069	108.431
HFI1B113A	B	M1	2	1	115.988	0.110	16	B1I / 2% OFFSET FOR UBS*	0.0069	111.055
HFI1B211A	B	M2	2	2	118.291	0.112	16	B1I / 2% OFFSET FOR UBS*	0.0070	115.193
HFI1B212A	B	M2	2	2	114.477	0.113	16	B1I / 2% OFFSET FOR UBS*	0.0071	112.572
HFI1B213A	B	M2	2	2	109.247	0.113	16	B1I / 2% OFFSET FOR UBS*	0.0071	107.161
HFI1C111A	C	M1	3	1	117.118	0.111	16	B1I / 2% OFFSET FOR UBS*	0.0069	112.475
HFI1C112A	C	M1	3	1	113.824	0.112	16	B1I / 2% OFFSET FOR UBS*	0.0070	111.140
HFI1C113A	C	M1	3	1	118.980	0.116	16	B1I / 2% OFFSET FOR UBS*	0.0073	119.858
HFI1C211A	C	M2	3	2	116.861	0.110	16	B1I / 2% OFFSET FOR UBS*	0.0069	112.008
HFI1C212A	C	M2	3	2	113.651	0.118	16	B1I / 2% OFFSET FOR UBS*	0.0074	116.413
HFI1C213A	C	M2	3	2	114.993	0.113	16	B1I / 2% OFFSET FOR UBS*	0.0071	113.229
								Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)		

*Ultimate Strength not obtained

Average	112.981	
Standard Dev.	4.018	
Coeff. of Var. [%]	3.556	
Min.	106.298	
Max.	118.980	
Number of Spec.	19	

Average$_{norm}$	0.0070	109.890
Standard Dev.$_{norm}$		6.059
Coeff. of Var. [%]$_{norm}$		5.514
Min.	0.0066	99.307
Max.	0.0074	119.858
Number of Spec.	19	19



Laminate Bearing Properties (SSB1) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

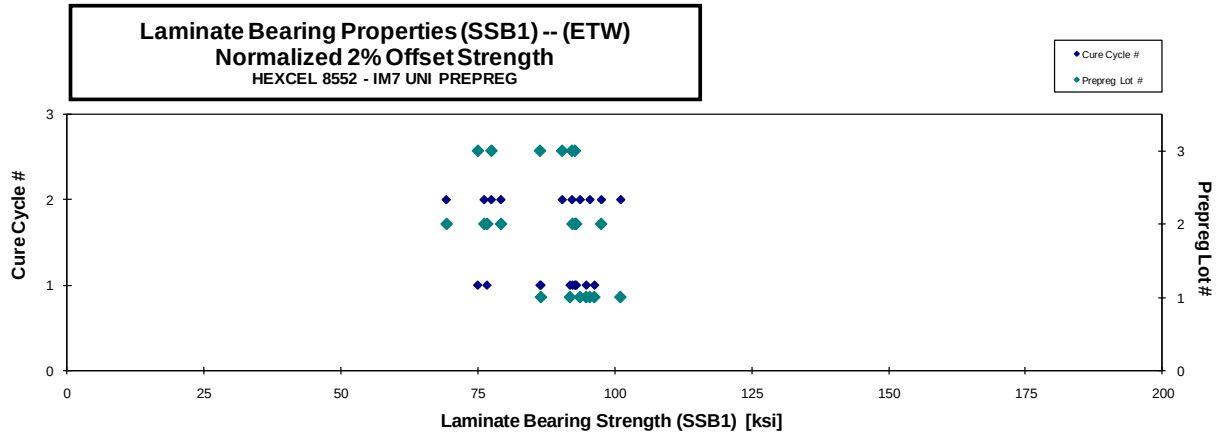
normalizing t_{ply} [in]: 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offest $Strength_{norm}$ [ksi]
HFI1A117D	A	M1	1	1	92.906	0.114	16	B1I / 2% OFFSET FOR UBS*	0.0071	91.858
HFI1A118D	A	M1	1	1	86.483	0.115	16	B1I / 2% OFFSET FOR UBS*	0.0072	86.520
HFI1A119D	A	M1	1	1	94.390	0.116	16	B1I / 2% OFFSET FOR UBS*	0.0072	94.827
HFI1A11AD	A	M1	1	1	94.925	0.117	16	B1I / 2% OFFSET FOR UBS*	0.0073	96.339
HFI1A217D	A	M2	1	2	95.782	0.115	16	B1I / 2% OFFSET FOR UBS*	0.0072	95.491
HFI1A218D	A	M2	1	2	99.813	0.117	16	B1I / 2% OFFSET FOR UBS*	0.0073	101.128
HFI1A219D	A	M2	1	2	92.654	0.117	16	B1I / 2% OFFSET FOR UBS*	0.0073	93.699
HFI1B116D	B	M1	2	1	96.354	0.111	16	B1I / 2% OFFSET FOR UBS*	0.0069	92.813
HFI1B117D	B	M1	2	1	98.015	0.109	16	B1I / 2% OFFSET FOR UBS*	0.0068	92.329
HFI1B118D	B	M1	2	1	96.256	0.111	16	B1I / 2% OFFSET FOR UBS*	0.0070	92.997
HFI1B119D	B	M1	2	1	75.485	0.117	16	B1I / 2% OFFSET FOR UBS*	0.0073	76.642
HFI1B216D	B	M2	2	2	95.780	0.117	16	B1I / 2% OFFSET FOR UBS*	0.0073	97.595
HFI1B217D	B	M2	2	2	79.089	0.111	16	B1I / 2% OFFSET FOR UBS*	0.0069	76.125
HFI1B219D	B	M2	2	2	77.542	0.118	16	B1I / 2% OFFSET FOR UBS*	0.0074	79.191
HFI1B21AD	B	M2	2	2	68.615	0.116	16	B1I / 2% OFFSET FOR UBS*	0.0073	69.191
HFI1C116D	C	M1	3	1	95.379	0.112	16	B1I / 2% OFFSET FOR UBS*	0.0070	92.771
HFI1C117D	C	M1	3	1	83.578	0.103	16	B1I / 2% OFFSET FOR UBS*	0.0065	74.945
HFI1C118D	C	M1	3	1	94.145	0.106	16	B1I / 2% OFFSET FOR UBS*	0.0066	86.354
HFI1C216D	C	M2	3	2	88.240	0.118	16	B1I / 2% OFFSET FOR UBS*	0.0074	90.423
HFI1C217D	C	M2	3	2	86.389	0.103	16	B1I / 2% OFFSET FOR UBS*	0.0065	77.440
HFI1C218D	C	M2	3	2	95.743	0.111	16	B1I / 2% OFFSET FOR UBS*	0.0069	92.211
								Ultimate Bearing Strength / B1I: B:Bearing, 1:first hole, I: Inapplicable (not on bolt, nut or head side)		

*Ultimate Strength not obtained

Average	89.884	
Standard Dev.	8.534	
Coeff. of Var. [%]	9.495	
Min.	68.615	
Max.	99.813	
Number of Spec.	21	

$Average_{norm}$	0.0071	88.138
$Standard\ Dev._{norm}$		8.903
Coeff. of Var. $[\%]_{norm}$		10.101
Min.	0.0065	69.191
Max.	0.0074	101.128
Number of Spec.	21	21



4.29 "10/80/10" Single Shear Bearing 2 Properties (SSB2)

Laminate Bearing Properties (SSB2) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

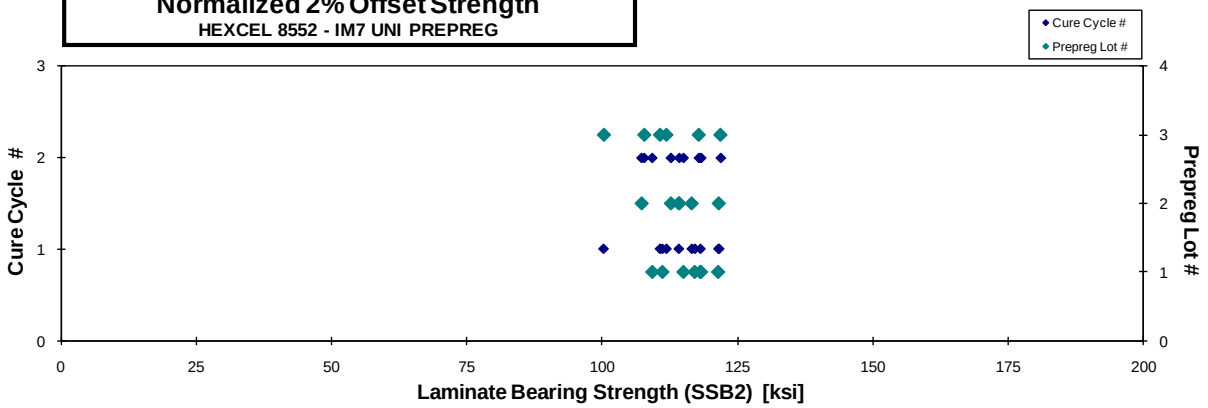
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]
HFI2A111A	A	M1	1	1	109.784	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	111.093
HFI2A113A	A	M1	1	1	115.844	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	117.051
HFI2A114A	A	M1	1	1	119.732	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	121.381
HFI2A115A	A	M1	1	1	116.225	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	118.068
HFI2A212A	A	M2	1	2	107.330	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0073	109.231
HFI2A213A	A	M2	1	2	113.680	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	114.969
HFI2A214A	A	M2	1	2	116.978	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	118.210
HFI2B111A	B	M1	2	1	122.564	0.143	20	B1I / 2% OFFSET FOR UBS*	0.0071	121.500
HFI2B112A	B	M1	2	1	113.243	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0073	114.108
HFI2B113A	B	M1	2	1	117.116	0.143	20	B1I / 2% OFFSET FOR UBS*	0.0072	116.492
HFI2B212A	B	M2	2	2	111.830	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0073	112.672
HFI2B213A	B	M2	2	2	114.749	0.143	20	B1I / 2% OFFSET FOR UBS*	0.0072	114.205
HFI2B215A	B	M2	2	2	109.087	0.142	20	B1I / 2% OFFSET FOR UBS*	0.0071	107.269
HFI2C111A	C	M1	3	1	104.420	0.138	20	B1I / 2% OFFSET FOR UBS*	0.0069	100.298
HFI2C112A	C	M1	3	1	114.777	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0069	110.659
HFI2C113A	C	M1	3	1	115.248	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	111.833
HFI2C211A	C	M2	3	2	111.985	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0069	107.760
HFI2C212A	C	M2	3	2	118.646	0.148	20	B1I / 2% OFFSET FOR UBS*	0.0074	121.805
HFI2C213A	C	M2	3	2	116.496	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	117.804

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

Average	114.197	
Standard Dev.	4.413	
Coeff. of Var. [%]	3.865	
Min.	104.420	
Max.	122.564	
Number of Spec.	19	

Average$_{norm}$	0.0072	114.021
Standard Dev.$_{norm}$		5.566
Coeff. of Var. [%]$_{norm}$		4.882
Min.	0.0069	100.298
Max.	0.0074	121.805
Number of Spec.	19	19

Laminate Bearing Properties (SSB2) -- (RTD)
Normalized 2% Offset Strength
HEXCEL 8552 - IM7 UNI PREPREG



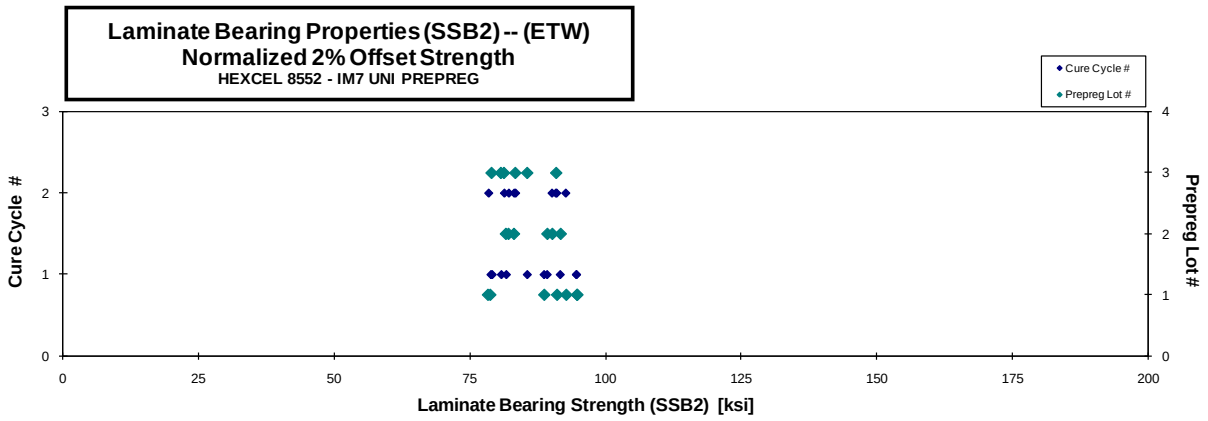
Laminate Bearing Properties (SSB2) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]
HFI2A118D	A	M1	1	1	92.682	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0074	94.731
HFI2A119D	A	M1	1	1	81.650	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0070	78.815
HFI2A11AD	A	M1	1	1	91.223	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	88.700
HFI2A11BD	A	M1	1	1	97.233	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	94.701
HFI2A216D	A	M2	1	2	88.887	0.148	20	B1I / 2% OFFSET FOR UBS*	0.0074	91.047
HFI2A218D	A	M2	1	2	77.484	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	78.398
HFI2A219D	A	M2	1	2	92.381	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	92.734
HFI2B115D	B	M1	2	1	89.332	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	89.270
HFI2B116D	B	M1	2	1	86.144	0.137	20	B1I / 2% OFFSET FOR UBS*	0.0068	81.678
HFI2B117D	B	M1	2	1	91.640	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	91.704
HFI2B216D	B	M2	2	2	82.833	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	83.149
HFI2B217D	B	M2	2	2	86.520	0.137	20	B1I / 2% OFFSET FOR UBS*	0.0068	82.154
HFI2B21AD	B	M2	2	2	90.471	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	90.178
HFI2C116D	C	M1	3	1	83.364	0.148	20	B1I / 2% OFFSET FOR UBS*	0.0074	85.574
HFI2C118D	C	M1	3	1	77.965	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	79.048
HFI2C119D	C	M1	3	1	79.807	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	80.758
HFI2C216D	C	M2	3	2	84.712	0.142	20	B1I / 2% OFFSET FOR UBS*	0.0071	83.399
HFI2C217D	C	M2	3	2	86.483	0.135	20	B1I / 2% OFFSET FOR UBS*	0.0068	81.318
HFI2C218D	C	M2	3	2	89.800	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	90.881

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

Average		86.874
Standard Dev.		5.393
Coeff. of Var. [%]		6.208
Min.		77.484
Max.		97.233
Number of Spec.		19
Average$_{norm}$	0.0071	86.223
Standard Dev.$_{norm}$		5.624
Coeff. of Var. [%]$_{norm}$		6.522
Min.	0.0068	78.398
Max.	0.0074	94.731
Number of Spec.	19	19



4.30 "50/40/10" Single Shear Bearing 3 Properties (SSB3)

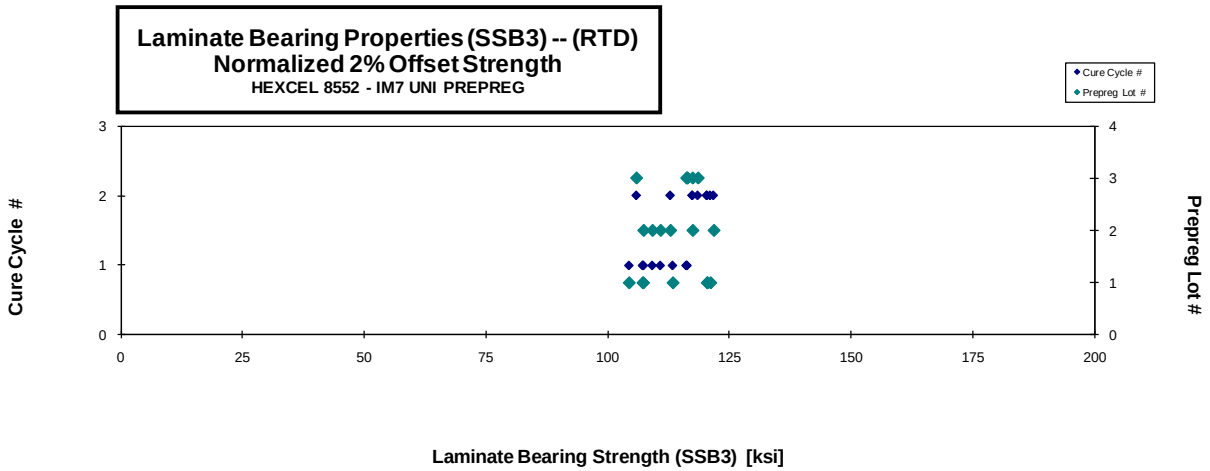
Laminate Bearing Properties (SSB3) -- (RTD)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]
HFI3A112A	A	M1	1	1	111.329	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0073	113.352
HFI3A113A	A	M1	1	1	110.555	0.140	20	B1I / 2% OFFSET FOR UBS*	0.0070	107.151
HFI3A114A	A	M1	1	1	110.982	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0070	107.244
HFI3A115A	A	M1	1	1	110.014	0.137	20	B1I / 2% OFFSET FOR UBS*	0.0068	104.322
HFI3A212A	A	M2	1	2	118.853	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0073	121.123
HFI3A213A	A	M2	1	2	118.684	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	120.428
HFI3A214A	A	M2	1	2	118.053	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0073	120.458
HFI3B111A	B	M1	2	1	112.900	0.137	20	B1I / 2% OFFSET FOR UBS*	0.0068	107.307
HFI3B112A	B	M1	2	1	108.476	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0074	110.812
HFI3B113A	B	M1	2	1	109.396	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	109.142
HFI3B211A	B	M2	2	2	116.878	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0070	112.861
HFI3B212A	B	M2	2	2	115.519	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	117.445
HFI3B213A	B	M2	2	2	122.041	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	121.801
HFI3C111A	C	M1	3	1	113.847	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0074	116.219
HFI3C112A	C	M1	3	1	116.374	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	116.361
HFI3C114A	C	M1	3	1	115.629	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	116.191
HFI3C212A	C	M2	3	2	104.569	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	105.840
HFI3C213A	C	M2	3	2	114.501	0.149	20	B1I / 2% OFFSET FOR UBS*	0.0075	118.543
HFI3C215A	C	M2	3	2	116.007	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	117.417

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

Average		113.927
Standard Dev.		4.317
Coeff. of Var. [%]		3.790
Min.		104.569
Max.		122.041
Number of Spec.		19
Average$_{norm}$	0.0072	113.896
Standard Dev.$_{norm}$		5.710
Coeff. of Var. [%]$_{norm}$		5.014
Min.	0.0068	104.322
Max.	0.0075	121.801
Number of Spec.	19	19



Laminate Bearing Properties (SSB3) -- (ETW)
Strength & Modulus
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply} [in]: 0.0072

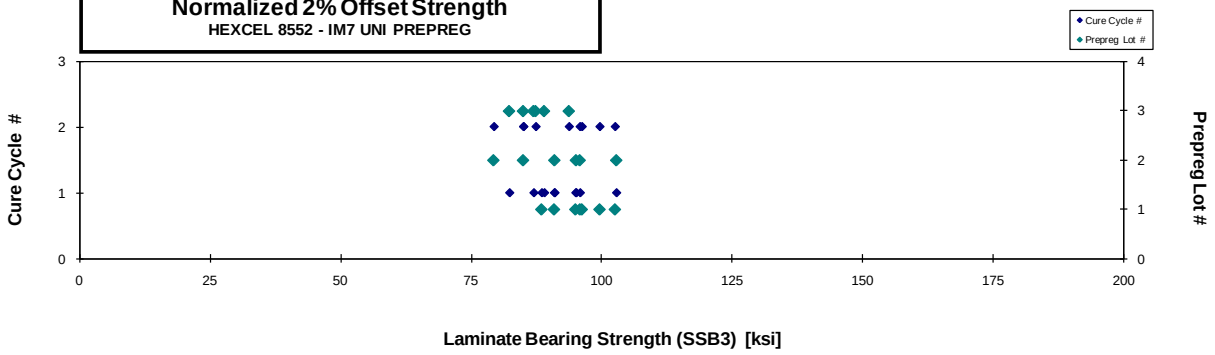
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Offset Strength$_{norm}$ [ksi]
HFI3A117D	A	M1	1	1	99.478	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0069	95.828
HFI3A119D	A	M1	1	1	87.757	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0073	88.489
HFI3A11AD	A	M1	1	1	94.216	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0073	94.979
HFI3A11BD	A	M1	1	1	91.661	0.143	20	B1I / 2% OFFSET FOR UBS*	0.0071	90.898
HFI3A216D	A	M2	1	2	99.866	0.148	20	B1I / 2% OFFSET FOR UBS*	0.0074	102.525
HFI3A218D	A	M2	1	2	99.109	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0072	99.591
HFI3A219D	A	M2	1	2	95.924	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	96.191
HFI3B116D	B	M1	2	1	101.302	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	102.780
HFI3B117D	B	M1	2	1	92.665	0.141	20	B1I / 2% OFFSET FOR UBS*	0.0071	90.970
HFI3B118D	B	M1	2	1	98.556	0.139	20	B1I / 2% OFFSET FOR UBS*	0.0069	95.088
HFI3B216D	B	M2	2	2	94.921	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0073	95.800
HFI3B217D	B	M2	2	2	85.275	0.134	20	B1I / 2% OFFSET FOR UBS*	0.0067	79.333
HFI3B218D	B	M2	2	2	86.622	0.141	20	B1I / 2% OFFSET FOR UBS*	0.0071	84.988
HFI3C116D	C	M1	3	1	86.888	0.144	20	B1I / 2% OFFSET FOR UBS*	0.0072	86.958
HFI3C117D	C	M1	3	1	87.638	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	88.987
HFI3C118D	C	M1	3	1	81.004	0.146	20	B1I / 2% OFFSET FOR UBS*	0.0073	82.316
HFI3C216D	C	M2	3	2	85.372	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0074	87.358
HFI3C217D	C	M2	3	2	83.126	0.147	20	B1I / 2% OFFSET FOR UBS*	0.0074	84.993
HFI3C218D	C	M2	3	2	92.797	0.145	20	B1I / 2% OFFSET FOR UBS*	0.0073	93.720

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

Average	91.799	
Standard Dev.	6.272	
Coeff. of Var. [%]	6.832	
Min.	81.004	
Max.	101.302	
Number of Spec.	19	

Average$_{norm}$	0.0072	91.673
Standard Dev.$_{norm}$		6.556
Coeff. of Var. [%]$_{norm}$		7.152
Min.	0.0067	79.333
Max.	0.0074	102.780
Number of Spec.	19	19

Laminate Bearing Properties (SSB3) -- (ETW)
Normalized 2% Offset Strength
HEXCEL 8552 - IM7 UNI PREPREG



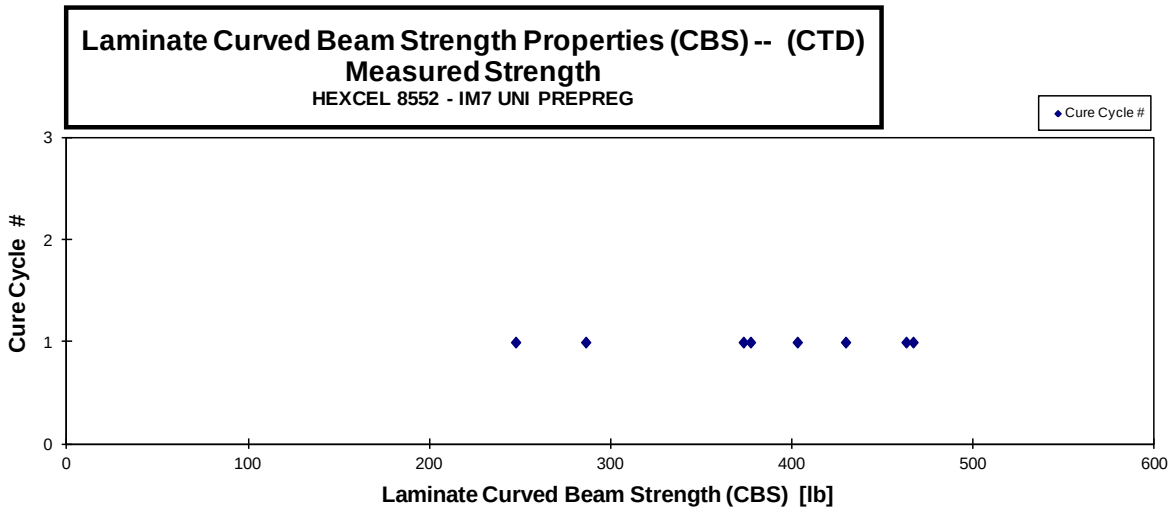
4.31 “25/50/25” Compression After Impact 1 Properties (CAI1)

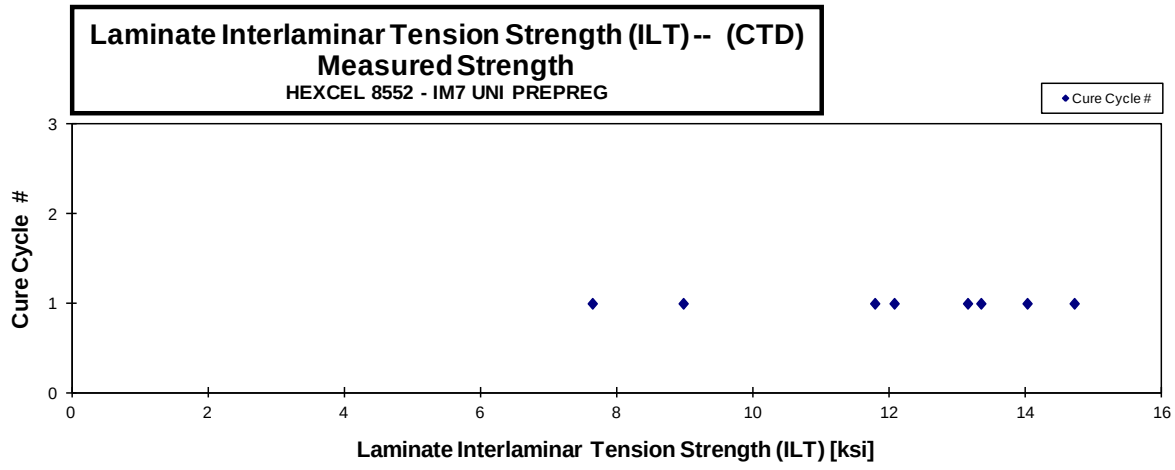
Data has been removed due to testing anomaly as explained in report CAM-RP-2013-020 N/C

4.32 Interlaminar Tension Properties (ILT)

Laminate Interlaminar Tension Properties (ILT) -- (CTD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

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]
HFIMA119B	A	M1	1	1	286.007	8.970	0.151	22	0.0069
HFIMA11AB	A	M1	1	1	402.797	13.144	0.146	22	0.0066
HFIMA11BB	A	M1	1	1	429.446	13.340	0.152	22	0.0069
HFIMA11CB	A	M1	1	1	376.970	12.066	0.148	22	0.0067
HFIMA11DB	A	M1	1	1	247.302	7.635	0.153	22	0.0070
HFIMA11EB	A	M1	1	1	462.853	14.709	0.149	22	0.0068
HFIMA11FB	A	M1	1	1	373.011	11.782	0.150	22	0.0068
HFIMA11GB	A	M1	1	1	466.694	14.018	0.157	22	0.0071
				Average	**380.635**	**11.958**		**Average**	0.0069
				Standard Dev.	**79.141**	**2.472**		**Standard Dev.**	
				Coeff. of Var. [%]	**20.792**	**20.675**		**Coeff. of Var. [%]**	
				Min.	**247.302**	**7.635**		**Min.**	0.0066
				Max.	**466.694**	**14.709**		**Max.**	0.0071
				Number of Spec.	**8**	**8**		**Number of Spec.**	**8**





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

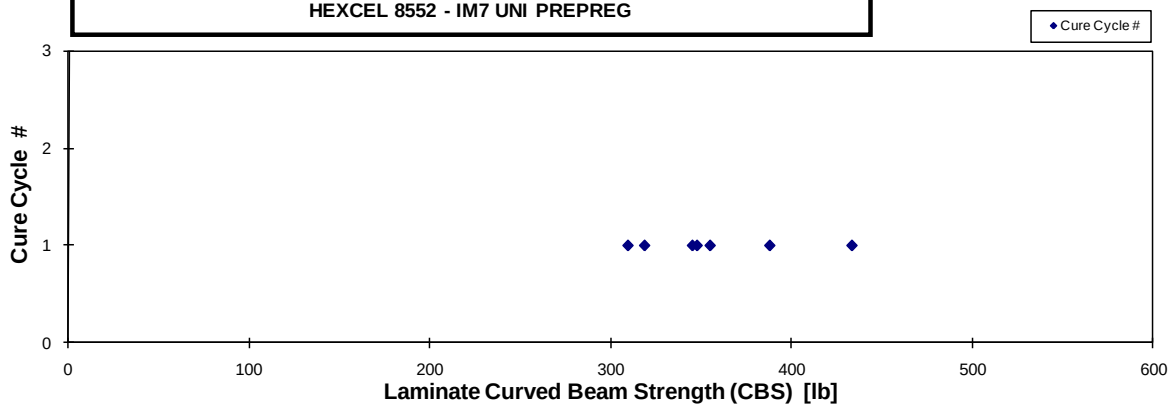
HEXCEL 8552 - IM7 UNI PREPREG

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]
HFIMA111A	A	M1	1	1	433.114	13.246	0.154	22	0.0070
HFIMA112A	A	M1	1	1	355.037	10.806	0.155	22	0.0070
HFIMA113A	A	M1	1	1	345.304	10.490	0.155	22	0.0071
HFIMA114A	A	M1	1	1	387.874	11.821	0.155	22	0.0070
HFIMA115A	A	M1	1	1	309.813	9.990	0.148	22	0.0067
HFIMA116A	A	M1	1	1	347.870	10.869	0.152	22	0.0069
HFIMA117A	A	M1	1	1	318.963	10.061	0.150	22	0.0068

Average	**356.853**	**11.041**	**Average**	0.0069
Standard Dev.	**42.119**	**1.149**	**Standard Dev.**	
Coeff. of Var. [%]	**11.803**	**10.410**	**Coeff. of Var. [%]**	
Min.	**309.813**	**9.990**	**Min.**	0.0067
Max.	**433.114**	**13.246**	**Max.**	0.0071
Number of Spec.	**7**	**7**	**Number of Spec.**	**7**

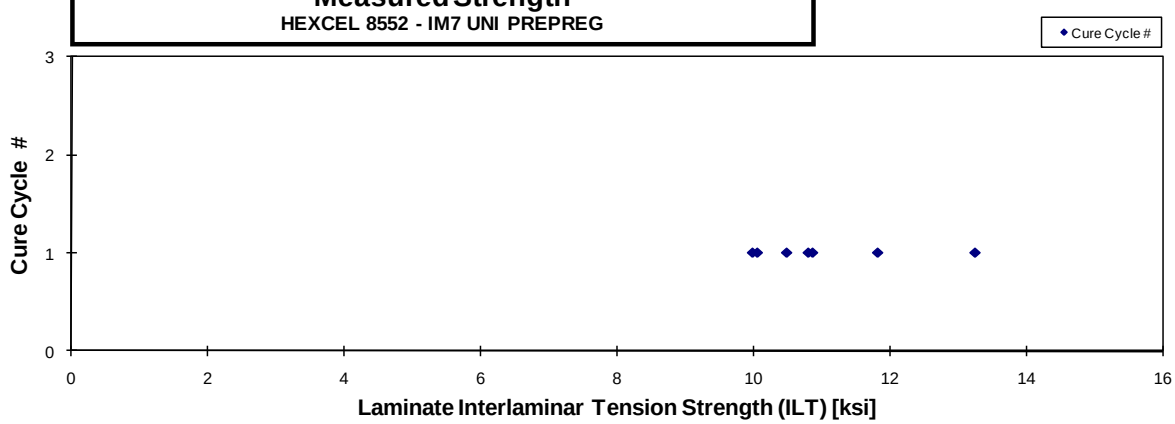
Laminate Curved Beam Strength Properties (CBS) -- (RTD) Measured Strength

HEXCEL 8552 - IM7 UNI PREPREG



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

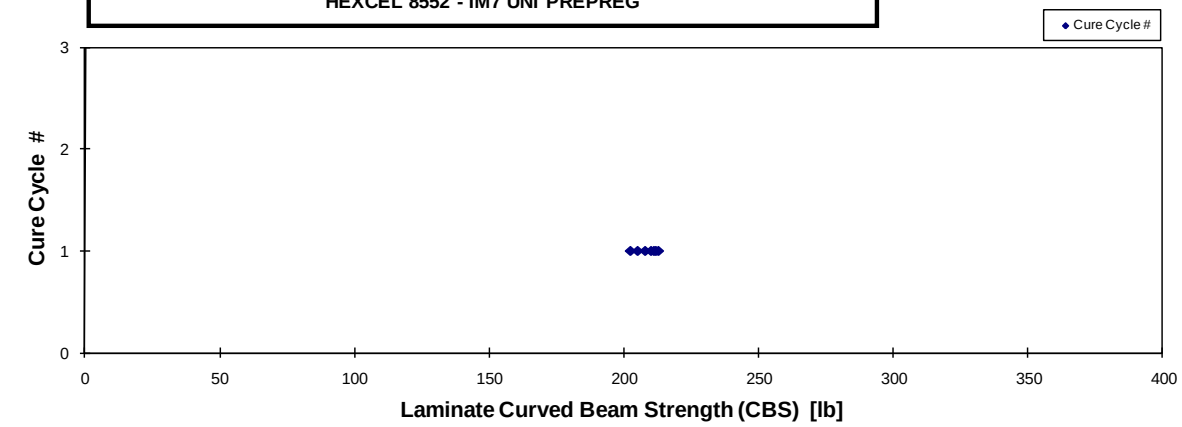
HEXCEL 8552 - IM7 UNI PREPREG



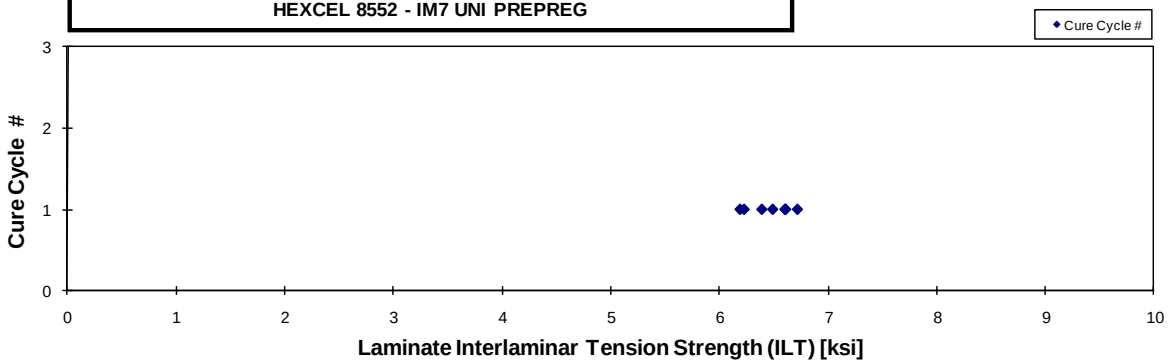
Laminate Interlaminar Tension Properties (ILT) -- (ETW) Strength
HEXCEL 8552 - IM7 UNI PREPREG

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]
HFIMA11HD	A	M1	1	1	207.829	6.391	0.154	22	0.0070
HFIMA11ID	A	M1	1	1	211.004	6.608	0.151	22	0.0069
HFIMA11JD	A	M1	1	1	209.973	6.601	0.151	22	0.0069
HFIMA11KD	A	M1	1	1	202.503	6.192	0.154	22	0.0070
HFIMA11LD	A	M1	1	1	212.626	6.715	0.150	22	0.0068
HFIMA11MD	A	M1	1	1	211.706	6.490	0.154	22	0.0070
HFIMA11ND	A	M1	1	1	205.110	6.230	0.155	22	0.0071
				Average	**208.679**	**6.461**		**Average**	0.0069
				Standard Dev.	**3.729**	**0.199**		**Standard Dev.**	
				Coeff. of Var. [%]	**1.787**	**3.077**		**Coeff. of Var. [%]**	
				Min.	**202.503**	**6.192**		**Min.**	0.0068
				Max.	**212.626**	**6.715**		**Max.**	0.0071
				Number of Spec.	**7**	**7**		**Number of Spec.**	**7**

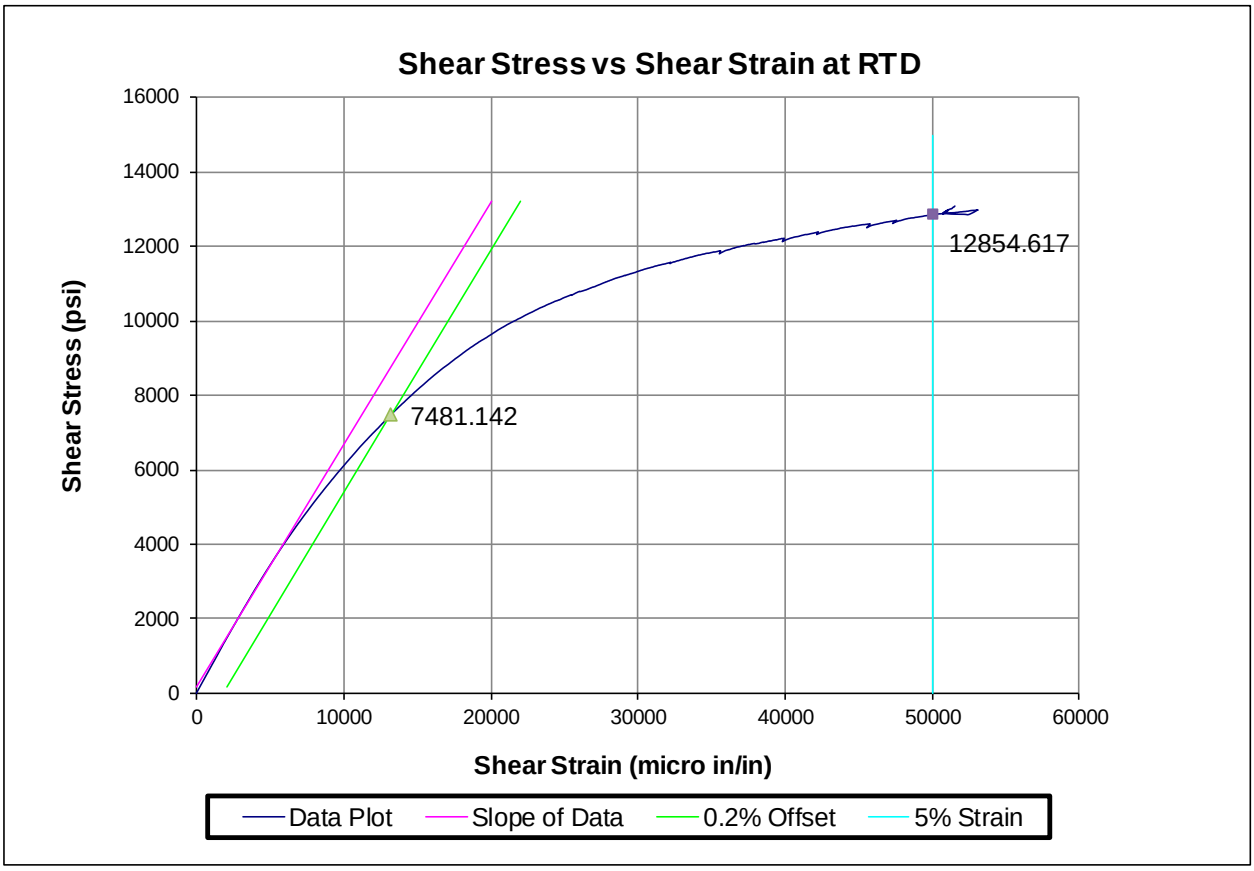
Laminate Curved Beam Strength Properties (CBS) -- (ETW) Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG

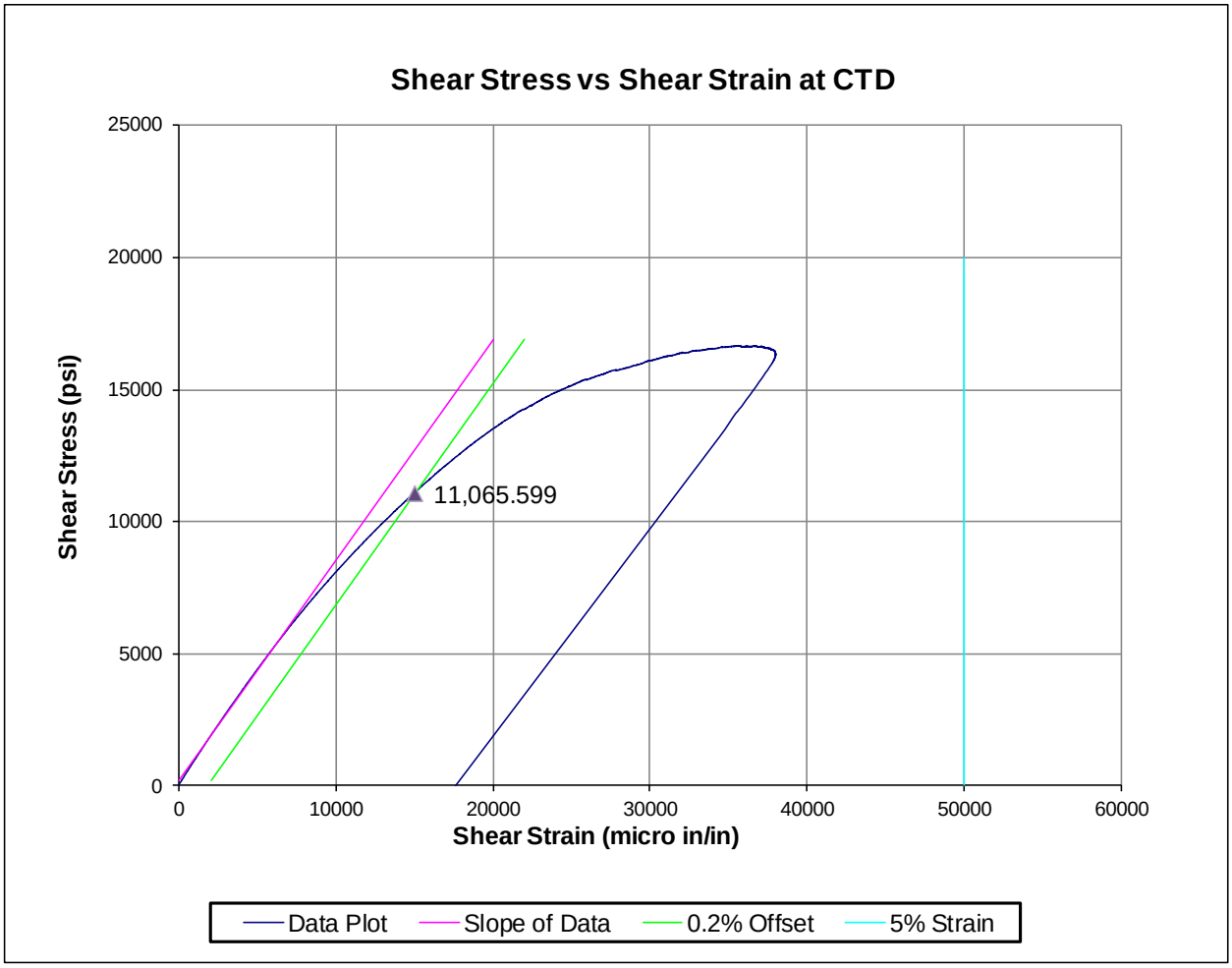


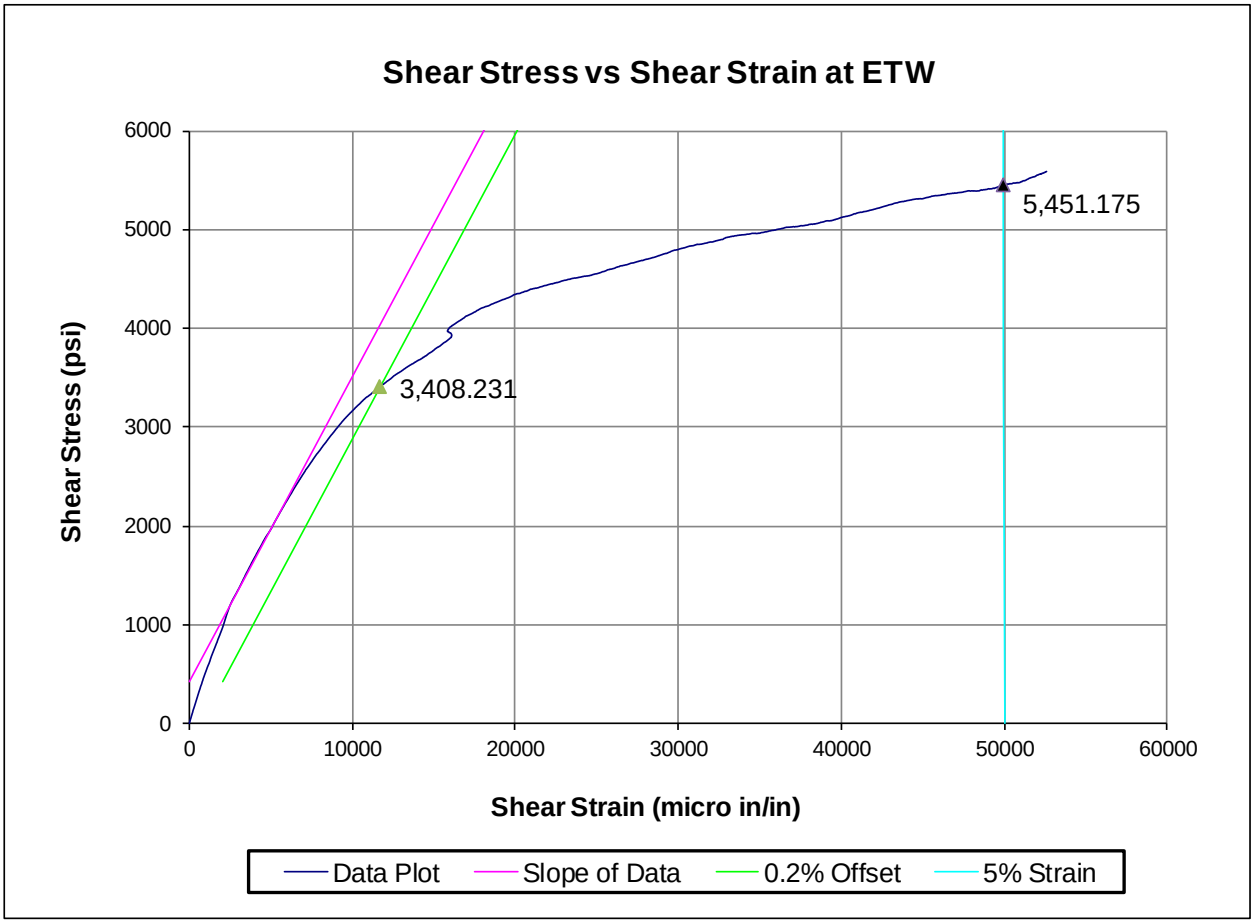
Laminate Interlaminar Tension Strength (ILT) -- (ETW) Measured Strength
HEXCEL 8552 - IM7 UNI PREPREG



5. Shear Stress vs. Shear Strain, RTD




Shear Stress vs Shear Strain at CTD
Shear Stress (psi)
25000
20000
15000
10000
5000
0
0
10000
20000
30000
40000
50000
60000
Shear Strain (micro in/in)
11,065.599
Data Plot
Slope of Data
0.2% Offset
5% Strain


Shear Stress vs Shear Strain at ETW
Shear Stress (psi)
6000
5000
4000
3000
2000
1000
0
0
10000
20000
30000
40000
50000
60000
Shear Strain (micro in/in)
3,408.231
5,451.175
Data Plot
Slope of Data
0.2% Offset
5% Strain

6. FLUID SENSITIVITY COMPARISON

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)
a	18.131	16.96	14.81	-6.895
b	16.821	16.96	14.81	0.828
c	16.749	16.96	14.81	1.252
d	16.561	16.96	14.81	2.361
e	16.480	16.96	14.81	2.843
f	16.221	16.96	14.81	4.369
g	15.835	16.96	14.81	6.643
h	16.586	16.96	14.81	2.214
i	15.852	16.96	14.81	6.545
j	16.804	16.96	14.81	0.930
k	16.794	16.96	14.81	0.989
l	16.297	16.96	14.81	3.916
r	15.819	16.96	14.81	6.735
A	16.962	16.96	14.81	0.000
t	14.811	16.96	14.81	12.681

a	100 Low lead Fuel
b	SAE AMS 2629 JRF
c	Mil-PRF-5606 Hydraulic Oil
d	Mil-PRF-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 + 50% Skydrol
j	MEK Washing Fluid
k	Polypropylene Glycol Deicer
l	Isopropyl Alcohol Deicing Agent
r	Distilled Water
A	Dry (Room Temp)
t	160°F±5°F(85%±5%) until Equilibrium

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	10.630	11.008	8.193	3.429
2	11.298	11.008	8.193	-2.635
3	11.053	11.008	8.193	-0.413
4	10.934	11.008	8.193	0.674
5	10.442	11.008	8.193	5.135
6	10.451	11.008	8.193	5.062
7	9.847	11.008	8.193	10.542
8	10.463	11.008	8.193	4.952
9	9.527	11.008	8.193	13.454
m	11.050	11.008	8.193	-0.381
n	11.133	11.008	8.193	-1.135
p	11.120	11.008	8.193	-1.018
s	9.642	11.008	8.193	12.407
C	11.008	11.008	8.193	0.000
D	8.193	11.008	8.193	25.574

1	100 Low lead Fuel
2	SAE AMS 2629 JRF
3	Mil-PRF-5606 Hydraulic Oil
4	Mil-PRF-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 + 50% Skydrol
m	MEK Washing Fluid
n	Polypropylene Glycol Deicer
p	Isopropyl Alcohol Deicing Agent
s	Distilled Water
C	Dry (Room Temp)
D	160°F±5°F(85%±5%) until Equilibrium

Fluid Sensitivity Screening
Short Beam Strength Properties (FSBS) -- (RTD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

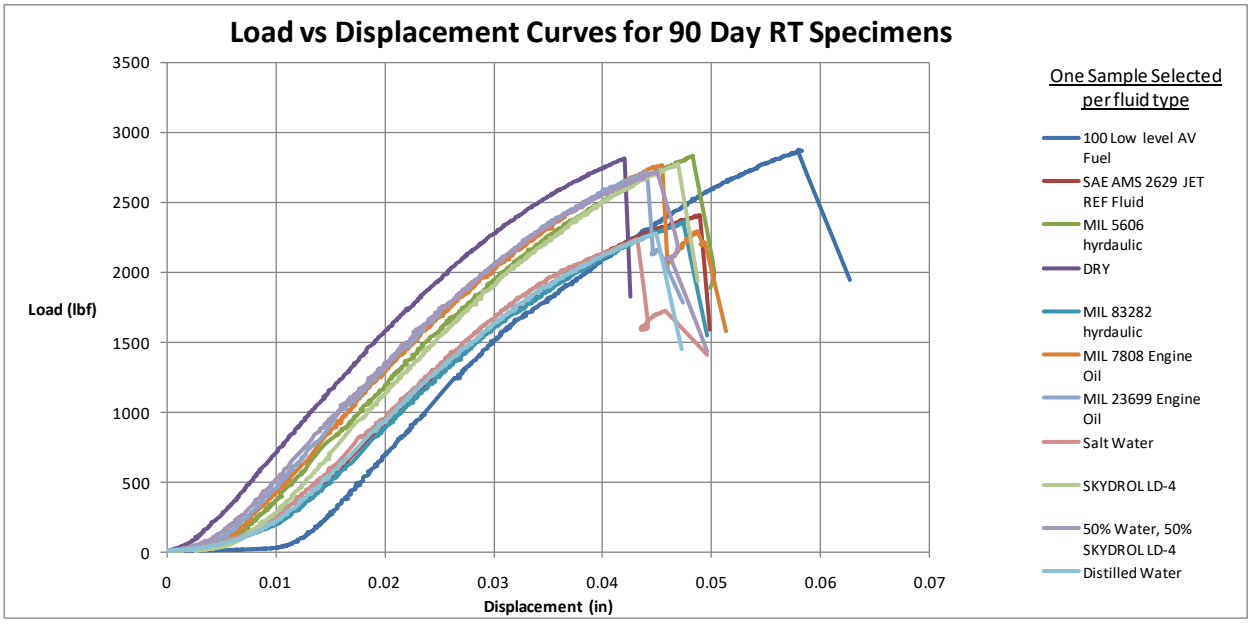
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Fluid	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode	Average
HFIQA121a	A	MH1	1	1	21.418	0.200	34	0.0059	INTERLAMINAR SHEAR	
HFIQA122a	A	MH1	1	1	17.274	0.212	34	0.0062	INTERLAMINAR SHEAR	
HFIQA123a	A	MH1	1	1	17.170	0.223	34	0.0066	INTERLAMINAR SHEAR	18.131
HFIQA124a	A	MH1	1	1	17.648	0.233	34	0.0068	INTERLAMINAR SHEAR	
HFIQA125a	A	MH1	1	1	17.687	0.238	34	0.0070	INTERLAMINAR SHEAR	
HFIQA126a	A	MH1	1	1	17.589	0.241	34	0.0071	INTERLAMINAR SHEAR	
HFIQA12Jb	A	MH1	1	2	16.630	0.216	34	0.0063	INTERLAMINAR SHEAR	
HFIQA12Kb	A	MH1	1	2	16.780	0.226	34	0.0066	INTERLAMINAR SHEAR	
HFIQA12Lb	A	MH1	1	2	16.647	0.237	34	0.0070	INTERLAMINAR SHEAR	16.821
HFIQA12Mb	A	MH1	1	2	16.886	0.245	34	0.0072	INTERLAMINAR SHEAR	
HFIQA12Nb	A	MH1	1	2	16.931	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA12Ob	A	MH1	1	2	17.053	0.254	34	0.0075	INTERLAMINAR SHEAR	
HFIQA131c	A	MH1	1	3	16.482	0.256	34	0.0075	INTERLAMINAR SHEAR	
HFIQA132c	A	MH1	1	3	16.659	0.257	34	0.0076	INTERLAMINAR SHEAR	
HFIQA133c	A	MH1	1	3	16.777	0.257	34	0.0076	INTERLAMINAR SHEAR	16.749
HFIQA134c	A	MH1	1	3	16.804	0.257	34	0.0076	INTERLAMINAR SHEAR	
HFIQA135c	A	MH1	1	3	16.651	0.257	34	0.0075	INTERLAMINAR SHEAR	
HFIQA136c	A	MH1	1	3	17.121	0.257	34	0.0076	INTERLAMINAR SHEAR	
HFIQA13Dd	A	MH1	1	4	16.450	0.214	34	0.0063	INTERLAMINAR SHEAR	
HFIQA13Ed	A	MH1	1	4	16.582	0.224	34	0.0066	INTERLAMINAR SHEAR	
HFIQA13Fd	A	MH1	1	4	16.250	0.234	34	0.0069	INTERLAMINAR SHEAR	16.561
HFIQA13Gd	A	MH1	1	4	16.805	0.243	34	0.0071	INTERLAMINAR SHEAR	
HFIQA13Hd	A	MH1	1	4	16.287	0.249	34	0.0073	INTERLAMINAR SHEAR	
HFIQA13Id	A	MH1	1	4	16.993	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA141e	A	MH1	1	5	16.326	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA142e	A	MH1	1	5	16.538	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA143e	A	MH1	1	5	16.367	0.247	34	0.0073	INTERLAMINAR SHEAR	16.480
HFIQA144e	A	MH1	1	5	16.283	0.242	34	0.0071	INTERLAMINAR SHEAR	
HFIQA145e	A	MH1	1	5	16.436	0.235	34	0.0069	INTERLAMINAR SHEAR	
HFIQA146e	A	MH1	1	5	16.928	0.226	34	0.0067	INTERLAMINAR SHEAR	
HFIQA14Df	A	MH1	1	6	16.064	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA14Ef	A	MH1	1	6	16.548	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA14Ff	A	MH1	1	6	16.399	0.252	34	0.0074	INTERLAMINAR SHEAR	16.221
HFIQA14Gf	A	MH1	1	6	16.014	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA14Hf	A	MH1	1	6	16.087	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA14If	A	MH1	1	6	16.213	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA151g	A	MH1	1	7	15.457	0.216	34	0.0064	INTERLAMINAR SHEAR	
HFIQA152g	A	MH1	1	7	16.263	0.227	34	0.0067	INTERLAMINAR SHEAR	
HFIQA153g	A	MH1	1	7	14.951	0.236	34	0.0069	INTERLAMINAR SHEAR	15.835
HFIQA154g	A	MH1	1	7	15.984	0.243	34	0.0072	INTERLAMINAR SHEAR	
HFIQA155g	A	MH1	1	7	15.915	0.248	34	0.0073	INTERLAMINAR SHEAR	
HFIQA156g	A	MH1	1	7	16.441	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA15Dh	A	MH1	1	8	16.374	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA15Eh	A	MH1	1	8	16.910	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA15Fh	A	MH1	1	8	16.811	0.247	34	0.0073	INTERLAMINAR SHEAR	16.586
HFIQA15Gh	A	MH1	1	8	16.291	0.243	34	0.0071	INTERLAMINAR SHEAR	
HFIQA15Hh	A	MH1	1	8	16.567	0.235	34	0.0069	INTERLAMINAR SHEAR	
HFIQA15Ih	A	MH1	1	8	16.564	0.226	34	0.0066	INTERLAMINAR SHEAR	
HFIQA161i	A	MH1	1	9	16.090	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA162i	A	MH1	1	9	16.125	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA163i	A	MH1	1	9	15.797	0.252	34	0.0074	INTERLAMINAR SHEAR	15.852
HFIQA164i	A	MH1	1	9	15.769	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA165i	A	MH1	1	9	15.476	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA16Dj	A	MH1	1	10	17.656	0.215	34	0.0063	INTERLAMINAR SHEAR	
HFIQA16Ej	A	MH1	1	10	17.078	0.226	34	0.0066	INTERLAMINAR SHEAR	
HFIQA16Fj	A	MH1	1	10	16.641	0.235	34	0.0069	INTERLAMINAR SHEAR	16.804
HFIQA16Gj	A	MH1	1	10	16.892	0.243	34	0.0071	INTERLAMINAR SHEAR	
HFIQA16Hj	A	MH1	1	10	16.266	0.248	34	0.0073	INTERLAMINAR SHEAR	
HFIQA16Ij	A	MH1	1	10	16.290	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA171k	A	MH1	1	11	16.905	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA172k	A	MH1	1	11	16.930	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA173k	A	MH1	1	11	16.382	0.248	34	0.0073	INTERLAMINAR SHEAR	16.794
HFIQA174k	A	MH1	1	11	16.512	0.243	34	0.0071	INTERLAMINAR SHEAR	
HFIQA175k	A	MH1	1	11	17.143	0.237	34	0.0070	INTERLAMINAR SHEAR	
HFIQA176k	A	MH1	1	11	16.891	0.229	34	0.0067	INTERLAMINAR SHEAR	
HFIQA17DL	A	MH1	1	12	16.419	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA17EL	A	MH1	1	12	16.410	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA17FL	A	MH1	1	12	16.230	0.252	34	0.0074	INTERLAMINAR SHEAR	16.297
HFIQA17GL	A	MH1	1	12	16.639	0.253	34	0.0075	INTERLAMINAR SHEAR	
HFIQA17HL	A	MH1	1	12	15.845	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA17IL	A	MH1	1	12	16.241	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA181r	A	MH1	1	13	15.918	0.213	34	0.0063	INTERLAMINAR SHEAR	
HFIQA182r	A	MH1	1	13	15.536	0.226	34	0.0066	INTERLAMINAR SHEAR	
HFIQA183r	A	MH1	1	13	15.983	0.235	34	0.0069	INTERLAMINAR SHEAR	15.819
HFIQA184r	A	MH1	1	13	15.599	0.243	34	0.0071	INTERLAMINAR SHEAR	
HFIQA185r	A	MH1	1	13	15.765	0.248	34	0.0073	INTERLAMINAR SHEAR	
HFIQA186r	A	MH1	1	13	16.116	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA18DA	A	MH1	1	14	16.659	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA18EA	A	MH1	1	14	16.852	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA18FA	A	MH1	1	14	16.800	0.248	34	0.0073	INTERLAMINAR SHEAR	16.962
HFIQA18GA	A	MH1	1	14	16.898	0.243	34	0.0071	INTERLAMINAR SHEAR	
HFIQA18HA	A	MH1	1	14	17.201	0.236	34	0.0069	INTERLAMINAR SHEAR	
HFIQA18IA	A	MH1	1	14	17.359	0.227	34	0.0067	INTERLAMINAR SHEAR	
HFIQA191t	A	MH1	1	15	15.132	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA192t	A	MH1	1	15	14.993	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA193t	A	MH1	1	15	14.716	0.253	34	0.0074	INTERLAMINAR SHEAR	14.811
HFIQA194t	A	MH1	1	15	15.192	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA195t	A	MH1	1	15	13.958	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA196t	A	MH1	1	15	14.874	0.253	34	0.0074	INTERLAMINAR SHEAR	

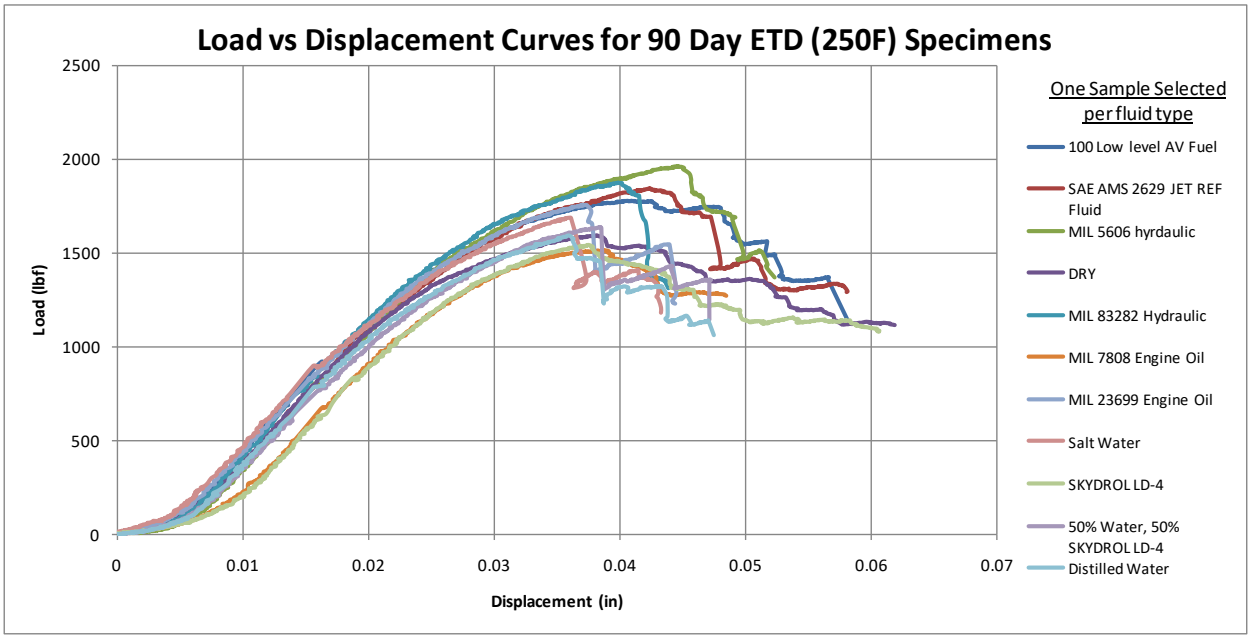
Average	**0.0071**
Min	**0.0059**
Max	**0.0076**

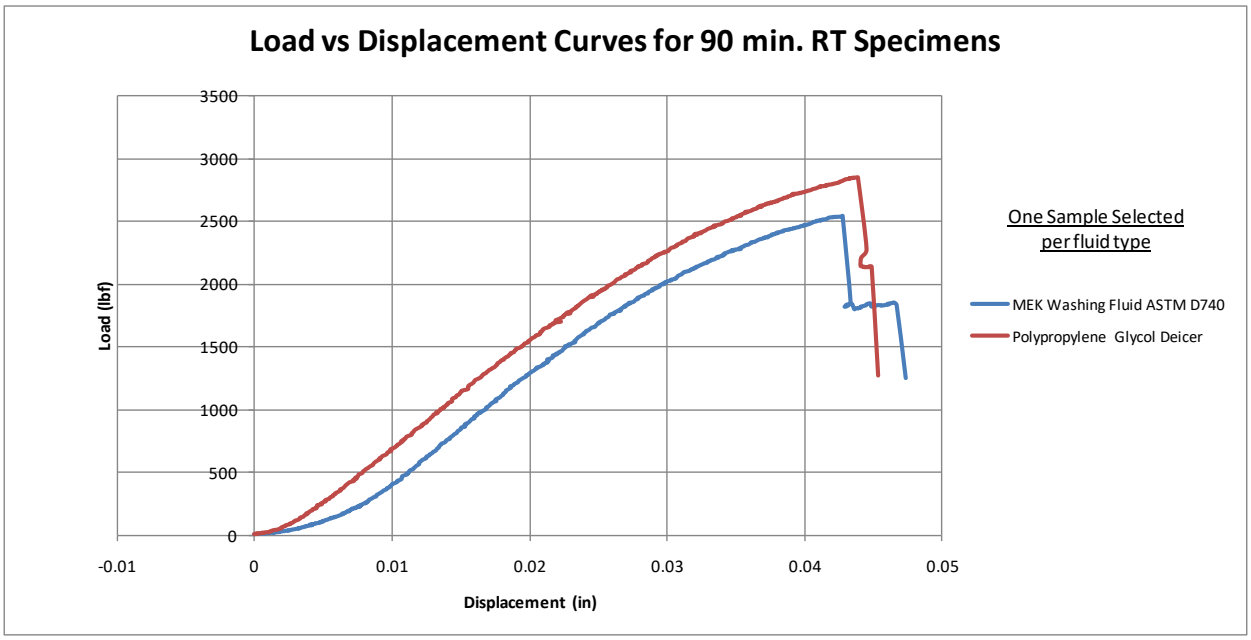
Fluid Sensitivity Screening
Short Beam Strength Properties (FSBS) -- (ETD) Strength
HEXCEL 8552 - IM7 UNI PREPREG

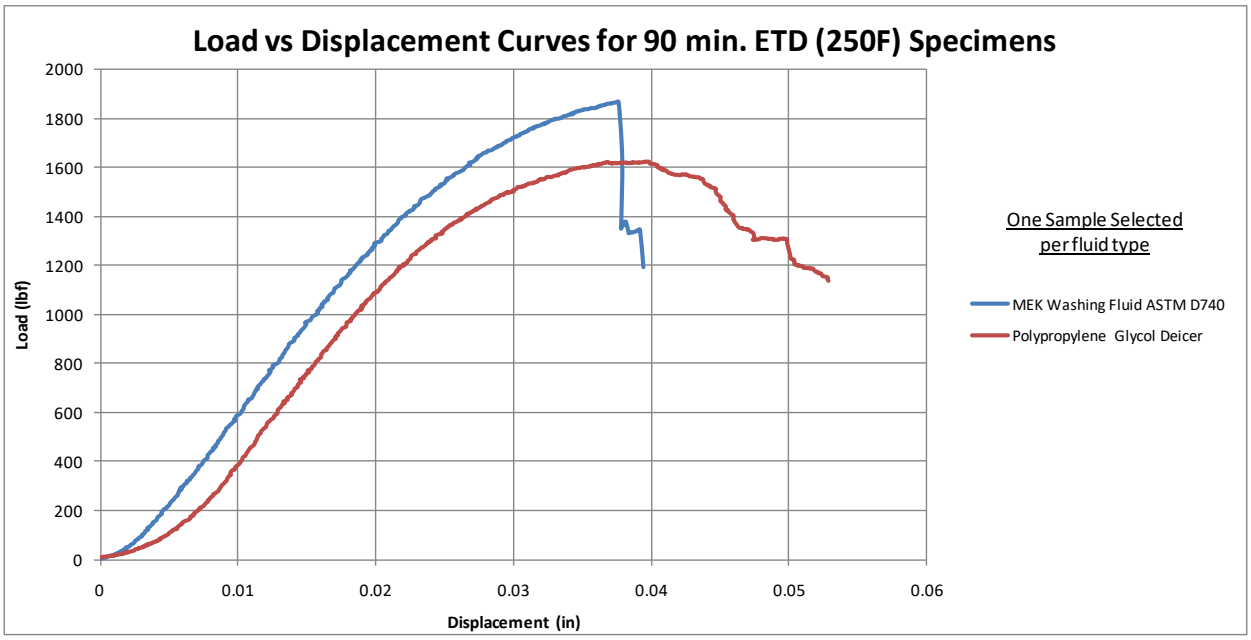
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Fluid	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode	Average
HFIQA1271	A	MH1	1	1	10.925	0.243	34	0.0071	INTERLAMINAR SHEAR	
HFIQA1281	A	MH1	1	1	11.029	0.242	34	0.0071	INTERLAMINAR SHEAR	
HFIQA1291	A	MH1	1	1	10.866	0.243	34	0.0071	INTERLAMINAR SHEAR	10.630
HFIQA12A1	A	MH1	1	1	8.809	0.242	34	0.0071	INTERLAMINAR SHEAR	
HFIQA12B1	A	MH1	1	1	11.063	0.242	34	0.0071	INTERLAMINAR SHEAR	
HFIQA12C1	A	MH1	1	1	11.090	0.243	34	0.0071	INTERLAMINAR SHEAR	
HFIQA12D2	A	MH1	1	2	11.334	0.243	34	0.0072	INTERLAMINAR SHEAR	
HFIQA12E2	A	MH1	1	2	11.269	0.240	34	0.0071	INTERLAMINAR SHEAR	
HFIQA12F2	A	MH1	1	2	11.302	0.236	34	0.0069	INTERLAMINAR SHEAR	11.298
HFIQA12G2	A	MH1	1	2	11.200	0.231	34	0.0068	INTERLAMINAR SHEAR	
HFIQA12H2	A	MH1	1	2	11.603	0.224	34	0.0066	INTERLAMINAR SHEAR	
HFIQA12I2	A	MH1	1	2	11.080	0.214	34	0.0063	INTERLAMINAR SHEAR	
HFIQA1373	A	MH1	1	3	11.415	0.256	34	0.0075	INTERLAMINAR SHEAR	
HFIQA1383	A	MH1	1	3	11.188	0.254	34	0.0075	INTERLAMINAR SHEAR	
HFIQA1393	A	MH1	1	3	11.167	0.251	34	0.0074	INTERLAMINAR SHEAR	11.053
HFIQA13A3	A	MH1	1	3	10.870	0.245	34	0.0072	INTERLAMINAR SHEAR	
HFIQA13B3	A	MH1	1	3	10.971	0.237	34	0.0070	INTERLAMINAR SHEAR	
HFIQA13C3	A	MH1	1	3	10.708	0.228	34	0.0067	INTERLAMINAR SHEAR	
HFIQA13J4	A	MH1	1	4	11.031	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA13K4	A	MH1	1	4	10.999	0.253	34	0.0075	INTERLAMINAR SHEAR	
HFIQA13L4	A	MH1	1	4	10.744	0.253	34	0.0075	INTERLAMINAR SHEAR	10.934
HFIQA13M4	A	MH1	1	4	10.975	0.254	34	0.0075	INTERLAMINAR SHEAR	
HFIQA13N4	A	MH1	1	4	10.913	0.253	34	0.0075	INTERLAMINAR SHEAR	
HFIQA13O4	A	MH1	1	4	10.939	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA1475	A	MH1	1	5	10.534	0.214	34	0.0063	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA1485	A	MH1	1	5	10.598	0.225	34	0.0066	INTERLAMINAR SHEAR	
HFIQA1495	A	MH1	1	5	10.451	0.234	34	0.0069	INTERLAMINAR SHEAR	10.442
HFIQA14A5	A	MH1	1	5	10.467	0.241	34	0.0071	INTERLAMINAR SHEAR	
HFIQA14B5	A	MH1	1	5	10.248	0.247	34	0.0073	INTERLAMINAR SHEAR	
HFIQA14C5	A	MH1	1	5	10.357	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA14J6	A	MH1	1	6	10.398	0.252	34	0.0074	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA14K6	A	MH1	1	6	10.327	0.250	34	0.0074	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA14L6	A	MH1	1	6	10.047	0.247	34	0.0073	INTERLAMINAR SHEAR / COMPRESSION	10.451
HFIQA14M6	A	MH1	1	6	10.455	0.241	34	0.0071	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA14N6	A	MH1	1	6	10.712	0.234	34	0.0069	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA14O6	A	MH1	1	6	10.764	0.226	34	0.0066	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA1577	A	MH1	1	7	9.993	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA1587	A	MH1	1	7	9.909	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA1597	A	MH1	1	7	9.651	0.253	34	0.0074	INTERLAMINAR SHEAR	9.847
HFIQA15A7	A	MH1	1	7	9.877	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA15B7	A	MH1	1	7	9.774	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA15C7	A	MH1	1	7	9.880	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA15J8	A	MH1	1	8	10.641	0.216	34	0.0063	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA15K8	A	MH1	1	8	10.674	0.226	34	0.0066	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA15L8	A	MH1	1	8	10.532	0.234	34	0.0069	INTERLAMINAR SHEAR / COMPRESSION	10.463
HFIQA15M8	A	MH1	1	8	10.321	0.243	34	0.0071	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA15N8	A	MH1	1	8	10.386	0.248	34	0.0073	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA15O8	A	MH1	1	8	10.221	0.251	34	0.0074	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA1679	A	MH1	1	9	9.691	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA1689	A	MH1	1	9	9.274	0.251	34	0.0074	INTERLAMINAR SHEAR / COMPRESSION	
HFIQA1699	A	MH1	1	9	9.467	0.248	34	0.0073	INTERLAMINAR SHEAR	
HFIQA16A9	A	MH1	1	9	9.419	0.244	34	0.0072	INTERLAMINAR SHEAR	9.527
HFIQA16B9	A	MH1	1	9	9.633	0.236	34	0.0069	INTERLAMINAR SHEAR	
HFIQA16C9	A	MH1	1	9	9.675	0.227	34	0.0067	INTERLAMINAR SHEAR	
HFIQA16Jm	A	MH1	1	10	11.079	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA16Km	A	MH1	1	10	11.226	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA16Lm	A	MH1	1	10	10.934	0.253	34	0.0074	INTERLAMINAR SHEAR	11.050
HFIQA16Mm	A	MH1	1	10	11.036	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA16Nm	A	MH1	1	10	10.943	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA16Om	A	MH1	1	10	11.081	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA177n	A	MH1	1	11	11.388	0.214	34	0.0063	INTERLAMINAR SHEAR	
HFIQA178n	A	MH1	1	11	11.276	0.225	34	0.0066	INTERLAMINAR SHEAR	
HFIQA179n	A	MH1	1	11	11.319	0.235	34	0.0069	INTERLAMINAR SHEAR	11.133
HFIQA17An	A	MH1	1	11	11.043	0.244	34	0.0072	INTERLAMINAR SHEAR	
HFIQA17Bn	A	MH1	1	11	10.959	0.248	34	0.0073	INTERLAMINAR SHEAR	
HFIQA17Cn	A	MH1	1	11	10.811	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA17Jp	A	MH1	1	12	11.070	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA17Kp	A	MH1	1	12	11.014	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA17Lp	A	MH1	1	12	11.074	0.248	34	0.0073	INTERLAMINAR SHEAR	11.120
HFIQA17Mp	A	MH1	1	12	11.082	0.243	34	0.0071	INTERLAMINAR SHEAR	
HFIQA17Np	A	MH1	1	12	11.290	0.237	34	0.0070	INTERLAMINAR SHEAR	
HFIQA17Op	A	MH1	1	12	11.189	0.228	34	0.0067	INTERLAMINAR SHEAR	
HFIQA187s	A	MH1	1	13	9.424	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA188s	A	MH1	1	13	9.683	0.253	34	0.0075	INTERLAMINAR SHEAR	
HFIQA189s	A	MH1	1	13	9.554	0.252	34	0.0074	INTERLAMINAR SHEAR	9.642
HFIQA18As	A	MH1	1	13	9.697	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA18Bs	A	MH1	1	13	9.712	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA18Cs	A	MH1	1	13	9.783	0.253	34	0.0074	INTERLAMINAR SHEAR	
HFIQA18JC	A	MH1	1	14	11.122	0.215	34	0.0063	INTERLAMINAR SHEAR	
HFIQA18KC	A	MH1	1	14	10.883	0.225	34	0.0066	INTERLAMINAR SHEAR	
HFIQA18LC	A	MH1	1	14	10.986	0.236	34	0.0069	INTERLAMINAR SHEAR	11.008
HFIQA18MC	A	MH1	1	14	11.400	0.244	34	0.0072	INTERLAMINAR SHEAR	
HFIQA18NC	A	MH1	1	14	10.839	0.248	34	0.0073	INTERLAMINAR SHEAR	
HFIQA18OC	A	MH1	1	14	10.817	0.251	34	0.0074	INTERLAMINAR SHEAR	
HFIQA197D	A	MH1	1	15	8.335	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA198D	A	MH1	1	15	8.207	0.252	34	0.0074	INTERLAMINAR SHEAR	
HFIQA199D	A	MH1	1	15	8.324	0.247	34	0.0073	INTERLAMINAR SHEAR	8.193
HFIQA19AD	A	MH1	1	15	7.842	0.243	34	0.0071	INTERLAMINAR SHEAR	
HFIQA19BD	A	MH1	1	15	8.293	0.235	34	0.0069	INTERLAMINAR SHEAR	
HFIQA19CD	A	MH1	1	15	8.154	0.225	34	0.0066	INTERLAMINAR SHEAR	

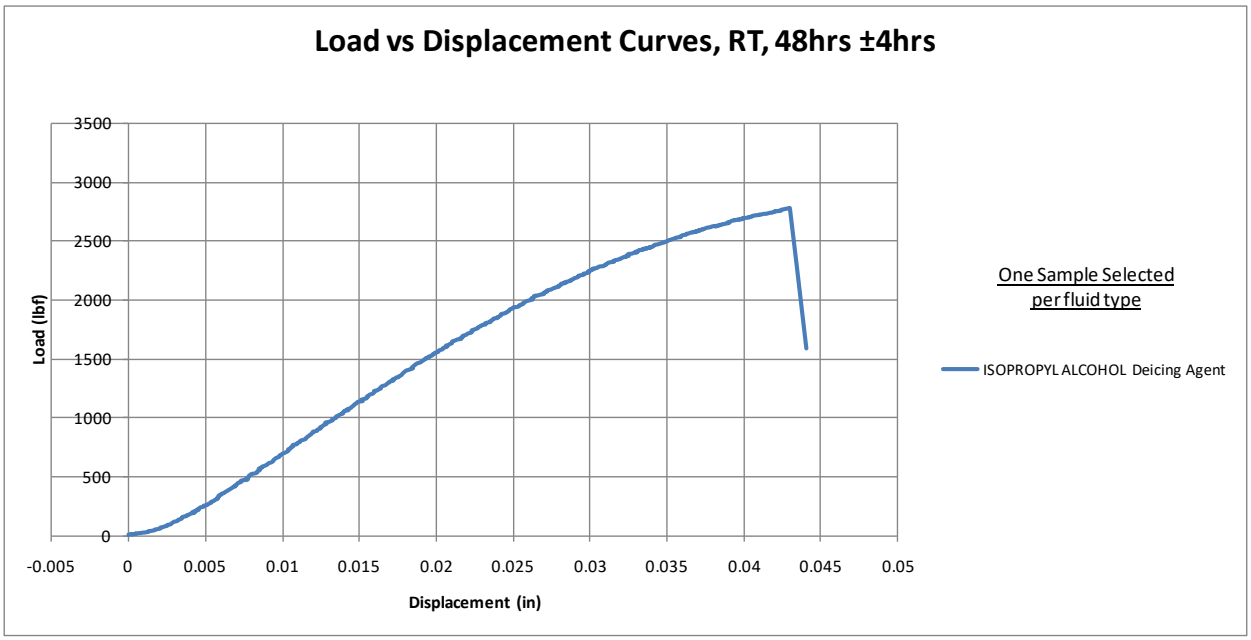
Average	**0.0071**
Min	**0.0063**
Max	**0.0075**

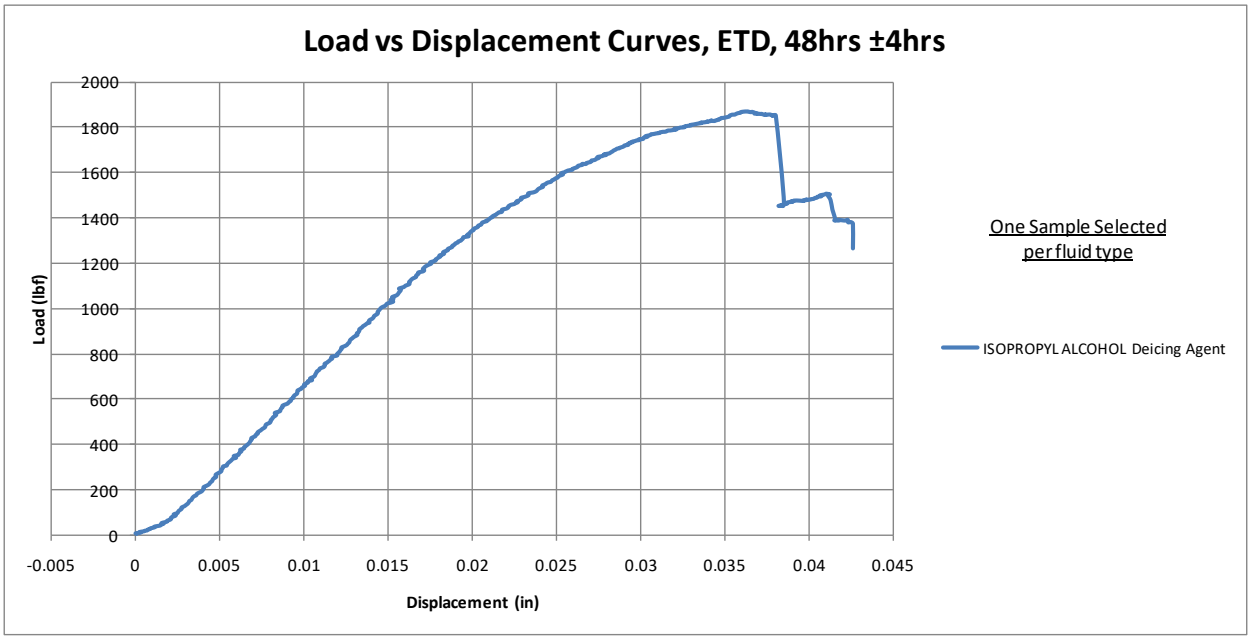

Load vs Displacement Curves for 90 Day RT Specimens
Load (lbf)
3500
3000
2500
2000
1500
1000
500
0
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Displacement (in)
One Sample Selected per fluid type
100 Low level AV Fuel
SAE AMS 2629 JET REF Fluid
MIL 5606 hyrdaulic
DRY
MIL 83282 hyrdaulic
MIL 7808 Engine Oil
MIL 23699 Engine Oil
Salt Water
SKYDROL LD-4
50% Water, 50% SKYDROL LD-4
Distilled Water

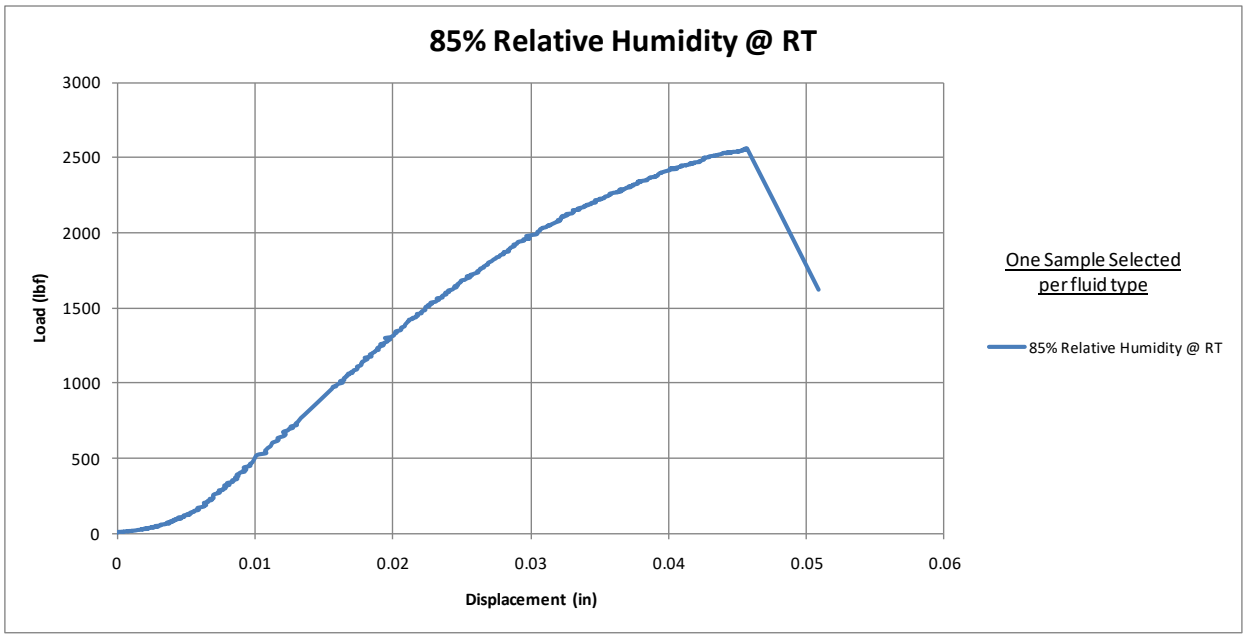

Load vs Displacement Curves for 90 Day ETD (250F) Specimens
Load (lbf)
2500
2000
1500
1000
500
0
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Displacement (in)
One Sample Selected per fluid type
100 Low level AV Fuel
SAE AMS 2629 JET REF Fluid
MIL 5606 hyrdaulic
DRY
MIL 83282 Hydraulic
MIL 7808 Engine Oil
MIL 23699 Engine Oil
Salt Water
SKYDROL LD-4
50% Water, 50% SKYDROL LD-4
Distilled Water

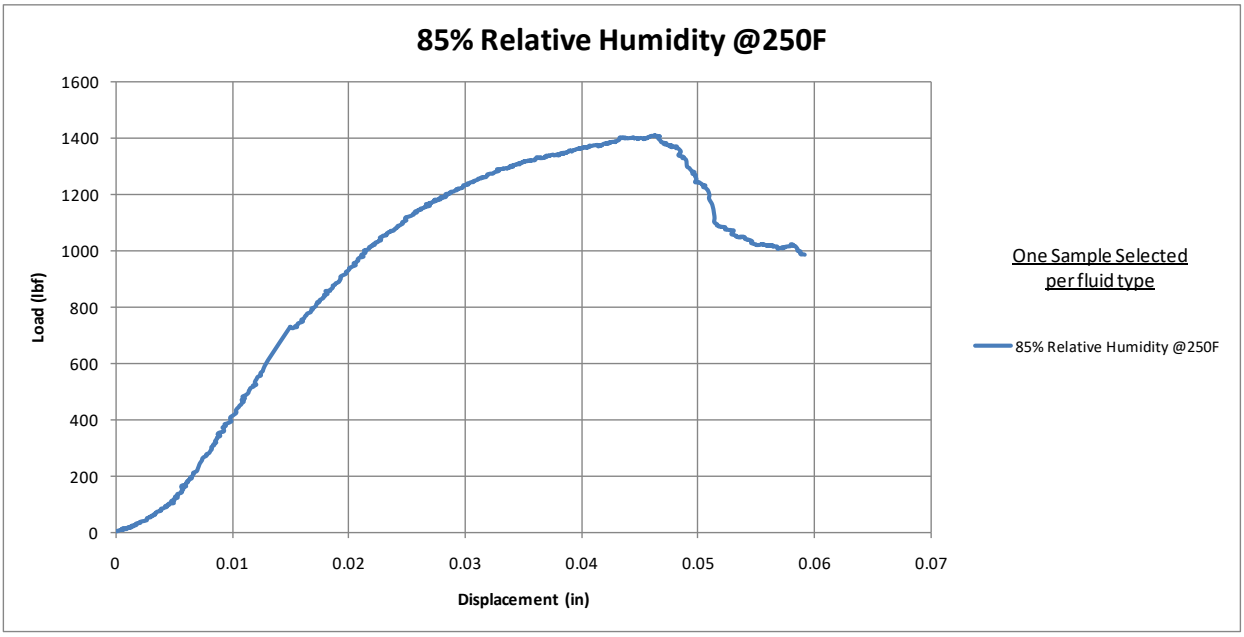

Load vs Displacement Curves for 90 min. RT Specimens
Load (lbf)
3500
3000
2500
2000
1500
1000
500
0
-0.01
0
0.01
0.02
0.03
0.04
0.05
Displacement (in)
One Sample Selected per fluid type
MEK Washing Fluid ASTM D740
Polypropylene Glycol Deicer


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)
3500
3000
2500
2000
1500
1000
500
0
-0.005
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
ISOPROPYL ALCOHOL Deicing Agent

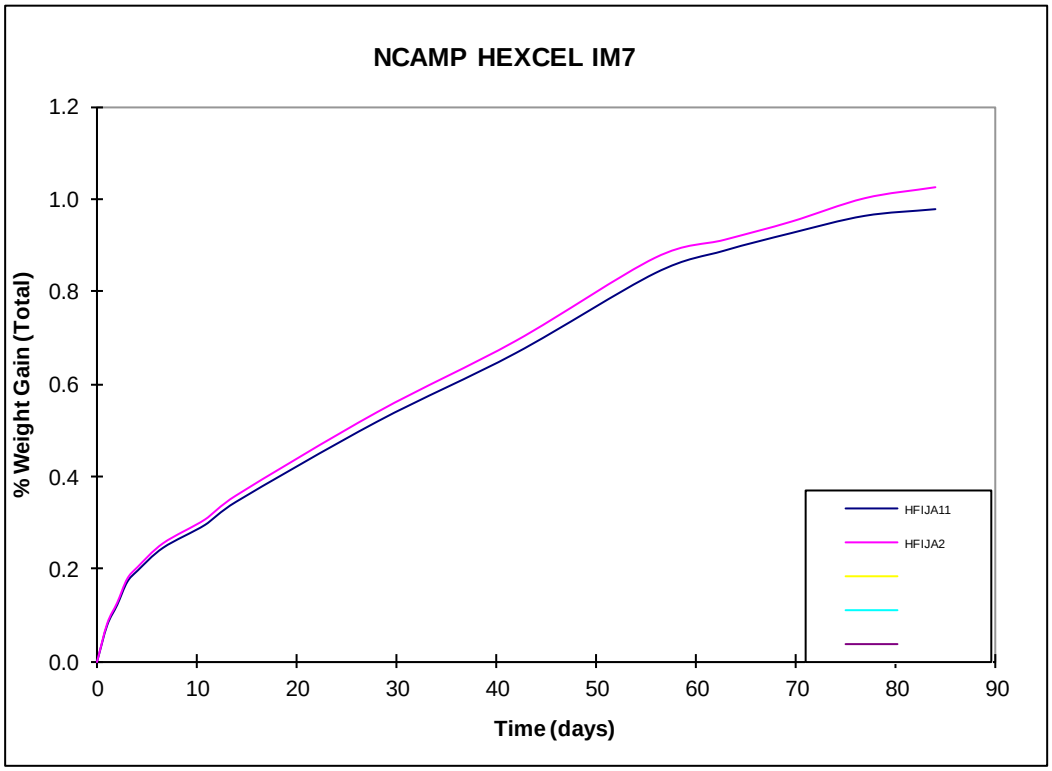

Load vs Displacement Curves, ETD, 48hrs ±4hrs
Load (lbf)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-0.005
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
Displacement (in)
One Sample Selected per fluid type
ISOPROPYL ALCOHOL Deicing Agent


85% Relative Humidity @ RT
Load (lbf)
3000
2500
2000
1500
1000
500
0
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

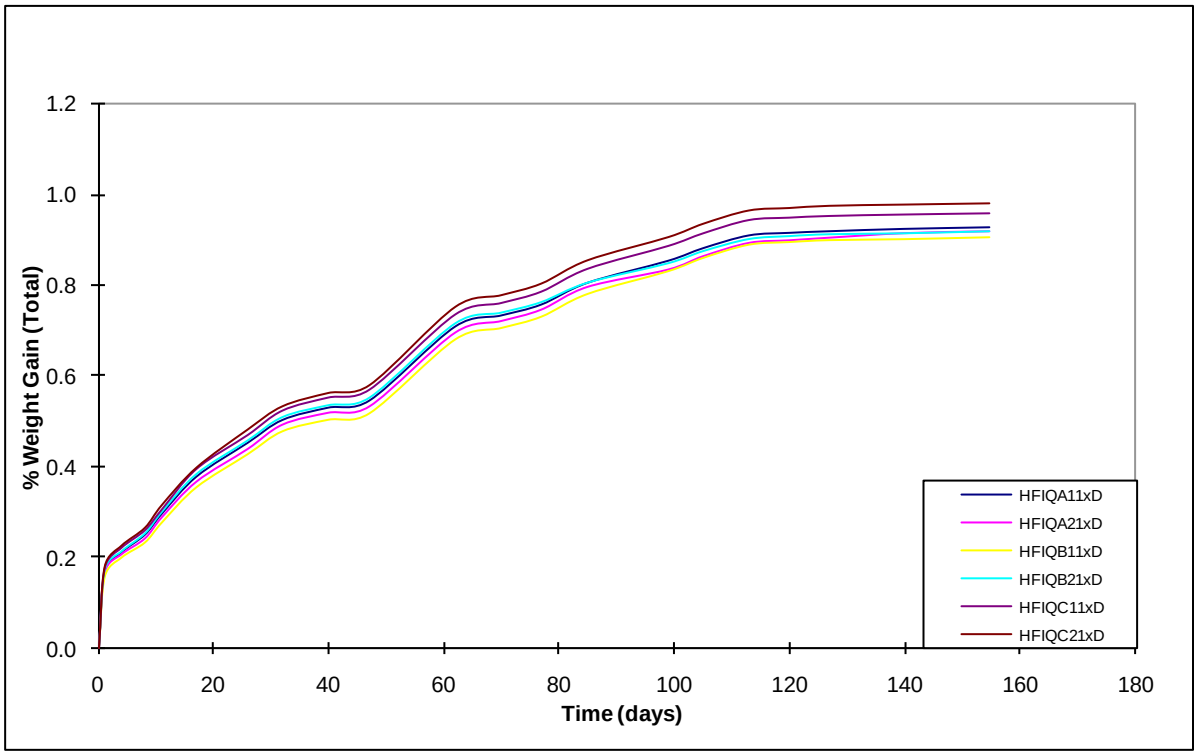

85% Relative Humidity @250F
Load (lbf)
1600
1400
1200
1000
800
600
400
200
0
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Displacement (in)
One Sample Selected per fluid type
85% Relative Humidity @250F

7. MOISTURE CONDITIONING CHARTS

7.1 Longitudinal Tension– Thinnest Panel



7.2 Short Beam Strength- Thickest Panel



8. DMA Results

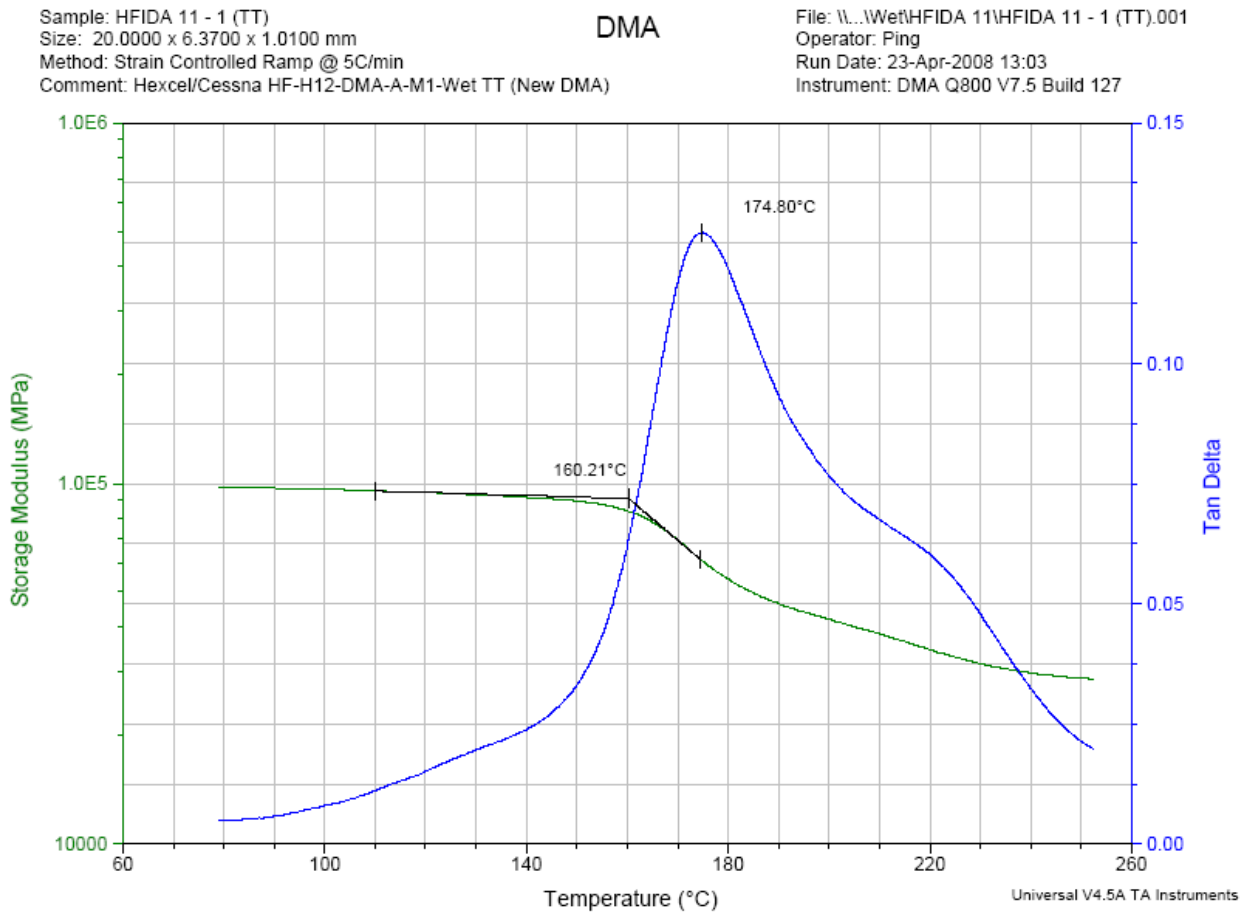
	DMA Results Summary				
	Hexcel / Cessna HF 071105C1 Wet				
		Onset Storage Modulus		Peak of Tangent Delta	
		Average		Average	
	Sample #	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
TT	HFIDA 11	160.50	320.90	174.65	346.36
	HFIDA 21	159.82	319.67	173.38	344.08
	HFIDB 11	160.28	320.50	172.74	342.93
	HFIDB 21	158.75	317.74	171.56	340.80
	HFIDC 11	159.21	318.57	172.69	342.83
	HFIDC 21	158.27	316.88	171.91	341.43
UNT3	HFIDA 11	162.39	324.30	178.21	352.77
	HFIDA 21	161.98	323.56	176.77	350.19
	HFIDB 11	162.03	323.65	176.59	349.85
	HFIDB 21	161.46	322.63	177.09	350.76
	HFIDC 11	161.68	323.02	176.25	349.24
	HFIDC 21	163.09	325.55	177.15	350.87
	Average	160.79	321.41	321.41	346.84
	Stdev	1.55	2.79	2.79	4.24

Table 8-1: DMA Wet Results

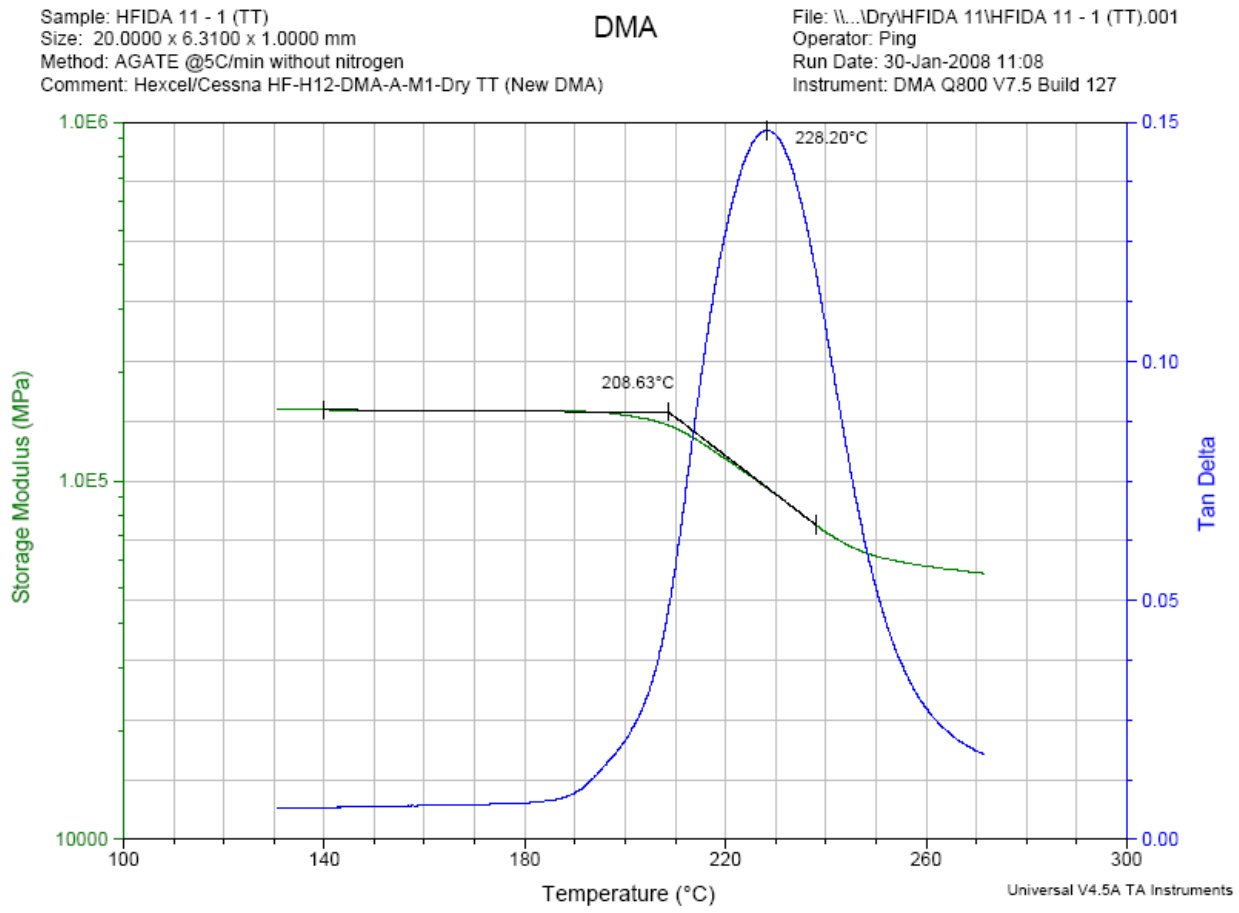
	DMA Results Summary				
	Hexcel / Cessna HF 071105C1 Dry				
		Onset Storage Modulus		Peak of Tangent Delta	
		Average		Average	
	Sample #	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
TT	HFIDA 11	207.27	405.08	228.19	442.73
	HFIDA 21	209.23	408.61	231.93	449.47
	HFIDB 11	209.35	408.82	231.76	449.16
	HFIDB 21	207.37	405.26	231.58	448.84
	HFIDC 11	204.70	400.45	232.99	451.37
	HFIDC 21	206.82	404.28	233.50	452.30
UNT3	HFIDA 11	209.37	408.87	234.62	454.31
	HFIDA 21	208.99	408.17	234.89	454.79
	HFIDB 11	206.87	404.37	235.17	455.31
	HFIDB 21	210.96	411.73	236.27	457.29
	HFIDC 11	207.34	405.21	235.41	455.74
	HFIDC 21	207.94	406.28	235.60	456.08
	Average	208.01	406.43	233.49	452.28
	Stdev	1.65	2.97	2.32	4.18

Table 8-2: DMA Dry Results

8.1 DMA Wet Batch A



8.2 DMA Dry Batch A



9. TMA Results

The TMA results were tested at Hexcel. Specimens were taken from the same panels as DMA and wet and dry testing was tested concurrently.

4/23/2008

Wet Specimens tested for Tg by TMA to HSP-T2 (NMS 128)

Sample ID	Rep	Thickness (mm)	Tg (Deg C)		Avg
HF071105C1 IAU2 2 HFITA21	1	0.1036	222.25	432.05	428.13
HF071105C1 IAU2 2 HFITA21	2	0.1346	217.89	424.20	
HF071105C1 IBU1 1 HFITB11	1	0.1863	218.91	426.04	422.81
HF071105C1 IBU1 1 HFITB11	2	0.1715	215.32	419.58	
HF071105C1 IAU1 1 HFITA 11	1	0.1652	220.96	429.73	429.78
HF071105C1 IAU1 1 HFITA 11	2	0.1482	221.02	429.84	
HF071105C1 IBU12 2	1	0.1910	216.55	421.79	419.79
HF071105C1 IBU12 2	2	0.1783	214.33	417.79	
HF071105C1 ICU1 1 HFITC 11	1	0.1585	219.76	427.57	421.57
HF071105C1 ICU1 1 HFITC 11	2	0.1477	213.09	415.56	
HF071105C1 ICU2 2 HFITC 21	1	0.1644	217.99	424.38	424.40
HF071105C1 ICU2 2 HFITC 21	2	0.1614	218.01	424.42	
HF071105C1 IAC1 1 HFITA 11	1	0.1627	221.11	430.00	428.50
HF071105C1 IAC1 1 HFITA 11	2	0.1707	219.45	427.01	
HF071105C1 ICC2 2 HFITC 21	1	0.1464	221.74	431.13	430.79
HF071105C1 ICC2 2 HFITC 21	2	0.1825	221.36	430.45	
HF071105C1 IAC2 2 HFITA 21	1	0.1702	212.45	414.41	414.98
HF071105C1 IAC2 2 HFITA 21	2	0.1658	213.08	415.54	
HF071105C1 IAC1 1 HFITC 11	1	0.1432	219.08	426.34	426.78
HF071105C1 IAC1 1 HFITC 11	2	0.1321	219.56	427.21	
HF071105C1 IBC1 1 HFITB 11	1	0.1750	212.53	414.55	417.18
HF071105C1 IBC1 1 HFITB 11	2	0.1785	215.45	419.81	
HF071105C1 IBC2 2 HFITB 21	1	0.1492	218.42	425.16	426.02
HF071105C1 IBC2 2 HFITB 21	2	0.1427	219.38	426.88	
AVERAGE					424.23
STDEV					5.06

Table 9-1: Wet TMA Results

HEXCEL

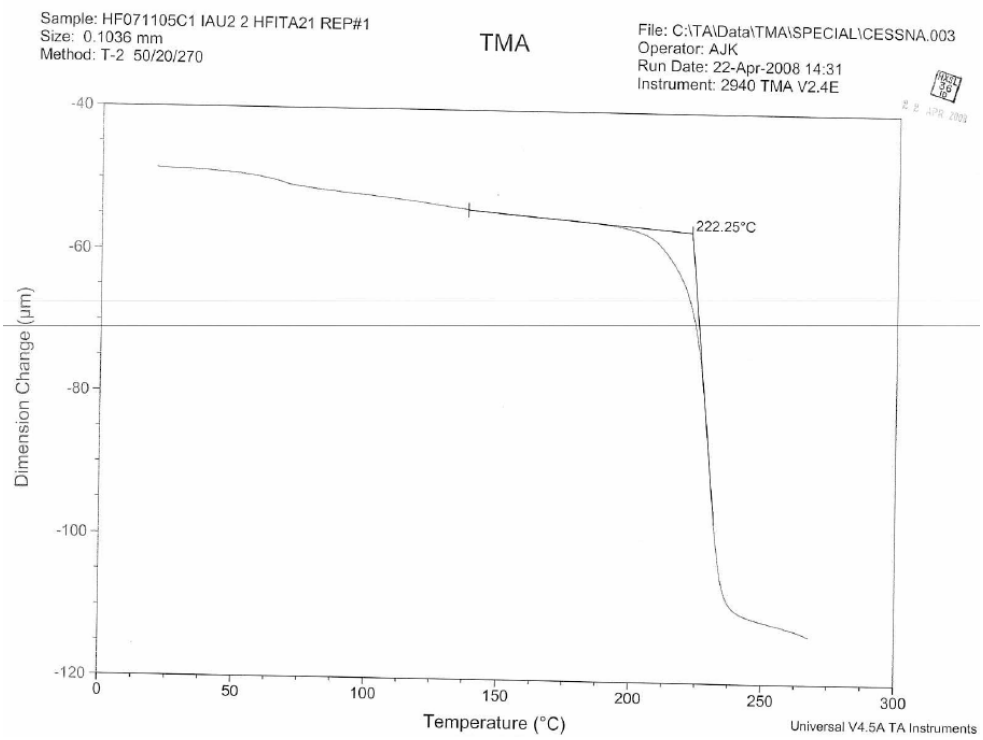
1/21/2008

Summary of Dry NCAMP Supplied Tg (TMA) Specimens

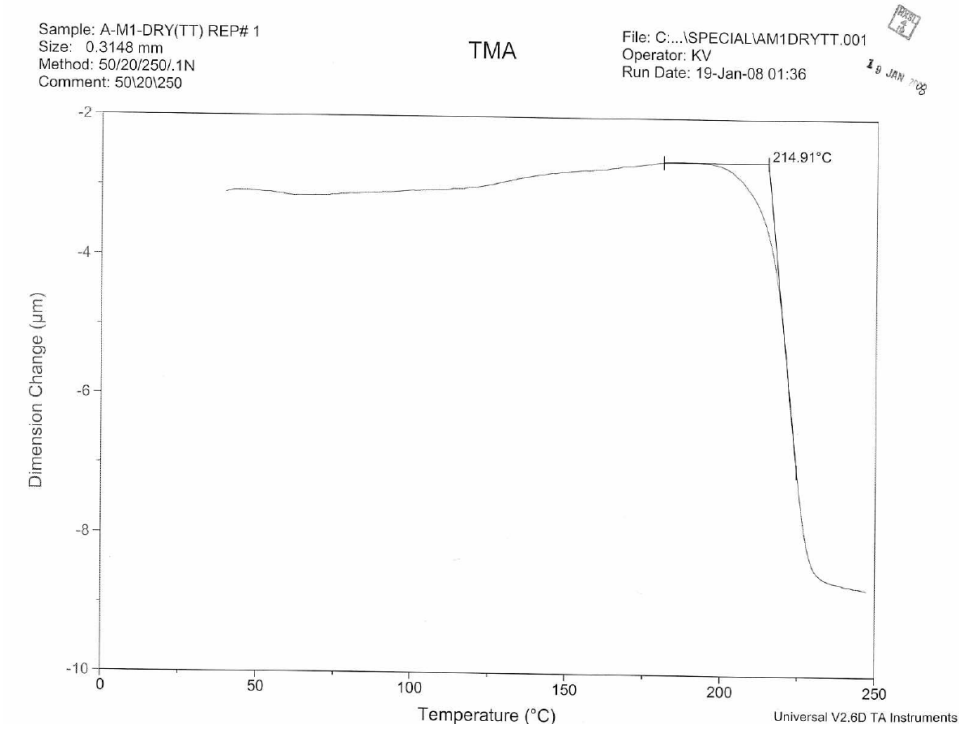
Specimen ID	Rep	Tg	Avg		Test Date	Time	Operator
HF-H12-TMA-A-M1-Dry (TT)	1	214.91	216.36	421.44	1/19/2008	1:36	KV
	2	217.80			1/19/2008	0:37	KV
HF-H12-TMA-A-M2-Dry (TT)	1	216.52	218.24	424.83	1/19/2008	1:54	KV
	2	219.96			1/19/2008	2:11	KV
HF-H12-TMA-B-M1-Dry (TT)	1	217.71	216.22	421.20	1/19/2008	2:35	KV
	2	214.73			1/19/2008	3:17	KV
HF-H12-TMA-B-M2-Dry (TT)	1	215.29	214.83	418.69	1/19/2008	3:42	KV
	2	214.37			1/19/2008	4:23	KV
HF-H12-TMA-C-M1-Dry (TT)	1	212.16	210.86	411.55	1/19/2008	5:02	KV
	2	209.56			1/19/2008	5:19	KV
HF-H12-TMA-C-M2-Dry (TT)	1	215.03	217.35	423.22	1/19/2008	5:35	KV
	2	219.66			1/19/2008	5:52	KV
HF-H12-TMA-A-M1-Dry (UNT3)	1	221.79	222.64	432.74	1/21/2008	7:09	KV
	2	223.48			1/21/2008	7:24	KV
HF-H12-TMA-A-M2-Dry (UNT3)	1	221.24	219.60	427.27	1/21/2008	7:41	KV
	2	217.95			1/21/2008	7:58	KV
HF-H12-TMA-B-M1-Dry (UNT3)	1	212.86	212.99	415.37	1/21/2008	8:16	KV
	2	213.11			1/21/2008	8:34	KV
HF-H12-TMA-B-M2-Dry (UNT3)	1	220.95	220.23	428.41	1/21/2008	8:51	KV
	2	219.50			1/21/2008	9:06	KV
HF-H12-TMA-C-M1-Dry (UNT3)	1	216.67	217.65	423.76	1/21/2008	9:53	KV
	2	218.62			1/21/2008	10:09	KV
HF-H12-TMA-C-M2-Dry (UNT3)	1	217.71	217.31	423.15	1/21/2008	10:37	KV
	2	216.90			1/21/2008	10:52	KV
AVERAGE				422.64			
STDEV				5.71			

Table 9-2: Dry TMA Results

9.1 TMA Wet Batch A Results



9.2 TMA Wet Batch A Results



10. Prepreg Physical Test Results

The following prepreg physical test results were obtained at Hexcel.

NMS 128/2 Rev.- IM7G/8552 Type35, Class1, Grade190												
IM7G	8552											
Lot	spl	rep	Date	Ind	Avg	Test ID	Ind	Avg	Test ID	Ind	Avg	Test ID
P6942-4SQ	1	1	25-Jan-07	12	12	GEL350	13.26	13.25	X_FLOW350B	0.688	0.711	X_VOL350P
P6942-4SQ		2	25-Jan-07	12		GEL350	12.98		X_FLOW350B	0.615		X_VOL350P
		3					13.5		X_FLOW350B	0.831		X_VOL350P
P6942-4SQ	16	1	25-Jan-07	12	12	GEL350	13.12	13.06	X_FLOW350B	0.966	0.981	X_VOL350P
P6942-4SQ		2	25-Jan-07	12		GEL350	12.95		X_FLOW350B	0.931		X_VOL350P
		3					13.1		X_FLOW350B	1.045		X_VOL350P
P6944	1	1	2-Mar-07	13	13	GEL350	13.69	12.36	X_FLOW350B	0.556	0.572	X_VOL350P
P6944		2	2-Mar-07	13		GEL350	11.38		X_FLOW350B	0.57		X_VOL350P
		3					12		X_FLOW350B	0.589		X_VOL350P
P6944	14	1	2-Mar-07	12	12.2	GEL350	13.17	11.7	X_FLOW350B	0.569	0.501	X_VOL350P
P6944		2	2-Mar-07	12.5		GEL350	11.34		X_FLOW350B	0.495		X_VOL350P
		3					10.6		X_FLOW350B	0.438		X_VOL350P
P7059	1	1	1-Mar-07	12.75	12.6	GEL350	14.42	14.75	X_FLOW350B	0.46	0.582	X_VOL350P
P7059		2	1-Mar-07	12.5		GEL350	14.95		X_FLOW350B	0.645		X_VOL350P
		3					14.87		X_FLOW350B	0.642		X_VOL350P
P7059	16	1	1-Mar-07	13	13	GEL350	15.72	16.38	X_FLOW350B	0.733	0.59	X_VOL350P
P7059		2	1-Mar-07	13		GEL350	16.27		X_FLOW350B	0.601		X_VOL350P

Table 10-1: Hexcel Prepreg Physical Testing Results

11. Deviations

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

2. For the ETW testing, it was discovered that the original adhesive used to bond the strain gauges was not rated for the 250° F testing. Therefore, specimens were refabricated and retested for modulus. This caused a delay in the program due the time required to recondition and retest the specimens. Below is a summary of what decisions were made affecting this Hexcel 8552 program.
    - CLC's – Gauge bonded with M Bond 600, cured for 1 hour 30 minutes at 300F
    - Gauges were applied before drying and then moisture conditioned.
    - Previously Tested CLC specimens - Hot Dry 250F: NCAMP looked for scraps for modulus specimens – more specimens were found and retested
    - ALL CLC specimens with Hot Wet 250F testing required 6 specimens per panel; 3 for modulus (gauged) and 3 for strength (not gauged). The number of specimens were 'doubled' because the protective coating applied on the gage might prevent (or slow down) moisture absorption rate in the gauged section.
3. Panel deviations:
    - UNT1-B-M2 had incorrect layup
    - UNT2-B-M1 had incorrect layup. Samples were taken from UNC2
    - UNC0-A-M1 and M2 had incorrect layup
    - UNC0-C-M2 had incorrect layup
    - UNC1-B-M1 had incorrect layup
    - UNC2-C-M1 had incorrect layup.
    - UNC3-B-M2 had incorrect layup. Samples were taken from UNT3
    - FHT2-B-M1 had incorrect layup. Samples were taken from FHC2 and SSB2
    - FHT2-B-M2 had incorrect layup.

4. CAI1 test data was not reported due to testing anomaly in machine set up. The explanation to this anomaly is reported in CAM-RP-2013-020 N/C