



Renegade RM-2014-LDk-Tk 4581 8HS Quartz fabric at 286 gsm & 38% RC Qualification Material Property Data Report

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1. Introduction

1.1 Scope

The test methods and results described in this document are intended to provide basic composite properties essential to most methods of analysis and are consistent with 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 NCAMP oversight in accordance with NSP 100 NCAMP Standard Operating Procedures; the test panels and test specimens have been inspected by NCAMP Authorized Inspection Representatives (AIR) and the testing has been witnessed by NCAMP Authorized Engineering Representatives (AER). However, the data may not fulfill all the needs of any specific company's program; specific properties, environments, laminate architecture, and loading situations may require additional testing.

The use of NCAMP material and process specifications does 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 Renegade RM-2014-LDk-Tk 4581 8HS Quartz fabric 286 gsm 38% RC Qualification Statistical Analysis Report NCP-RP-2024-002 Rev A. The qualification material was procured to NCAMP Material Specification NMS 201/1 Revision - dated July 23, 2024. The qualification test panels were fabricated in accordance with NCAMP Process Specification NPS 82014 Revision A dated July 12, 2024 using baseline "A" Cure Cycle. The NCAMP Test Plan NTP 2014Q1 Revision C 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 201/1. NMS 201/1 may have additional requirements that are listed in its prepreg process control document (PCD), fiber specification, fiber PCD, and other raw material specifications and PCDs which impose essential quality controls on the raw materials and raw material manufacturing equipment and processes. *Aircraft companies and certifying agencies should assume that the material property data published in this report is not applicable when the material is not procured to NMS 201/1.* NMS 201/1 is a free, publicly available, non-proprietary aerospace industry material specification.

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

1.2 Symbols

ν_{12}^t	major Poisson's ratio, tension
$\mu\epsilon$	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
ν_{12}^c	major Poisson's Ratio, compression
ν_{21}^c	minor Poisson's Ratio, compression
F_{12}^{su}	in-plane shear ultimate peak strength
F_{12}^{smax}	in-plane shear peak strength before 5% strain
$F_{12}^{s5\% \text{ strain}}$	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
CBS	curved beam strength
CV	coefficient of variation
CTD	cold temperature dry
CTE	coefficient of thermal expansion
CPT	cured ply thickness
DMA	dynamic mechanical analysis
ETD	elevated temperature dry
ETW	elevated temperature wet
Gr/Ep	graphite/epoxy
ILT	interlaminar tension
IPF	in-plane fill
IPW	in-plane warp
norm	normalized
N/A	not applicable
OOP	out of plane
RMC	Renegade Materials Corporation
RTD	room temperature dry
SBS	short beam strength
Tply	thickness divided by the number of plies provides the thickness average per specimen
wet	specimen with an “equilibrium” moisture content
Tg	glass transition temperature
T, RH	temperature, relative humidity
TMA	thermomechanical analysis

1.3 Specimen Naming Format

All panels and specimens shall be uniquely identified by an 11-code reference system, cross referenced with descriptive identification information as follows: This Document Number-Prepregger ID-Material Code-Fabricator ID-Intended Test Type-Batch ID-Cure Cycle ID-Test Panel ID-Actual Test Type-Test Condition-Specimen Number. For example, NTP2014Q1-RMC-R14-RS-WT-A-C1-2-FT-RTD-3 denotes Prepregger: Renegade, Prepreg Name: RM-2014-LDk-Tk 4581 8HS satin fabric prepreg, Fabricator: Resonant Sciences, Intended Test Type: Warp Tension, Prepreg Batch: A, Cure Cycle: C1, Test Panel ID: 2, Actual Test Method: Fill Tension, Test Condition: Room Temperature Dry, and Specimen Number: 3. The testing lab may assign a separate identification code but must reference the 11 code reference system and uniquely identify the panels and specimens.

Panels to be manufactured are listed in Appendix 2 of test plan NTP 2014Q1 and will follow the same I.D. above, inherently omitting the actual test type, test condition and specimen number. The above parameters can have the following values:

Prepregger ID	Material Code	Prepreg Name
Renegade: RMC	R14	Renegade RM-2014-LDk-Tk 4581 8HS Quartz

Fabricator ID (Company that layup, bag, and cure the test panels)
Resonant Sciences: RS

Intended and Actual Test Types	
WT: Warp tension	UNT1, UNT2...: Un-notched Tension Layup 1, Layup 2, etc.
FT: Fill Tension	OHT1, OHT2...: Open Hole Tension Layup 1, Layup 2, etc.
WC: Warp Compression	OHC1, OHC2...: Open Hole Compression Layup 1 etc.
FC: Fill Compression	FHT1, FHT2...: Filled Hole Tension Layup 1, Layup 2 etc.
IPS: In Plane Shear	FHC1, FHC2...: Filled Hole Compression Layup 1, Layup 2 etc.
SBS: Short Beam Strength	SSB1, SSB2...: Single Shear Pin Bearing Layup 1, Layup 2, etc.
LT: Longitudinal Tension	CAI1: Compression After Impact Layup 1, Layup 2, etc.
TT: Transverse Tension	FSL: Freezer and Out Life Verification
LC: Longitudinal Compression	DMA: Dynamic Mechanical Analysis
ILT: Interlaminar Tension	DSC: Differential Scanning Calorimetry
	SBS1: Short Beam Strength Layup 1
	SBSFS: Short Beam Strength for Fluid Sensitivity

(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-ply laminates used for the unidirectional materials only are designated “Layup 0”).

Batch ID: A, B, C, D, E, F etc. (to be cross referenced with prepreg batch numbers as shown in Appendix 3 of test plan NTP 2014Q1)

Cure Cycle ID: C1, C2, C3, etc.: Cure Cycle 1, 2, 3, etc.

Note: Cure Cycle ID numbers 1, 2, 3, etc. in Appendix 2 of test plan NTP 2014Q1 are for reference only. Actual numbers may vary depending on the actual cure cycle runs.

Test Panel ID: 1,2,3,4,5,6,7,8,9,A,B,C..... etc. (restart from 1 for every Cure Cycle ID)

Test Condition: CTD, RTD, ETD, ETW, etc. (test conditions as defined in section 6 of test plan NTP 2014Q1)
 FS11RT, FS12RT, FS13RT, etc. (fluid sensitivity test - see Table 5 of test plan NTP 2014Q1)
 0/1, 0/5, 0/7, 0/10, etc. (Freezer and Out Life Verification – see Table 6b of test plan NTP 2014Q1)
 D, W (dry, wet conditions for DMA)

Specimen Number: 1,2,3,4,5,6,7,8,9,A,B,C..... etc.

1.4 References

ASTM Standards

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

- ASTM D2344/D2344M-16 – Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
- ASTM D3039/D3039M-17 – Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials
- ASTM D3418-15 – Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry
- ASTM D3518/D3518M-18 – Standard Test Method for In-Plane Shear Response of Polymer Matrix Composite Materials by Tensile Test of a $\pm 45^\circ$ Laminate In-Plane Shear Strength and Modulus
- ASTM D5766/D5766M-11 (2018) – Standard Test Method for Open Hole Tensile Strength of Polymer Matrix Composite Laminates
- ASTM D5961/D5961-17 – Standard Test Method for Bearing Response of Polymer Matrix Composite Laminates
- ASTM D6415M-22 – Standard Test Method for Measuring the Curved Beam Strength of a Fiber-Reinforced Polymer-Matrix Composite
- ASTM D6484/D6484M-20 – Standard Test Method for Open-Hole Compressive Strength of Polymer Matrix Composite Laminates
- ASTM D6641/D6641-16e2 – Standard Test Method for Determining the Compressive Properties of Polymer Matrix Composite Laminates Using a Combined Loading Compression (CLC) Test Fixture
- ASTM D6742/D6742-17 – Standard Practice for Filled-Hole Tension and Compression Testing of Polymer Matrix Composite Laminates
- ASTM D7028-07 (2015) – Standard Test Method for Glass Transition Temperature (DMA T_g) of Polymer Matrix Composites by Dynamic Mechanical Analysis (DMA)
- ASTM D7136/D7136M-15 – Standard Test Method for Measuring the Damage Resistance of a Fiber-Reinforced Polymer Matrix Composite to a Drop-Weight Impact Event
- ASTM D7137/D7137-17 – Standard Test Method for Compressive Residual Strength Properties of Damaged Polymer Matrix Composite Plates

- ASTM D831-19 – Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis
- ASTM E682-92 – Standard Practice for Liquid Chromatography Terms and Relationships

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.

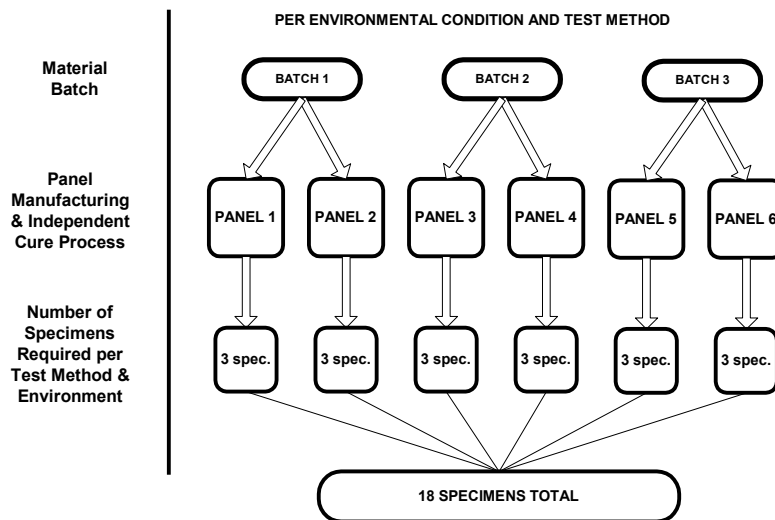


Figure 1-1: Specimen Selection Methodology

All panels were fabricated in accordance with NCAMP Process Specification NPS 82014 baseline “A” 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.

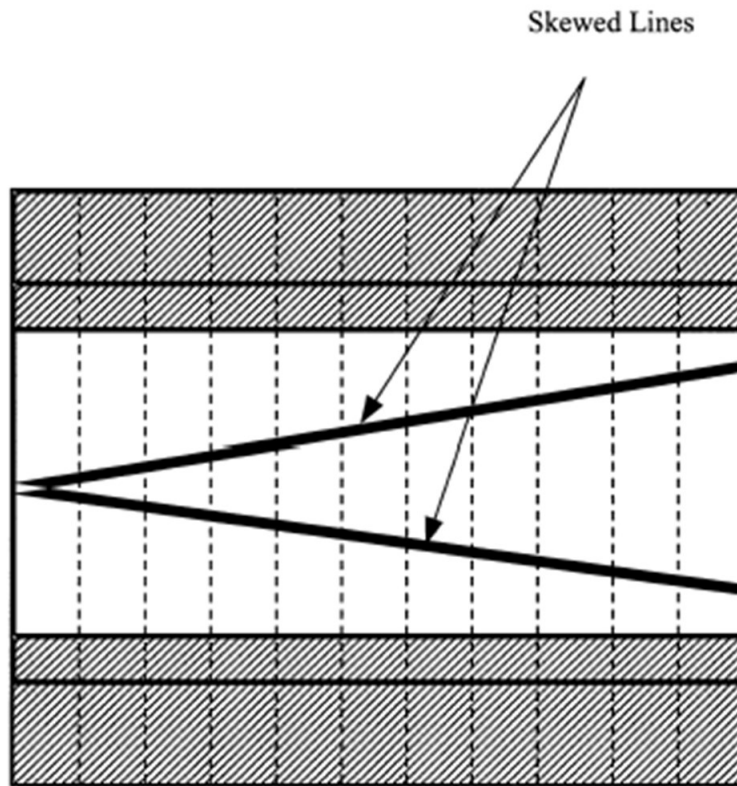


Figure 1-2: Specimen Traceability Line

1.5.2 Specimen & Testing Details

1.5.2.1 Tabbings

Tabs were not used for this program.

1.5.2.2 Specimen Dimensions & Test Configuration

For SBS specimens, T was used where T was the average thickness of the specific panel being tested. The same T was used to compute the width and length of the specimen.

Caul plate was used, excluding ILT.

Jet Fuel was used:

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 $\pm 5^\circ\text{F}$ 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) NASM21297 bolts with MS21084 nuts and MS21206 washers for FHC, FHT, and SSB.

1.5.2.3 Specimen Strain Device Used

Corresponding Gage ID can be obtained from Appendix 1 of NTP 2014Q1.

Uniaxial gages were used on:

- All of Tension specimens except Warp Tension specimens.

- Two of RTD Tension specimens except Warp Tension for obtaining full stress strain curves.

- All conditions of combined loading compression specimens.

- Two of RTD Open Hole Compression specimens for detecting buckling.

- One of CAI specimen for balancing.

Biaxial gages were used on:

- All conditions of IPS specimens.

- All conditions of Warp Tension specimens.

- Two of RTD Warp Tension specimens for obtaining full stress strain curves.

Deflectometers were used on:

- Interlaminar Tension.

1.5.3 Test Matrix

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

Layup (4) (warp direction)	Test Type and Direction	Property	Number of Batches x Number of Panels x Number of Test Specimens			
			Test Temperature/Moisture Condition			
			CTD	RTD	ETD	ETW
[0] ₁₀	ASTM D3039 Warp Tension	Strength, Modulus, and Poisson's Ratio	3x2x3	3x2x3 (3)	3x2x3	3x2x3
[0] ₁₀	ASTM D6641 Warp Compression	Strength and Modulus	3x2x3	3x2x3 (1) (3)	3x2x3	3x2x3
[90] ₁₀	ASTM D3039 Fill Tension	Strength and Modulus	5x2x3	5x2x3 (3)	5x2x3	5x2x3
[90] ₁₀	ASTM D6641 Fill Compression	Strength and Modulus	3x2x3	3x2x3 (1) (3)	3x2x3	3x2x3
[45/-45] ₆	ASTM D3518 In-Plane Shear (2)	Strength and Modulus	3x2x3	3x2x3 (3)	3x2x3	3x2x3
[0] ₂₀	ASTM D2344 Short Beam	Strength	3x2x3	3x2x3	3x2x3	3x2x3

Notes:

1. Back-to-back strain gages were needed on the first two specimens. If no buckling was observed, the remaining modulus specimens required a strain gage on one side of the specimens only. An appropriate extensometer may have been used in place of the strain gage.
2. Gripped (tab) length is 1.5±0.5" on each end of the 10" long specimen. Continued testing until ultimate failure was observed.
3. At least two specimens were gaged to obtain full stress-strain curve to failure. An appropriate extensometer may have been used in place of the strain gage for the remaining specimens.
4. Face was not be flipped at mid-plane.

Table 1-1: Lamina Level Test Matrix

Table 1-2 below summarizes the laminate level tests carried out. The layup angles 0° , 45° , -45° , and 90° 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.

In the case of the fabric materials, certain laminates, such as the quasi-isotropic layup, have an unequal number of $+45^\circ$ and -45° plies. While such lay-ups are mid-plane symmetric, there exists the possibility of differences in warp and fill modulus values leading to a slight deviation from perfect balanced – i.e., the A_{16} and A_{26} terms in the in-plane stiffness matrix are nonzero. Again, the effect on in plane stiffness and strength properties was expected to be minimal and if anything yielded slightly conservative results.

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

(%0°/%±45°/%90°) Actual Test Type	Test Type and Layup (5) (8)	Property	Number of Batches x Number of Panels x Number of Test Specimens			
			Test Temperature/Moisture Condition			
			CTD	RTD	ETD	ETW
(25/50/25 - QI) UNT1	ASTM D3039 Un-notched Tension [45/0/-45/90/45/0/90/-45/0/45/90/-45]	Strength & modulus	3x2x3	3x2x3 (6)		3x2x3
(10/80/10) UNT2	ASTM D3039 Un-notched Tension [45/-45/45/-45/0/0/-45/45/-45/45]	Strength & modulus	3x2x3	3x2x3 (6)		3x2x3
(40/20/40) UNT3	ASTM D3039 Un-notched Tension [0/90/0/90/45/45/90/0/90/0]	Strength & modulus	3x2x3	3x2x3 (6)		3x2x3
(25/50/25 - QI) UNC1	ASTM D6641 Un-notched Compression [45/0/-45/90/45/0/90/-45/0/45/90/-45]	Strength & modulus		3x2x3 (4&6)		3x2x3
(10/80/10) UNC2	ASTM D6641 Un-notched Compression [45/-45/45/-45/0/0/-45/45/-45/45]	Strength & modulus		3x2x3 (4&6)		3x2x3
(40/20/40) UNC3	ASTM D6641 Un-notched Compression [0/90/0/90/45/45/90/0/90/0]	Strength & modulus		3x2x3 (4&6)		3x2x3
(25/50/25 - QI) SBS1	ASTM D2344 Short Beam (9) [45/0/-45/90/45/0/90/-45/0/45/90/-45]	Strength		3x2x3		3x2x3
(25/50/25 - QI) OHT1	ASTM D5766 Open Hole Tension (1) [45/0/-45/90/45/0/90/-45/0/45/90/-45]	Strength	3x2x3	3x2x3	3x2x3	3x2x3
(10/80/10) OHT2	ASTM D5766 Open Hole Tension (1) [45/-45/45/-45/0/0/-45/45/-45/45]	Strength	3x2x3	3x2x3		3x2x3
(40/20/40) OHT3	ASTM D5766 Open Hole Tension (1) [0/90/0/90/45/45/90/0/90/0]	Strength	3x2x3	3x2x3		3x2x3
(25/50/25 - QI) FHT1	ASTM D6742 Filled Hole Tension (2) [45/0/-45/90/45/0/90/-45/0/45/90/-45]	Strength	3x2x3	3x2x3		3x2x3
(10/80/10) FHT2	ASTM D6742 Filled Hole Tension (2) [45/-45/45/-45/0/0/-45/45/-45/45]	Strength	3x2x3	3x2x3		3x2x3
(40/20/40) FHT3	ASTM D6742 Filled Hole Tension (2) [0/90/0/90/45/45/90/0/90/0]	Strength	3x2x3	3x2x3		3x2x3
(25/50/25 - QI) OHC1	ASTM D6484 Open Hole Compression (1) [45/0/-45/90/45/0/90/-45/0/45/90/-45]	Strength		3x2x3 (4)	3x2x3	3x2x3
(10/80/10) OHC2	ASTM D6484 Open Hole Compression (1) [45/-45/45/-45/0/0/-45/45/-45/45]	Strength		3x2x3 (4)		3x2x3
(40/20/40) OHC3	ASTM D6484 Open Hole Compression (1) [0/90/0/90/45/45/90/0/90/0]	Strength		3x2x3 (4)		3x2x3
(25/50/25 - QI) FHC1	ASTM D6742 Filled Hole Compression (2) [45/0/-45/90/45/0/90/-45/0/45/90/-45]	Strength		3x2x3		3x2x3
(10/80/10) FHC2	ASTM D6742 Filled Hole Compression (2) [45/-45/45/-45/0/0/-45/45/-45/45]	Strength		3x2x3		3x2x3
(40/20/40) FHC3	ASTM D6742 Filled Hole Compression (2) [0/90/0/90/45/45/90/0/90/0]	Strength		3x2x3		3x2x3
(25/50/25 - QI) SSB1	ASTM D5961 Single Shear Bearing (3) [45/0/-45/90/45/0/90/-45/0/45/90/-45]	Strength & Deformation		3x2x3		3x2x3
(10/80/10) SSB2	ASTM D5961 Single Shear Bearing (3) [45/-45/45/-45/0/0/-45/45/-45/45]	Strength & Deformation		3x2x3		3x2x3
(40/20/40) SSB3	ASTM D5961 Single Shear Bearing (3) [0/90/0/90/45/45/90/0/90/0]	Strength & Deformation		3x2x3		3x2x3
(50/0/50) ILT	ASTM D6415 Interlaminar Tension [0] ₂₀	Strength	1x1x6	1x1x6		1x1x6
(25/50/25 - QI) CAI1	ASTM D7136 & D7137 Compression After Impact (1500 in.lb/in) (7) [45/0/-45/90/45/0/90/-45/0/45/90/-45]	Strength		1x1x6		

Notes:

1. Open-hole configuration: 0.25" hole diameter, 1.5-inch width.
2. Filled-hole test configuration: 0.25" diameter, see section 1.5.2.2 for fastener callout, 1.5" width.
3. Single shear bearing test configuration: 0.25: hole diameter, 1.5" width, see section 1.5.2.2 for fastener callout, $e/D=3$, ASTM D5961-17 Procedure C
4. Back-to-back strain gages needed on the first two specimens. If no buckling was observed, the remaining modulus specimens required strain gage on one side of the specimens only. Appropriate extensometer may have been used in place of the strain gage.
5. Loading direction was generally along the 0-degree direction
6. At least two specimens were gaged to obtain full stress-strain curve to failure. An appropriate extensometer may have been used in place of the strain gage for the remaining specimens.
7. Back-to-back strain gages on two locations (a total of four strain gages) were needed on the first specimen. The specimen should be equivalent to the test specimens in terms of material, layup, and geometry, shall be un-damaged. Alternatively, an instrumented metallic plate, equivalent in thickness to the test specimens to within ± 0.25 mm [± 0.010 in.], may have been used.
8. Face was not flipped at mid-plane.
9. SBS1 specimens were machined from UNC1 panels.

Table 1-2: Laminate Level Test Matrix**1.5.4 Cured Laminate Physical Testing**

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

Property	Condition/Method (Note 1)	Min Replicates per Panel
Cured Ply Thickness	ASTM D3171-15	All data from mechanical test specimens
Laminate Density	ASTM D792-13	Per Note 6
Fiber Volume, % by Volume	ASTM D3171-15 (Note 2)	3
Resin Content, % by Weight	ASTM D3171-15 (Note 2)	3
Void Content, % by Volume	ASTM D3171-15	Per Note 6
Ultrasonic Through Transmission, C-Scan	MIL-HDBK-787A (Note 3)	1
Glass Transition Temperature, T _g by DMA flexural loading	Single Cantilever ASTM D7028-07 (2015)	1 Dry (Note 4)
	3pt Bend ASTM D7028-07 (2015)	1 Dry, 1 Wet (Note 5)
Dielectric constant and loss	ASTM D2520-21 (Note 7)	2 per lot
Coefficient of Thermal Expansion (CTE) (Note 8) X (0 degree, warp) direction Y (90 degree, fill) direction Z (Thickness) direction	ASTM E831-19	Per note 8

Notes:

1. Where the applicable standard allows variations in specimen form or test method, the specific parameters were used will be specified in the test work instructions and reported in the final test report.
2. Method II
3. Five MHz is preferred for solid laminates. Panels with anomaly were segregated. Microscopy images and void content were taken from questionable areas. NCAMP was involved in the review of all C-scans.
4. Minimum total of 24 dry for each material system. Testing to be conducted by Renegade, potentially specification limits was generated using this data for Renegade's batch release testing. Equipment was calibrated per Renegade's procedure.
5. Minimum total of 24 dry and 24 wet for each material system. Testing to be conducted by NIAR, potentially specification limits was generated using this data for users' receiving inspection testing. Equipment was calibrated per ASTM procedure.
6. A minimum of 4 panels per batch, 3 specimens per panel.
7. Testing to be conducted by Resonant Sciences.
8. Specimens were machined from [0]₂₀ laminates. CTE data to be reported with normalized dimension change across 30 °C to 150 °C. 3 specimens/batch/direction. The tests were run from room temperature (~25° C) to 180° C. The linear range was calculated from the range of 50° C to 100° C. The mean CTE across this range was reported, along with the high/low ends of the range, and standard deviation.

Table 1-3: Physical Testing Matrix

1.5.5 Environmental Conditioning

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

CTD = -65±5°F, dry
 RTD = 70±10°F, room temperature dry
 ETD = 212±5°F, dry
 ETW = 212±5°F, wet

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

For dry testing, specimens were dried at 160°F±5°F for 120 hours minimum. After drying, specimens were kept in a desiccator until mechanical testing. Alternatively, the specimens may be left at 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 hours minimum 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 changes by less than 0.02% for two consecutive determinations which are 7±0.5 days apart and may be expressed by:

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

Where:

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

When representative specimens could not be measured to determine the moisture content (due to size, fastener and tab effects), traveler coupons of at least 1" by 1" by specimen thickness and weighing at least 15 grams were used to establish weight gain measurements. If the specimens or traveler coupons passed the criteria for two consecutive determinations which are 7 ± 0.5 days apart, the specimens were kept in the environmental chamber for up to an additional 60 days. Alternatively, the specimens may have been removed from the environmental chamber and placed in a sealed plastic bag along with a moist cotton towel for a maximum of 14 days until mechanical testing. Strain-gaged specimens were removed from the controlled environment for a maximum of 2 hours for application of gages in ambient laboratory conditions.

1.5.6 Non-ambient Testing

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

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

For wet specimens, the moisture loss was determined by subjecting representative specimens to the same amount of time required to heat-up and fail the specimens. For filled-hole or bearing specimens, fasteners were removed prior to conducting moisture loss measurements. For tabbed specimens, representative coupons without tabs and having the same number of plies were used to conduct the moisture loss measurements. A minimum of one specimen or representative coupon was used to measure the moisture loss for every combination of test temperature and stacking sequence.

1.5.7 Fluid Sensitivity Screening

Table 1-4 lists the requirements for fluid sensitivity screening, which requires ASTM D2344-16 Short Beam Strength testing on $[0^\circ]_{20}$ lamina level specimens dried at $160^\circ\text{F} \pm 5^\circ\text{F}$ for 120 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. Fluid Sensitivity specimens were tested by NIAR.

<u>Extended Contact:</u>	Exposure	Test Condition	Code
100 Low Lead Aviation Fuel (ASTM D910)	90 days min. @ 70°F±10°F	70°F	FS11RT
	90 days min. @ 70°F±10°F	180°F	FS11ET
ASTM D1655 Jet A Fuel (other jet fuel may be used but its type must be reported)	90 days min. @ 70°F±10°F	70°F	FS12RT
	90 days min. @ 70°F±10°F	180°F	FS12ET
MIL-PRF-5606 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS13RT
	90 days min. @ 70°F±10°F	180°F	FS13ET
MIL-PRF-83282 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS14RT
	90 days min. @ 70°F±10°F	180°F	FS14ET
MIL-PRF-7808 Engine Oil	90 days min. @ 70°F±10°F	70°F	FS15RT
	90 days min. @ 70°F±10°F	180°F	FS15ET
MIL-PRF-23699, Class STD Engine Oil	90 days min. @ 70°F±10°F	70°F	FS16RT
	90 days min. @ 70°F±10°F	180°F	FS16ET
Sea Water (ASTM D1141 or equiv.)	90 days min. @ 70°F±10°F	70°F	FS17RT
	90 days min. @ 70°F±10°F	180°F	FS17ET
Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS18RT
	90 days min. @ 70°F±10°F	180°F	FS18ET
50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS19RT
	90 days min. @ 70°F±10°F	180°F	FS19ET
Isopropyl Alcohol Deicing Agent (TT-I-735)	90 days min. @ 70°F±10°F	70°F	FS20RT
	90 days min. @ 70°F±10°F	180°F	FS20ET
<u>Short Duration Contact:</u>			
MEK washing fluid. ASTM D740	90 minutes min. @ 70°F±10°F	70°F	FS21RT
	90 minutes min. @ 70°F±10°F	180°F	FS21ET
Polypropylene Glycol Deicer (Type I) SAE AMS 1424	90 minutes min. @ 70°F±10°F	70°F	FS22RT
	90 minutes min. @ 70°F±10°F	180°F	FS22ET
Isopropyl Alcohol Deicing Agent (TT-I-735)	48±4 hours @70°F±10°F	70°F	FS23RT
	48±4 hours @70°F±10°F	180°F	FS23ET
Acetone	75±15 minutes @70°F±10°F	70°F	FS24RT
	75±15 minutes @70°F±10°F	180°F	FS24ET
<u>Control Tests:</u>			
Distilled Water	90 days min. at 70°F±10°F	70°F	FS31RT
	90 days min. at 70°F±10°F	180°F	FS31ET
Dry	Dry per section 1.5.5	70°F	FS32RT
	Dry per section 1.5.5	180°F	FS32ET
85% Relative Humidity	Per section 1.5.5	70°F	FS33RT
	Per section 1.5.5	180°F	FS33ET

Table 1-4: Fluid Sensitivity Screening

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 90° tensile strength and modulus (unidirectional only), 90° 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 fabric-based materials where the fiber areal weight of each fabric batch is known quite accurately prior to impregnation, the fiber volume fraction was accurately assessed by physical measurements of thickness and density according to ASTM D3171 Method II and this value, based on specimen thickness, was used to normalize the strength and modulus properties:

$$\text{Normalized Value} = \text{Measured Value} \times \text{Nominal V\%F} / \text{Measured V\%F}$$

The cured ply thickness of 0.01120 inches based on actual Qualification panels has been used as the nominal cured ply thickness (CPT) for normalization purpose. The following normalization formula was used:

$$\text{Normalized Value} = \text{Measured Value} \times \text{Measured CPT} / \text{Nominal CPT}$$

1.5.9 Inspection Verification

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

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

1.5.10 Material Pedigree Information

The PMC Data Collection Template includes the material pedigree information required, such as material and batch information, as well as panel fabrication record, environmental conditioning, test equipment, and test procedures.

2. Test Results

2.1 Lamina Level Test Summary

Prepreg Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%					Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric					
Material Specification: NMS 201/1					286 gsm with RC 38%					
Process Specification: NPS 82014					Lamina Properties Summary					
Fabric: 4581 8HS Quartz satin weave					Resin: Renegade RM-2014-LDk-TK					
Tg(dry, 3pt bend): 294.46°F					Tg METHOD: ASTM D7028					
g(dry, single cantilever): 318.1°F					Tg(wet, 3pt bend): 245.50°F					
Fiber Lot	Lot 1		Lot 2		Lot 3		Lot 4		Lot 5	
	151530A		151651B		151828A		38135A & 38122A		38135A & 38122A	
Date of fiber manufacture	12/16/2021		1/4/2023		6/12/2023		1/18/2024 - 1/30/2024		1/18/2024 - 1/30/2024	
Resin Lot	RES-2023-0026		RES-2023-0214		RES-2023-0332		RES-2024-0041		RES-2024-0042	
Date of resin manufacture	3/7/2023		8/8/2023		9/6/2023		1/24/2024		1/26/2024	
Prepreg Lot	RMC-2023-1015		RMC-2023-1058		RMC-2023-1059		RMC-2024-1028		RMC-2024-1034	
Date of prepreg manufacture	3/7/2023		8/10/2023		9/8/2023		4/17/2024		6/12/2024	
Date of composite manufacture						7/8/2023 - 7/26/2024				
Date of testing						9/12/2023 - 11/25/2024				
Date of data submittal						5/12/2025				
LAMINA MECHANICAL PROPERTY SUMMARY										
Data reported as: Normalized & Measured										
(Normalized by CPT=0.01120 inch)										
Properties	CTD (-65°F) Mean		RTD (70°F) Mean		ETD (212°F) Mean		ETW (212°F) Mean			
	Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured		
F ₁ ^{tu} [ksi]	122.2	123.5	108.1	108.3	110.9	111.2	74.75	75.09		
E ₁ ^t [Msi]	3.495	3.534	3.275	3.281	3.124	3.131	3.024	3.033		
ν ₁₂ ^t		0.1284		0.1247		0.1001		0.07861		
F ₂ ^{tu} [ksi]	105.3	104.2	90.72	89.86	87.59	86.86	63.94	62.98		
E ₂ ^t [Msi]	3.406	3.373	3.170	3.142	3.010	2.986	2.846	2.821		
F ₁ ^{cu} [ksi]	79.16	79.11	68.67	68.03	55.18	54.68	41.57	41.50		
E ₁ ^c [Msi]	3.579	3.576	3.499	3.466	3.328	3.300	3.208	3.198		
F ₂ ^{cu} [ksi]	66.02	66.84	58.33	58.56	44.36	44.54	30.73	31.03		
E ₂ ^c [Msi]	3.408	3.451	3.346	3.360	3.180	3.194	2.906	2.937		
F ₁₂ ^{s0.2%} [ksi]		5.616		4.335		2.791		1.653		
F ₁₂ ^{s5%strain} [ksi]		9.901		7.622		4.923		2.527		
G ₁₂ ^s [Msi]		0.7640		0.5988		0.4137		0.2470		
SBS [ksi]		9.467		8.638		5.883		3.447		

Table 2-1: Lamina Summary Data

2.2 Laminate Level Test Summary

Prepreg Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%					Renegade RM-2014-LDk-Tk 4581 8HS		
Material Specification: NMS 201/1					Quartz Fabric 286 gsm with RC 38%		
Process Specification: NPS 82014					Laminate Properties Summary		
Fabric: 4581 8HS Quartz satin weave					Resin: Renegade RM-2014-LDk-TK		
Tg(dry, 3pt bend): 294.46°F			Tg(wet, 3pt bend): 245.50°F		Tg METHOD: ASTM D7028		
Tg(dry, single cantilever): 318.1°F							
	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5		
Fiber Lot	151530A	151651B	151828A	38135A & 38122A	38135A & 38122A		
Date of fiber manufacture	12/16/2021	1/4/2023	6/12/2023	1/18/2024 - 1/30/2024	1/18/2024 - 1/30/2024		
Resin Lot	RES-2023-0026	RES-2023-0214	RES-2023-0332	RES-2024-0041	RES-2024-0042		
Date of resin manufacture	3/7/2023	8/8/2023	9/6/2023	1/24/2024	1/26/2024		
Prepreg Lot	RMC-2023-1015	RMC-2023-1058	RMC-2023-1059	RMC-2024-1028	RMC-2024-1034		
Date of prepreg manufacture	3/7/2023	8/10/2023	9/8/2023	4/17/2024	6/12/2024		
Date of composite manufacture				7/8/2023 - 7/26/2024			
Date of testing				9/12/2023 - 11/25/2024			
Date of data submittal				5/12/2025			
LAMINATE MECHANICAL PROPERTY SUMMARY							
Data reported as: Normalized & Measured							
(Normalized by CPT=0.01120 inch)							
Properties	Layup	25/50/25 (Quasi)		10/80/10 (Soft)		40/20/40 (Hard)	
	Test Condition	Normalized	Measured	Normalized	Measured	Normalized	Measured
OHT Strength [ksi]	CTD (-65°F)	49.37	49.20	34.20	34.39	71.37	71.52
	RTD (70°F)	43.95	43.74	29.43	29.56	58.00	58.06
	ETD (212°F)	42.39	42.28				
	ETW (212°F)	30.26	30.01	17.67	17.72	38.52	38.72
OHC Strength [ksi]	RTD (70°F)	32.05	31.79	24.60	24.77	32.80	33.20
	ETD (212°F)	24.91	24.74				
	ETW (212°F)	21.69	21.58	14.14	14.26	21.08	21.41
UNT Strength [ksi]	CTD (-65°F)	82.81	81.77	46.05	46.11	101.4	102.1
	RTD (70°F)	76.62	75.52	39.42	39.40	90.57	91.42
	ETD (212°F)	49.31	48.94	21.43	21.54	61.81	62.63
UNT Modulus [Msi]	CTD (-65°F)	2.881	2.846	2.450	2.453	3.245	3.268
	RTD (70°F)	2.616	2.577	2.087	2.085	3.008	3.035
	ETW (212°F)	2.083	2.066	1.549	1.556	2.628	2.669
UNC Strength [ksi]	RTD (70°F)	58.75	58.55	36.47	37.13	57.77	58.13
	ETW (212°F)	31.93	32.05	19.17	19.53	32.24	32.58
UNC Modulus [Msi]	RTD (70°F)	2.799	2.789	2.213	2.254	3.131	3.152
	ETW (212°F)	2.232	2.232	1.484	1.506	2.709	2.733
FHT Strength [ksi]	CTD (-65°F)	51.30	50.70	37.97	38.34	63.23	63.15
	RTD (70°F)	45.72	45.37	31.15	31.40	54.60	54.71
	ETW (212°F)	32.13	31.73	18.71	18.90	38.41	38.51
FHC Strength [ksi]	RTD (70°F)	57.77	57.65	37.79	38.15	57.89	58.56
	ETW (212°F)	29.83	29.70	18.16	18.24	31.48	31.81
SBS1 Strength [ksi]	RTD (70°F)		7.857				
	ETW (212°F)		3.423				
SSB 2% Offset Strength [ksi]	RTD (70°F)	87.73	86.45	74.67	74.45	78.97	78.56
	ETW (212°F)	69.32	68.35	56.63	56.50	58.26	57.85
SSB Ultimate Strength [ksi]	RTD (70°F)	103.6	102.1	95.42	95.13	88.06	87.60
	ETW (212°F)	71.77	70.80	65.39	65.25	59.04	58.63
CBS [lb]*	CTD (-65°F)		527.3				
	RTD (70°F)		401.4				
	ETW (212°F)		150.1				
ILT [ksi]*	CTD (-65°F)		10.39				
	RTD (70°F)		7.979				
	ETW (212°F)		2.949				
CAI1 Strengath [ksi]	RTD (70°F)	26.04	25.77				

*The actual layup for ILT is [0]20, (50/0/50).

Table 2-2: Laminate Summary Data

2.3 Individual Test Summaries

2.3.1 Warp Tension Properties (WT)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%						Tension, 1-axis Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0] ₁₀			
Resin content: 37.02 % wt		Comp. density: 1.647 g/cc							
Fiber volume: 47.19 % vol									
Ply count: 10									
Test method: ASTM D3039-17		Modulus calculation: 1000 to 3000 microstrain							
Normalized by: 0.01120		in. CPT							

2.3.2 Fill Tension Properties (FT)

Material: Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%				Tension, 2-axis Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [90] ₁₀			
Resin content: 37.69 % w t		Comp. density: 1.638 g/cc					
Fiber volume: 46.50 % vol							
Ply count: 10							
Test method: ASTM D3039-08		Modulus calculation: 1000 to 3000 microstrain					
Normalized by: 0.01120		in. CPT					
		CTD	RTD	ETD	ETW		
Test Temperature [°F]		-65	70	212	212		
Moisture Conditioning		Dry	Dry	Dry	Equilibrium		
Equilibrium at T, RH					160 F, 85%		
Source code Prefixed by: NTP2014Q1-RMC-R14-R		FT-X-CX-1-CTD-X	FT-X-CX-1-RTD-X	FT-X-CX-1-ETD-X	FT-X-CX-1-ETW-X		
		Normalized	Measured	Normalized	Measured	Normalized	Measured
F ₂ TM [ksi]	Mean	105.3	104.2	90.72	89.86	87.59	86.86
	Minimum	98.00	97.70	79.08	75.70	77.098	78.50
	Maximum	111.8	110.1	97.67	96.90	97.57	96.10
	C.V.(%)	2.469	2.478	4.574	5.693	6.826	6.307
	No. Specimens	30		28		28	
No. Prepreg Lots		5		5		5	
E ₂ ¹ [Msi]	Mean	3.406	3.373	3.170	3.142	3.010	2.986
	Minimum	3.313	3.199	2.988	2.860	2.775	2.800
	Maximum	3.479	3.559	3.361	3.453	3.143	3.230
	C.V.(%)	1.205	2.884	4.102	6.134	2.791	3.013
	No. Specimens	30		28		28	
No. Prepreg Lots		5		5		5	

2.3.3 Warp Compression Properties (WC)

Material:		Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Compression, 1-axis Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0]₁₀							
Resin content:		37.00 % wt						Comp. density:		1.643 g/cc	
Fiber volume:		46.85 % vol									
Ply count:		10									
Test method:		ASTM D6641-16		Modulus calculation: 1000 to 3000 microstrain							
Normalized by:		0.01120		in. CPT							
		CTD		RTD		ETD		ETW			
Test Temperature [°F]		-65		70		212		212			
Moisture Conditioning		Dry		Dry		Dry		Equilibrium			
Equilbrum at T, RH								160 F, 85%			
Source code prefixed by:		NTP2014Q1-RMC-R14-RS-		WC-X-CX-1-CTD-X		WC-X-CX-1-RTD-X		WC-X-CX-1-ETD-X			
		WC-X-CX-1-CTD-X		WC-X-CX-1-RTD-X		WC-X-CX-1-ETD-X		WC-X-CX-1-ETW-X			
		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			
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		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			
		Normalized		Measured		Normalized		Measured			

2.3.4 Fill Compression Properties (FC)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Comp. density: 1.646 g/cc		Compression, 2-axis Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [90] ₁₀			
Resin content: 36.68 % wt		Fiber volume: 47.19 % vol					
Ply count: 10							
Test method: ASTM D6641-16		Modulus calculation: 1000 to 3000 microstrain					
Normalized by: 0.01120		in. CPT					
		CTD	RTD	ETD	ETW		
Test Temperature [°F]		-65	70	212	212		
Moisture Conditioning		Dry	Dry	Dry	Equilibrium		
Equilibrium at T, RH					160 F, 85%		
Source code prefixed by: NTP2014Q1-RMC-R14-RS-		FC-X-CX-1-CTD-X	FC-X-CX-1-RTD-X	FC-X-CX-1-ETD-X	FC-X-CX-1-ETW-X		
		Normalized	Measured	Normalized	Measured	Normalized	Measured
F₂^{CU} [ksi]	Mean	66.02	66.84	58.33	58.56	44.36	44.54
	Minimum	60.95	61.75	54.58	54.10	39.25	38.90
	Maximum	70.90	71.55	62.07	63.20	47.30	47.50
	C.V.(%)	3.806	3.785	3.240	4.111	5.194	4.925
	No. Specimens	18		18		18	
	No. Prepreg Lots	3		3		3	
E₂^c [Msi]	Mean	3.408	3.451	3.346	3.360	3.180	3.194
	Minimum	3.283	3.283	3.148	3.120	2.966	2.940
	Maximum	3.482	3.603	3.591	3.690	3.410	3.410
	C.V.(%)	1.736	2.641	3.675	5.128	3.753	4.690
	No. Specimens	18		18		18	
	No. Prepreg Lots	3		3		3	

2.3.5 In-Plane Shear Properties (IPS)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%						In-Plane Shear Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/-45]₂			
Resin content: 37.06 % wt		Comp. density: 1.642 g/cc							
Fiber volume: 46.80 % vol									
Ply count: 12									
Test method: ASTM D3518-18		Modulus calculation: 1000 to 3000 microstrain							
Normalized by: NA									
Test Temperature [°F]		CTD		RTD		ETD		ETW	
Moisture Conditioning		-65		70		212		212	
Equilibrium at T, RH		Dry		Dry		Dry		Equilibrium	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-		IPS-X-CX-1-CTD-X		IPS-X-CX-1-RTD-X		IPS-X-CX-1-ETD-X		IPS-X-CX-1-ETW-X	
		Normalized Measured		Normalized Measured		Normalized Measured		Normalized Measured	
F ₁₂ ^{sub 2%} [ksi]	Mean	5.616		4.335		2.791		1.653	
	Minimum	5.503		4.180		2.610		1.410	
	Maximum	5.789		4.530		3.000		1.830	
	C.V.(%)	1.406		2.228		3.816		6.278	
	No. Specimens	18		18		20		21	
No. Prepreg Lots		3		3		3		3	
F ₁₂ ^{sub 5%strain} [ksi]	Mean	9.901		7.622		4.923		2.527	
	Minimum	9.217		7.210		4.440		2.250	
	Maximum	10.45		8.090		5.500		3.030	
	C.V.(%)	3.643		3.476		5.877		7.562	
	No. Specimens	18		18		20		18	
No. Prepreg Lots		3		3		3		3	
G ₁₂ ^{sub} [Msi]	Mean	0.7640		0.5988		0.4137		0.2470	
	Minimum	0.7336		0.5700		0.3900		0.2170	
	Maximum	0.7878		0.6440		0.4370		0.3060	
	C.V.(%)	2.183		3.291		3.516		8.913	
	No. Specimens	18		18		18		21	
No. Prepreg Lots		3		3		3		3	

2.3.6 “25/50/25” Unnotched Tension 1 Properties (UNT1)

Material:		Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%				Unnotched Tension 1 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/0/-45/90/45/0/90/-45/0/45/90/-45]			
Resin content:		37.00 % wt		Comp. density:				1.638 g/cc	
Fiber volume:		46.49 % vol							
Ply count:		12							
Test method:		ASTM D3039-17		Modulus calculation: 1000 to 3000 microstrain					
Normalized by:		0.01120		in. CPT					
		CTD		RTD		ETW			
Test Temperature [°F]		-65		70		212			
Moisture Conditioning		Dry		Dry		Equilibrium			
Equilbrum at T, RH						160 F, 85%			
Source code prefixed by: NTP2014Q1-RMC-R14-RS-		UNT1-A-C1-1-CTD-X		UNT1-X-CX-1-RTD-X		UNT1-X-CX-1-ETW-X			
		NormalizedMeasured		NormalizedMeasured		NormalizedMeasured			
UNT1 Strength [ksi]	Mean	82.81	81.77	76.62	75.52	49.31	48.94		
	Minimum	78.50	77.03	73.27	71.20	44.69	45.50		
	Maximum	87.09	85.73	80.24	79.30	52.50	51.50		
	C.V.(%)	3.417	3.390	2.952	3.003	4.071	3.277		
	No. Specimens	18		18		28			
No. Prepreg Lots		3		3		3			
UNT1 Modulus [Msi]	Mean	2.881	2.846	2.616	2.577	2.083	2.066		
	Minimum	2.796	2.724	2.452	2.439	1.945	1.950		
	Maximum	2.937	2.971	2.730	2.718	2.151	2.190		
	C.V.(%)	1.169	2.099	4.132	3.170	3.04	2.73		
	No. Specimens	18		18		16			
No. Prepreg Lots		3		3		3			

2.3.7 “10/80/10” Unnotched Tension 2 Properties (UNT2)

Material: Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Unnotched Tension 2 Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/-45/45/-45/0/0/-45/45/-45/45]	
Resin content: 36.63 % wt	Comp. density: 1.644 g/cc		
Fiber volume: 47.07 % vol			
Ply count: 10			
Test method: ASTM D3039-17	Modulus calculation: 1000 to 3000 microstrain		
Normalized by: 0.01120	in. CPT		
	CTD	RTD	ETW
Test Temperature [°F]	-65	70	212
Moisture Conditioning	Dry	Dry	Equilibrium
Equilibrium at T, RH			160 F, 85%
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	UNT2-X-CX-1-CTD-X	UNT2-X-CX-1-RTD-X	UNT2-X-CX-1-ETW-X
	Normalized	Measured	Normalized
			Measured
UNT2 Strength [ksi]	Mean	46.05	46.11
	Minimum	44.82	44.01
	Maximum	47.72	48.46
	C.V.(%)	1.670	2.331
	No. Specimens	18	
	No. Prepreg Lots	3	
UNT2 Modulus [Msi]	Mean	2.450	2.453
	Minimum	2.369	2.349
	Maximum	2.484	2.507
	C.V.(%)	1.121	1.698
	No. Specimens	18	
	No. Prepreg Lots	3	

2.3.8 “40/20/40” Unnotched Tension 3 Properties (UNT3)

Material: Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Unnotched Tension 3 Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0/90/0/90/45/45/90/0/90/0]	
Resin content: 36.92 % wt	Comp. density: 1.649 g/cc		
Fiber volume: 47.49 % vol			
Ply count: 10			
Test method: ASTM D3039-17	Modulus calculation: 1000 to 3000 microstrain		
Normalized by: 0.01120	in. CPT		
	CTD	RTD	ETW
Test Temperature [°F]	-65	70	212
Moisture Conditioning	Dry	Dry	Equilibrium
Equilibrium at T, RH			160 F, 85%
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	UNT3-X-CX-1-CTD-X	UNT3-X-CX-1-RTD-X	UNT3-X-CX-1-ETW-X
	Normalized	Measured	Normalized
			Measured
UNT3 Strength [ksi]			
Mean	101.4	102.1	90.57
Minimum	97.38	97.13	84.65
Maximum	106.7	106.7	94.01
C.V.(%)	2.579	2.459	3.008
No. Specimens	18	18	29
No. Prepreg Lots	3	3	3
UNT3 Modulus [Msi]			
Mean	3.245	3.268	3.008
Minimum	3.203	3.198	2.780
Maximum	3.284	3.329	3.125
C.V.(%)	0.7291	1.287	4.111
No. Specimens	18	18	18
No. Prepreg Lots	3	3	3

2.3.9 “25/50/25” Unnotched Compression 1 Properties (UNC1)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Unnotched Compression 1 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/0/-45/90/45/0/90/-45/0/45/90/-45]			
Resin content: 37.13 % wt	Comp. density: 1.644 g/cc				
Fiber volume: 47.04 % vol					
Ply count: 12					
Test method: ASTM D6641-16	Modulus calculation: 1000 to 3000 microstrain				
Normalized by: 0.01120	in. CPT				
	RTD	ETW			
Test Temperature [°F]	70	212			
Moisture Conditioning	Dry	Equilibrium			
Equilibrium at T, RH		160 F.85%			
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	UNC1-X-CX-1-RTD-X	UNC1-X-CX-1-ETW-X			
	Normalized	Measured	Normalized	Measured	
UNC1 Strength [ksi]	58.75	58.55	31.93	32.05	
Mean	56.63	55.20	24.11	24.00	
Minimum	61.26	61.90	36.63	37.30	
Maximum	2.188	2.933	8.878	9.643	
C.V.(%)					
No. Specimens	18		22		
No. Prepreg Lots	3		3		
UNC1 Modulus [Msi]	2.799	2.789	2.232	2.232	
Mean	2.671	2.720	2.108	2.130	
Minimum	2.854	2.850	2.344	2.300	
Maximum	2.029	1.380	3.041	2.358	
C.V.(%)					
No. Specimens	18		18		
No. Prepreg Lots	3		3		

2.3.10 “10/80/10” Unnotched Compression 2 Properties (UNC2)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Unnotched Compression 2 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/-45/45/-45/0/0/-45/45/-45/45]	
Resin content: 36.46 % wt	Comp. density: 1.653 g/cc		
Fiber volume: 47.89 % vol			
Ply count: 10			
Test method: ASTM D6641-16	Modulus calculation: 1000 to 3000 microstrain		
Normalized by: 0.01120	in. CPT		
	RTD	ETW	
Test Temperature [°F]	70	212	
Moisture Conditioning	Dry	Equilibrium	
Equilibrium at T, RH		160 F, 85%	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	UNC2-X-CX-1-RTD-X	UNC2-X-CX-1-ETW-X	
	Normalized	Measured	Normalized
			Measured
UNC2 Strength [ksi]			
Mean	36.47	37.13	19.17
Minimum	33.46	34.70	16.99
Maximum	38.48	38.60	21.50
C.V.(%)	3.194	2.599	6.645
No. Specimens	18	23	
No. Prepreg Lots	3	3	
UNC2 Modulus [Msi]			
Mean	2.213	2.254	1.484
Minimum	2.112	2.150	1.347
Maximum	2.309	2.330	1.610
C.V.(%)	2.302	2.242	5.407
No. Specimens	18	18	
No. Prepreg Lots	3	3	

2.3.11 “40/20/40” Unnotched Compression 3 Properties (UNC3)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Unnotched Compression 3 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0/90/0/90/45/45/90/0/90/0]	
Resin content: 36.58 % wt	Comp. density: 1.647 g/cc		
Fiber volume: 47.32 % vol			
Ply count: 10			
Test method: ASTM D6641-16	Modulus calculation: 1000 to 3000 microstrain		
Normalized by: 0.01120	in. CPT		
	RTD	ETW	
Test Temperature [°F]	70	212	
Moisture Conditioning	Dry	Equilibrium	
Equilibrium at T, RH		160 F, 85%	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	UNC3-X-CX-1-RTD-X	UNC3-X-CX-1-ETW-X	
	Normalized	Measured	Normalized
			Measured
UNC3 Strength [ksi]	Mean	57.77	58.13
	Minimum	54.80	54.80
	Maximum	59.96	60.90
	C.V.(%)	2.723	2.978
	No. Specimens	18	22
	No. Prepreg Lots	3	3
UNC3 Modulus [Msi]	Mean	3.131	3.152
	Minimum	2.931	2.880
	Maximum	3.300	3.370
	C.V.(%)	3.529	5.064
	No. Specimens	18	18
	No. Prepreg Lots	3	3

2.3.12 Lamina Short-Beam Strength Properties (SBS)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Short-Beam Strength Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0] ₂₀	
Resin content: 37.19 % wt	Comp. density: 1.646 g/cc		
Fiber volume: 47.10% vol			
Ply count: 20			
Test method: ASTM D2344-22			
Normalized by: NA			
	CTD	RTD	ETD
Test Temperature [°F]	-65	70	212
Moisture Conditioning	Dry	Dry	Dry
Equilibrium at T, RH			212 Equilibrium 160 F, 85%
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	SBS-X-CX-1-CTD-X	SBS-X-CX-1-RTD-X	SBS-X-CX-1-ETD-X
	Normalized	Measured	Normalized
Mean	9.467	8.638	5.883
Minimum	9.275	8.380	5.690
Maximum	9.780	8.900	6.050
C.V.(%)	1.447	1.855	1.681
SBS Strength [ksi]			
No. Specimens	18	18	18
No. Prepreg Lots	3	3	3

2.3.13 Laminate Short-Beam Strength Properties (SBS1)

Material: Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Laminate Short-Beam Strength	
Resin content: 38.3 % wt	Comp. density: 1.174 g/cc	Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%	
Fiber volume: 47.05 % vol		[45/0/-45/90/45/0/90/-45/0/45/90/-45]	
Ply count: 12			
Test method: ASTM D2344-22			
Normalized by: NA			
	RTD	ETW	
Test Temperature [°F]	70	212	
Moisture Conditioning	Dry	Equilibrium	
Equilibrium at T, RH		160 F, 85%	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	SBS1-X-CX-1-RTD-X	SBS1-X-CX-1-ETW-X	
	Normalized	Measured	
Mean	7.857	3.423	
Minimum	7.590	3.010	
Maximum	8.070	4.040	
C.V.(%)	1.768	6.063	
No. Specimens	18	24	
No. Prepreg Lots	3	3	

2.3.14 “25/50/25” Open-Hole Tension 1 Properties (OHT1)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Open-Hole Tension 1 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/0/-45/90/45/0/90/-45/0/45/90/-45]	
Resin content: 37.33 % wt	Comp. density: 1.641 g/cc		
Fiber volume: 46.75 % vol			
Ply count: 12			
Test method: ASTM D5766-11			
Normalized by: 0.01120	in. CPT		
	CTD	RTD	ETD
Test Temperature [°F]	-65	70	212
Moisture Conditioning	Dry	Dry	Dry
Equilibrium at T, RH			Equilibrium 160 F, 85%
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	OHT1-X-CX-1-CTD-X	OHT1-X-CX-1-RTD-X	OHT1-X-CX-1-ETD-X
	Normalized	Measured	Normalized
Mean	49.37	49.20	42.39
Minimum	46.35	46.49	40.89
Maximum	51.61	51.54	43.84
C.V.(%)	2.849	2.623	1.908
OHT1 Strength [ksi]			
Mean			30.26
Minimum			27.61
Maximum			31.47
C.V.(%)			4.240
No. Specimens	18	18	18
No. Prepreg Lots	3	3	3

2.3.15 “10/80/10” Open-Hole Tension 2 Properties (OHT2)

Material:		Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%				Open-Hole Tension 2 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/-45/45/-45/0/0/-45/45/-45/45]			
Resin content:	36.48 % wt	Comp. density:		1.651 g/cc					
Fiber volume:	47.66 % vol								
Ply count:	10								
Test method:	ASTM D5766-11								
Normalized by:	0.01120	in. CPT							
		CTD		RTD		ETW			
Test Temperature [°F]		-65		70		212			
Moisture Conditioning		Dry		Dry		Equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code prefixed by: NTP2014Q1-RMC-R14-RS-		OHT2-X-CX-1-CTD-X		OHT2-X-CX-1-RTD-X		OHT2-X-CX-1-ETW-X			
		Normalized	Measured	Normalized	Measured	Normalized	Measured		
OHT2 Strength [ksi]	Mean	34.20	34.39	29.43	29.56	17.67	17.72		
	Minimum	32.69	32.68	28.09	28.60	16.74	16.30		
	Maximum	35.32	35.51	30.54	30.20	18.33	18.80		
	C.V.(%)	2.171	1.847	2.250	1.613	2.583	4.274		
No. Specimens		18		18		18			
No. Prepreg Lots		3		3		3			

2.3.16 “40/20/40” Open-Hole Tension 3 Properties (OHT3)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Open-Hole Tension 3 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0/90/0/90/45/45/90/0/90/0]	
Resin content: 36.58 % wt	Comp. density: 1.650 g/cc		
Fiber volume: 47.52 % vol			
Ply count: 10			
Test method: ASTM D5766-11			
Normalized by: 0.01120 in. CPT			
	CTD	RTD	ETW
Test Temperature [°F]	-65	70	212
Moisture Conditioning	Dry	Dry	Equilibrium
Equilibrium at T, RH			160 F,85%
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	OHT3-X-CX-1-CTD-X	OHT3-X-CX-1-RTD-X	OHT3-X-CX-1-ETW-X
	Normalized	Measured	Normalized
Mean	71.37	71.52	58.00
Minimum	68.73	68.89	50.04
Maximum	73.35	73.95	62.17
C.V.(%)	1.966	2.050	7.679
OHT3 Strength [ksi]			
No. Specimens	18	18	18
No. Prepreg Lots	3	3	3

2.3.17 “25/50/25” Filled-Hole Tension 1 Properties (FHT1)

Material:		Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Filled-Hole Tension 1 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/0/-45/90/45/0/90/-45/0/45/90/-45]	
Resin content:	37.27 % wt	Comp. density:	1.643 g/cc		
Fiber volume:	46.87 % vol				
Ply count:	12				
Test method:	ASTM D6742-17				
Normalized by:	0.01120	in. CPT			
		CTD	RTD	ETW	
Test Temperature [°F]		-65	70	212	
Moisture Conditioning		Dry	Dry	Equilibrium	
Equilibrium at T, RH				160 F,85%	
Source code prefixed by:	NTP2014Q1-RMC-R14-RS-	FHT1-X-CX-1-CTD-X	FHT1-X-CX-1-RTD-X	FHT1-X-CX-1-ETW-X	
		Normalized	Measured	Normalized	Measured
FHT1 Strength [ksi]	Mean	51.30	50.70	45.72	45.37
	Minimum	47.92	47.32	43.71	43.20
	Maximum	55.55	54.73	48.47	47.90
	C.V.(%)	3.384	3.431	2.326	2.326
		No. Specimens	18	18	18
		No. Prepreg Lots	3	3	3

2.3.18 “10/80/10” Filled-Hole Tension 2 Properties (FHT2)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Resin content: 36.54 % wt		Comp. density: 1.651 g/cc		FHT2-X-CX-1-CTD-X	
Fiber volume: 47.72 % vol		Ply count: 10		Test method: ASTM D6742-17		Normalized by: 0.01120 in. CPT	
Test Temperature [°F]		Moisture Conditioning		Equilibrium at T, RH		Source code prefixed by: NTP2014Q1-RMC-R14-RS-	
CTD		RTD		ETW			
-65		70		212			
Dry		Dry		Equilibrium			
FHT2-X-CX-1-CTD-X		FHT2-X-CX-1-RTD-X		FHT2-X-CX-1-ETW-X			
Normalized		Measured		Normalized		Measured	
Mean		37.97		31.15		18.71	
Minimum		36.61		30.23		16.35	
Maximum		39.19		32.00		19.82	
C.V.(%)		1.837		1.686		4.295	
FHT2 Strength [ksi]							
No. Specimens		18		18		18	
No. Prepreg Lots		3		3		3	

2.3.19 “40/20/40” Filled-Hole Tension 3 Properties (FHT3)

Material:		Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Filled-Hole Tension 3 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0/90/0/90/45/45/90/0/90/0]	
Resin content:	37.41 % wt	Comp. density:	1.647 g/cc		
Fiber volume:	47.39 % vol				
Ply count:	10				
Test method:	ASTM D6742-17				
Normalized by:	0.01120	in. CPT			
		CTD	RTD	ETW	
Test Temperature [°F]		-65	70	212	
Moisture Conditioning		Dry	Dry	Equilibrium	
Equilibrium at T, RH				160 F,85%	
Source code prefixed by:	NTP2014Q1-RMC-R14-RS-	FHT3-X-CX-1-CTD-X	FHT3-X-CX-1-RTD-X	FHT3-X-CX-1-ETW-X	
		Normalized	Measured	Normalized	Measured
FHT3 Strength [ksi]	Mean	63.23	63.15	54.60	54.71
	Minimum	59.46	59.16	52.73	52.80
	Maximum	65.85	65.61	57.31	56.80
	C.V.(%)	3.220	3.271	2.442	2.106
	No. Specimens	18	18	18	
	No. Prepreg Lots	3	3	3	

2.3.20 “25/50/25” Open-Hole Compression 1 Properties (OHC1)

Material: Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Open-Hole Compression 1 Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/0/-45/90/45/0/90/-45/0/45/90/-45]	
Resin content: 37.07 % wt	Comp. density: 1.643 g/cc		
Fiber volume: 46.92 % vol			
Ply count: 12			
Test method: ASTM D6484-20			
Normalized by: 0.01120	in. CPT		
	RTD	ETD	ETW
Test Temperature [°F]	70	212	212
Moisture Conditioning	Dry	Dry	Equilibrium
Equilibrium at T, RH			160 F, 85%
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	OHC1-X-CX-1-RTD-X	OHC1-X-CX-1-ETD-X	OHC1-X-CX-1-ETW-X
	Normalized	Measured	Normalized
			Measured
Mean	32.05	31.79	24.91
Minimum	30.30	29.94	23.73
Maximum	33.27	32.90	26.50
C.V.(%)	2.022	1.948	3.497
OHC1 Strength [ksi]			
No. Specimens	18	18	18
No. Prepreg Lots	3	3	3

2.3.21 “10/80/10” Open-Hole Compression 2 Properties (OHC2)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Open-Hole Compression 2 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/-45/45/-45/0/0/-45/45/-45/45]	
Resin content: 36.52 % wt	Comp. density: 1.646 g/cc		
Fiber volume: 47.27 % vol			
Ply count: 10			
Test method: ASTM D6484-20			
Normalized by: 0.01120 in. CPT			
	RTD	ETW	
Test Temperature [°F] 70		212	
Moisture Conditioning Dry		Equilibrium	
Equilibrium at T, RH 160 F, 85%			
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	OHC2-X-CX-1-RTD-X	OHC2-X-CX-1-ETW-X	
	Normalized	Measured	Normalized
			Measured
	24.60	24.77	14.14
	23.18	23.60	12.90
	25.60	25.60	15.06
	2.854	2.375	4.542
			5.011
OHC2 Strength [ksi]			
Mean			
Minimum			
Maximum			
C.V.(%)			
No. Specimens 18			
No. Prepreg Lots 3			

2.3.22 “40/20/40” Open-Hole Compression 3 Properties (OHC3)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Open-Hole Compression 3 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0/90/0/90/45/45/90/0/90/0]	
Resin content: 36.65 % wt	Comp. density: 1.648 g/cc		
Fiber volume: 47.37 % vol			
Ply count: 10			
Test method: ASTM D6484-20			
Normalized by: 0.01120	in. CPT		
	RTD	ETW	
Test Temperature [°F]	70	212	
Moisture Conditioning	Dry	Equilibrium	
Equilibrium at T, RH		160 F, 85%	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	OHC3-X-CX-1-RTD-X	OHC3-X-CX-1-ETW-X	
	Normalized	Measured	Normalized
Mean	32.80	33.20	21.08
Minimum	31.41	31.13	19.15
Maximum	34.61	34.61	24.04
OHC3 Strength [ksi]	3.014	2.741	6.939
No. Specimens	18	18	
No. Prepreg Lots	3	3	

2.3.23 “25/50/25” Filled-Hole Compression 1 Properties (FHC1)

Material: Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Filled-Hole Compression 1 Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/0/-45/90/45/0/90/-45/0/45/90/-45]	
Resin content: 36.85 % wt	Comp. density: 1.651 g/cc		
Fiber volume: 47.63 % vol			
Ply count: 12			
Test method: ASTM D6742-17			
Normalized by: 0.01120	in. CPT		
	RTD	ETW	
Test Temperature [°F]	70	212	
Moisture Conditioning	Dry	Equilibrium	
Equilibrium at T, RH		160 F, 85%	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	FHC1-X-CX-1-RTD-X	FHC1-X-CX-1-ETW-X	
	Normalized	Measured	Normalized
Mean	57.77	57.65	29.83
Minimum	56.59	56.04	27.10
Maximum	59.35	59.12	33.31
FHC1 Strength [ksi]	1.409	1.510	5.822
			6.370
No. Specimens	19		18
No. Prepreg Lots	3		3

2.3.24 “10/80/10” Filled-Hole Compression 2 Properties (FHC2)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Filled-Hole Compression 2 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/-45/45/-45/0/0/-45/45/-45/45]	
Resin content: 36.23 % wt	Comp. density: 1.654 g/cc		
Fiber volume: 47.94 % vol			
Ply count: 10			
Test method: ASTM D6742-17			
Normalized by: 0.01120	in. CPT		
	RTD	ETW	
Test Temperature [°F]	70	212	
Moisture Conditioning	Dry	Equilibrium	
Equilibrium at T, RH		160 F, 85%	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	FHC2-X-CX-1-RTD-X	FHC2-X-CX-1-ETW-X	
	Normalized	Measured	Normalized
Mean	37.79	38.15	18.16
Minimum	36.16	36.34	17.33
Maximum	39.27	39.38	19.12
FHC2 Strength [ksi]	2.439	2.228	2.852
C.V.(%)			3.347
No. Specimens	20		18
No. Prepreg Lots	3		3

2.3.25 “40/20/40” Filled-Hole Compression 3 Properties (FHC3)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Filled-Hole Compression 3 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0/90/0/90/45/45/90/0/90/0]	
Resin content: 36.25 % wt	Comp. density: 1.657 g/cc		
Fiber volume: 48.22 % vol			
Ply count: 10			
Test method: ASTM D6742-17			
Normalized by: 0.01120 in. CPT			
	RTD	ETW	
Test Temperature [°F]	70	212	
Moisture Conditioning	Dry	Equilibrium	
Equilibrium at T, RH		160 F, 85%	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	FHC3-X-CX-1-RTD-X	FHC3-X-CX-1-ETW-X	
	Normalized	Measured	Normalized
			Measured
Mean	57.89	58.56	31.48
Minimum	52.87	52.97	29.67
Maximum	59.96	61.39	33.28
FHC3 Strength [ksi]	3.080	3.347	3.294
C.V.(%)			3.210
No. Specimens	22		18
No. Prepreg Lots	3		3

2.3.26 “25/50/25” Single-Shear Bearing 1 Properties (SSB1)

Material:		Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Single-Shear Bearing 1	
Resin content:		36.57 % wt		Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%	
Fiber volume:		47.15 % vol		[45/0/-45/90/45/0/90/-45/0/45/90/-45]	
Ply count:		12			
Test method:		ASTM D5961-17			
Normalized by:		0.01120 in. CPT			
		RTD		ETW	
Test Temperature [°F]		70		212	
Moisture Conditioning		Dry		Equilibrium	
Equilibrium at T, RH				160 F, 85%	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-		SSB1-X-CX-1-RTD-X		SSB1-X-CX-1-ETW-X	
		Normalized		Measured	
		Normalized		Measured	
SSB1 2% Offset Strength [ksi]	Mean	87.73	86.45	69.32	68.35
	Minimum	78.43	80.77	56.46	58.72
	Maximum	92.74	90.16	76.67	75.02
	C.V.(%)	3.926	2.535	7.920	7.192
	No. Specimens	18		18	
No. Prepreg Lots		3		3	
SSB1 Ultimate Strength [ksi]	Mean	103.6	102.1	71.77	70.80
	Minimum	98.11	97.03	65.15	64.87
	Maximum	106.9	105.1	79.86	77.38
	C.V.(%)	2.713	1.922	5.924	5.636
	No. Specimens	18		18	
No. Prepreg Lots		3		3	

2.3.27 “10/80/10” Single-Shear Bearing 2 Properties (SSB2)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Single-Shear Bearing 2 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/-45/45/-45/0/0/-45/45/-45/45]	
Resin content: 36.34 % wt	Comp. density: 1.651 g/cc		
Fiber volume: 47.75 % vol			
Ply count: 10			
Test method: ASTM D5961-17			
Normalized by: 0.01120 in. CPT			
	RTD	ETW	
Test Temperature [°F]	70	212	
Moisture Conditioning	Dry	Equilibrium	
Equilibrium at T, RH		160 F, 85%	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	SSB2-X-CX-1-RTD-X	SSB2-X-CX-1-ETW-X	
	Normalized	Measured	Normalized
Mean	74.67	74.45	56.63
Minimum	71.22	71.45	45.68
Maximum	78.90	78.24	63.23
SSB2 2% Offset Strength [ksi] C.V.(%)	2.965	2.803	7.500
No. Specimens	18	19	
No. Prepreg Lots	3	3	
Mean	95.42	95.13	65.39
Minimum	90.86	90.52	59.42
Maximum	101.4	100.2	68.92
SSB2 Ultimate Strength [ksi] C.V.(%)	3.572	3.092	3.841
No. Specimens	18	19	
No. Prepreg Lots	3	3	

2.3.28 “40/20/40” Single-Shear Bearing 3 Properties (SSB3)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Single-Shear Bearing 3 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0/90/0/90/45/45/90/0/90/0]	
Resin content: 36.63 % wt	Comp. density: 1.652 g/cc		
Fiber volume: 47.80 % vol			
Ply count: 10			
Test method: ASTM D5961-17			
Normalized by: 0.01120 in. CPT			
	RTD	ETW	
Test Temperature [°F]	70	212	
Moisture Conditioning	Dry	Equilibrium	
Equilibrium at T, RH		160 F, 85%	
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	SSB3-X-CX-1-RTD-X	SSB3-X-CX-1-ETW-X	
	Normalized	Measured	Normalized
			Measured
Mean	78.97	78.56	58.26
Minimum	71.59	71.91	53.13
Maximum	85.95	85.07	63.22
SSB3 2% Offset Strength [ksi]	4.522	4.297	6.051
C.V.(%)			5.979
No. Specimens	18		18
No. Prepreg Lots	3		3
Mean	88.06	87.60	59.04
Minimum	84.66	84.51	54.42
Maximum	92.87	92.34	63.40
SSB3 Ultimate Strength [ksi]	2.709	2.485	5.370
C.V.(%)			5.270
No. Specimens	18		18
No. Prepreg Lots	3		3

2.3.29 “25/50/25” Compression After Impact 1 Properties (CAI1)

Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Compression After Impact 1 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [45/0/-45/90/45/0/90/-45/0/45/90/-45]	
Resin content: 36.84 % wt	Comp. density: 1.647 g/cc		
Fiber volume: 47.27 % vol			
Ply count: 12			
Test method: ASTM D7136/7137-17			
Normalized by: 0.01120	in. CPT		
	RTD		
Test Temperature [°F] 70			
Moisture Conditioning Dry			
Equilibrium at T, RH			
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	CAI1-A-C1-1-RTD-X		
	Normalized	Measured	
Mean	26.04	25.77	
Minimum	25.23	24.94	
Maximum	26.69	26.43	
CAI1 Strength [ksi] C.V.(%)	1.827	1.833	
No. Specimens	7		
No. Prepreg Lots	1		

2.3.30 Interlaminar Tension Properties (ILT)

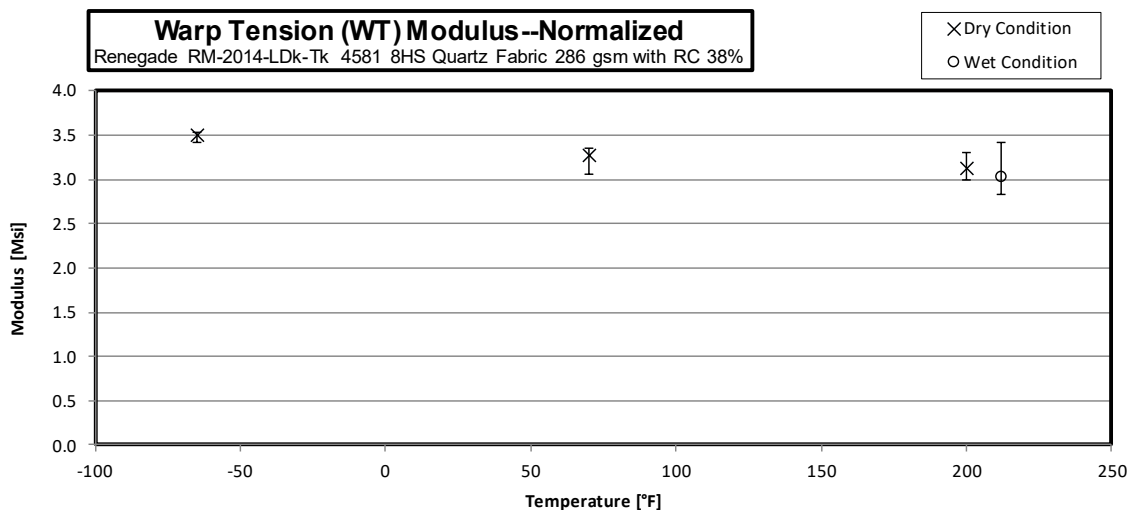
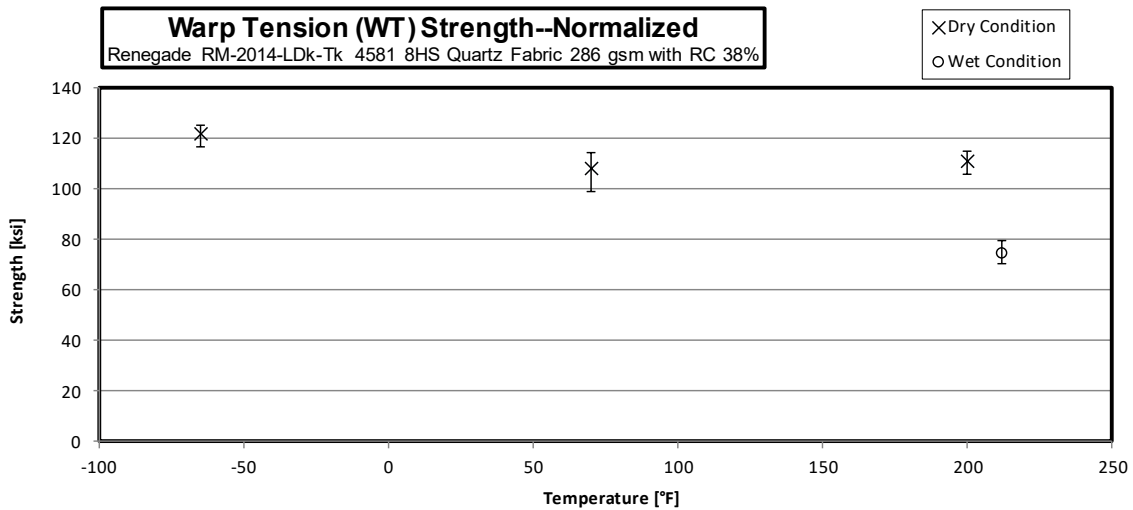
Material: Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%		Interlaminar Tension Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38% [0] ₂₀	
Resin content: 35.17 % wt	Comp. density: 1.665 g/cc		
Fiber volume: 49.07 % vol			
Ply count: 20			
Test method: ASTM D6415-22			
Normalized by: NA			
	CTD	RTD	ETW
Test Temperature [°F]	-65	70	212
Moisture Conditioning	Dry	Dry	Equilibrium
Equilibrium at T, RH			160 F, 85%
Source code prefixed by: NTP2014Q1-RMC-R14-RS-	ILT-A-C1-1-CTD-X	ILT-A-C1-1-RTD-X	ILT-A-C1-1-ETW-X
	Normalized	Measured	Normalized
Mean			
Minimum			
Maximum			
C.V.(%)			
CBS [lb]			
No. Specimens	7	6	6
No. Prepreg Lots	1	1	1
Mean	10.39	7.979	2.949
Minimum	9.423	7.636	2.601
Maximum	11.11	8.364	3.116
C.V.(%)	6.823	3.935	6.227
ILT [ksi]			
No. Specimens	7	6	6
No. Prepreg Lots	1	1	1

3. Individual Test Charts

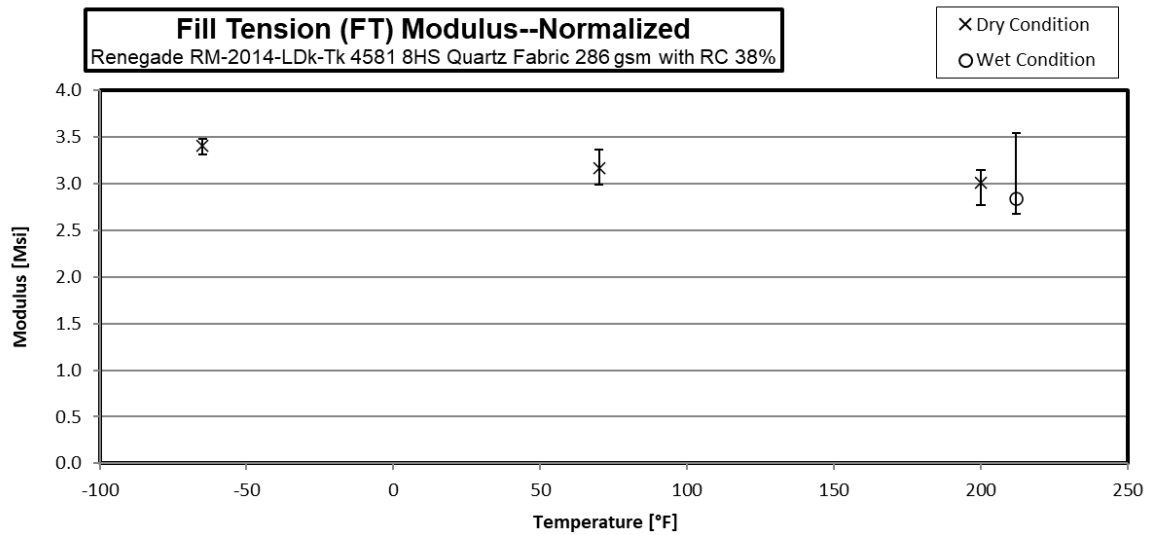
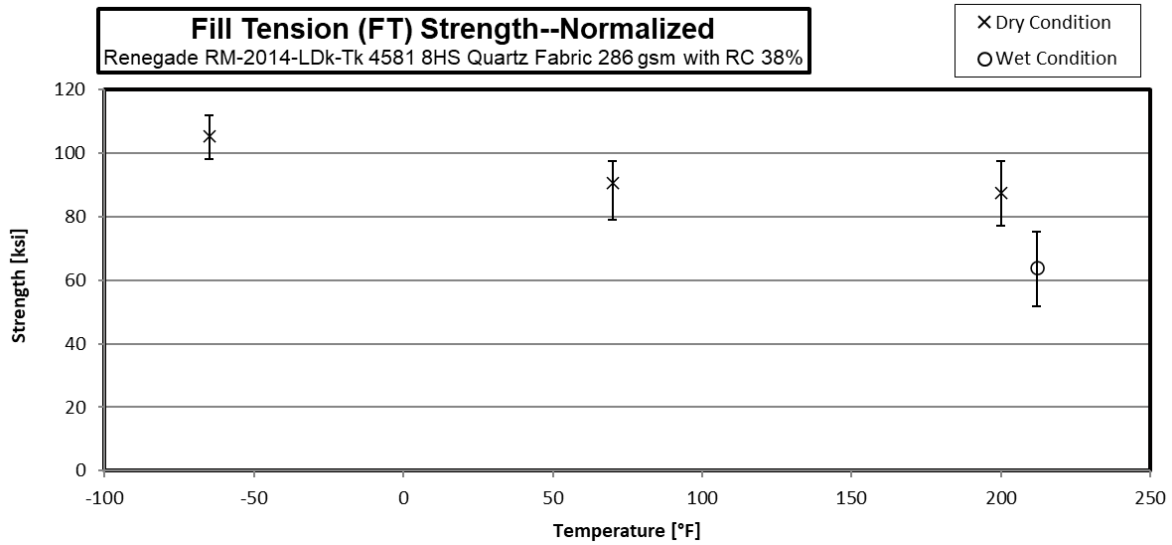
These charts combine all three batches of data and plot the minimum and maximum modulus and strength range based on the test temperature.

Test temperature for ETD is 212°F. However, it is offset to 200°F in the charts below to provide clarity when reviewing plots.

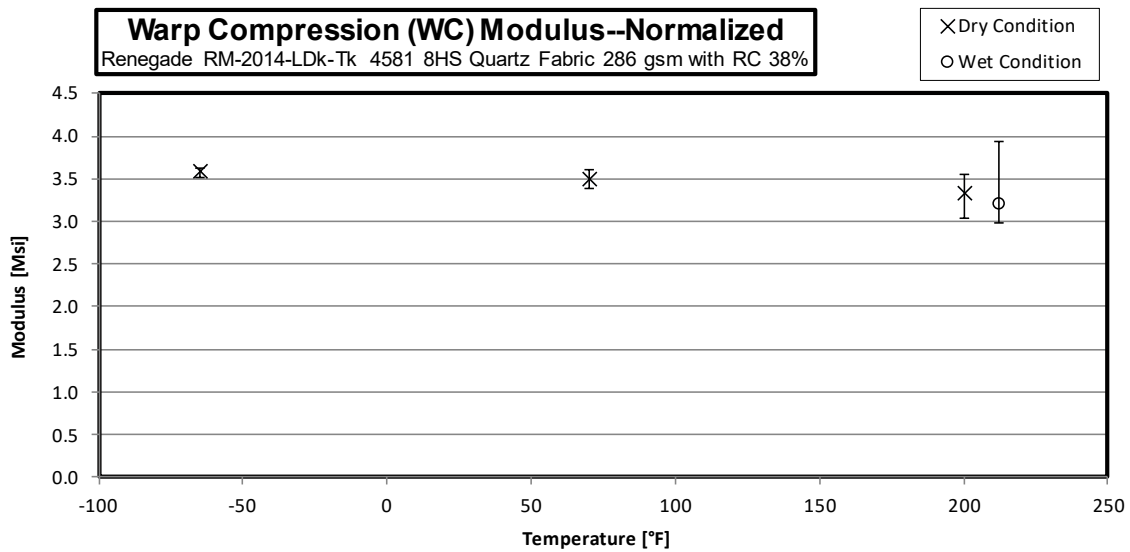
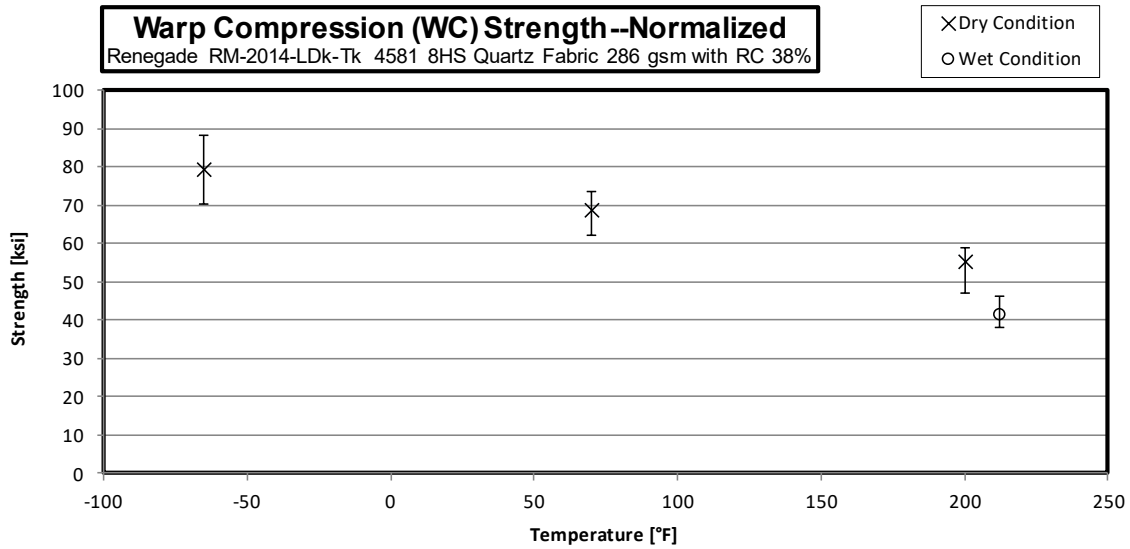
3.1 Warp Tension Properties (WT)



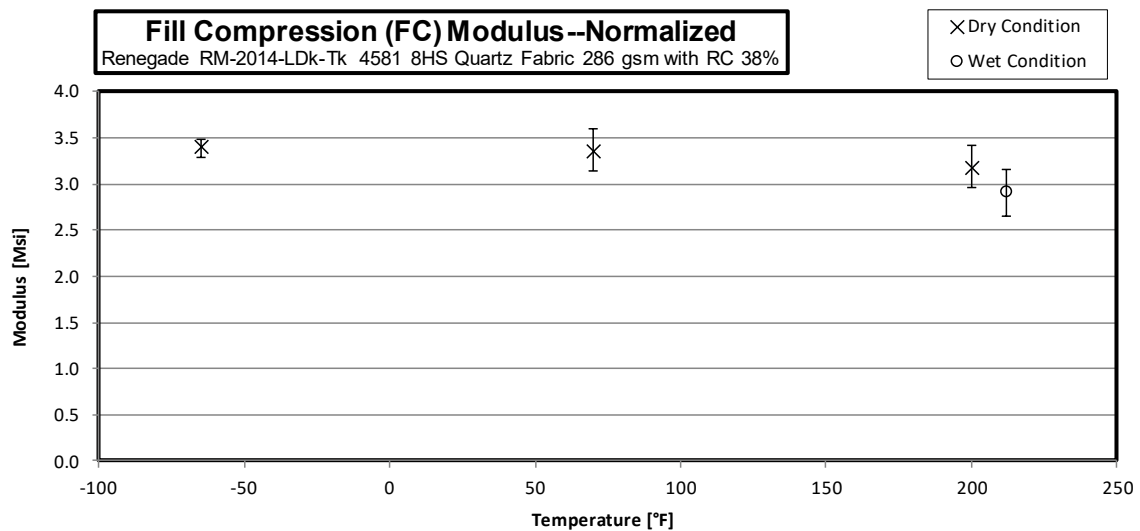
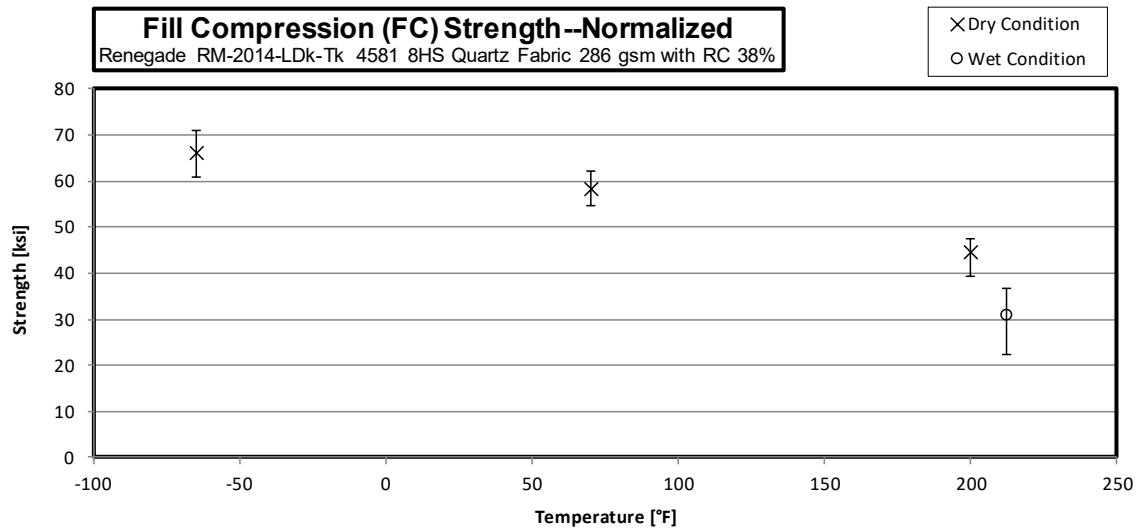
3.2 Fill Tension Properties (FT)



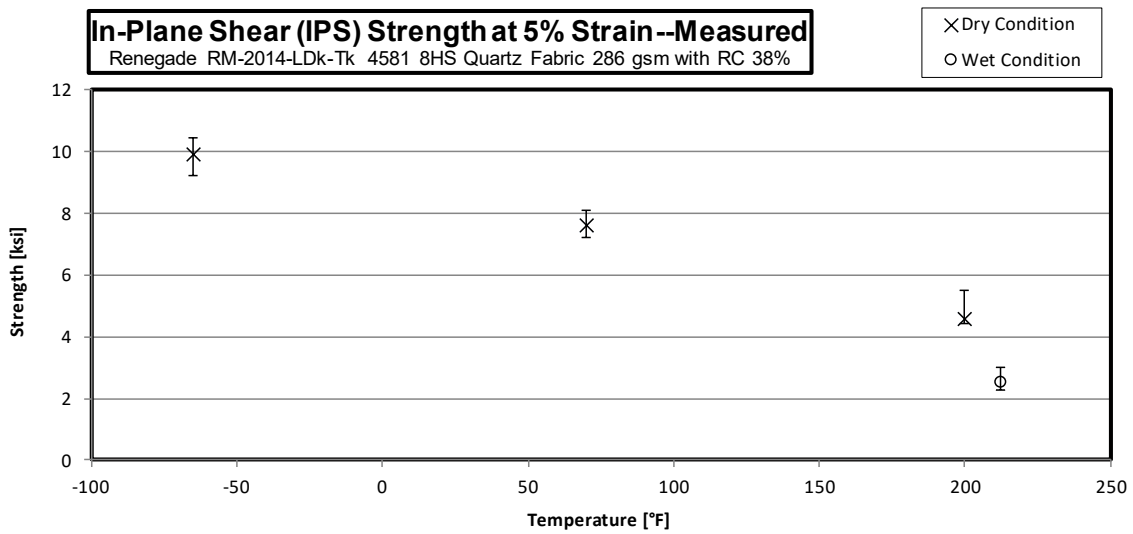
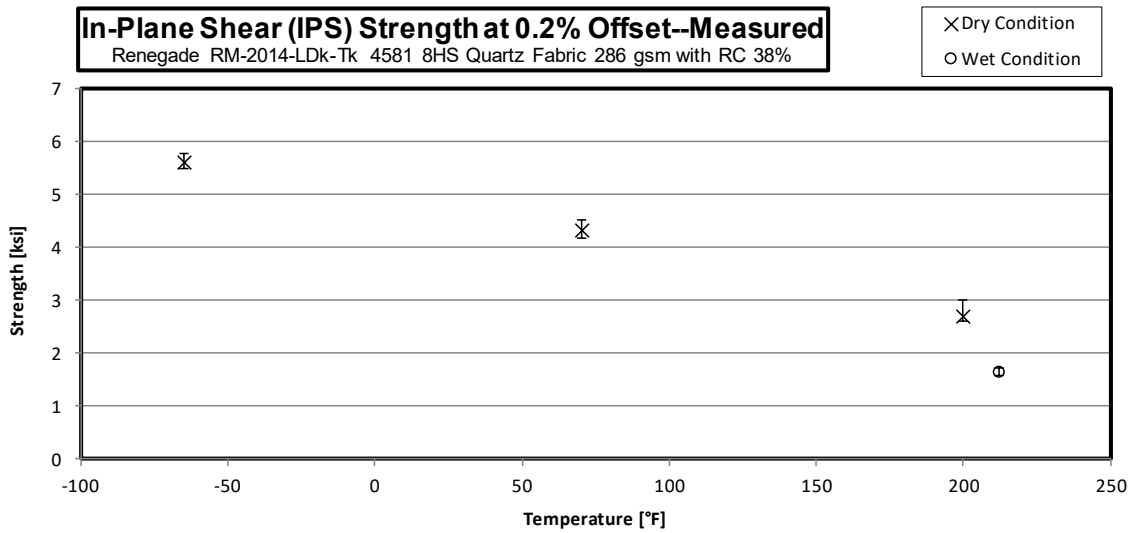
3.3 Warp Compression Properties (WC)

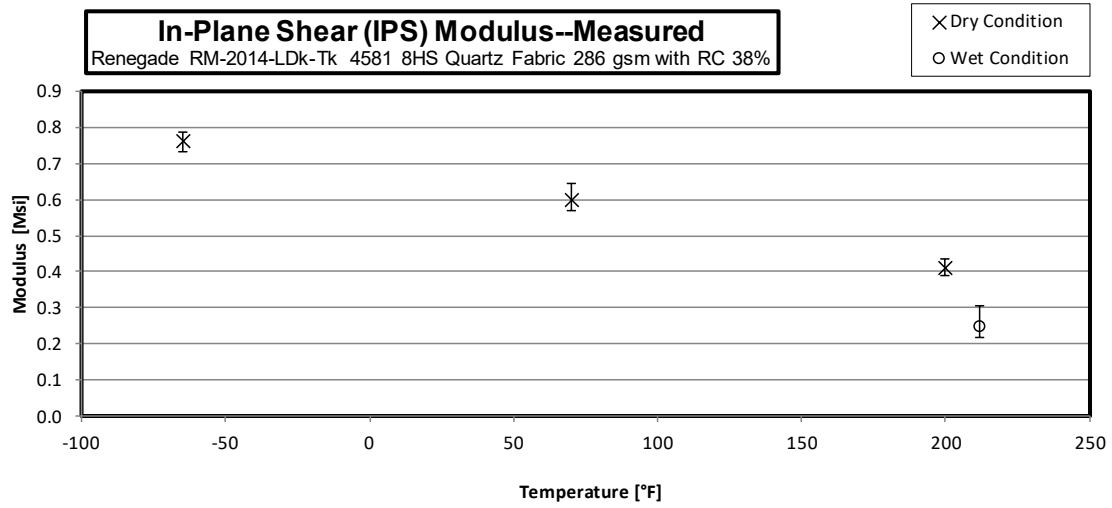


3.4 Fill Compression Properties (FC)

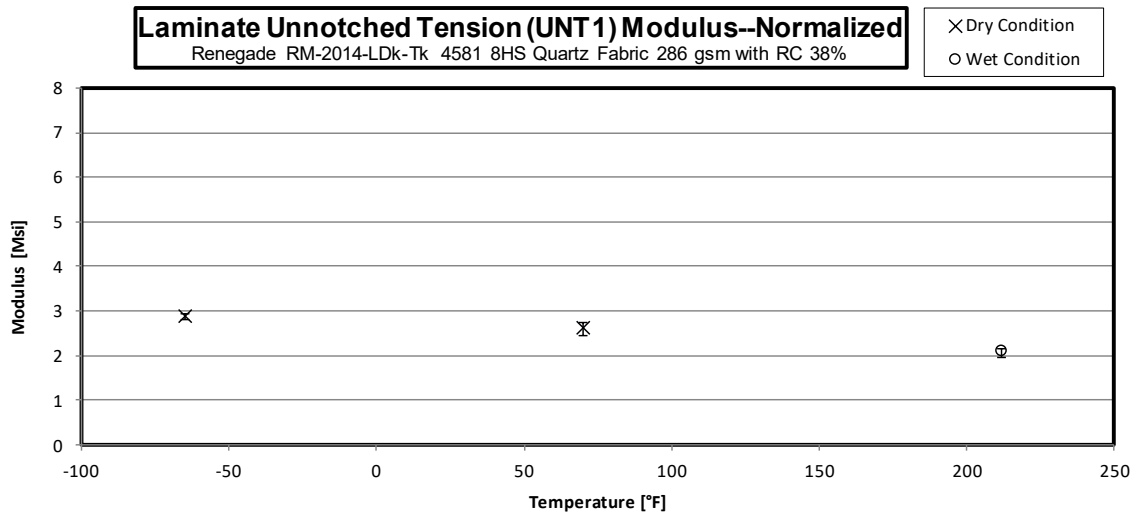
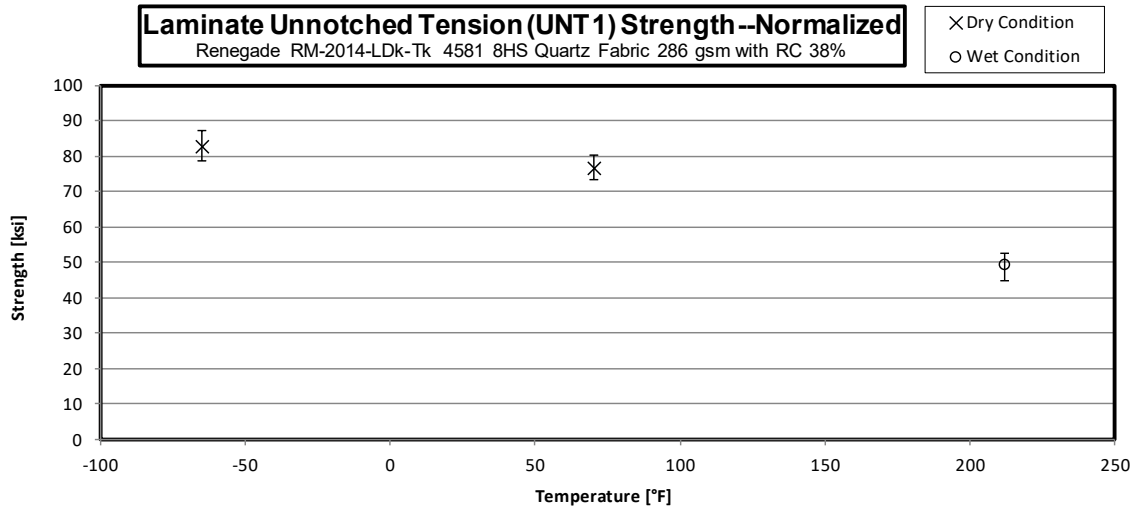


3.5 In-Plane Shear Properties (IPS)

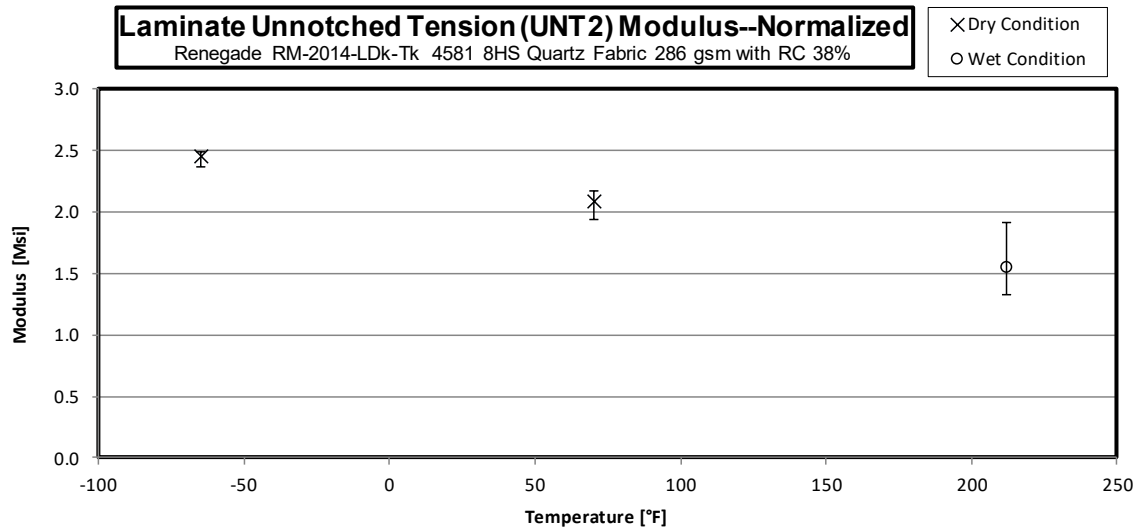
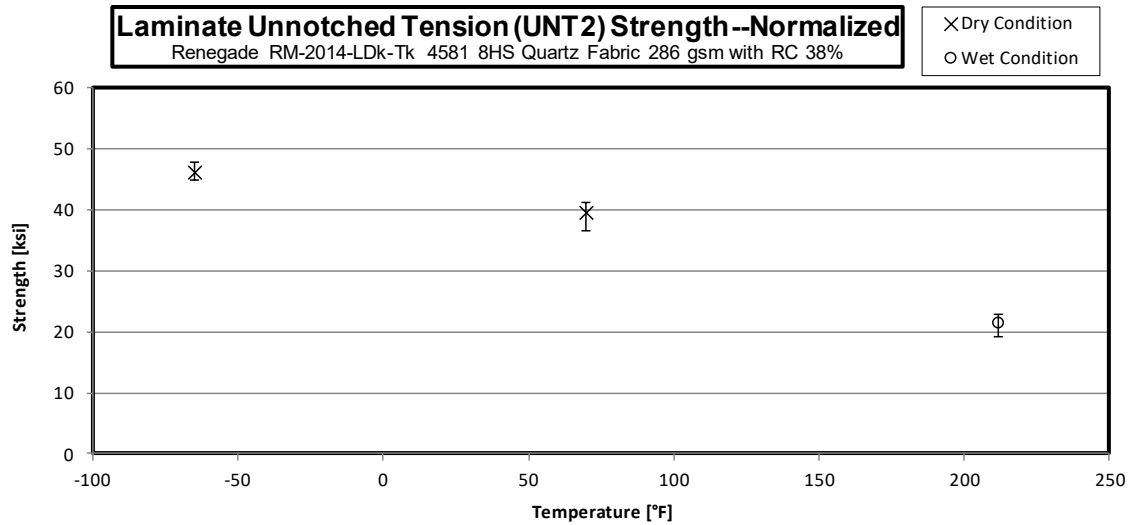




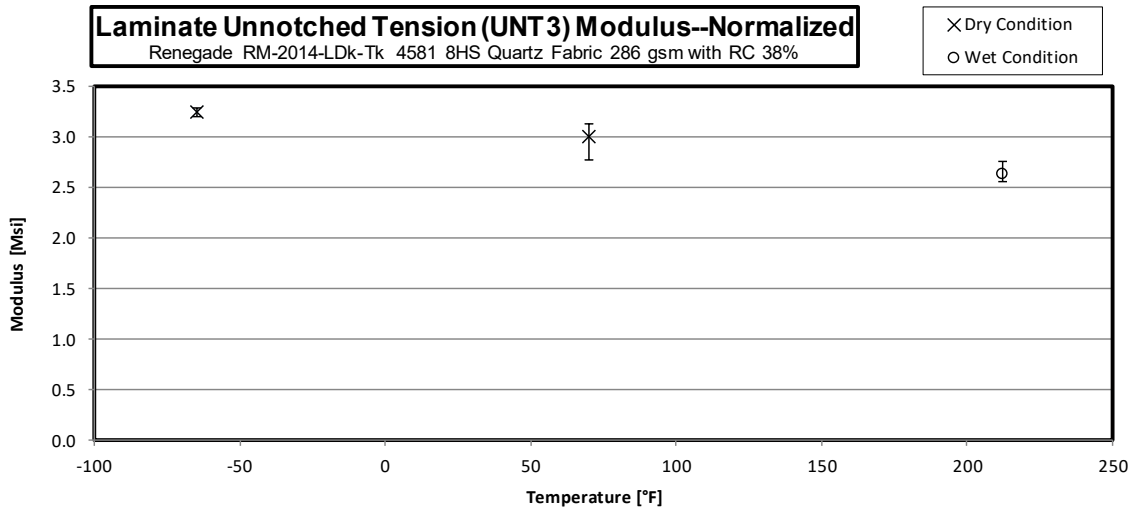
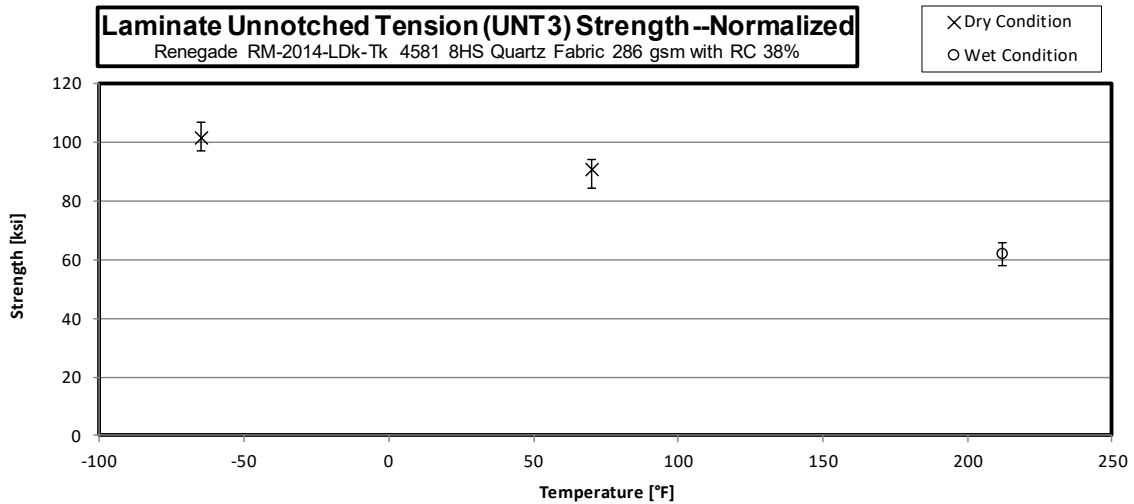
3.6 “25/50/25” Unnotched Tension 1 Properties (UNT1)



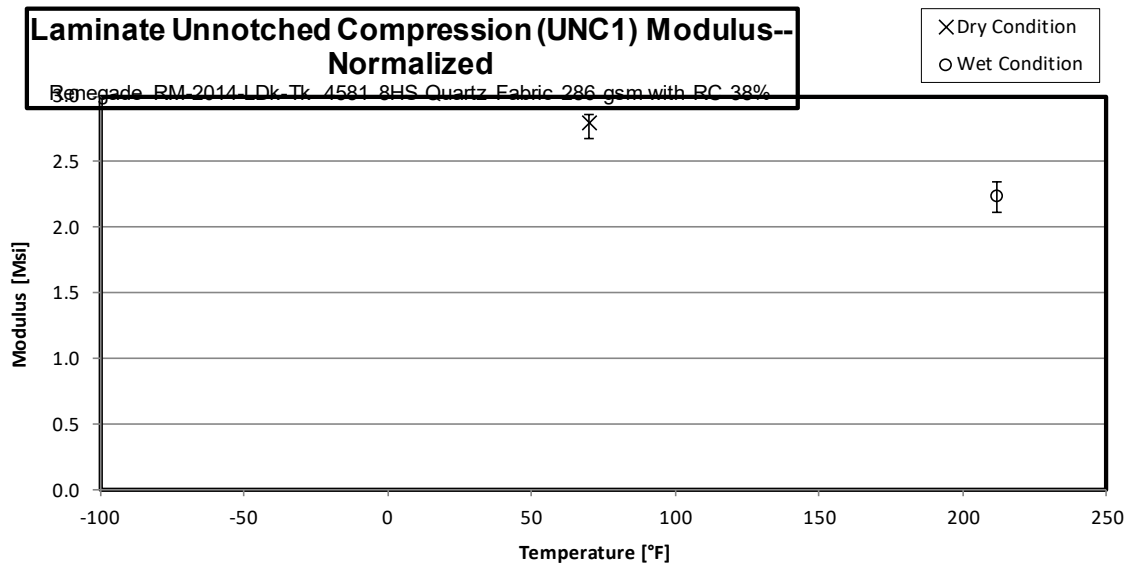
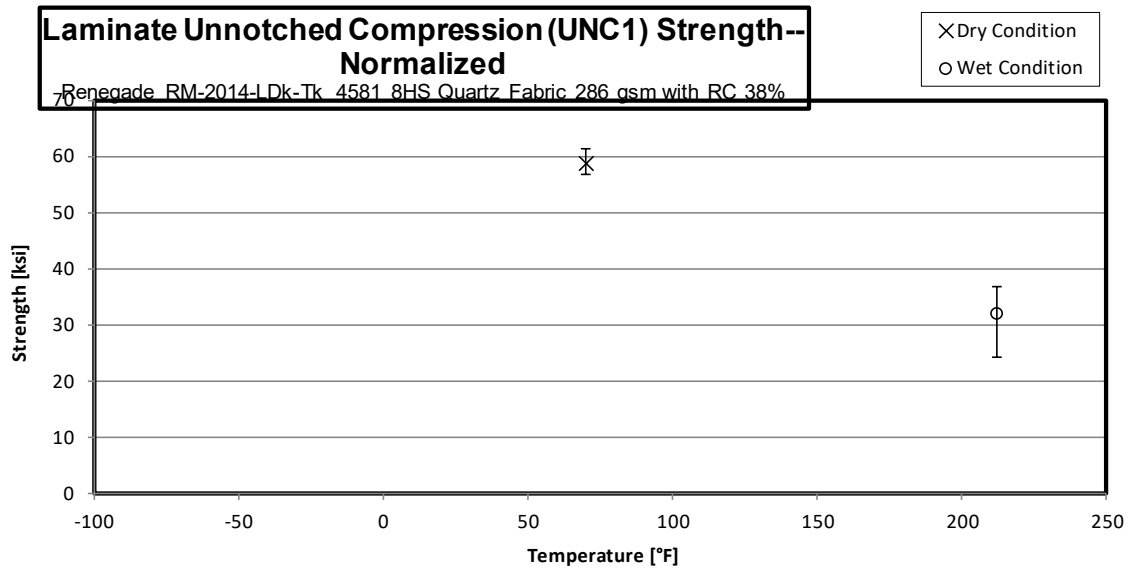
3.7 “10/80/10” Unnotched Tension 2 Properties (UNT2)



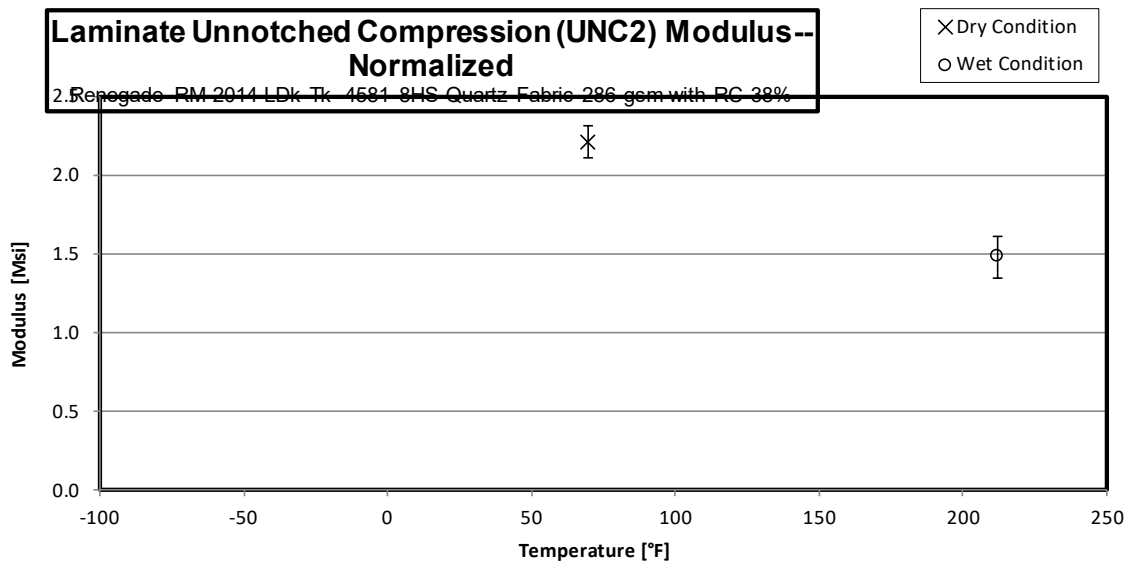
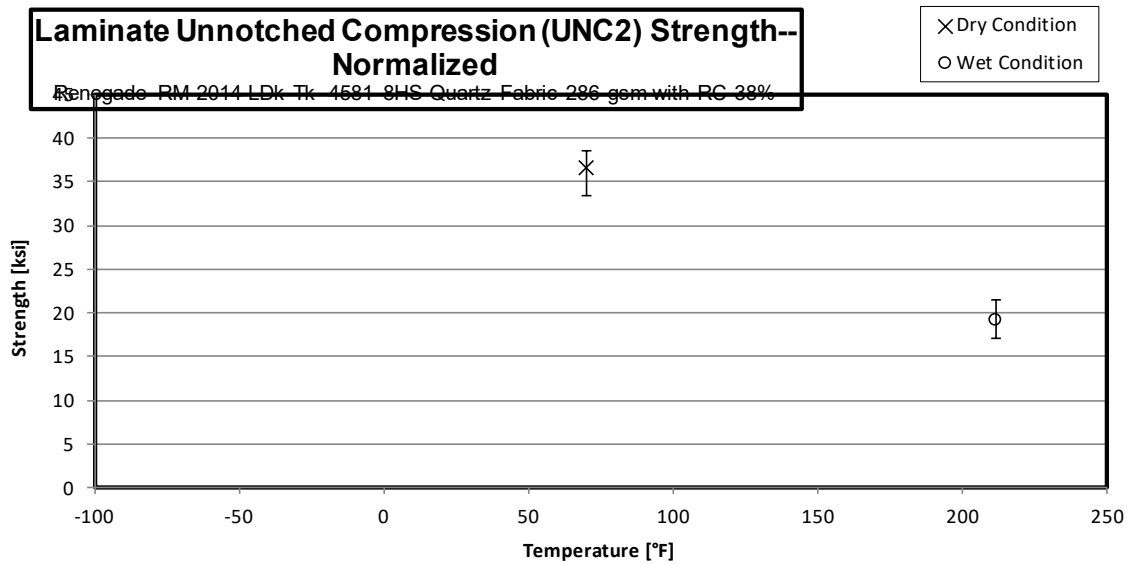
3.8 “40/20/40” Unnotched Tension 3 Properties (UNT3)



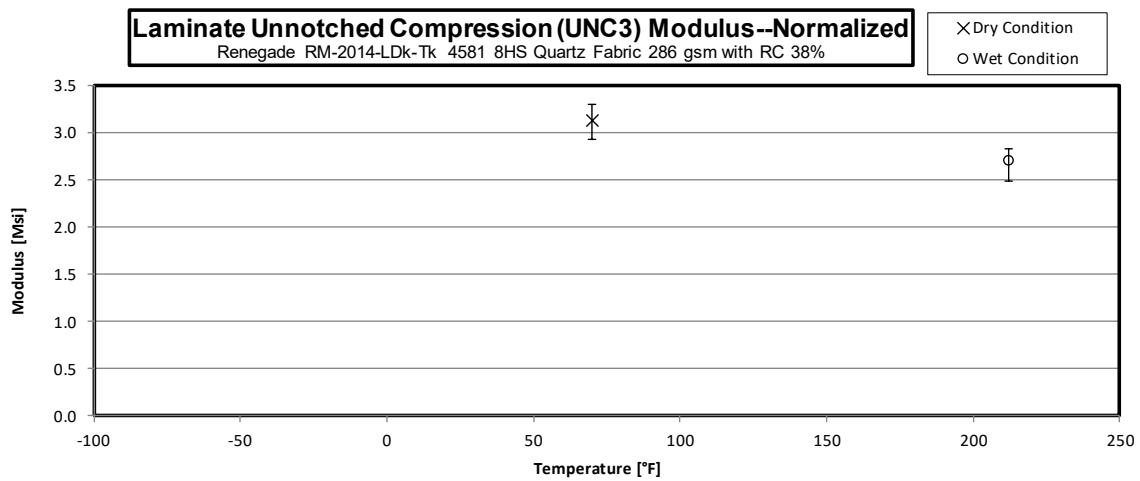
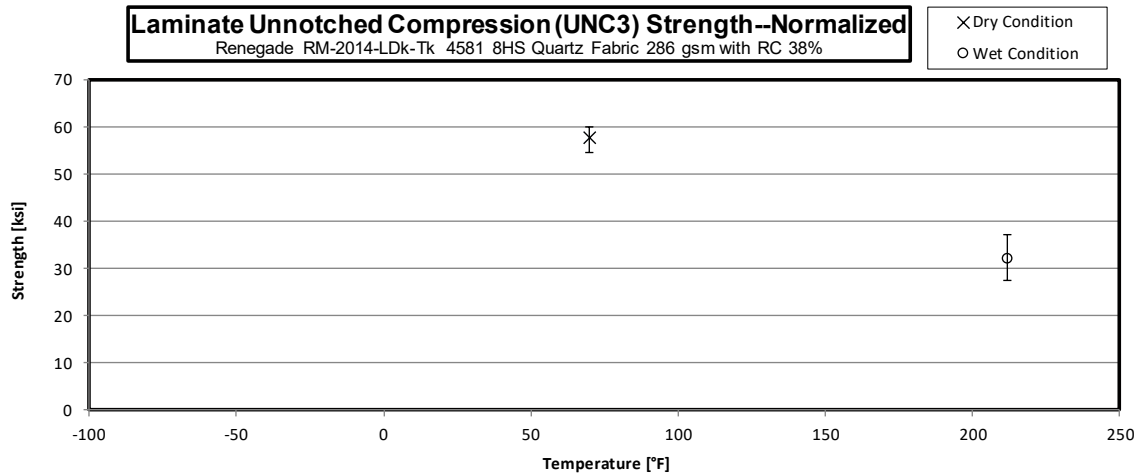
3.9 “25/50/25” Unnotched Compression 1 Properties (UNC1)



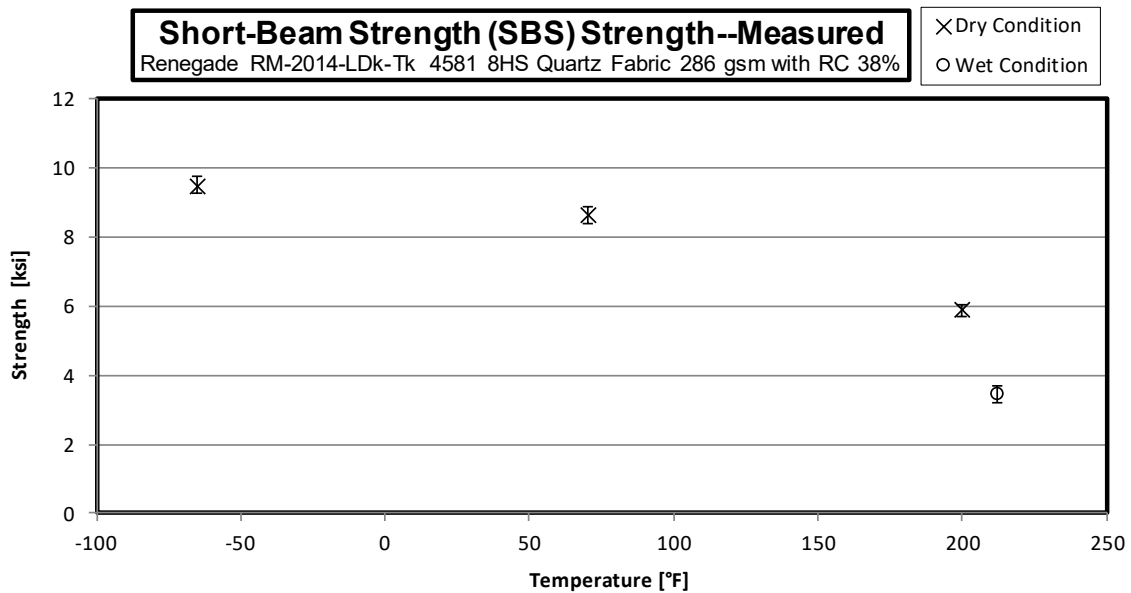
3.10 “10/80/10” Unnotched Compression 2 Properties (UNC2)



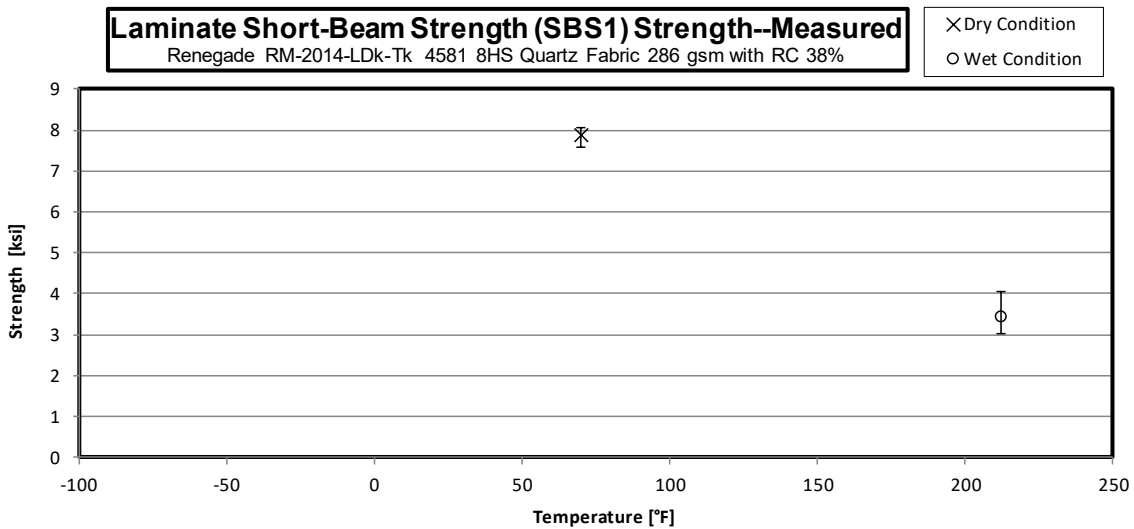
3.11 “40/20/40” Unnotched Compression 3 Properties (UNC3)



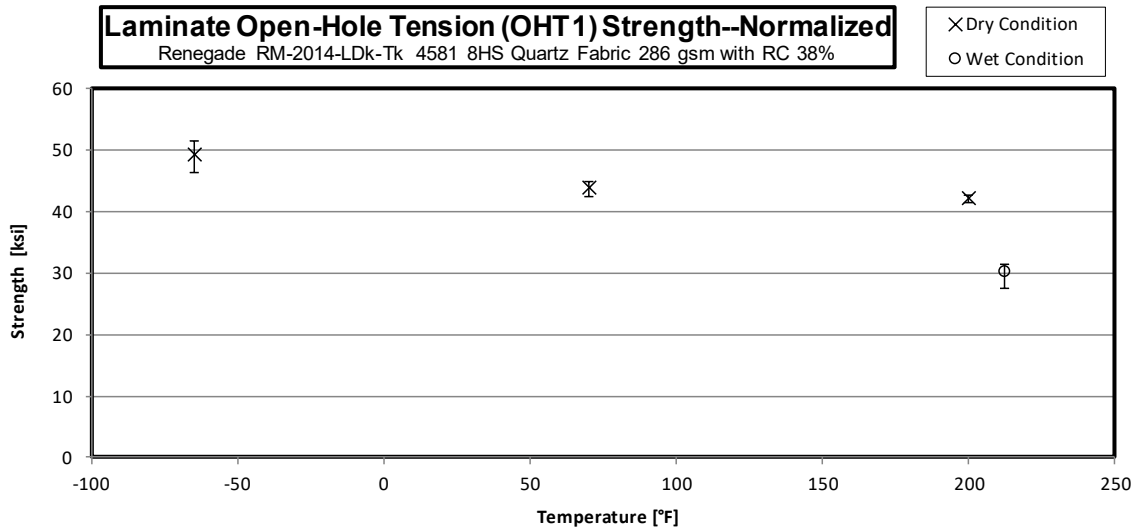
3.12 Lamina Short-Beam Shear Properties (SBS)



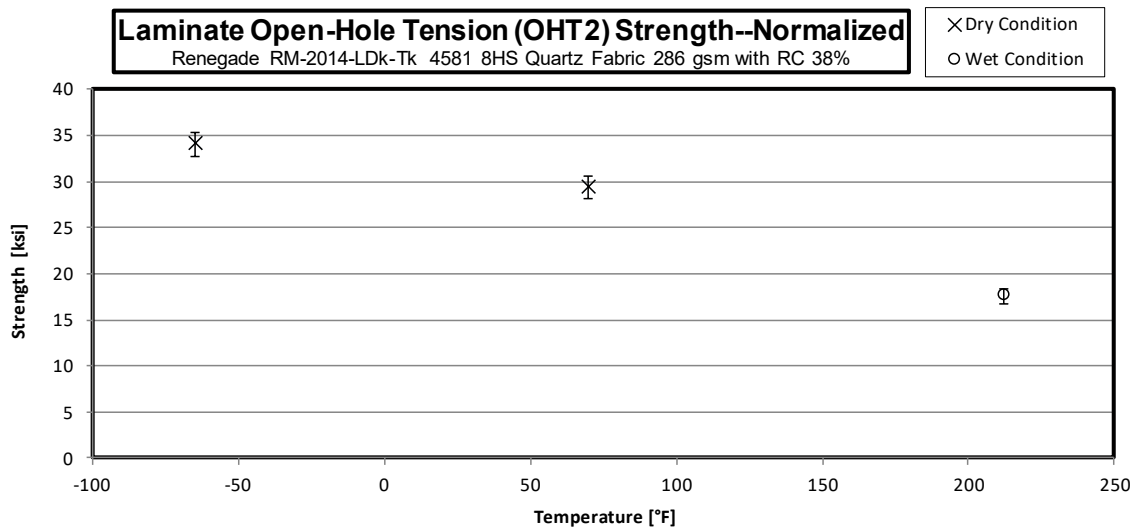
3.13 Laminate Short-Beam Strength Properties (SBS1)



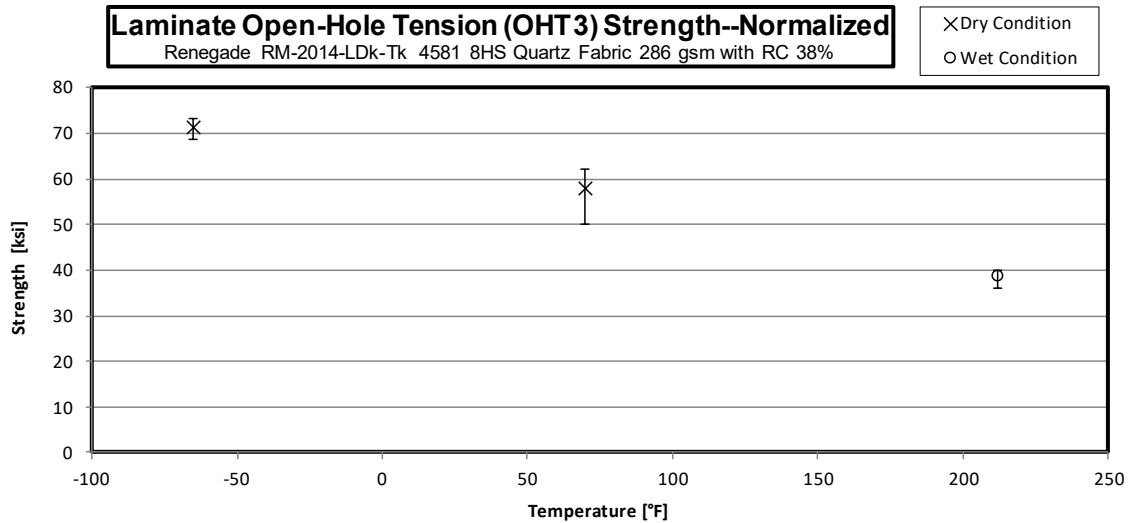
3.14 “25/50/25” Open-Hole Tension 1 Properties (OHT1)



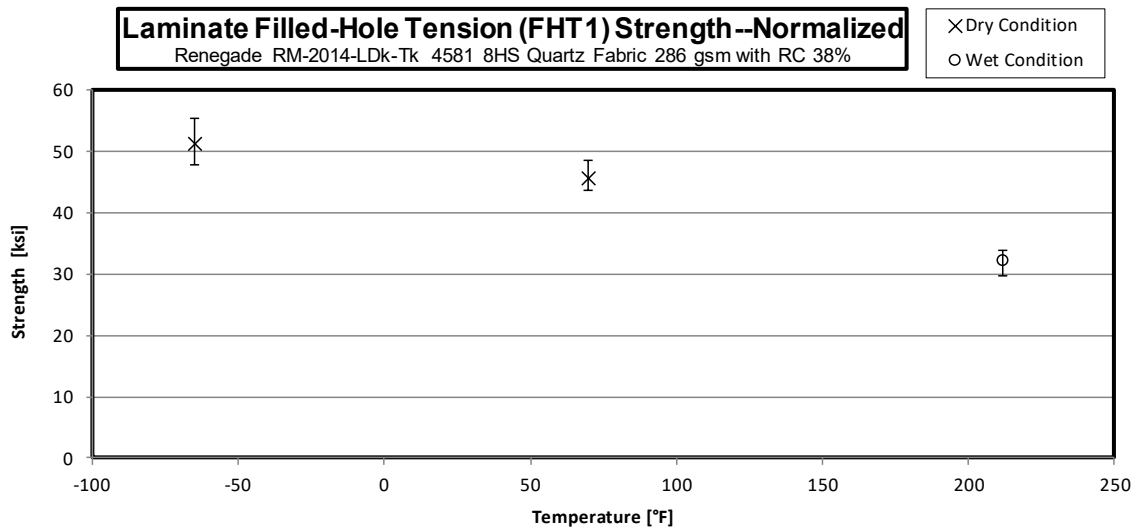
3.15 “10/80/10” Open-Hole Tension 2 Properties (OHT2)



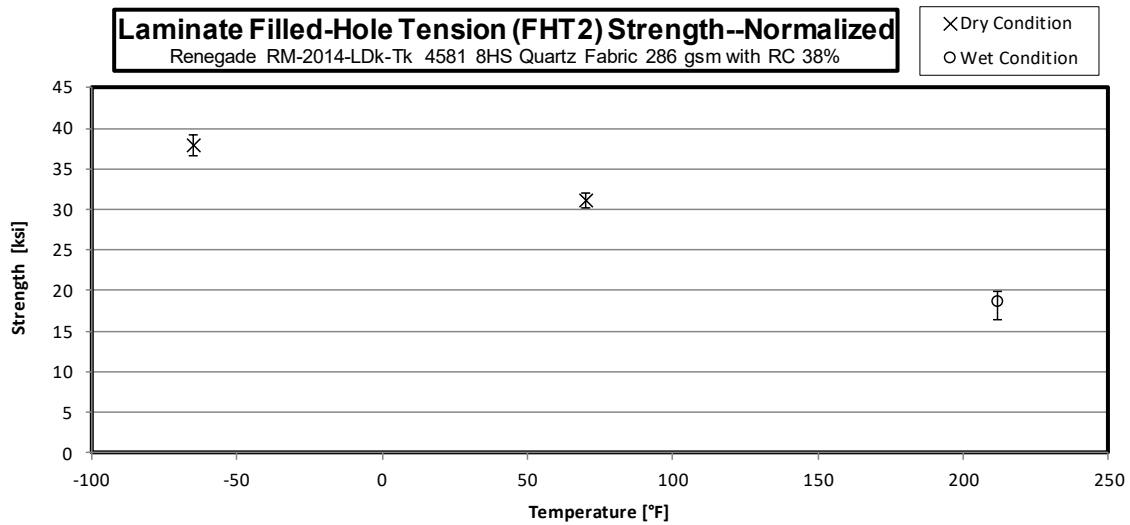
3.16 “40/20/40” Open-Hole Tension 3 Properties (OHT3)



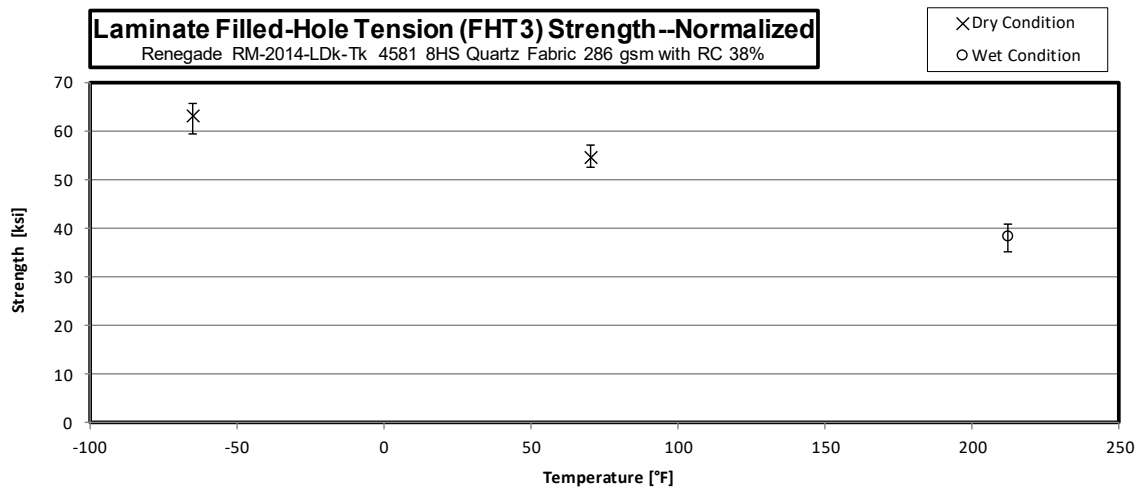
3.17 “25/50/25” Filled-Hole Tension 1 Properties (FHT1)



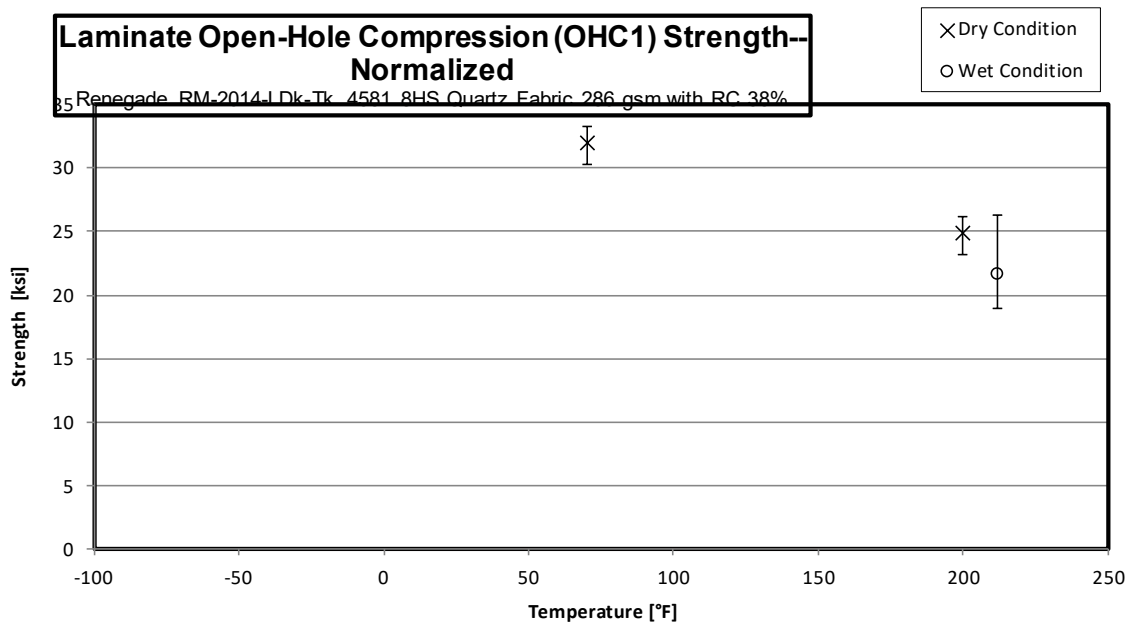
3.18 “10/80/10” Filled-Hole Tension 2 Properties (FHT2)



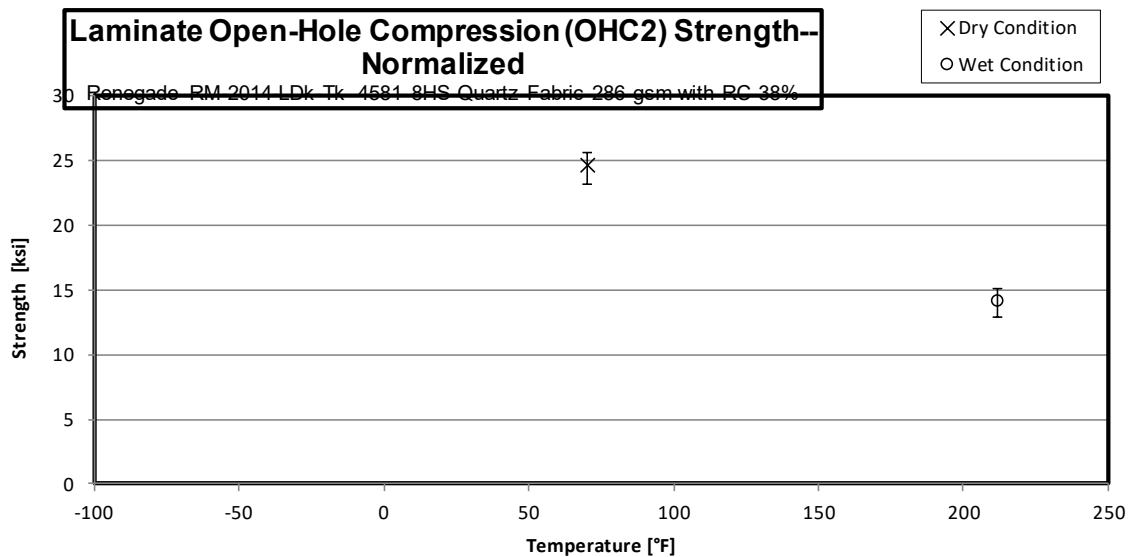
3.19 “40/20/40” Filled-Hole Tension 3 Properties (FHT3)



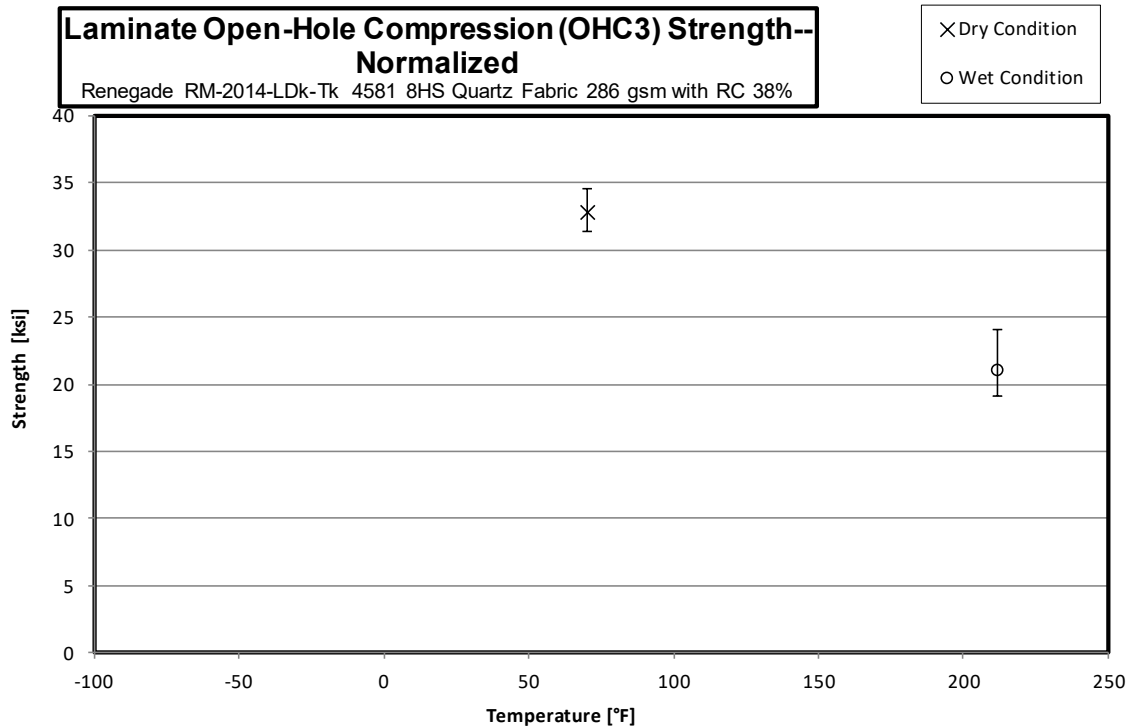
3.20 “25/50/25” Open-Hole Compression 1 Properties (OHC1)



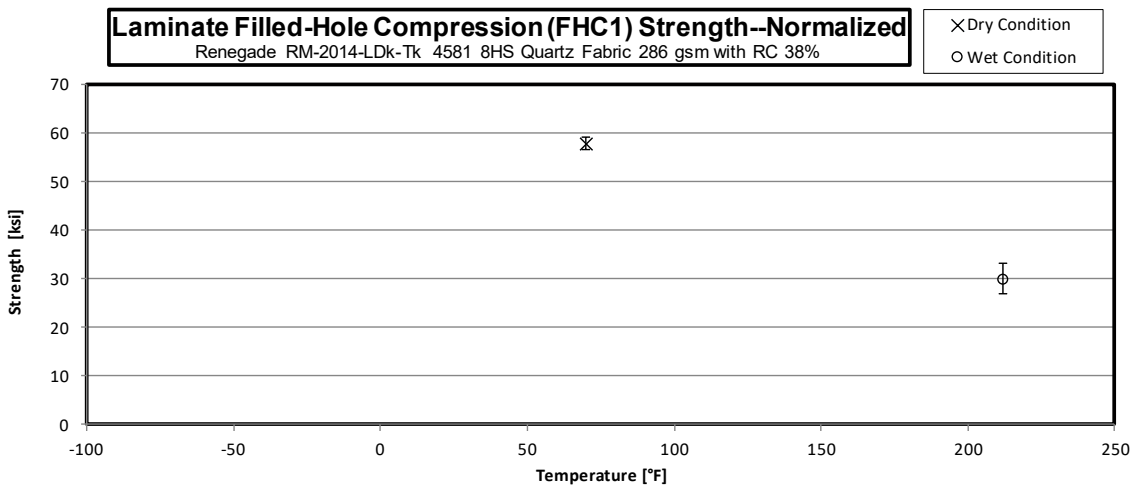
3.21 “10/80/10” Open-Hole Compression 2 Properties (OHC2)



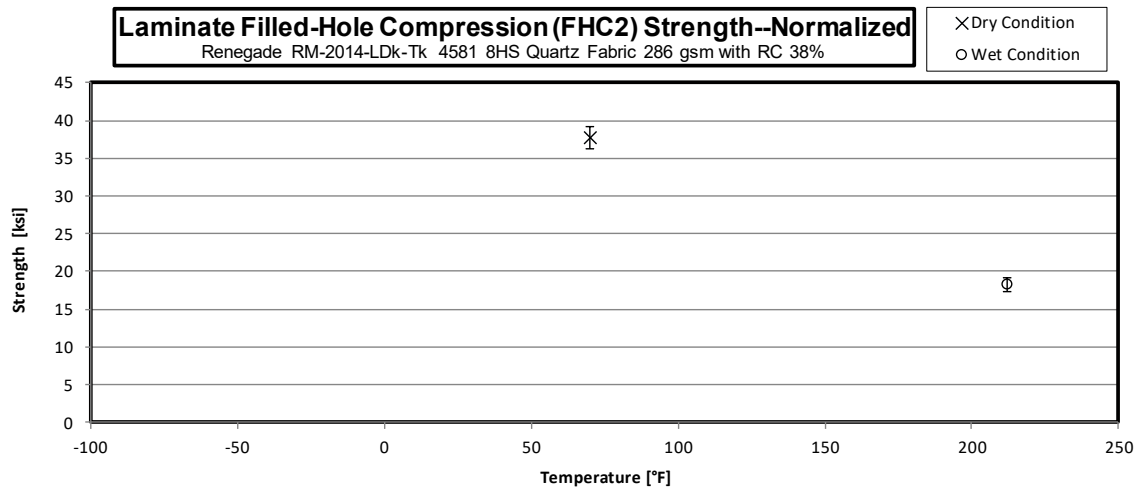
3.22 “40/20/40” Open-Hole Compression 3 Properties (OHC3)



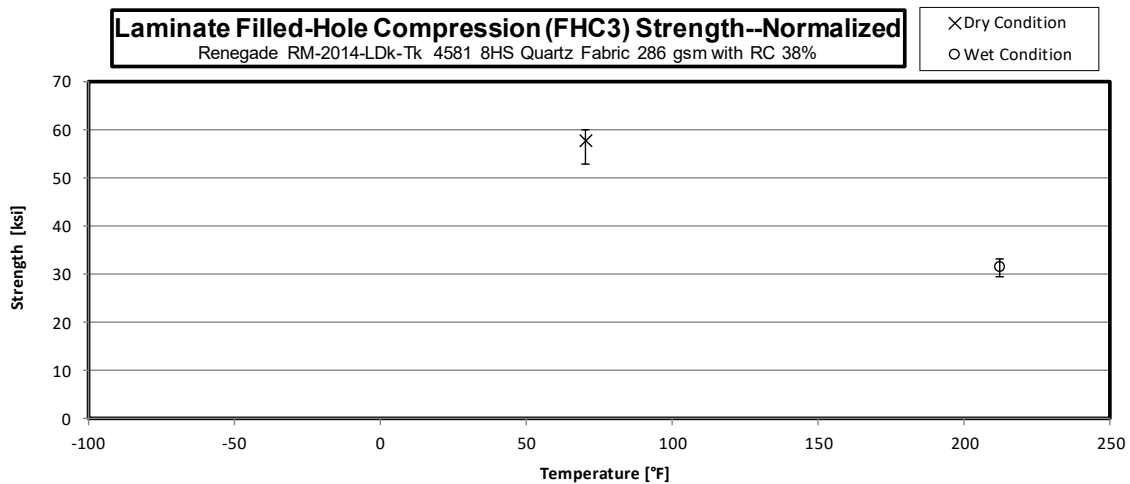
3.23 “25/50/25” Filled-Hole Compression 1 Properties (FHC1)



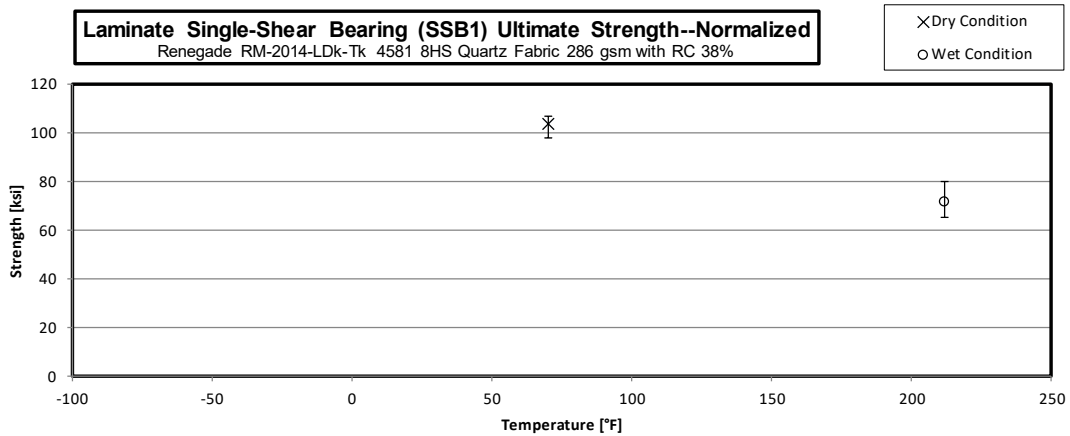
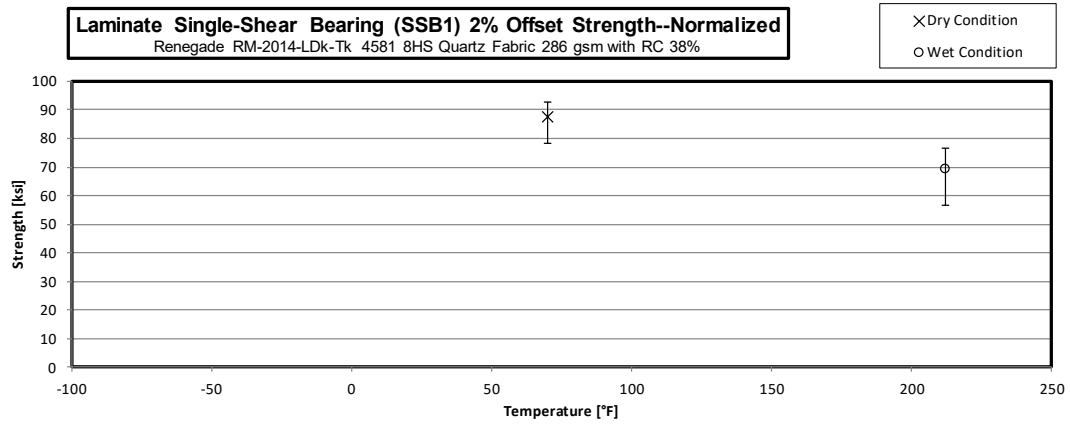
3.24 “10/80/10” Filled-Hole Compression 2 Properties (FHC2)



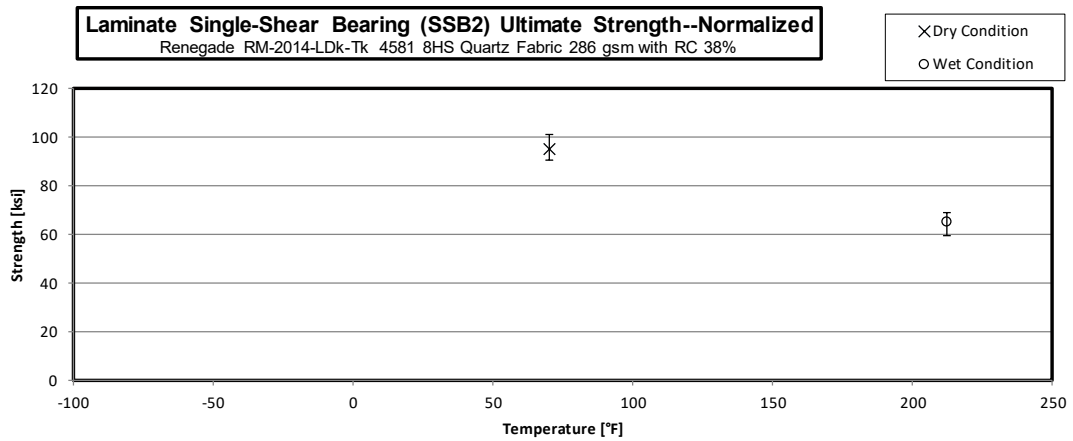
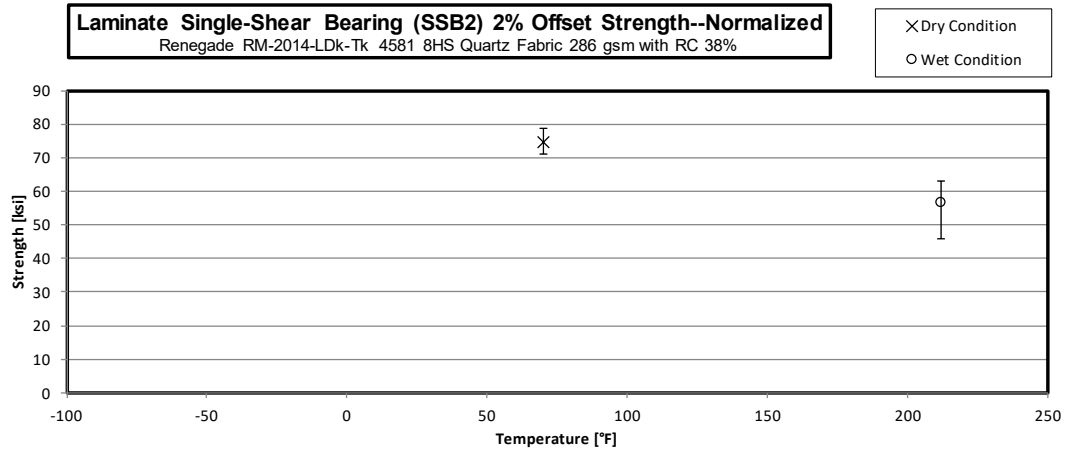
3.25 “40/20/40” Filled-Hole Compression 3 Properties (FHC3)



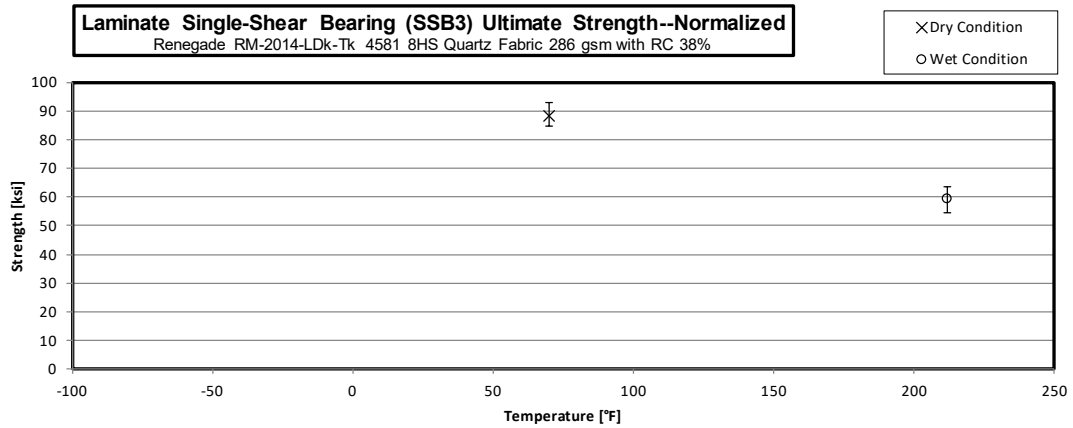
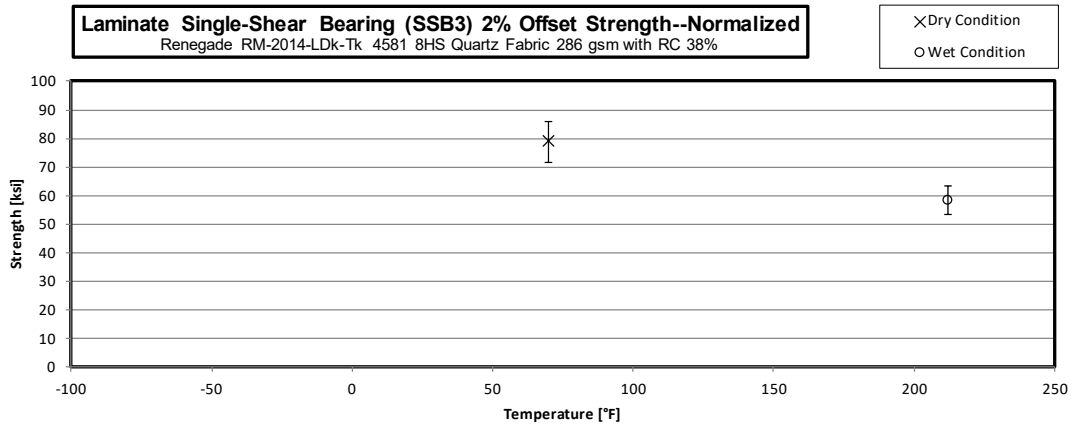
3.26 “25/50/25” Single-Shear Bearing 1 Properties (SSB1)



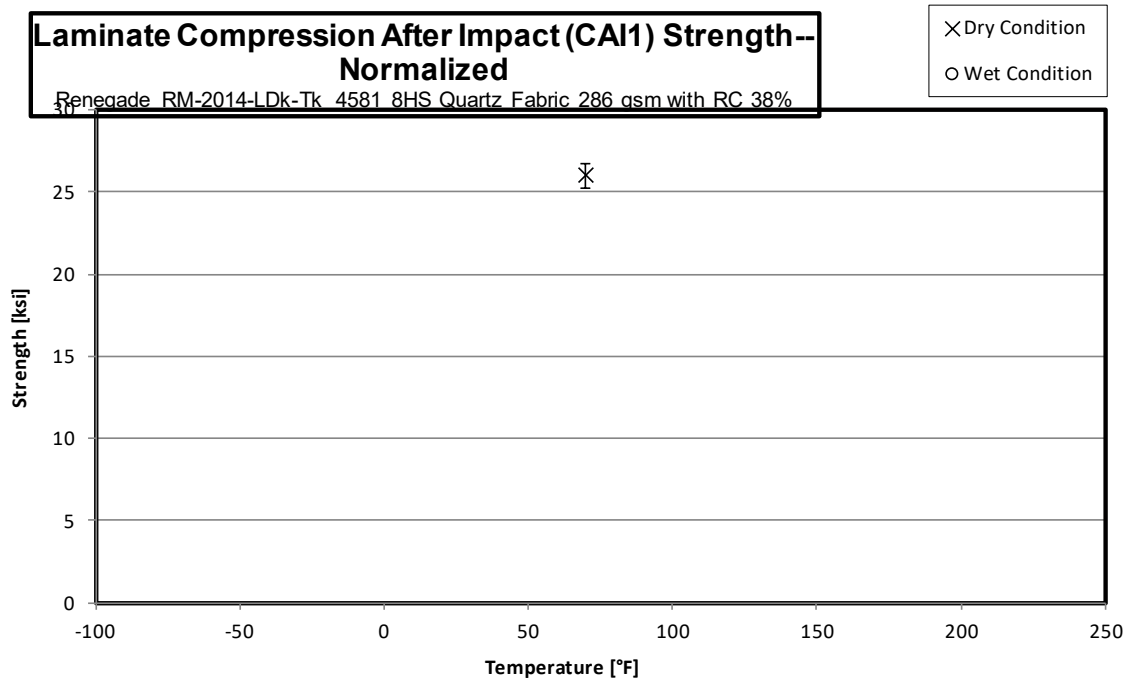
3.27 “10/80/10” Single-Shear Bearing 2 Properties (SSB2)



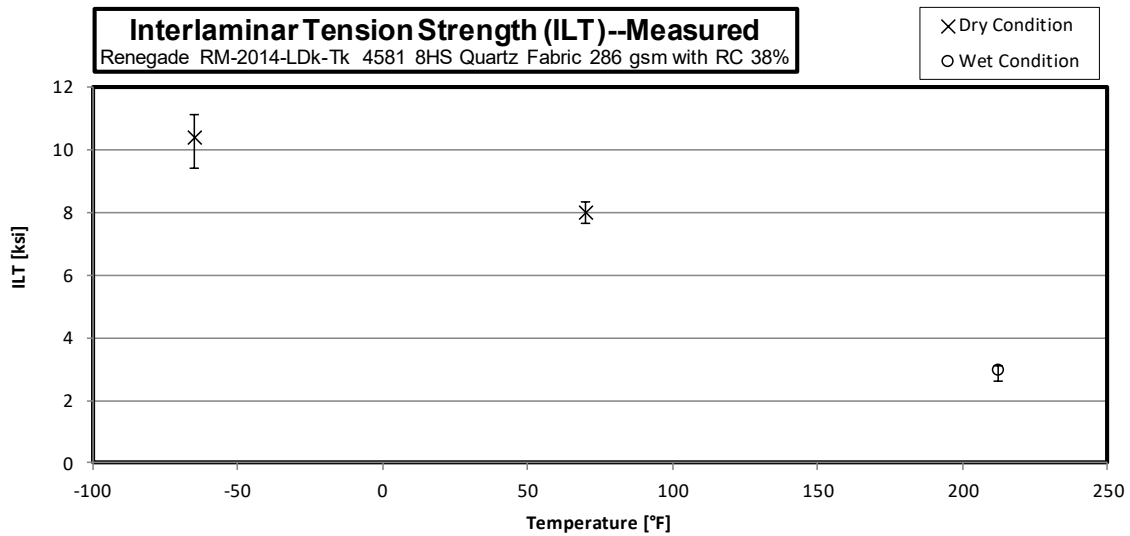
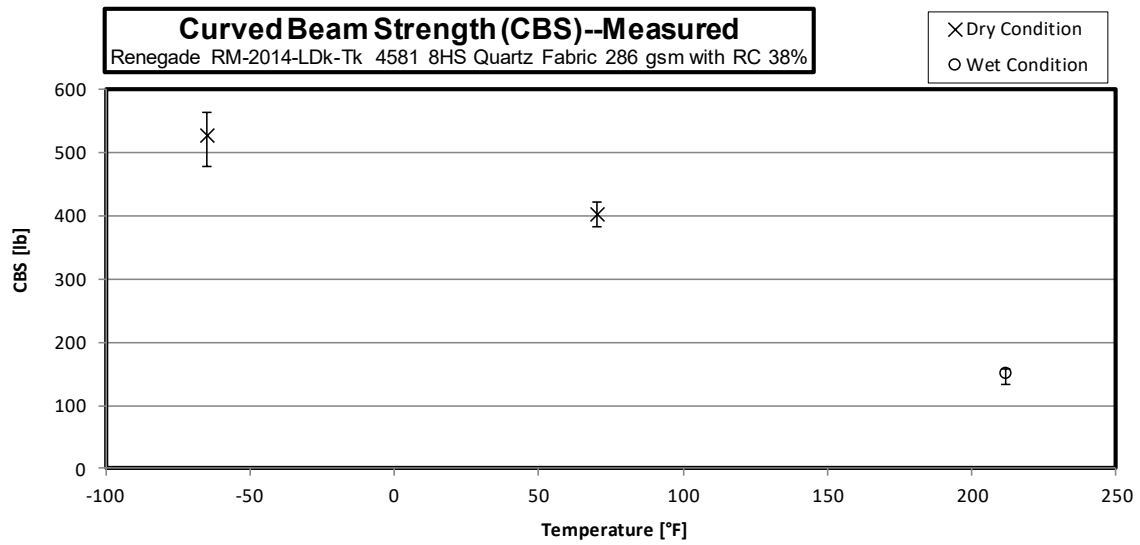
3.28 “40/20/40” Single-Shear Bearing 3 Properties (SSB3)



3.29 “25/50/25” Compression After Impact 1 Properties (CAI1)



3.30 Interlaminar Tension Properties (ILT)



4. Raw Data

4.1 Warp Tension Properties (WT)

Warp Tension Properties (WT)--CTD Strength & Modulus

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

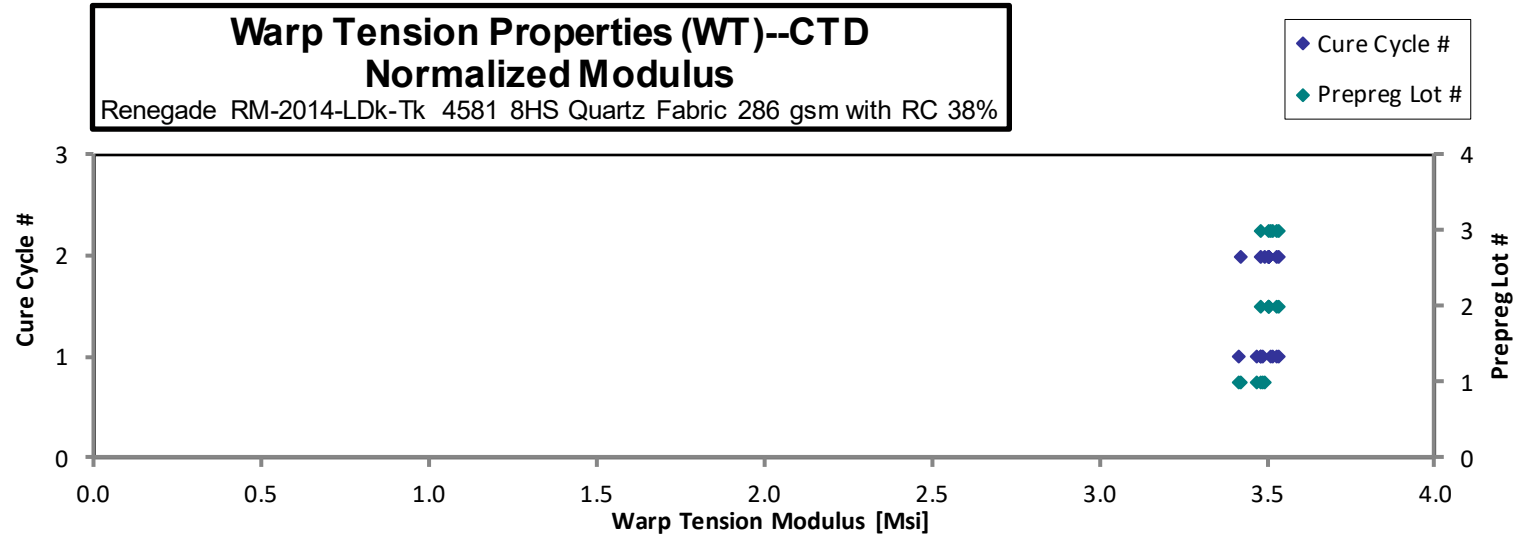
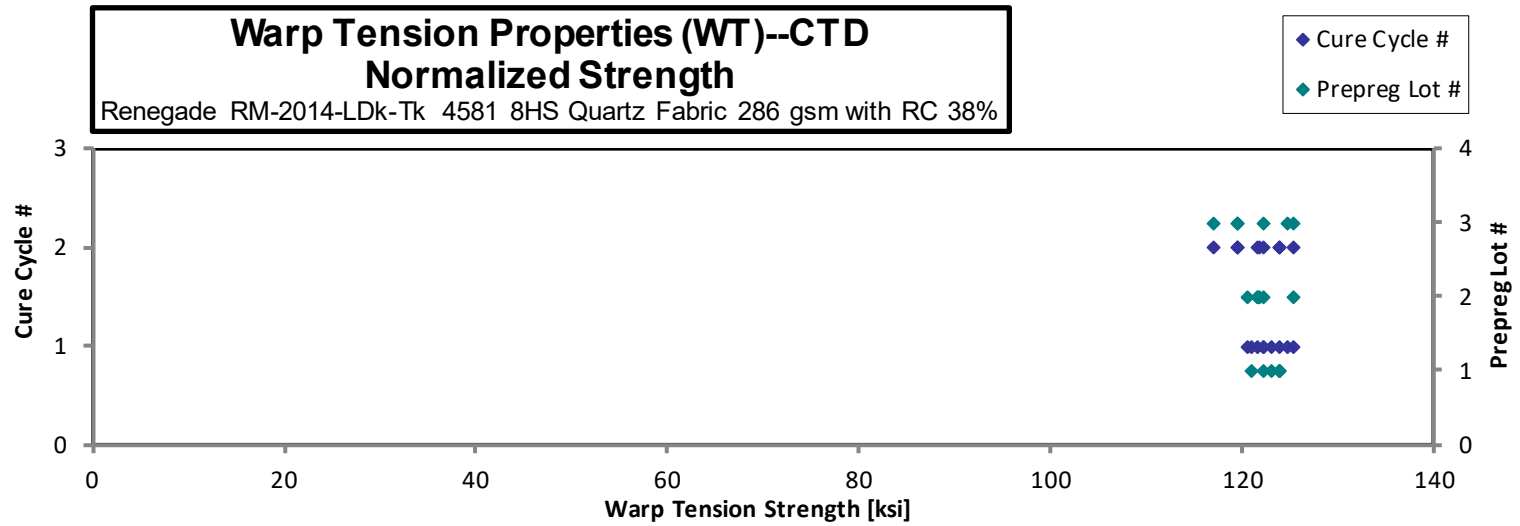
 t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-CTD-1	A	C1	1	1	124.0	3.516	0.1336	0.1112	10	DGM
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-CTD-6	A	C1	1	1	120.8	3.466	0.1278	0.1122	10	DGM
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-CTD-11	A	C1	1	1	125.3	3.455	0.1189	0.1107	10	DGM
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-CTD-1	A	C2	1	2	123.3	3.526	0.1297	0.1110	10	DGM
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-CTD-6	A	C2	1	2	125.2	3.461	0.1215	0.1108	10	DGM
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-CTD-11	A	C2	1	2	124.3	3.497	0.1320	0.1116	10	DGM
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-CTD-1	B	C1	2	1	123.1	3.555	0.1286	0.1112	10	DGM, AGB, M(A,L)WT
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-CTD-6	B	C1	2	1	119.9	3.468	0.1223	0.1125	10	DGM, LAB
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-CTD-11	B	C1	2	1	121.5	3.529	0.1262	0.1122	10	DGM, LGB
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-CTD-1	B	C2	2	2	123.6	3.456	0.1318	0.1136	10	DGM, LWB
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-CTD-6	B	C2	2	2	117.7	3.394	0.1307	0.1157	10	DGM, LWB
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-CTD-11	B	C2	2	2	121.1	3.486	0.1271	0.1126	10	M(A,D,L)GDM
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-CTD-1	C	C1	3	1	126.2	3.630	0.1249	0.1084	10	DGM
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-CTD-6	C	C1	3	1	127.0	3.578	0.1339	0.1100	10	DGM, M(A,L)AB
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-CTD-11	C	C1	3	1	130.6	3.626	0.1258	0.1075	10	DGM, M(A,L)GB
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-CTD-1	C	C2	3	2	124.5	3.654	0.1256	0.1075	10	DGM, LWB
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-CTD-6	C	C2	3	2	122.9	3.635	0.1332	0.1090	10	DGM, LGB
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-CTD-11	C	C2	3	2	121.9	3.678	0.1375	0.1075	10	DGM, LAT

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01112	123.0	3.489
0.01122	121.0	3.472
0.01107	123.9	3.415
0.01110	122.2	3.493
0.01108	123.9	3.424
0.01116	123.9	3.484
0.01112	122.2	3.528
0.01125	120.5	3.483
0.01122	121.6	3.534
0.01136	125.3	3.505
0.01157	121.6	3.506
0.01126	121.8	3.504
0.01084	122.2	3.513
0.01100	124.7	3.515
0.01075	125.3	3.479
0.01075	119.4	3.505
0.01090	119.6	3.537
0.01075	116.9	3.529

Average 123.5 3.534 0.1284
 Standard Dev. 2.916 0.08252 0.004870
 Coeff. of Var. [%] 2.362 2.335 3.793
 Min. 117.7 3.394 0.1189
 Max. 130.6 3.678 0.1375
 Number of Spec. 18 18 18

Average_{norm} 0.01108 122.2 3.495
 Standard Dev._{norm} 2.200 0.03362
 Coeff. of Var. [%]_{norm} 1.801 0.9619
 Min. 0.01075 116.9 3.415
 Max. 0.01157 125.3 3.537
 Number of Spec. 18 18 18



Warp Tension Properties (WT)--RTD Strength & Modulus

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-RTD-2	A	C1	1	1	104.3	3.201	0.1210	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-RTD-7	A	C1	1	1	108.3	3.250	0.1270	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-RTD-12	A	C1	1	1	108.1	3.266	0.1280	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-RTD-7	A	C2	1	2	100.5	3.090	0.1170	0.1110	10	M(X,L)VT
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-RTD-10	A	C2	1	2	108.0	3.280	0.1260	0.1130	10	XGT
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-RTD-12	A	C2	1	2	100.0	3.310	0.1270	0.1110	10	XGV
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-RTD-2	B	C1	2	1	106.0	3.300	0.1270	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-RTD-7	B	C1	2	1	109.1	3.270	0.1260	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-RTD-12	B	C1	2	1	106.4	3.190	0.1220	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-RTD-2	B	C2	2	2	104.0	3.171	0.1240	0.1160	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-RTD-7	B	C2	2	2	102.8	3.142	0.1250	0.1170	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-RTD-12	B	C2	2	2	98.90	3.229	0.1240	0.1150	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-RTD-2	C	C1	3	1	117.7	3.370	0.1260	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-RTD-7	C	C1	3	1	113.3	3.340	0.1250	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-RTD-12	C	C1	3	1	115.1	3.340	0.1240	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-RTD-2	C	C2	3	2	116.4	3.440	0.1230	0.1070	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-RTD-7	C	C2	3	2	115.5	3.450	0.1270	0.1080	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-RTD-12	C	C2	3	2	115.8	3.410	0.1250	0.1070	10	XGM

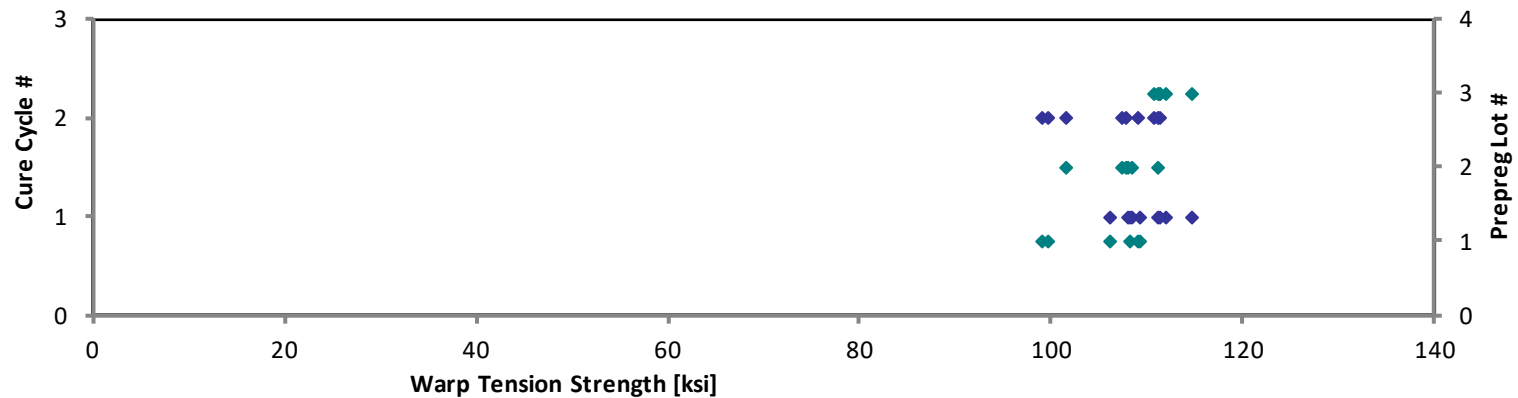
Avg. t _{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01140	106.2	3.258
0.01130	109.3	3.279
0.01120	108.1	3.266
0.01110	99.60	3.062
0.01130	109.0	3.309
0.01110	99.11	3.280
0.01140	107.9	3.359
0.01140	111.0	3.328
0.01140	108.3	3.247
0.01160	107.7	3.284
0.01170	107.4	3.282
0.01150	101.5	3.315
0.01090	114.5	3.280
0.01100	111.3	3.280
0.01090	112.0	3.251
0.01070	111.2	3.286
0.01080	111.4	3.327
0.01070	110.6	3.258

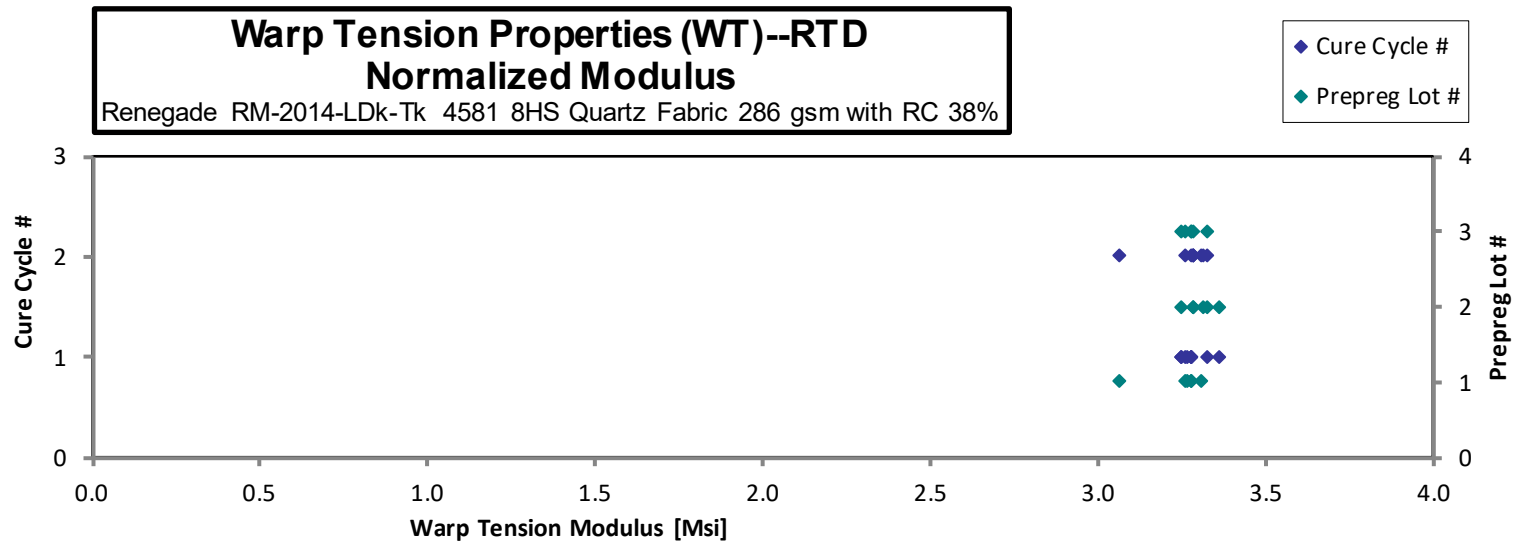
Average 108.3 3.281 0.1247
Standard Dev. 6.067 0.1009 0.002679
Coeff. of Var. [%] 5.600 3.077 2.149
Min. 98.90 3.090 0.1170
Max. 117.7 3.450 0.1280
Number of Spec. 18 18 18

Average_{norm} 0.01119 108.1 3.275
Standard Dev._{norm} 4.236 0.06087
Coeff. of Var. [%]_{norm} 3.918 1.859
Min. 0.01070 99.11 3.062
Max. 0.01170 114.5 3.359
Number of Spec. 18 18 18

Warp Tension Properties (WT)--RTD Normalized Strength

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%





Warp Tension Properties (WT)--ETD Strength & Modulus

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
t_{ply} [in]
0.01120

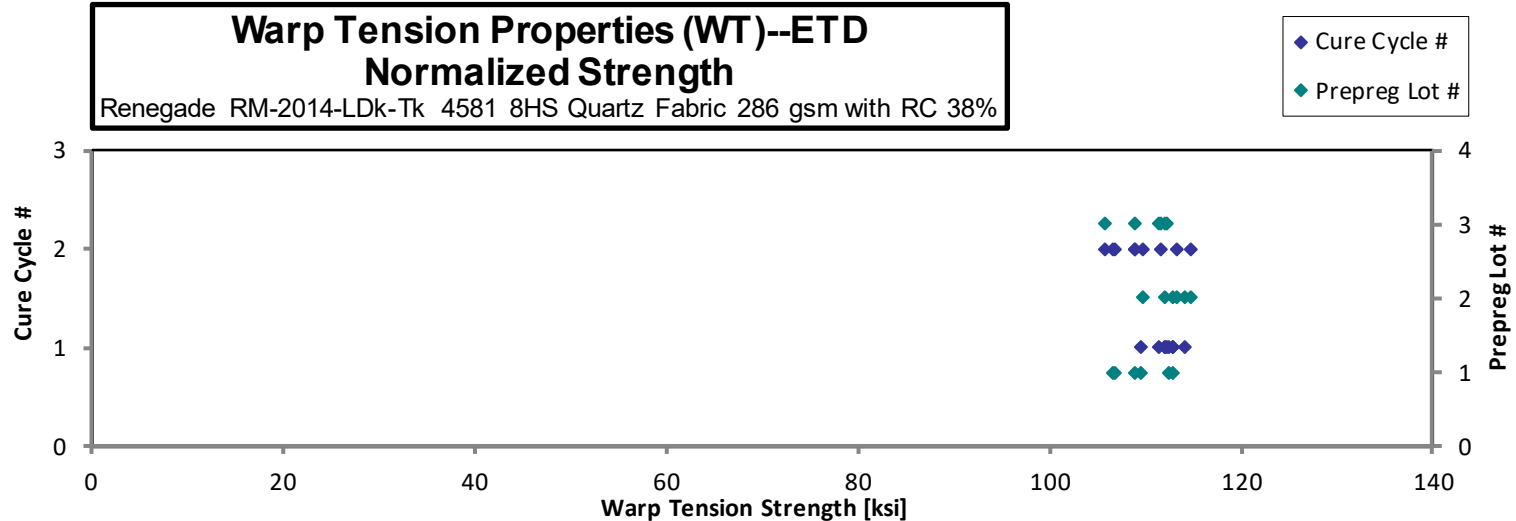
Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-ETD-3	A	C1	1	1	111.5	3.020	0.1020	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-ETD-8	A	C1	1	1	107.6	2.970	0.1020	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-ETD-13	A	C1	1	1	112.8	3.030	0.1040	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-ETD-3*	A	C2	1	2		3.140	0.1170	0.1110	10	XGT
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-ETD-8	A	C2	1	2	107.7	3.070	0.1040	0.1110	10	XGT
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-ETD-13	A	C2	1	2	110.0	3.340	0.1120	0.1110	10	XGT
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-ETD-15*	A	C2	1	2	107.8			0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-ETD-3	B	C1	2	1	111.1	3.200	0.09400	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-ETD-8	B	C1	2	1	112.9	3.240	0.1090	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-ETD-13	B	C1	2	1	112.2	3.140	0.09500	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-ETD-3	B	C2	2	2	109.4	3.060	0.1010	0.1160	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-ETD-8	B	C2	2	2	105.9	3.090	0.09500	0.1160	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-ETD-13	B	C2	2	2	110.9	3.110	0.1000	0.1160	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-ETD-3	C	C1	3	1	114.2	3.060	0.09500	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-ETD-8	C	C1	3	1	113.5	3.250	0.1090	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-ETD-13	C	C1	3	1	115.4	3.070	0.1010	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-ETD-3	C	C2	3	2	112.9	3.260	0.08600	0.1080	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-ETD-8	C	C2	3	2	115.8	3.140	0.08900	0.1080	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-ETD-13	C	C2	3	2	109.7	3.170	0.08700	0.1080	10	XGM

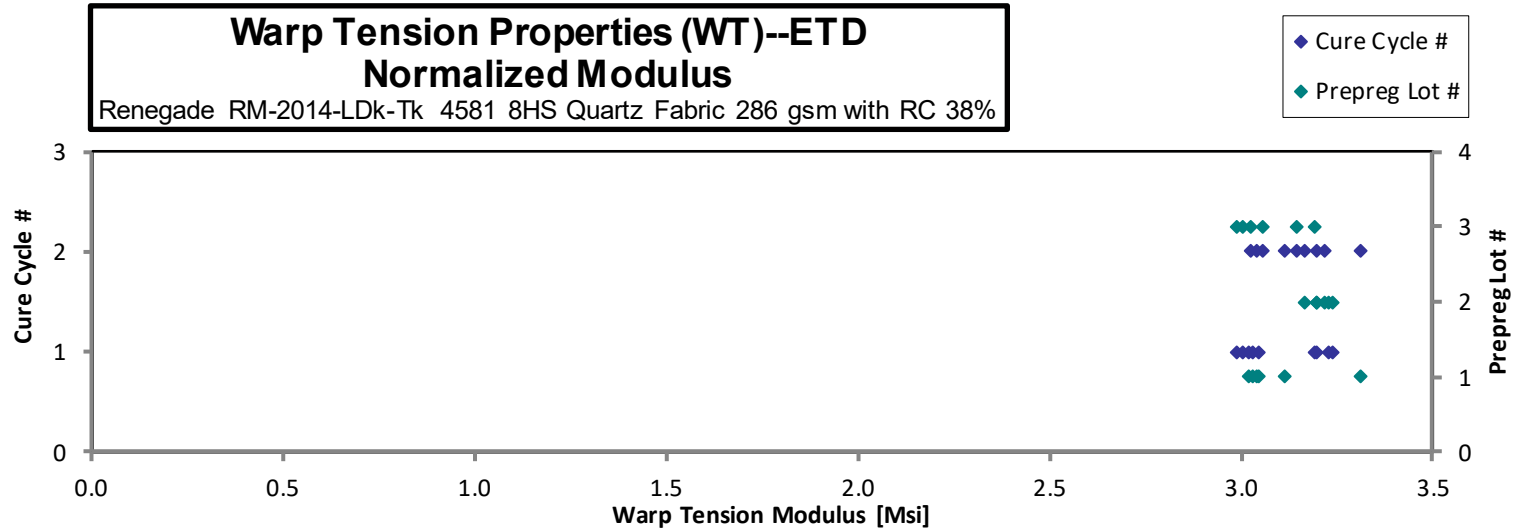
*Excluded strength due to grip slippage

**Specimen was tested for strength only

Average	111.2	3.131	0.1001
Standard Dev.	2.812	0.09731	0.008519
Coeff. of Var. [%]	2.529	3.108	8.510
Min.	105.9	2.970	0.08600
Max.	115.8	3.340	0.117
Number of Spec.	18	18	18

Average _{norm}	0.01117	110.9	3.124
Standard Dev. _{norm}		2.651	0.09843
Coeff. of Var. [%] _{norm}		2.390	3.151
Min.	0.01080	105.8	2.988
Max.	0.01160	114.9	3.310
Number of Spec.	19	18	18





Warp Tension Properties (WT)--ETW
Strength & Modulus

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

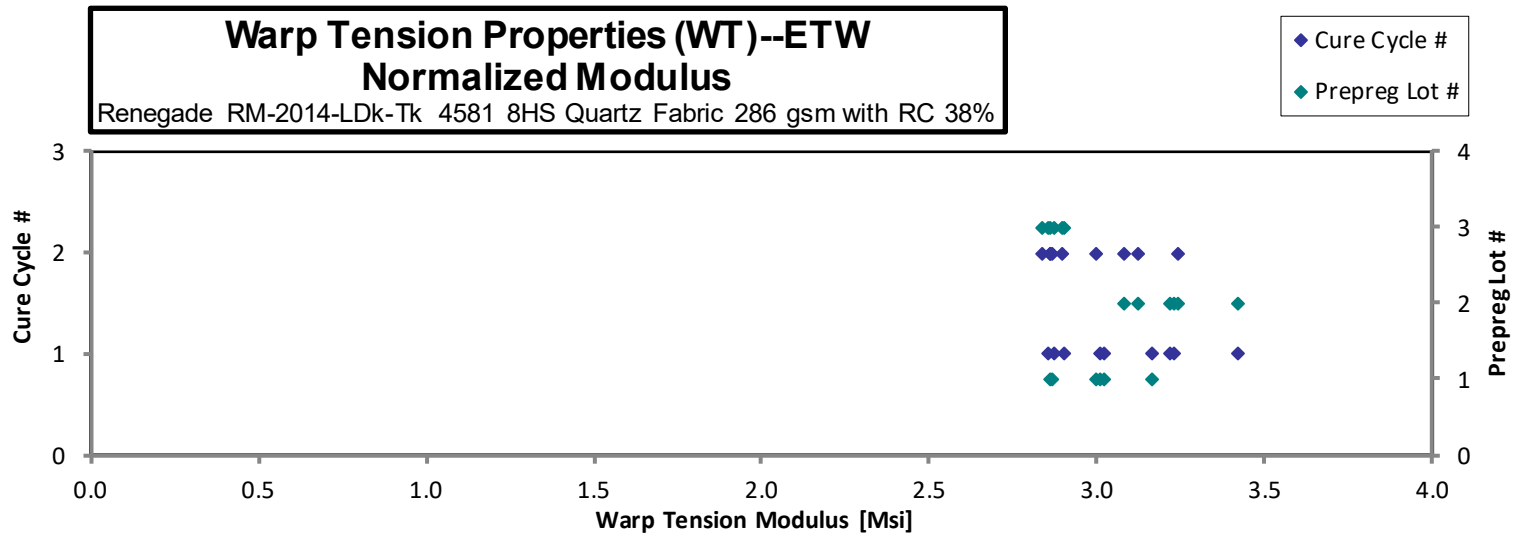
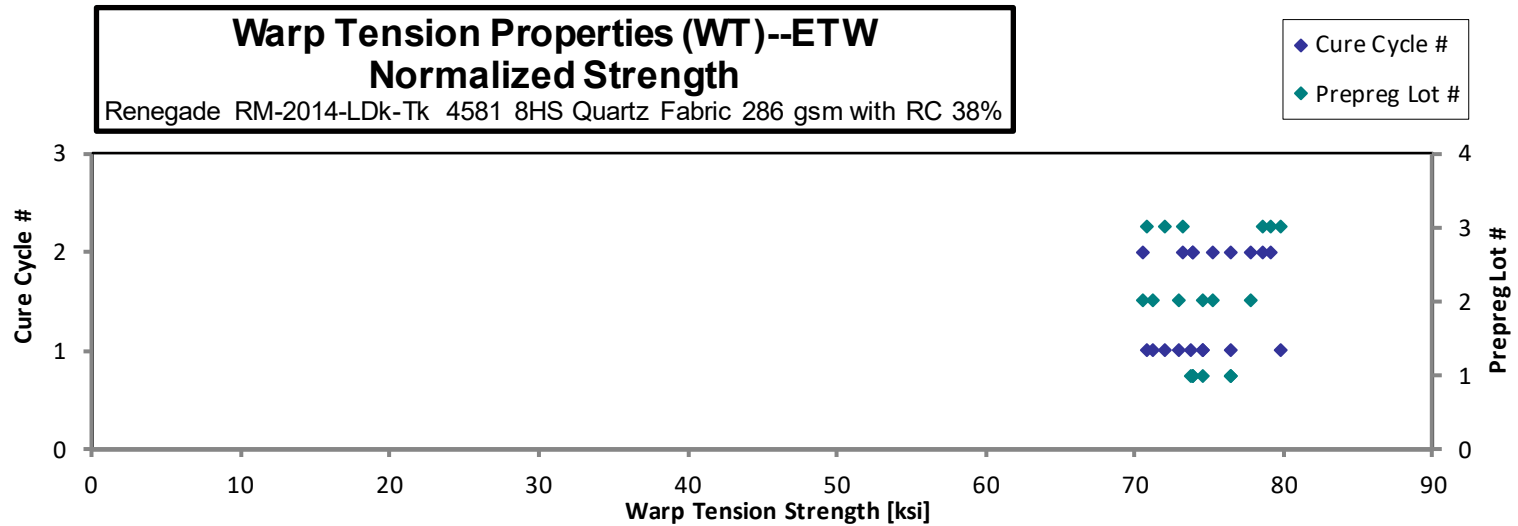
normalizing
 $t_{ply} [in]$
 0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-ETW-4	A	C1	1	1	76.50	3.010	0.08500	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-ETW-9	A	C1	1	1	73.80	3.020	0.05700	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-ETW-14	A	C1	1	1	76.00	3.220	0.07400	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-ETW-4	A	C2	1	2	74.60	3.020	0.06000	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-ETW-9	A	C2	1	2	74.60	2.890	0.06300	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-ETW-14	A	C2	1	2	76.50	2.860	0.06000	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-ETW-4	B	C1	2	1	73.30	3.170	0.09400	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-ETW-9	B	C1	2	1	69.40	3.130	0.1020	0.1150	10	XGB
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-ETW-14	B	C1	2	1	72.30	3.390	0.09500	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-ETW-4	B	C2	2	2	67.60	3.100	0.09000	0.1170	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-ETW-9	B	C2	2	2	72.00	2.950	0.08600	0.1170	10	XGM
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-ETW-14	B	C2	2	2	74.50	2.990	0.09400	0.1170	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-ETW-4	C	C1	3	1	82.00	2.980	0.07700	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-ETW-9	C	C1	3	1	74.00	2.930	0.07400	0.1090	10	XGT
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-ETW-14	C	C1	3	1	72.80	2.950	0.07300	0.1090	10	XGT
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-ETW-4	C	C2	3	2	76.70	2.990	0.07800	0.1070	10	XGB
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-ETW-9	C	C2	3	2	82.80	3.030	0.07600	0.1070	10	XGM
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-ETW-14	C	C2	3	2	82.30	2.970	0.07700	0.1070	10	XGB

Avg. $t_{ply} [in]$	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01120	76.50	3.010
0.01120	73.80	3.020
0.01100	74.64	3.163
0.01110	73.93	2.993
0.01110	73.93	2.864
0.01120	76.50	2.860
0.01140	74.61	3.227
0.01150	71.26	3.214
0.01130	72.95	3.420
0.01170	70.62	3.238
0.01170	75.21	3.082
0.01170	77.83	3.123
0.01090	79.80	2.900
0.01090	72.02	2.852
0.01090	70.85	2.871
0.01070	73.28	2.857
0.01070	79.10	2.895
0.01070	78.63	2.837

Average 75.09 3.033 0.07861
 Standard Dev. 4.091 0.1286 0.01329
 Coeff. of Var. [%] 5.448 4.240 16.91
 Min. 67.60 2.860 0.05700
 Max. 82.80 3.390 0.1020
 Number of Spec. 18 18 18

Average_{norm} 0.01116 74.75 3.024
 Standard Dev_{norm} 2.817 0.1739
 Coeff. of Var. [%]_{norm} 3.769 5.752
 Min. 0.01070 70.62 2.837
 Max. 0.01170 79.80 3.420
 Number of Spec. 18 18 18



4.2 Fill Tension Properties (FT)

Fill Tension Properties (FT)--CTD

Strength & Modulus

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]

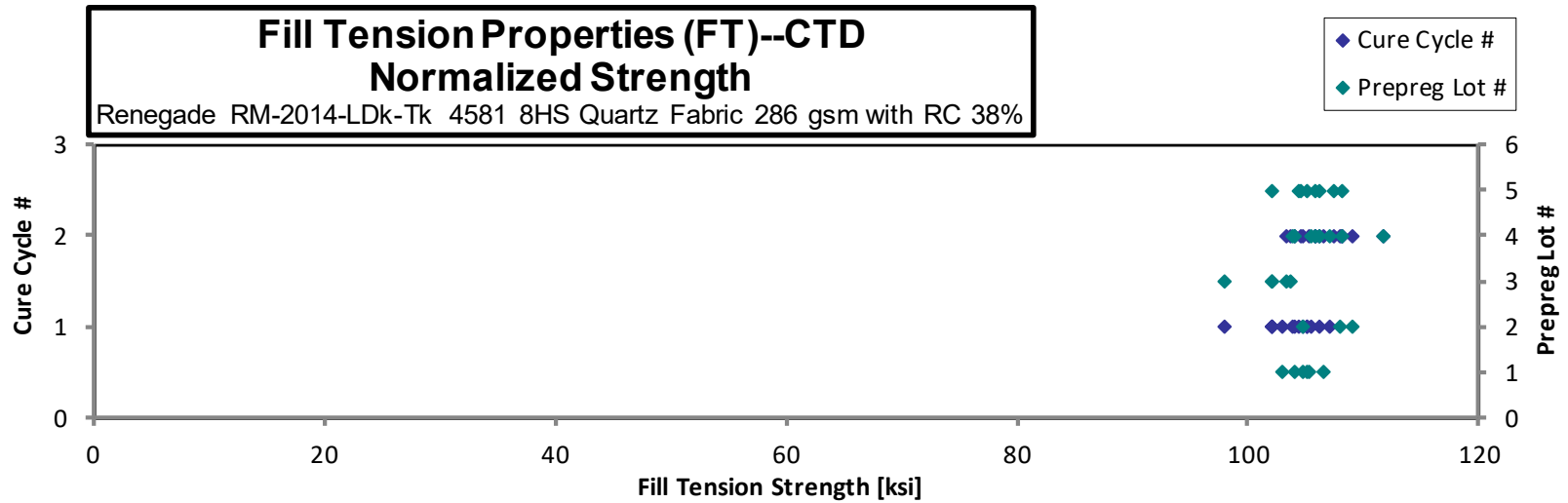
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-CTD-1	A	C1	1	1	104.9	3.404	0.1101	10	DGB
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-CTD-6	A	C1	1	1	106.3	3.462	0.1109	10	DGM
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-CTD-11	A	C1	1	1	106.2	3.431	0.1106	10	DGM
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-CTD-1	A	C2	1	2	106.5	3.420	0.1108	10	M(D,L)GT
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-CTD-6	A	C2	1	2	104.9	3.387	0.1112	10	M(D,L)GT
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-CTD-11	A	C2	1	2	107.4	3.410	0.1113	10	DGM
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-CTD-1	B	C2	2	2	103.6	3.374	0.1133	10	M(A,D,L)GM
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-CTD-6	B	C2	2	2	105.9	3.213	0.1155	10	M(A,D)GM, LGB
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-CTD-11	B	C2	2	2	107.1	3.353	0.1130	10	DGM, LGB
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-CTD-1	C	C1	3	1	105.4	3.548	0.1085	10	DGM
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-CTD-6	C	C1	3	1	105.3	3.518	0.1086	10	DGM, M(A,L)WB
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-CTD-11	C	C1	3	1	101.3	3.559	0.1084	10	DGM
NTP2014Q1-RMC-R14-RS-FT-C-C2-1-CTD-1	C	C2	3	2	105.2	3.489	0.1101	10	M(A,D,L)GM
NTP2014Q1-RMC-R14-RS-FT-C-C2-1-CTD-6	C	C2	3	2	104.6	3.475	0.1111	10	M(D,L)GM
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-CTD-1	D	C1	4	1	102.1	3.370	0.1143	10	M(A,D)WB, DGM
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-CTD-2	D	C1	4	1	105.0	3.408	0.1143	10	M(A,D)WB, DGM
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-CTD-3	D	C1	4	1	102.0	3.356	0.1142	10	M(A,D)WB, DGM
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-CTD-4	D	C1	4	1	103.2	3.400	0.1146	10	M(A,D)WB
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-CTD-1	D	C2	4	2	110.1	3.381	0.1137	10	M(A,D)WB
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-CTD-2	D	C2	4	2	106.4	3.413	0.1139	10	LGT, M(A,L)WB
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-CTD-3	D	C2	4	2	104.6	3.384	0.1135	10	M(A,D)GB
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-CTD-4	D	C2	4	2	105.1	3.393	0.1132	10	M(A,D)WB
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-CTD-1	E	C1	5	1	102.3	3.244	0.1163	10	M(D,L)WB
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-CTD-2	E	C1	5	1	99.68	3.199	0.1173	10	LWT, M(A,D)AB
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-CTD-3	E	C1	5	1	97.70	3.254	0.1171	10	DGM, M(A,D)GT
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-CTD-4	E	C1	5	1	100.8	3.245	0.1168	10	LWT, M(A,D)WB
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-CTD-1	E	C2	5	2	104.5	3.261	0.1152	10	DGM, M(A,D)WT
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-CTD-2	E	C2	5	2	100.8	3.293	0.1162	10	DGM, M(D,L)WT
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-CTD-3	E	C2	5	2	104.4	3.291	0.1161	10	M(D,L)WB, LWT, LAT
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-CTD-4	E	C2	5	2	102.4	3.251	0.1158	10	M(A,D)WB, M(A,D)GT

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01101	103.1	3.346
0.01109	105.2	3.426
0.01106	104.8	3.387
0.01108	105.4	3.384
0.01112	104.1	3.361
0.01113	106.7	3.387
0.01133	104.8	3.412
0.01155	109.2	3.313
0.01130	108.0	3.382
0.01085	102.1	3.435
0.01086	102.1	3.410
0.01084	98.00	3.444
0.01101	103.4	3.429
0.01111	103.8	3.447
0.01143	104.2	3.439
0.01143	107.2	3.479
0.01142	104.0	3.422
0.01146	105.6	3.479
0.01137	111.8	3.433
0.01139	108.2	3.471
0.01135	106.0	3.429
0.01132	106.2	3.430
0.01163	106.3	3.370
0.01173	104.4	3.351
0.01171	102.1	3.400
0.01168	105.2	3.384
0.01152	107.5	3.352
0.01162	104.6	3.417
0.01161	108.2	3.411
0.01158	105.9	3.361

Average 104.2 3.373
 Standard Dev. 2.582 0.09726
 Coeff. of Var. [%] 2.478 2.884
 Min. 97.70 3.199
 Max. 110.1 3.559
 Number of Spec. 30 30

Average_{norm} 0.01132 105.3 3.406
 Standard Dev_{norm} 2.599 0.04104
 Coeff. of Var. [%]_{norm} 2.469 1.205
 Min. 0.01084 98.00 3.313
 Max. 0.01173 111.8 3.479
 Number of Spec. 30 30 30



**Fill Tension Properties (FT)--RTD
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]

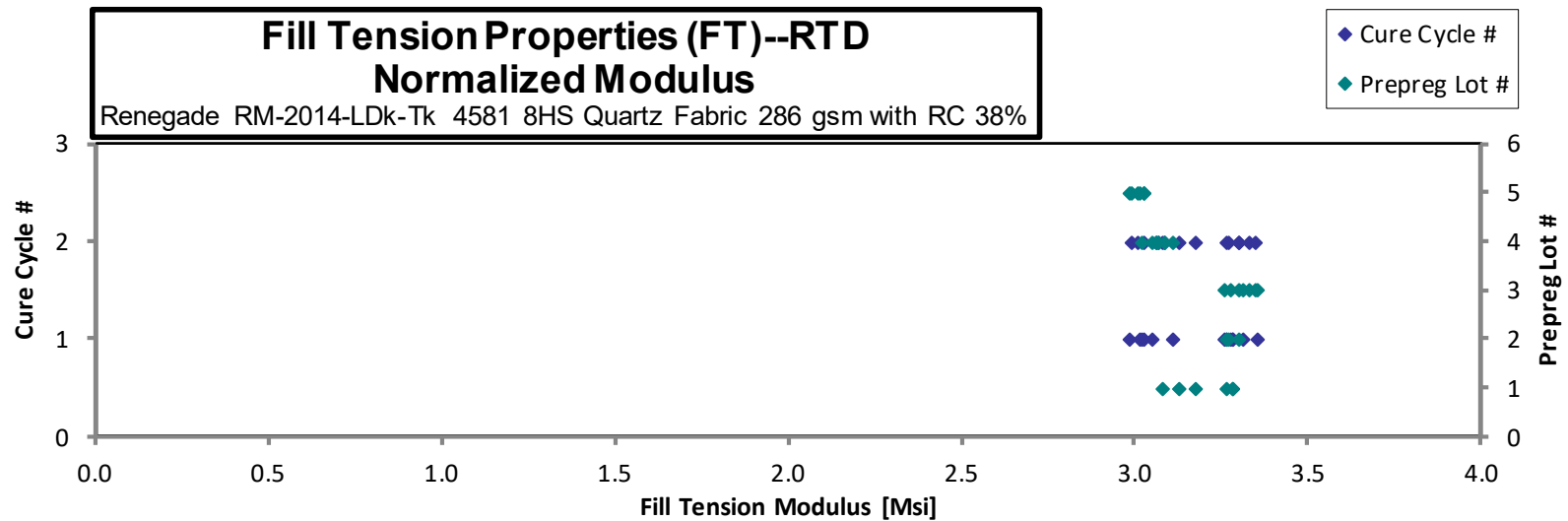
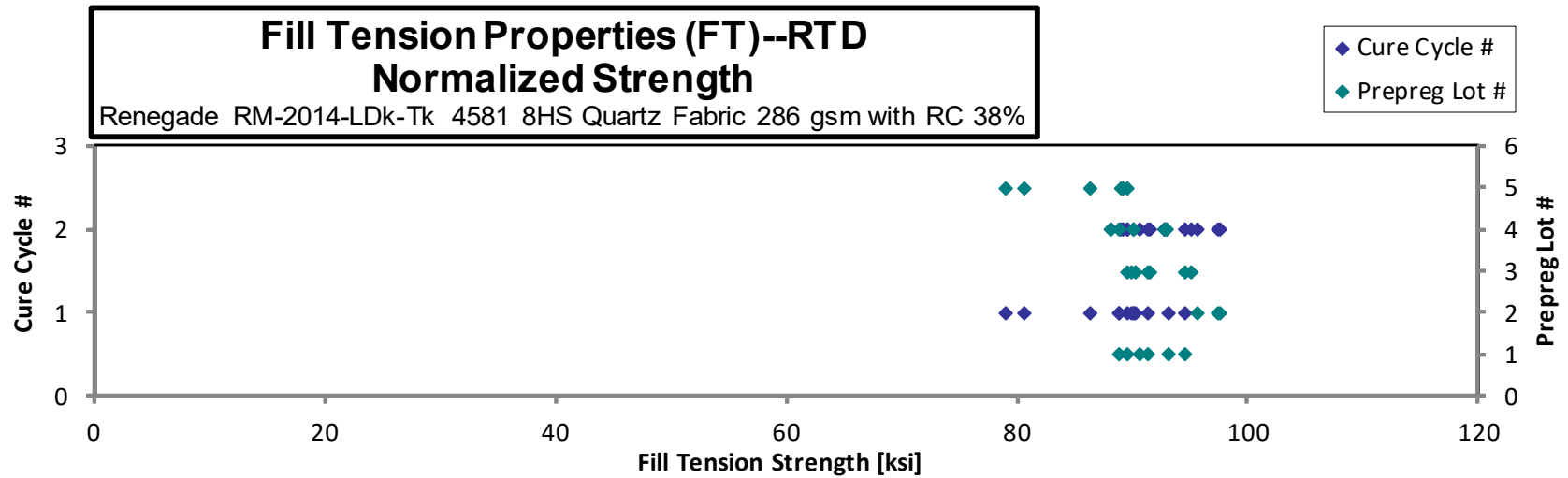
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-2-RTD	A	C1	1	1	93.20	3.266	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-7-RTD	A	C1	1	1	94.60	3.287	0.1120	10	XGT
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-12-RTD	A	C1	1	1	89.00	3.284	0.1120	10	XGT
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-2-RTD	A	C2	1	2	90.80	3.180	0.1120	10	XGT
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-7-RTD	A	C2	1	2	90.50	3.110	0.1110	10	XGT
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-12-RTD	A	C2	1	2	91.40	3.130	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FT-B-C1-1-2-RTD	B	C2	2	2	92.40	3.163	0.1160	10	XGV
NTP2014Q1-RMC-R14-RS-FT-B-C1-1-7-RTD	B	C2	2	2	93.50	3.161	0.1170	10	XGM
NTP2014Q1-RMC-R14-RS-FT-B-C1-1-12-RTD	B	C2	2	2	94.10	3.158	0.1160	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-2-RTD	C	C1	3	1	92.50	3.453	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-5-RTD	C	C1	3	1	93.80	3.400	0.1080	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-7-RTD	C	C1	3	1	94.00	3.352	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-12-RTD	C	C1	3	1	92.10	3.406	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C2-1-2-RTD	C	C2	3	2	96.90	3.366	0.1100	10	XGT
NTP2014Q1-RMC-R14-RS-FT-C-C2-1-5-RTD	C	C2	3	2	96.40	3.396	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C2-1-7-RTD	C	C2	3	2	93.30	3.410	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-5-RTD	D	C1	4	1	88.60	2.970	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-7-RTD	D	C1	4	1	88.60	3.000	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-8-RTD	D	C1	4	1	86.60	3.030	0.1150	10	XGM
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-5-RTD	D	C2	4	2	91.40	3.020	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-6-RTD	D	C2	4	2	91.30	3.010	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-7-RTD	D	C2	4	2	87.50	3.060	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-5-RTD	E	C1	5	1	82.70	2.860	0.1170	10	XGM
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-6-RTD	E	C1	5	1	77.20	2.890	0.1170	10	XGM
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-7-RTD	E	C1	5	1	75.70	2.900	0.1170	10	XGM
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-5-RTD	E	C2	5	2	85.40	2.900	0.1170	10	XGB
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-6-RTD	E	C2	5	2	86.00	2.890	0.1160	10	XGB
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-7-RTD	E	C2	5	2	86.50	2.910	0.1160	10	XGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01120	93.20	3.266
0.01120	94.60	3.287
0.01120	89.00	3.284
0.01120	90.80	3.180
0.01110	89.69	3.082
0.01120	91.40	3.130
0.01160	95.70	3.276
0.01170	97.67	3.302
0.01160	97.46	3.271
0.01090	90.02	3.361
0.01080	90.45	3.279
0.01090	91.48	3.262
0.01090	89.63	3.315
0.01100	95.17	3.306
0.01100	94.68	3.335
0.01100	91.63	3.349
0.01140	90.18	3.023
0.01140	90.18	3.054
0.01150	88.92	3.111
0.01140	93.03	3.074
0.01140	92.93	3.064
0.01130	88.28	3.087
0.01170	86.39	2.988
0.01170	80.65	3.019
0.01170	79.08	3.029
0.01170	89.21	3.029
0.01160	89.07	2.993
0.01160	89.59	3.014

Average 89.86 3.142
Standard Dev. 5.115 0.1927
Coeff. of Var. [%] 5.693 6.134
Min. 75.70 2.860
Max. 96.90 3.453
Number of Spec. 28 28

Average_{norm} 0.01132 90.72 3.170
Standard Dev_{norm} 4.149 4.102
Coeff. of Var. [%]_{norm} 4.574 4.102
Min. 0.01080 79.08 2.988
Max. 0.01170 97.67 3.361
Number of Spec. 28 28 28



**Fill Tension Properties (FT)--ETD
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]

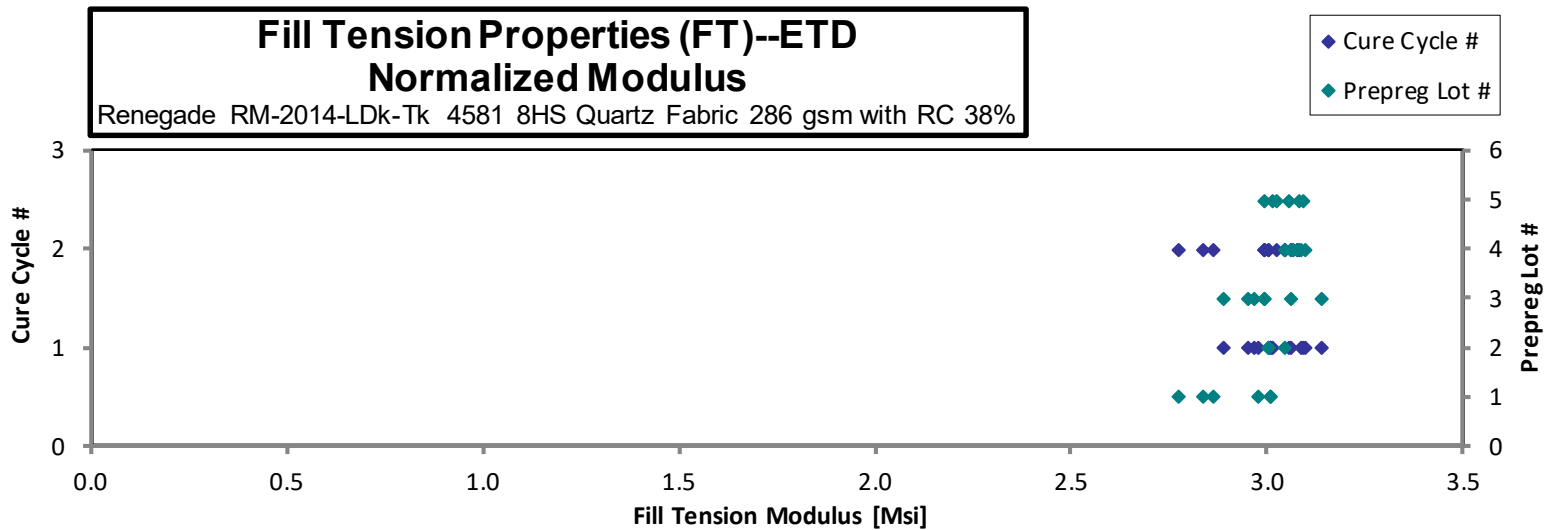
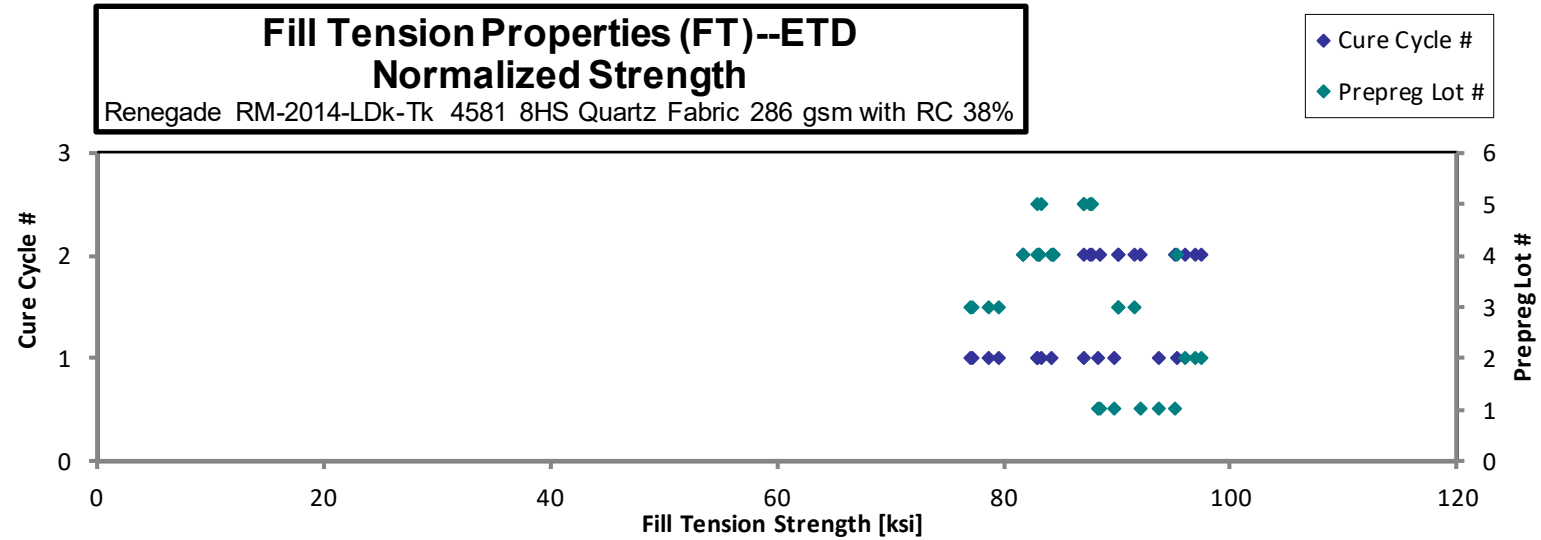
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-ETD-3	A	C1	1	1	88.40	2.980	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-ETD-8	A	C1	1	1	89.90	3.010	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-ETD-13	A	C1	1	1	93.80	3.010	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-ETD-3	A	C2	1	2	88.60	2.840	0.1120	10	XGT
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-ETD-8	A	C2	1	2	93.00	2.800	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-ETD-13	A	C2	1	2	96.10	2.890	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-ETD-3	B	C2	2	2	93.40	2.920	0.1170	10	XGM
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-ETD-8	B	C2	2	2	92.00	2.880	0.1170	10	XGM
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-ETD-10	B	C2	2	2	94.50	2.930	0.1150	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-ETD-3	C	C1	3	1	79.40	3.230	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-ETD-8	C	C1	3	1	81.00	2.970	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-ETD-10	C	C1	3	1	82.60	3.080	0.1080	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-ETD-13	C	C1	3	1	78.50	3.010	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C2-1-ETD-3	C	C2	3	2	92.50	3.020	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C2-1-ETD-8	C	C2	3	2	91.00	3.090	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FT-C-C2-1-ETD-10	C	C2	3	2	91.90	3.050	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-ETD-9	D	C1	4	1	81.60	3.010	0.1140	10	XGB
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-ETD-10	D	C1	4	1	83.60	3.070	0.1130	10	XGB
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-ETD-11	D	C1	4	1	92.90	3.010	0.1150	10	XGV
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-ETD-8	D	C2	4	2	83.80	3.020	0.1130	10	XGT
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-ETD-9	D	C2	4	2	81.00	3.050	0.1130	10	XGT
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-ETD-10	D	C2	4	2	83.30	3.070	0.1120	10	XGB
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-ETD-8	E	C1	5	1	79.90	2.890	0.1170	10	XGB
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-ETD-9	E	C1	5	1	80.20	2.990	0.1160	10	XGB
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-ETD-10	E	C1	5	1	84.80	2.980	0.1150	10	XGT
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-ETD-8	E	C2	5	2	83.50	2.900	0.1170	10	XGB
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-ETD-9	E	C2	5	2	84.70	2.890	0.1160	10	XGB
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-ETD-10	E	C2	5	2	86.30	3.030	0.1140	10	XGB

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01120	88.40	2.980
0.01120	89.90	3.010
0.01120	93.80	3.010
0.01120	88.60	2.840
0.01110	92.17	2.775
0.01110	95.24	2.864
0.01170	97.57	3.050
0.01170	96.11	3.009
0.01150	97.03	3.008
0.01090	77.27	3.143
0.01090	78.83	2.890
0.01080	79.65	2.970
0.01100	77.10	2.956
0.01110	91.67	2.993
0.01110	90.19	3.062
0.01100	90.26	2.996
0.01140	83.06	3.064
0.01130	84.35	3.097
0.01150	95.39	3.091
0.01130	84.55	3.047
0.01130	81.72	3.077
0.01120	83.30	3.070
0.01170	83.47	3.019
0.01160	83.06	3.097
0.01150	87.07	3.060
0.01170	87.23	3.029
0.01160	87.73	2.993
0.01140	87.84	3.084

Average 86.86 2.986
Standard Dev. 5.478 0.08999
Coeff. of Var. [%] 6.307 3.013
Min. 78.50 2.800
Max. 96.10 3.230
Number of Spec. 28 28

Average_{norm} 0.01129 87.59 3.010
Standard Dev._{norm} 5.979 0.08400
Coeff. of Var. [%]_{norm} 6.826 2.791
Min. 0.01080 77.10 2.775
Max. 0.01170 97.57 3.143
Number of Spec. 28 28 28



**Fill Tension Properties (FT)–ETW
Strength & Modulus**

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]

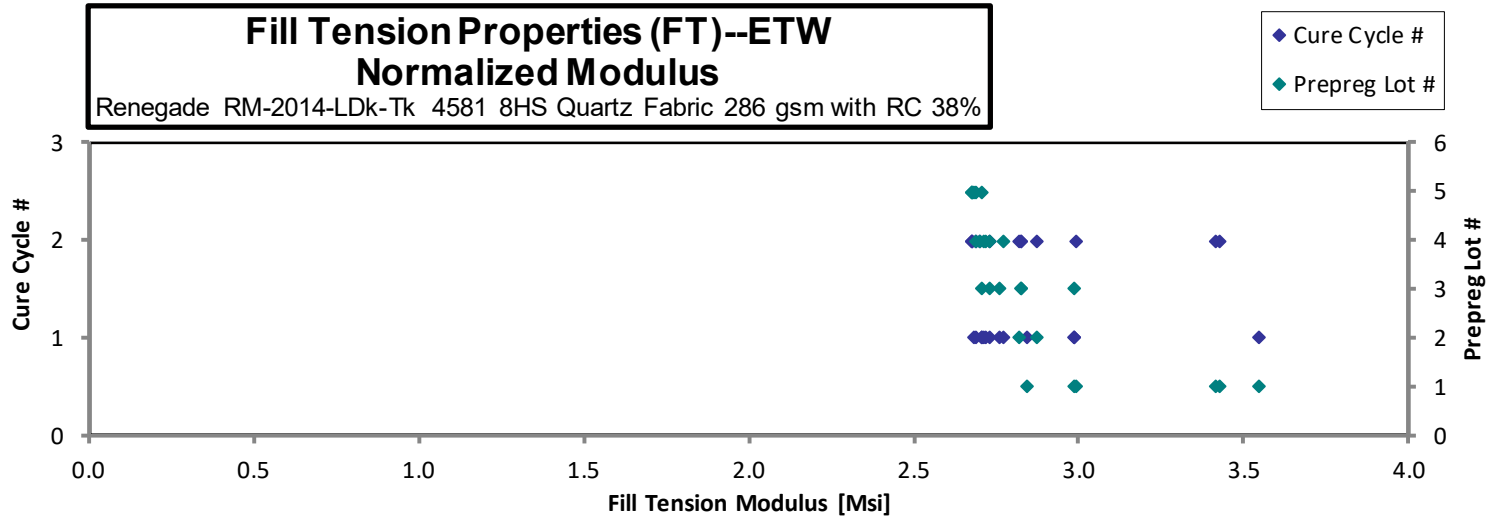
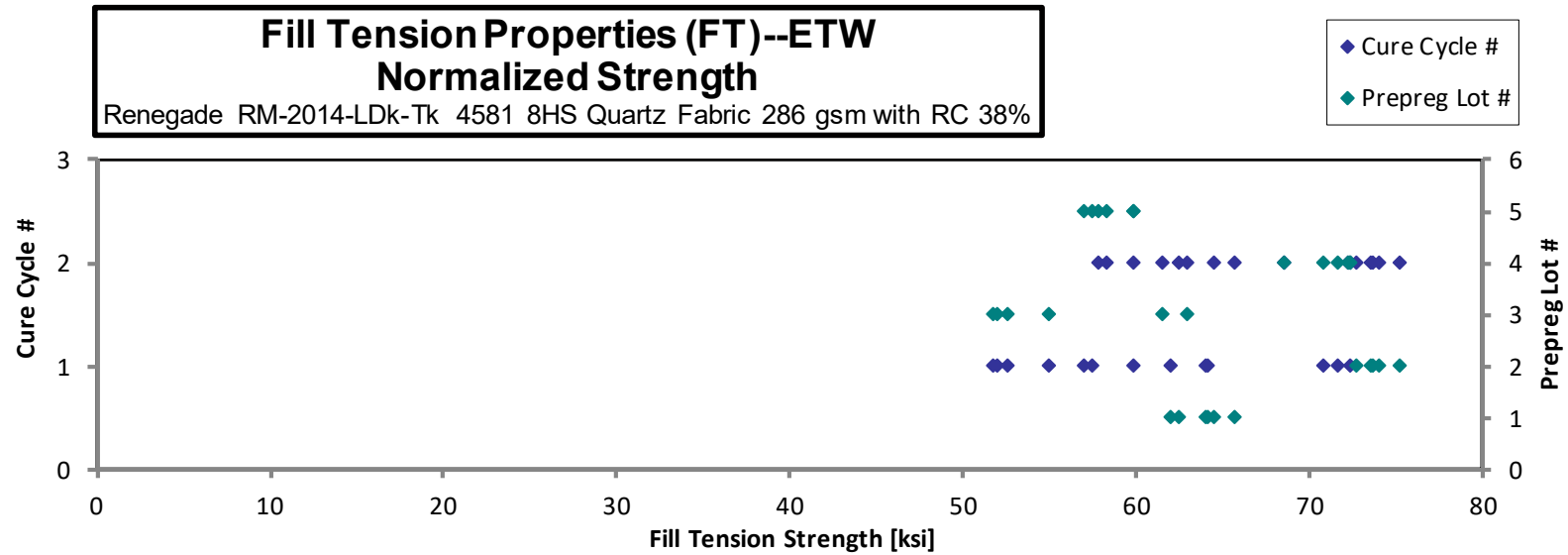
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-ETW-4	A	C1	1	1	65.20	2.900	0.1100	10	XGT	0.01100	64.04	2.848
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-ETW-5	A	C1	1	1	63.40	2.970	0.1100	10	XGM	0.01100	62.27	2.917
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-ETW-9	A	C1	1	1	63.10	3.040	0.1100	10	XGB	0.01100	61.97	2.986
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-ETW-14	A	C1	1	1	64.70	3.580	0.1110	10	XGM	0.01110	64.12	3.548
NTP2014Q1-RMC-R14-RS-FT-A-C1-1-ETW-19	A	C1	1	1	60.90	2.760	0.1110	10	XGM	0.01110	60.36	2.735
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-ETW-4	A	C2	1	2	65.60	3.430	0.1120	10	XGM	0.01120	65.60	3.430
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-ETW-5	A	C2	1	2	63.00	2.750	0.1120	10	XGM	0.01120	63.00	2.750
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-ETW-9	A	C2	1	2	63.60	3.050	0.1100	10	XGT	0.01100	62.46	2.996
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-ETW-14	A	C2	1	2	65.00	3.450	0.1110	10	XGT	0.01110	64.42	3.419
NTP2014Q1-RMC-R14-RS-FT-A-C2-1-ETW-19	A	C2	1	2	60.20	2.800	0.1100	10	XGT	0.01100	59.13	2.750
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-ETW-4*	B	C2	2	2	70.80		0.1170	10	XGV	0.01170	73.96	
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-ETW-9*	B	C2	2	2	71.40		0.1180	10	XGV	0.01180	75.23	
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-ETW-14*	B	C2	2	2	69.90		0.1180	10	XGV	0.01180	73.64	
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-ETW-15	B	C2	2	2	69.80	2.730	0.1180	10	XGM	0.01180	73.54	2.876
NTP2014Q1-RMC-R14-RS-FT-B-C2-1-ETW-19	B	C2	2	2	69.60	2.700	0.1170	10	XGM	0.01170	72.71	2.821
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-ETW-4	C	C1	3	1	54.50	2.810	0.1080	10	XGM	0.01080	52.55	2.710
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-ETW-9	C	C1	3	1	53.40	2.810	0.1090	10	XGM	0.01090	51.97	2.735
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-ETW-14	C	C1	3	1	53.60	3.100	0.1080	10	XGM	0.01080	51.69	2.989
NTP2014Q1-RMC-R14-RS-FT-C-C1-1-ETW-15	C	C1	3	1	56.50	2.840	0.1090	10	XGM	0.01090	54.99	2.764
NTP2014Q1-RMC-R14-RS-FT-C-C2-1-ETW-4	C	C2	3	2	62.60	2.880	0.1100	10	XGM	0.01100	61.48	2.829
NTP2014Q1-RMC-R14-RS-FT-C-C2-1-ETW-9	C	C2	3	2	64.10	2.880	0.1100	10	XGM	0.01100	62.96	2.829
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-ETW-17	D	C1	4	1	69.80	2.650	0.1150	10	XGM	0.01150	71.67	2.721
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-ETW-18	D	C1	4	1	69.80	2.680	0.1160	10	XGM	0.01160	72.29	2.776
NTP2014Q1-RMC-R14-RS-FT-D-C1-1-ETW-19	D	C1	4	1	68.30	2.620	0.1160	10	XGM	0.01160	70.74	2.714
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-ETW-17	D	C2	4	2	69.70	2.610	0.1160	10	XGT	0.01160	72.19	2.703
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-ETW-18	D	C2	4	2	70.50	2.660	0.1150	10	XGM	0.01150	72.39	2.731
NTP2014Q1-RMC-R14-RS-FT-D-C2-1-ETW-19	D	C2	4	2	66.20	2.600	0.1160	10	XGM	0.01160	68.56	2.693
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-ETW-18	E	C1	5	1	54.50	2.550	0.1180	10	XGT	0.01180	57.42	2.687
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-ETW-19	E	C1	5	1	54.10	2.570	0.1180	10	XGT	0.01180	57.00	2.708
NTP2014Q1-RMC-R14-RS-FT-E-C1-1-ETW-20	E	C1	5	1	57.70	2.600	0.1160	10	XGM	0.01160	59.76	2.693
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-ETW-15	E	C2	5	2	56.80	2.540	0.1180	10	XGT	0.01180	59.84	2.676
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-ETW-16	E	C2	5	2	55.30	2.540	0.1180	10	XGB	0.01180	58.26	2.676
NTP2014Q1-RMC-R14-RS-FT-E-C2-1-ETW-19	E	C2	5	2	54.80	2.540	0.1180	10	XGT	0.01180	57.74	2.676

*Excluded modulus due to strain gage slippage

Average 62.98 2.821
Standard Dev. 6.054 0.2767
Coeff. of Var. [%] 9.61 9.81
Min. 53.40 2.540
Max. 71.40 3.580
Number of Spec. 33 30

Average_{norm} 0.01136 63.94 2.846
Standard Dev._{norm} 7.032 0.2312
Coeff. of Var. [%]_{norm} 11.00 8.123
Min. 0.01080 51.69 2.676
Max. 0.01180 75.23 3.548
Number of Spec. 33 33 30



4.3 Warp Compression Properties (WC)

Warp Compression Properties (WC)--CTD

Strength & Modulus

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

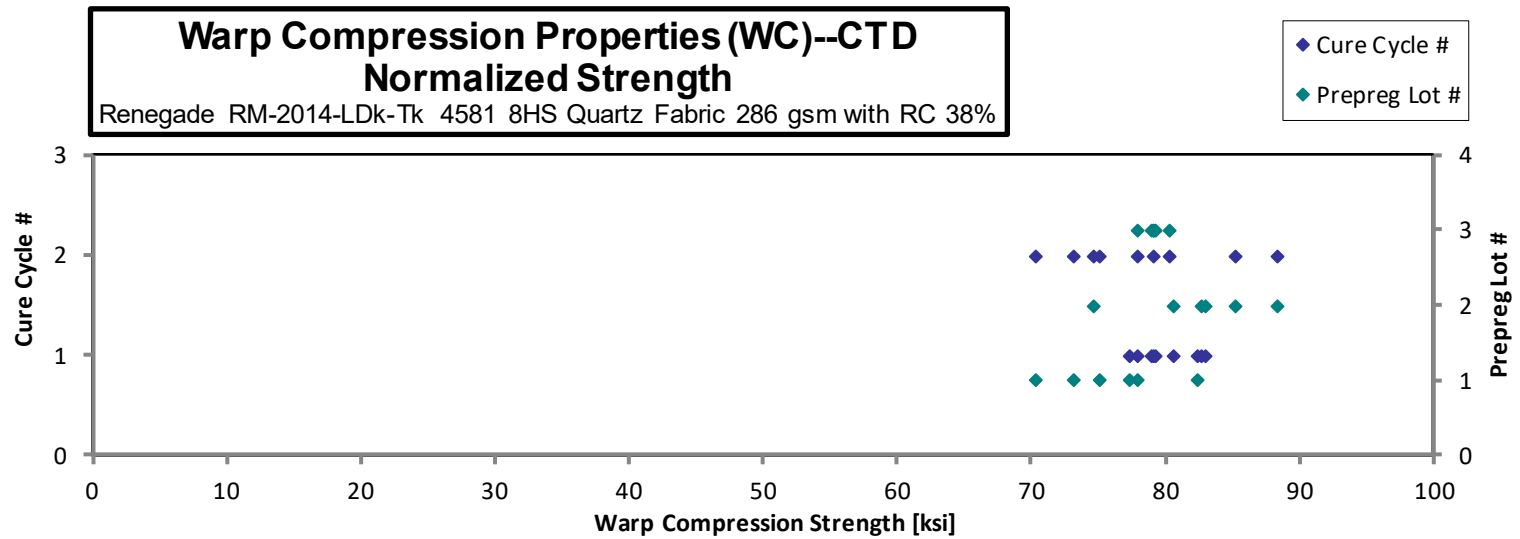
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-CTD-1	A	C1	1	1	83.54	3.595	0.1104	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-CTD-6	A	C1	1	1	78.93	3.565	0.1106	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-CTD-11	A	C1	1	1	78.55	3.651	0.1102	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-CTD-1	A	C2	1	2	69.66	3.534	0.1132	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-CTD-6	A	C2	1	2	72.10	3.552	0.1136	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-CTD-11	A	C2	1	2	74.87	3.576	0.1124	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-CTD-1	B	C1	2	1	83.28	3.550	0.1115	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-CTD-6	B	C1	2	1	79.64	3.514	0.1133	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-CTD-11	B	C1	2	1	83.11	3.564	0.1113	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-CTD-1	B	C2	2	2	87.51	3.569	0.1131	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-CTD-6	B	C2	2	2	84.35	3.553	0.1131	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-CTD-11	B	C2	2	2	74.13	3.579	0.1128	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-CTD-1	C	C1	3	1	79.45	3.633	0.1112	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-CTD-6	C	C1	3	1	79.01	3.559	0.1122	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-CTD-11	C	C1	3	1	79.77	3.629	0.1112	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-CTD-1	C	C2	3	2	78.88	3.611	0.1122	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-CTD-6	C	C2	3	2	79.42	3.526	0.1133	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-CTD-11	C	C2	3	2	77.85	3.612	0.1121	10	BGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01104	82.32	3.542
0.01106	77.94	3.520
0.01102	77.29	3.592
0.01132	70.37	3.570
0.01136	73.15	3.603
0.01124	75.13	3.588
0.01115	82.92	3.535
0.01133	80.55	3.554
0.01113	82.62	3.543
0.01131	88.38	3.605
0.01131	85.18	3.587
0.01128	74.65	3.604
0.01112	78.89	3.607
0.01122	79.15	3.566
0.01112	79.20	3.603
0.01122	79.02	3.617
0.01133	80.30	3.565
0.01121	77.90	3.615

Average 79.11 3.576
Standard Dev. 4.440 0.03841
Coeff. of Var. [%] 5.612 1.074
Min. 69.66 3.514
Max. 87.51 3.651
Number of Spec. 18 18

Average_{norm} 0.01121 79.16 3.579
Standard Dev._{norm} 4.319 0.03018
Coeff. of Var. [%]_{norm} 5.456 0.8432
Min. 0.01102 70.37 3.520
Max. 0.01136 88.38 3.617
Number of Spec. 18 18 18



**Warp Compression Properties (WC)--RTD
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

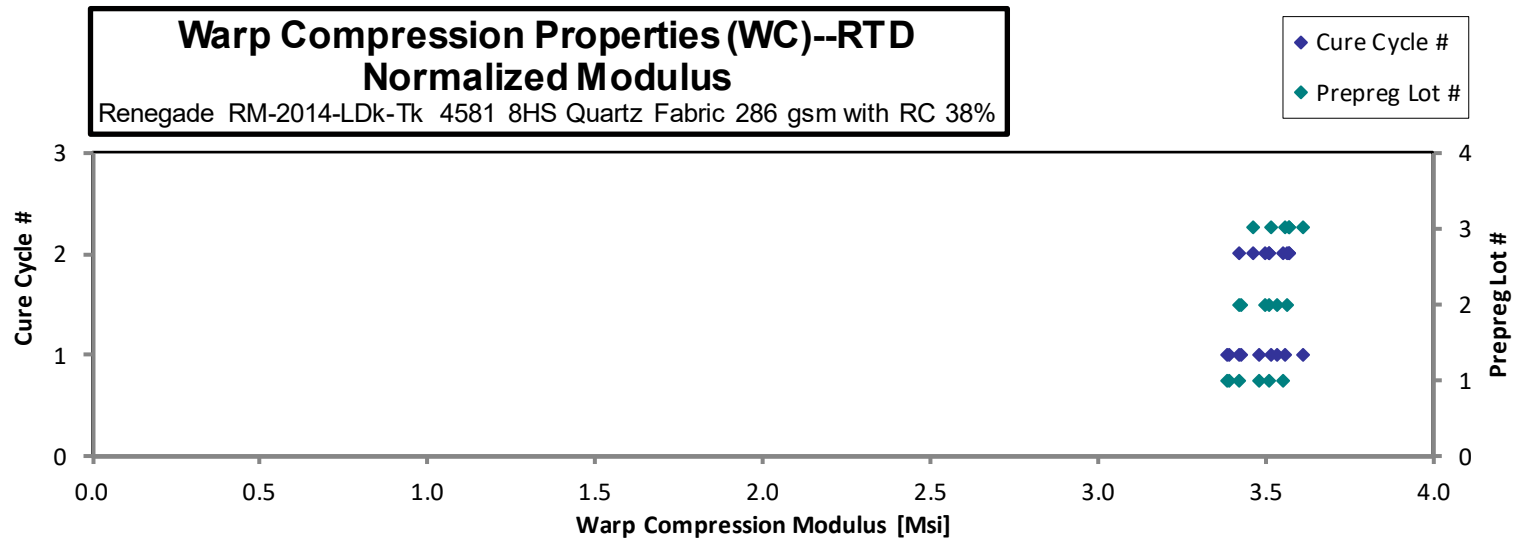
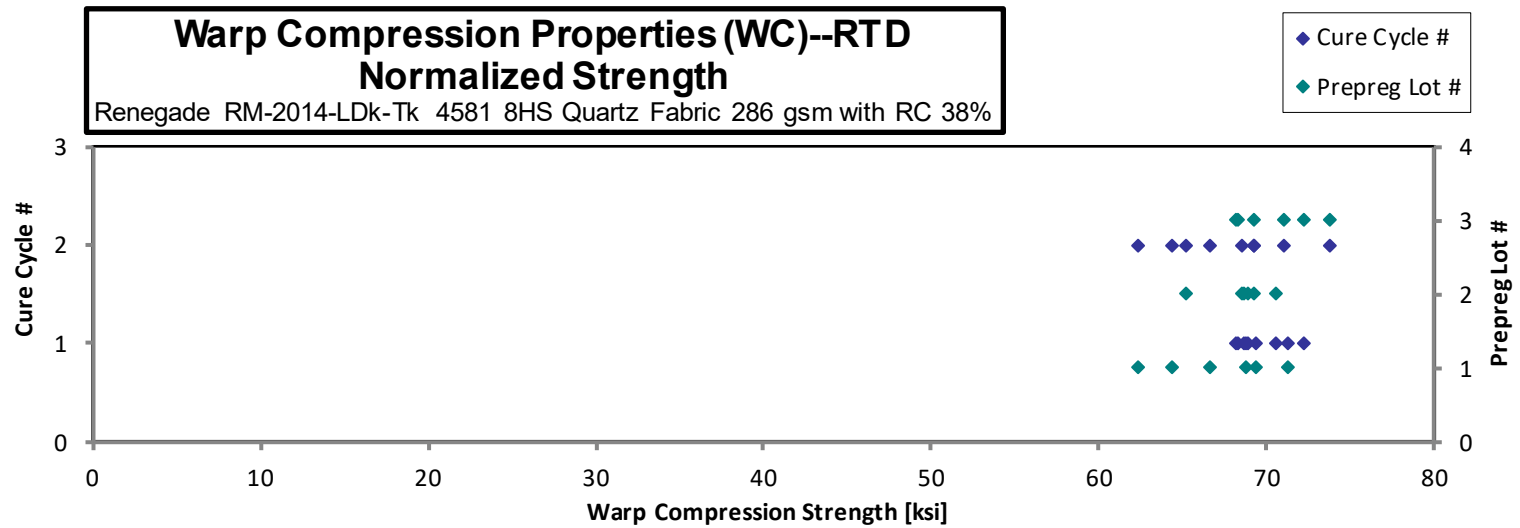
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-RTD-2	A	C1	1	1	70.00	3.450	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-RTD-7	A	C1	1	1	71.90	3.510	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-RTD-12	A	C1	1	1	70.00	3.420	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-RTD-2	A	C2	1	2	63.70	3.480	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-RTD-7	A	C2	1	2	60.70	3.460	0.1150	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-RTD-12	A	C2	1	2	65.40	3.360	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-RTD-2	B	C1	2	1	66.80	3.440	0.1150	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-RTD-7	B	C1	2	1	68.70	3.340	0.1150	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-RTD-12	B	C1	2	1	67.70	3.360	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-RTD-2	B	C2	2	2	66.10	3.390	0.1160	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-RTD-7	B	C2	2	2	67.40	3.410	0.1150	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-RTD-12	B	C2	2	2	64.00	3.500	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-RTD-2	C	C1	3	1	68.10	3.610	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-RTD-7	C	C1	3	1	68.30	3.560	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-RTD-12	C	C1	3	1	72.90	3.550	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-RTD-2	C	C2	3	2	73.80	3.460	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-RTD-7	C	C2	3	2	68.60	3.540	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-RTD-12	C	C2	3	2	70.40	3.540	0.1130	10	BGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01100	68.75	3.388
0.01110	71.26	3.479
0.01110	69.38	3.389
0.01130	64.27	3.511
0.01150	62.33	3.553
0.01140	66.57	3.420
0.01150	68.59	3.532
0.01150	70.54	3.429
0.01140	68.91	3.420
0.01160	68.46	3.511
0.01150	69.21	3.501
0.01140	65.14	3.563
0.01120	68.10	3.610
0.01120	68.30	3.560
0.01110	72.25	3.518
0.01120	73.80	3.460
0.01130	69.21	3.572
0.01130	71.03	3.572

Average 68.03 3.466
Standard Dev. 3.322 0.07717
Coeff. of Var. [%] 4.883 2.227
Min. 60.70 3.340
Max. 73.80 3.610
Number of Spec. 18 18

Average_{norm} 0.01131 68.67 3.499
Standard Dev._{norm} 2.797 0.06806
Coeff. of Var. [%]_{norm} 4.073 1.945
Min. 0.01100 62.33 3.388
Max. 0.01160 73.80 3.610
Number of Spec. 18 18 18



**Warp Compression Properties (WC)--ETD
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

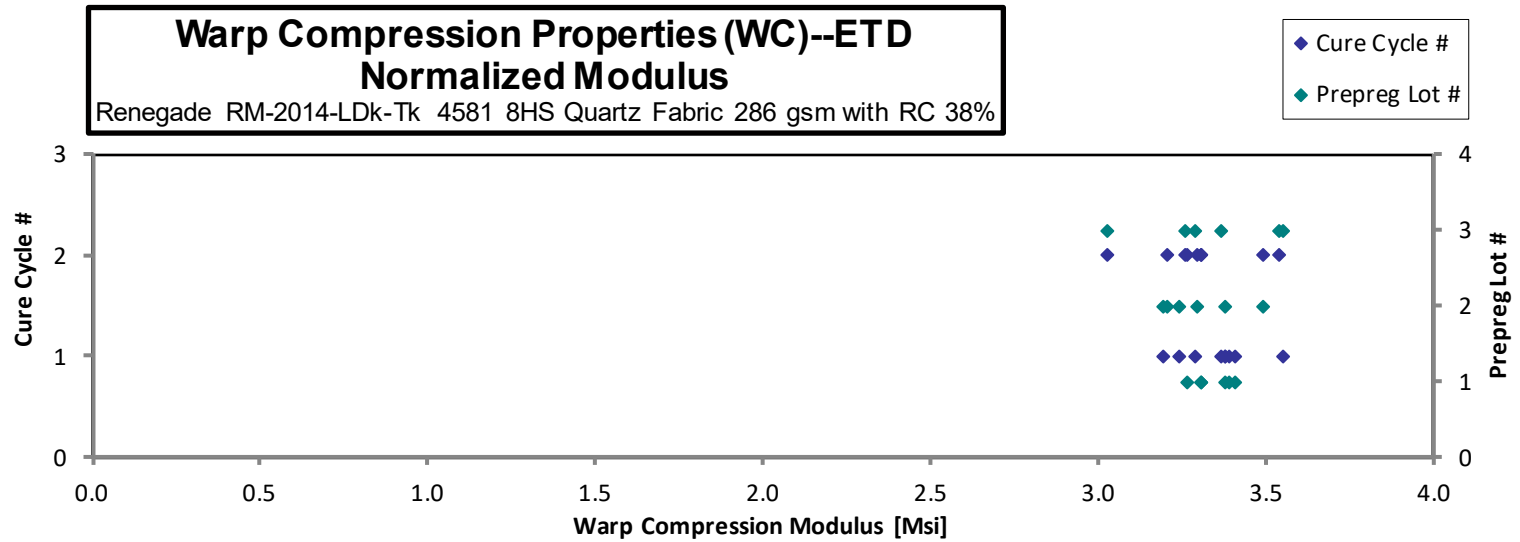
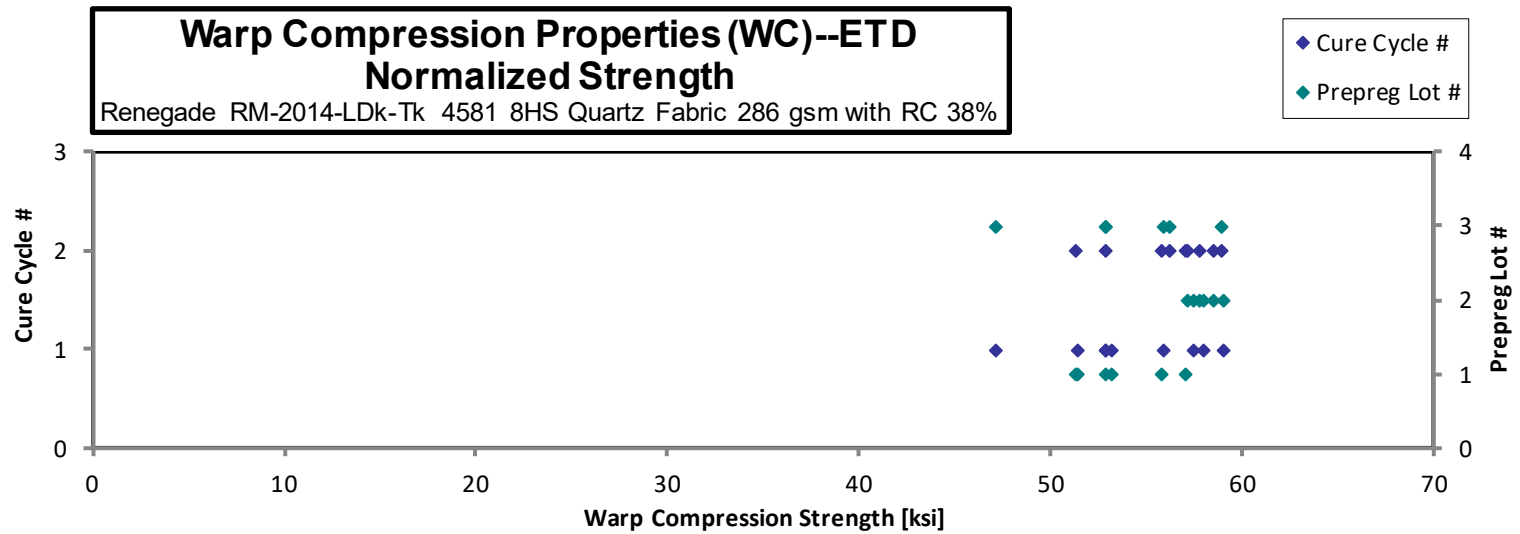
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-ETD-3	A	C1	1	1	53.30	3.420	0.1110	10	BGT
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-ETD-8	A	C1	1	1	52.30	3.440	0.1100	10	BGT
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-ETD-13	A	C1	1	1	53.70	3.440	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-ETD-3	A	C2	1	2	56.50	3.280	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-ETD-8	A	C2	1	2	54.80	3.250	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-ETD-13	A	C2	1	2	50.40	3.210	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-ETD-3	B	C1	2	1	56.00	3.290	0.1150	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-ETD-8	B	C1	2	1	56.50	3.110	0.1150	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-ETD-13	B	C1	2	1	57.50	3.160	0.1150	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-ETD-3	B	C2	2	2	56.50	3.180	0.1160	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-ETD-8	B	C2	2	2	56.30	3.400	0.1150	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-ETD-13	B	C2	2	2	56.10	3.150	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-ETD-3	C	C1	3	1	47.10	3.550	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-ETD-8	C	C1	3	1	53.30	3.400	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-ETD-13	C	C1	3	1	56.40	3.320	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-ETD-3	C	C2	3	2	52.90	3.030	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-ETD-8	C	C2	3	2	55.70	3.230	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-ETD-13	C	C2	3	2	58.90	3.540	0.1120	10	BGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01110	52.82	3.389
0.01100	51.37	3.379
0.01110	53.22	3.409
0.01130	57.00	3.309
0.01140	55.78	3.308
0.01140	51.30	3.267
0.01150	57.50	3.378
0.01150	58.01	3.193
0.01150	59.04	3.245
0.01160	58.52	3.294
0.01150	57.81	3.491
0.01140	57.10	3.206
0.01120	47.10	3.550
0.01110	52.82	3.370
0.01110	55.90	3.290
0.01120	52.90	3.030
0.01130	56.20	3.259
0.01120	58.90	3.540

Average 54.68 3.300
Standard Dev. 2.823 0.1486
Coeff. of Var. [%] 5.163 4.504
Min. 47.10 3.030
Max. 58.90 3.550
Number of Spec. 18 18

Average_{norm} 0.01130 55.18 3.328
Standard Dev._{norm} 3.291 0.1280
Coeff. of Var. [%]_{norm} 5.964 3.846
Min. 0.01100 47.10 3.030
Max. 0.01160 59.04 3.550
Number of Spec. 18 18 18



**Warp Compression Properties (WC)--ETW
Strength & Modulus**

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-ETW-4	A	C1	1	1	43.90	3.240	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-ETW-5**	A	C1	1	1	44.30		0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-ETW-9	A	C1	1	1	45.40	4.010	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-ETW-14	A	C1	1	1	41.00	3.030	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-ETW-18**	A	C1	1	1	41.10		0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-ETW-19**	A	C1	1	1	43.80		0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-ETW-4**	A	C2	1	2	41.20		0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-ETW-5	A	C2	1	2	40.70	3.060	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-ETW-8	A	C2	1	2	40.40	3.010	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-ETW-14	A	C2	1	2	39.20	2.950	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-ETW-18**	A	C2	1	2	38.90		0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-ETW-19**	A	C2	1	2	39.10		0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-ETW-9	B	C1	2	1	40.80	3.090	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-ETW-14	B	C1	2	1	39.10	3.210	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-ETW-19	B	C1	2	1	38.30	3.160	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-ETW-4*	B	C2	2	2	38.70		0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-ETW-9	B	C2	2	2	40.60	3.170	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-ETW-14	B	C2	2	2	39.90	3.340	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-ETW-19	B	C2	2	2	42.40	3.280	0.1120	10	HGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-ETW-9	C	C1	3	1	42.00	3.220	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-ETW-14	C	C1	3	1	44.50	3.110	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-ETW-19	C	C1	3	1	40.60	3.210	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-ETW-4	C	C2	3	2	45.80	3.180	0.1130	10	HGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-ETW-9	C	C2	3	2	42.90	3.130	0.1140	10	HGM
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-ETW-14	C	C2	3	2	43.00	3.170	0.1130	10	BGM

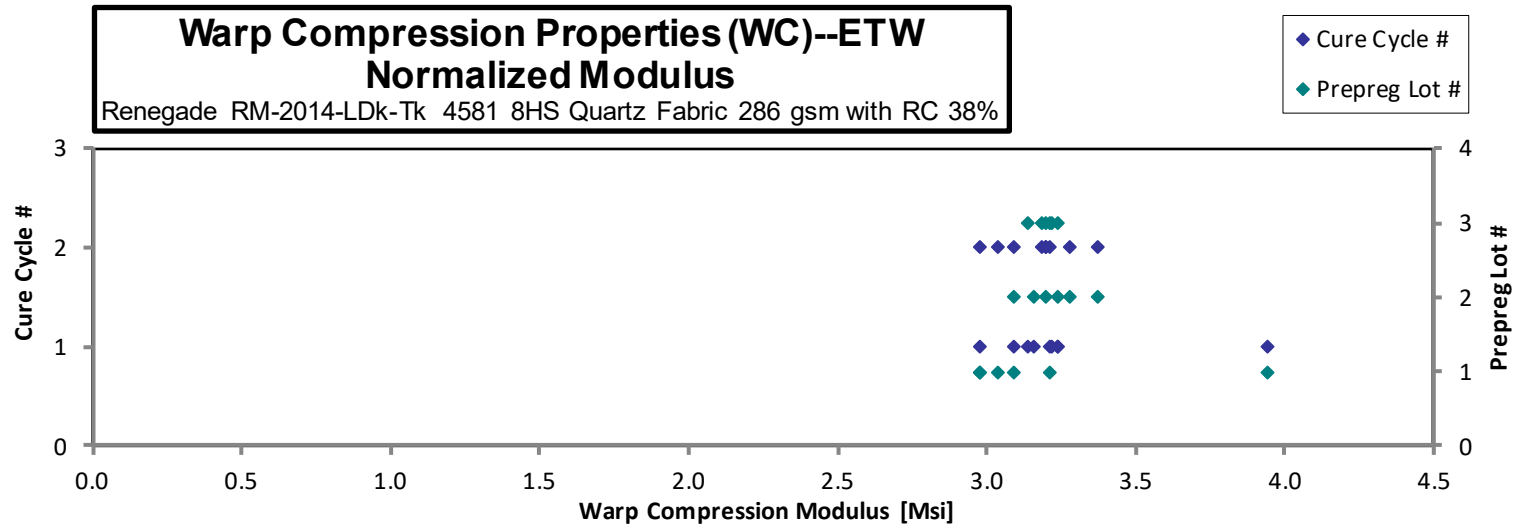
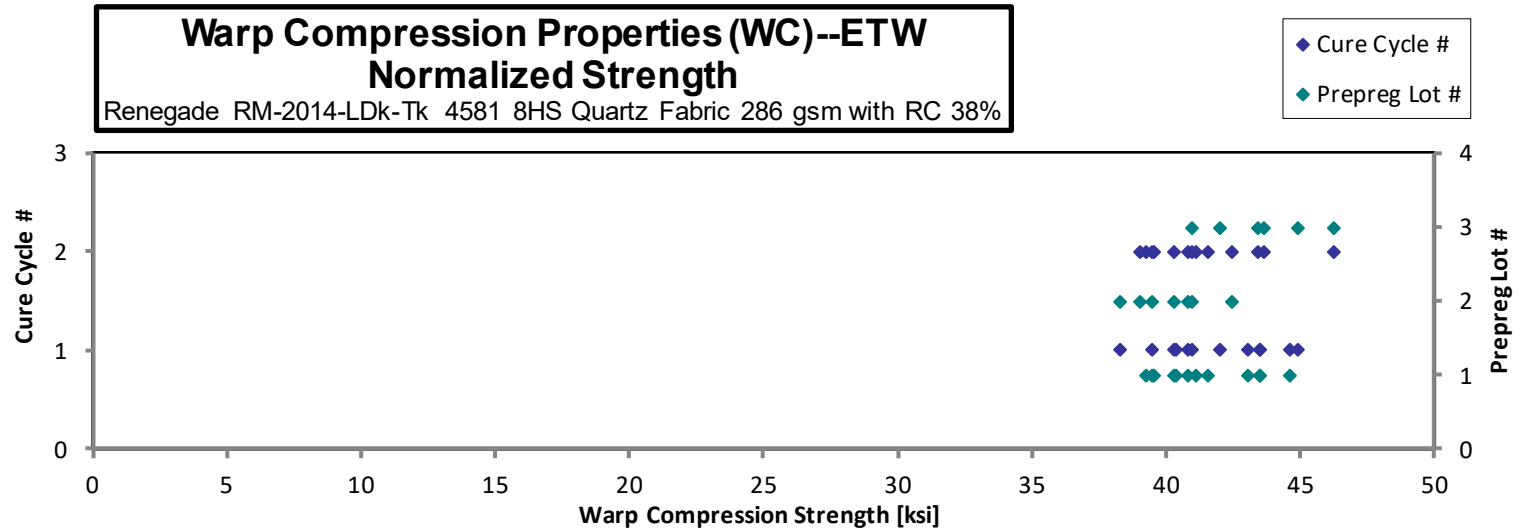
*Excluded modulus due to strain gage slippage

**Specimen was tested for strength only

Average 41.50 3.198
Standard Dev. 2.194 0.2250
Coeff. of Var. [%] 5.286 7.033
Min. 38.30 2.950
Max. 45.80 4.010
Number of Spec. 25 18

Average_{norm} 0.01122 41.57 3.208
Standard Dev._{norm} 2.067 0.2087
Coeff. of Var. [%]_{norm} 4.972 6.503
Min. 0.01100 38.30 2.976
Max. 0.01140 46.21 3.938
Number of Spec. 25 25 18

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01110	43.51	3.211
0.01100	43.51	
0.01100	44.59	3.938
0.01100	40.27	2.976
0.01100	40.37	
0.01100	43.02	
0.01130	41.57	
0.01130	41.06	3.087
0.01130	40.76	3.037
0.01130	39.55	2.976
0.01130	39.25	
0.01130	39.45	
0.01120	40.80	3.090
0.01130	39.45	3.239
0.01120	38.30	3.160
0.01130	39.05	
0.01130	40.96	3.198
0.01130	40.26	3.370
0.01120	42.40	3.280
0.01120	42.00	3.220
0.01130	44.90	3.138
0.01130	40.96	3.239
0.01130	46.21	3.208
0.01140	43.67	3.186
0.01130	43.38	3.198



4.4 Fill Compression Properties (FC)

Fill Compression Properties (FC)--CTD

Strength & Modulus

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

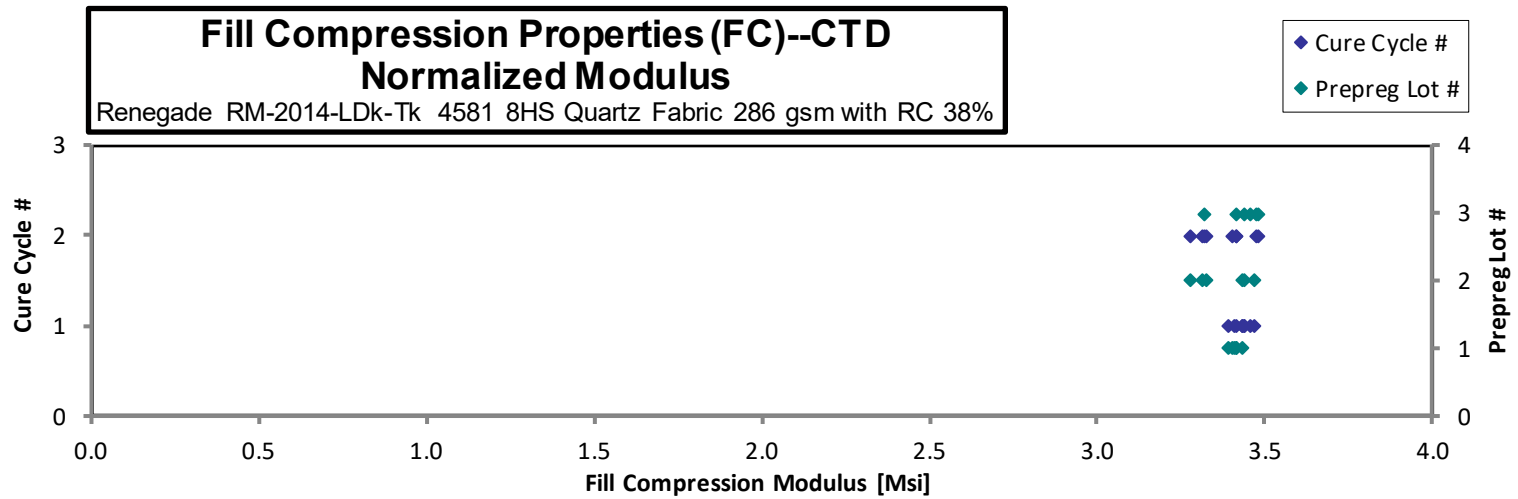
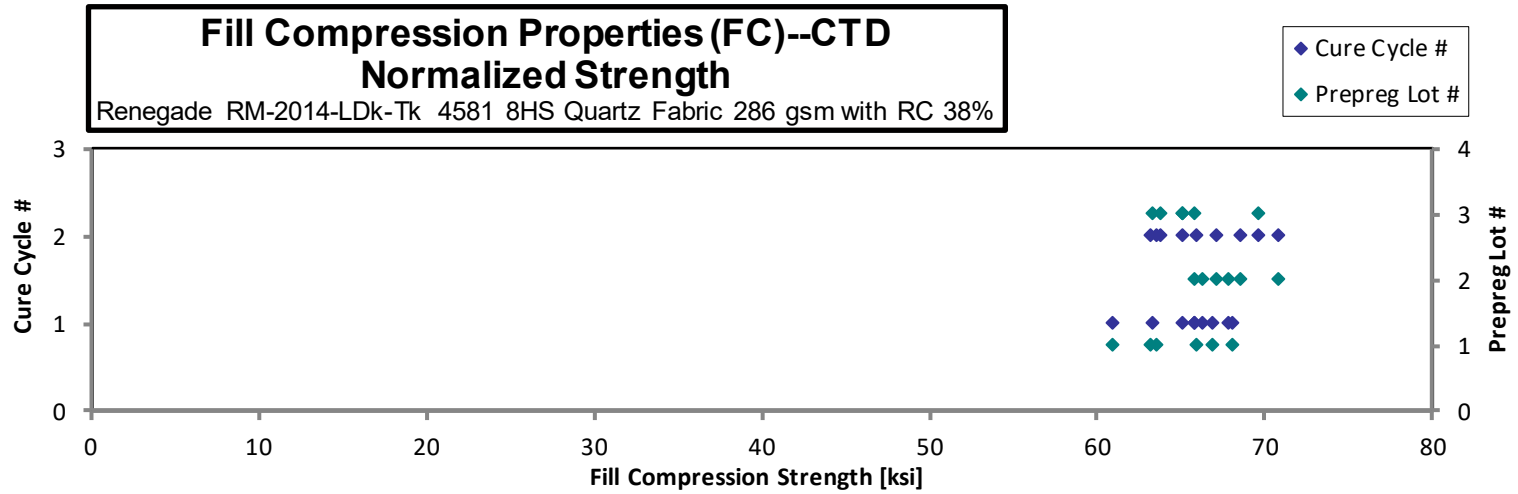
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-CTD-1	A	C1	1	1	67.44	3.421	0.1111	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-CTD-6	A	C1	1	1	68.82	3.447	0.1109	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-CTD-11	A	C1	1	1	61.75	3.481	0.1106	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-CTD-1	A	C2	1	2	63.17	3.401	0.1121	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-CTD-6	A	C2	1	2	65.17	3.378	0.1133	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-CTD-11	A	C2	1	2	63.76	3.427	0.1116	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-CTD-1	B	C1	2	1	67.07	3.516	0.1107	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-CTD-6	B	C1	2	1	68.31	3.455	0.1113	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-CTD-11	B	C1	2	1	66.44	3.472	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-CTD-1	B	C2	2	2	71.39	3.306	0.1112	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-CTD-6	B	C2	2	2	66.23	3.283	0.1136	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-CTD-11	B	C2	2	2	68.96	3.332	0.1115	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-CTD-1	C	C1	3	1	67.07	3.564	0.1088	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-CTD-6	C	C1	3	1	65.47	3.558	0.1083	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-CTD-11	C	C1	3	1	67.12	3.482	0.1099	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-CTD-1	C	C2	3	2	66.08	3.603	0.1082	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-CTD-6	C	C2	3	2	67.31	3.429	0.1085	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-CTD-11	C	C2	3	2	71.55	3.569	0.1091	10	BGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01111	66.86	3.392
0.01109	68.15	3.413
0.01106	60.95	3.436
0.01121	63.22	3.404
0.01133	65.92	3.416
0.01116	63.53	3.415
0.01107	66.27	3.474
0.01113	67.86	3.433
0.01110	65.87	3.442
0.01112	70.90	3.283
0.01136	67.16	3.329
0.01115	68.63	3.316
0.01088	65.15	3.461
0.01083	63.32	3.441
0.01099	65.89	3.418
0.01082	63.86	3.482
0.01085	65.18	3.321
0.01091	69.68	3.476

Average 66.84 3.451
 Standard Dev. 2.530 0.09116
 Coeff. of Var. [%] 3.785 2.641
 Min. 61.75 3.283
 Max. 71.55 3.603
 Number of Spec. 18 18

Average_{norm} 0.01106 66.02 3.408
 Standard Dev._{norm} 2.513 0.05918
 Coeff. of Var. [%]_{norm} 3.806 1.736
 Min. 0.01082 60.95 3.283
 Max. 0.01136 70.90 3.482
 Number of Spec. 18 18 18



**Fill Compression Properties (FC)--RTD
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

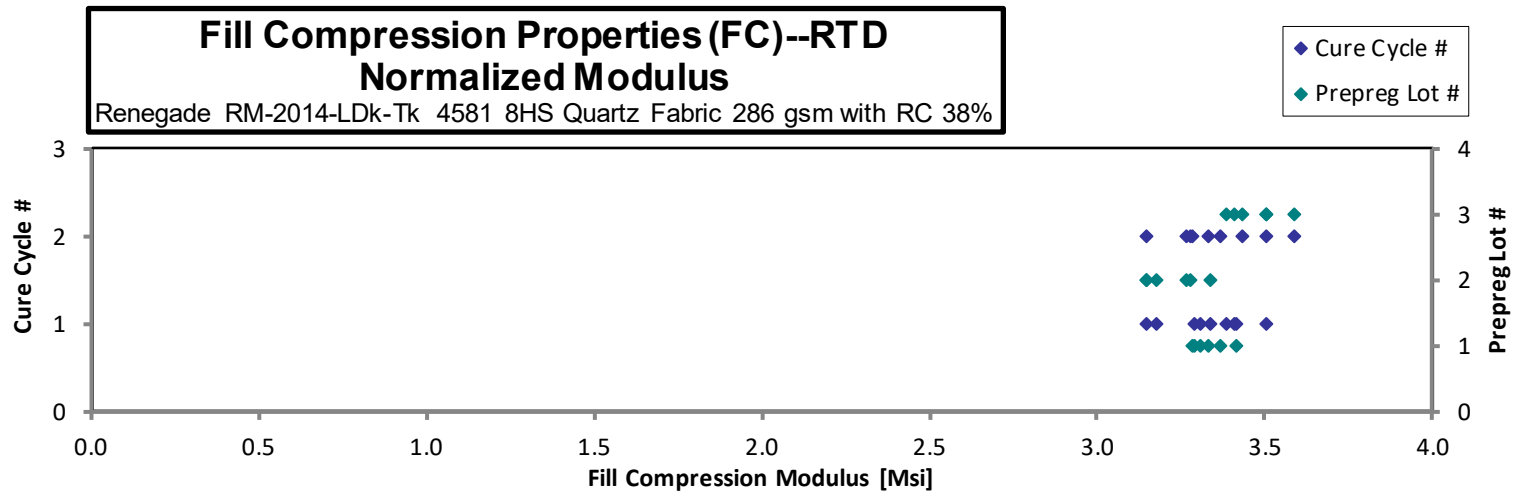
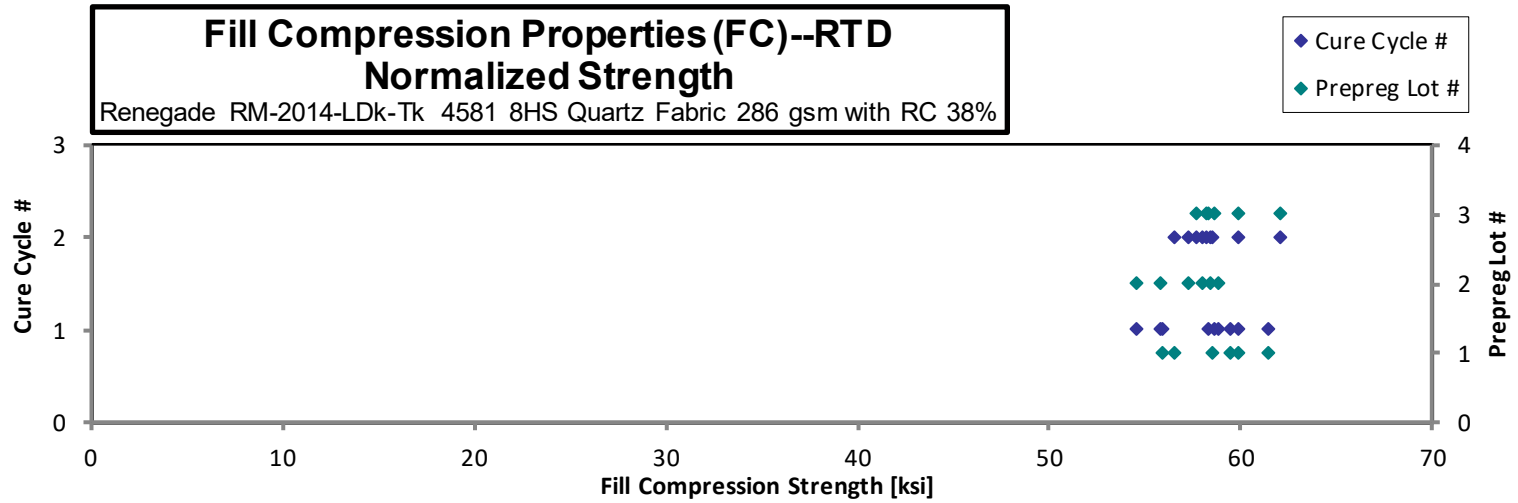
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-RTD-2	A	C1	1	1	62.00	3.450	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-RTD-7	A	C1	1	1	59.50	3.310	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-RTD-12	A	C1	1	1	56.50	3.320	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-RTD-2	A	C2	1	2	57.50	3.310	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-RTD-7	A	C2	1	2	58.30	3.250	0.1150	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-RTD-12	A	C2	1	2	55.60	3.230	0.1140	10	HGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-RTD-2	B	C1	2	1	54.10	3.120	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-RTD-7	B	C1	2	1	55.80	3.180	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-RTD-12	B	C1	2	1	57.80	3.280	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-RTD-2	B	C2	2	2	58.50	3.280	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-RTD-7	B	C2	2	2	56.30	3.210	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-RTD-12	B	C2	2	2	58.00	3.150	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-RTD-2	C	C1	3	1	60.50	3.640	0.1080	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-RTD-7	C	C1	3	1	60.80	3.540	0.1080	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-RTD-12	C	C1	3	1	61.00	3.450	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-RTD-2	C	C2	3	2	59.90	3.690	0.1090	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-RTD-12	C	C2	3	2	58.80	3.570	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-RTD-17	C	C2	3	2	63.20	3.500	0.1100	10	BGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01110	61.45	3.419
0.01120	59.50	3.310
0.01110	56.00	3.290
0.01140	58.53	3.369
0.01150	59.86	3.337
0.01140	56.59	3.288
0.01130	54.58	3.148
0.01120	55.80	3.180
0.01140	58.83	3.339
0.01120	58.50	3.280
0.01140	57.31	3.267
0.01120	58.00	3.150
0.01080	58.34	3.510
0.01080	58.63	3.414
0.01100	59.91	3.388
0.01090	58.30	3.591
0.01100	57.75	3.506
0.01100	62.07	3.438

Average 58.56 3.360
Standard Dev. 2.408 0.1723
Coeff. of Var. [%] 4.111 5.128
Min. 54.10 3.120
Max. 63.20 3.690
Number of Spec. 18 18

Average_{norm} 0.01116 58.33 3.346
Standard Dev._{norm} 1.890 0.1230
Coeff. of Var. [%]_{norm} 3.240 3.675
Min. 0.01080 54.58 3.148
Max. 0.01150 62.07 3.591
Number of Spec. 18 18 18



**Fill Compression Properties (FC)--ETD
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

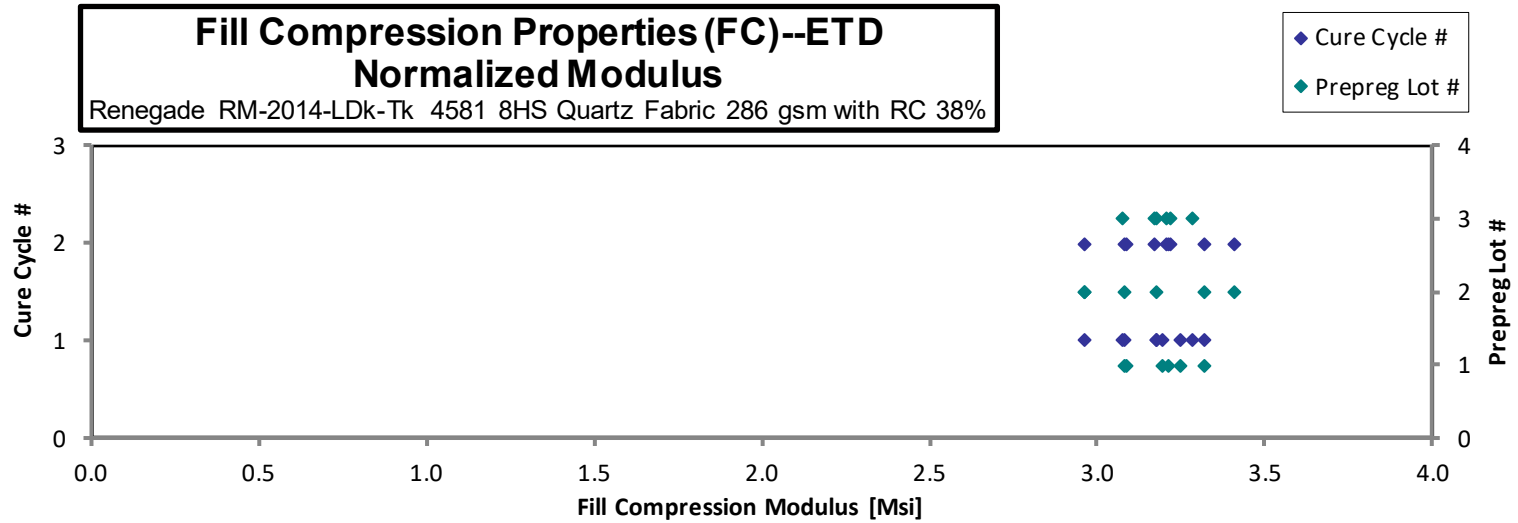
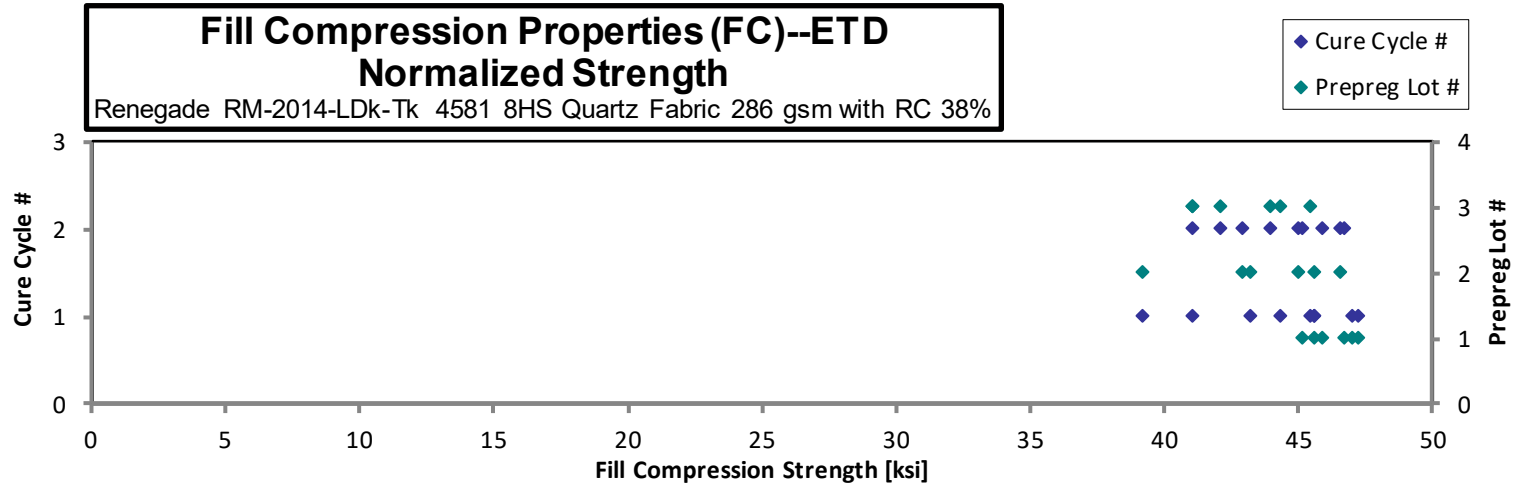
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-RTD-3	A	C1	1	1	47.30	3.320	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-RTD-8	A	C1	1	1	47.50	3.280	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-RTD-10	A	C1	1	1	45.60	3.200	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-RTD-3	A	C2	1	2	45.90	3.160	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-RTD-8	A	C2	1	2	44.70	3.010	0.1150	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-RTD-13	A	C2	1	2	44.40	3.030	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-RTD-3	B	C1	2	1	38.90	2.940	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-RTD-8	B	C1	2	1	45.20	3.150	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-RTD-13	B	C1	2	1	42.50	3.030	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-RTD-3	B	C2	2	2	44.60	3.380	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-RTD-8	B	C2	2	2	42.60	2.940	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-RTD-13	B	C2	2	2	46.60	3.320	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-RTD-3	C	C1	3	1	46.00	3.410	0.1080	10	HGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-RTD-8	C	C1	3	1	42.60	3.300	0.1080	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-RTD-10	C	C1	3	1	46.70	3.160	0.1090	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-RTD-3	C	C2	3	2	43.30	3.300	0.1090	10	HGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-RTD-8	C	C2	3	2	42.20	3.310	0.1090	10	HGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-RTD-13	C	C2	3	2	45.20	3.260	0.1090	10	HGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01120	47.30	3.320
0.01110	47.08	3.251
0.01120	45.60	3.200
0.01140	46.72	3.216
0.01150	45.90	3.091
0.01140	45.19	3.084
0.01130	39.25	2.966
0.01130	45.60	3.178
0.01140	43.26	3.084
0.01130	45.00	3.410
0.01130	42.98	2.966
0.01120	46.60	3.320
0.01080	44.36	3.288
0.01080	41.08	3.182
0.01090	45.45	3.075
0.01090	42.14	3.212
0.01090	41.07	3.221
0.01090	43.99	3.173

Average 44.54 3.194
Standard Dev. 2.194 0.1498
Coeff. of Var. [%] 4.925 4.690
Min. 38.90 2.940
Max. 47.50 3.410
Number of Spec. 18 18

Average_{norm} 0.01116 44.36 3.180
Standard Dev._{norm} 2.304 0.1193
Coeff. of Var. [%]_{norm} 5.194 3.753
Min. 0.01080 39.25 2.966
Max. 0.01150 47.30 3.410
Number of Spec. 18 18 18



**Fill Compression Properties (FC)--ETW
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]
0.01120

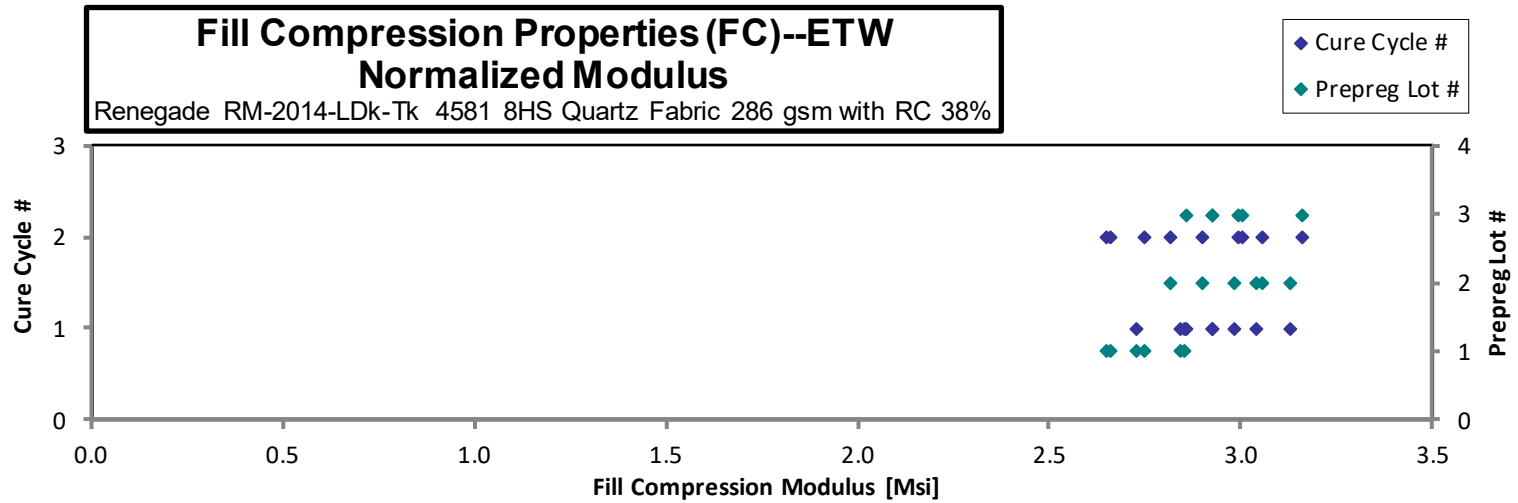
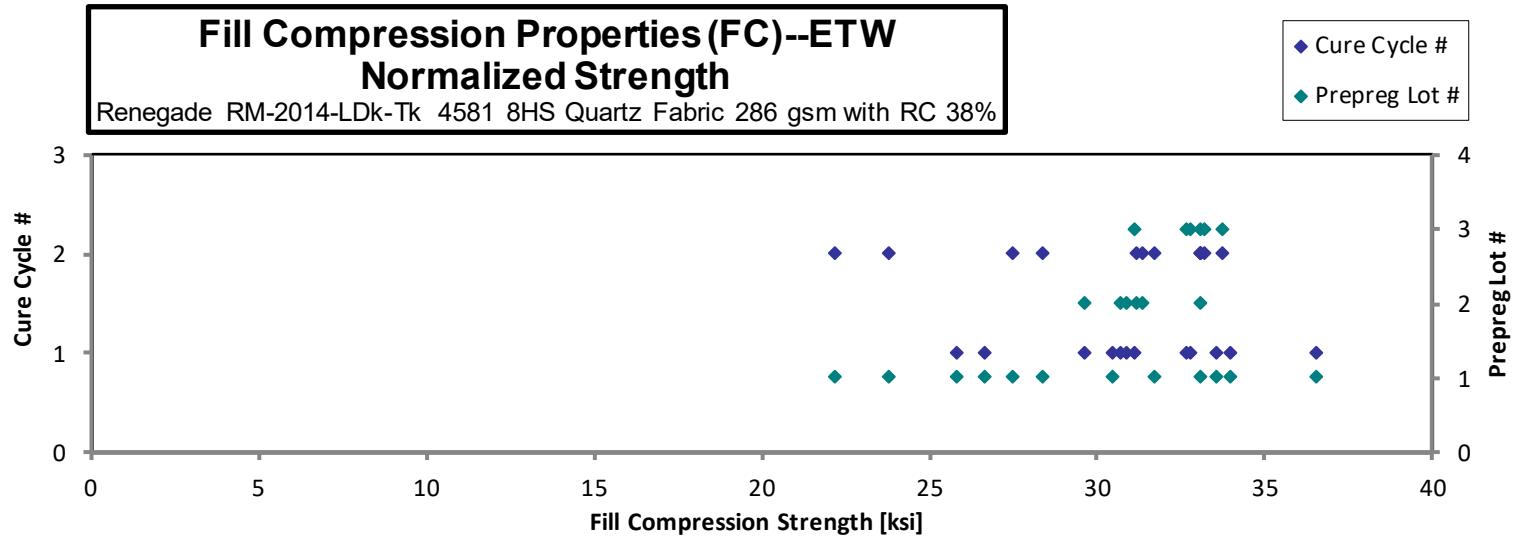
Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-ETW-4*	A	C1	1	1	34.60		0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-ETW-5	A	C1	1	1	26.90	2.880	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-ETW-9	A	C1	1	1	26.30	2.780	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-ETW-13*	A	C1	1	1	36.90		0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-ETW-14	A	C1	1	1	31.30	2.920	0.1090	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C1-1-ETW-19*	A	C1	1	1	34.20		0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-ETW-4	A	C2	1	2	27.50	2.650	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-ETW-5*	A	C2	1	2	28.40		0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-ETW-9	A	C2	1	2	22.20	2.750	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-ETW-14	A	C2	1	2	23.80	2.660	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-ETW-18*	A	C2	1	2	31.20		0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-FC-A-C2-1-ETW-19*	A	C2	1	2	33.40		0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-ETW-4	B	C1	2	1	30.20	3.190	0.1100	10	HGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-ETW-9	B	C1	2	1	31.30	3.100	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-FC-B-C1-1-ETW-14	B	C1	2	1	31.20	3.010	0.1110	10	HGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-ETW-9	B	C2	2	2	33.10	3.060	0.1120	10	HGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-ETW-14	B	C2	2	2	31.20	2.820	0.1120	10	HGM
NTP2014Q1-RMC-R14-RS-FC-B-C2-1-ETW-19	B	C2	2	2	31.40	2.900	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-ETW-4	C	C1	3	1	33.40	2.980	0.1100	10	HGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-ETW-9	C	C1	3	1	31.70	2.910	0.1100	10	HGM
NTP2014Q1-RMC-R14-RS-FC-C-C1-1-ETW-14	C	C1	3	1	32.70	2.930	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-ETW-4	C	C2	3	2	33.70	3.060	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-ETW-9	C	C2	3	2	34.70	3.250	0.1090	10	HGM
NTP2014Q1-RMC-R14-RS-FC-C-C2-1-ETW-14	C	C2	3	2	33.50	3.020	0.1110	10	HGM

*Specimen was tested for strength only

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01100	33.98	
0.01110	26.66	2.854
0.01100	25.83	2.730
0.01110	36.57	
0.01090	30.46	2.842
0.01100	33.59	
0.01120	27.50	2.650
0.01120	28.40	
0.01120	22.20	2.750
0.01120	23.80	2.660
0.01140	31.76	
0.01110	33.10	
0.01100	29.66	3.133
0.01100	30.74	3.045
0.01110	30.92	2.983
0.01120	33.10	3.060
0.01120	31.20	2.820
0.01120	31.40	2.900
0.01100	32.80	2.927
0.01100	31.13	2.858
0.01120	32.70	2.930
0.01100	33.10	3.005
0.01090	33.77	3.163
0.01110	33.20	2.993

Average 31.03 2.937
Standard Dev. 3.568 0.1664
Coeff. of Var. [%] 11.50 5.667
Min. 22.20 2.650
Max. 36.90 3.250
Number of Spec. 24 18

Average_{norm} 0.01110 30.73 2.906
Standard Dev._{norm} 3.449 0.1500
Coeff. of Var. [%]_{norm} 11.22 5.163
Min. 0.01090 22.20 2.650
Max. 0.01140 36.57 3.163
Number of Spec. 24 24 18



4.5 In-Plane Shear Properties (IPS)

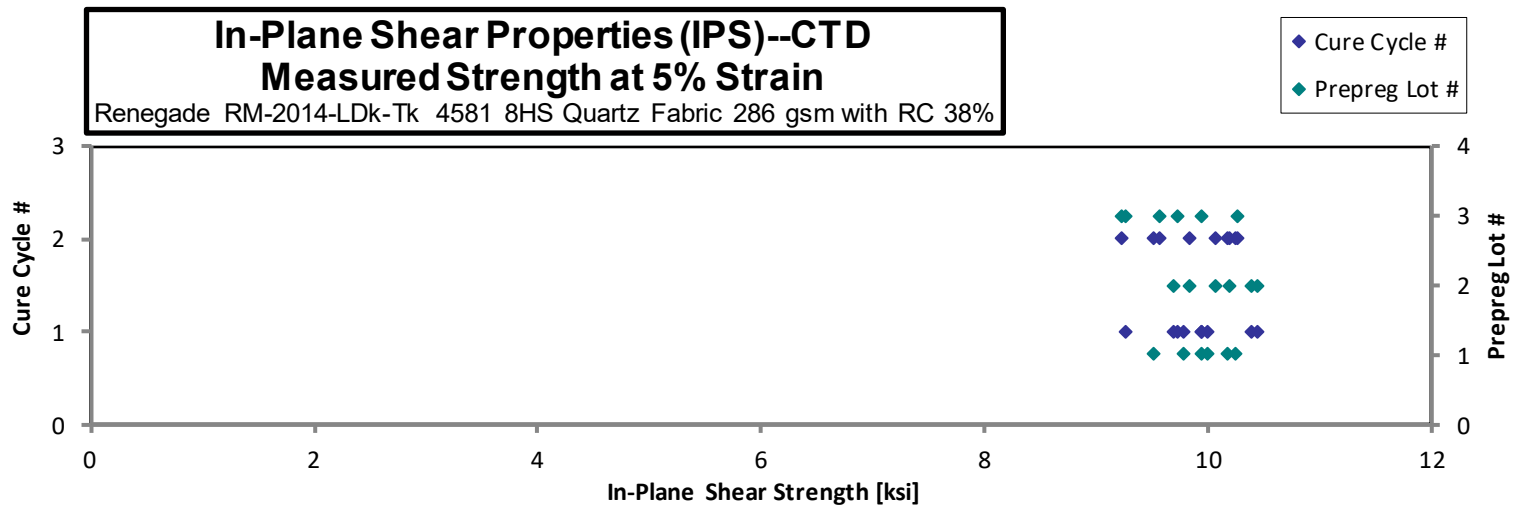
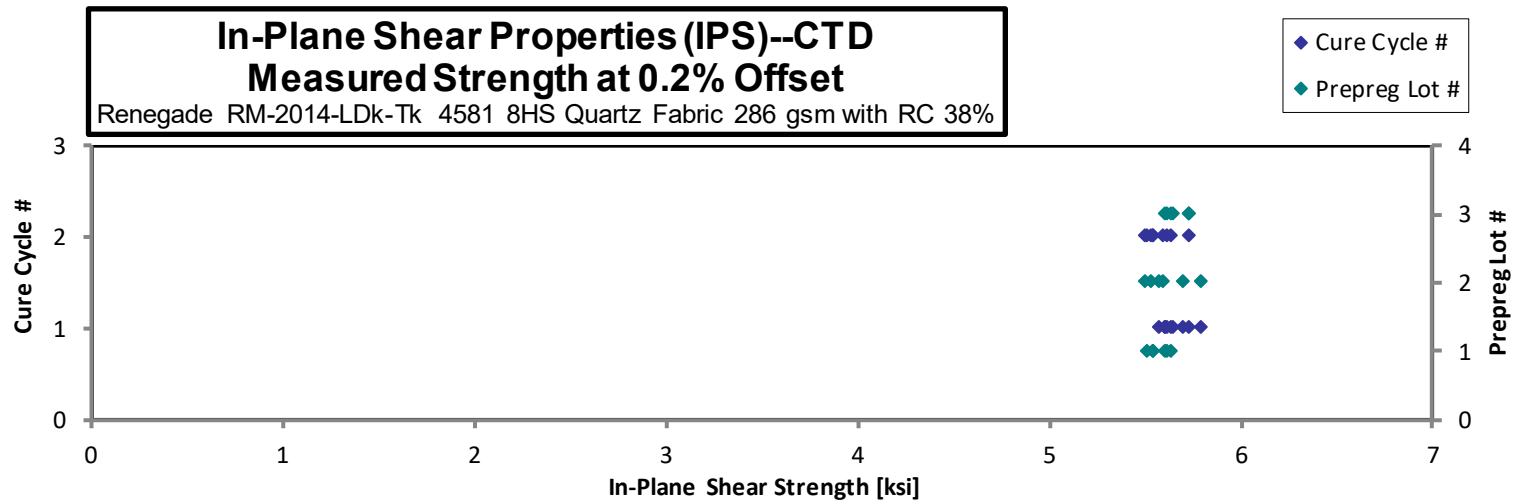
In-Plane Shear Properties (IPS)--CTD

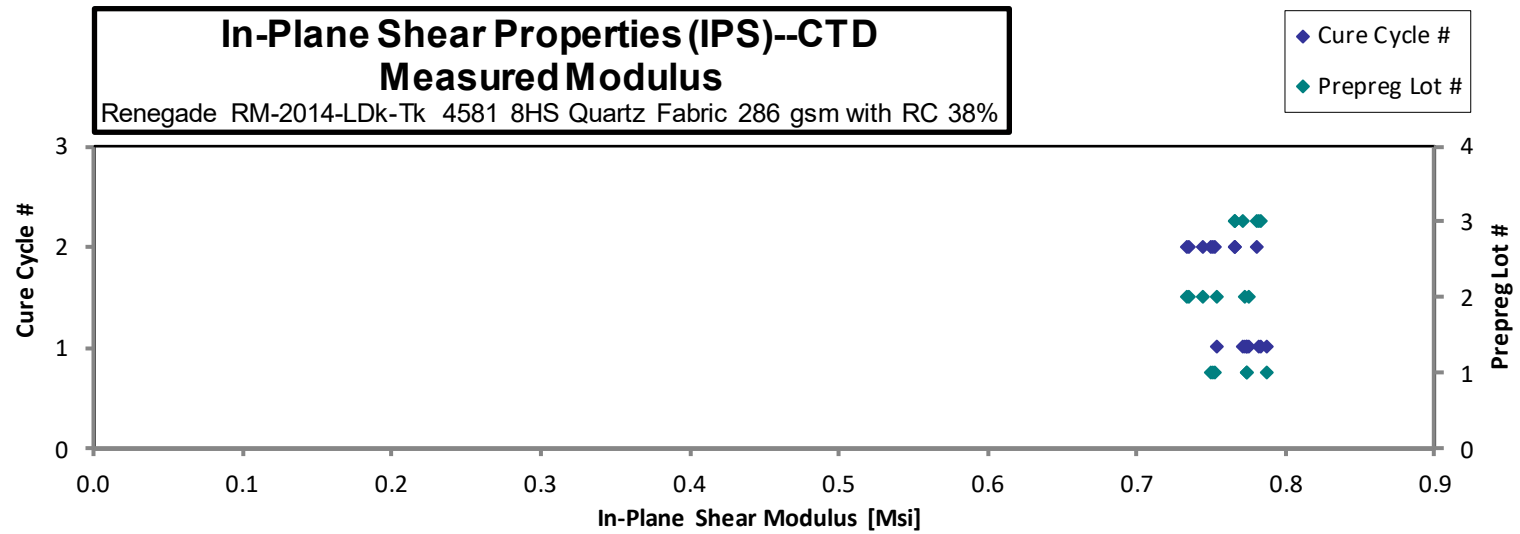
Strength & Modulus

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	0.2% Offset Strength [ksi]	Strength at 5% Strain [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-CTD-1	A	C1	1	1	5.636	9.786	0.7740	0.1307	12	0.01089
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-CTD-6	A	C1	1	1	5.608	9.932	0.7878	0.1323	12	0.01103
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-CTD-11	A	C1	1	1	5.612	9.989	0.7741	0.1319	12	0.01099
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-CTD-1	A	C2	1	2	5.546	10.24	0.7497	0.1350	12	0.01125
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-CTD-6	A	C2	1	2	5.538	10.17	0.7508	0.1357	12	0.01131
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-CTD-11	A	C2	1	2	5.512	9.508	0.7532	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-CTD-1	B	C1	2	1	5.789	10.45	0.7729	0.1328	12	0.01106
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-CTD-6	B	C1	2	1	5.696	10.39	0.7756	0.1344	12	0.01120
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-CTD-11	B	C1	2	1	5.577	9.693	0.7537	0.1354	12	0.01128
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-CTD-1	B	C2	2	2	5.597	10.19	0.7440	0.1364	12	0.01137
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-CTD-6	B	C2	2	2	5.503	10.06	0.7354	0.1387	12	0.01156
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-CTD-11	B	C2	2	2	5.530	9.832	0.7336	0.1368	12	0.01140
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-CTD-1	C	C1	3	1	5.725	9.932	0.7828	0.1329	12	0.01107
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-CTD-6	C	C1	3	1	5.604	9.727	0.7815	0.1338	12	0.01115
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-CTD-11	C	C1	3	1	5.641	9.265	0.7712	0.1335	12	0.01112
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-CTD-1	C	C2	3	2	5.730	10.26	0.7808	0.1323	12	0.01103
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-CTD-6	C	C2	3	2	5.631	9.569	0.7653	0.1333	12	0.01111
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-CTD-11	C	C2	3	2	5.616	9.217	0.7654	0.1325	12	0.01104

Average	5.616	9.901	0.7640	0.01116
Standard Dev.	0.07899	0.3607	0.01668	
Coeff. of Var. [%]	1.406	3.643	2.183	
Min.	5.503	9.217	0.7336	0.01089
Max.	5.789	10.45	0.7878	0.01156
Number of Spec.	18	18	18	18



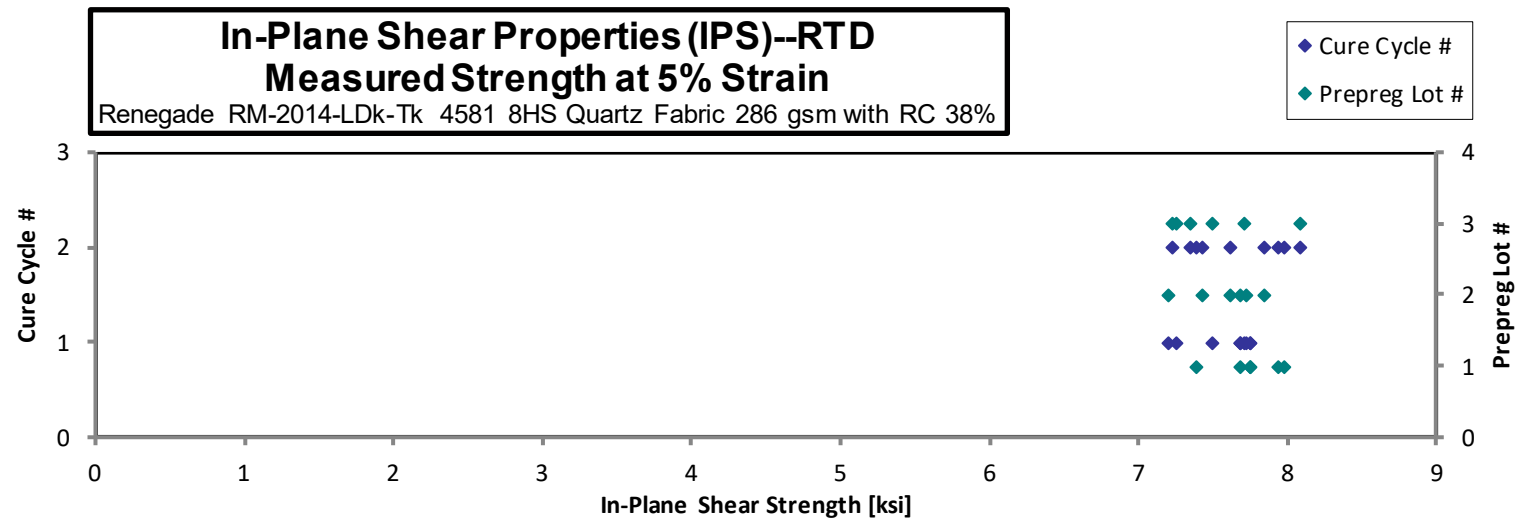
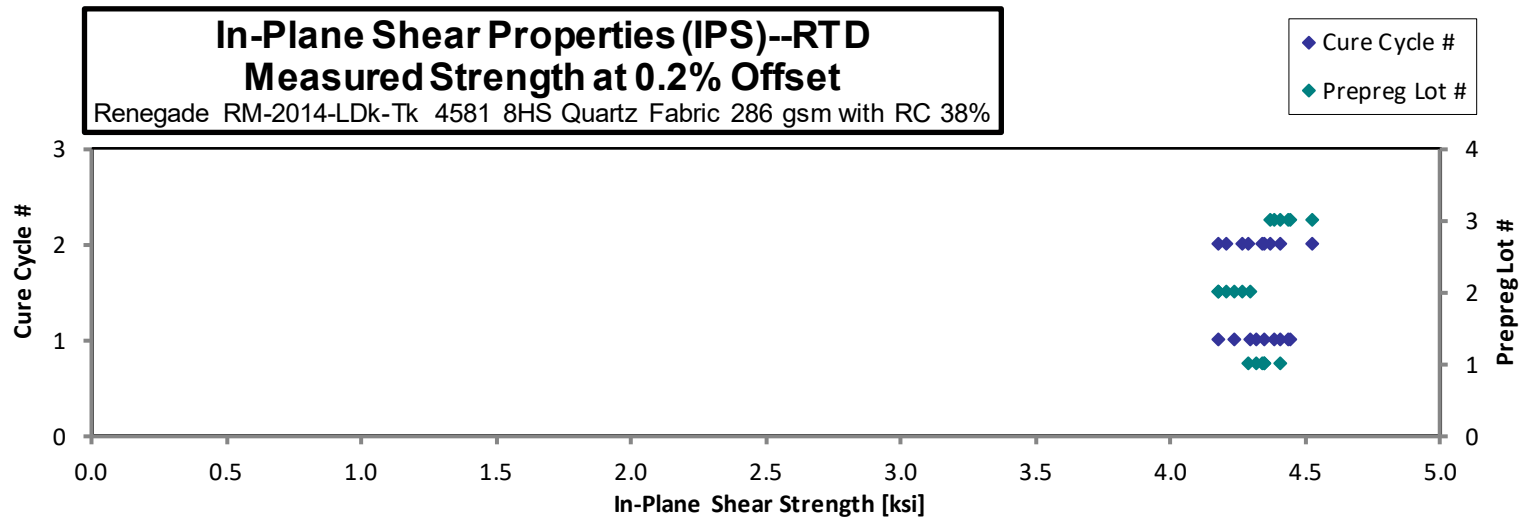


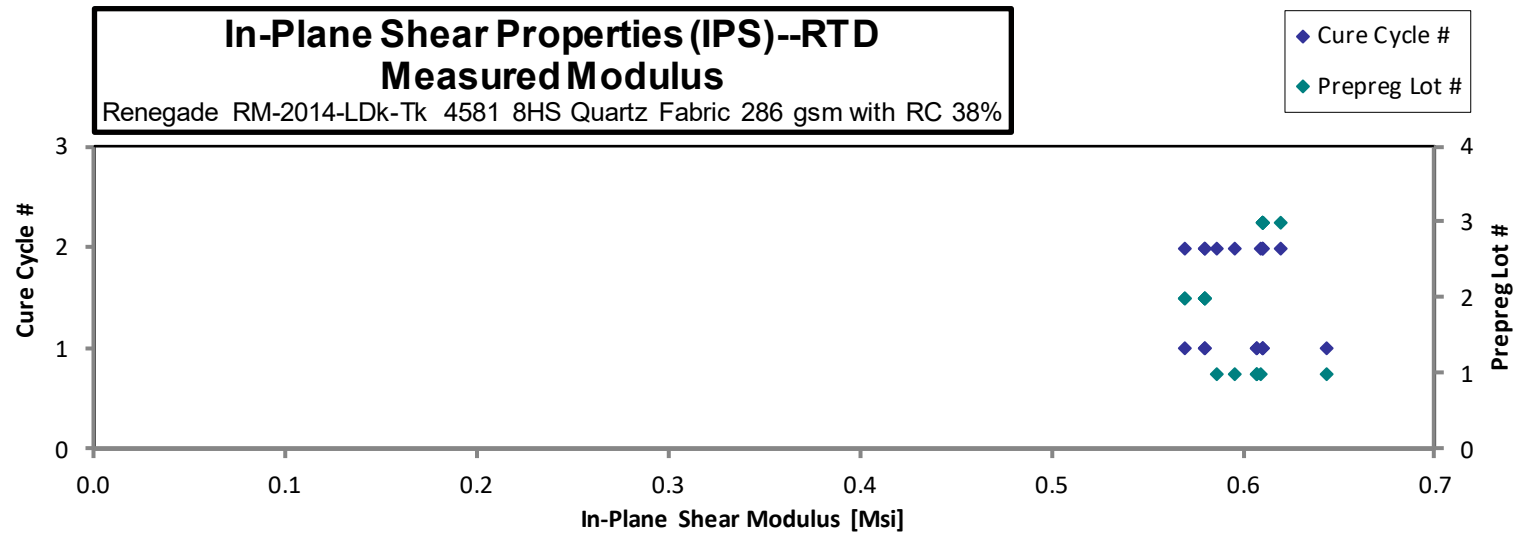
**In-Plane Shear Properties (IPS)--RTD
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	0.2% Offset Strength [ksi]	Strength at 5% Strain [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-RTD-2	A	C1	1	1	4.410	7.750	0.6440	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-RTD-7	A	C1	1	1	4.350	7.690	0.6070	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-RTD-12	A	C1	1	1	4.320	7.750	0.6070	0.1340	12	0.01117
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-RTD-2	A	C2	1	2	4.340	7.940	0.5860	0.1360	12	0.01133
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-RTD-7	A	C2	1	2	4.350	7.990	0.5960	0.1350	12	0.01125
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-RTD-12	A	C2	1	2	4.290	7.400	0.6090	0.1340	12	0.01117
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-RTD-2	B	C1	2	1	4.300	7.730	0.5700	0.1370	12	0.01142
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-RTD-7	B	C1	2	1	4.240	7.690	0.5800	0.1370	12	0.01142
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-RTD-12	B	C1	2	1	4.180	7.210	0.5800	0.1380	12	0.01150
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-RTD-2	B	C2	2	2	4.270	7.850	0.5800	0.1380	12	0.01150
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-RTD-7	B	C2	2	2	4.210	7.620	0.5700	0.1400	12	0.01167
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-RTD-12	B	C2	2	2	4.180	7.430	0.5800	0.1390	12	0.01158
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-RTD-2	C	C1	3	1	4.450	7.710	0.6100	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-RTD-7	C	C1	3	1	4.440	7.500	0.6100	0.1320	12	0.01100
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-RTD-12	C	C1	3	1	4.390	7.260	0.6100	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-RTD-2	C	C2	3	2	4.530	8.090	0.6200	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-RTD-7	C	C2	3	2	4.410	7.360	0.6100	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-RTD-12	C	C2	3	2	4.370	7.230	0.6100	0.1330	12	0.01108

Average	4.335	7.622	0.5988	0.01125
Standard Dev.	0.09660	0.2649	0.01971	
Coeff. of Var. [%]	2.228	3.476	3.291	
Min.	4.180	7.210	0.5700	0.01100
Max.	4.530	8.090	0.6440	0.01167
Number of Spec.	18	18	18	18



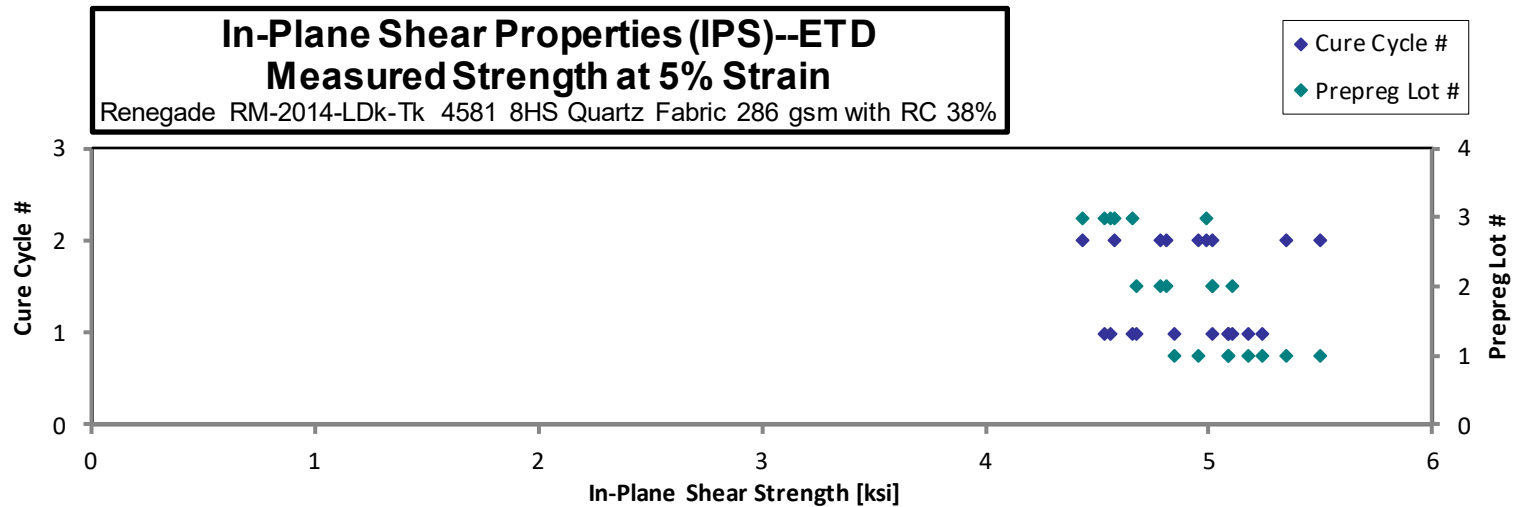
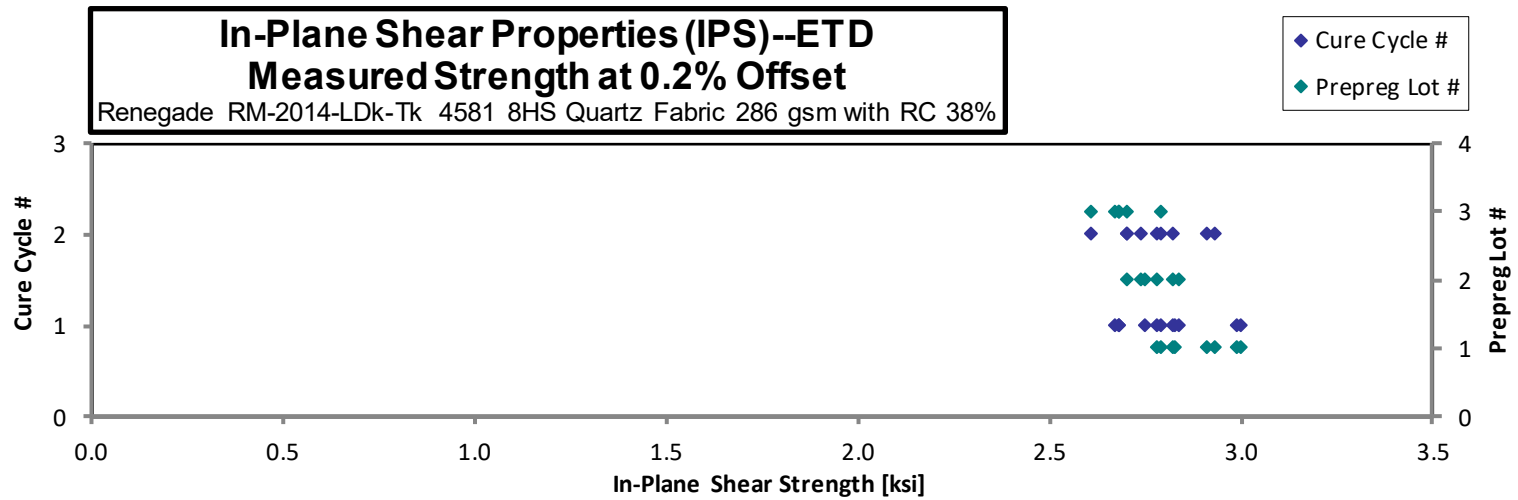


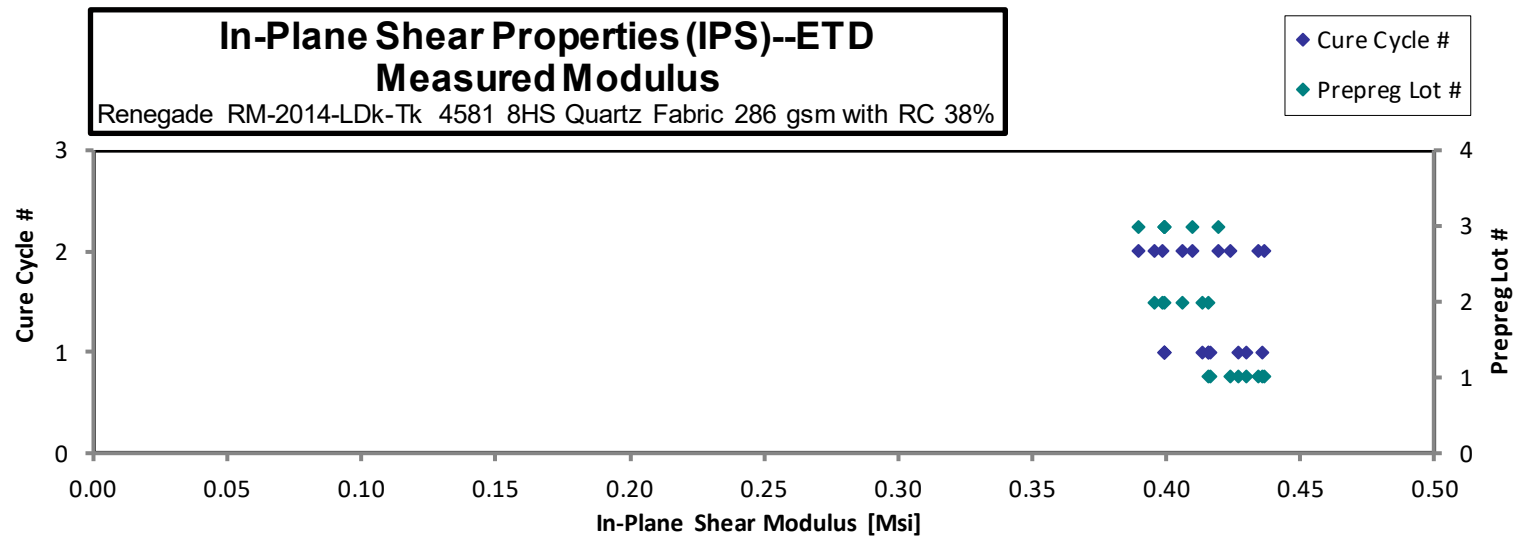
**In-Plane Shear Properties (IPS)--ETD
Strength & Modulus**

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	0.2% Offset Strength [ksi]	Strength at 5% Strain [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-ETD-3	A	C1	1	1	2.990	5.180	0.4270	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-ETD-8	A	C1	1	1	3.000	5.240	0.4360	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-ETD-10	A	C1	1	1	2.780	4.850	0.4170	0.1320	12	0.01100
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-ETD-13	A	C1	1	1	2.830	5.090	0.4300	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-ETD-15	A	C1	1	1	2.790	5.090	0.4160	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-ETD-3	A	C2	1	2	2.930	5.350	0.4240	0.1360	12	0.01133
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-ETD-8	A	C2	1	2	2.910	5.500	0.4370	0.1360	12	0.01133
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-ETD-13	A	C2	1	2	2.820	4.960	0.4350	0.1340	12	0.01117
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-ETD-3	B	C1	2	1	2.840	5.110	0.4140	0.1370	12	0.01142
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-ETD-8	B	C1	2	1	2.820	5.020	0.4160	0.1360	12	0.01133
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-ETD-13	B	C1	2	1	2.750	4.680	0.4000	0.1380	12	0.01150
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-ETD-3	B	C2	2	2	2.780	5.020	0.3990	0.1400	12	0.01167
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-ETD-8	B	C2	2	2	2.700	4.810	0.3960	0.1400	12	0.01167
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-ETD-13	B	C2	2	2	2.740	4.790	0.4060	0.1390	12	0.01158
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-ETD-3	C	C1	3	1	2.680	4.660	0.4000	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-ETD-8	C	C1	3	1	2.680	4.560	0.4000	0.1320	12	0.01100
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-ETD-13	C	C1	3	1	2.670	4.540	0.4000	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-ETD-3	C	C2	3	2	2.790	4.990	0.4200	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-ETD-8	C	C2	3	2	2.610	4.440	0.3900	0.1340	12	0.01117
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-ETD-13	C	C2	3	2	2.700	4.580	0.4100	0.1330	12	0.01108

Average	2.791	4.923	0.4137	0.01124
Standard Dev.	0.1065	0.2893	0.01454	
Coeff. of Var. [%]	3.816	5.877	3.516	
Min.	2.610	4.440	0.3900	0.01100
Max.	3.000	5.500	0.4370	0.01167
Number of Spec.	20	20	20	20





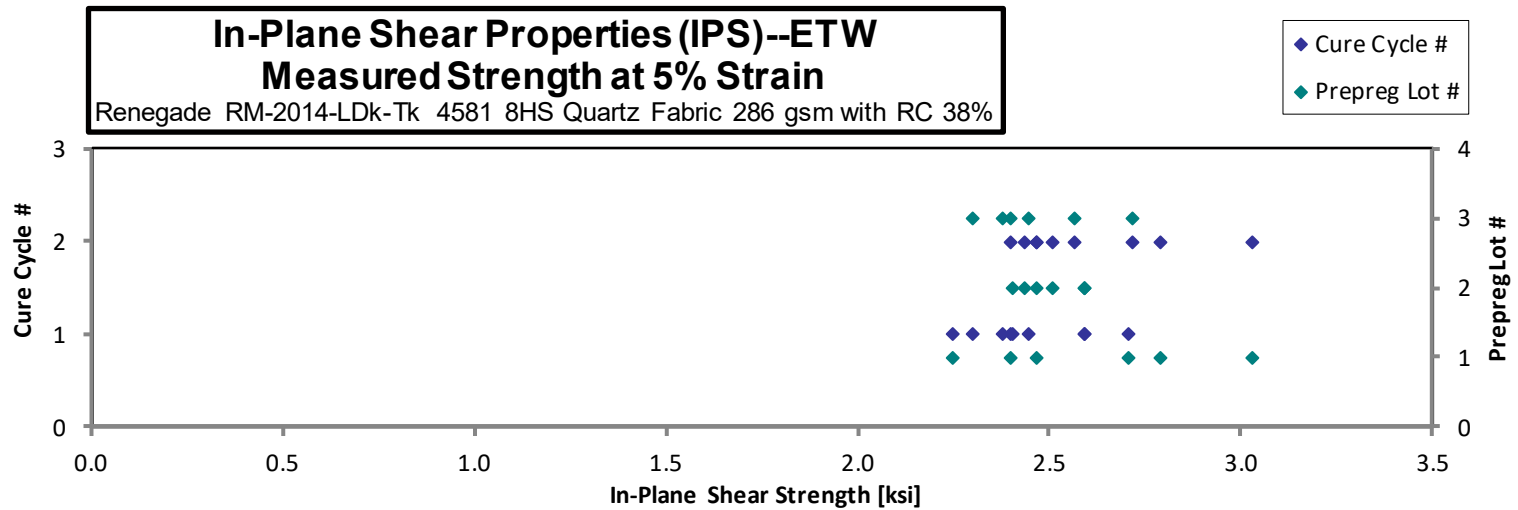
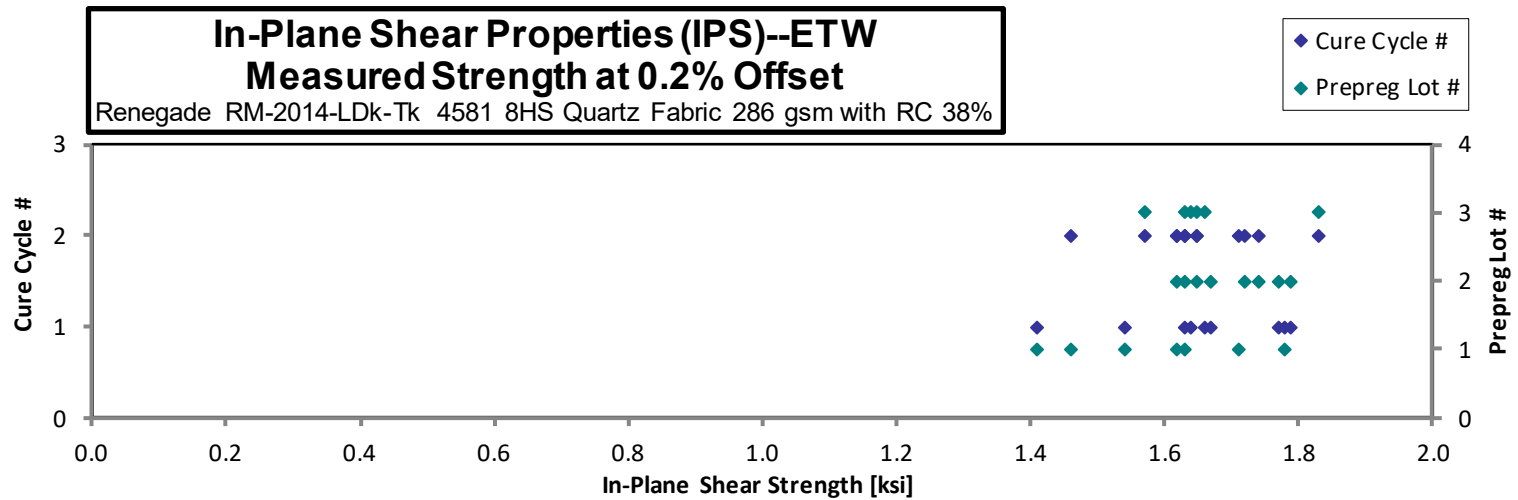
**In-Plane Shear Properties (IPS)--ETW
Strength & Modulus**

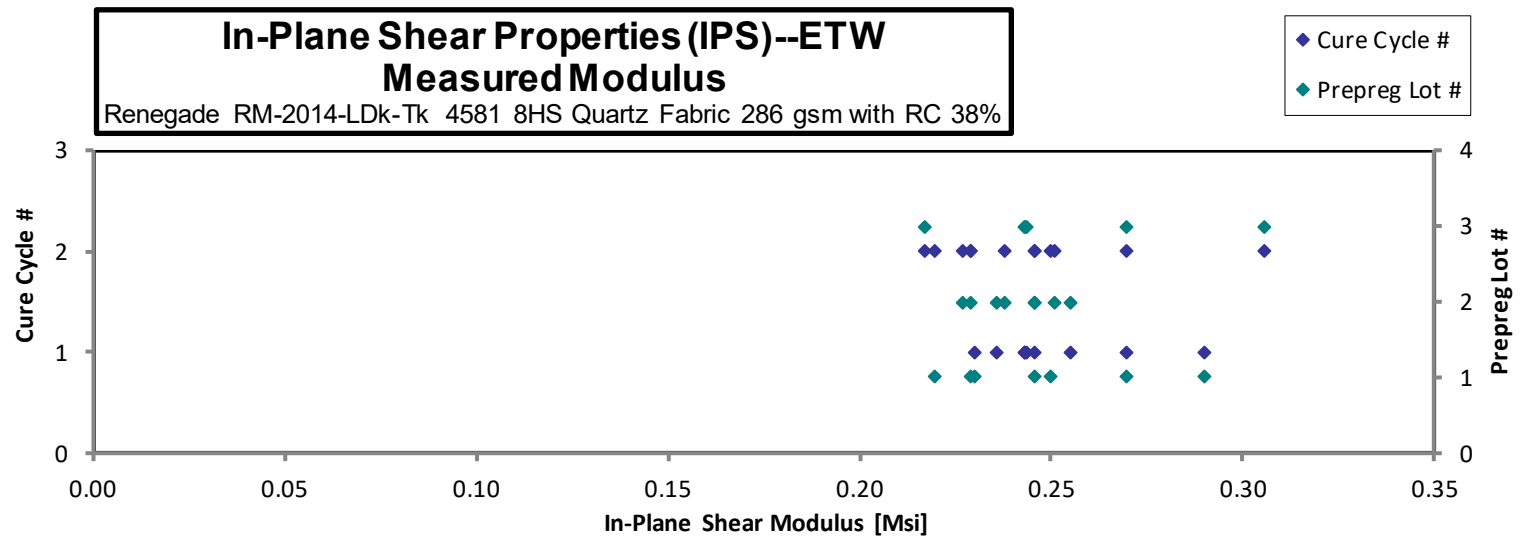
Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	0.2% Offset Strength [ksi]	Strength at 5% Strain [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t _{ply} [in]
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-ETW-4	A	C1	1	1	1.780	2.710	0.2900	0.1310	12	0.01092
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-ETW-9	A	C1	1	1	1.540	2.400	0.2700	0.1320	12	0.01100
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1-ETW-14	A	C1	1	1	1.410	2.250	0.2300	0.1320	12	0.01100
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-ETW-4*	A	C2	1	2	1.630		0.2500	0.1350	12	0.01125
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-ETW-5	A	C2	1	2	1.710	2.790	0.2460	0.1360	12	0.01133
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-ETW-9	A	C2	1	2	1.620	3.030	0.2290	0.1370	12	0.01142
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1-ETW-14	A	C2	1	2	1.460	2.470	0.2200	0.1350	12	0.01125
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-ETW-4	B	C1	2	1	1.790	2.592	0.2460	0.1350	12	0.01125
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-ETW-9	B	C1	2	1	1.770	2.592	0.2550	0.1350	12	0.01125
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1-ETW-14	B	C1	2	1	1.670	2.405	0.2360	0.1380	12	0.01150
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-ETW-4*	B	C2	2	2	1.720		0.2460	0.1390	12	0.01158
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-ETW-9*	B	C2	2	2	1.620		0.2380	0.1390	12	0.01158
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-ETW-14	B	C2	2	2	1.740	2.510	0.2510	0.1380	12	0.01150
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-ETW-15	B	C2	2	2	1.630	2.440	0.2290	0.1390	12	0.01158
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1-ETW-19	B	C2	2	2	1.650	2.470	0.2270	0.1380	12	0.01150
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-ETW-4	C	C1	3	1	1.660	2.450	0.2440	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-ETW-9	C	C1	3	1	1.630	2.300	0.2430	0.1320	12	0.01100
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1-ETW-14	C	C1	3	1	1.640	2.380	0.2430	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-ETW-4	C	C2	3	2	1.830	2.720	0.2700	0.1330	12	0.01108
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-ETW-9	C	C2	3	2	1.650	2.400	0.2170	0.1320	12	0.01100
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1-ETW-14	C	C2	3	2	1.570	2.570	0.3060	0.1330	12	0.01108

*Strength at 5% strain not reported due to strain gage failure prior to 5% strain

Average	1.653	2.527	0.2470	0.01125
Standard Dev.	0.1038	0.1911	0.02201	
Coeff. of Var. [%]	6.278	7.562	8.913	
Min.	1.410	2.250	0.2170	0.01092
Max.	1.830	3.030	0.3060	0.01158
Number of Spec.	21	18	21	21





4.6 “25/50/25” Unnotched Tension 1 Properties (UNT1)

Laminate Unnotched Tension Properties (UNT1)--CTD
Strength & Modulus
 Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

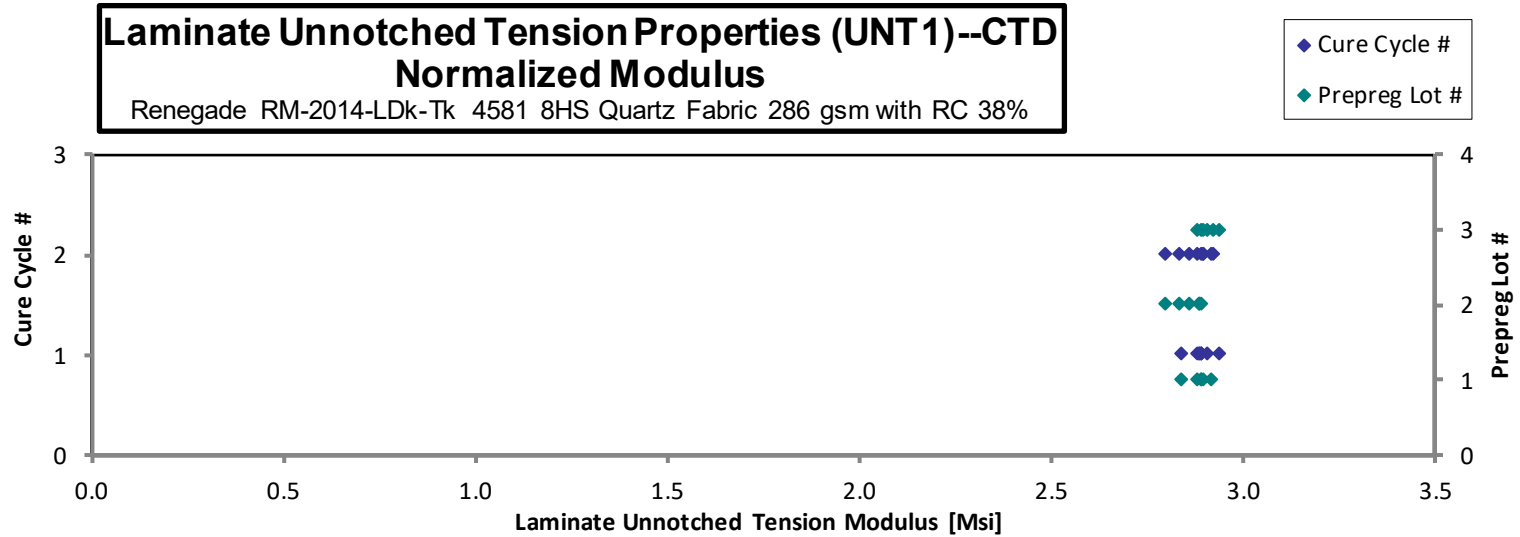
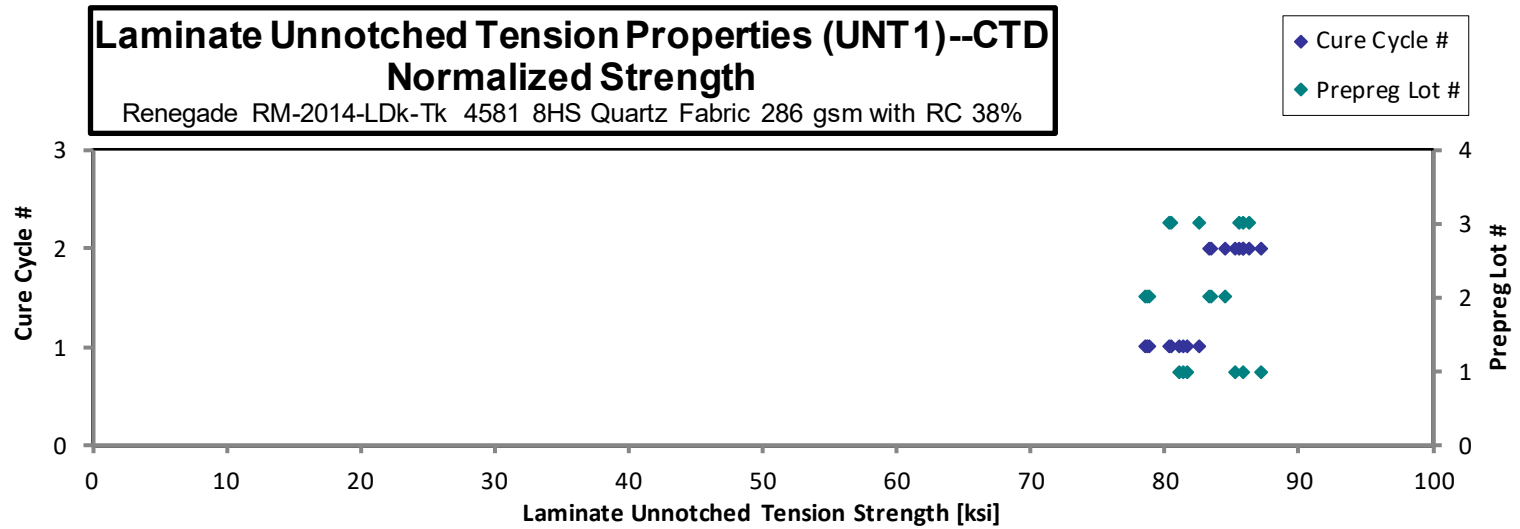
normalizing
 t_{ply} [in]
 0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-CTD-1	A	C1	1	1	83.97	2.971	0.1303	12	DGB
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-CTD-4	A	C1	1	1	83.66	2.909	0.1311	12	DGT
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-CTD-7	A	C1	1	1	82.81	2.949	0.1315	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-CTD-1	A	C2	1	2	84.25	2.834	0.1370	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-CTD-4	A	C2	1	2	85.73	2.850	0.1365	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-CTD-7	A	C2	1	2	83.87	2.872	0.1365	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-CTD-1	B	C1	2	1	77.03	2.829	0.1370	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-CTD-4	B	C1	2	1	77.20	2.830	0.1372	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-CTD-7	B	C1	2	1	77.12	2.826	0.1371	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-CTD-1	B	C2	2	2	81.51	2.768	0.1374	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-CTD-4	B	C2	2	2	82.31	2.724	0.1380	12	DGM, AWT
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-CTD-7	B	C2	2	2	81.47	2.788	0.1378	12	DGM, AGT
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-CTD-1	C	C1	3	1	78.81	2.882	0.1369	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-CTD-4	C	C1	3	1	78.97	2.835	0.1370	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-CTD-7	C	C1	3	1	81.74	2.875	0.1357	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-CTD-1	C	C2	3	2	84.42	2.831	0.1375	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-CTD-4	C	C2	3	2	83.35	2.844	0.1380	12	DGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-CTD-7	C	C2	3	2	83.59	2.804	0.1380	12	DGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01086	81.41	2.880
0.01092	81.60	2.837
0.01096	81.04	2.886
0.01141	85.85	2.887
0.01138	87.09	2.896
0.01138	85.18	2.916
0.01141	78.50	2.883
0.01143	78.80	2.888
0.01143	78.69	2.883
0.01145	83.35	2.830
0.01150	84.50	2.796
0.01148	83.50	2.857
0.01141	80.29	2.937
0.01141	80.47	2.889
0.01131	82.53	2.903
0.01146	86.35	2.896
0.01150	85.60	2.921
0.01150	85.80	2.878

Average 81.77 2.846
 Standard Dev. 2.772 0.05972
 Coeff. of Var. [%] 3.390 2.099
 Min. 77.03 2.724
 Max. 85.73 2.971
 Number of Spec. 18 18

Average_{norm} 0.01134 82.81 2.881
 Standard Dev._{norm} 2.830 0.03367
 Coeff. of Var. [%]_{norm} 3.417 1.169
 Min. 0.01086 78.50 2.796
 Max. 0.01150 87.09 2.937
 Number of Spec. 18 18 18



**Laminate Unnotched Tension Properties (UNT1)--RTD
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

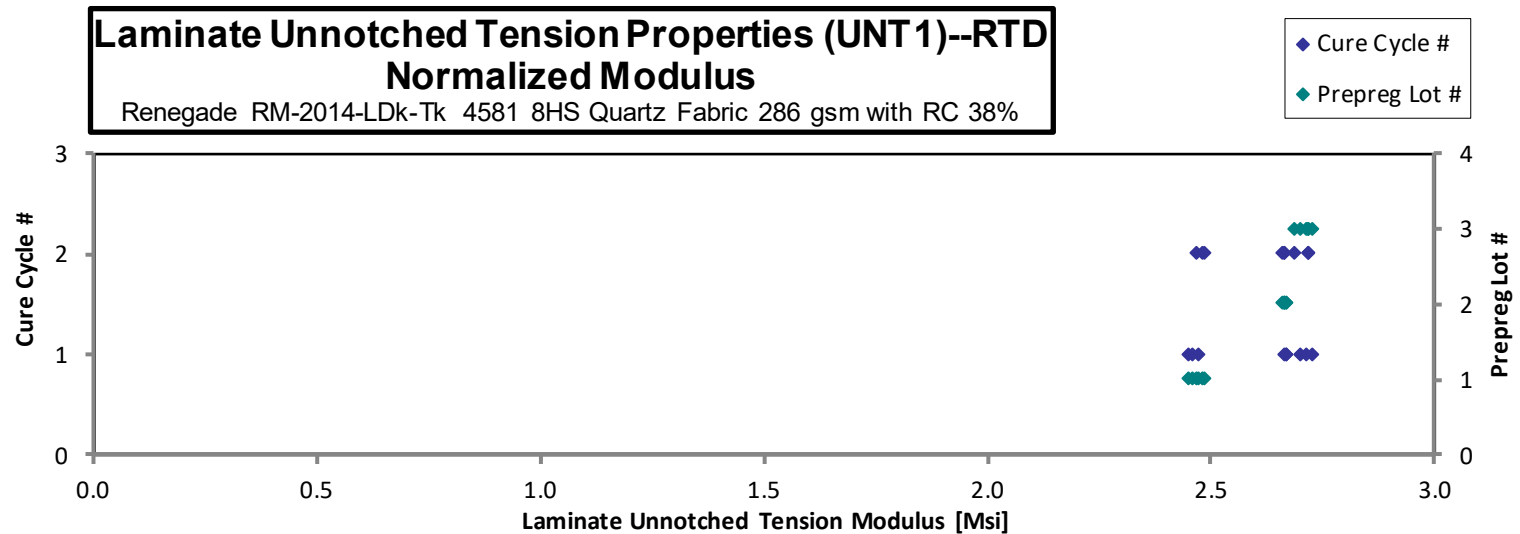
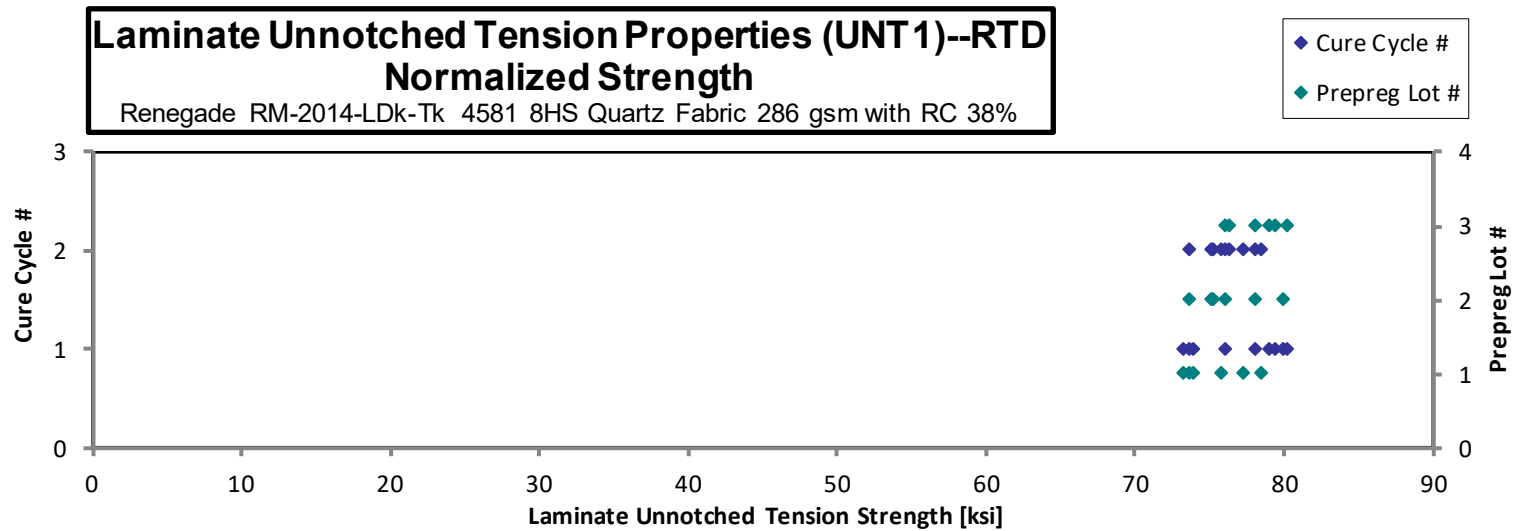
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-RTD-2	A	C1	1	1	74.90	2.497	0.1320	12	LWT
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-RTD-5	A	C1	1	1	74.60	2.518	0.1320	12	LWB, LWT
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-RTD-8	A	C1	1	1	75.30	2.504	0.1320	12	LWT
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-RTD-2	A	C2	1	2	74.90	2.439	0.1360	12	LWT
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-RTD-5	A	C2	1	2	77.50	2.458	0.1360	12	LGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-RTD-8	A	C2	1	2	76.90	2.473	0.1350	12	LWT
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-RTD-2	B	C1	2	1	73.50	2.578	0.1390	12	XGT
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-RTD-5	B	C1	2	1	77.80	2.599	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-RTD-8	B	C1	2	1	76.00	2.599	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-RTD-2	B	C2	2	2	71.20	2.576	0.1390	12	XGT
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-RTD-5	B	C2	2	2	72.80	2.576	0.1390	12	XGT
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-RTD-8	B	C2	2	2	72.60	2.572	0.1390	12	XGB
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-RTD-2	C	C1	3	1	79.30	2.683	0.1360	12	XGT
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-RTD-5	C	C1	3	1	78.00	2.669	0.1360	12	XGB
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-RTD-8	C	C1	3	1	79.10	2.718	0.1350	12	XGT
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-RTD-2	C	C2	3	2	76.00	2.647	0.1380	12	XGT
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-RTD-5	C	C2	3	2	74.30	2.649	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-RTD-11	C	C2	3	2	74.60	2.637	0.1370	12	XGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01100	73.56	2.452
0.01100	73.27	2.473
0.01100	73.96	2.459
0.01133	75.79	2.468
0.01133	78.42	2.487
0.01125	77.24	2.484
0.01158	76.02	2.666
0.01150	79.88	2.669
0.01150	78.04	2.669
0.01158	73.64	2.664
0.01158	75.29	2.664
0.01158	75.08	2.660
0.01133	80.24	2.715
0.01133	78.93	2.701
0.01125	79.45	2.730
0.01150	78.04	2.718
0.01150	76.29	2.720
0.01142	76.04	2.688

Average 75.52 2.577
Standard Dev. 2.267 0.08171
Coeff. of Var. [%] 3.003 3.170
Min. 71.20 2.439
Max. 79.30 2.718
Number of Spec. 18 18

Average_{norm} 0.01137 76.62 2.616
Standard Dev_{norm} 2.262 0.1081
Coeff. of Var. [%]_{norm} 2.952 4.132
Min. 0.01100 73.27 2.452
Max. 0.01158 80.24 2.730
Number of Spec. 18 18 18



Laminate Unnotched Tension Properties (UNT1)--ETW
Strength & Modulus

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]

0.01120

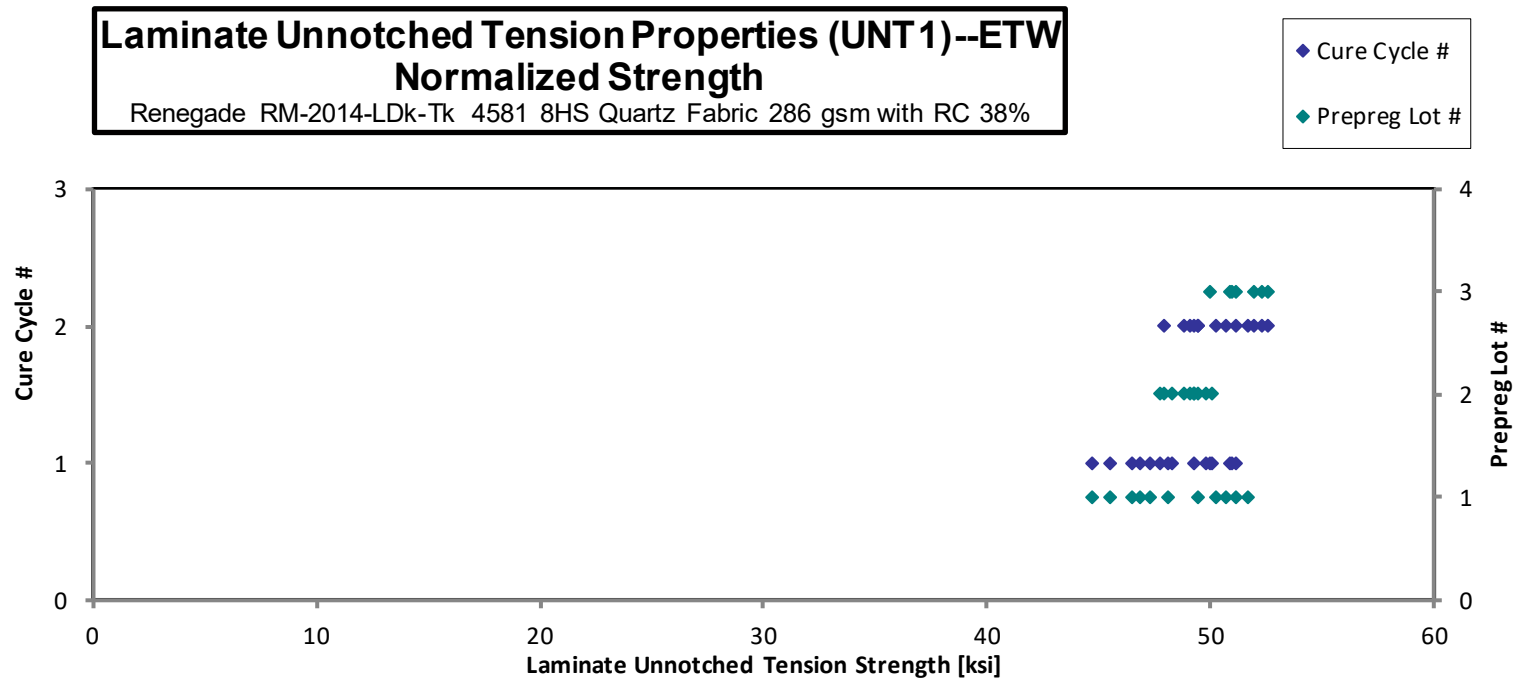
Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-ETW-3*	A	C1	1	1	48.50		0.1310	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-ETW-6*	A	C1	1	1	49.30		0.1310	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-ETW-9*	A	C1	1	1	48.00		0.1310	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-ETW-12	A	C1	1	1	46.30	1.980	0.1320	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-ETW-13	A	C1	1	1	47.30	2.190	0.1320	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-ETW-15	A	C1	1	1	45.50	2.030	0.1320	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-ETW-3*	A	C2	1	2	50.70		0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-ETW-6*	A	C2	1	2	50.50		0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-ETW-9*	A	C2	1	2	49.60		0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-ETW-13	A	C2	1	2	49.00	2.050	0.1390	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-ETW-15	A	C2	1	2	48.50	2.110	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-ETW-3*	B	C1	2	1	47.70		0.1360	12	XGB
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-ETW-6*	B	C1	2	1	49.20		0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-ETW-9*	B	C1	2	1	49.40		0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-ETW-12	B	C1	2	1	48.30	2.060	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-ETW-15	B	C1	2	1	46.80	1.950	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-ETW-3*	B	C2	2	2	48.50		0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-ETW-6*	B	C2	2	2	47.80		0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-ETW-9*	B	C2	2	2	48.30		0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-ETW-12	B	C2	2	2	47.00	2.080	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-ETW-15	B	C2	2	2	48.20	2.090	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-ETW-3	C	C1	3	1	50.70	2.100	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-ETW-6	C	C1	3	1	51.30	2.010	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-ETW-9	C	C1	3	1	50.10	2.110	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-ETW-12	C	C1	3	1	50.20	2.090	0.1360	12	XGT
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-ETW-3	C	C2	3	2	51.30	2.070	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-ETW-6	C	C2	3	2	51.50	2.080	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-ETW-12	C	C2	3	2	50.90	2.050	0.1370	12	XGM

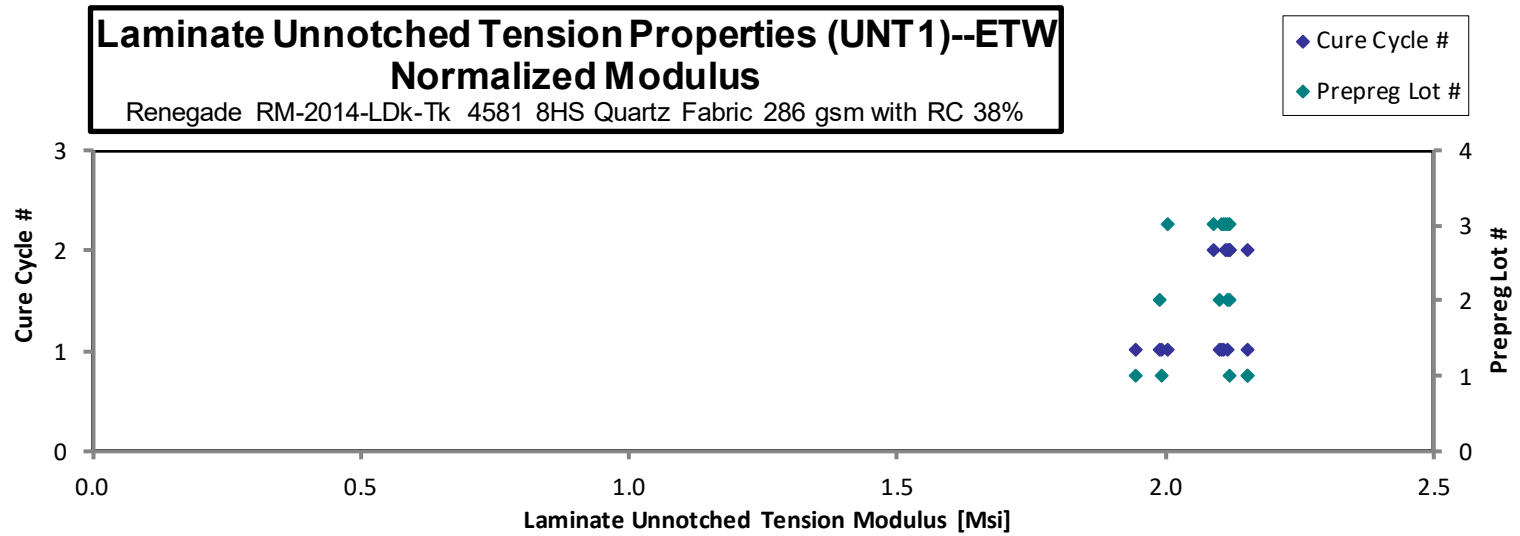
*Excluded modulus due to strain gage reading affected by moisture between gage and specimen

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01092	47.27	
0.01092	48.05	
0.01092	46.79	
0.01100	45.47	1.945
0.01100	46.46	2.151
0.01100	44.69	1.994
0.01142	51.68	
0.01133	51.10	
0.01133	50.19	
0.01158	50.68	2.120
0.01142	49.44	2.151
0.01133	48.27	
0.01133	49.79	
0.01133	49.99	
0.01142	49.23	2.100
0.01142	47.71	1.988
0.01142	49.44	
0.01150	49.08	
0.01142	49.23	
0.01142	47.91	2.120
0.01133	48.77	2.115
0.01125	50.93	2.109
0.01117	51.15	2.004
0.01117	49.95	2.104
0.01133	50.80	2.115
0.01142	52.29	2.110
0.01142	52.50	2.120
0.01142	51.88	2.090

Average 48.94 2.066
Standard Dev. 1.604 0.0564
Coeff. of Var. [%] 3.277 2.733
Min. 45.50 1.950
Max. 51.50 2.190
Number of Spec. 28 16

Average_{norm} 0.01128 49.31 2.083
Standard Dev_{norm} 2.007 0.0632
Coeff. of Var. [%]_{norm} 4.071 3.04
Min. 0.01092 44.69 1.945
Max. 0.01158 52.50 2.151
Number of Spec. 28 28 16





4.7 “10/80/10” Unnotched Tension 2 Properties (UNT2)

Laminate Unnotched Tension Properties (UNT2) --CTD
Strength & Modulus
 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

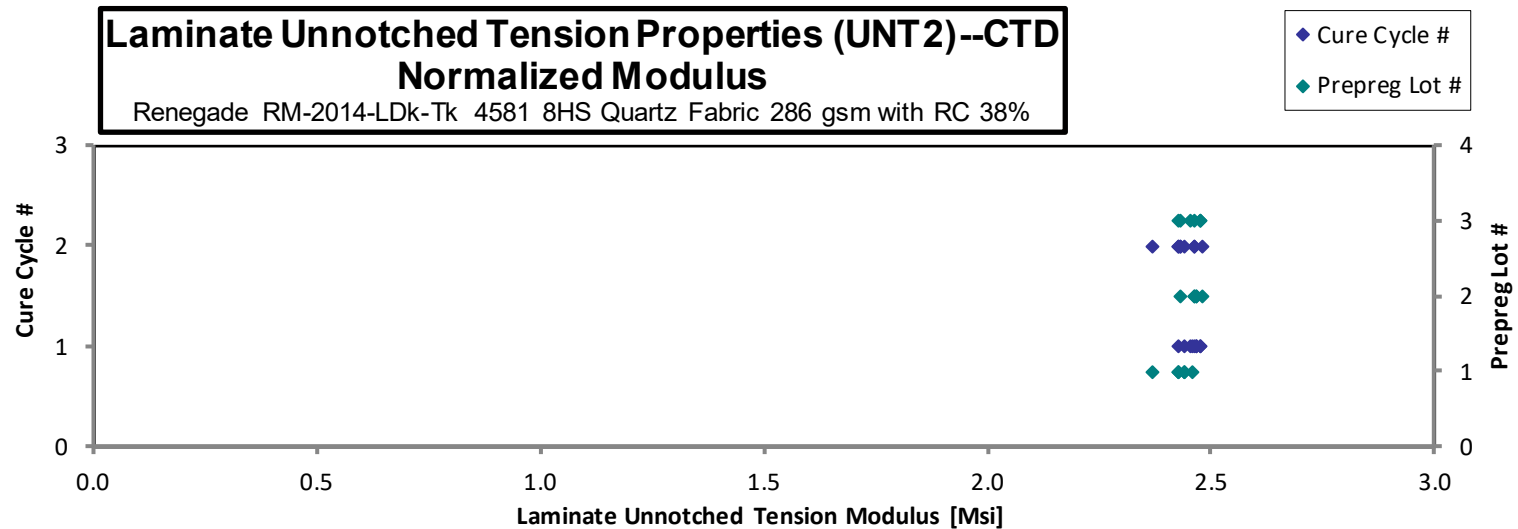
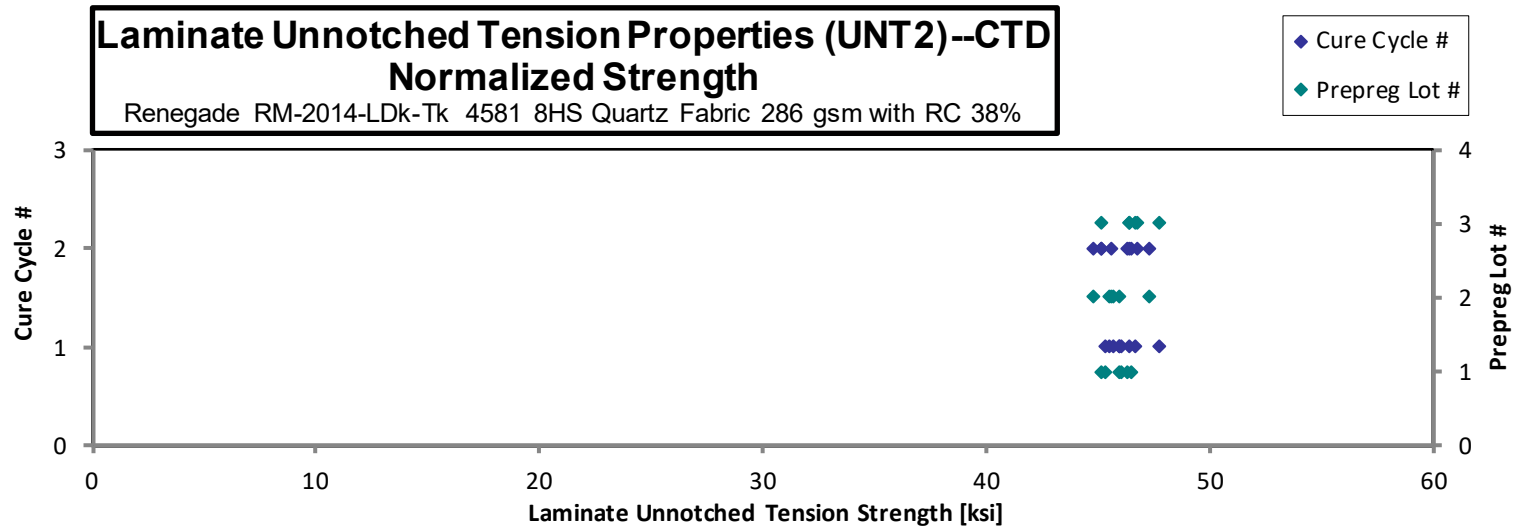
normalizing
 t_{ply} [in]
 0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1-CTD-1	A	C1	1	1	46.33	2.476	0.1112	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1-CTD-4	A	C1	1	1	45.86	2.471	0.1107	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1-CTD-7	A	C1	1	1	47.00	2.483	0.1096	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C2-1-CTD-1	A	C2	1	2	46.10	2.423	0.1129	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C2-1-CTD-4	A	C2	1	2	44.73	2.408	0.1130	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C2-1-CTD-7	A	C2	1	2	45.89	2.349	0.1129	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C1-1-CTD-1	B	C1	2	1	45.16	2.451	0.1128	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C1-1-CTD-4	B	C1	2	1	45.57	2.445	0.1130	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C1-1-CTD-7	B	C1	2	1	45.45	2.453	0.1125	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C2-1-CTD-1	B	C2	2	2	44.01	2.391	0.1141	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C2-1-CTD-4	B	C2	2	2	46.50	2.442	0.1139	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C2-1-CTD-7	B	C2	2	2	44.84	2.428	0.1138	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C1-1-CTD-4	C	C1	3	1	47.20	2.507	0.1107	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C1-1-CTD-7	C	C1	3	1	48.46	2.496	0.1103	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C1-1-CTD-10	C	C1	3	1	46.73	2.498	0.1111	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C2-1-CTD-1	C	C2	3	2	47.17	2.451	0.1110	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C2-1-CTD-4	C	C2	3	2	46.99	2.496	0.1106	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C2-1-CTD-7	C	C2	3	2	46.05	2.481	0.1098	10	DGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01112	46.01	2.459
0.01107	45.31	2.442
0.01096	45.99	2.429
0.01129	46.47	2.442
0.01130	45.12	2.429
0.01129	46.27	2.369
0.01128	45.49	2.469
0.01130	45.99	2.468
0.01125	45.64	2.463
0.01141	44.82	2.435
0.01139	47.30	2.484
0.01138	45.56	2.467
0.01107	46.64	2.477
0.01103	47.72	2.458
0.01111	46.37	2.479
0.01110	46.73	2.428
0.01106	46.39	2.464
0.01098	45.14	2.432

Average 46.11 2.453
 Standard Dev. 1.075 0.04164
 Coeff. of Var. [%] 2.331 1.698
 Min. 44.01 2.349
 Max. 48.46 2.507
 Number of Spec. 18 18

Average_{norm} 0.01119 46.05 2.450
 Standard Dev_{norm} 0.7691 0.02747
 Coeff. of Var. [%]_{norm} 1.670 1.121
 Min. 0.01096 44.82 2.369
 Max. 0.01141 47.72 2.484
 Number of Spec. 18 18 18



**Laminate Unnotched Tension Properties (UNT2) --RTD
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]

0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1-RTD-2	A	C1	1	1	39.20	2.024	0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1-RTD-5*	A	C1	1	1		2.003	0.1110	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1-RTD-8	A	C1	1	1	39.00	1.989	0.1110	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1-RTD-11**	A	C1	1	1	38.40		0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C2-1-RTD-2	A	C2	1	2	36.30	1.978	0.1130	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C2-1-RTD-5	A	C2	1	2	37.80	1.922	0.1130	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C2-1-RTD-8	A	C2	1	2	38.70	1.941	0.1140	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C1-1-RTD-2	B	C1	2	1	37.10	2.078	0.1140	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C1-1-RTD-5	B	C1	2	1	39.30	2.081	0.1140	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C1-1-RTD-8	B	C1	2	1	38.20	2.047	0.1150	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C2-1-RTD-2	B	C2	2	2	39.00	2.063	0.1160	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C2-1-RTD-5	B	C2	2	2	39.50	2.085	0.1150	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C2-1-RTD-8	B	C2	2	2	39.30	2.066	0.1150	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C1-1-RTD-2	C	C1	3	1	42.10	2.199	0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C1-1-RTD-5	C	C1	3	1	41.50	2.200	0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C1-1-RTD-8	C	C1	3	1	42.40	2.228	0.1090	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C2-1-RTD-2	C	C2	3	2	41.60	2.211	0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C2-1-RTD-5	C	C2	3	2	41.00	2.215	0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C2-1-RTD-11	C	C2	3	2	38.80	2.207	0.1090	10	DGM

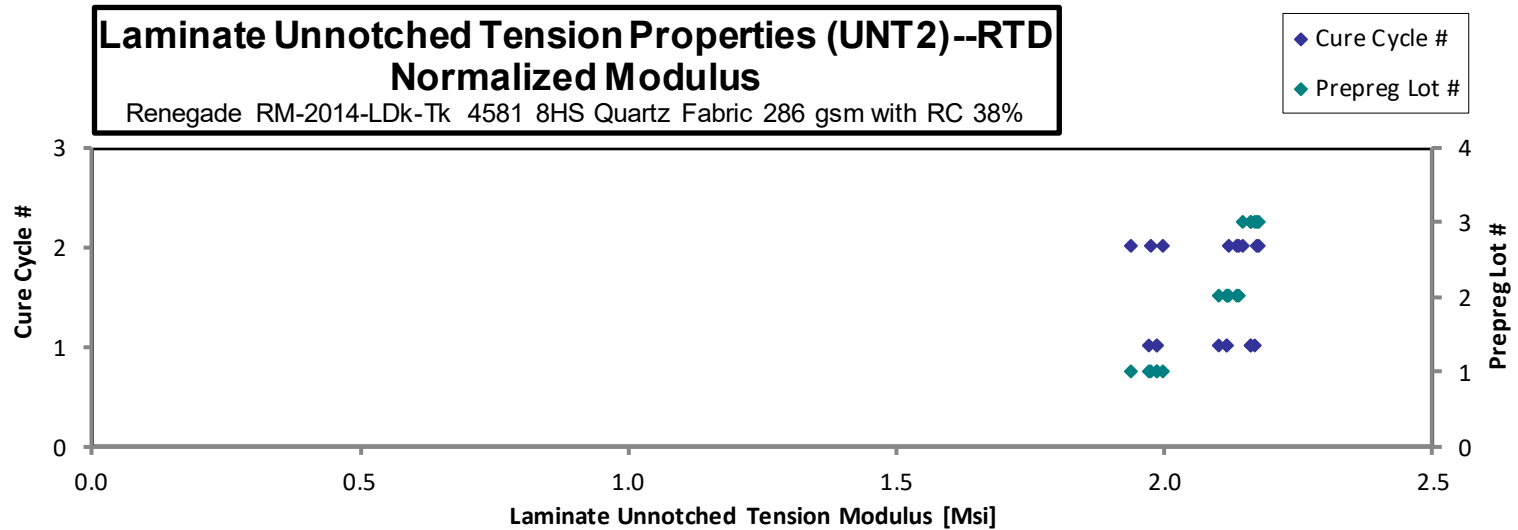
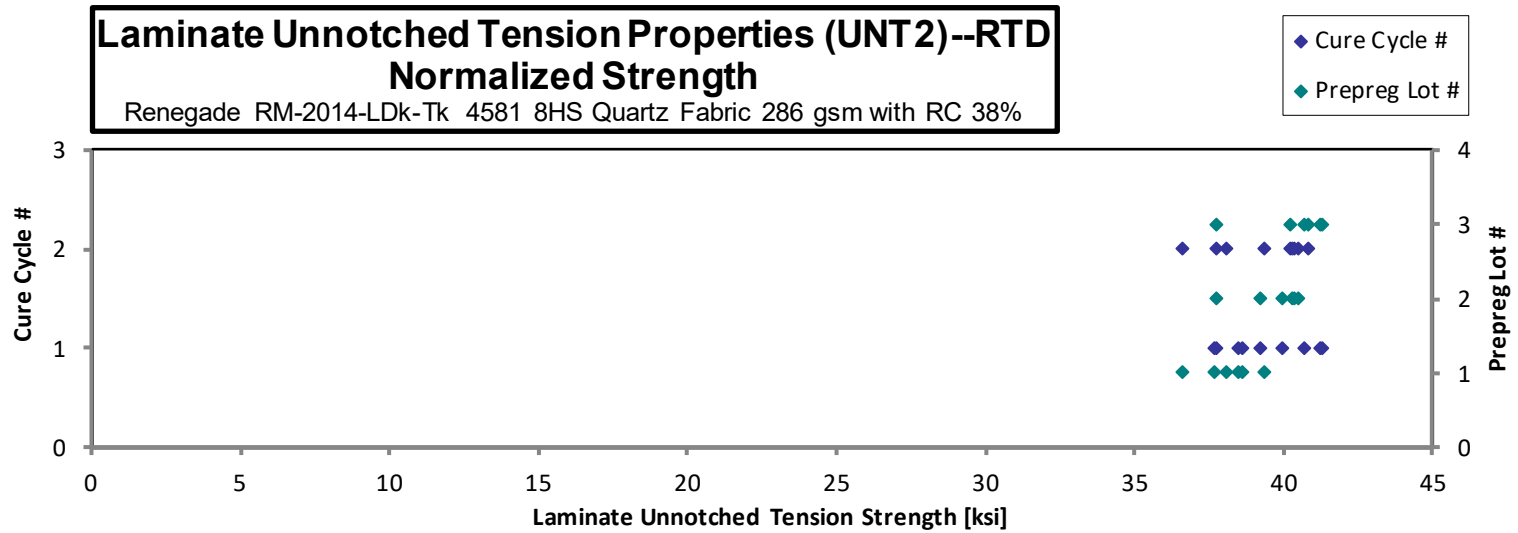
*Excluded strength due to specimen slippage

**Specimen was tested for strength only

Average 39.40 2.085
Standard Dev. 1.702 0.1015
Coeff. of Var. [%] 4.320 4.867
Min. 36.30 1.922
Max. 42.40 2.228
Number of Spec. 18 18

Average_{norm} 0.01121 39.42 2.087
Standard Dev_{norm} 1.424 0.08428
Coeff. of Var. [%]_{norm} 3.613 4.037
Min. 0.01090 36.62 1.939
Max. 0.01160 41.35 2.175
Number of Spec. 19 18 18

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01100	38.50	1.988
0.01110		1.985
0.01110	38.65	1.971
0.01100	37.71	
0.01130	36.62	1.996
0.01130	38.14	1.939
0.01140	39.39	1.976
0.01140	37.76	2.115
0.01140	40.00	2.118
0.01150	39.22	2.102
0.01160	40.39	2.137
0.01150	40.56	2.141
0.01150	40.35	2.121
0.01100	41.35	2.160
0.01100	40.76	2.161
0.01090	41.26	2.168
0.01100	40.86	2.172
0.01100	40.27	2.175
0.01090	37.76	2.148



Laminate Unnotched Tension Properties (UNT2) --ETW
Strength & Modulus

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

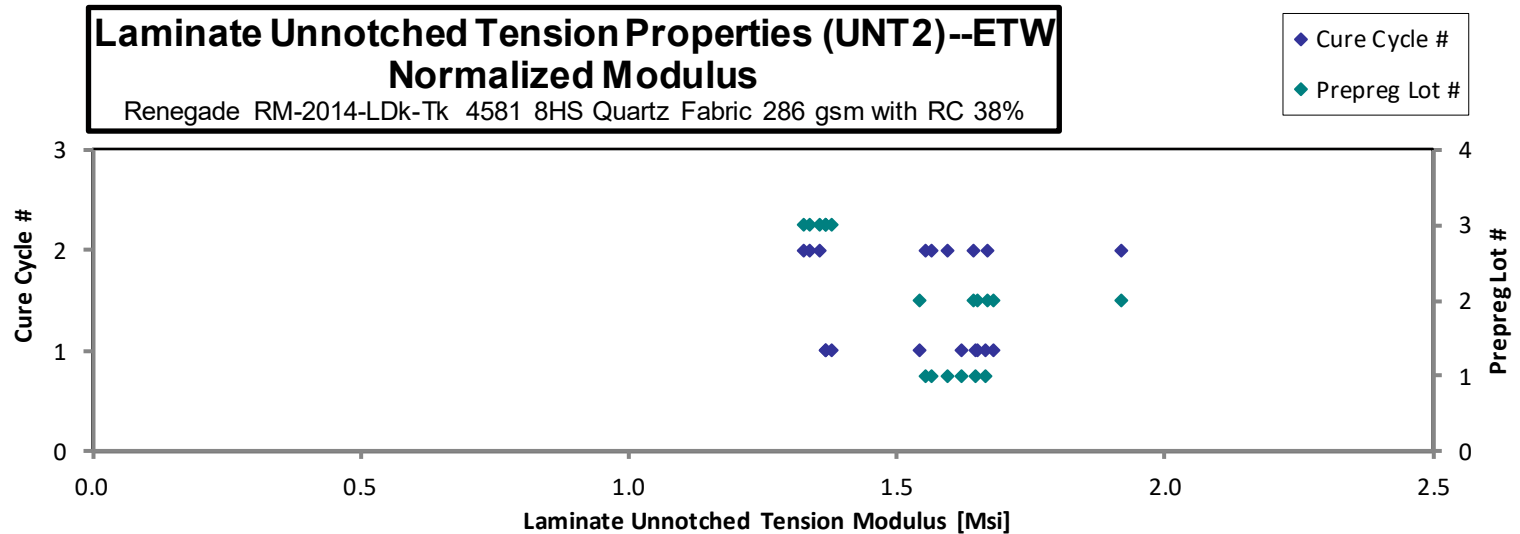
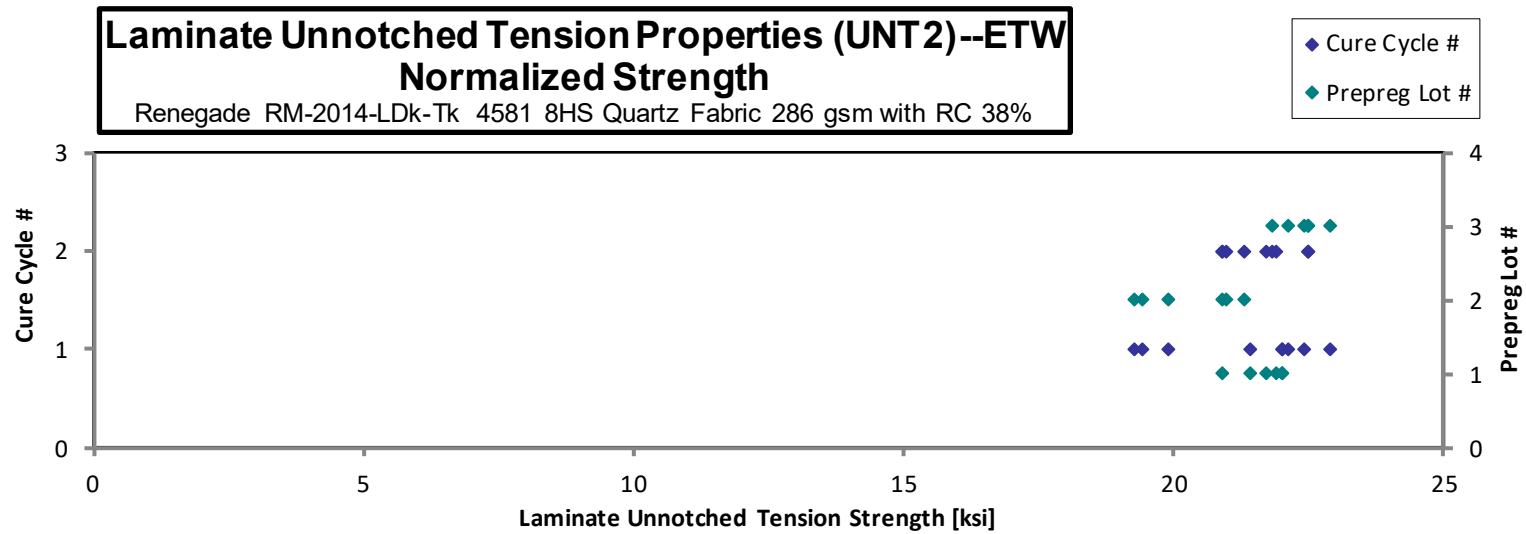
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1-ETW-3	A	C1	1	1	22.20	1.680	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1-ETW-6	A	C1	1	1	22.40	1.650	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1-ETW-9	A	C1	1	1	22.00	1.690	0.1090	10	AGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C2-1-ETW-3	A	C2	1	2	21.70	1.580	0.1130	10	AGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C2-1-ETW-6	A	C2	1	2	21.50	1.540	0.1130	10	AGM
NTP2014Q1-RMC-R14-RS-UNT2-A-C2-1-ETW-9	A	C2	1	2	20.70	1.550	0.1130	10	AGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C1-1-ETW-3	B	C1	2	1	19.40	1.650	0.1120	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C1-1-ETW-6	B	C1	2	1	19.90	1.680	0.1120	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C1-1-ETW-9	B	C1	2	1	19.60	1.570	0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C2-1-ETW-3	B	C2	2	2	20.80	1.630	0.1130	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C2-1-ETW-6	B	C2	2	2	20.90	1.670	0.1120	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-B-C2-1-ETW-9	B	C2	2	2	21.10	1.900	0.1130	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C1-1-ETW-3	C	C1	3	1	22.90	1.380	0.1120	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C1-1-ETW-6	C	C1	3	1	22.30	1.380	0.1110	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C1-1-ETW-9	C	C1	3	1	22.60	1.380	0.1110	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C2-1-ETW-3	C	C2	3	2	22.20	1.350	0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C2-1-ETW-6	C	C2	3	2	22.90	1.360	0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-UNT2-C-C2-1-ETW-9	C	C2	3	2	22.70	1.370	0.1110	10	DGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01110	22.00	1.665
0.01100	22.00	1.621
0.01090	21.41	1.645
0.01130	21.89	1.594
0.01130	21.69	1.554
0.01130	20.88	1.564
0.01120	19.40	1.650
0.01120	19.90	1.680
0.01100	19.25	1.542
0.01130	20.99	1.645
0.01120	20.90	1.670
0.01130	21.29	1.917
0.01120	22.90	1.380
0.01110	22.10	1.368
0.01110	22.40	1.368
0.01100	21.80	1.326
0.01100	22.49	1.336
0.01110	22.50	1.358

Average 21.54 1.556
Standard Dev. 1.124 0.1558
Coeff. of Var. [%] 5.218 10.01
Min. 19.40 1.350
Max. 22.90 1.900
Number of Spec. 18 18

Average_{norm} 0.01114 21.43 1.549
Standard Dev._{norm} 1.054 0.1614
Coeff. of Var. [%]_{norm} 4.919 10.42
Min. 0.01090 19.25 1.326
Max. 0.01130 22.90 1.917
Number of Spec. 18 18 18



4.8 “40/20/40” Unnotched Tension 3 Properties (UNT3)

Laminate Unnotched Tension Properties (UNT3)--CTD
Strength & Modulus
 Renegade RM-2014-LDk-Tk 4561 8HS Quartz Fabric 286 gsm with RC 38%

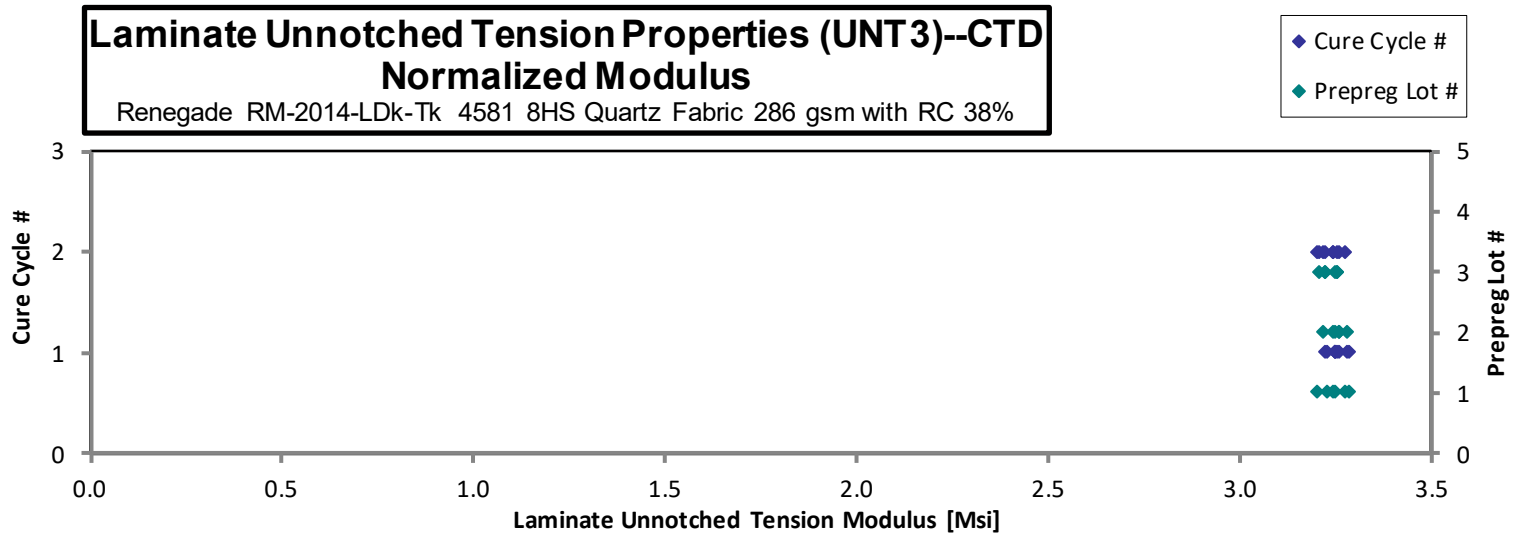
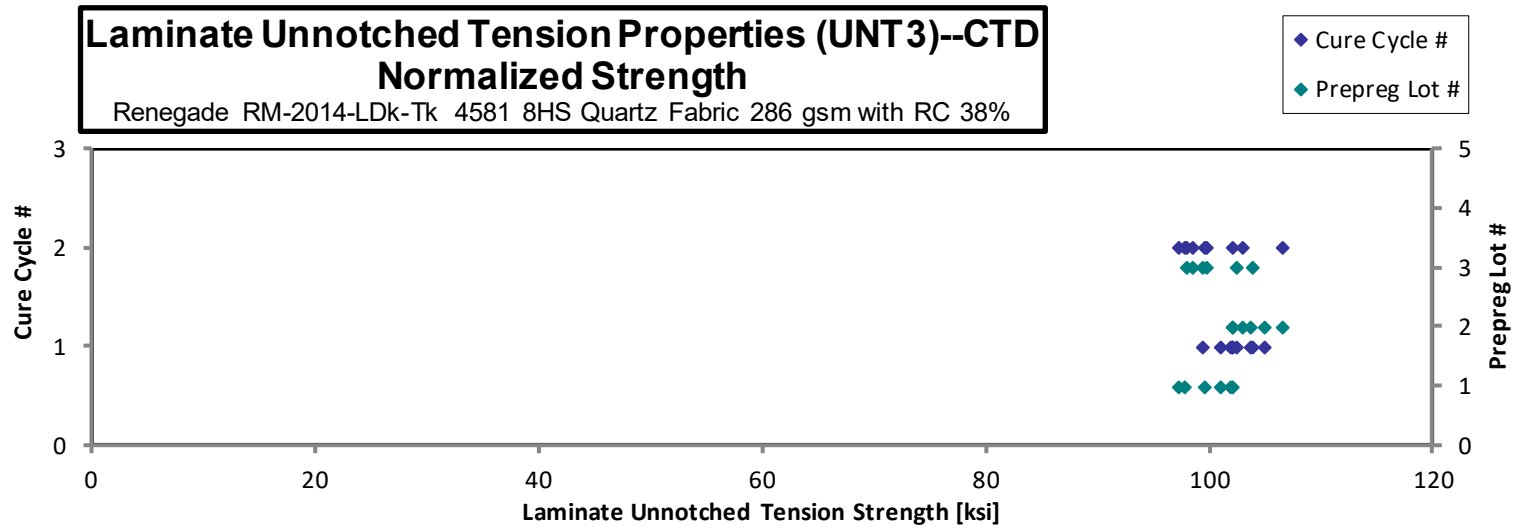
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 t_{ply} [in]
 0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-CTD-1	A	C1	1	1	101.5	3.261	0.1116	10	DGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-CTD-4	A	C1	1	1	102.8	3.249	0.1112	10	DGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-CTD-7	A	C1	1	1	103.3	3.329	0.1105	10	DGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-CTD-1	A	C2	1	2	97.38	3.231	0.1125	10	DWT
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-CTD-4	A	C2	1	2	97.13	3.270	0.1123	10	DWT
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-CTD-7	A	C2	1	2	99.56	3.198	0.1122	10	DWT
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-CTD-1	B	C1	2	1	103.7	3.218	0.1134	10	M(D,L)GM
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-CTD-4	B	C1	2	1	101.0	3.241	0.1133	10	M(D,L)GM, LAB, LAT
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-CTD-7	B	C1	2	1	103.1	3.230	0.1127	10	DGM, LAB, LWT
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-CTD-1	B	C2	2	2	102.9	3.242	0.1121	10	M(D,L)GM, LAT
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-CTD-4	B	C2	2	2	106.7	3.260	0.1120	10	DGM, LWT
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-CTD-7	B	C2	2	2	102.5	3.225	0.1117	10	DGM, LAB, LWT
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-CTD-1	C	C1	3	1	105.7	3.307	0.1102	10	DGM, LWT
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-CTD-4	C	C1	3	1	101.6	3.316	0.1097	10	DGM, M(A,L)WB
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-CTD-7	C	C1	3	1	104.5	3.283	0.1099	10	DGM, LAB
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-CTD-1	C	C2	3	2	100.1	3.324	0.1097	10	DGM, AWB
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-CTD-4	C	C2	3	2	101.2	3.311	0.1091	10	DGM, LWB, LGM
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-CTD-7	C	C2	3	2	103.4	3.326	0.1081	10	DGM, M(A,L)WB

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01116	101.1	3.248
0.01112	102.1	3.227
0.01105	101.9	3.284
0.01125	97.80	3.244
0.01123	97.38	3.278
0.01122	99.70	3.203
0.01134	105.0	3.258
0.01133	102.2	3.279
0.01127	103.8	3.250
0.01121	102.9	3.245
0.01120	106.7	3.261
0.01117	102.2	3.217
0.01102	103.9	3.253
0.01097	99.49	3.249
0.01099	102.5	3.221
0.01097	97.98	3.255
0.01091	98.64	3.225
0.01081	99.76	3.209

Average 102.1 3.268
 Standard Dev. 2.511 0.04205
 Coeff. of Var. [%] 2.459 1.287
 Min. 97.13 3.198
 Max. 106.7 3.329
 Number of Spec. 18 18

Average_{norm} 0.01112 101.4 3.245
 Standard Dev._{norm} 2.615 0.02366
 Coeff. of Var. [%]_{norm} 2.579 0.7291
 Min. 0.01081 97.38 3.203
 Max. 0.01134 106.7 3.284
 Number of Spec. 18 18



**Laminate Unnotched Tension Properties (UNT3)--RTD
Strength & Modulus**

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

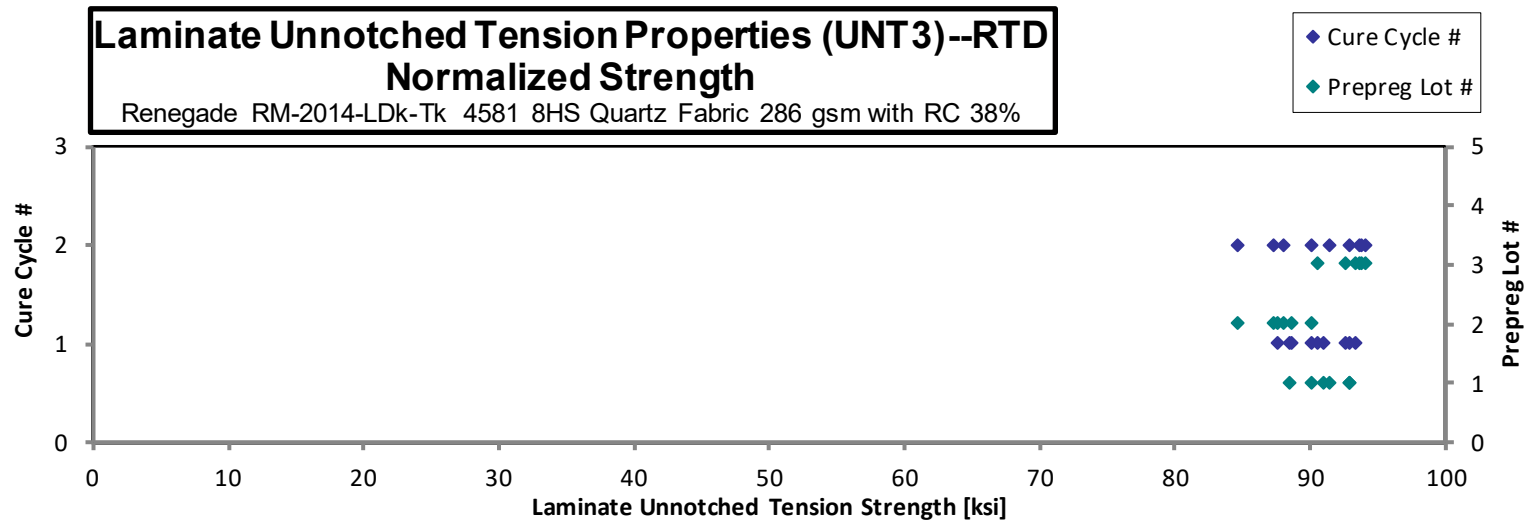
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-RTD-2	A	C1	1	1	91.80	2.876	0.1110	10	XGT
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-RTD-5	A	C1	1	1	94.60	2.913	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-RTD-8	A	C1	1	1	89.20	2.891	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C2-1-RTD-2	A	C2	1	2	92.80	2.780	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C2-1-RTD-5	A	C2	1	2	91.40	2.836	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C2-1-RTD-8	A	C2	1	2	90.10	2.852	0.1120	10	XGB
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-RTD-2	B	C1	2	1	87.00	3.057	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-RTD-5	B	C1	2	1	85.20	2.996	0.1150	10	XGT
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-RTD-8	B	C1	2	1	89.20	3.050	0.1130	10	XGT
NTP2014Q1-RMC-R14-RS-UNT3-B-C2-1-RTD-2	B	C2	2	2	83.90	3.038	0.1130	10	XGB
NTP2014Q1-RMC-R14-RS-UNT3-B-C2-1-RTD-5	B	C2	2	2	87.20	3.062	0.1130	10	XGV
NTP2014Q1-RMC-R14-RS-UNT3-B-C2-1-RTD-8	B	C2	2	2	87.20	3.096	0.1120	10	XGT
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-RTD-2	C	C1	3	1	94.30	3.139	0.1100	10	XGT
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-RTD-5	C	C1	3	1	95.90	3.186	0.1090	10	XGT
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-RTD-8	C	C1	3	1	93.90	3.219	0.1080	10	XGT
NTP2014Q1-RMC-R14-RS-UNT3-C-C2-1-RTD-2	C	C2	3	2	96.30	3.211	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-C-C2-1-RTD-5	C	C2	3	2	97.10	3.197	0.1080	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-C-C2-1-RTD-8	C	C2	3	2	98.40	3.234	0.1070	10	XGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01110	90.98	2.850
0.01100	92.91	2.861
0.01110	88.40	2.865
0.01120	92.80	2.780
0.01120	91.40	2.836
0.01120	90.10	2.852
0.01140	88.55	3.112
0.01150	87.48	3.076
0.01130	90.00	3.077
0.01130	84.65	3.065
0.01130	87.98	3.089
0.01120	87.20	3.096
0.01100	92.62	3.083
0.01090	93.33	3.101
0.01080	90.55	3.104
0.01090	93.72	3.125
0.01080	93.63	3.083
0.01070	94.01	3.090

Average 91.42 3.035
Standard Dev. 4.294 0.1475
Coeff. of Var. [%] 4.697 4.861
Min. 83.90 2.780
Max. 98.40 3.234
Number of Spec. 18 18

Average_{norm} 0.01111 90.57 3.008
Standard Dev_{norm} 2.725 0.1237
Coeff. of Var. [%]_{norm} 3.008 4.111
Min. 0.01070 84.65 2.780
Max. 0.01150 94.01 3.125
Number of Spec. 18 18 18



**Laminate Unnotched Tension Properties (UNT3)--ETW
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]

0.01120

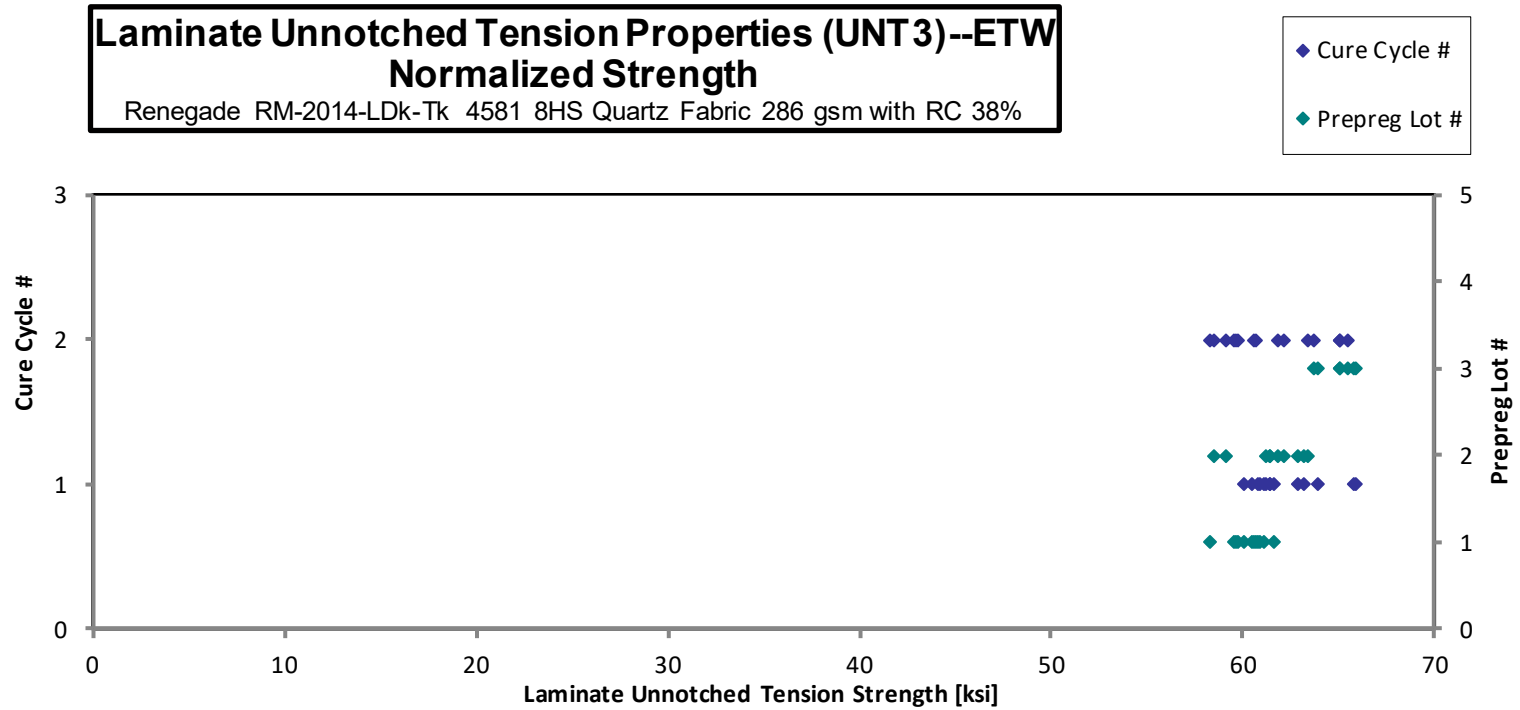
Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-ETW-3*	A	C1	1	1	61.30		0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-ETW-6*	A	C1	1	1	60.60		0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-ETW-9*	A	C1	1	1	61.50		0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-ETW-12	A	C1	1	1	61.10	2.580	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-ETW-13	A	C1	1	1	62.10	2.580	0.1110	10	XGB
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1-ETW-15	A	C1	1	1	61.40	2.660	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C2-1-ETW-3*	A	C2	1	2	60.10		0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C2-1-ETW-6*	A	C2	1	2	58.20		0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C2-1-ETW-9*	A	C2	1	2	59.50		0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C2-1-ETW-12	A	C2	1	2	60.20	2.580	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C2-1-ETW-13	A	C2	1	2	61.10	2.600	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-A-C2-1-ETW-15	A	C2	1	2	60.10	2.590	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-ETW-3	B	C1	2	1	62.30	2.730	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-ETW-6*	B	C1	2	1	61.40		0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-ETW-9*	B	C1	2	1	62.30		0.1100	10	XGT
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-ETW-12	B	C1	2	1	63.20	2.620	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1-ETW-15	B	C1	2	1	61.90	2.650	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-B-C2-1-ETW-3*	B	C2	2	2	59.00		0.1110	10	XGB
NTP2014Q1-RMC-R14-RS-UNT3-B-C2-1-ETW-6*	B	C2	2	2	62.30		0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-B-C2-1-ETW-9*	B	C2	2	2	65.10		0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-B-C2-1-ETW-12	B	C2	2	2	62.10	2.620	0.1120	10	XGT
NTP2014Q1-RMC-R14-RS-UNT3-B-C2-1-ETW-15	B	C2	2	2	59.60	2.770	0.1110	10	XGT
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-ETW-3	C	C1	3	1	67.10	2.670	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-ETW-6	C	C1	3	1	67.60	2.700	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1-ETW-9	C	C1	3	1	66.90	2.720	0.1070	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-C-C2-1-ETW-3	C	C2	3	2	67.40	2.730	0.1080	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-C-C2-1-ETW-6	C	C2	3	2	67.90	2.800	0.1080	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-C-C2-1-ETW-9	C	C2	3	2	66.70	2.710	0.1070	10	XGM
NTP2014Q1-RMC-R14-RS-UNT3-C-C2-1-ETW-12	C	C2	3	2	66.20	2.740	0.1100	10	XGM

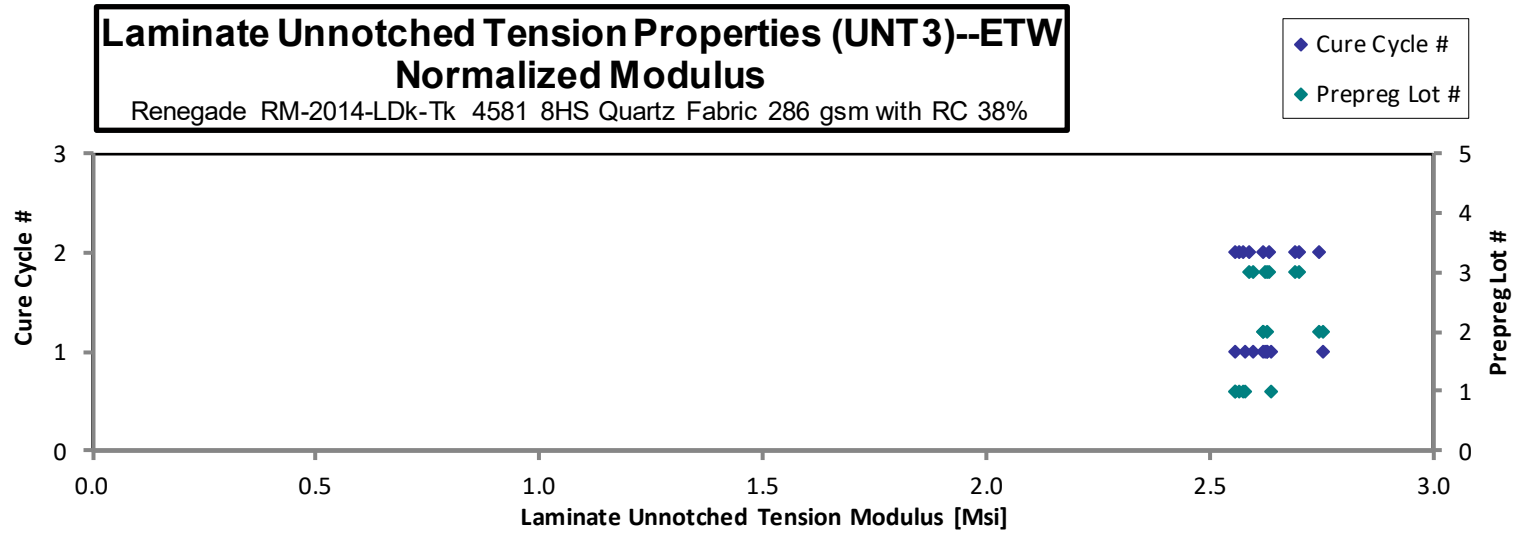
*Excluded modulus due to incorrectly installed strain gages

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01110	60.75	
0.01110	60.06	
0.01100	60.40	
0.01120	61.10	2.580
0.01110	61.55	2.557
0.01110	60.85	2.636
0.01130	60.64	
0.01120	58.20	
0.01120	59.50	
0.01110	59.66	2.557
0.01110	60.55	2.577
0.01110	59.56	2.567
0.01130	62.86	2.754
0.01120	61.40	
0.01100	61.19	
0.01120	63.20	2.620
0.01110	61.35	2.626
0.01110	58.47	
0.01110	61.74	
0.01090	63.36	
0.01120	62.10	2.620
0.01110	59.07	2.745
0.01100	65.90	2.622
0.01090	65.79	2.628
0.01070	63.91	2.599
0.01080	64.99	2.633
0.01080	65.48	2.700
0.01070	63.72	2.589
0.01100	65.02	2.691

Average 62.63 2.669
Standard Dev. 2.903 0.07075
Coeff. of Var. [%] 4.635 2.650
Min. 58.20 2.580
Max. 67.90 2.800
Number of Spec. 29 18

Average_{norm} 0.01106 61.81 2.628
Standard Dev._{norm} 2.221 0.05955
Coeff. of Var. [%]_{norm} 3.593 2.266
Min. 0.01070 58.20 2.557
Max. 0.01130 65.90 2.754
Number of Spec. 29 29 18





4.9 “25/50/25” Unnotched Compression 1 Properties (UNC1)

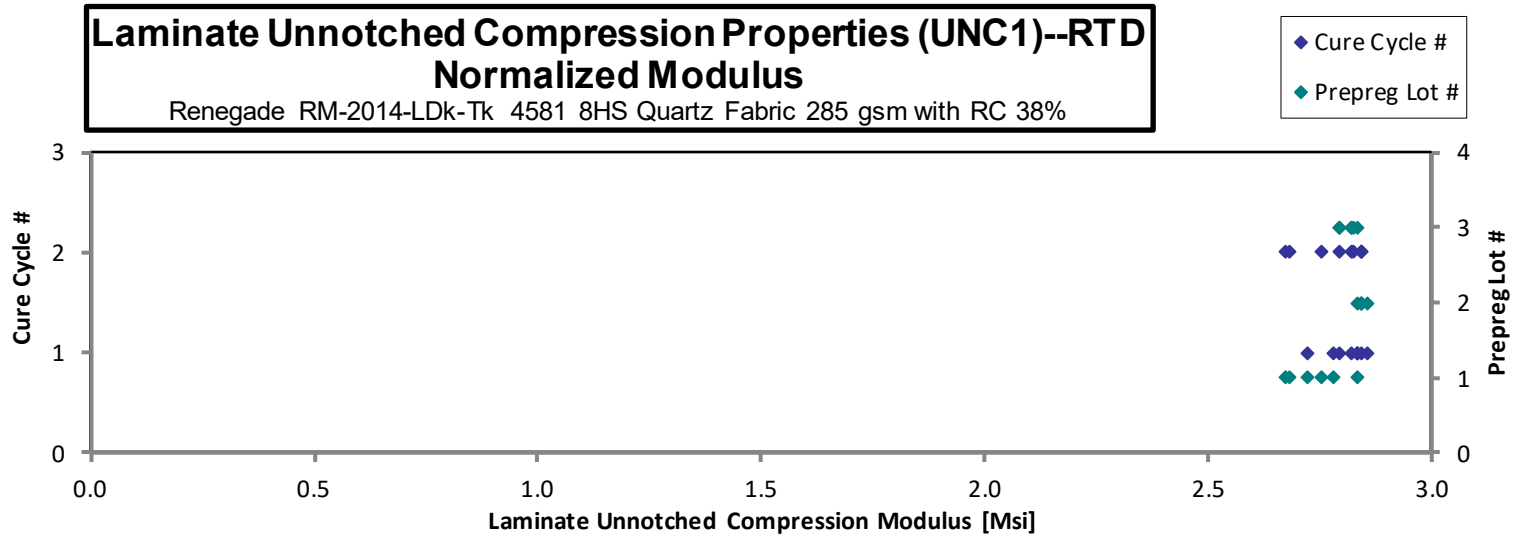
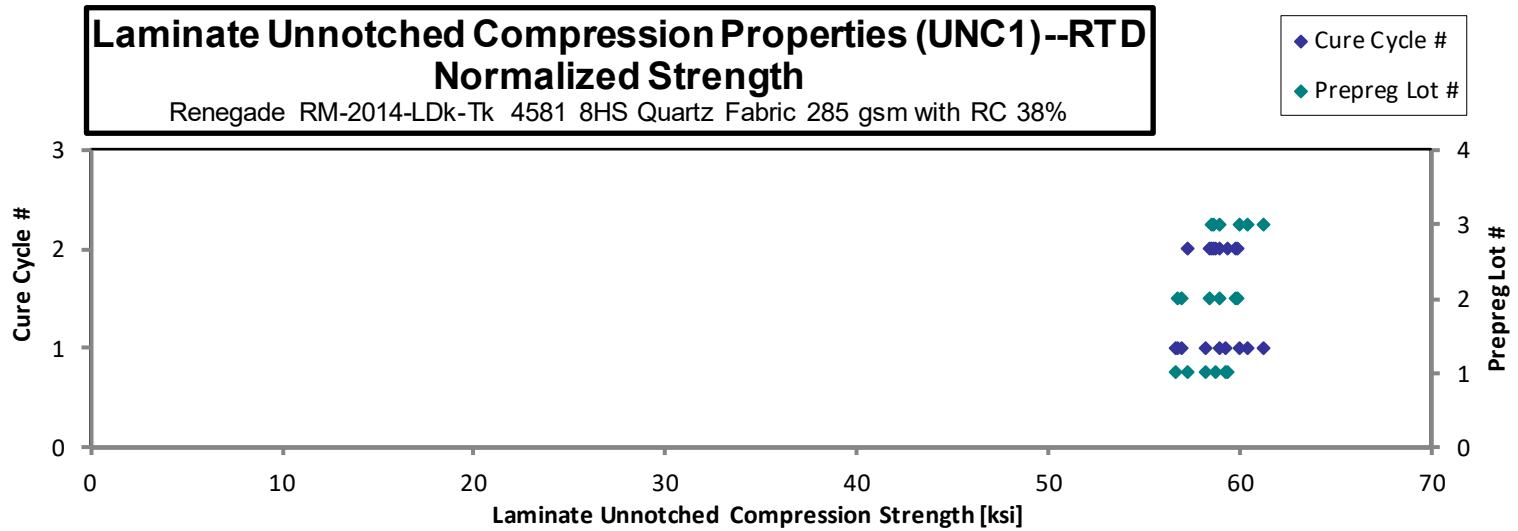
Laminate Unnotched Compression Properties (UNC1)--RTD
Strength & Modulus
 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 285 gsm with RC 38%

normalizing
 t_{ply} [in]
 0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-RTD-1	A	C1	1	1	56.80	2.790	0.1340	12	BGM	0.01117	56.63	2.782
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-RTD-3	A	C1	1	1	58.40	2.730	0.1340	12	BGM	0.01117	58.23	2.722
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-RTD-5	A	C1	1	1	59.40	2.840	0.1340	12	BGM	0.01117	59.22	2.832
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1-RTD-1	A	C2	1	2	59.80	2.720	0.1320	12	BGM	0.01100	58.73	2.671
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1-RTD-3	A	C2	1	2	57.80	2.780	0.1330	12	BGM	0.01108	57.20	2.751
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1-RTD-5	A	C2	1	2	60.40	2.730	0.1320	12	BGM	0.01100	59.32	2.681
NTP2014Q1-RMC-R14-RS-UNC1-B-C1-1-RTD-1	B	C1	2	1	55.20	2.760	0.1380	12	BGM	0.01150	56.68	2.834
NTP2014Q1-RMC-R14-RS-UNC1-B-C1-1-RTD-3	B	C1	2	1	57.40	2.780	0.1380	12	BGM	0.01150	58.94	2.854
NTP2014Q1-RMC-R14-RS-UNC1-B-C1-1-RTD-5	B	C1	2	1	55.40	2.770	0.1380	12	BGM	0.01150	56.88	2.844
NTP2014Q1-RMC-R14-RS-UNC1-B-C2-1-RTD-1	B	C2	2	2	57.70	2.810	0.1360	12	BGM	0.01133	58.39	2.843
NTP2014Q1-RMC-R14-RS-UNC1-B-C2-1-RTD-3	B	C2	2	2	58.30	2.770	0.1380	12	BGM	0.01150	59.86	2.844
NTP2014Q1-RMC-R14-RS-UNC1-B-C2-1-RTD-5	B	C2	2	2	58.60	2.790	0.1370	12	BGM	0.01142	59.73	2.844
NTP2014Q1-RMC-R14-RS-UNC1-C-C1-1-RTD-1	C	C1	3	1	61.90	2.850	0.1330	12	BGM	0.01108	61.26	2.820
NTP2014Q1-RMC-R14-RS-UNC1-C-C1-1-RTD-3	C	C1	3	1	60.10	2.840	0.1340	12	BGM	0.01117	59.92	2.832
NTP2014Q1-RMC-R14-RS-UNC1-C-C1-1-RTD-5	C	C1	3	1	60.50	2.800	0.1340	12	BGM	0.01117	60.32	2.792
NTP2014Q1-RMC-R14-RS-UNC1-C-C2-1-RTD-1	C	C2	3	2	58.80	2.830	0.1340	12	BGM	0.01117	58.63	2.822
NTP2014Q1-RMC-R14-RS-UNC1-C-C2-1-RTD-3	C	C2	3	2	58.70	2.810	0.1350	12	BGM	0.01125	58.96	2.823
NTP2014Q1-RMC-R14-RS-UNC1-C-C2-1-RTD-5	C	C2	3	2	58.70	2.800	0.1340	12	BGM	0.01117	58.53	2.792

Average 58.55 2.789
 Standard Dev. 1.717 0.03848
 Coeff. of Var. [%] 2.933 1.380
 Min. 55.20 2.720
 Max. 61.90 2.850
 Number of Spec. 18 18

Average_{norm} 0.01124 58.75 2.799
 Standard Dev._{norm} 1.285 0.05678
 Coeff. of Var. [%]_{norm} 2.188 0.209
 Min. 0.01100 56.63 2.671
 Max. 0.01150 61.26 2.854
 Number of Spec. 18 18 18



**Laminate Unnotched Compression Properties (UNC1)--ETW
Strength & Modulus**

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]
0.01120

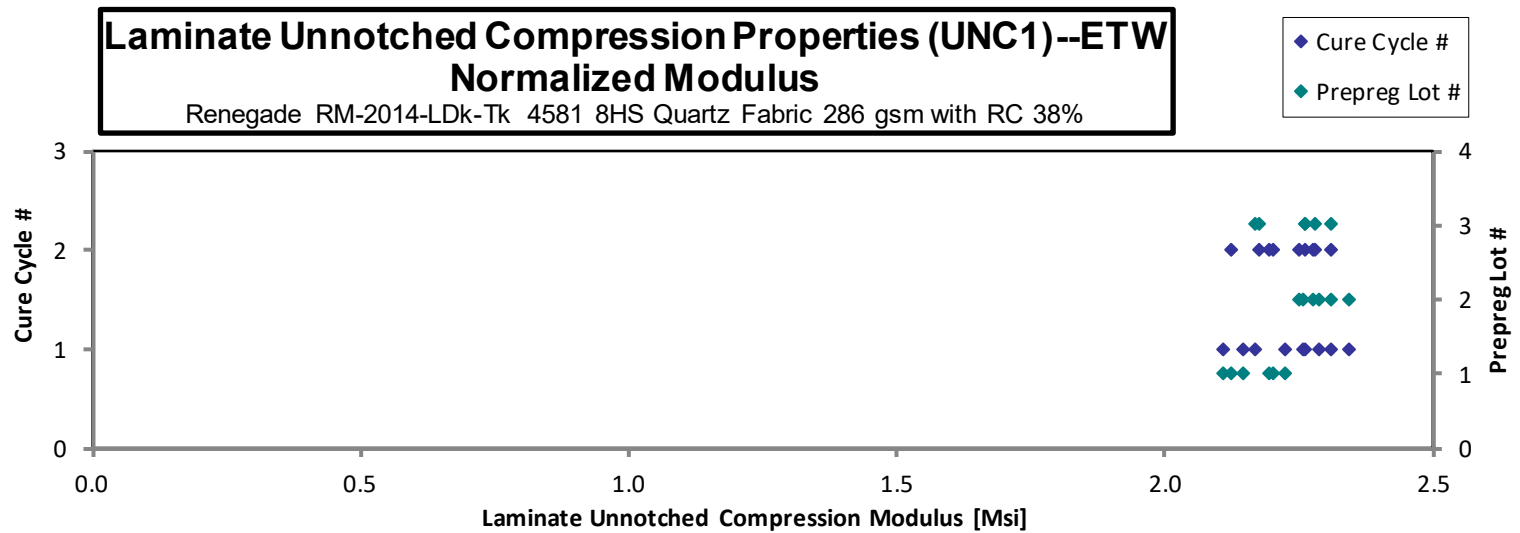
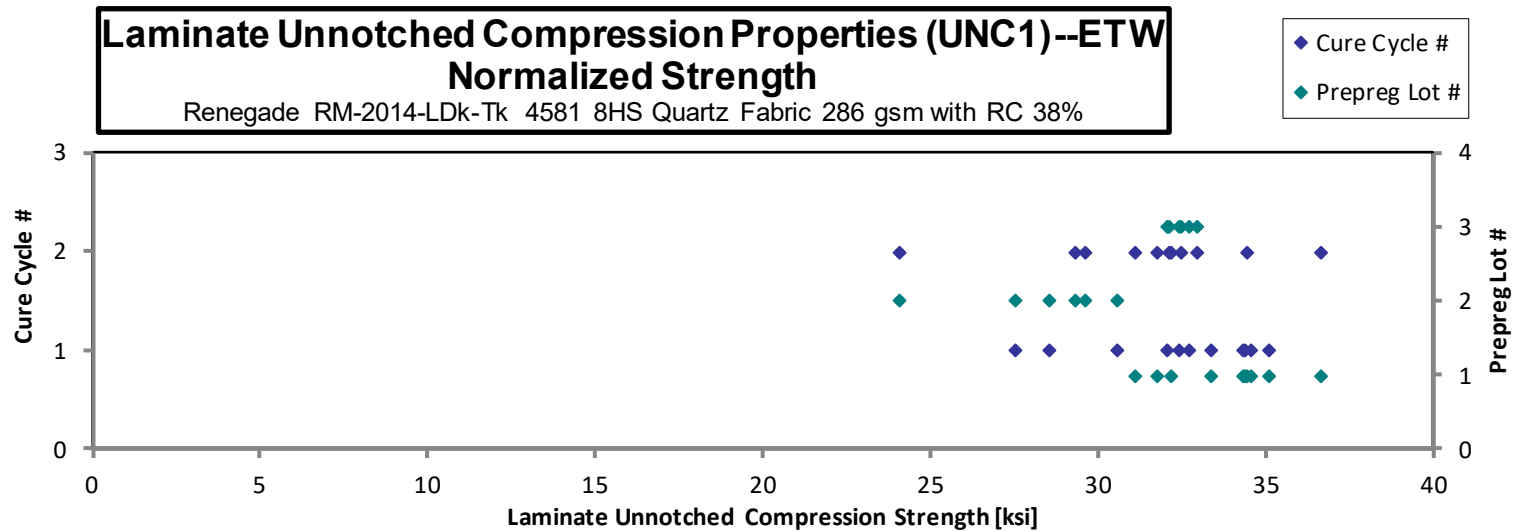
Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-ETW-2*	A	C1	1	1	35.20		0.1320	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-ETW-4	A	C1	1	1	34.70	2.130	0.1330	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-ETW-6	A	C1	1	1	34.50	2.230	0.1340	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-ETW-8	A	C1	1	1	33.70	2.170	0.1330	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-ETW-10*	A	C1	1	1	35.50		0.1330	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1-ETW-2	A	C2	1	2	32.60	2.180	0.1310	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1-ETW-4	A	C2	1	2	33.00	2.260	0.1310	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1-ETW-6	A	C2	1	2	31.90	2.250	0.1310	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1-ETW-8*	A	C2	1	2	35.10		0.1320	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1-ETW-10*	A	C2	1	2	37.30		0.1320	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-B-C1-1-ETW-2	B	C1	2	1	27.20	2.230	0.1360	12	HGM
NTP2014Q1-RMC-R14-RS-UNC1-B-C1-1-ETW-4	B	C1	2	1	30.20	2.260	0.1360	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-B-C1-1-ETW-6	B	C1	2	1	28.00	2.300	0.1370	12	HGM
NTP2014Q1-RMC-R14-RS-UNC1-B-C2-1-ETW-4	B	C2	2	2	29.50	2.300	0.1350	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-B-C2-1-ETW-6	B	C2	2	2	29.00	2.250	0.1360	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-B-C2-1-ETW-8	B	C2	2	2	24.00	2.240	0.1350	12	HGM
NTP2014Q1-RMC-R14-RS-UNC1-C-C1-1-ETW-2	C	C1	3	1	31.90	2.160	0.1350	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-C-C1-1-ETW-4	C	C1	3	1	32.60	2.250	0.1350	12	HGM
NTP2014Q1-RMC-R14-RS-UNC1-C-C1-1-ETW-6	C	C1	3	1	32.30	2.300	0.1350	12	HGM
NTP2014Q1-RMC-R14-RS-UNC1-C-C2-1-ETW-2	C	C2	3	2	32.10	2.150	0.1360	12	BGM
NTP2014Q1-RMC-R14-RS-UNC1-C-C2-1-ETW-4	C	C2	3	2	32.00	2.270	0.1350	12	HGM
NTP2014Q1-RMC-R14-RS-UNC1-C-C2-1-ETW-6	C	C2	3	2	32.80	2.250	0.1350	12	HGT

*Specimen was tested for strength only

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01100	34.57	
0.01108	34.34	2.108
0.01117	34.40	2.223
0.01108	33.35	2.147
0.01108	35.13	
0.01092	31.78	2.125
0.01092	32.17	2.203
0.01092	31.09	2.193
0.01100	34.47	
0.01100	36.63	
0.01133	27.52	2.257
0.01133	30.56	2.287
0.01142	28.54	2.344
0.01125	29.63	2.310
0.01133	29.35	2.277
0.01125	24.11	2.250
0.01125	32.04	2.170
0.01125	32.75	2.260
0.01125	32.44	2.310
0.01133	32.48	2.176
0.01125	32.14	2.280
0.01125	32.95	2.260

Average 32.05 2.232
Standard Dev. 3.091 0.05264
Coeff. of Var. [%] 9.643 2.358
Min. 24.00 2.130
Max. 37.30 2.300
Number of Spec. 22 18

Average_{norm} 0.01117 31.93 2.232
Standard Dev_{norm} 2.835 0.06787
Coeff. of Var. [%]_{norm} 8.878 3.041
Min. 0.01092 24.11 2.108
Max. 0.01142 36.63 2.344
Number of Spec. 22 22 18



4.10 “10/80/10” Unnotched Compression 2 Properties (UNC2)

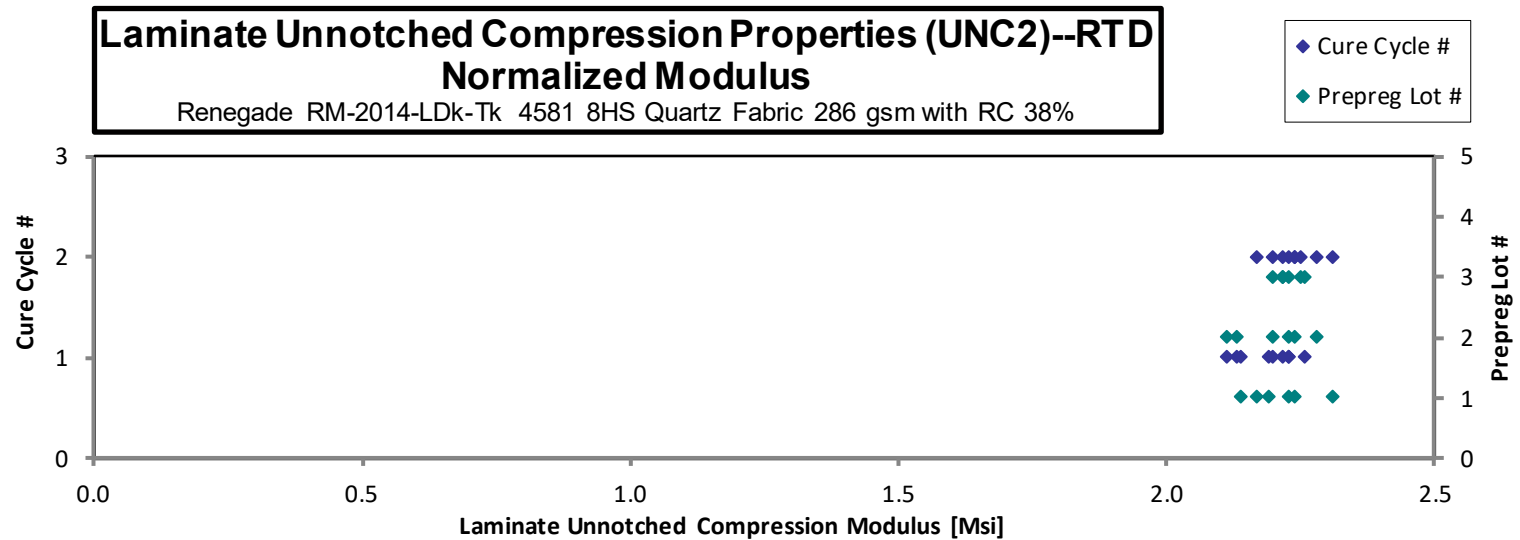
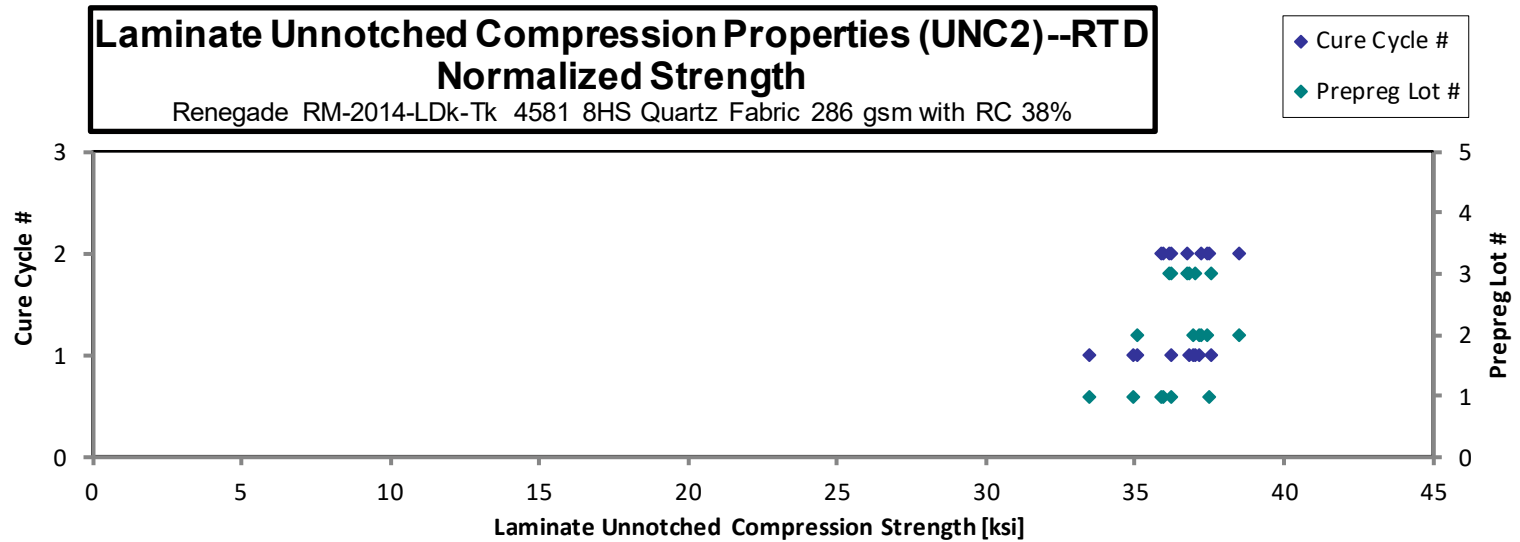
Laminate Unnotched Compression Properties (UNC2)--RTD
Strength & Modulus
 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
 t_{ply} [in]
 0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-RTD-1	A	C1	1	1	34.70	2.220	0.1080	10	BGM	0.01080	33.46	2.141
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-RTD-2	A	C1	1	1	35.90	2.290	0.1090	10	BGM	0.01090	34.94	2.229
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-RTD-3	A	C1	1	1	37.20	2.250	0.1090	10	BGM	0.01090	36.20	2.190
NTP2014Q1-RMC-R14-RS-UNC2-A-C2-1-RTD-1	A	C2	1	2	36.60	2.280	0.1100	10	BGM	0.01100	35.95	2.239
NTP2014Q1-RMC-R14-RS-UNC2-A-C2-1-RTD-3	A	C2	1	2	36.20	2.330	0.1110	10	BGM	0.01110	35.88	2.309
NTP2014Q1-RMC-R14-RS-UNC2-A-C2-1-RTD-5	A	C2	1	2	37.80	2.190	0.1110	10	BGM	0.01110	37.46	2.170
NTP2014Q1-RMC-R14-RS-UNC2-B-C1-1-RTD-1	B	C1	2	1	36.00	2.190	0.1090	10	BGM	0.01090	35.04	2.131
NTP2014Q1-RMC-R14-RS-UNC2-B-C1-1-RTD-3	B	C1	2	1	37.60	2.240	0.1100	10	BGM	0.01100	36.93	2.200
NTP2014Q1-RMC-R14-RS-UNC2-B-C1-1-RTD-5	B	C1	2	1	37.80	2.150	0.1100	10	BGM	0.01100	37.13	2.112
NTP2014Q1-RMC-R14-RS-UNC2-B-C2-1-RTD-1	B	C2	2	2	37.20	2.280	0.1120	10	BGM	0.01120	37.20	2.280
NTP2014Q1-RMC-R14-RS-UNC2-B-C2-1-RTD-3	B	C2	2	2	37.10	2.210	0.1130	10	BGM	0.01130	37.43	2.230
NTP2014Q1-RMC-R14-RS-UNC2-B-C2-1-RTD-5	B	C2	2	2	37.80	2.200	0.1140	10	BGM	0.01140	38.48	2.239
NTP2014Q1-RMC-R14-RS-UNC2-C-C1-1-RTD-1	C	C1	3	1	38.60	2.320	0.1090	10	BGM	0.01090	37.57	2.258
NTP2014Q1-RMC-R14-RS-UNC2-C-C1-1-RTD-3	C	C1	3	1	38.00	2.280	0.1090	10	BGM	0.01090	36.98	2.219
NTP2014Q1-RMC-R14-RS-UNC2-C-C1-1-RTD-5	C	C1	3	1	37.80	2.290	0.1090	10	BGM	0.01090	36.79	2.229
NTP2014Q1-RMC-R14-RS-UNC2-C-C2-1-RTD-1	C	C2	3	2	37.20	2.260	0.1090	10	BGM	0.01090	36.20	2.199
NTP2014Q1-RMC-R14-RS-UNC2-C-C2-1-RTD-3	C	C2	3	2	36.80	2.290	0.1100	10	BGM	0.01100	36.14	2.249
NTP2014Q1-RMC-R14-RS-UNC2-C-C2-1-RTD-5	C	C2	3	2	38.10	2.300	0.1080	10	BGM	0.01080	36.74	2.218

Average 37.13 2.254
 Standard Dev. 0.9653 0.05054
 Coeff. of Var. [%] 2.599 2.242
 Min. 34.70 2.150
 Max. 38.60 2.330
 Number of Spec. 18 18

Average_{norm} 0.01100 36.47 2.213
 Standard Dev._{norm} 1.165 0.05096
 Coeff. of Var. [%]_{norm} 3.194 2.302
 Min. 0.01080 33.46 2.112
 Max. 0.01140 38.48 2.309
 Number of Spec. 18 18 18



**Laminate Unnotched Compression Properties (UNC2)--ETW
Strength & Modulus**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]

0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-ETW-2	A	C1	1	1	18.60	1.450	0.1080	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-ETW-4*	A	C1	1	1	18.40		0.1080	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-ETW-6	A	C1	1	1	18.00	1.410	0.1070	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-ETW-8**	A	C1	1	1	19.10		0.1080	10	ACM
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-ETW-10**	A	C1	1	1	19.90		0.1070	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-ETW-2	A	C2	1	2	19.20	1.440	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-ETW-4	A	C2	1	2	17.30	1.400	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-ETW-6	A	C2	1	2	18.70	1.410	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-ETW-8**	A	C2	1	2	18.60		0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1-ETW-10**	A	C2	1	2	19.80		0.1090	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-B-C1-1-ETW-4	B	C1	2	1	21.30	1.520	0.1100	10	HGM
NTP2014Q1-RMC-R14-RS-UNC2-B-C1-1-ETW-6	B	C1	2	1	20.70	1.570	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-B-C1-1-ETW-8	B	C1	2	1	19.60	1.460	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-B-C2-1-ETW-2	B	C2	2	2	19.70	1.600	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-UNC2-B-C2-1-ETW-4	B	C2	2	2	21.10	1.610	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-B-C2-1-ETW-6	B	C2	2	2	21.50	1.540	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-B-C2-1-ETW-8	B	C2	2	2	21.00	1.580	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-C-C1-1-ETW-2	C	C1	3	1	20.50	1.580	0.1100	10	HGM
NTP2014Q1-RMC-R14-RS-UNC2-C-C1-1-ETW-4	C	C1	3	1	19.40	1.530	0.1110	10	HGM
NTP2014Q1-RMC-R14-RS-UNC2-C-C1-1-ETW-6	C	C1	3	1	20.00	1.570	0.1110	10	HGM
NTP2014Q1-RMC-R14-RS-UNC2-C-C2-1-ETW-2	C	C2	3	2	19.90	1.480	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-UNC2-C-C2-1-ETW-4	C	C2	3	2	19.00	1.470	0.1110	10	HGM
NTP2014Q1-RMC-R14-RS-UNC2-C-C2-1-ETW-6	C	C2	3	2	17.90	1.490	0.1100	10	HGM

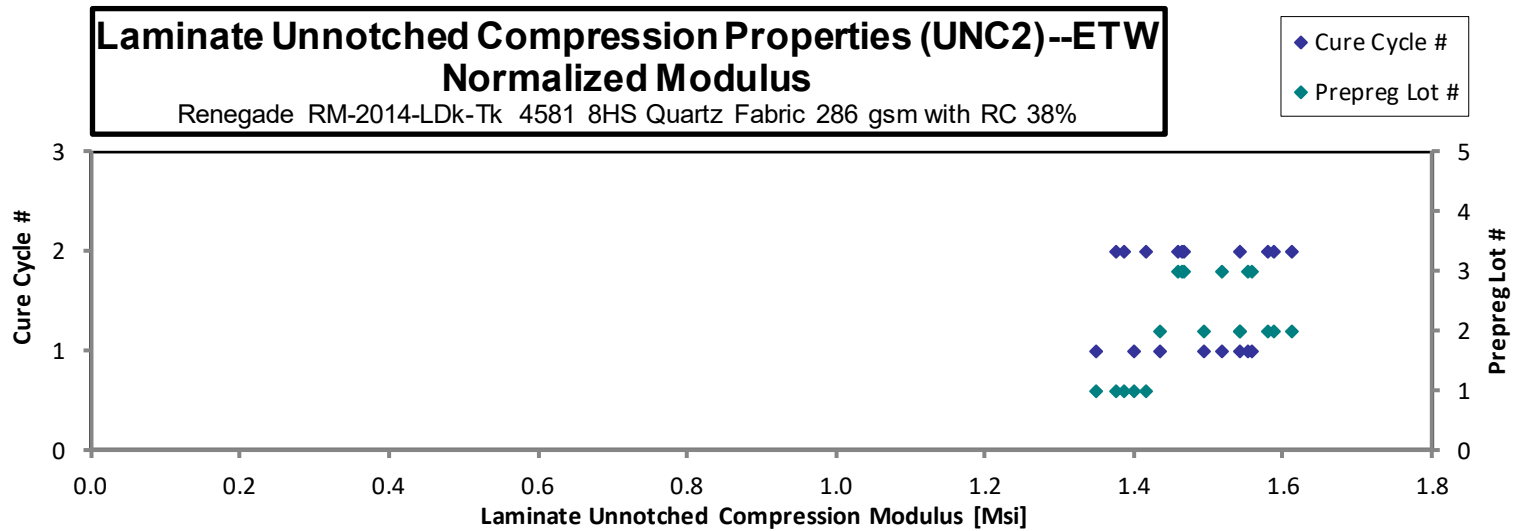
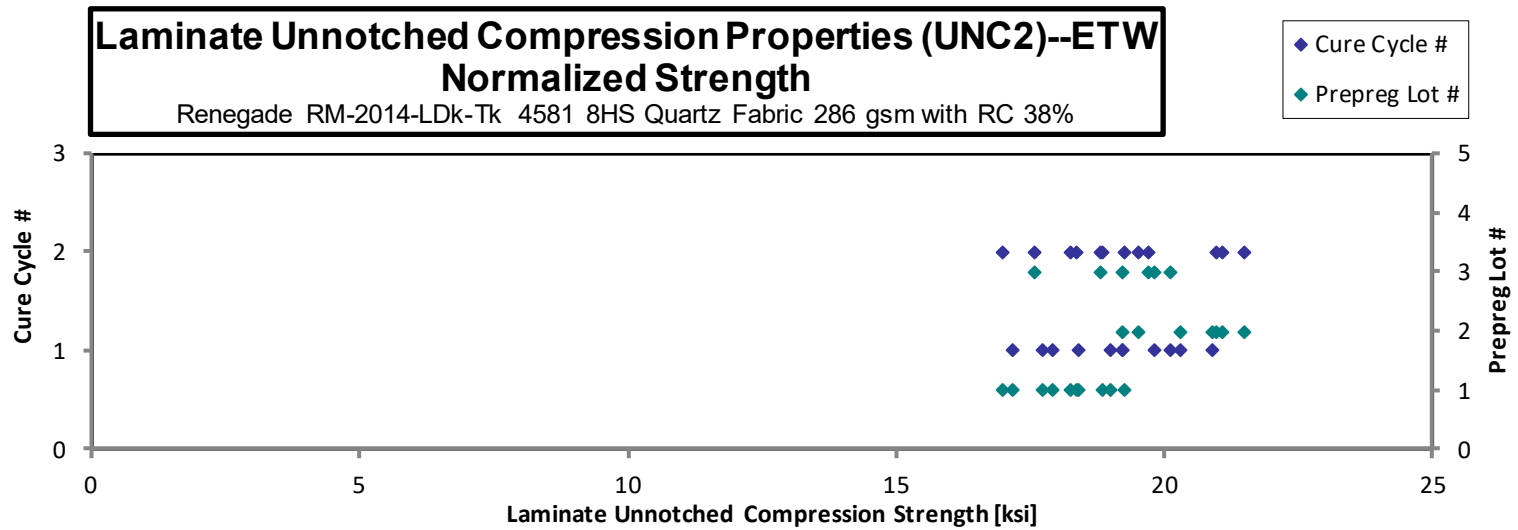
*Excluded modulus due to strain gage wire failure

**Specimen was tested for strength only

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01080	17.94	1.398
0.01080	17.74	
0.01070	17.20	1.347
0.01080	18.42	
0.01070	19.01	
0.01100	18.86	1.414
0.01100	16.99	1.375
0.01100	18.37	1.385
0.01100	18.27	
0.01090	19.27	
0.01100	20.92	1.493
0.01100	20.33	1.542
0.01100	19.25	1.434
0.01110	19.52	1.586
0.01120	21.10	1.610
0.01120	21.50	1.540
0.01120	21.00	1.580
0.01100	20.13	1.552
0.01110	19.23	1.516
0.01110	19.82	1.556
0.01110	19.72	1.467
0.01110	18.83	1.457
0.01100	17.58	1.463

Average 19.53 1.506
Standard Dev. 1.144 0.06955
Coeff. of Var. [%] 5.859 4.618
Min. 17.30 1.400
Max. 21.50 1.610
Number of Spec. 23 18

Average_{norm} 0.01099 19.17 1.484
Standard Dev._{norm} 1.274 0.08025
Coeff. of Var. [%]_{norm} 6.645 5.407
Min. 0.01070 16.99 1.347
Max. 0.01120 21.50 1.610
Number of Spec. 23 23 18



4.11 “40/20/40” Unnotched Compression 3 Properties (UNC3)

Laminate Unnotched Compression Properties (UNC3)--RTD
Strength & Modulus
 Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
 t_{ply} [in]
 0.01120

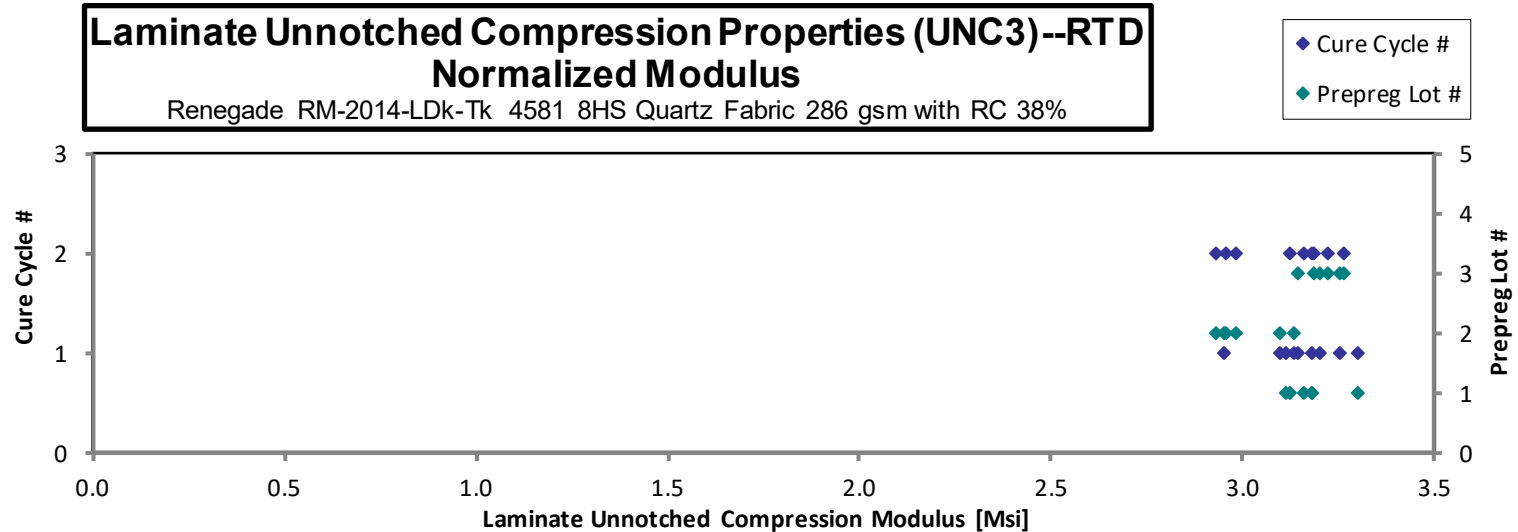
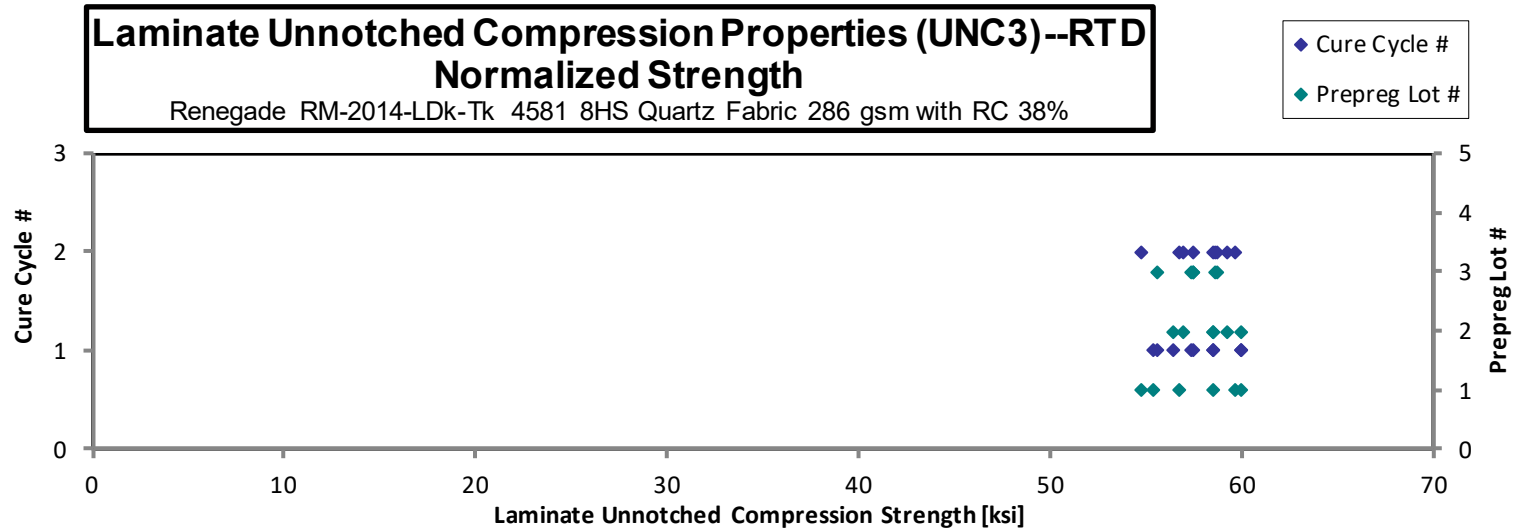
Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNC3-A-C1-1-RTD-1	A	C1	1	1	60.50	3.210	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C1-1-RTD-3	A	C1	1	1	55.90	3.330	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C1-1-RTD-5	A	C1	1	1	59.00	3.140	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C2-1-RTD-1	A	C2	1	2	56.20	3.150	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C2-1-RTD-3	A	C2	1	2	59.70	3.160	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C2-1-RTD-5	A	C2	1	2	54.80	3.120	0.1120	10	HGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C1-1-RTD-1	B	C1	2	1	56.40	3.130	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C1-1-RTD-3	B	C1	2	1	57.50	3.040	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C1-1-RTD-5	B	C1	2	1	58.90	2.900	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C2-1-RTD-1	B	C2	2	2	56.40	2.930	0.1130	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C2-1-RTD-3	B	C2	2	2	57.50	2.880	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C2-1-RTD-5	B	C2	2	2	58.20	2.930	0.1140	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C1-1-RTD-1	C	C1	3	1	59.50	3.370	0.1080	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C1-1-RTD-3	C	C1	3	1	57.10	3.230	0.1090	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C1-1-RTD-5	C	C1	3	1	59.10	3.290	0.1090	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C2-1-RTD-1	C	C2	3	2	60.90	3.300	0.1080	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C2-1-RTD-3	C	C2	3	2	59.10	3.310	0.1090	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C2-1-RTD-5	C	C2	3	2	59.70	3.320	0.1100	10	BGM

*Modulus are average values of 2 strain gages

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01110	59.96	3.181
0.01110	55.40	3.300
0.01110	58.47	3.112
0.01130	56.70	3.178
0.01120	59.70	3.160
0.01120	54.80	3.120
0.01120	56.40	3.130
0.01140	58.53	3.094
0.01140	59.95	2.952
0.01130	56.90	2.956
0.01140	58.53	2.931
0.01140	59.24	2.982
0.01080	57.38	3.250
0.01090	55.57	3.143
0.01090	57.52	3.202
0.01080	58.73	3.182
0.01090	57.52	3.221
0.01100	58.63	3.261

Average 58.13 3.152
 Standard Dev. 1.731 0.1596
 Coeff. of Var. [%] 2.978 5.064
 Min. 54.80 2.880
 Max. 60.90 3.370
 Number of Spec. 18 18

Average_{norm} 0.01113 57.77 3.131
 Standard Dev_{norm} 1.573 0.1105
 Coeff. of Var. [%]_{norm} 2.723 3.529
 Min. 0.01080 54.80 2.931
 Max. 0.01140 59.96 3.300
 Number of Spec. 18 18 18



**Laminate Unnotched Compression Properties (UNC3)--ETW
Strength & Modulus**

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]
0.01120

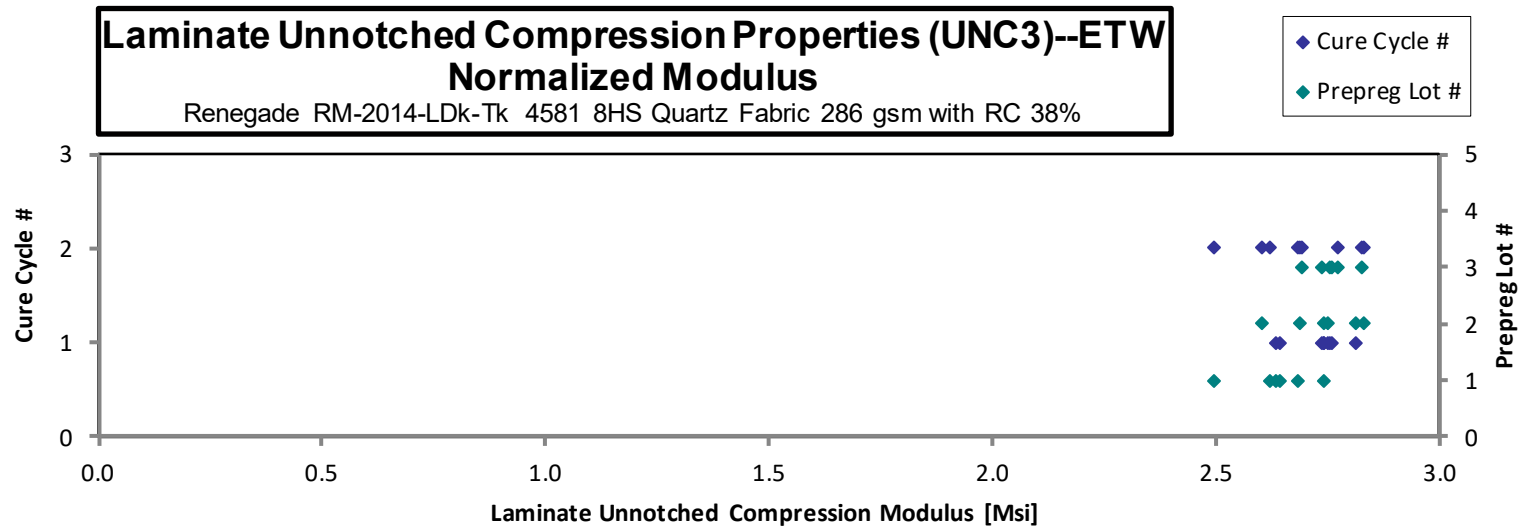
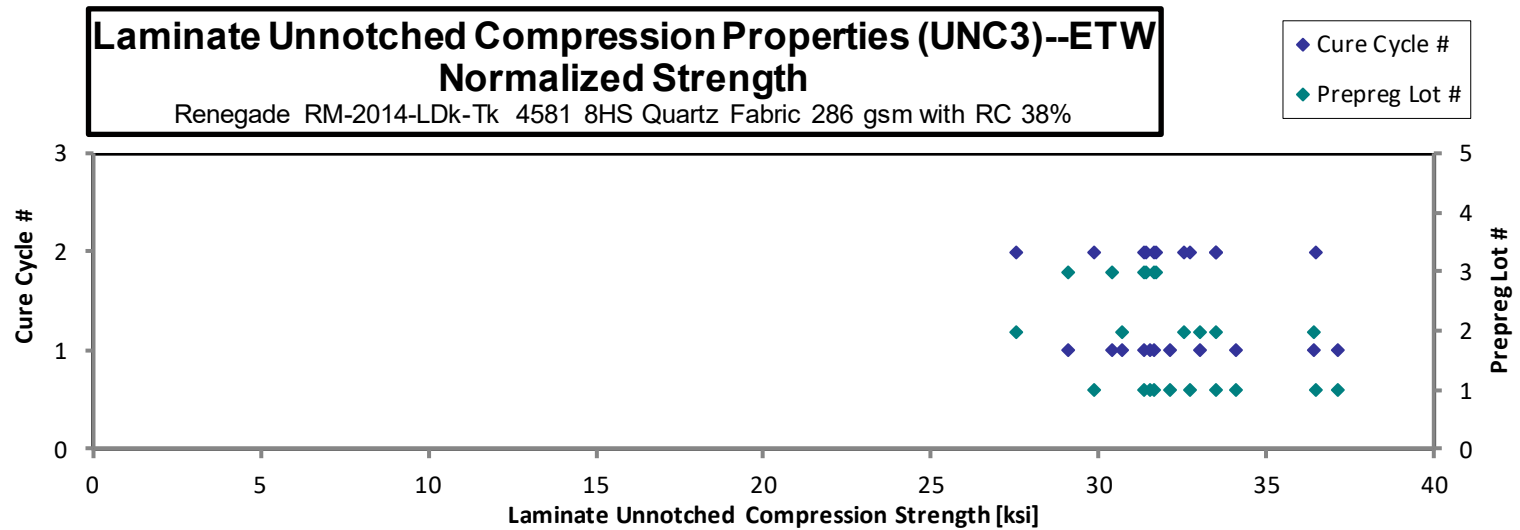
Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-UNC3-A-C1-1-ETW-2*	A	C1	1	1	34.70		0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C1-1-ETW-4	A	C1	1	1	32.70	2.680	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C1-1-ETW-6	A	C1	1	1	32.10	2.790	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C1-1-ETW-8	A	C1	1	1	32.20	2.690	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C1-1-ETW-10*	A	C1	1	1	37.80		0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C2-1-ETW-2	A	C2	1	2	33.30	2.540	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C2-1-ETW-4	A	C2	1	2	31.30	2.620	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C2-1-ETW-6	A	C2	1	2	30.40	2.730	0.1100	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C2-1-ETW-8*	A	C2	1	2	33.80		0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-UNC3-A-C2-1-ETW-10*	A	C2	1	2	37.10		0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C1-1-ETW-2	B	C1	2	1	36.40	2.810	0.1120	10	HGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C1-1-ETW-4	B	C1	2	1	33.00	2.750	0.1120	10	HGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C1-1-ETW-6	B	C1	2	1	30.70	2.740	0.1120	10	HGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C2-1-ETW-4	B	C2	2	2	27.50	2.600	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C2-1-ETW-6	B	C2	2	2	32.80	2.710	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-B-C2-1-ETW-8	B	C2	2	2	33.50	2.830	0.1120	10	HGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C1-1-ETW-2	C	C1	3	1	32.20	2.830	0.1090	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C1-1-ETW-4	C	C1	3	1	30.90	2.810	0.1100	10	HGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C1-1-ETW-6	C	C1	3	1	29.30	2.760	0.1110	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C1-1-ETW-2	C	C2	3	2	31.90	2.850	0.1110	10	HGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C1-1-ETW-4	C	C2	3	2	31.70	2.770	0.1120	10	BGM
NTP2014Q1-RMC-R14-RS-UNC3-C-C1-1-ETW-6	C	C2	3	2	31.40	2.690	0.1120	10	HGM

*Specimen was tested for strength only

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01100	34.08	
0.01100	32.12	2.632
0.01100	31.53	2.740
0.01100	31.63	2.642
0.01100	37.13	
0.01100	32.71	2.495
0.01120	31.30	2.620
0.01100	29.86	2.681
0.01110	33.50	
0.01100	36.44	
0.01120	36.40	2.810
0.01120	33.00	2.750
0.01120	30.70	2.740
0.01120	27.50	2.600
0.01110	32.51	2.686
0.01120	33.50	2.830
0.01090	31.34	2.754
0.01100	30.35	2.760
0.01110	29.04	2.735
0.01110	31.62	2.825
0.01120	31.70	2.770
0.01120	31.40	2.690

Average 32.58 2.733
Standard Dev. 2.413 0.08568
Coeff. of Var. [%] 7.408 3.135
Min. 27.50 2.540
Max. 37.80 2.850
Number of Spec. 22 18

Average_{norm} 0.01109 32.24 2.709
Standard Dev_{norm} 2.335 0.08700
Coeff. of Var. [%]_{norm} 7.244 3.212
Min. 0.01090 27.50 2.495
Max. 0.01120 37.13 2.830
Number of Spec. 22 22 18



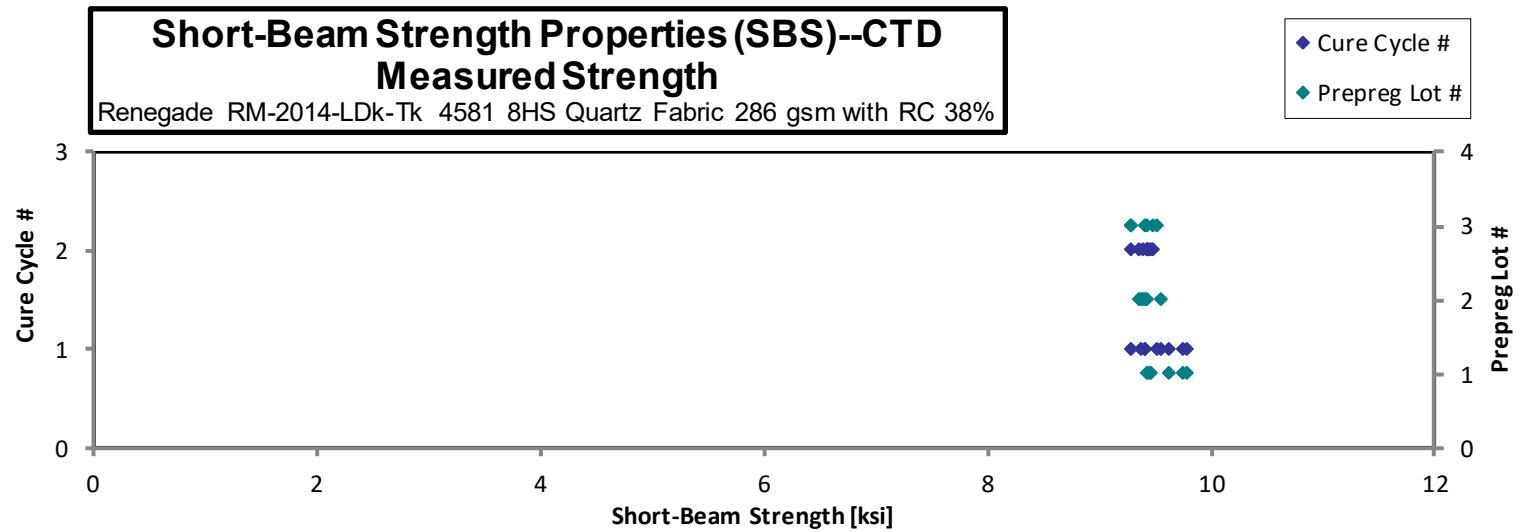
4.12 Lamina Short-Beam Strength Properties (SBS)

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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksij]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-CTD-1	A	C1	1	1	9.780	0.2205	20	0.01103	ILS, COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-CTD-6	A	C1	1	1	9.622	0.2217	20	0.01108	ILS, COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-CTD-11	A	C1	1	1	9.743	0.2209	20	0.01105	ILS, COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-CTD-1	A	C2	1	2	9.450	0.2267	20	0.01133	ILS, COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-CTD-6	A	C2	1	2	9.435	0.2282	20	0.01141	ILS, COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-CTD-11	A	C2	1	2	9.469	0.2268	20	0.01134	ILS, COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-CTD-1	B	C1	2	1	9.551	0.2245	20	0.01123	ILS
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-CTD-6	B	C1	2	1	9.369	0.2241	20	0.01121	ILS
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-CTD-11	B	C1	2	1	9.417	0.2245	20	0.01122	ILS, COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-CTD-1	B	C2	2	2	9.355	0.2256	20	0.01128	ILS
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-CTD-6	B	C2	2	2	9.387	0.2271	20	0.01136	ILS
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-CTD-11	B	C2	2	2	9.428	0.2257	20	0.01129	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-CTD-1	C	C1	3	1	9.407	0.2227	20	0.01114	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-CTD-6	C	C1	3	1	9.523	0.2218	20	0.01109	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-CTD-11	C	C1	3	1	9.281	0.2229	20	0.01114	ILS, COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-CTD-1	C	C2	3	2	9.431	0.2211	20	0.01105	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-CTD-6	C	C2	3	2	9.474	0.2217	20	0.01108	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-CTD-11	C	C2	3	2	9.275	0.2220	20	0.01110	ILS

Average	9.467	0.01119
Standard Dev.	0.1370	
Coeff. of Var. [%]	1.447	
Min.	9.275	0.01103
Max.	9.780	0.01141
Number of Spec.	18	18

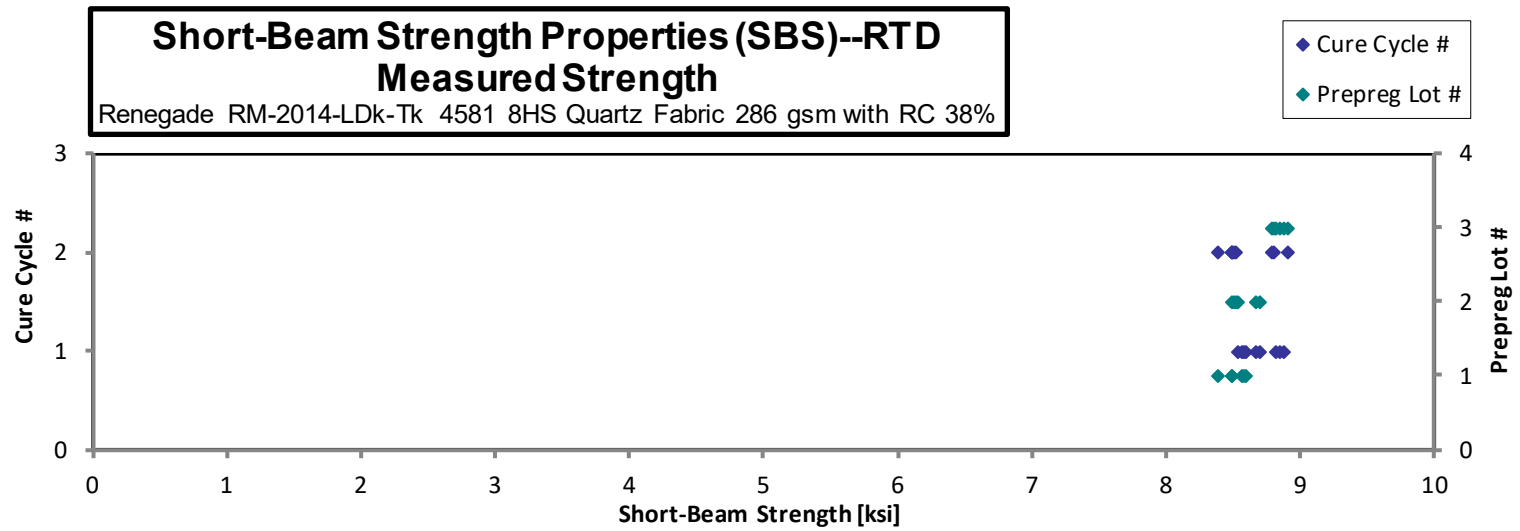


**Short-Beam Strength Properties (SBS)--RTD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-RTD-2	A	C1	1	1	8.560	0.2220	20	0.01110	ILS
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-RTD-7	A	C1	1	1	8.590	0.2240	20	0.01120	ILS
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-RTD-12	A	C1	1	1	8.580	0.2230	20	0.01115	ILS
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-RTD-2	A	C2	1	2	8.490	0.2280	20	0.01140	ILS
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-RTD-7	A	C2	1	2	8.490	0.2280	20	0.01140	ILS
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-RTD-12	A	C2	1	2	8.380	0.2280	20	0.01140	ILS
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-RTD-5	B	C1	2	1	8.530	0.2290	20	0.01145	ILS
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-RTD-7	B	C1	2	1	8.690	0.2290	20	0.01145	ILS
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-RTD-12	B	C1	2	1	8.660	0.2300	20	0.01150	ILS
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-RTD-2	B	C2	2	2	8.490	0.2320	20	0.01160	ILS
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-RTD-7	B	C2	2	2	8.510	0.2330	20	0.01165	ILS
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-RTD-12	B	C2	2	2	8.500	0.2320	20	0.01160	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-RTD-7	C	C1	3	1	8.870	0.2210	20	0.01105	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-RTD-12	C	C1	3	1	8.810	0.2230	20	0.01115	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-RTD-17	C	C1	3	1	8.840	0.2210	20	0.01105	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-RTD-2	C	C2	3	2	8.790	0.2210	20	0.01105	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-RTD-7	C	C2	3	2	8.900	0.2210	20	0.01105	ILS
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-RTD-12	C	C2	3	2	8.800	0.2230	20	0.01115	ILS

Average	8.638	0.01130
Standard Dev.	0.1602	
Coeff. of Var. [%]	1.855	
Min.	8.380	0.01105
Max.	8.900	0.01165
Number of Spec.	18	18

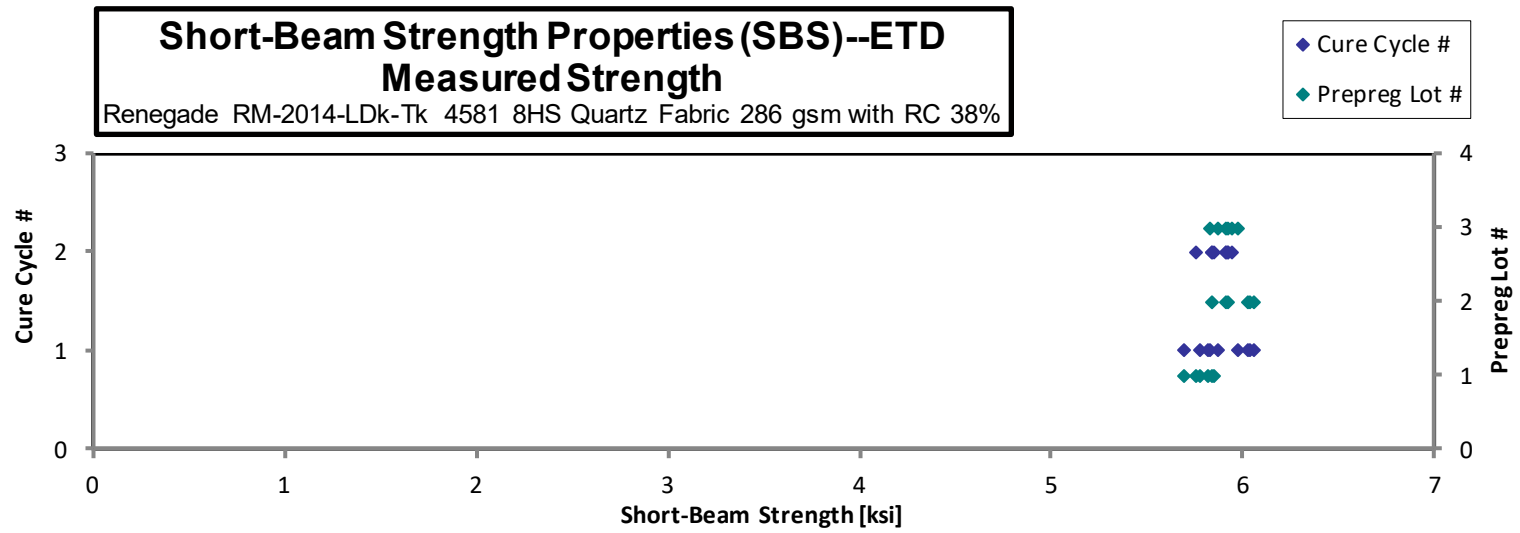


**Short-Beam Strength Properties (SBS)--ETD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-ETD-3	A	C1	1	1	5.690	0.2230	20	0.01115	COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-ETD-8	A	C1	1	1	5.770	0.2240	20	0.01120	COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-ETD-13	A	C1	1	1	5.810	0.2230	20	0.01115	COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-ETD-3	A	C2	1	2	5.750	0.2270	20	0.01135	COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-ETD-8	A	C2	1	2	5.850	0.2290	20	0.01145	COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-ETD-11	A	C2	1	2	5.840	0.2280	20	0.01140	COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-ETD-3	B	C1	2	1	6.030	0.2300	20	0.01150	COMPRESSION, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-ETD-8	B	C1	2	1	6.020	0.2290	20	0.01145	COMPRESSION, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-ETD-13	B	C1	2	1	6.050	0.2300	20	0.01150	COMPRESSION, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-ETD-3	B	C2	2	2	5.830	0.2320	20	0.01160	COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-ETD-8	B	C2	2	2	5.920	0.2330	20	0.01165	COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-ETD-13	B	C2	2	2	5.910	0.2320	20	0.01160	COMPRESSION
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-ETD-3	C	C1	3	1	5.820	0.2230	20	0.01115	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-ETD-8	C	C1	3	1	5.870	0.2210	20	0.01105	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-ETD-13	C	C1	3	1	5.970	0.2230	20	0.01115	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-ETD-3	C	C2	3	2	5.920	0.2220	20	0.01110	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-ETD-8	C	C2	3	2	5.940	0.2210	20	0.01105	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-ETD-13	C	C2	3	2	5.910	0.2220	20	0.01110	INELASTIC DEFORMATION

Average	5.883	0.01131
Standard Dev.	0.09888	
Coeff. of Var. [%]	1.681	
Min.	5.690	0.01105
Max.	6.050	0.01165
Number of Spec.	18	18

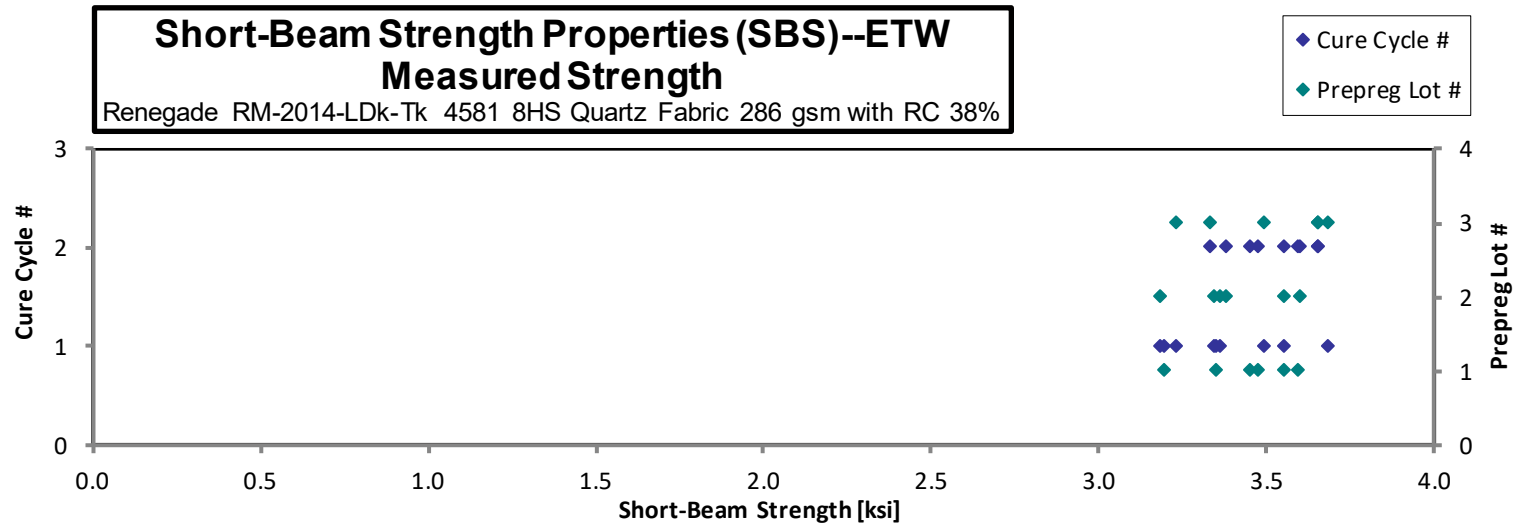


**Short-Beam Strength Properties (SBS)--ETW
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-ETW-4	A	C1	1	1	3.550	0.2210	20	0.01105	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-ETW-9	A	C1	1	1	3.350	0.2220	20	0.01110	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1-ETW-14	A	C1	1	1	3.190	0.2220	20	0.01110	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-ETW-4	A	C2	1	2	3.590	0.2270	20	0.01135	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-ETW-9	A	C2	1	2	3.450	0.2270	20	0.01135	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1-ETW-14	A	C2	1	2	3.470	0.2270	20	0.01135	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-ETW-4	B	C1	2	1	3.340	0.2260	20	0.01130	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-ETW-9	B	C1	2	1	3.180	0.2260	20	0.01130	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1-ETW-14	B	C1	2	1	3.360	0.2270	20	0.01135	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-ETW-4	B	C2	2	2	3.550	0.2300	20	0.01150	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-ETW-9	B	C2	2	2	3.600	0.2310	20	0.01155	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1-ETW-14	B	C2	2	2	3.380	0.2300	20	0.01150	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-ETW-4	C	C1	3	1	3.680	0.2230	20	0.01115	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-ETW-9	C	C1	3	1	3.490	0.2200	20	0.01100	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1-ETW-14	C	C1	3	1	3.230	0.2220	20	0.01110	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-ETW-4	C	C2	3	2	3.650	0.2200	20	0.01100	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-ETW-9	C	C2	3	2	3.650	0.2200	20	0.01100	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1-ETW-14	C	C2	3	2	3.330	0.2220	20	0.01110	INELASTIC DEFORMATION

Average	3.447	0.01123
Standard Dev.	0.1600	
Coeff. of Var. [%]	4.642	
Min.	3.180	0.01100
Max.	3.680	0.01155
Number of Spec.	18	18



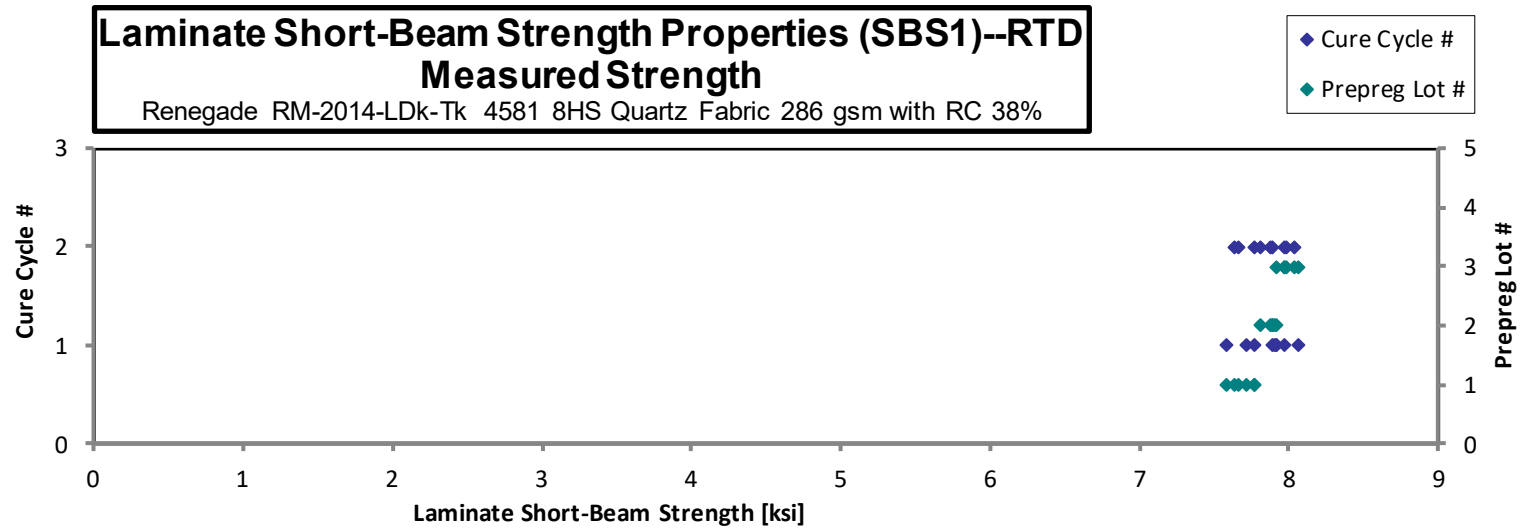
4.13 Laminate Short-Beam Strength Properties (SBS1)

Laminate Short-Beam Strength Properties (SBS1)--RTD Strength

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
NTP2014Q1-RMC-R14-RS-SBS1-A-C1-1-RTD-1	A	C1	1	1	7.590	0.1360	12	0.01133	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-A-C1-1-RTD-3	A	C1	1	1	7.720	0.1350	12	0.01125	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-A-C1-1-RTD-5	A	C1	1	1	7.770	0.1350	12	0.01125	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-A-C2-1-RTD-1	A	C2	1	2	7.780	0.1340	12	0.01117	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-A-C2-1-RTD-3	A	C2	1	2	7.640	0.1340	12	0.01117	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-A-C2-1-RTD-5	A	C2	1	2	7.660	0.1340	12	0.01117	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-RTD-1	B	C1	2	1	7.920	0.1360	12	0.01133	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-RTD-3	B	C1	2	1	7.890	0.1360	12	0.01133	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-RTD-5	B	C1	2	1	7.910	0.1360	12	0.01133	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C2-1-RTD-1	B	C2	2	2	7.810	0.1340	12	0.01117	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C2-1-RTD-3	B	C2	2	2	7.880	0.1340	12	0.01117	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C2-1-RTD-5	B	C2	2	2	7.900	0.1340	12	0.01117	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C1-1-RTD-1	C	C1	3	1	7.970	0.1330	12	0.01108	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C1-1-RTD-3	C	C1	3	1	8.070	0.1330	12	0.01108	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C1-1-RTD-5	C	C1	3	1	7.920	0.1340	12	0.01117	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C2-1-RTD-1	C	C2	3	2	8.040	0.1340	12	0.01117	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C2-1-RTD-3	C	C2	3	2	7.970	0.1340	12	0.01117	ILS, INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C2-1-RTD-5	C	C2	3	2	7.990	0.1340	12	0.01117	ILS, INELASTIC DEFORMATION

Average	7.857	Average	0.01120
Standard Dev.	0.1389	Standard Dev.	
Coeff. of Var. [%]	1.768	Coeff. of Var. [%]	
Min.	7.590	Min.	0.01108
Max.	8.070	Max.	0.01133
Number of Spec.	18	Number of Spec.	18



**Laminate Short-Beam Strength Properties (SBS1)--ETW
Strength**

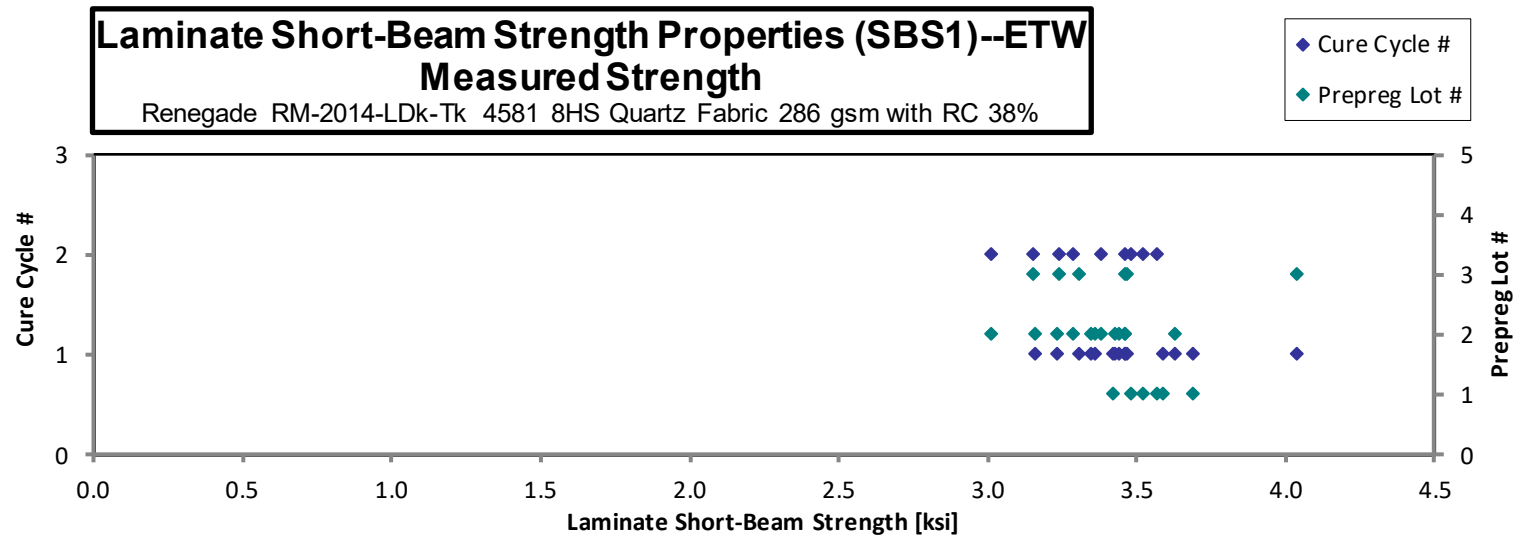
Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
NTP2014Q1-RMC-R14-RS-SBS1-A-C1-1-ETW-2	A	C1	1	1	3.690	0.1330	12	0.01108	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-A-C1-1-ETW-4	A	C1	1	1	3.420	0.1330	12	0.01108	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-A-C1-1-ETW-6	A	C1	1	1	3.590	0.1330	12	0.01108	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-A-C2-1-ETW-2	A	C2	1	2	3.570	0.1300	12	0.01083	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-A-C2-1-ETW-4	A	C2	1	2	3.480	0.1310	12	0.01092	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-A-C2-1-ETW-6	A	C2	1	2	3.520	0.1310	12	0.01092	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-ETW-1*	B	C1	2	1	3.360	0.1370	12	0.01142	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-ETW-2*	B	C1	2	1	3.440	0.1370	12	0.01142	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-ETW-3*	B	C1	2	1	3.160	0.1370	12	0.01142	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-ETW-4*	B	C1	2	1	3.630	0.1360	12	0.01133	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-ETW-5*	B	C1	2	1	3.460	0.1370	12	0.01142	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-ETW-6*	B	C1	2	1	3.350	0.1370	12	0.01142	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-ETW-7*	B	C1	2	1	3.460	0.1370	12	0.01142	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-ETW-8*	B	C1	2	1	3.230	0.1370	12	0.01142	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C1-1-ETW-9*	B	C1	2	1	3.430	0.1370	12	0.01142	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C2-1-ETW-1*	B	C2	2	2	3.010	0.1340	12	0.01117	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C2-1-ETW-2*	B	C2	2	2	3.380	0.1350	12	0.01125	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-B-C2-1-ETW-3*	B	C2	2	2	3.290	0.1350	12	0.01125	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C1-1-ETW-2	C	C1	3	1	4.040	0.1330	12	0.01108	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C1-1-ETW-4	C	C1	3	1	3.470	0.1340	12	0.01117	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C1-1-ETW-6	C	C1	3	1	3.310	0.1340	12	0.01117	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C2-1-ETW-2	C	C2	3	2	3.460	0.1340	12	0.01117	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C2-1-ETW-4	C	C2	3	2	3.240	0.1340	12	0.01117	INELASTIC DEFORMATION
NTP2014Q1-RMC-R14-RS-SBS1-C-C2-1-ETW-6	C	C2	3	2	3.150	0.1340	12	0.01117	INELASTIC DEFORMATION

*Cut from untested UNC1 specimens

Average 3.423
Standard Dev. 0.2075
Coeff. of Var. [%] 6.063
Min. 3.010
Max. 4.040
Number of Spec. 24

Average 0.01122
Standard Dev. 0.01108
Coeff. of Var. [%] 0.01083
Min. 0.01083
Max. 0.01142
Number of Spec. 24



4.14 “25/50/25” Open-Hole Tension 1 Properties (OHT1)

**Laminate Open-Hole Tension Properties (OHT1)--CTD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

 $t_{ply} [in]$

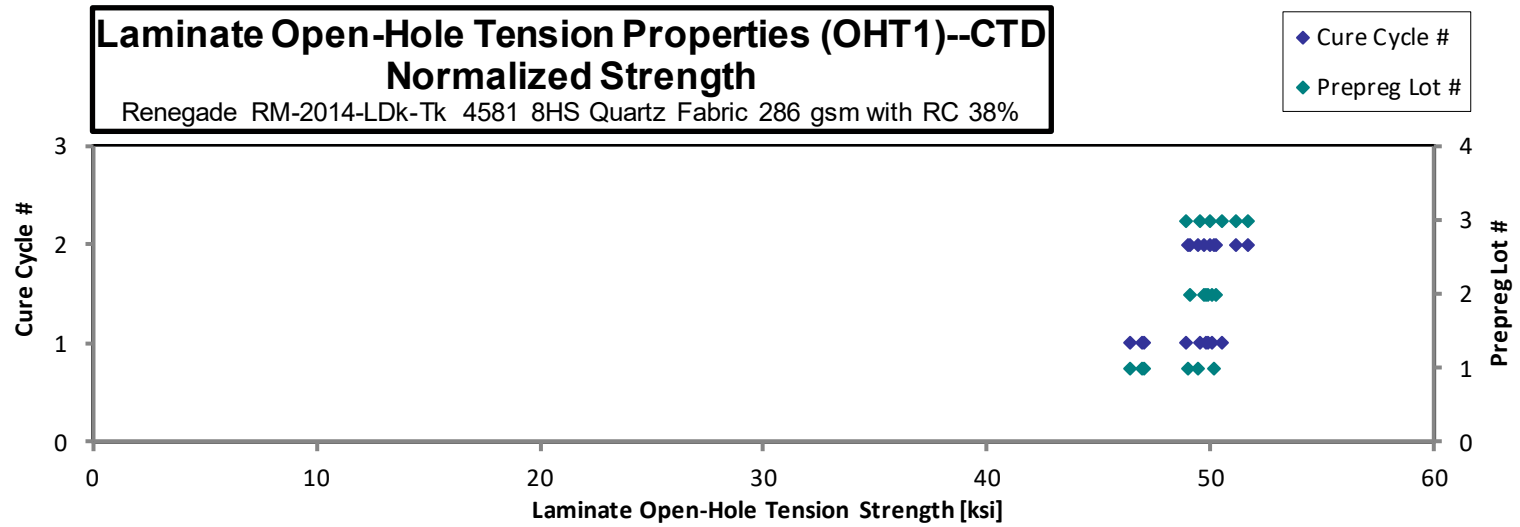
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-CTD-9	A	C1	1	1	47.42	0.1332	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-CTD-12	A	C1	1	1	46.80	0.1346	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-CTD-14	A	C1	1	1	46.49	0.1340	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-CTD-1	A	C2	1	2	49.21	0.1336	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-CTD-2	A	C2	1	2	49.58	0.1338	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-CTD-4	A	C2	1	2	50.12	0.1345	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-CTD-1	B	C1	2	1	49.21	0.1358	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-CTD-6	B	C1	2	1	49.13	0.1369	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-CTD-11	B	C1	2	1	49.40	0.1357	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-CTD-1	B	C2	2	2	49.70	0.1327	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-CTD-6	B	C2	2	2	49.98	0.1351	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-CTD-11	B	C2	2	2	49.52	0.1349	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-CTD-1	C	C1	3	1	49.51	0.1371	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-CTD-6	C	C1	3	1	48.48	0.1354	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-CTD-11	C	C1	3	1	48.69	0.1366	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-CTD-1	C	C2	3	2	51.54	0.1346	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-CTD-6	C	C2	3	2	49.85	0.1345	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-CTD-11	C	C2	3	2	51.01	0.1348	12	M(A,D)GM

Avg. $t_{ply} [in]$	Strength _{norm} [ksi]
0.01110	46.99
0.01122	46.87
0.01117	46.35
0.01113	48.91
0.01115	49.36
0.01121	50.15
0.01132	49.74
0.01141	50.04
0.01130	49.86
0.01106	49.08
0.01125	50.22
0.01124	49.68
0.01143	50.51
0.01128	48.84
0.01138	49.46
0.01122	51.61
0.01121	49.90
0.01123	51.15

Average 49.20
Standard Dev. 1.291
Coeff. of Var. [%] 2.623
Min. 46.49
Max. 51.54
Number of Spec. 18

Average_{norm} 0.01124 49.37
Standard Dev._{norm} 1.406
Coeff. of Var. [%]_{norm} 2.849
Min. 0.01106 46.35
Max. 0.01143 51.61
Number of Spec. 18 18



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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
t_{ply} [in]
0.01120

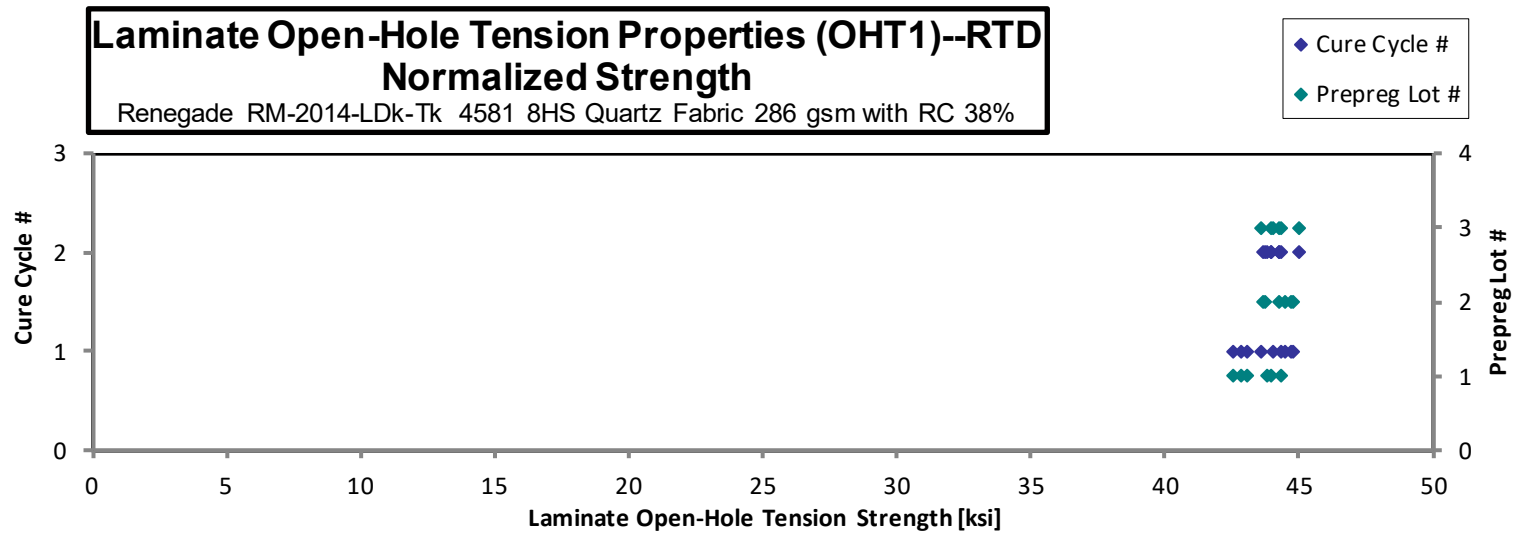
Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-RTD-1	A	C1	1	1	44.60	0.1290	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-RTD-3	A	C1	1	1	44.00	0.1300	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-RTD-5	A	C1	1	1	44.50	0.1300	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-RTD-1*	A	C2	1	2	43.10	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-RTD-3*	A	C2	1	2	43.30	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-RTD-5*	A	C2	1	2	43.50	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-RTD-2	B	C1	2	1	43.90	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-RTD-5	B	C1	2	1	43.30	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-RTD-8	B	C1	2	1	43.50	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-RTD-2	B	C2	2	2	43.90	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-RTD-5	B	C2	2	2	43.50	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-RTD-8	B	C2	2	2	43.70	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-RTD-2	C	C1	3	1	44.10	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-RTD-7	C	C1	3	1	43.70	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-RTD-12	C	C1	3	1	43.50	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-RTD-2	C	C2	3	2	43.80	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-RTD-7	C	C2	3	2	44.10	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-RTD-12	C	C2	3	2	43.40	0.1370	12	XGM

*Replacement Specimen

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01075	42.81
0.01083	42.56
0.01083	43.04
0.01142	43.93
0.01133	43.82
0.01142	44.34
0.01142	44.75
0.01150	44.46
0.01150	44.67
0.01117	43.77
0.01125	43.69
0.01133	44.22
0.01125	44.30
0.01117	43.57
0.01133	44.02
0.01150	44.97
0.01117	43.97
0.01142	44.24

Average 43.74
Standard Dev. 0.4090
Coeff. of Var. [%] 0.9351
Min. 43.10
Max. 44.60
Number of Spec. 18

Average_{norm} 0.01125 43.95
Standard Dev._{norm} 0.6514
Coeff. of Var. [%]_{norm} 1.482
Min. 0.01075 42.56
Max. 0.01150 44.97
Number of Spec. 18 18



**Laminate Open-Hole Tension Properties (OHT1)--ETD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
t_{ply} [in]
0.01120

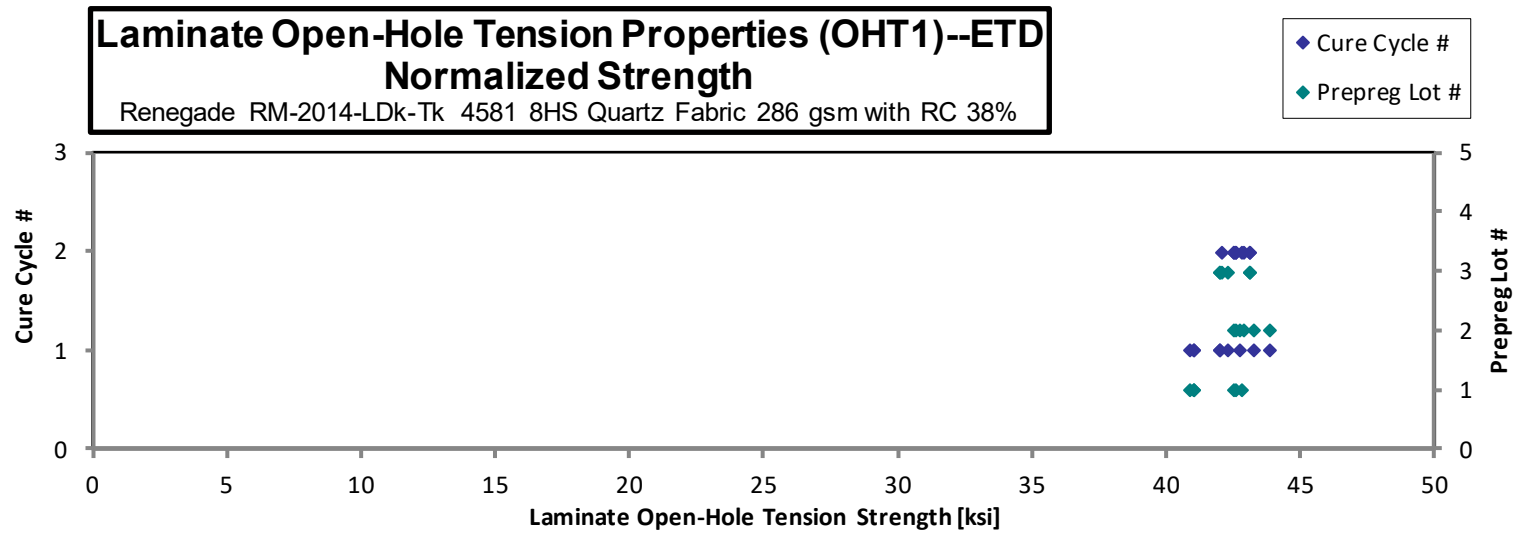
Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-ETD-2	A	C1	1	1	42.60	0.1290	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-ETD-4	A	C1	1	1	42.70	0.1290	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-ETD-6	A	C1	1	1	42.70	0.1290	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-ETD-2*	A	C2	1	2	41.80	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-ETD-4*	A	C2	1	2	42.00	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-ETD-6*	A	C2	1	2	42.30	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-ETD-3	B	C1	2	1	41.90	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-ETD-7	B	C1	2	1	42.70	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-ETD-12	B	C1	2	1	42.40	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-ETD-3	B	C2	2	2	42.40	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-ETD-7	B	C2	2	2	42.40	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-ETD-13	B	C2	2	2	42.00	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-ETD-3	C	C1	3	1	41.50	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-ETD-8	C	C1	3	1	42.10	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-ETD-13	C	C1	3	1	42.10	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-ETD-3	C	C2	3	2	42.60	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-ETD-8	C	C2	3	2	42.20	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-ETD-13	C	C2	3	2	42.60	0.1360	12	XGM

*Replacement Specimens

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01075	40.89
0.01075	40.98
0.01075	40.98
0.01142	42.61
0.01133	42.50
0.01133	42.80
0.01142	42.71
0.01150	43.84
0.01142	43.22
0.01125	42.59
0.01133	42.90
0.01133	42.50
0.01133	41.99
0.01117	41.97
0.01125	42.29
0.01133	43.11
0.01117	42.07
0.01133	43.11

Average 42.28
Standard Dev. 0.3507
Coeff. of Var. [%] 0.8296
Min. 41.50
Max. 42.70
Number of Spec. 18

Average_{norm} 0.01123 42.39
Standard Dev._{norm} 0.8090
Coeff. of Var. [%]_{norm} 1.908
Min. 0.01075 40.89
Max. 0.01150 43.84
Number of Spec. 18 18



**Laminate Open-Hole Tension Properties (OHT1)--ETW
Strength**

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

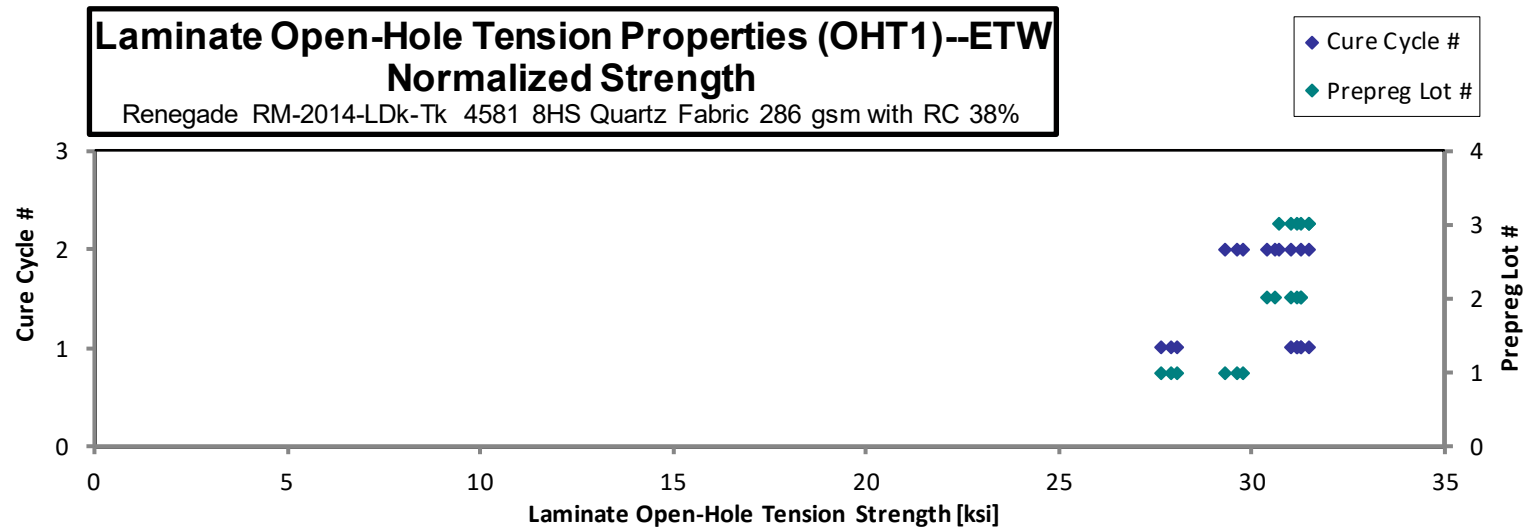
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-ETW-10	A	C1	1	1	28.40	0.1320	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-ETW-11	A	C1	1	1	27.90	0.1330	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-ETW-13	A	C1	1	1	28.10	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-ETW-3	A	C2	1	2	29.60	0.1330	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-ETW-5	A	C2	1	2	29.70	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-ETW-7	A	C2	1	2	29.60	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-ETW-4	B	C1	2	1	30.20	0.1390	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-ETW-14	B	C1	2	1	30.10	0.1390	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1-ETW-19	B	C1	2	1	30.00	0.1400	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-ETW-4	B	C2	2	2	29.80	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-ETW-9	B	C2	2	2	30.20	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1-ETW-14	B	C2	2	2	30.00	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-ETW-4	C	C1	3	1	31.00	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-ETW-9	C	C1	3	1	31.10	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1-ETW-14	C	C1	3	1	31.30	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-ETW-4	C	C2	3	2	31.10	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-ETW-9	C	C2	3	2	31.00	0.1330	12	XGM
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1-ETW-14	C	C2	3	2	31.10	0.1360	12	XGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01100	27.89
0.01108	27.61
0.01117	28.02
0.01108	29.29
0.01117	29.61
0.01125	29.73
0.01158	31.23
0.01158	31.13
0.01167	31.25
0.01142	30.38
0.01150	31.01
0.01142	30.58
0.01125	31.14
0.01117	31.01
0.01125	31.44
0.01125	31.24
0.01108	30.68
0.01133	31.47

Average 30.01
Standard Dev. 1.041
Coeff. of Var. [%] 3.470
Min. 27.90
Max. 31.30
Number of Spec. 18

Average_{norm} 0.01129 30.26
Standard Dev._{norm} 1.283
Coeff. of Var. [%]_{norm} 4.240
Min. 0.01100 27.61
Max. 0.01167 31.47
Number of Spec. 18 18



4.15 “10/80/10” Open-Hole Tension 2 Properties (OHT2)

Laminate Open-Hole Tension Properties (OHT2)--CTD

Strength

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

 t_{ply} [in]

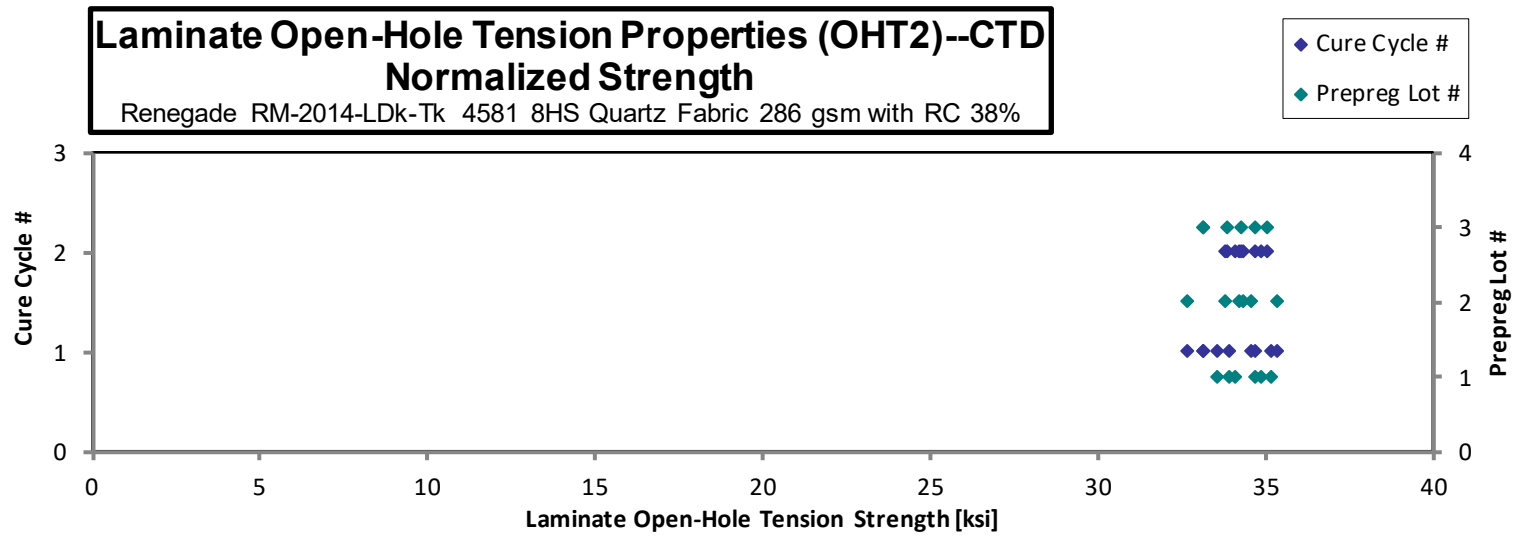
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHT2-A-C1-1-CTD-1	A	C1	1	1	35.51	0.1109	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C1-1-CTD-6	A	C1	1	1	34.35	0.1106	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C1-1-CTD-7	A	C1	1	1	34.02	0.1106	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C2-1-CTD-9	A	C2	1	2	34.32	0.1114	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C2-1-CTD-13	A	C2	1	2	34.81	0.1117	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C2-1-CTD-15	A	C2	1	2	34.92	0.1119	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C1-1-CTD-1	B	C1	2	1	32.68	0.1120	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C1-1-CTD-6	B	C1	2	1	34.88	0.1134	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C1-1-CTD-11	B	C1	2	1	34.54	0.1122	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C2-1-CTD-1	B	C2	2	2	34.40	0.1113	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C2-1-CTD-6	B	C2	2	2	34.56	0.1113	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C2-1-CTD-11	B	C2	2	2	34.00	0.1114	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C1-1-CTD-1	C	C1	3	1	33.54	0.1107	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C1-1-CTD-5	C	C1	3	1	33.88	0.1096	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C1-1-CTD-9	C	C1	3	1	34.69	0.1121	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C2-1-CTD-1	C	C2	3	2	35.13	0.1118	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C2-1-CTD-5	C	C2	3	2	34.33	0.1118	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C2-1-CTD-9	C	C2	3	2	34.48	0.1100	10	DGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.01109	35.17
0.01106	33.93
0.01106	33.58
0.01114	34.12
0.01117	34.71
0.01119	34.89
0.01120	32.69
0.01134	35.32
0.01122	34.60
0.01113	34.19
0.01113	34.35
0.01114	33.80
0.01107	33.15
0.01096	33.14
0.01121	34.72
0.01118	35.07
0.01118	34.26
0.01100	33.87

Average 34.39
 Standard Dev. 0.6354
 Coeff. of Var. [%] 1.847
 Min. 32.68
 Max. 35.51
 Number of Spec. 18

Average_{norm} 0.01114 34.20
 Standard Dev._{norm} 0.7424
 Coeff. of Var. [%]_{norm} 2.171
 Min. 0.01096 32.69
 Max. 0.01134 35.32
 Number of Spec. 18 18



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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

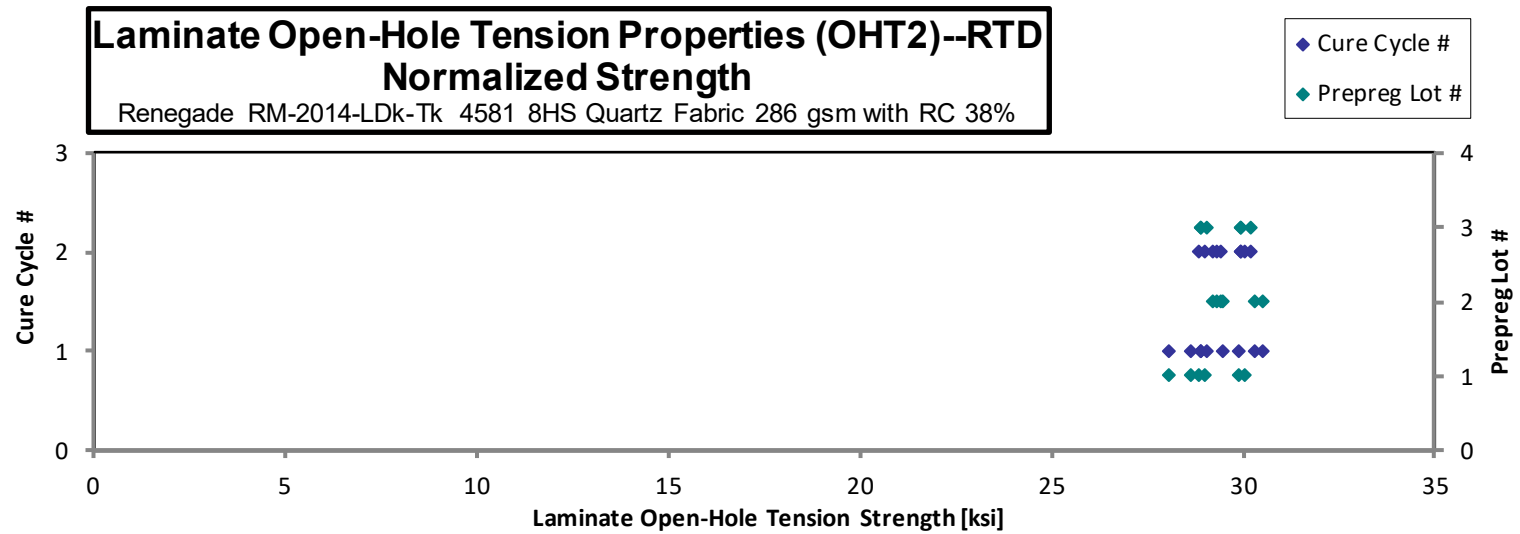
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHT2-A-C1-1-RTD-2	A	C1	1	1	29.90	0.1120	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C1-1-RTD-12	A	C1	1	1	28.90	0.1110	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C1-1-RTD-15	A	C1	1	1	28.60	0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C2-1-RTD-2	A	C2	1	2	29.80	0.1130	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C2-1-RTD-7	A	C2	1	2	29.00	0.1120	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C2-1-RTD-11	A	C2	1	2	29.10	0.1110	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C1-1-RTD-10	B	C1	2	1	29.20	0.1130	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C1-1-RTD-12	B	C1	2	1	29.80	0.1140	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C1-1-RTD-15	B	C1	2	1	30.00	0.1140	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C2-1-RTD-2	B	C2	2	2	29.20	0.1120	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C2-1-RTD-8	B	C2	2	2	29.60	0.1110	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C2-1-RTD-10	B	C2	2	2	29.40	0.1120	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C1-1-RTD-2	C	C1	3	1	29.60	0.1100	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C1-1-RTD-4	C	C1	3	1	29.70	0.1090	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C1-1-RTD-6	C	C1	3	1	29.70	0.1090	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C2-1-RTD-2	C	C2	3	2	30.20	0.1120	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C2-1-RTD-4	C	C2	3	2	30.20	0.1110	10	DGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C2-1-RTD-6	C	C2	3	2	30.20	0.1110	10	DGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01120	29.90
0.01110	28.64
0.01100	28.09
0.01130	30.07
0.01120	29.00
0.01110	28.84
0.01130	29.46
0.01140	30.33
0.01140	30.54
0.01120	29.20
0.01110	29.34
0.01120	29.40
0.01100	29.07
0.01090	28.90
0.01090	28.90
0.01120	30.20
0.01110	29.93
0.01110	29.93

Average 29.56
Standard Dev. 0.4767
Coeff. of Var. [%] 1.613
Min. 28.60
Max. 30.20
Number of Spec. 18

Average_{norm} 0.01115 29.43
Standard Dev._{norm} 0.6621
Coeff. of Var. [%]_{norm} 2.250
Min. 0.01090 28.09
Max. 0.01140 30.54
Number of Spec. 18



**Laminate Open-Hole Tension Properties (OHT2)--ETW
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

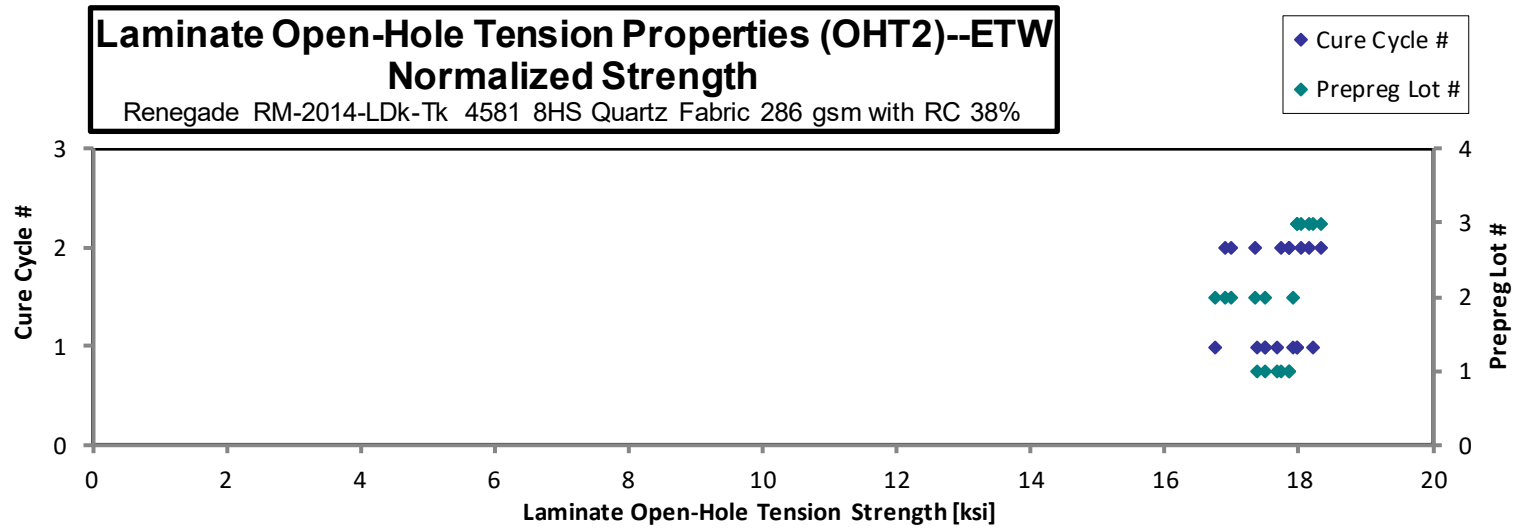
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHT2-A-C1-1-ETW-4	A	C1	1	1	17.70	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C1-1-ETW-5	A	C1	1	1	17.80	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C1-1-ETW-9	A	C1	1	1	18.00	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C2-1-ETW-4	A	C2	1	2	18.00	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C2-1-ETW-5	A	C2	1	2	17.90	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-A-C2-1-ETW-10	A	C2	1	2	18.00	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C1-1-ETW-3	B	C1	2	1	16.30	0.1150	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C1-1-ETW-5	B	C1	2	1	16.90	0.1160	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C1-1-ETW-7	B	C1	2	1	17.30	0.1160	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C2-1-ETW-3	B	C2	2	2	16.60	0.1140	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C2-1-ETW-5	B	C2	2	2	16.90	0.1150	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-B-C2-1-ETW-7	B	C2	2	2	16.70	0.1140	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C1-1-ETW-3	C	C1	3	1	18.30	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C1-1-ETW-7	C	C1	3	1	18.70	0.1090	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C1-1-ETW-8	C	C1	3	1	18.80	0.1070	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C2-1-ETW-3	C	C2	3	2	18.50	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C2-1-ETW-7	C	C2	3	2	18.30	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-OHT2-C-C2-1-ETW-8	C	C2	3	2	18.20	0.1110	10	AGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01100	17.38
0.01100	17.48
0.01100	17.68
0.01110	17.84
0.01110	17.74
0.01110	17.84
0.01150	16.74
0.01160	17.50
0.01160	17.92
0.01140	16.90
0.01150	17.35
0.01140	17.00
0.01100	17.97
0.01090	18.20
0.01070	17.96
0.01110	18.33
0.01110	18.14
0.01110	18.04

Average 17.72
Standard Dev. 0.7571
Coeff. of Var. [%] 4.274
Min. 16.30
Max. 18.80
Number of Spec. 18

Average_{norm} 0.01118 17.67
Standard Dev._{norm} 0.4564
Coeff. of Var. [%]_{norm} 2.583
Min. 0.01070 16.74
Max. 0.01160 18.33
Number of Spec. 18 18



4.16 “40/20/40” Open-Hole Tension 3 Properties (OHT3)

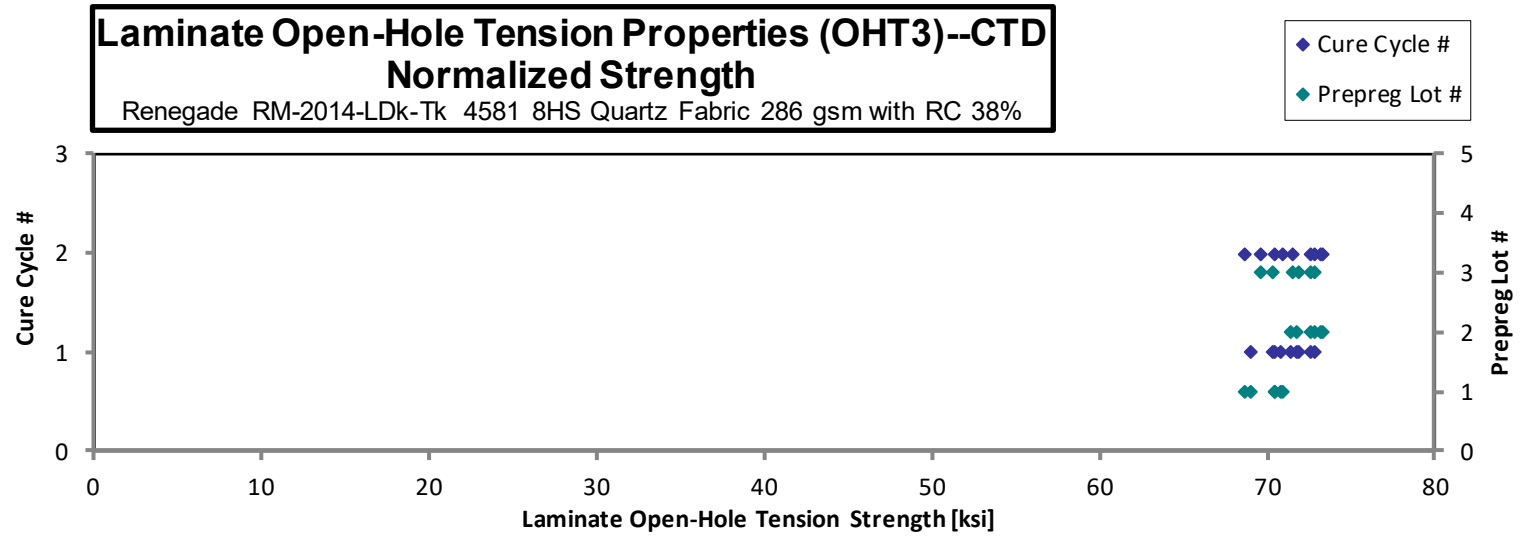
**Laminate Open-Hole Tension Properties (OHT3)--CTD
Strength**
Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t _{ply} [in]	Strength _{norm} [ksi]
NTP2014Q1-RMC-R14-RS-OHT3-A-C1-1-CTD-2	A	C1	1	1	70.22	0.1129	10	M(A,L,D) GM	0.01129	70.81
NTP2014Q1-RMC-R14-RS-OHT3-A-C1-1-CTD-7	A	C1	1	1	70.29	0.1123	10	M(A,L,D) GM	0.01123	70.49
NTP2014Q1-RMC-R14-RS-OHT3-A-C1-1-CTD-8	A	C1	1	1	69.04	0.1120	10	M(A,L,D) GM	0.01120	69.05
NTP2014Q1-RMC-R14-RS-OHT3-A-C2-1-CTD-1	A	C2	1	2	70.56	0.1119	10	M(A,L,D) GM	0.01119	70.47
NTP2014Q1-RMC-R14-RS-OHT3-A-C2-1-CTD-6	A	C2	1	2	68.89	0.1117	10	M(A,L,D) GM	0.01117	68.73
NTP2014Q1-RMC-R14-RS-OHT3-A-C2-1-CTD-7	A	C2	1	2	71.14	0.1118	10	M(A,L,D) GM	0.01118	70.98
NTP2014Q1-RMC-R14-RS-OHT3-B-C1-1-CTD-1	B	C1	2	1	71.30	0.1128	10	M(D,A,L) GM	0.01128	71.78
NTP2014Q1-RMC-R14-RS-OHT3-B-C1-1-CTD-6	B	C1	2	1	72.30	0.1125	10	M(D,A,L) GM	0.01125	72.64
NTP2014Q1-RMC-R14-RS-OHT3-B-C1-1-CTD-11	B	C1	2	1	71.01	0.1126	10	M(D,A,L) GM	0.01126	71.39
NTP2014Q1-RMC-R14-RS-OHT3-B-C2-1-CTD-1	B	C2	2	2	72.77	0.1126	10	M(D,L) GM	0.01126	73.17
NTP2014Q1-RMC-R14-RS-OHT3-B-C2-1-CTD-5	B	C2	2	2	72.54	0.1124	10	M(D,L) GM	0.01124	72.80
NTP2014Q1-RMC-R14-RS-OHT3-B-C2-1-CTD-7	B	C2	2	2	72.95	0.1126	10	M(D,L) GM	0.01126	73.35
NTP2014Q1-RMC-R14-RS-OHT3-C-C1-1-CTD-1	C	C1	3	1	73.95	0.1103	10	M(D,L) GM	0.01103	72.80
NTP2014Q1-RMC-R14-RS-OHT3-C-C1-1-CTD-5	C	C1	3	1	71.18	0.1107	10	M(D,L) GM	0.01107	70.33
NTP2014Q1-RMC-R14-RS-OHT3-C-C1-1-CTD-9	C	C1	3	1	73.12	0.1101	10	M(D,L) GM	0.01101	71.88
NTP2014Q1-RMC-R14-RS-OHT3-C-C2-1-CTD-1	C	C2	3	2	73.42	0.1109	10	M(D,L) GM	0.01109	72.68
NTP2014Q1-RMC-R14-RS-OHT3-C-C2-1-CTD-5	C	C2	3	2	72.15	0.1111	10	M(D,L) GM	0.01111	71.57
NTP2014Q1-RMC-R14-RS-OHT3-C-C2-1-CTD-10	C	C2	3	2	70.49	0.1107	10	M(D,L) GM	0.01107	69.67

Average 71.52
Standard Dev. 1.466
Coeff. of Var. [%] 2.050
Min. 68.89
Max. 73.95
Number of Spec. 18

Average_{norm} 0.01118
Standard Dev_{norm} 1.403
Coeff. of Var. [%]_{norm} 1.966
Min. 0.01101
Max. 0.01129
Number of Spec. 18



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

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

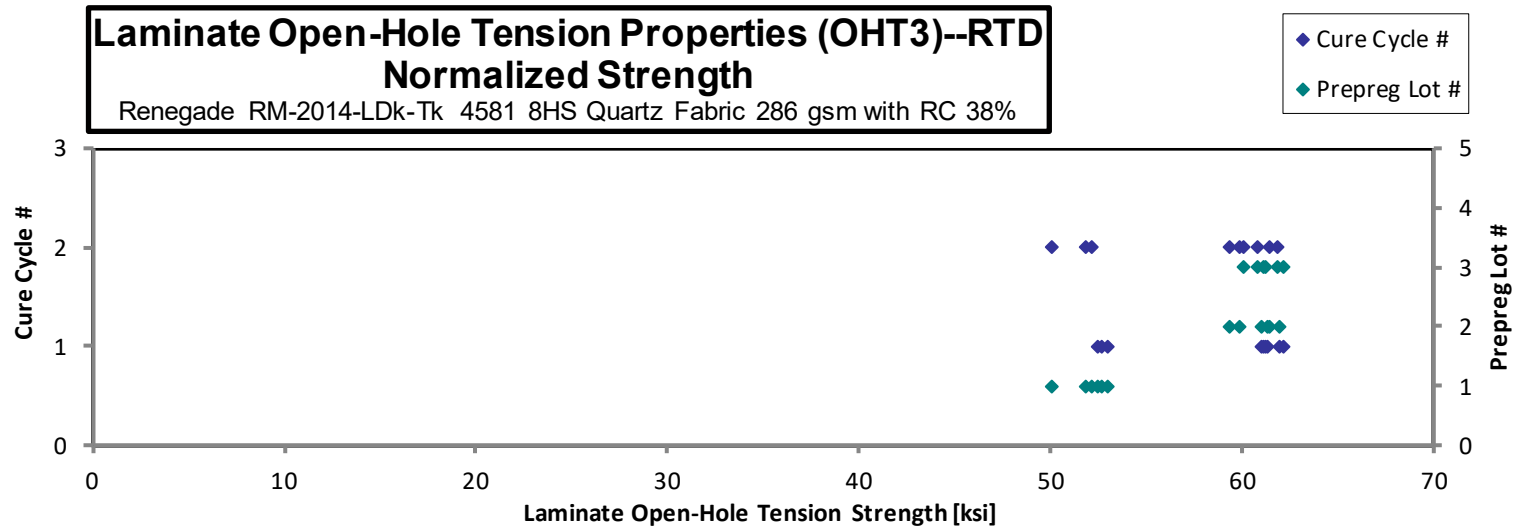
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHT3-A-C1-1-RTD-1	A	C1	1	1	51.50	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-A-C1-1-RTD-3	A	C1	1	1	52.00	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-A-C1-1-RTD-6	A	C1	1	1	51.70	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-A-C2-1-RTD-2	A	C2	1	2	51.40	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-A-C2-1-RTD-3	A	C2	1	2	51.70	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-A-C2-1-RTD-8	A	C2	1	2	49.60	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C1-1-RTD-2	B	C1	2	1	61.90	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C1-1-RTD-8	B	C1	2	1	61.00	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C1-1-RTD-10	B	C1	2	1	60.80	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C2-1-RTD-11	B	C2	2	2	58.80	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C2-1-RTD-13	B	C2	2	2	59.30	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C2-1-RTD-14	B	C2	2	2	61.40	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C1-1-RTD-2	C	C1	3	1	62.20	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C1-1-RTD-4	C	C1	3	1	62.30	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C1-1-RTD-6	C	C1	3	1	63.30	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C2-1-RTD-2	C	C2	3	2	63.00	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C2-1-RTD-4	C	C2	3	2	61.90	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C2-1-RTD-6	C	C2	3	2	61.20	0.1100	10	XGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01140	52.42
0.01140	52.93
0.01140	52.62
0.01130	51.86
0.01130	52.16
0.01130	50.04
0.01120	61.90
0.01120	61.00
0.01130	61.34
0.01130	59.33
0.01130	59.83
0.01120	61.40
0.01100	61.09
0.01100	61.19
0.01100	62.17
0.01100	61.88
0.01100	60.79
0.01100	60.11

Average 58.06
Standard Dev. 5.043
Coeff. of Var. [%] 8.686
Min. 49.60
Max. 63.30
Number of Spec. 18

Average_{norm} 0.01120 58.00
Standard Dev._{norm} 4.454
Coeff. of Var. [%]_{norm} 7.679
Min. 0.01100 50.04
Max. 0.01140 62.17
Number of Spec. 18 18



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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

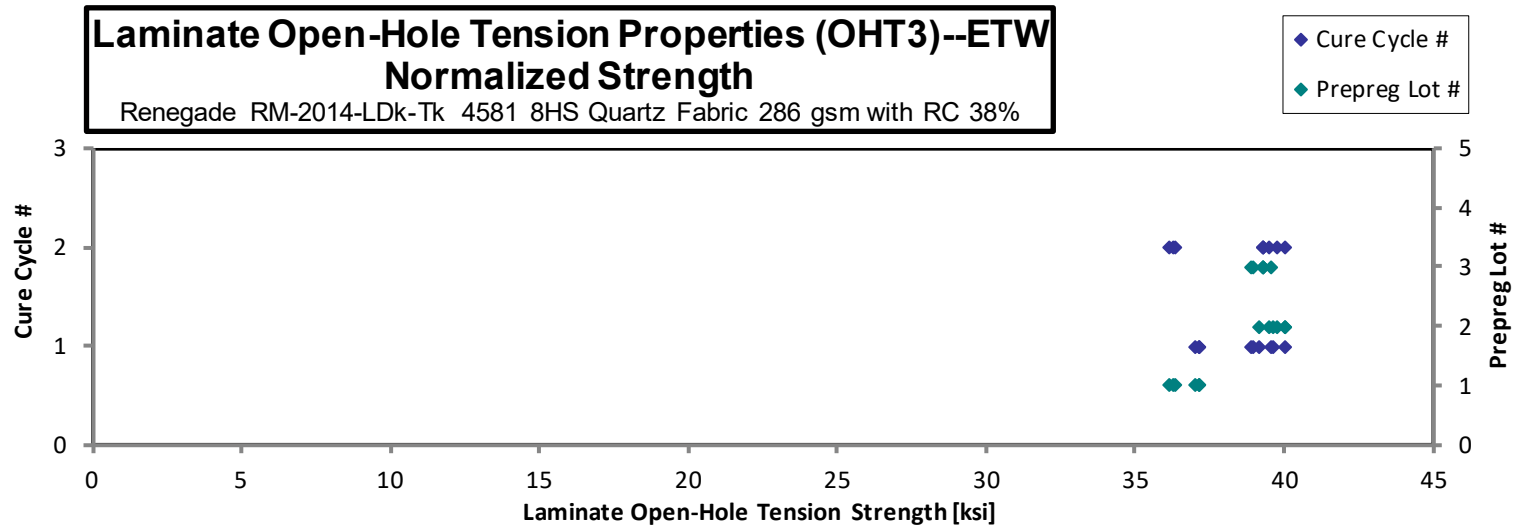
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHT3-A-C1-1-ETW-4	A	C1	1	1	36.80	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-A-C1-1-ETW-9	A	C1	1	1	37.00	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-A-C1-1-ETW-14	A	C1	1	1	37.50	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-A-C2-1-ETW-4	A	C2	1	2	36.50	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-A-C2-1-ETW-5	A	C2	1	2	36.60	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-A-C2-1-ETW-9	A	C2	1	2	36.70	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C1-1-ETW-3	B	C1	2	1	39.60	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C1-1-ETW-5	B	C1	2	1	39.70	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C1-1-ETW-7	B	C1	2	1	39.50	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C2-1-ETW-2	B	C2	2	2	39.30	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C2-1-ETW-3	B	C2	2	2	38.80	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-B-C2-1-ETW-4	B	C2	2	2	39.40	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C1-1-ETW-3	C	C1	3	1	40.00	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C1-1-ETW-7	C	C1	3	1	39.90	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C1-1-ETW-8	C	C1	3	1	39.60	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C2-1-ETW-3	C	C2	3	2	40.00	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C2-1-ETW-7	C	C2	3	2	40.00	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-OHT3-C-C2-1-ETW-8	C	C2	3	2	40.00	0.1100	10	XGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01130	37.13
0.01120	37.00
0.01110	37.17
0.01110	36.17
0.01110	36.27
0.01110	36.37
0.01120	39.60
0.01130	40.05
0.01110	39.15
0.01140	40.00
0.01140	39.49
0.01130	39.75
0.01090	38.93
0.01110	39.54
0.01100	38.89
0.01100	39.29
0.01100	39.29
0.01100	39.29

Average 38.72
Standard Dev. 1.404
Coeff. of Var. [%] 3.626
Min. 36.50
Max. 40.00
Number of Spec. 18

Average_{norm} 0.01114 38.52
Standard Dev_{norm} 1.392
Coeff. of Var. [%]_{norm} 3.613
Min. 0.01090 36.17
Max. 0.01140 40.05
Number of Spec. 18 18



4.17 “25/50/25” Filled-Hole Tension 1 Properties (FHT1)

Laminate Filled-Hole Tension Properties (FHT1)--CTD

Strength

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

 t_{ply} [in]

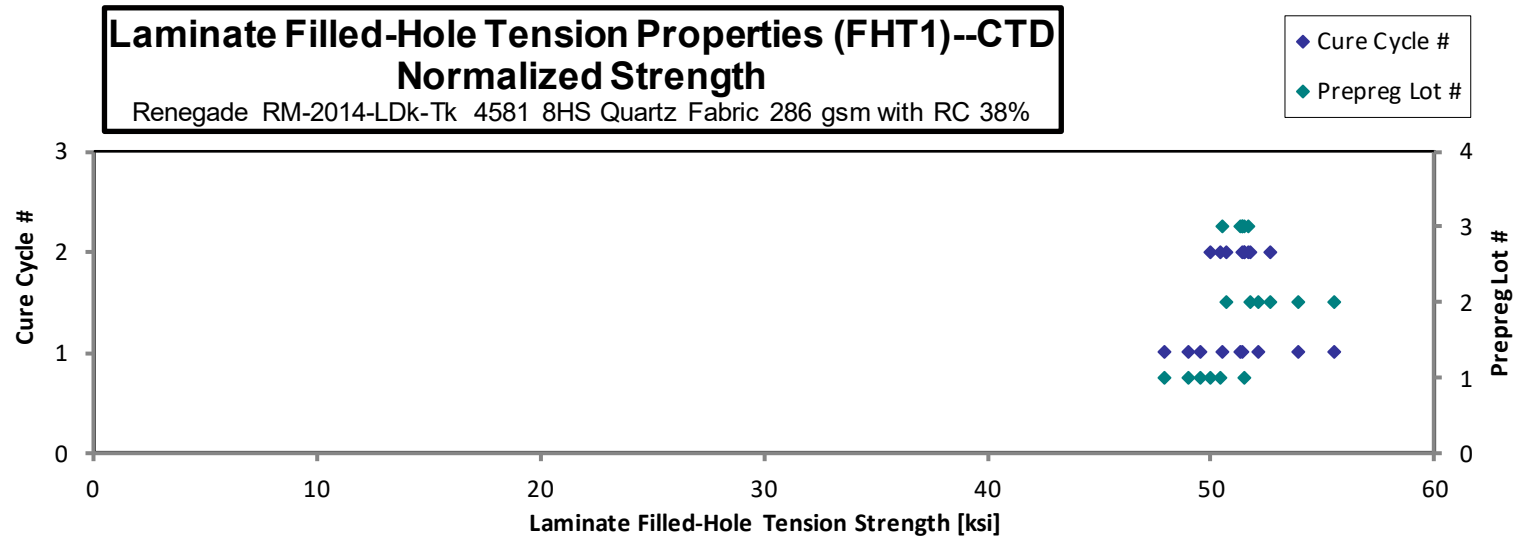
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FHT1-A-C1-1-CTD-1	A	C1	1	1	49.02	0.1360	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-A-C1-1-CTD-2	A	C1	1	1	47.32	0.1361	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-A-C1-1-CTD-3	A	C1	1	1	48.48	0.1359	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-A-C2-1-CTD-8	A	C2	1	2	49.10	0.1368	12	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-A-C2-1-CTD-12	A	C2	1	2	49.74	0.1363	12	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-A-C2-1-CTD-15	A	C2	1	2	50.70	0.1366	12	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-B-C1-1-CTD-2	B	C1	2	1	54.73	0.1364	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-B-C1-1-CTD-4	B	C1	2	1	51.33	0.1365	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-B-C1-1-CTD-8	B	C1	2	1	53.64	0.1351	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-B-C2-1-CTD-4	B	C2	2	2	51.95	0.1364	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-B-C2-1-CTD-6	B	C2	2	2	51.18	0.1361	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-B-C2-1-CTD-8	B	C2	2	2	50.34	0.1354	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-C-C1-1-CTD-1	C	C1	3	1	49.95	0.1360	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-C-C1-1-CTD-5	C	C1	3	1	51.12	0.1351	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-C-C1-1-CTD-9	C	C1	3	1	50.56	0.1367	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-C-C2-1-CTD-1	C	C2	3	2	50.82	0.1361	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-C-C2-1-CTD-5	C	C2	3	2	51.03	0.1357	12	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT1-C-C2-1-CTD-9	C	C2	3	2	51.52	0.1350	12	M(A,D)GM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.01133	49.59
0.01134	47.92
0.01132	49.00
0.01140	49.98
0.01136	50.45
0.01138	51.51
0.01137	55.55
0.01137	52.13
0.01126	53.93
0.01136	52.70
0.01134	51.83
0.01129	50.73
0.01133	50.53
0.01126	51.38
0.01139	51.43
0.01134	51.47
0.01131	51.51
0.01125	51.74

Average 50.70
 Standard Dev. 1.739
 Coeff. of Var. [%] 3.431
 Min. 47.32
 Max. 54.73
 Number of Spec. 18

Average_{norm} 0.01133 51.30
 Standard Dev_{norm} 1.736
 Coeff. of Var. [%]_{norm} 3.384
 Min. 0.01125 47.92
 Max. 0.01140 55.55
 Number of Spec. 18 18



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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

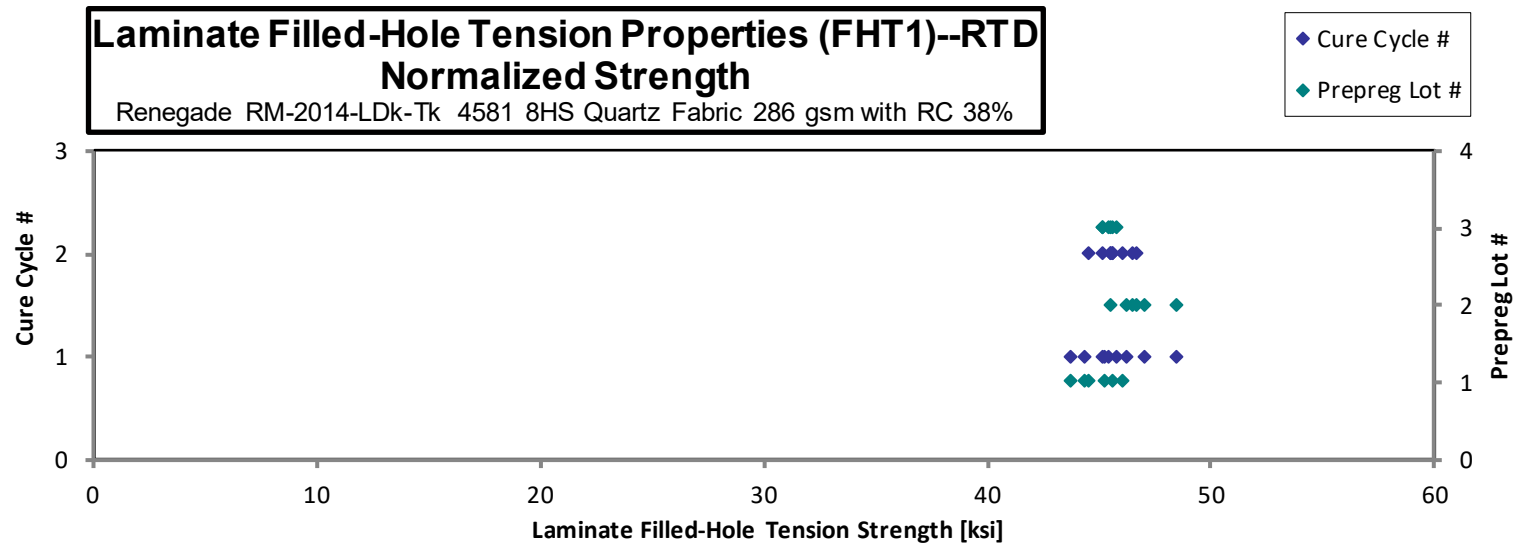
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FHT1-A-C1-1-RTD-6	A	C1	1	1	43.20	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-A-C1-1-RTD-10	A	C1	1	1	43.90	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-A-C1-1-RTD-14	A	C1	1	1	44.70	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-A-C2-1-RTD-2	A	C2	1	2	45.40	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-A-C2-1-RTD-7	A	C2	1	2	44.40	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-A-C2-1-RTD-14	A	C2	1	2	45.50	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C1-1-RTD-6	B	C1	2	1	46.50	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C1-1-RTD-11	B	C1	2	1	47.90	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C1-1-RTD-14	B	C1	2	1	45.40	0.1370	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C2-1-RTD-2	B	C2	2	2	46.50	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C2-1-RTD-9	B	C2	2	2	45.70	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C2-1-RTD-10	B	C2	2	2	46.30	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C1-1-RTD-2	C	C1	3	1	44.90	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C1-1-RTD-4	C	C1	3	1	45.60	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C1-1-RTD-6	C	C1	3	1	45.70	0.1330	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C2-1-RTD-2	C	C2	3	2	45.00	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C2-1-RTD-4	C	C2	3	2	45.10	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C2-1-RTD-6	C	C2	3	2	45.00	0.1350	12	XGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01133	43.71
0.01133	44.42
0.01133	45.23
0.01125	45.60
0.01125	44.60
0.01133	46.04
0.01133	47.05
0.01133	48.47
0.01142	46.28
0.01125	46.71
0.01117	45.56
0.01125	46.51
0.01133	45.43
0.01125	45.80
0.01108	45.22
0.01133	45.54
0.01133	45.64
0.01125	45.20

Average 45.37
Standard Dev. 1.055
Coeff. of Var. [%] 2.326
Min. 43.20
Max. 47.90
Number of Spec. 18

Average_{norm} 0.01129 45.72
Standard Dev_{norm} 1.064
Coeff. of Var. [%]_{norm} 2.326
Min. 0.01108 43.71
Max. 0.01142 48.47
Number of Spec. 18 18



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

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

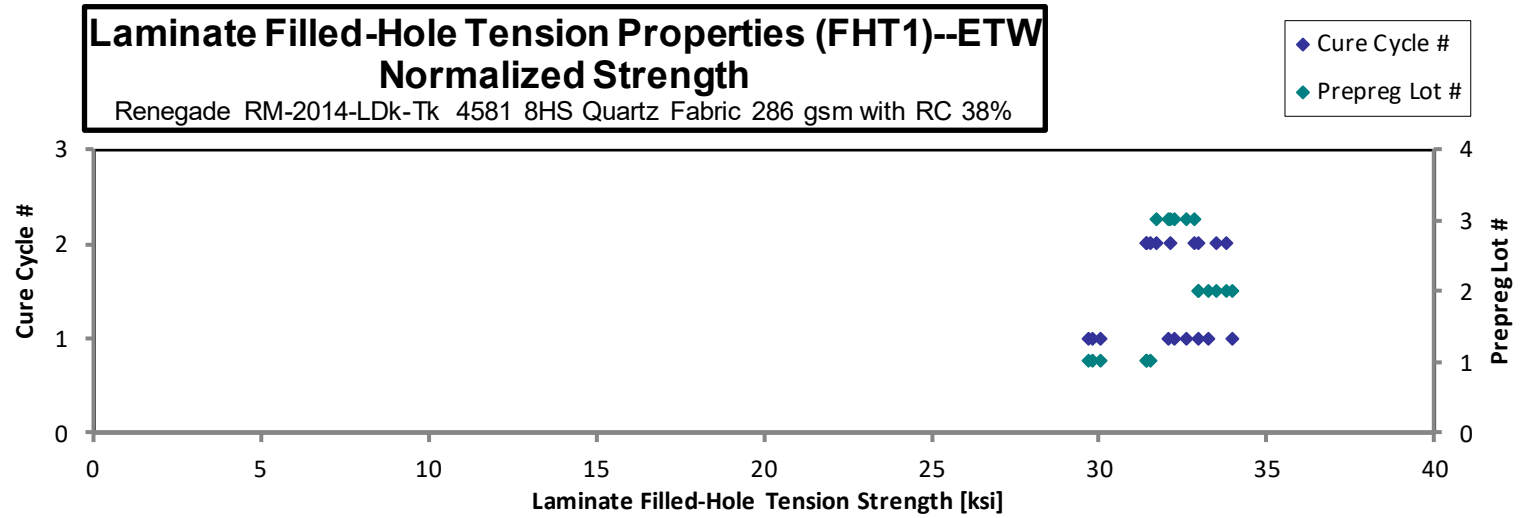
normalizing
 t_{ply} [in]
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FHT1-A-C1-1-ETW-4	A	C1	1	1	29.70	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-A-C1-1-ETW-7	A	C1	1	1	29.60	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-A-C1-1-ETW-9	A	C1	1	1	29.70	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-A-C2-1-ETW-1	A	C2	1	2	31.40	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-A-C2-1-ETW-6	A	C2	1	2	31.30	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-A-C2-1-ETW-11	A	C2	1	2	31.30	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C1-1-ETW-3	B	C1	2	1	32.10	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C1-1-ETW-5	B	C1	2	1	32.40	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C1-1-ETW-7	B	C1	2	1	33.10	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C2-1-ETW-3	B	C2	2	2	32.40	0.1390	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C2-1-ETW-5	B	C2	2	2	32.70	0.1390	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-B-C2-1-ETW-7	B	C2	2	2	32.10	0.1380	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C1-1-ETW-3	C	C1	3	1	32.10	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C1-1-ETW-8	C	C1	3	1	32.20	0.1340	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C1-1-ETW-11	C	C1	3	1	32.50	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C2-1-ETW-3	C	C2	3	2	32.50	0.1360	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C2-1-ETW-7	C	C2	3	2	31.60	0.1350	12	XGM
NTP2014Q1-RMC-R14-RS-FHT1-C-C2-1-ETW-8	C	C2	3	2	32.50	0.1330	12	XGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.01125	29.83
0.01125	29.73
0.01133	30.05
0.01125	31.54
0.01125	31.44
0.01125	31.44
0.01150	32.96
0.01150	33.27
0.01150	33.99
0.01158	33.51
0.01158	33.82
0.01150	32.96
0.01125	32.24
0.01117	32.10
0.01125	32.65
0.01133	32.89
0.01125	31.74
0.01108	32.16

Average 31.73
 Standard Dev. 1.068
 Coeff. of Var. [%] 3.366
 Min. 29.60
 Max. 33.10
 Number of Spec. 18

Average_{norm} 0.01134 32.13
 Standard Dev._{norm} 1.295
 Coeff. of Var. [%]_{norm} 4.031
 Min. 0.01108 29.73
 Max. 0.01158 33.99
 Number of Spec. 18 18



4.18 “10/80/10” Filled-Hole Tension 2 Properties (FHT2)

**Laminate Filled-Hole Tension Properties (FHT2)--CTD
Strength**
Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
t_{ply} [in]

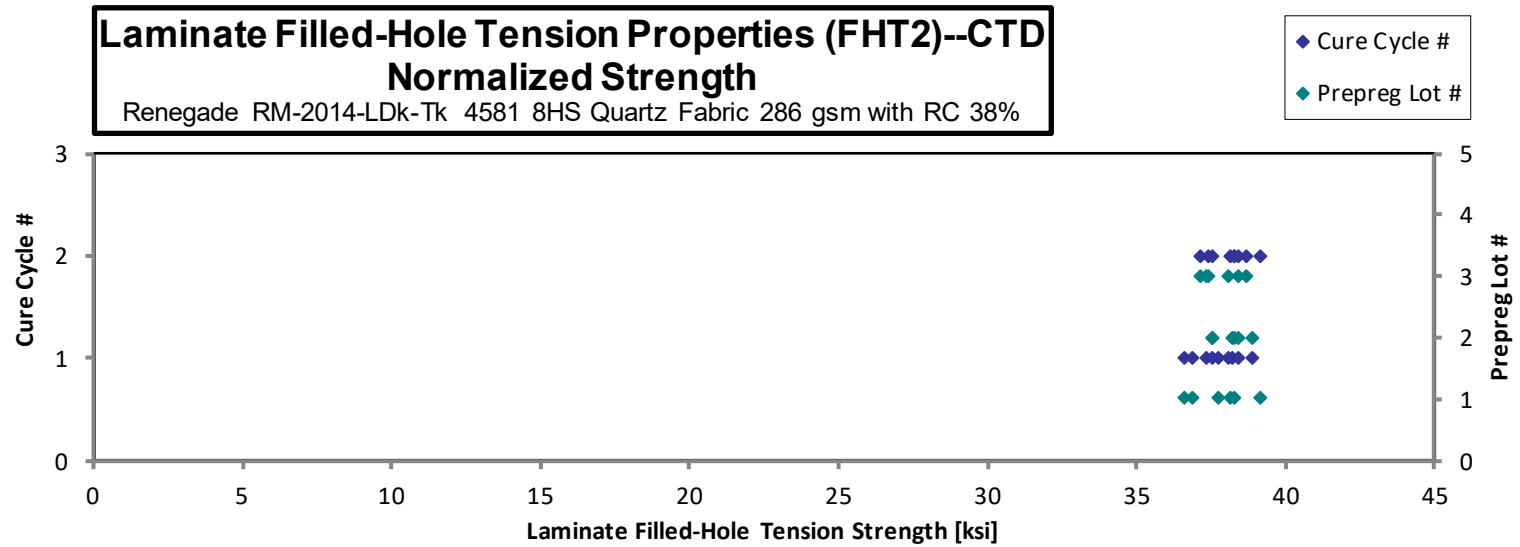
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FHT2-A-C1-1-CTD-1	A	C1	1	1	37.52	0.1103	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-A-C1-1-CTD-2	A	C1	1	1	37.08	0.1106	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-A-C1-1-CTD-9	A	C1	1	1	38.29	0.1106	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-A-C2-1-CTD-2	A	C2	1	2	39.62	0.1108	10	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-A-C2-1-CTD-6	A	C2	1	2	38.53	0.1109	10	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-A-C2-1-CTD-9	A	C2	1	2	38.63	0.1111	10	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-B-C1-1-CTD-1	B	C1	2	1	39.20	0.1112	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-B-C1-1-CTD-6	B	C1	2	1	38.41	0.1116	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-B-C1-1-CTD-11	B	C1	2	1	37.32	0.1128	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-B-C2-1-CTD-1	B	C2	2	2	38.20	0.1127	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-B-C2-1-CTD-6	B	C2	2	2	37.66	0.1117	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-B-C2-1-CTD-11	B	C2	2	2	37.84	0.1135	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-C-C1-1-CTD-1	C	C1	3	1	39.60	0.1087	10	M(A,D,L)GM
NTP2014Q1-RMC-R14-RS-FHT2-C-C1-1-CTD-5	C	C1	3	1	38.75	0.1102	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-C-C1-1-CTD-9	C	C1	3	1	38.21	0.1096	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-C-C2-1-CTD-1	C	C2	3	2	39.56	0.1096	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-C-C2-1-CTD-5	C	C2	3	2	37.68	0.1105	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT2-C-C2-1-CTD-9	C	C2	3	2	38.10	0.1101	10	M(A,D)GM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01103	36.94
0.01106	36.61
0.01106	37.80
0.01108	39.19
0.01109	38.15
0.01111	38.32
0.01112	38.91
0.01116	38.27
0.01128	37.57
0.01127	38.43
0.01117	37.55
0.01135	38.35
0.01087	38.42
0.01102	38.14
0.01096	37.40
0.01096	38.72
0.01105	37.19
0.01101	37.45

Average 38.34
Standard Dev. 0.7784
Coeff. of Var. [%] 2.030
Min. 37.08
Max. 39.62
Number of Spec. 18

Average_{norm} 0.01109 37.97
Standard Dev_{norm} 0.6973
Coeff. of Var. [%]_{norm} 1.837
Min. 0.01087 36.61
Max. 0.01135 39.19
Number of Spec. 18 18



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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

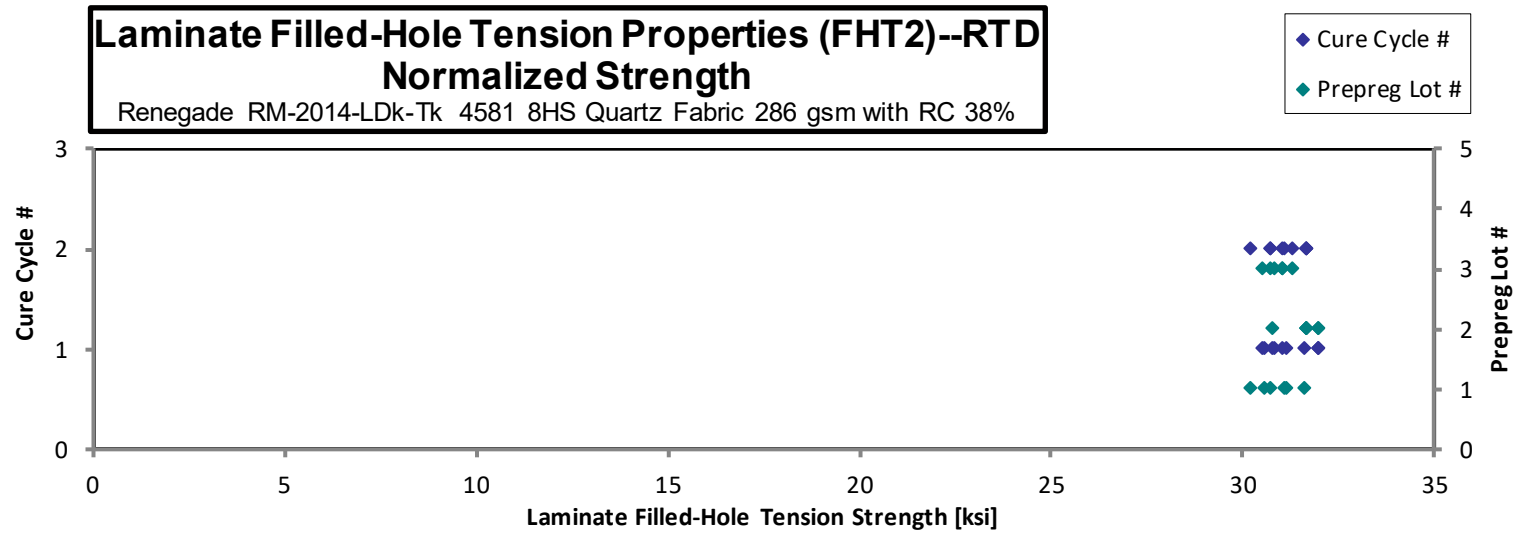
normalizing
t_{ply} [in]
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FHT2-A-C1-1-RTD-3	A	C1	1	1	32.20	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-A-C1-1-RTD-7	A	C1	1	1	31.70	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-A-C1-1-RTD-8	A	C1	1	1	31.40	0.1090	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-A-C2-1-RTD-1	A	C2	1	2	31.00	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-A-C2-1-RTD-3	A	C2	1	2	31.40	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-A-C2-1-RTD-10	A	C2	1	2	30.50	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C1-1-RTD-2	B	C1	2	1	31.70	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C1-1-RTD-4	B	C1	2	1	32.00	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C1-1-RTD-8	B	C1	2	1	30.80	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C2-1-RTD-4	B	C2	2	2	31.40	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C2-1-RTD-8	B	C2	2	2	31.70	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C2-1-RTD-9	B	C2	2	2	31.10	0.1140	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C1-1-RTD-4	C	C1	3	1	31.60	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C1-1-RTD-6	C	C1	3	1	31.40	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C1-1-RTD-10	C	C1	3	1	31.10	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C2-1-RTD-2	C	C2	3	2	31.60	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C2-1-RTD-4	C	C2	3	2	31.60	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C2-1-RTD-6	C	C2	3	2	31.00	0.1110	10	XGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01100	31.63
0.01100	31.13
0.01090	30.56
0.01110	30.72
0.01110	31.12
0.01110	30.23
0.01130	31.98
0.01120	32.00
0.01120	30.80
0.01130	31.68
0.01120	31.70
0.01140	31.66
0.01100	31.04
0.01100	30.84
0.01100	30.54
0.01100	31.04
0.01110	31.32
0.01110	30.72

Average 31.40
Standard Dev. 0.4243
Coeff. of Var. [%] 1.351
Min. 30.50
Max. 32.20
Number of Spec. 18

Average_{norm} 0.01111 31.15
Standard Dev._{norm} 0.5251
Coeff. of Var. [%]_{norm} 1.686
Min. 0.01090 30.23
Max. 0.01140 32.00
Number of Spec. 18 18



**Laminate Filled-Hole Tension Properties (FHT2)--ETW
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

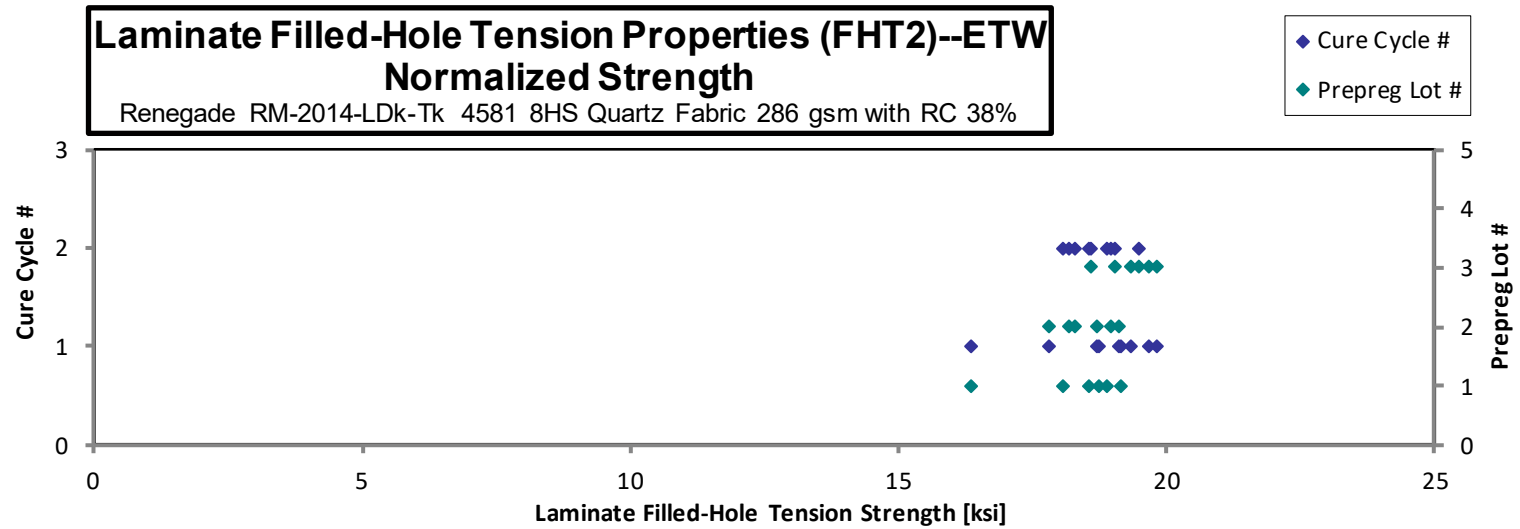
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FHT2-A-C1-1-ETW-4	A	C1	1	1	19.10	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-A-C1-1-ETW-5	A	C1	1	1	19.50	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-A-C1-1-ETW-12	A	C1	1	1	16.80	0.1090	10	MGM
NTP2014Q1-RMC-R14-RS-FHT2-A-C2-1-ETW-4	A	C2	1	2	19.40	0.1090	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-A-C2-1-ETW-5	A	C2	1	2	18.40	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-A-C2-1-ETW-7	A	C2	1	2	18.90	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C1-1-ETW-3	B	C1	2	1	18.70	0.1120	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C1-1-ETW-5	B	C1	2	1	19.10	0.1120	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C1-1-ETW-7	B	C1	2	1	17.80	0.1120	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C2-1-ETW-3	B	C2	2	2	18.80	0.1130	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C2-1-ETW-5	B	C2	2	2	18.30	0.1120	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-B-C2-1-ETW-7	B	C2	2	2	18.20	0.1120	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C1-1-ETW-3	C	C1	3	1	20.20	0.1090	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C1-1-ETW-7	C	C1	3	1	20.00	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C1-1-ETW-8	C	C1	3	1	19.70	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C2-1-ETW-3	C	C2	3	2	18.60	0.1120	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C2-1-ETW-7	C	C2	3	2	19.50	0.1120	10	AGM
NTP2014Q1-RMC-R14-RS-FHT2-C-C2-1-ETW-8	C	C2	3	2	19.20	0.1110	10	AGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01100	18.76
0.01100	19.15
0.01090	16.35
0.01090	18.88
0.01100	18.07
0.01100	18.56
0.01120	18.70
0.01120	19.10
0.01120	17.80
0.01130	18.97
0.01120	18.30
0.01120	18.20
0.01090	19.66
0.01110	19.82
0.01100	19.35
0.01120	18.60
0.01120	19.50
0.01110	19.03

Average 18.90
Standard Dev. 0.8239
Coeff. of Var. [%] 4.359
Min. 16.80
Max. 20.20
Number of Spec. 18

Average_{norm} 0.01109 18.71
Standard Dev_{norm} 0.8037
Coeff. of Var. [%]_{norm} 4.295
Min. 0.01090 16.35
Max. 0.01130 19.82
Number of Spec. 18



4.19 “40/20/40” Filled-Hole Tension 3 Properties (FHT3)

**Laminate Filled-Hole Tension Properties (FHT3)--CTD
Strength**
Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

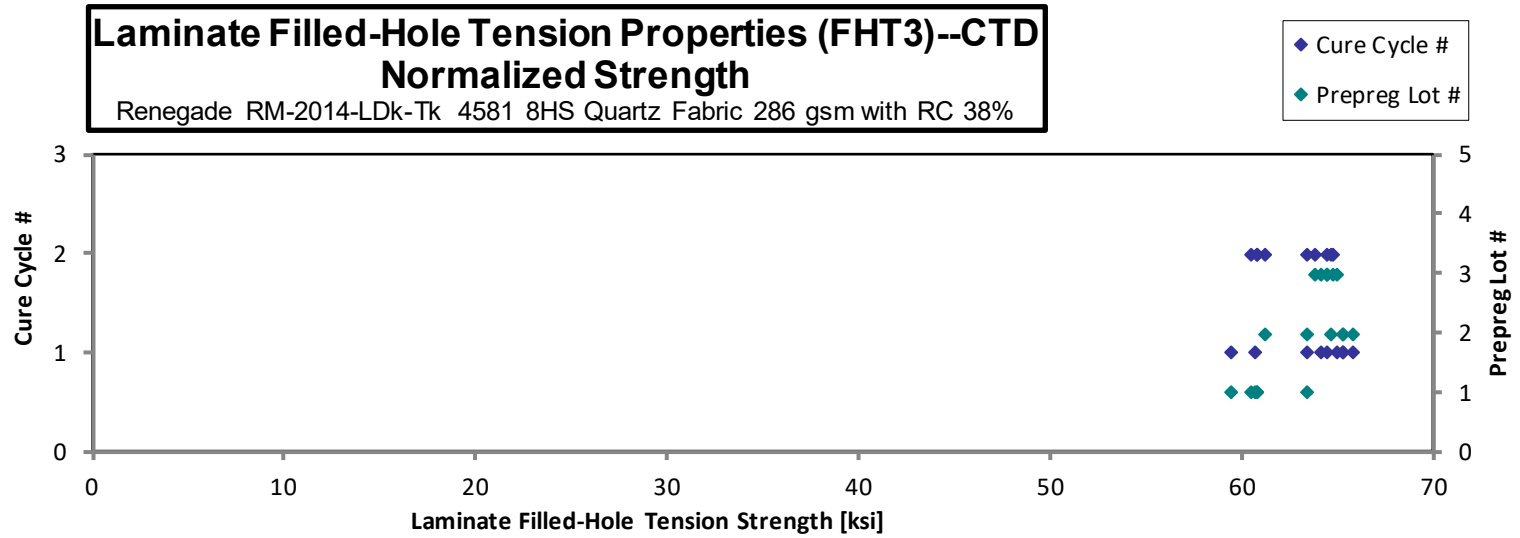
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FHT3-A-C1-1-CTD-6	A	C1	1	1	60.53	0.1123	10	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-A-C1-1-CTD-7	A	C1	1	1	59.16	0.1126	10	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-A-C1-1-CTD-12	A	C1	1	1	63.57	0.1117	10	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-A-C2-1-CTD-2	A	C2	1	2	60.66	0.1117	10	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-A-C2-1-CTD-11	A	C2	1	2	60.66	0.1123	10	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-A-C2-1-CTD-12	A	C2	1	2	60.75	0.1122	10	M(A,L,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-B-C1-1-CTD-1	B	C1	2	1	65.61	0.1124	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-B-C1-1-CTD-9	B	C1	2	1	64.53	0.1133	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-B-C1-1-CTD-11	B	C1	2	1	64.41	0.1135	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-B-C2-1-CTD-1	B	C2	2	2	64.30	0.1126	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-B-C2-1-CTD-6	B	C2	2	2	61.01	0.1124	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-B-C2-1-CTD-11	B	C2	2	2	63.04	0.1127	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-C-C1-1-CTD-1	C	C1	3	1	64.55	0.1113	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-C-C1-1-CTD-4	C	C1	3	1	65.15	0.1118	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-C-C1-1-CTD-8	C	C1	3	1	65.08	0.1109	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-C-C2-1-CTD-1	C	C2	3	2	64.49	0.1120	10	M(A,D)GM
NTP2014Q1-RMC-R14-RS-FHT3-C-C2-1-CTD-5	C	C2	3	2	64.85	0.1118	10	DGM
NTP2014Q1-RMC-R14-RS-FHT3-C-C2-1-CTD-9	C	C2	3	2	64.38	0.1111	10	M(A,D)GM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01123	60.70
0.01126	59.46
0.01117	63.37
0.01117	60.50
0.01123	60.84
0.01122	60.83
0.01124	65.85
0.01133	65.27
0.01135	65.26
0.01126	64.63
0.01124	61.24
0.01127	63.43
0.01113	64.16
0.01118	65.03
0.01109	64.43
0.01120	64.49
0.01118	64.72
0.01111	63.85

Average 63.15
Standard Dev. 2.066
Coeff. of Var. [%] 3.271
Min. 59.16
Max. 65.61
Number of Spec. 18

Average_{norm} 0.01121 63.23
Standard Dev_{norm} 2.036
Coeff. of Var. [%]_{norm} 3.220
Min. 0.01109 59.46
Max. 0.01135 65.85
Number of Spec. 18



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

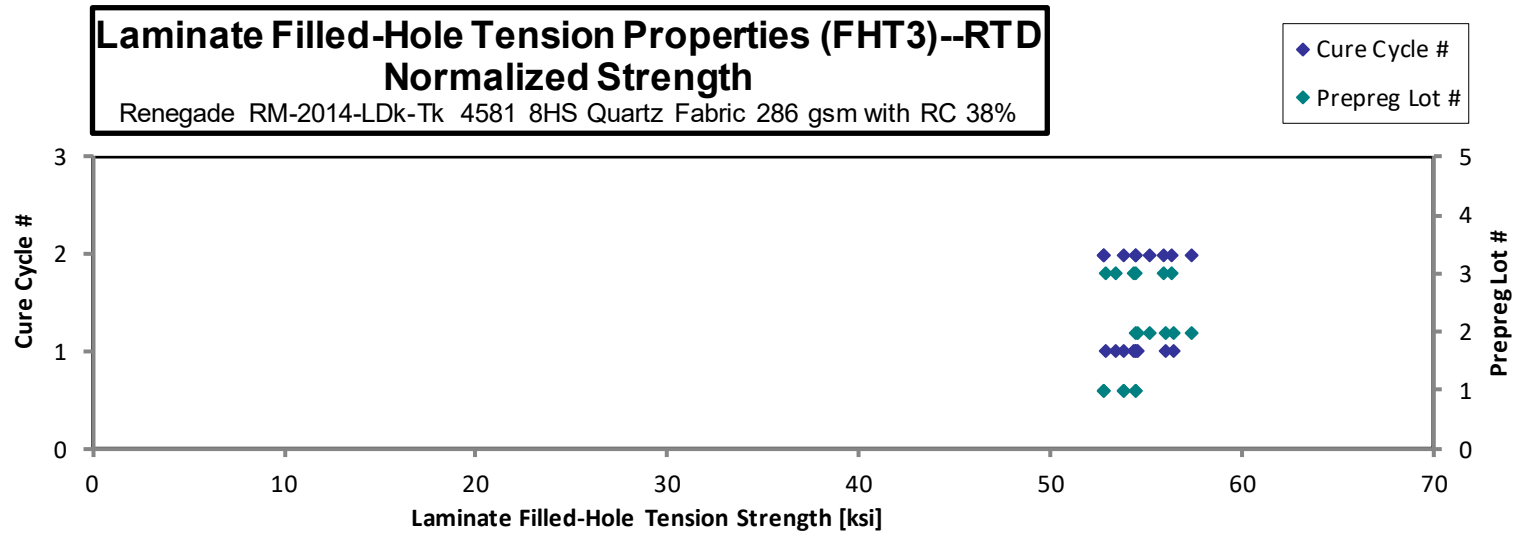
Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t _{ply} [in]	Strength _{norm} [ksi]
NTP2014Q1-RMC-R14-RS-FHT3-A-C1-1-RTD-1	A	C1	1	1	53.80	0.1120	10	XGM	0.01120	53.80
NTP2014Q1-RMC-R14-RS-FHT3-A-C1-1-RTD-2	A	C1	1	1	54.40	0.1120	10	XGM	0.01120	54.40
NTP2014Q1-RMC-R14-RS-FHT3-A-C1-1-RTD-3	A	C1	1	1	54.40	0.1120	10	XGM	0.01120	54.40
NTP2014Q1-RMC-R14-RS-FHT3-A-C2-1-RTD-3	A	C2	1	2	53.20	0.1110	10	XGM	0.01110	52.73
NTP2014Q1-RMC-R14-RS-FHT3-A-C2-1-RTD-7	A	C2	1	2	52.80	0.1120	10	XGM	0.01120	52.80
NTP2014Q1-RMC-R14-RS-FHT3-A-C2-1-RTD-13	A	C2	1	2	53.80	0.1120	10	XGM	0.01120	53.80
NTP2014Q1-RMC-R14-RS-FHT3-B-C1-1-RTD-2	B	C1	2	1	54.00	0.1130	10	XGM	0.01130	54.48
NTP2014Q1-RMC-R14-RS-FHT3-B-C1-1-RTD-4	B	C1	2	1	55.90	0.1130	10	XGM	0.01130	56.40
NTP2014Q1-RMC-R14-RS-FHT3-B-C1-1-RTD-8	B	C1	2	1	56.00	0.1120	10	XGM	0.01120	56.00
NTP2014Q1-RMC-R14-RS-FHT3-B-C2-1-RTD-2	B	C2	2	2	56.80	0.1130	10	XGM	0.01130	57.31
NTP2014Q1-RMC-R14-RS-FHT3-B-C2-1-RTD-4	B	C2	2	2	55.20	0.1120	10	XGM	0.01120	55.20
NTP2014Q1-RMC-R14-RS-FHT3-B-C2-1-RTD-8	B	C2	2	2	54.90	0.1110	10	XGM	0.01110	54.41
NTP2014Q1-RMC-R14-RS-FHT3-C-C1-1-RTD-2	C	C1	3	1	54.30	0.1120	10	XGM	0.01120	54.30
NTP2014Q1-RMC-R14-RS-FHT3-C-C1-1-RTD-5	C	C1	3	1	53.80	0.1100	10	XGM	0.01100	52.84
NTP2014Q1-RMC-R14-RS-FHT3-C-C1-1-RTD-6	C	C1	3	1	54.40	0.1100	10	XGM	0.01100	53.43
NTP2014Q1-RMC-R14-RS-FHT3-C-C2-1-RTD-2	C	C2	3	2	54.40	0.1120	10	XGM	0.01120	54.40
NTP2014Q1-RMC-R14-RS-FHT3-C-C2-1-RTD-4	C	C2	3	2	56.30	0.1120	10	XGM	0.01120	56.30
NTP2014Q1-RMC-R14-RS-FHT3-C-C2-1-RTD-6	C	C2	3	2	56.40	0.1110	10	XGM	0.01110	55.90

Average 54.71
Standard Dev. 1.152
Coeff. of Var. [%] 2.106
Min. 52.80
Max. 56.80
Number of Spec. 18

Average_{norm} 0.01118
Standard Dev._{norm} 1.333
Coeff. of Var. [%]_{norm} 2.442
Min. 0.01100
Max. 0.01130
Number of Spec. 18



**Laminate Filled-Hole Tension Properties (FHT3)--ETW
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

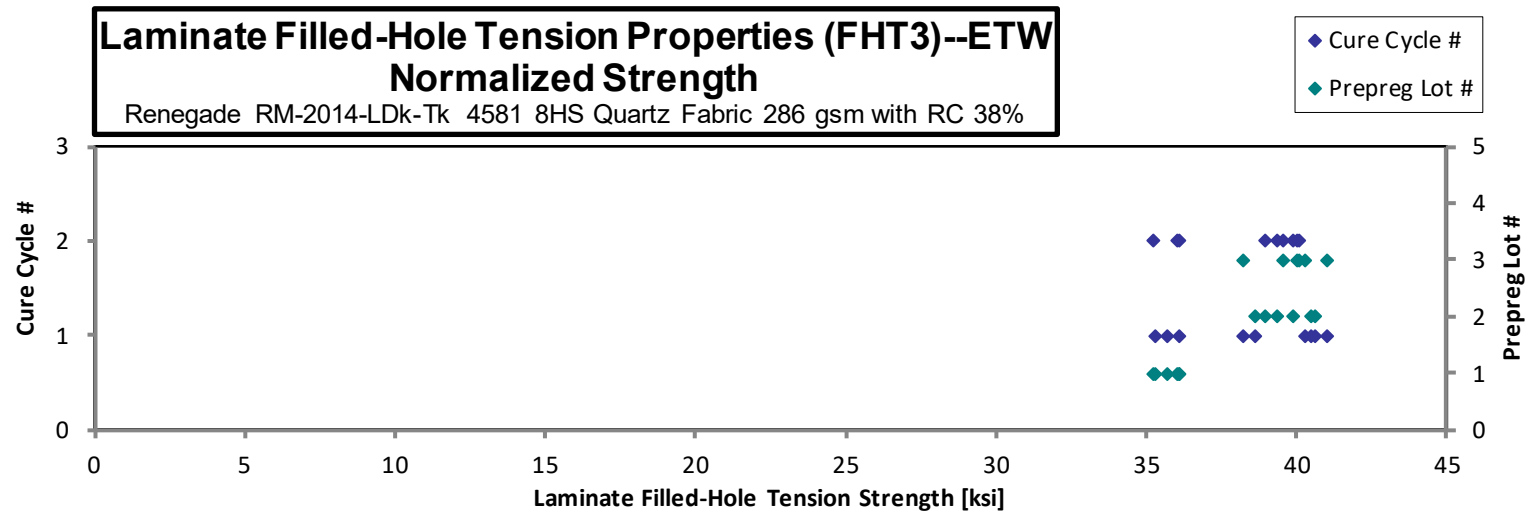
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FHT3-A-C1-1-ETW-4	A	C1	1	1	36.00	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-A-C1-1-ETW-5	A	C1	1	1	36.10	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-A-C1-1-ETW-9	A	C1	1	1	35.60	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-A-C2-1-ETW-4	A	C2	1	2	36.00	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-A-C2-1-ETW-5	A	C2	1	2	36.10	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-A-C2-1-ETW-9	A	C2	1	2	35.20	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-B-C1-1-ETW-3	B	C1	2	1	38.30	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-B-C1-1-ETW-5	B	C1	2	1	40.60	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-B-C1-1-ETW-7	B	C1	2	1	40.10	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-B-C2-1-ETW-3	B	C2	2	2	38.60	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-B-C2-1-ETW-5	B	C2	2	2	39.90	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-B-C2-1-ETW-7	B	C2	2	2	39.00	0.1130	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-C-C1-1-ETW-3	C	C1	3	1	41.00	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-C-C1-1-ETW-7	C	C1	3	1	38.60	0.1110	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-C-C1-1-ETW-11	C	C1	3	1	41.00	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-C-C2-1-ETW-3	C	C2	3	2	40.00	0.1120	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-C-C2-1-ETW-8	C	C2	3	2	40.30	0.1100	10	XGM
NTP2014Q1-RMC-R14-RS-FHT3-C-C2-1-ETW-11	C	C2	3	2	40.80	0.1100	10	XGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01110	35.68
0.01120	36.10
0.01110	35.28
0.01120	36.00
0.01120	36.10
0.01120	35.20
0.01130	38.64
0.01120	40.60
0.01130	40.46
0.01130	38.94
0.01120	39.90
0.01130	39.35
0.01100	40.27
0.01110	38.26
0.01120	41.00
0.01120	40.00
0.01100	39.58
0.01100	40.07

Average 38.51
Standard Dev. 2.112
Coeff. of Var. [%] 5.484
Min. 35.20
Max. 41.00
Number of Spec. 18

Average_{norm} 0.01117 38.41
Standard Dev_{norm} 2.076
Coeff. of Var. [%]_{norm} 5.406
Min. 0.01100 35.20
Max. 0.01130 41.00
Number of Spec. 18 18



4.20 “25/50/25” Open-Hole Compression 1 Properties (OHC1)

**Laminate Open-Hole Compression Properties (OHC1)--RTD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

 t_{ply} [in]

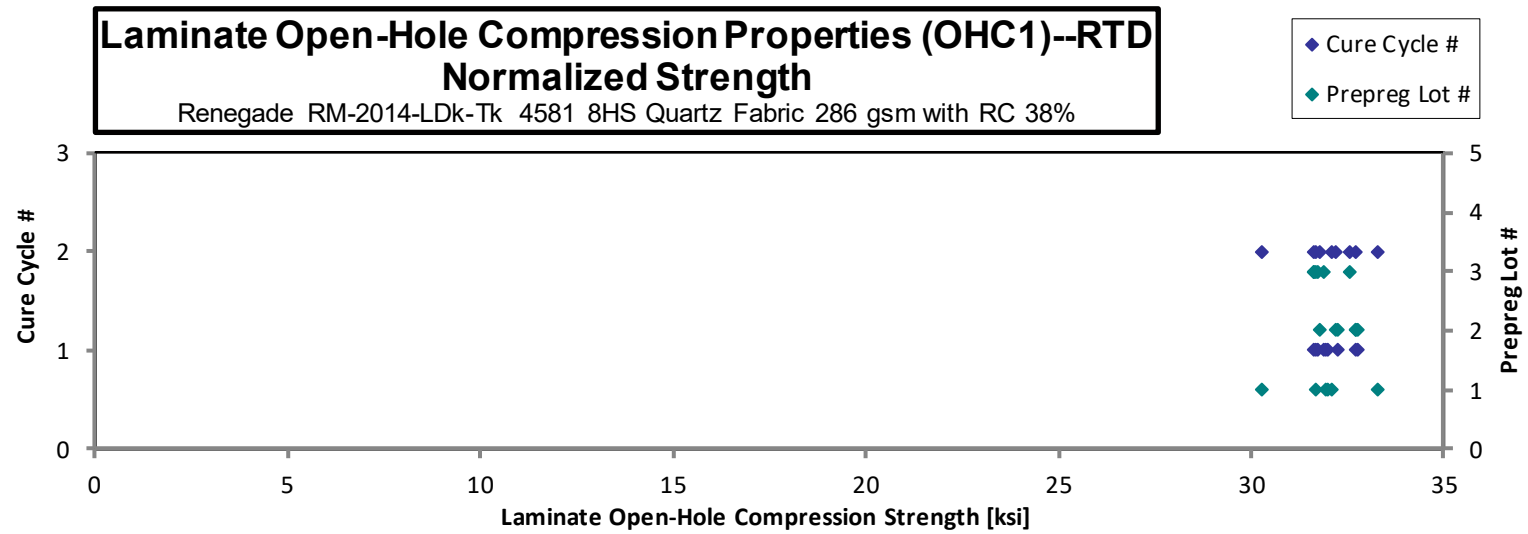
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHC1-A-C1-1-RTD-1	A	C1	1	1	31.64	0.1360	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C1-1-RTD-2	A	C1	1	1	31.78	0.1350	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C1-1-RTD-12	A	C1	1	1	31.56	0.1350	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C2-1-RTD-1	A	C2	1	2	31.96	0.1350	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C2-1-RTD-4	A	C2	1	2	29.94	0.1360	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C2-1-RTD-11	A	C2	1	2	32.64	0.1370	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C1-1-RTD-2	B	C1	2	1	32.40	0.1360	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C1-1-RTD-4	B	C1	2	1	32.10	0.1370	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C1-1-RTD-5	B	C1	2	1	31.40	0.1380	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C2-1-RTD-1	B	C2	2	2	31.80	0.1360	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C2-1-RTD-2	B	C2	2	2	31.40	0.1360	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C2-1-RTD-8	B	C2	2	2	32.10	0.1370	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C1-1-RTD-1	C	C1	3	1	32.00	0.1340	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C1-1-RTD-5	C	C1	3	1	31.60	0.1350	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C1-1-RTD-7	C	C1	3	1	31.50	0.1350	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C2-1-RTD-1	C	C2	3	2	32.90	0.1330	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C2-1-RTD-7	C	C2	3	2	31.70	0.1340	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C2-1-RTD-11	C	C2	3	2	31.80	0.1340	12	LGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.01133	32.02
0.01125	31.92
0.01125	31.70
0.01125	32.10
0.01133	30.30
0.01142	33.27
0.01133	32.79
0.01142	32.72
0.01150	32.24
0.01133	32.18
0.01133	31.77
0.01142	32.72
0.01117	31.90
0.01125	31.74
0.01125	31.64
0.01108	32.56
0.01117	31.61
0.01117	31.71

Average 31.79
Standard Dev. 0.6194
Coeff. of Var. [%] 1.948
Min. 29.94
Max. 32.90
Number of Spec. 18

Average_{norm} 0.01129
Standard Dev_{norm} 0.6480
Coeff. of Var. [%]_{norm} 2.022
Min. 0.01108
Max. 0.01150
Number of Spec. 18



**Laminate Open-Hole Compression Properties (OHC1)--ETD
Strength**

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

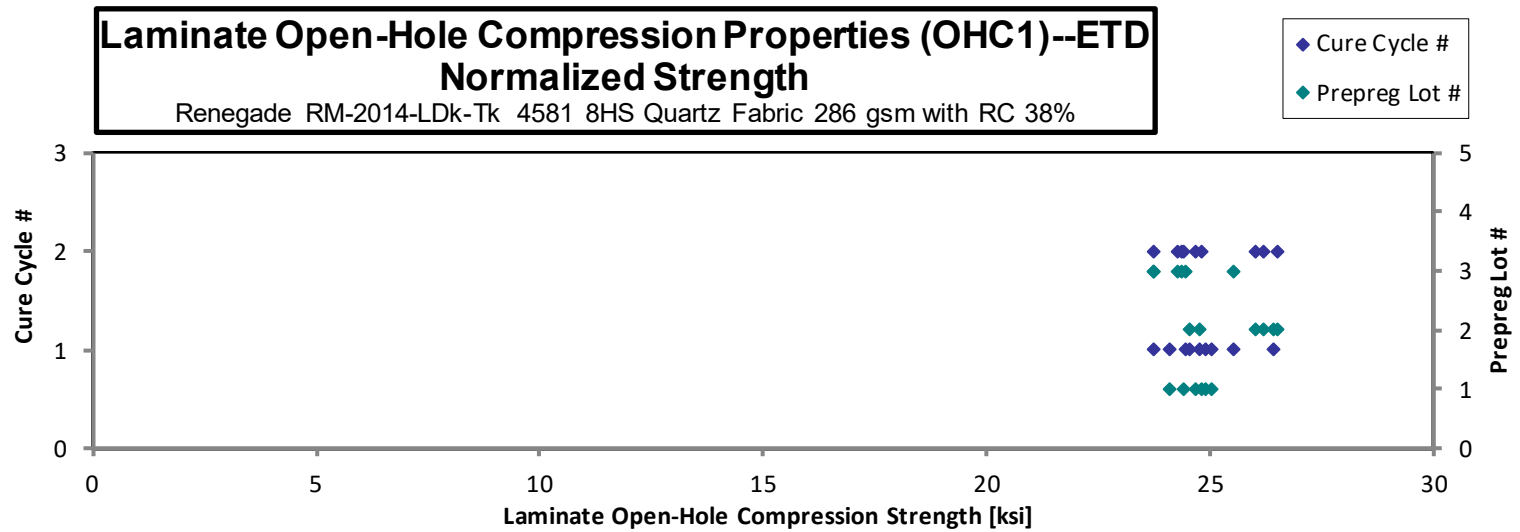
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHC1-A-C1-1-ETD-7	A	C1	1	1	24.80	0.1350	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C1-1-ETD-9	A	C1	1	1	24.00	0.1350	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C1-1-ETD-13	A	C1	1	1	24.90	0.1350	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C2-1-ETD-2	A	C2	1	2	24.30	0.1350	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C2-1-ETD-3	A	C2	1	2	24.70	0.1350	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C2-1-ETD-9	A	C2	1	2	24.20	0.1370	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C1-1-ETD-7	B	C1	2	1	24.10	0.1380	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C1-1-ETD-10	B	C1	2	1	25.90	0.1370	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C1-1-ETD-11	B	C1	2	1	23.90	0.1380	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C2-1-ETD-4	B	C2	2	2	25.90	0.1360	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C2-1-ETD-5	B	C2	2	2	25.70	0.1360	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C2-1-ETD-7	B	C2	2	2	26.00	0.1370	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C1-1-ETD-2	C	C1	3	1	25.60	0.1340	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C1-1-ETD-4	C	C1	3	1	24.50	0.1340	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C1-1-ETD-8	C	C1	3	1	23.80	0.1340	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C2-1-ETD-2	C	C2	3	2	24.50	0.1330	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C2-1-ETD-4	C	C2	3	2	24.60	0.1330	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C2-1-ETD-8	C	C2	3	2	24.00	0.1330	12	LGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01125	24.91
0.01125	24.11
0.01125	25.01
0.01125	24.41
0.01125	24.81
0.01142	24.67
0.01150	24.75
0.01142	26.40
0.01150	24.54
0.01133	26.21
0.01133	26.01
0.01142	26.50
0.01117	25.52
0.01117	24.43
0.01117	23.73
0.01108	24.24
0.01108	24.34
0.01108	23.75

Average 24.74
Standard Dev. 0.7548
Coeff. of Var. [%] 3.050
Min. 23.80
Max. 26.00
Number of Spec. 18

Average_{norm} 0.01127 24.91
Standard Dev._{norm} 0.8711
Coeff. of Var. [%]_{norm} 3.497
Min. 0.01108 23.73
Max. 0.01150 26.50
Number of Spec. 18 18



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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

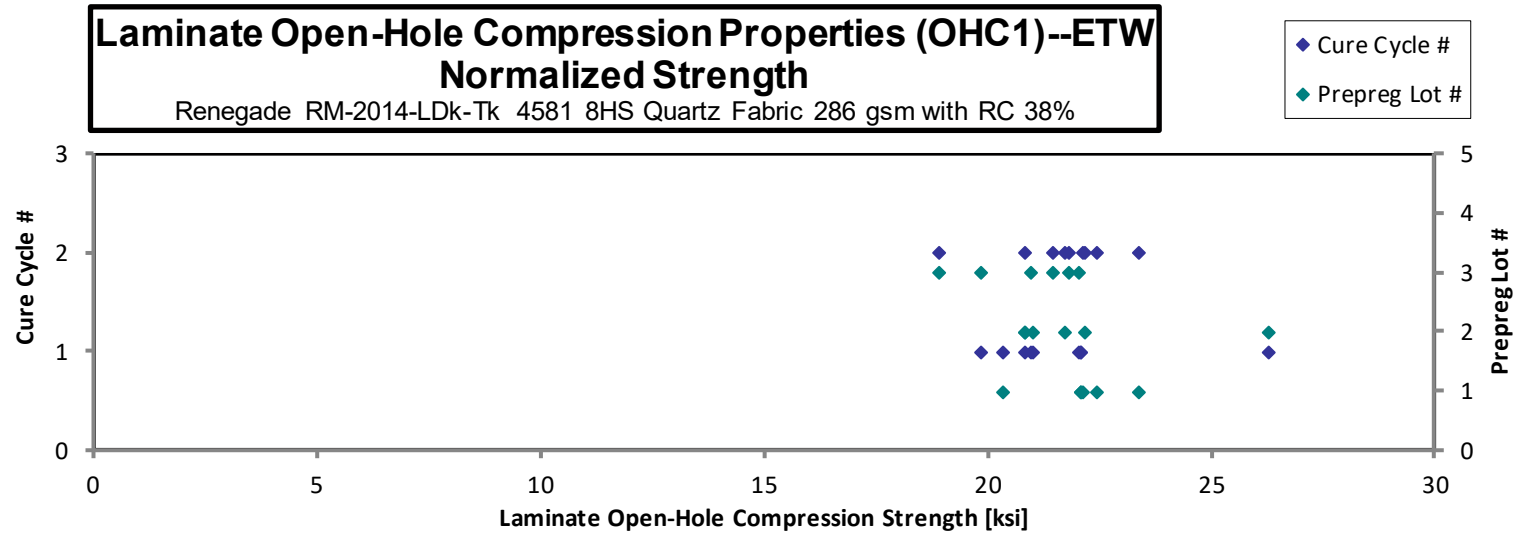
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHC1-A-C1-1-ETW-10	A	C1	1	1	20.40	0.1340	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C1-1-ETW-11	A	C1	1	1	22.00	0.1350	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C1-1-ETW-14	A	C1	1	1	22.00	0.1350	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C2-1-ETW-10	A	C2	1	2	21.70	0.1370	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C2-1-ETW-12	A	C2	1	2	22.20	0.1360	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-A-C2-1-ETW-14	A	C2	1	2	23.10	0.1360	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C1-1-ETW-3	B	C1	2	1	20.60	0.1360	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C1-1-ETW-6	B	C1	2	1	20.60	0.1370	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C1-1-ETW-9	B	C1	2	1	26.00	0.1360	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C2-1-ETW-6	B	C2	2	2	20.60	0.1360	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C2-1-ETW-15	B	C2	2	2	21.50	0.1360	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-B-C2-1-ETW-16	B	C2	2	2	21.90	0.1360	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C1-1-ETW-3	C	C1	3	1	21.20	0.1330	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C1-1-ETW-6	C	C1	3	1	22.10	0.1340	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C1-1-ETW-9	C	C1	3	1	19.90	0.1340	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C2-1-ETW-3	C	C2	3	2	21.70	0.1330	12	MGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C2-1-ETW-6	C	C2	3	2	19.10	0.1330	12	LGM
NTP2014Q1-RMC-R14-RS-OHC1-C-C2-1-ETW-9	C	C2	3	2	21.90	0.1340	12	MGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01117	20.34
0.01125	22.10
0.01125	22.10
0.01142	22.12
0.01133	22.46
0.01133	23.38
0.01133	20.85
0.01142	21.00
0.01133	26.31
0.01133	20.85
0.01133	21.76
0.01133	22.16
0.01108	20.98
0.01117	22.03
0.01117	19.84
0.01108	21.47
0.01108	18.90
0.01117	21.83

Average 21.58
Standard Dev. 1.465
Coeff. of Var. [%] 6.788
Min. 19.10
Max. 26.00
Number of Spec. 18

Average_{norm} 0.01125 21.69
Standard Dev_{norm} 1.556
Coeff. of Var. [%]_{norm} 7.171
Min. 0.01108 18.90
Max. 0.01142 26.31
Number of Spec. 18 18



4.21 “10/80/10” Open-Hole Compression 2 Properties (OHC2)

**Laminate Open-Hole Compression Properties (OHC2)--RTD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

t_{ply} [in]

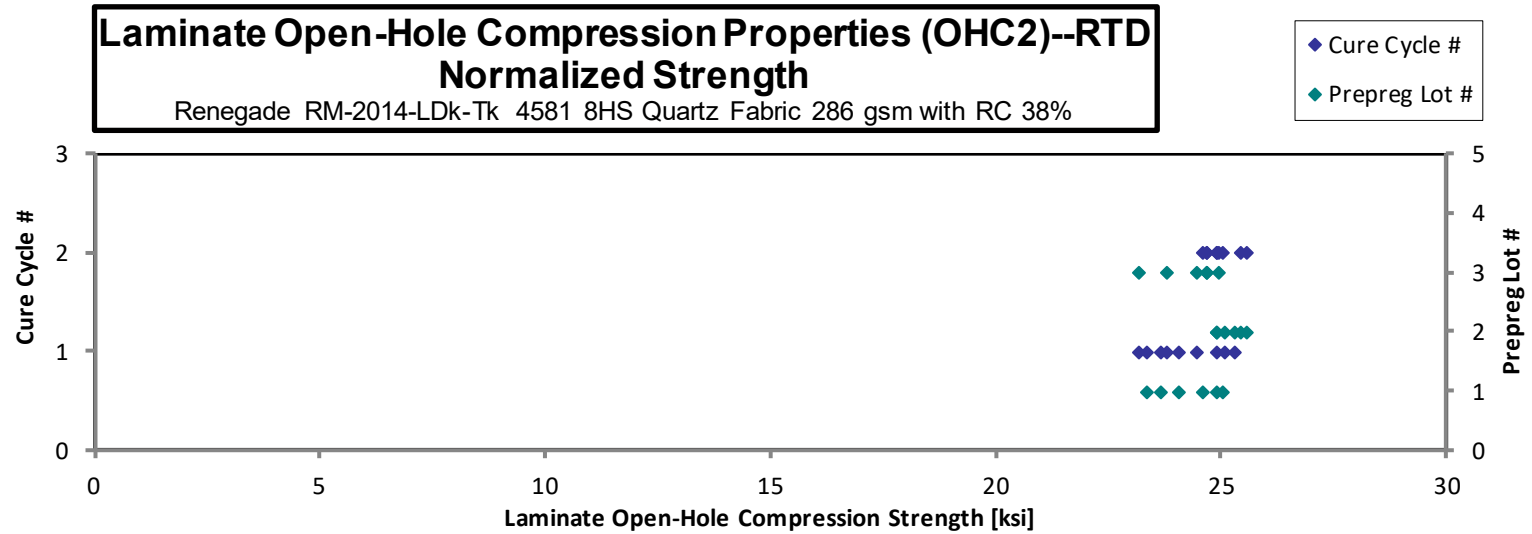
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHC2-A-C1-1-RTD-5	A	C1	1	1	23.90	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-OHC2-A-C1-1-RTD-6	A	C1	1	1	23.80	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-OHC2-A-C1-1-RTD-7	A	C1	1	1	24.30	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-OHC2-A-C2-1-RTD-5	A	C2	1	2	25.15	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-A-C2-1-RTD-6	A	C2	1	2	25.27	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-A-C2-1-RTD-8	A	C2	1	2	25.06	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C1-1-RTD-1	B	C1	2	1	24.90	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C1-1-RTD-3	B	C1	2	1	25.10	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C1-1-RTD-5	B	C1	2	1	25.30	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C2-1-RTD-1	B	C2	2	2	25.60	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C2-1-RTD-3	B	C2	2	2	25.20	0.1130	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C2-1-RTD-5	B	C2	2	2	24.70	0.1130	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C1-1-RTD-1	C	C1	3	1	23.60	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C1-1-RTD-3	C	C1	3	1	24.90	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C1-1-RTD-5	C	C1	3	1	24.00	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C2-1-RTD-1	C	C2	3	2	24.90	0.1110	10	LGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C2-1-RTD-3	C	C2	3	2	25.20	0.1110	10	LGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C2-1-RTD-5	C	C2	3	2	24.90	0.1110	10	MGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01110	23.69
0.01100	23.38
0.01110	24.08
0.01110	24.93
0.01110	25.04
0.01100	24.61
0.01120	24.90
0.01120	25.10
0.01120	25.30
0.01120	25.60
0.01130	25.43
0.01130	24.92
0.01100	23.18
0.01100	24.46
0.01110	23.79
0.01110	24.68
0.01110	24.98
0.01110	24.68

Average 24.77
Standard Dev. 0.5881
Coeff. of Var. [%] 2.375
Min. 23.60
Max. 25.60
Number of Spec. 18

Average_{norm} 0.01112
Standard Dev_{norm} 0.7019
Coeff. of Var. [%]_{norm} 2.854
Min. 0.01100
Max. 0.01130
Number of Spec. 18



**Laminate Open-Hole Compression Properties (OHC2)--ETW
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

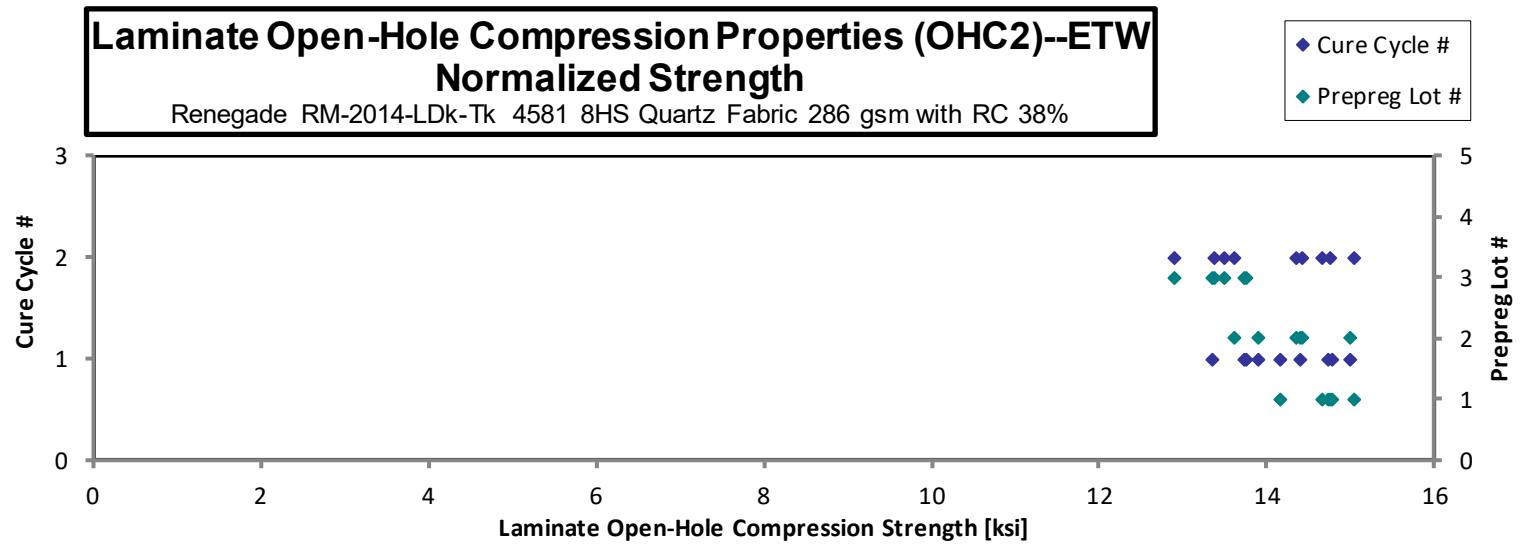
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHC2-A-C1-1-ETW-1	A	C1	1	1	14.70	0.1080	10	AGM
NTP2014Q1-RMC-R14-RS-OHC2-A-C1-1-ETW-2	A	C1	1	1	15.30	0.1080	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-A-C1-1-ETW-3	A	C1	1	1	15.20	0.1090	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-A-C2-1-ETW-2	A	C2	1	2	14.90	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-A-C2-1-ETW-3	A	C2	1	2	14.80	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-OHC2-A-C2-1-ETW-4	A	C2	1	2	15.20	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C1-1-ETW-2	B	C1	2	1	14.40	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C1-1-ETW-6	B	C1	2	1	15.00	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C1-1-ETW-8	B	C1	2	1	13.90	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C2-1-ETW-2	B	C2	2	2	14.10	0.1140	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C2-1-ETW-4	B	C2	2	2	14.30	0.1130	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-B-C2-1-ETW-6	B	C2	2	2	13.50	0.1130	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C1-1-ETW-2	C	C1	3	1	13.90	0.1110	10	AGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C1-1-ETW-4	C	C1	3	1	14.00	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C1-1-ETW-6	C	C1	3	1	13.60	0.1100	10	AGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C2-1-ETW-2	C	C2	3	2	13.50	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C2-1-ETW-4	C	C2	3	2	12.90	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC2-C-C2-1-ETW-6	C	C2	3	2	13.50	0.1110	10	MGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01080	14.18
0.01080	14.75
0.01090	14.79
0.01110	14.77
0.01110	14.67
0.01110	15.06
0.01120	14.40
0.01120	15.00
0.01120	13.90
0.01140	14.35
0.01130	14.43
0.01130	13.62
0.01110	13.78
0.01100	13.75
0.01100	13.36
0.01120	13.50
0.01120	12.90
0.01110	13.38

Average 14.26
Standard Dev. 0.7147
Coeff. of Var. [%] 5.011
Min. 12.90
Max. 15.30
Number of Spec. 18

Average_{norm} 0.01111 14.14
Standard Dev_{norm} 0.6424
Coeff. of Var. [%]_{norm} 4.542
Min. 0.01080 12.90
Max. 0.01140 15.06
Number of Spec. 18 18



4.22 “40/20/40” Open-Hole Compression 3 Properties (OHC3)

**Laminate Open-Hole Compression Properties (OHC3)--RTD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

 t_{ply} [in]

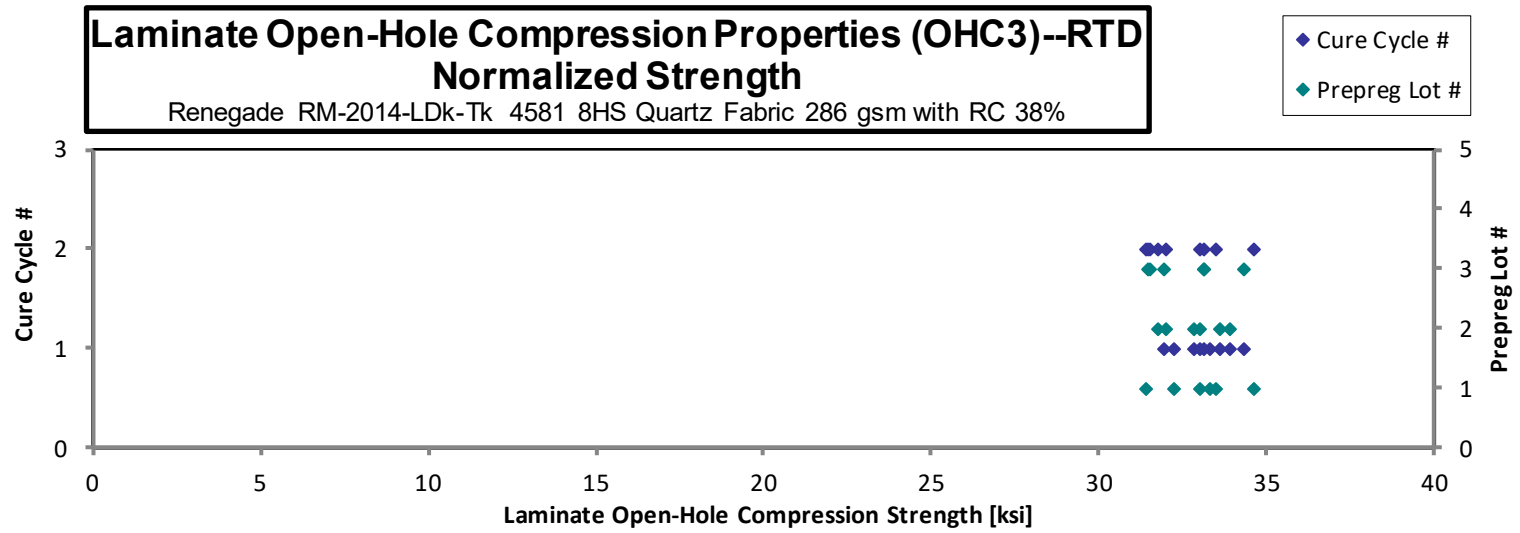
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHC3-A-C1-1-RTD-6	A	C1	1	1	33.60	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-A-C1-1-RTD-7	A	C1	1	1	32.80	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-A-C1-1-RTD-8	A	C1	1	1	33.60	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-A-C2-1-RTD-5	A	C2	1	2	34.61	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-A-C2-1-RTD-6	A	C2	1	2	31.13	0.1130	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-A-C2-1-RTD-7	A	C2	1	2	33.18	0.1130	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C1-1-RTD-1	B	C1	2	1	33.60	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C1-1-RTD-3	B	C1	2	1	32.80	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C1-1-RTD-5	B	C1	2	1	33.90	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C2-1-RTD-1	B	C2	2	2	33.60	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C2-1-RTD-3	B	C2	2	2	32.30	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C2-1-RTD-5	B	C2	2	2	32.30	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C1-1-RTD-3	C	C1	3	1	34.00	0.1090	10	LGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C1-1-RTD-5	C	C1	3	1	32.50	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C1-1-RTD-7	C	C1	3	1	34.60	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C2-1-RTD-1	C	C2	3	2	32.60	0.1080	10	LGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C2-1-RTD-3	C	C2	3	2	34.00	0.1090	10	LGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C2-1-RTD-5	C	C2	3	2	32.40	0.1090	10	LGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.01100	33.00
0.01100	32.21
0.01110	33.30
0.01120	34.61
0.01130	31.41
0.01130	33.48
0.01120	33.60
0.01120	32.80
0.01120	33.90
0.01100	33.00
0.01100	31.72
0.01110	32.01
0.01090	33.09
0.01100	31.92
0.01110	34.29
0.01080	31.44
0.01090	33.09
0.01090	31.53

Average 33.20
Standard Dev. 0.9098
Coeff. of Var. [%] 2.741
Min. 31.13
Max. 34.61
Number of Spec. 18

Average_{norm} 0.01107
Standard Dev_{norm} 0.9885
Coeff. of Var. [%]_{norm} 3.014
Min. 0.01080
Max. 0.01130
Number of Spec. 18



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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

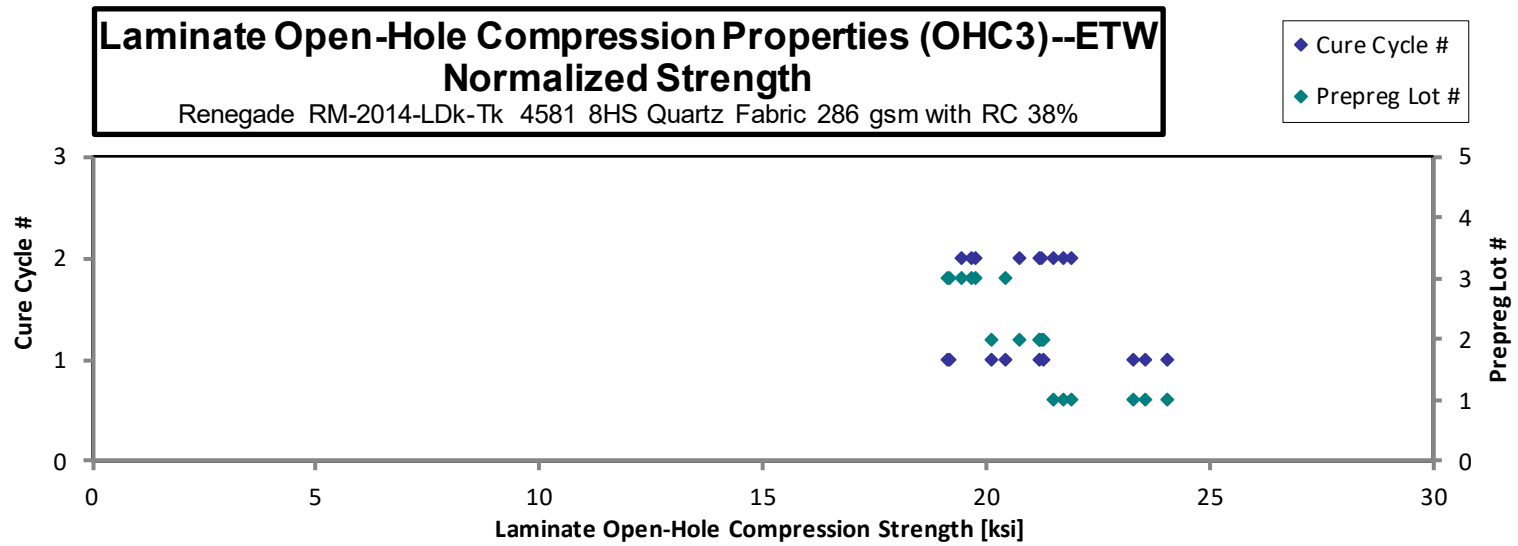
normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-OHC3-A-C1-1-ETW-1	A	C1	1	1	24.70	0.1090	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-A-C1-1-ETW-2	A	C1	1	1	23.70	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-A-C1-1-ETW-3	A	C1	1	1	24.00	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-A-C2-1-ETW-1	A	C2	1	2	21.90	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-A-C2-1-ETW-2	A	C2	1	2	21.70	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-A-C2-1-ETW-3	A	C2	1	2	22.10	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C1-1-ETW-2	B	C1	2	1	21.00	0.1130	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C1-1-ETW-4	B	C1	2	1	21.30	0.1120	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C1-1-ETW-6	B	C1	2	1	20.30	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C2-1-ETW-2	B	C2	2	2	21.60	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C2-1-ETW-4	B	C2	2	2	21.10	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-B-C2-1-ETW-6	B	C2	2	2	21.40	0.1110	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C1-1-ETW-2	C	C1	3	1	19.70	0.1090	10	LGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C1-1-ETW-4	C	C1	3	1	20.80	0.1100	10	LGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C1-1-ETW-6	C	C1	3	1	19.50	0.1100	10	LGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C2-1-ETW-2	C	C2	3	2	20.40	0.1080	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C2-1-ETW-4	C	C2	3	2	19.80	0.1100	10	MGM
NTP2014Q1-RMC-R14-RS-OHC3-C-C2-1-ETW-6	C	C2	3	2	20.30	0.1090	10	MGM

Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01090	24.04
0.01100	23.28
0.01100	23.57
0.01110	21.70
0.01110	21.51
0.01110	21.90
0.01130	21.19
0.01120	21.30
0.01110	20.12
0.01100	21.21
0.01100	20.72
0.01110	21.21
0.01090	19.17
0.01100	20.43
0.01100	19.15
0.01080	19.67
0.01100	19.45
0.01090	19.76

Average 21.41
Standard Dev. 1.473
Coeff. of Var. [%] 6.884
Min. 19.50
Max. 24.70
Number of Spec. 18

Average_{norm} 0.01103 21.08
Standard Dev._{norm} 1.463
Coeff. of Var. [%]_{norm} 6.939
Min. 0.01080 19.15
Max. 0.01130 24.04
Number of Spec. 18 18



4.23 “25/50/25” Filled-Hole Compression 1 Properties (FHC1)

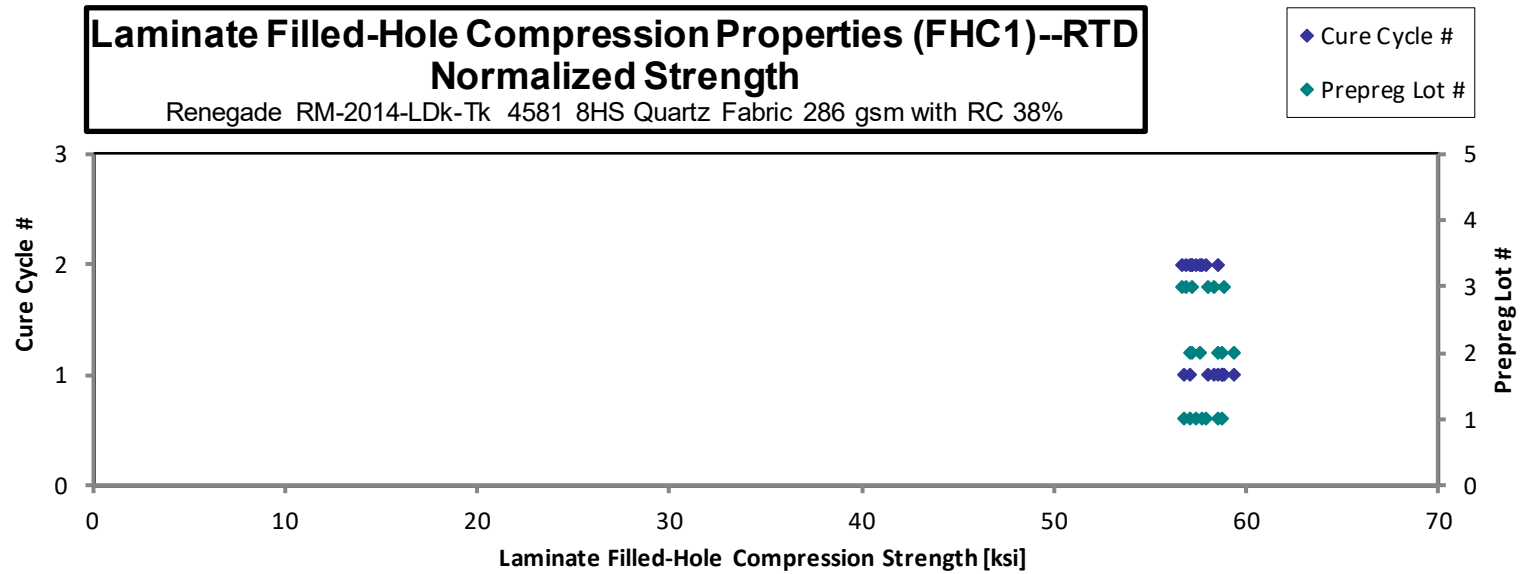
**Laminate Filled-Hole Compression Properties (FHC1)--RTD
Strength**
Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
 t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]
NTP2014Q1-RMC-R14-RS-FHC1-A-C1-1-RTD-2	A	C1	1	1	57.29	0.1332	12	M(A,L)GF	0.01110	56.77
NTP2014Q1-RMC-R14-RS-FHC1-A-C1-1-RTD-3	A	C1	1	1	58.86	0.1336	12	M(A,L)GF	0.01113	58.50
NTP2014Q1-RMC-R14-RS-FHC1-A-C1-1-RTD-4	A	C1	1	1	58.99	0.1336	12	M(A,L)AT	0.01114	58.65
NTP2014Q1-RMC-R14-RS-FHC1-A-C2-1-RTD-1	A	C2	1	2	57.83	0.1334	12	M(A,L)GF	0.01112	57.40
NTP2014Q1-RMC-R14-RS-FHC1-A-C2-1-RTD-2	A	C2	1	2	57.61	0.1346	12	M(A,L)GF	0.01122	57.69
NTP2014Q1-RMC-R14-RS-FHC1-A-C2-1-RTD-3	A	C2	1	2	57.55	0.1350	12	M(A,L)GF	0.01125	57.83
NTP2014Q1-RMC-R14-RS-FHC1-A-C2-1-RTD-4	A	C2	1	2	56.71	0.1352	12	M(A,L)GF	0.01127	57.04
NTP2014Q1-RMC-R14-RS-FHC1-B-C1-1-RTD-1	B	C1	2	1	56.04	0.1368	12	LGB	0.01140	57.03
NTP2014Q1-RMC-R14-RS-FHC1-B-C1-1-RTD-2	B	C1	2	1	57.54	0.1371	12	M(A,L)GF	0.01143	58.70
NTP2014Q1-RMC-R14-RS-FHC1-B-C1-1-RTD-3	B	C1	2	1	57.79	0.1380	12	M(A,L)GB	0.01150	59.35
NTP2014Q1-RMC-R14-RS-FHC1-B-C2-1-RTD-1	B	C2	2	2	59.12	0.1329	12	M(A,L)WT	0.01107	58.45
NTP2014Q1-RMC-R14-RS-FHC1-B-C2-1-RTD-2	B	C2	2	2	57.08	0.1345	12	M(A,L)GF	0.01121	57.13
NTP2014Q1-RMC-R14-RS-FHC1-B-C2-1-RTD-3	B	C2	2	2	57.41	0.1347	12	M(A,L)GF	0.01123	57.55
NTP2014Q1-RMC-R14-RS-FHC1-C-C1-1-RTD-1	C	C1	3	1	58.39	0.1334	12	M(A,L)GF	0.01111	57.93
NTP2014Q1-RMC-R14-RS-FHC1-C-C1-1-RTD-2	C	C1	3	1	57.96	0.1351	12	LWT	0.01126	58.28
NTP2014Q1-RMC-R14-RS-FHC1-C-C1-1-RTD-3	C	C1	3	1	58.69	0.1347	12	M(A,L)GF	0.01123	58.83
NTP2014Q1-RMC-R14-RS-FHC1-C-C2-1-RTD-1	C	C2	3	2	57.18	0.1343	12	LWB	0.01119	57.15
NTP2014Q1-RMC-R14-RS-FHC1-C-C2-1-RTD-2	C	C2	3	2	56.47	0.1347	12	M(A,L)GF	0.01122	56.59
NTP2014Q1-RMC-R14-RS-FHC1-C-C2-1-RTD-3	C	C2	3	2	56.75	0.1345	12	M(A,L)GF	0.01121	56.81

Average 57.65
Standard Dev. 0.8703
Coeff. of Var. [%] 1.510
Min. 56.04
Max. 59.12
Number of Spec. 19

Average_{norm} 0.01123 57.77
Standard Dev_{norm} 0.8143
Coeff. of Var. [%]_{norm} 1.409
Min. 0.01107 56.59
Max. 0.01150 59.35
Number of Spec. 19 19



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

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

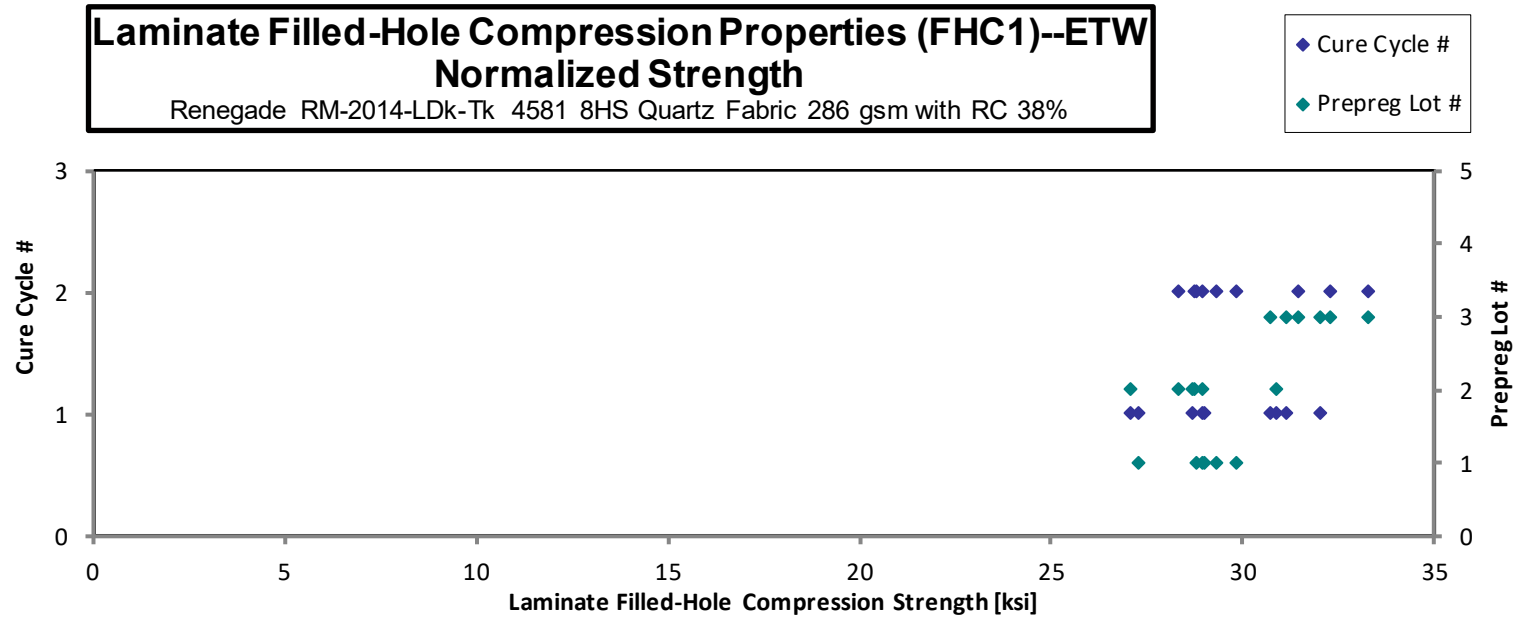
normalizing
t_{ply} [in]

0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t _{ply} [in]	Strength _{norm} [ksi]
NTP2014Q1-RMC-R14-RS-FHC1-A-C1-1-ETW-1	A	C1	1	1	27.47	0.1335	12	LGF	0.01113	27.29
NTP2014Q1-RMC-R14-RS-FHC1-A-C1-1-ETW-2	A	C1	1	1	29.22	0.1335	12	LGF	0.01113	29.03
NTP2014Q1-RMC-R14-RS-FHC1-A-C1-1-ETW-3	A	C1	1	1	29.14	0.1336	12	LGF	0.01113	28.96
NTP2014Q1-RMC-R14-RS-FHC1-A-C2-1-ETW-1	A	C2	1	2	28.51	0.1357	12	LGF	0.01131	28.78
NTP2014Q1-RMC-R14-RS-FHC1-A-C2-1-ETW-2	A	C2	1	2	29.04	0.1358	12	M(A,L)WB	0.01132	29.35
NTP2014Q1-RMC-R14-RS-FHC1-A-C2-1-ETW-3	A	C2	1	2	29.54	0.1357	12	LGF	0.01131	29.83
NTP2014Q1-RMC-R14-RS-FHC1-B-C1-1-ETW-1	B	C1	2	1	30.09	0.1379	12	M(A,L)GF	0.01149	30.87
NTP2014Q1-RMC-R14-RS-FHC1-B-C1-1-ETW-2	B	C1	2	1	28.10	0.1372	12	M(A,L)GF, M(A,L)WB	0.01143	28.68
NTP2014Q1-RMC-R14-RS-FHC1-B-C1-1-ETW-3	B	C1	2	1	26.49	0.1375	12	M(A,L)GF, LWT	0.01146	27.10
NTP2014Q1-RMC-R14-RS-FHC1-B-C2-1-ETW-1	B	C2	2	2	28.18	0.1352	12	M(A,L)WB	0.01126	28.34
NTP2014Q1-RMC-R14-RS-FHC1-B-C2-1-ETW-2	B	C2	2	2	28.59	0.1353	12	M(A,L)WT	0.01127	28.77
NTP2014Q1-RMC-R14-RS-FHC1-B-C2-1-ETW-3	B	C2	2	2	28.71	0.1355	12	M(A,L)GF	0.01129	28.94
NTP2014Q1-RMC-R14-RS-FHC1-C-C1-1-ETW-1	C	C1	3	1	31.86	0.1351	12	LWT	0.01126	32.02
NTP2014Q1-RMC-R14-RS-FHC1-C-C1-1-ETW-2	C	C1	3	1	30.53	0.1352	12	M(A,L)WB	0.01127	30.72
NTP2014Q1-RMC-R14-RS-FHC1-C-C1-1-ETW-3	C	C1	3	1	31.04	0.1349	12	M(A,L)WB	0.01124	31.16
NTP2014Q1-RMC-R14-RS-FHC1-C-C2-1-ETW-1	C	C2	3	2	31.69	0.1334	12	AAB	0.01111	31.45
NTP2014Q1-RMC-R14-RS-FHC1-C-C2-1-ETW-2	C	C2	3	2	33.69	0.1329	12	LGB	0.01107	33.31
NTP2014Q1-RMC-R14-RS-FHC1-C-C2-1-ETW-3	C	C2	3	2	32.68	0.1328	12	AWB	0.01107	32.30

Average 29.70
Standard Dev. 1.892
Coeff. of Var. [%] 6.370
Min. 26.49
Max. 33.69
Number of Spec. 18

Average_{norm} 0.01125 29.83
Standard Dev._{norm} 1.737
Coeff. of Var. [%]_{norm} 5.822
Min. 0.01107 27.10
Max. 0.01149 33.31
Number of Spec. 18 18



4.24 “10/80/10” Filled-Hole Compression 2 Properties (FHC2)

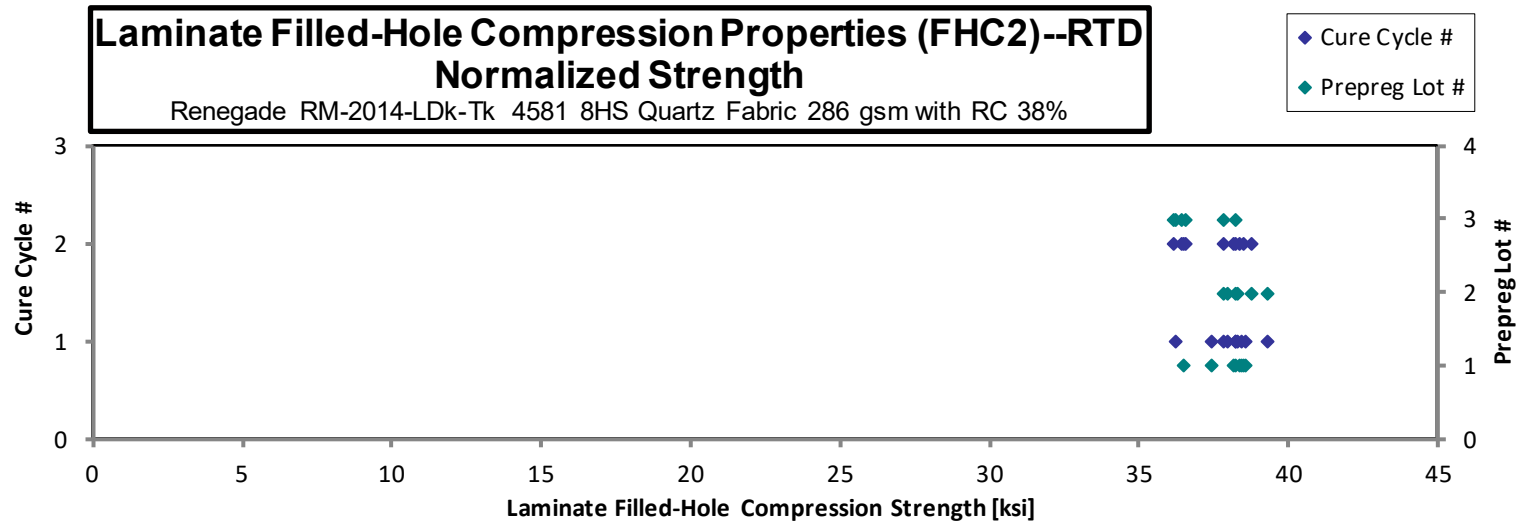
**Laminate Filled-Hole Compression Properties (FHC2)--RTD
Strength**
Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
 t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]
NTP2014Q1-RMC-R14-RS-FHC2-A-C1-1-RTD-1	A	C1	1	1	39.38	0.1097	10	M(A,L)GF	0.01097	38.56
NTP2014Q1-RMC-R14-RS-FHC2-A-C1-1-RTD-2	A	C1	1	1	38.32	0.1095	10	M(A,L)GF	0.01095	37.45
NTP2014Q1-RMC-R14-RS-FHC2-A-C1-1-RTD-3	A	C1	1	1	38.94	0.1105	10	M(A,L)WB	0.01105	38.42
NTP2014Q1-RMC-R14-RS-FHC2-A-C1-1-RTD-4	A	C1	1	1	38.85	0.1102	10	M(A,L)WT	0.01102	38.23
NTP2014Q1-RMC-R14-RS-FHC2-A-C2-1-RTD-1	A	C2	1	2	36.84	0.1109	10	M(A,L)GF	0.01109	36.46
NTP2014Q1-RMC-R14-RS-FHC2-A-C2-1-RTD-2	A	C2	1	2	38.68	0.1115	10	M(A,L)WB	0.01115	38.50
NTP2014Q1-RMC-R14-RS-FHC2-A-C2-1-RTD-3	A	C2	1	2	38.33	0.1114	10	M(A,L)GF	0.01114	38.13
NTP2014Q1-RMC-R14-RS-FHC2-A-C2-1-RTD-4	A	C2	1	2	38.55	0.1113	10	M(A,L)GF	0.01113	38.32
NTP2014Q1-RMC-R14-RS-FHC2-B-C1-1-RTD-1	B	C1	2	1	38.01	0.1118	10	M(A,L)GF	0.01118	37.95
NTP2014Q1-RMC-R14-RS-FHC2-B-C1-1-RTD-2	B	C1	2	1	38.95	0.1129	10	M(A,L)GF	0.01129	39.27
NTP2014Q1-RMC-R14-RS-FHC2-B-C1-1-RTD-3	B	C1	2	1	37.79	0.1134	10	M(A,L)GF	0.01134	38.26
NTP2014Q1-RMC-R14-RS-FHC2-B-C2-1-RTD-1	B	C2	2	2	39.29	0.1104	10	M(A,L)GF	0.01104	38.72
NTP2014Q1-RMC-R14-RS-FHC2-B-C2-1-RTD-2	B	C2	2	2	38.16	0.1111	10	M(A,L)GF	0.01111	37.84
NTP2014Q1-RMC-R14-RS-FHC2-B-C2-1-RTD-3	B	C2	2	2	38.55	0.1110	10	M(A,L)GF	0.01110	38.21
NTP2014Q1-RMC-R14-RS-FHC2-C-C1-1-RTD-1	C	C1	3	1	38.28	0.1108	10	M(A,L)GF	0.01108	37.85
NTP2014Q1-RMC-R14-RS-FHC2-C-C1-1-RTD-2	C	C1	3	1	38.35	0.1116	10	M(A,L)GF	0.01116	38.19
NTP2014Q1-RMC-R14-RS-FHC2-C-C1-1-RTD-3	C	C1	3	1	36.34	0.1116	10	M(A,L)GF	0.01116	36.20
NTP2014Q1-RMC-R14-RS-FHC2-C-C2-1-RTD-1	C	C2	3	2	37.15	0.1090	10	M(A,L)GF	0.01090	36.16
NTP2014Q1-RMC-R14-RS-FHC2-C-C2-1-RTD-2	C	C2	3	2	37.21	0.1101	10	M(A,L)GF	0.01101	36.57
NTP2014Q1-RMC-R14-RS-FHC2-C-C2-1-RTD-3	C	C2	3	2	36.96	0.1104	10	M(A,L)GF	0.01104	36.44

Average 38.15
Standard Dev. 0.8499
Coeff. of Var. [%] 2.228
Min. 36.34
Max. 39.38
Number of Spec. 20

Average_{norm} 0.01109 37.79
Standard Dev._{norm} 0.9216
Coeff. of Var. [%]_{norm} 2.439
Min. 0.01090 36.16
Max. 0.01134 39.27
Number of Spec. 20 20



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

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

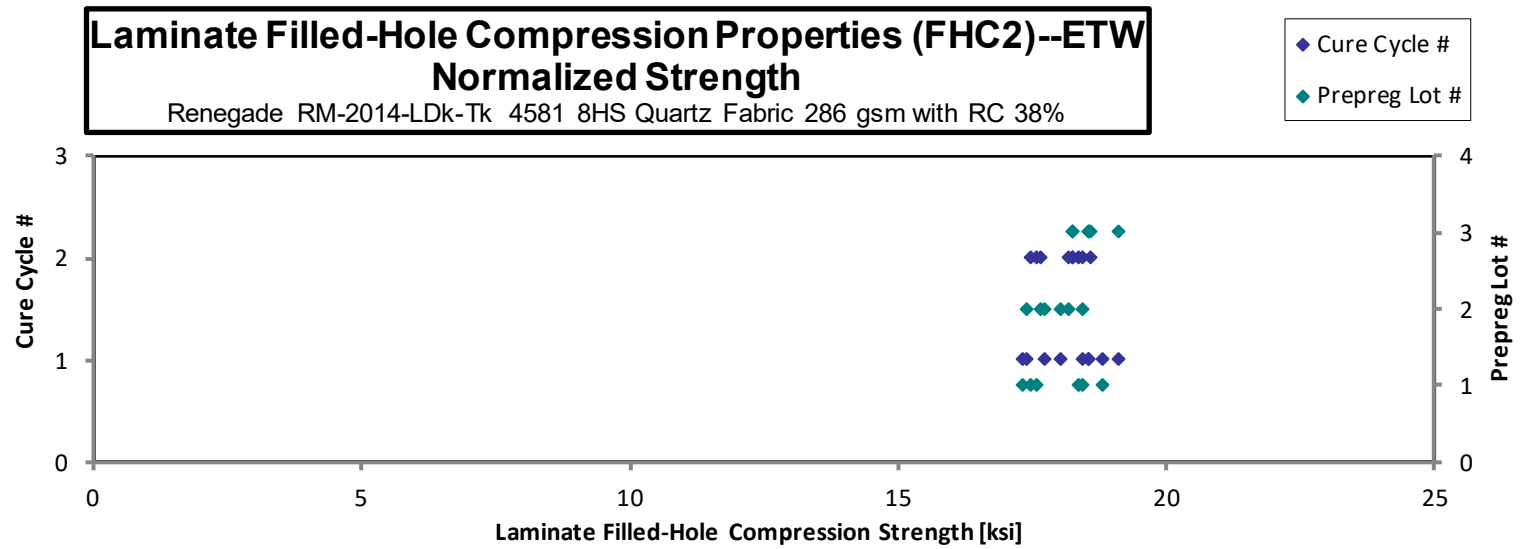
normalizing
 t_{ply} [in]
 0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FHC2-A-C1-1-ETW-1	A	C1	1	1	17.56	0.1106	10	AGF
NTP2014Q1-RMC-R14-RS-FHC2-A-C1-1-ETW-2	A	C1	1	1	18.81	0.1098	10	M(A,L)WB
NTP2014Q1-RMC-R14-RS-FHC2-A-C1-1-ETW-3	A	C1	1	1	19.15	0.1101	10	M(A,L)WB
NTP2014Q1-RMC-R14-RS-FHC2-A-C2-1-ETW-1	A	C2	1	2	17.54	0.1117	10	AGF
NTP2014Q1-RMC-R14-RS-FHC2-A-C2-1-ETW-2	A	C2	1	2	17.69	0.1114	10	AGF
NTP2014Q1-RMC-R14-RS-FHC2-A-C2-1-ETW-3	A	C2	1	2	18.33	0.1123	10	AGF
NTP2014Q1-RMC-R14-RS-FHC2-B-C1-1-ETW-1	B	C1	2	1	17.77	0.1138	10	M(A,L)WT
NTP2014Q1-RMC-R14-RS-FHC2-B-C1-1-ETW-2	B	C1	2	1	17.15	0.1137	10	M(A,L)WT
NTP2014Q1-RMC-R14-RS-FHC2-B-C1-1-ETW-3	B	C1	2	1	17.46	0.1139	10	AGF
NTP2014Q1-RMC-R14-RS-FHC2-B-C2-1-ETW-1	B	C2	2	2	18.62	0.1110	10	M(A,L)WT
NTP2014Q1-RMC-R14-RS-FHC2-B-C2-1-ETW-2	B	C2	2	2	18.32	0.1112	10	M(A,L)WB
NTP2014Q1-RMC-R14-RS-FHC2-B-C2-1-ETW-3	B	C2	2	2	17.82	0.1110	10	M(A,L)GF
NTP2014Q1-RMC-R14-RS-FHC2-C-C1-1-ETW-1	C	C1	3	1	18.64	0.1116	10	M(A,L)WT
NTP2014Q1-RMC-R14-RS-FHC2-C-C1-1-ETW-2	C	C1	3	1	19.17	0.1117	10	M(A,L)GF
NTP2014Q1-RMC-R14-RS-FHC2-C-C1-1-ETW-3	C	C1	3	1	18.66	0.1115	10	M(A,L)WB
NTP2014Q1-RMC-R14-RS-FHC2-C-C2-1-ETW-1	C	C2	3	2	18.46	0.1107	10	M(A,L)WB
NTP2014Q1-RMC-R14-RS-FHC2-C-C2-1-ETW-2	C	C2	3	2	18.76	0.1110	10	M(A,L)WB
NTP2014Q1-RMC-R14-RS-FHC2-C-C2-1-ETW-3	C	C2	3	2	18.49	0.1107	10	M(A,L)WB

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.01106	17.33
0.01098	18.44
0.01101	18.82
0.01117	17.49
0.01114	17.59
0.01123	18.37
0.01138	18.06
0.01137	17.41
0.01139	17.76
0.01110	18.45
0.01112	18.19
0.01110	17.67
0.01116	18.57
0.01117	19.12
0.01115	18.58
0.01107	18.25
0.01110	18.60
0.01107	18.28

Average 18.24
 Standard Dev. 0.6107
 Coeff. of Var. [%] 3.347
 Min. 17.15
 Max. 19.17
 Number of Spec. 18

Average_{norm} 0.01115 18.16
 Standard Dev_{norm} 0.5180
 Coeff. of Var. [%]_{norm} 2.852
 Min. 0.01098 17.33
 Max. 0.01139 19.12
 Number of Spec. 18 18



4.25 “40/20/40” Filled-Hole Compression 3 Properties (FHC3)

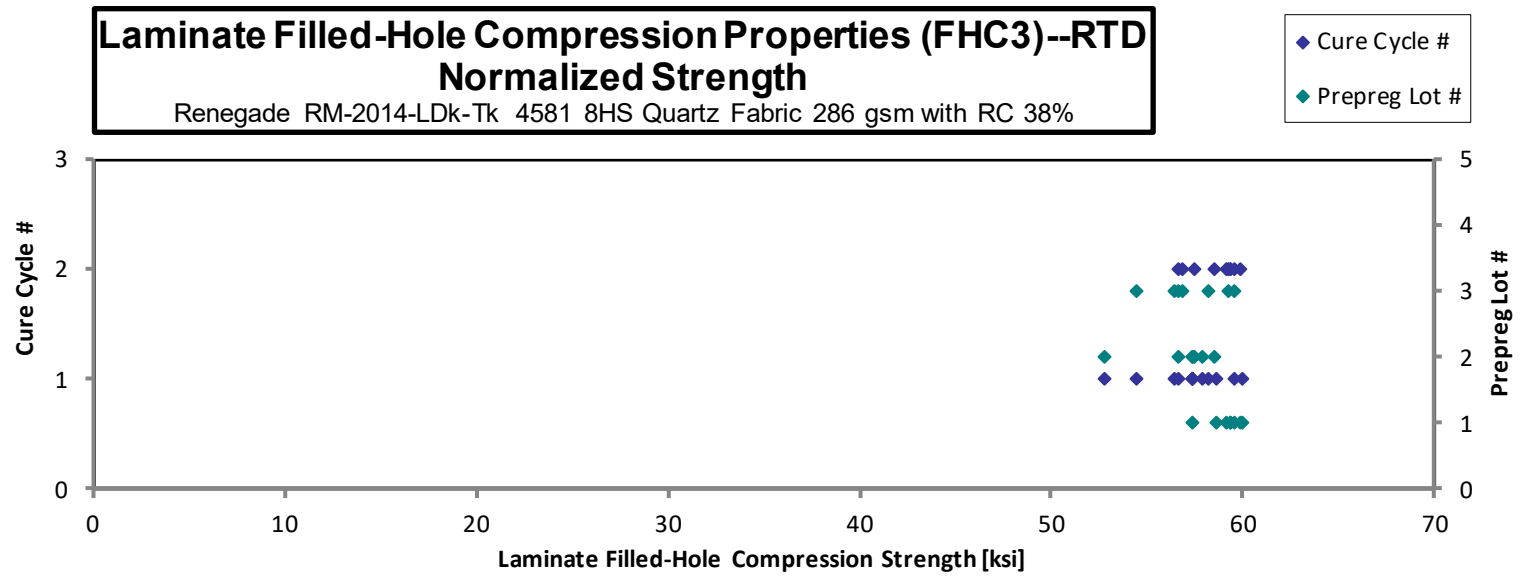
**Laminate Filled-Hole Compression Properties (FHC3)--RTD
Strength**
Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t _{ply} [in]	Strength _{norm} [ksi]
NTP2014Q1-RMC-R14-RS-FHC3-A-C1-1-RTD-1	A	C1	1	1	61.39	0.1094	10	M(A,L)WB	0.01094	59.96
NTP2014Q1-RMC-R14-RS-FHC3-A-C1-1-RTD-2	A	C1	1	1	60.24	0.1109	10	M(A,L)GF	0.01109	59.64
NTP2014Q1-RMC-R14-RS-FHC3-A-C1-1-RTD-3	A	C1	1	1	59.04	0.1114	10	M(A,L)GF	0.01114	58.71
NTP2014Q1-RMC-R14-RS-FHC3-A-C1-1-RTD-4	A	C1	1	1	57.77	0.1113	10	M(A,L)GF	0.01113	57.42
NTP2014Q1-RMC-R14-RS-FHC3-A-C2-1-RTD-1	A	C2	1	2	60.16	0.1101	10	LGB	0.01101	59.13
NTP2014Q1-RMC-R14-RS-FHC3-A-C2-1-RTD-2	A	C2	1	2	60.65	0.1107	10	M(A,L)WB	0.01107	59.95
NTP2014Q1-RMC-R14-RS-FHC3-A-C2-1-RTD-3	A	C2	1	2	60.01	0.1109	10	M(A,L)GF	0.01109	59.40
NTP2014Q1-RMC-R14-RS-FHC3-A-C2-1-RTD-4	A	C2	1	2	60.46	0.1100	10	M(A,L)GF	0.01100	59.39
NTP2014Q1-RMC-R14-RS-FHC3-B-C1-1-RTD-1	B	C1	2	1	58.07	0.1106	10	M(A,L)GF	0.01106	57.36
NTP2014Q1-RMC-R14-RS-FHC3-B-C1-1-RTD-2	B	C1	2	1	52.97	0.1118	10	M(A,L)WT	0.01118	52.87
NTP2014Q1-RMC-R14-RS-FHC3-B-C1-1-RTD-3	B	C1	2	1	57.98	0.1110	10	M(A,L)WT	0.01110	57.45
NTP2014Q1-RMC-R14-RS-FHC3-B-C1-1-RTD-4	B	C1	2	1	58.34	0.1112	10	M(A,L)WB	0.01112	57.91
NTP2014Q1-RMC-R14-RS-FHC3-B-C2-1-RTD-1	B	C2	2	2	58.55	0.1101	10	M(A,L)GF	0.01101	57.54
NTP2014Q1-RMC-R14-RS-FHC3-B-C2-1-RTD-2	B	C2	2	2	59.20	0.1107	10	M(A,L)GF	0.01107	58.52
NTP2014Q1-RMC-R14-RS-FHC3-B-C2-1-RTD-3	B	C2	2	2	57.41	0.1107	10	M(A,L)WB	0.01107	56.72
NTP2014Q1-RMC-R14-RS-FHC3-C-C1-1-RTD-1	C	C1	3	1	55.49	0.1100	10	LGF	0.01100	54.49
NTP2014Q1-RMC-R14-RS-FHC3-C-C1-1-RTD-2	C	C1	3	1	58.97	0.1106	10	M(A,L)WT	0.01106	58.22
NTP2014Q1-RMC-R14-RS-FHC3-C-C1-1-RTD-3	C	C1	3	1	57.16	0.1112	10	M(A,L)WT	0.01112	56.73
NTP2014Q1-RMC-R14-RS-FHC3-C-C1-1-RTD-4	C	C1	3	1	56.73	0.1115	10	M(A,L)WB	0.01115	56.49
NTP2014Q1-RMC-R14-RS-FHC3-C-C2-1-RTD-1	C	C2	3	2	60.60	0.1101	10	M(A,L)GF	0.01101	59.55
NTP2014Q1-RMC-R14-RS-FHC3-C-C2-1-RTD-2	C	C2	3	2	57.23	0.1113	10	M(A,L)GF	0.01113	56.88
NTP2014Q1-RMC-R14-RS-FHC3-C-C2-1-RTD-4	C	C2	3	2	59.94	0.1107	10	M(A,L)GF	0.01107	59.26

Average 58.56
Standard Dev. 1.960
Coeff. of Var. [%] 3.347
Min. 52.97
Max. 61.39
Number of Spec. 22

Average_{norm} 0.01107 57.89
Standard Dev_{norm} 1.783
Coeff. of Var. [%]_{norm} 3.080
Min. 0.01094 52.87
Max. 0.01118 59.96
Number of Spec. 22 22



Laminate Filled-Hole Compression Properties (FHC3)--ETW
Strength

Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

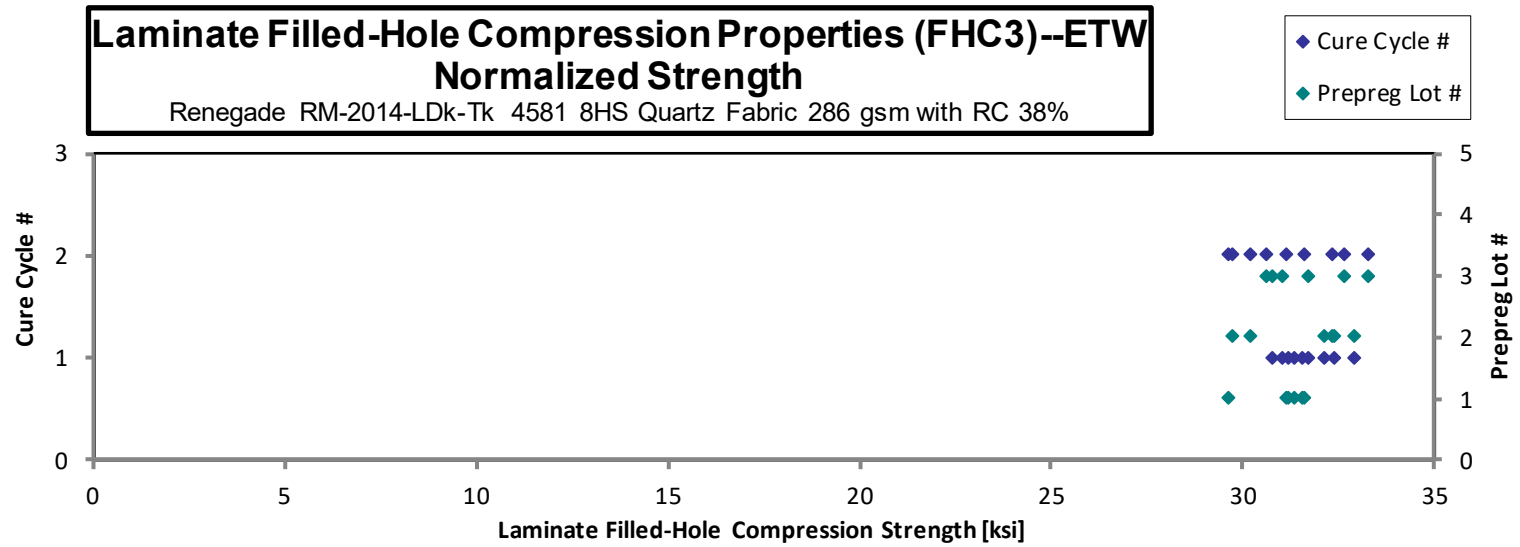
normalizing
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-FHC3-A-C1-1-ETW-1	A	C1	1	1	31.52	0.1115	10	LGF
NTP2014Q1-RMC-R14-RS-FHC3-A-C1-1-ETW-2	A	C1	1	1	31.41	0.1113	10	LWB
NTP2014Q1-RMC-R14-RS-FHC3-A-C1-1-ETW-3	A	C1	1	1	31.63	0.1117	10	LWB
NTP2014Q1-RMC-R14-RS-FHC3-A-C2-1-ETW-1	A	C2	1	2	30.02	0.1107	10	LGF
NTP2014Q1-RMC-R14-RS-FHC3-A-C2-1-ETW-2	A	C2	1	2	31.69	0.1102	10	LGF
NTP2014Q1-RMC-R14-RS-FHC3-A-C2-1-ETW-3	A	C2	1	2	32.26	0.1099	10	LWB
NTP2014Q1-RMC-R14-RS-FHC3-B-C1-1-ETW-1	B	C1	2	1	33.29	0.1108	10	LWB
NTP2014Q1-RMC-R14-RS-FHC3-B-C1-1-ETW-2	B	C1	2	1	32.52	0.1108	10	LWB
NTP2014Q1-RMC-R14-RS-FHC3-B-C1-1-ETW-3	B	C1	2	1	32.62	0.1113	10	LWB
NTP2014Q1-RMC-R14-RS-FHC3-B-C2-1-ETW-1	B	C2	2	2	30.68	0.1103	10	M(A,L)WLB
NTP2014Q1-RMC-R14-RS-FHC3-B-C2-1-ETW-2	B	C2	2	2	32.96	0.1100	10	LGF
NTP2014Q1-RMC-R14-RS-FHC3-B-C2-1-ETW-3	B	C2	2	2	30.22	0.1103	10	LWB
NTP2014Q1-RMC-R14-RS-FHC3-C-C1-1-ETW-1	C	C1	3	1	31.24	0.1113	10	M(A,L)WLB
NTP2014Q1-RMC-R14-RS-FHC3-C-C1-1-ETW-2	C	C1	3	1	31.10	0.1109	10	LGT
NTP2014Q1-RMC-R14-RS-FHC3-C-C1-1-ETW-3	C	C1	3	1	31.96	0.1113	10	LWB
NTP2014Q1-RMC-R14-RS-FHC3-C-C2-1-ETW-1	C	C2	3	2	31.05	0.1105	10	M(A,L)WLB
NTP2014Q1-RMC-R14-RS-FHC3-C-C2-1-ETW-2	C	C2	3	2	33.07	0.1106	10	M(A,L)WLB
NTP2014Q1-RMC-R14-RS-FHC3-C-C2-1-ETW-3	C	C2	3	2	33.41	0.1116	10	LWT

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.01115	31.39
0.01113	31.21
0.01117	31.55
0.01107	29.67
0.01102	31.18
0.01099	31.65
0.01108	32.94
0.01108	32.16
0.01113	32.40
0.01103	30.22
0.01100	32.37
0.01103	29.77
0.01113	31.05
0.01109	30.80
0.01113	31.75
0.01105	30.64
0.01106	32.66
0.01116	33.28

Average 31.81
 Standard Dev. 1.021
 Coeff. of Var. [%] 3.210
 Min. 30.02
 Max. 33.41
 Number of Spec. 18

Average_{norm} 0.01108 31.48
 Standard Dev._{norm} 1.037
 Coeff. of Var. [%]_{norm} 3.294
 Min. 0.01099 29.67
 Max. 0.01117 33.28
 Number of Spec. 18 18



4.26 “25/50/25” Single-Shear Bearing 1 Properties (SSB1)

**Laminate Single-Shear Bearing Properties (SSB1)--RTD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

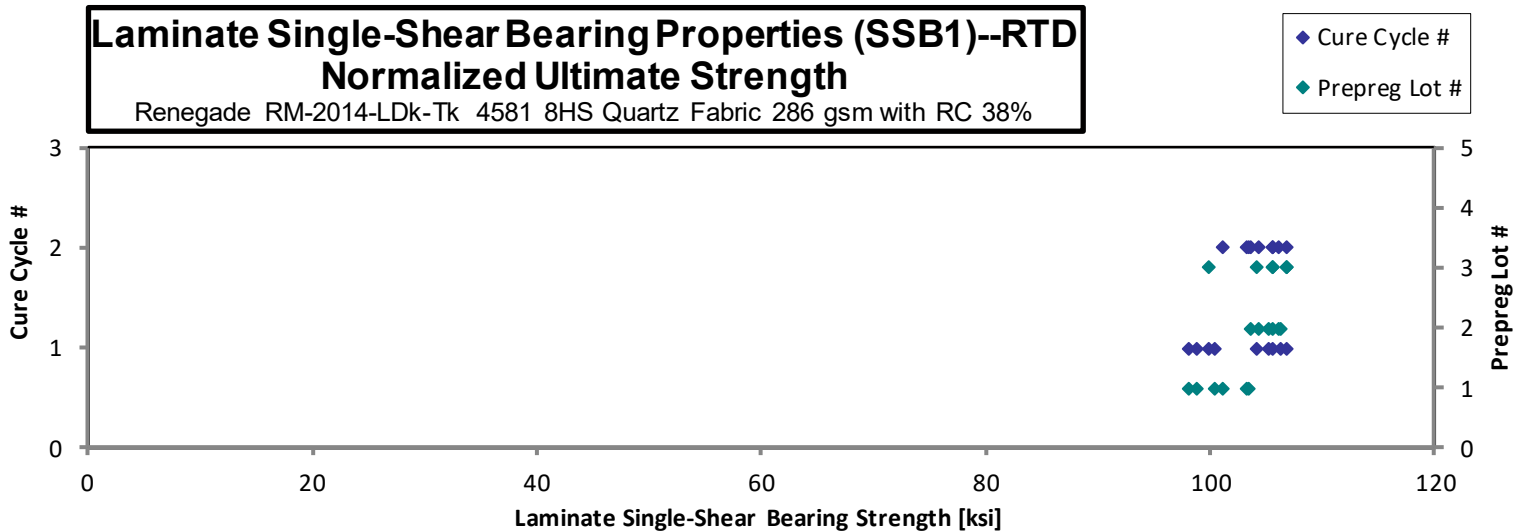
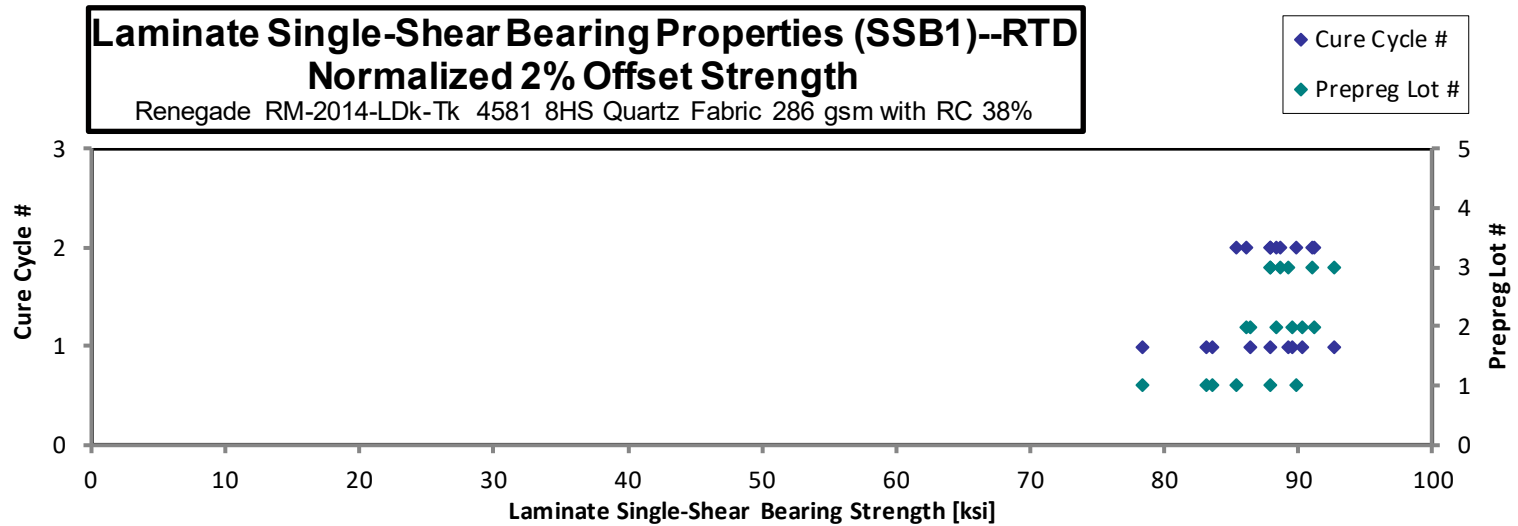
t_{ply} [in]
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-SSB1-A-C1-1-RTD-1	A	C1	1	1	85.30	100.7	0.1310	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-A-C1-1-RTD-2	A	C1	1	1	85.91	101.4	0.1309	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-A-C1-1-RTD-3	A	C1	1	1	80.77	103.4	0.1305	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-A-C2-1-RTD-1	A	C2	1	2	88.30	101.3	0.1369	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-A-C2-1-RTD-2	A	C2	1	2	85.97	98.75	0.1376	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-A-C2-1-RTD-3	A	C2	1	2	84.41	102.2	0.1361	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-B-C1-1-RTD-1	B	C1	2	1	88.49	103.4	0.1373	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-B-C1-1-RTD-2	B	C1	2	1	84.73	103.0	0.1372	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-B-C1-1-RTD-3	B	C1	2	1	87.26	103.5	0.1381	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-B-C2-1-RTD-1	B	C2	2	2	86.35	103.5	0.1377	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-B-C2-1-RTD-2	B	C2	2	2	89.10	101.9	0.1378	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-B-C2-1-RTD-3	B	C2	2	2	84.38	101.3	0.1374	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-C-C1-1-RTD-1	C	C1	3	1	85.73	101.6	0.1379	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-C-C1-1-RTD-2	C	C1	3	1	90.16	97.03	0.1382	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-C-C1-1-RTD-3	C	C1	3	1	87.26	104.5	0.1375	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-C-C2-1-RTD-1	C	C2	3	2	86.56	105.1	0.1366	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-C-C2-1-RTD-2	C	C2	3	2	88.89	103.2	0.1377	12	B1I
NTP2014Q1-RMC-R14-RS-SSB1-C-C2-1-RTD-3	C	C2	3	2	86.48	102.8	0.1380	12	B1I

Avg. t_{ply} [in]	2% Offset Strength _{norm} [ksi]	Ultimate Strength _{norm} [ksi]
0.01092	83.13	98.11
0.01091	83.70	98.81
0.01088	78.43	100.4
0.01141	89.96	103.2
0.01147	88.02	101.1
0.01134	85.50	103.5
0.01144	90.40	105.6
0.01143	86.49	105.1
0.01151	89.68	106.4
0.01148	88.47	106.1
0.01148	91.32	104.4
0.01145	86.24	103.6
0.01149	87.99	104.2
0.01152	92.74	99.80
0.01146	89.27	106.9
0.01138	87.99	106.9
0.01147	91.05	105.7
0.01150	88.76	105.5

Average 86.45 102.1
Standard Dev. 2.191 1.963
Coeff. of Var. [%] 2.535 1.922
Min. 80.77 97.03
Max. 90.16 105.1
Number of Spec. 18 18

Average_{norm} 0.01136 87.73 103.6
Standard Dev._{norm} 3.444 2.811
Coeff. of Var. [%]_{norm} 3.926 2.713
Min. 0.01088 78.43 98.11
Max. 0.01152 92.74 106.9
Number of Spec. 18 18 18



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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

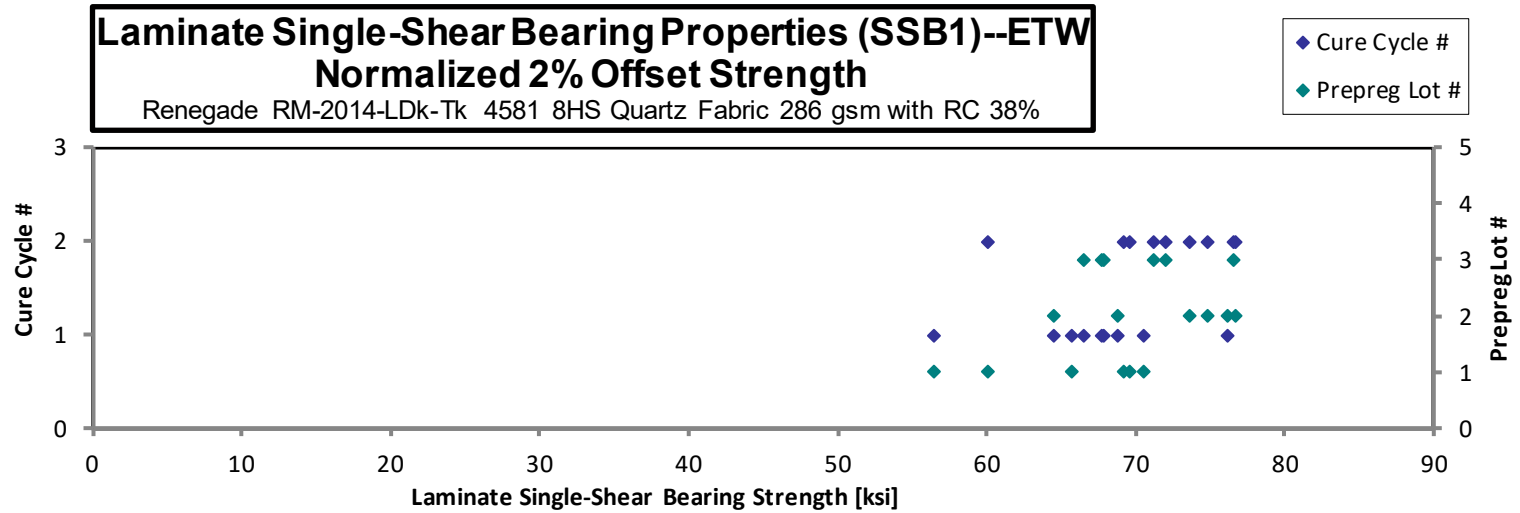
t_{ply} [in]

0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	2% Offset Strength _{norm} [ksi]	Ultimate Strength _{norm} [ksi]
NTP2014Q1-RMC-R14-RS-SSB1-A-C1-1-ETW-1	A	C1	1	1	58.72	67.77	0.1292	12	B1I	0.01077	56.46	65.15
NTP2014Q1-RMC-R14-RS-SSB1-A-C1-1-ETW-2	A	C1	1	1	73.22	76.44	0.1295	12	B1I	0.01079	70.55	73.65
NTP2014Q1-RMC-R14-RS-SSB1-A-C1-1-ETW-3	A	C1	1	1	67.02	71.64	0.1318	12	B1I	0.01098	65.73	70.26
NTP2014Q1-RMC-R14-RS-SSB1-A-C2-1-ETW-1	A	C2	1	2	68.85	69.75	0.1360	12	B1I	0.01133	69.64	70.56
NTP2014Q1-RMC-R14-RS-SSB1-A-C2-1-ETW-2	A	C2	1	2	58.91	66.98	0.1370	12	B1I	0.01142	60.05	68.28
NTP2014Q1-RMC-R14-RS-SSB1-A-C2-1-ETW-3	A	C2	1	2	68.46	68.58	0.1358	12	B1I	0.01132	69.17	69.29
NTP2014Q1-RMC-R14-RS-SSB1-B-C1-1-ETW-1	B	C1	2	1	62.85	66.35	0.1378	12	B1I	0.01148	64.43	68.02
NTP2014Q1-RMC-R14-RS-SSB1-B-C1-1-ETW-2	B	C1	2	1	73.96	74.87	0.1384	12	B1I	0.01153	76.13	77.07
NTP2014Q1-RMC-R14-RS-SSB1-B-C1-1-ETW-3	B	C1	2	1	67.10	69.88	0.1378	12	B1I	0.01148	68.79	71.64
NTP2014Q1-RMC-R14-RS-SSB1-B-C2-1-ETW-1	B	C2	2	2	72.29	74.48	0.1369	12	B1I	0.01141	73.65	75.89
NTP2014Q1-RMC-R14-RS-SSB1-B-C2-1-ETW-2	B	C2	2	2	73.19	74.88	0.1373	12	B1I	0.01144	74.76	76.49
NTP2014Q1-RMC-R14-RS-SSB1-B-C2-1-ETW-3	B	C2	2	2	75.02	75.90	0.1374	12	B1I	0.01145	76.67	77.56
NTP2014Q1-RMC-R14-RS-SSB1-C-C1-1-ETW-1	C	C1	3	1	66.25	66.60	0.1377	12	B1I	0.01148	67.89	68.25
NTP2014Q1-RMC-R14-RS-SSB1-C-C1-1-ETW-2	C	C1	3	1	64.86	64.87	0.1379	12	B1I	0.01149	66.55	66.56
NTP2014Q1-RMC-R14-RS-SSB1-C-C1-1-ETW-3	C	C1	3	1	66.41	66.56	0.1371	12	B1I	0.01142	67.73	67.88
NTP2014Q1-RMC-R14-RS-SSB1-C-C2-1-ETW-1	C	C2	3	2	69.92	70.08	0.1383	12	B1I	0.01152	71.93	72.09
NTP2014Q1-RMC-R14-RS-SSB1-C-C2-1-ETW-2	C	C2	3	2	74.12	77.38	0.1387	12	B1I	0.01156	76.49	79.86
NTP2014Q1-RMC-R14-RS-SSB1-C-C2-1-ETW-3	C	C2	3	2	69.07	71.30	0.1385	12	B1I	0.01154	71.15	73.45

Average 68.35 70.80
Standard Dev. 4.915 3.990
Coeff. of Var. [%] 7.192 5.636
Min. 58.72 64.87
Max. 75.02 77.38
Number of Spec. 18 18

Average_{norm} 0.01136 69.32 71.77
Standard Dev._{norm} 5.490 4.252
Coeff. of Var. [%]_{norm} 7.920 5.924
Min. 0.01077 56.46 65.15
Max. 0.01156 76.67 79.86
Number of Spec. 18 18 18



4.27 “10/80/10” Single-Shear Bearing 2 Properties (SSB2)

**Laminate Single-Shear Bearing Properties (SSB2)--RTD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

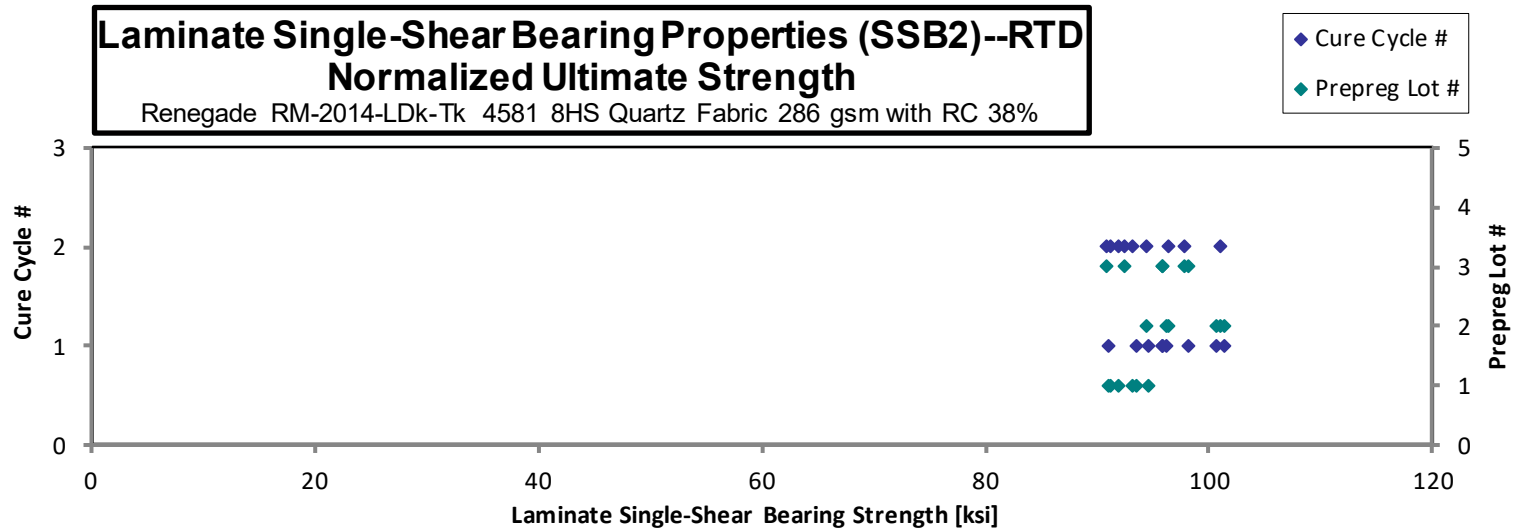
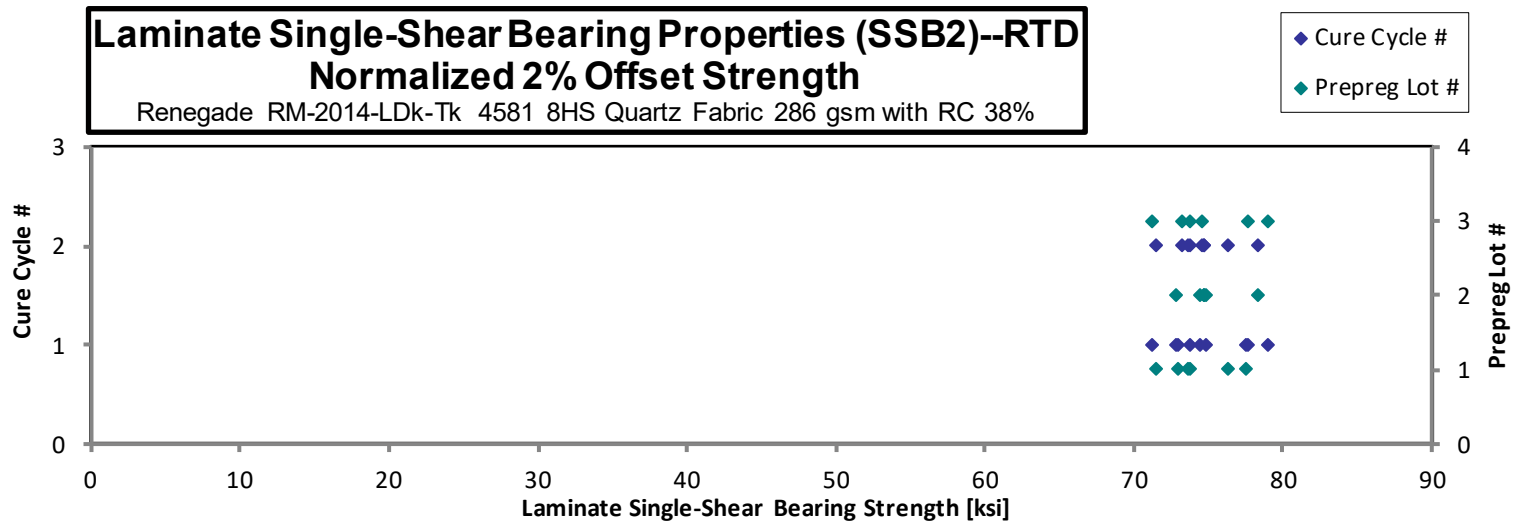
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-SSB2-A-C1-1-RTD-1	A	C1	1	1	78.24	95.67	0.1109	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C1-1-RTD-2	A	C1	1	1	74.52	92.01	0.1108	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C1-1-RTD-3	A	C1	1	1	73.72	94.67	0.1108	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C2-1-RTD-1	A	C2	1	2	73.74	93.40	0.1118	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C2-1-RTD-2	A	C2	1	2	76.14	91.22	0.1121	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C2-1-RTD-3	A	C2	1	2	71.45	92.05	0.1120	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C1-1-RTD-1	B	C1	2	1	73.33	99.39	0.1135	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C1-1-RTD-2	B	C1	2	1	71.96	100.2	0.1134	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C1-1-RTD-3	B	C1	2	1	74.17	95.38	0.1130	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C2-1-RTD-1	B	C2	2	2	73.61	99.57	0.1136	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C2-1-RTD-2	B	C2	2	2	76.98	94.80	0.1139	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C2-1-RTD-3	B	C2	2	2	73.95	93.68	0.1130	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C1-1-RTD-1	C	C1	3	1	78.07	97.19	0.1132	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C1-1-RTD-2	C	C1	3	1	71.46	96.20	0.1116	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C1-1-RTD-3	C	C1	3	1	77.27	95.49	0.1124	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C2-1-RTD-1	C	C2	3	2	73.51	98.32	0.1116	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C2-1-RTD-2	C	C2	3	2	73.46	90.52	0.1124	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C2-1-RTD-3	C	C2	3	2	74.58	92.62	0.1119	10	B1I

Avg. t_{ply} [in]	2% Offset Strength _{norm} [ksi]	Ultimate Strength _{norm} [ksi]
0.01109	77.48	94.75
0.01108	73.72	91.02
0.01108	72.91	93.62
0.01118	73.60	93.23
0.01121	76.20	91.29
0.01120	71.45	92.05
0.01135	74.31	100.7
0.01134	72.83	101.4
0.01130	74.80	96.19
0.01136	74.68	101.0
0.01139	78.26	96.38
0.01130	74.61	94.51
0.01132	78.90	98.22
0.01116	71.22	95.88
0.01124	77.56	95.84
0.01116	73.22	97.92
0.01124	73.73	90.86
0.01119	74.53	92.55

Average 74.45 95.13
Standard Dev. 2.087 2.942
Coeff. of Var. [%] 2.803 3.092
Min. 71.45 90.52
Max. 78.24 100.2
Number of Spec. 18 18

Average_{norm} 0.01123 74.67 95.42
Standard Dev._{norm} 2.214 3.408
Coeff. of Var. [%]_{norm} 2.965 3.572
Min. 0.01108 71.22 90.86
Max. 0.01139 78.90 101.4
Number of Spec. 18 18 18



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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

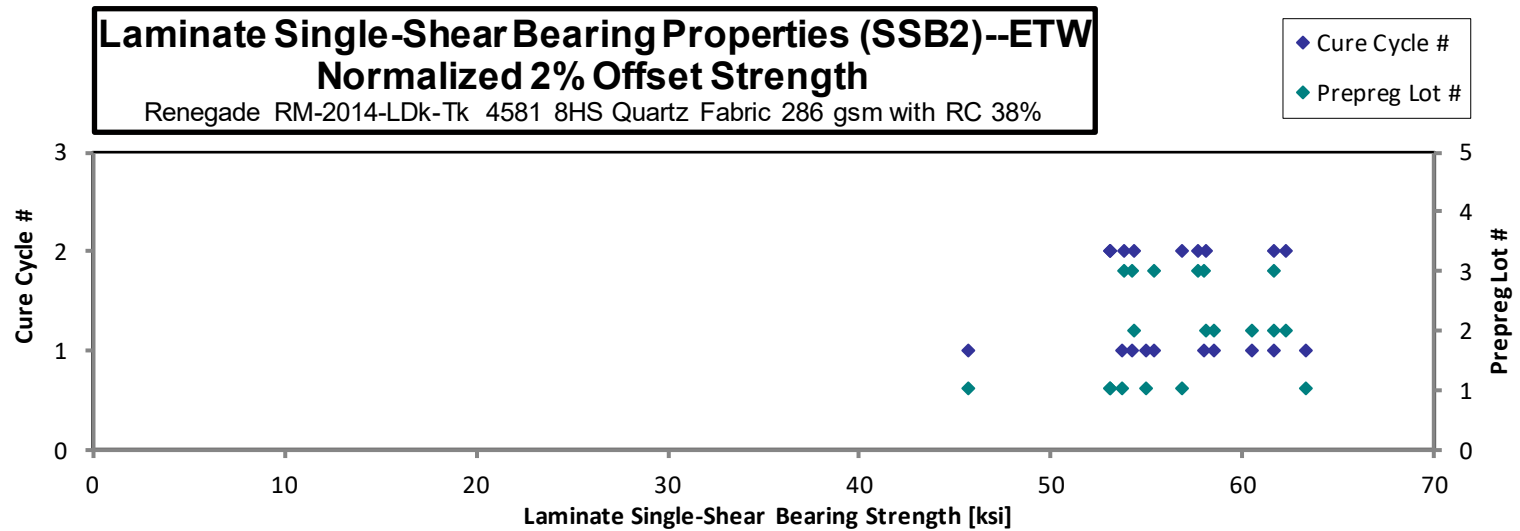
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-SSB2-A-C1-1-ETW-1	A	C1	1	1	46.16	60.05	0.1108	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C1-1-ETW-2	A	C1	1	1	64.17	69.94	0.1104	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C1-1-ETW-3	A	C1	1	1	54.21	62.32	0.1108	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C1-1-ETW-4	A	C1	1	1	55.46	66.87	0.1109	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C2-1-ETW-1	A	C2	1	2	56.64	65.76	0.1124	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C2-1-ETW-2	A	C2	1	2	53.13	66.56	0.1119	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-A-C2-1-ETW-3	A	C2	1	2	52.89	66.14	0.1123	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C1-1-ETW-1	B	C1	2	1	61.41	66.98	0.1124	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C1-1-ETW-2	B	C1	2	1	59.83	66.83	0.1131	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C1-1-ETW-3	B	C1	2	1	58.04	66.17	0.1129	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C2-1-ETW-1	B	C2	2	2	53.75	64.00	0.1132	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C2-1-ETW-2	B	C2	2	2	56.97	61.03	0.1141	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-B-C2-1-ETW-3	B	C2	2	2	61.49	66.15	0.1133	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C1-1-ETW-1	C	C1	3	1	55.24	67.07	0.1122	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C1-1-ETW-2	C	C1	3	1	54.06	67.66	0.1124	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C1-1-ETW-3	C	C1	3	1	57.80	65.07	0.1123	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C2-1-ETW-1	C	C2	3	2	53.75	64.00	0.1121	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C2-1-ETW-2	C	C2	3	2	56.97	61.03	0.1132	10	B1I
NTP2014Q1-RMC-R14-RS-SSB2-C-C2-1-ETW-3	C	C2	3	2	61.49	66.15	0.1122	10	B1I

Avg. t_{ply} [in]	2% Offset Strength _{norm} [ksi]	Ultimate Strength _{norm} [ksi]
0.01108	45.68	59.42
0.01104	63.23	68.92
0.01108	53.62	61.64
0.01109	54.92	66.22
0.01124	56.83	65.98
0.01119	53.06	66.47
0.01123	53.03	66.32
0.01124	61.63	67.22
0.01131	60.42	67.49
0.01129	58.51	66.70
0.01132	54.34	64.70
0.01141	58.02	62.15
0.01133	62.19	66.91
0.01122	55.33	67.18
0.01124	54.25	67.90
0.01123	57.95	65.24
0.01121	53.80	64.06
0.01132	57.60	61.70
0.01122	61.57	66.24

Average 56.50 65.25
Standard Dev. 4.140 2.570
Coeff. of Var. [%] 7.328 3.939
Min. 46.16 60.05
Max. 64.17 69.94
Number of Spec. 19 19

Average_{norm} 0.01122 56.63 65.39
Standard Dev_{norm} 4.247 2.512
Coeff. of Var. [%]_{norm} 7.500 3.841
Min. 0.01104 45.68 59.42
Max. 0.01141 63.23 68.92
Number of Spec. 19 19 19



4.28 “40/20/40” Single-Shear Bearing 3 Properties (SSB3)

**Laminate Single-Shear Bearing Properties (SSB3)--RTD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

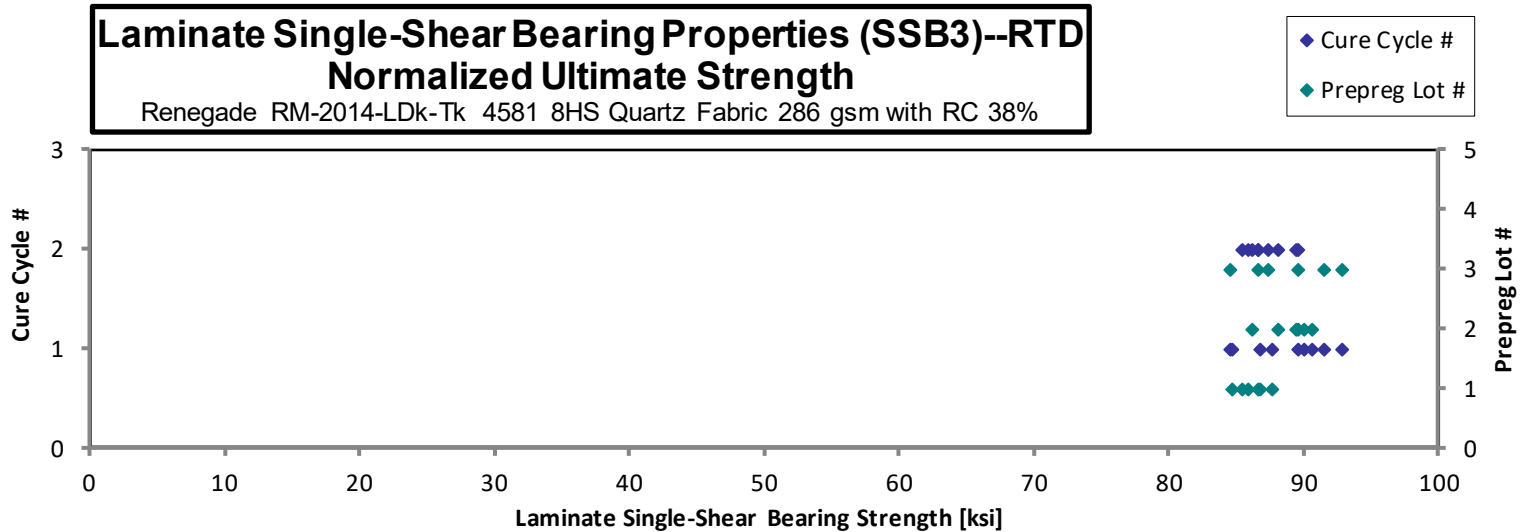
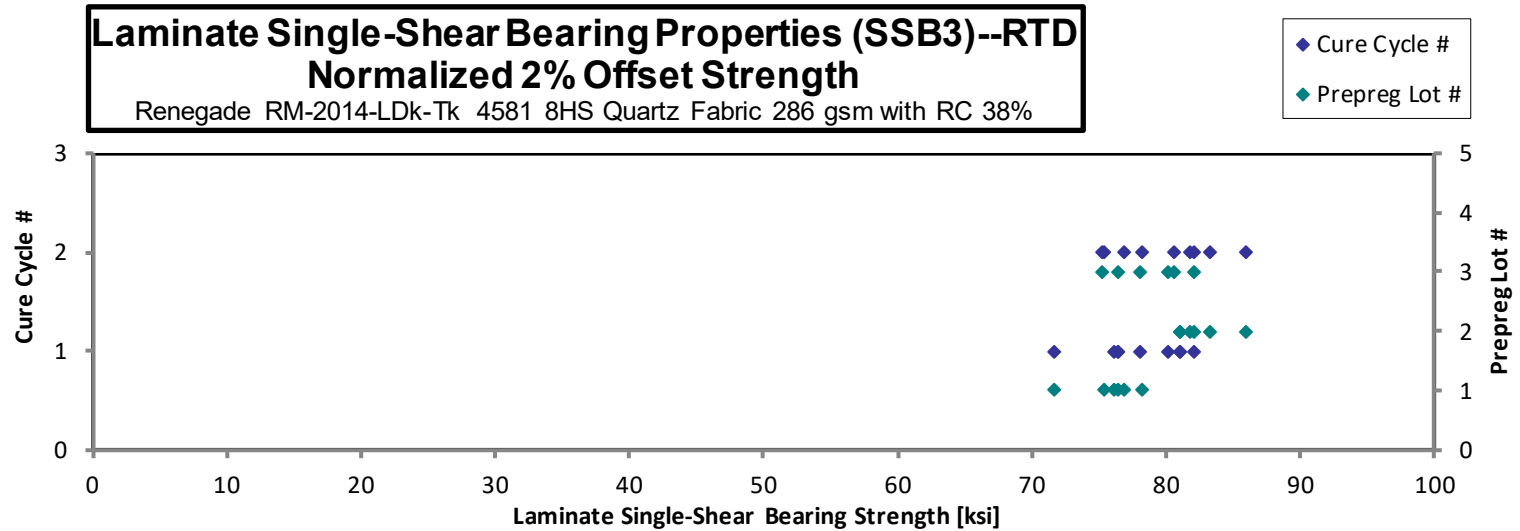
t_{ply} [in]
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Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-SSB3-A-C1-1-RTD-1	A	C1	1	1	71.91	88.07	0.1115	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-A-C1-1-RTD-2	A	C1	1	1	76.21	84.93	0.1118	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-A-C1-1-RTD-3	A	C1	1	1	76.67	87.25	0.1115	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-A-C2-1-RTD-1	A	C2	1	2	76.24	84.94	0.1128	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-A-C2-1-RTD-2	A	C2	1	2	77.77	86.29	0.1125	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-A-C2-1-RTD-3	A	C2	1	2	74.54	85.07	0.1132	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C1-1-RTD-1	B	C1	2	1	79.34	87.81	0.1145	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C1-1-RTD-2	B	C1	2	1	80.26	88.12	0.1145	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C1-1-RTD-3	B	C1	2	1	79.70	89.21	0.1139	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C2-1-RTD-1	B	C2	2	2	85.07	88.66	0.1132	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C2-1-RTD-2	B	C2	2	2	82.81	85.77	0.1127	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C2-1-RTD-3	B	C2	2	2	80.84	87.13	0.1133	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C1-1-RTD-1	C	C1	3	1	76.25	84.51	0.1122	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C1-1-RTD-2	C	C1	3	1	77.77	91.35	0.1124	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C1-1-RTD-3	C	C1	3	1	79.61	92.34	0.1127	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C2-1-RTD-1	C	C2	3	2	83.04	88.51	0.1106	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C2-1-RTD-2	C	C2	3	2	74.90	89.44	0.1124	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C2-1-RTD-3	C	C2	3	2	81.26	87.45	0.1111	10	B1I

Avg. t_{ply} [in]	2% Offset Strength _{norm} [ksi]	Ultimate Strength _{norm} [ksi]
0.01115	71.59	87.68
0.01118	76.04	84.74
0.01115	76.33	86.87
0.01128	76.80	85.56
0.01125	78.14	86.70
0.01132	75.35	86.00
0.01145	81.07	89.73
0.01145	82.02	90.04
0.01139	81.04	90.71
0.01132	85.95	89.57
0.01127	83.30	86.28
0.01133	81.76	88.12
0.01122	76.39	84.66
0.01124	78.01	91.64
0.01127	80.07	92.87
0.01106	81.97	87.38
0.01124	75.14	89.73
0.01111	80.58	86.73

Average 78.56 87.60
Standard Dev. 3.376 2.177
Coeff. of Var. [%] 4.297 2.485
Min. 71.91 84.51
Max. 85.07 92.34
Number of Spec. 18 18

Average_{norm} 0.01126 78.97 88.06
Standard Dev._{norm} 3.571 2.385
Coeff. of Var. [%]_{norm} 4.522 2.709
Min. 0.01106 71.59 84.66
Max. 0.01145 85.95 92.87
Number of Spec. 18 18 18



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

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing

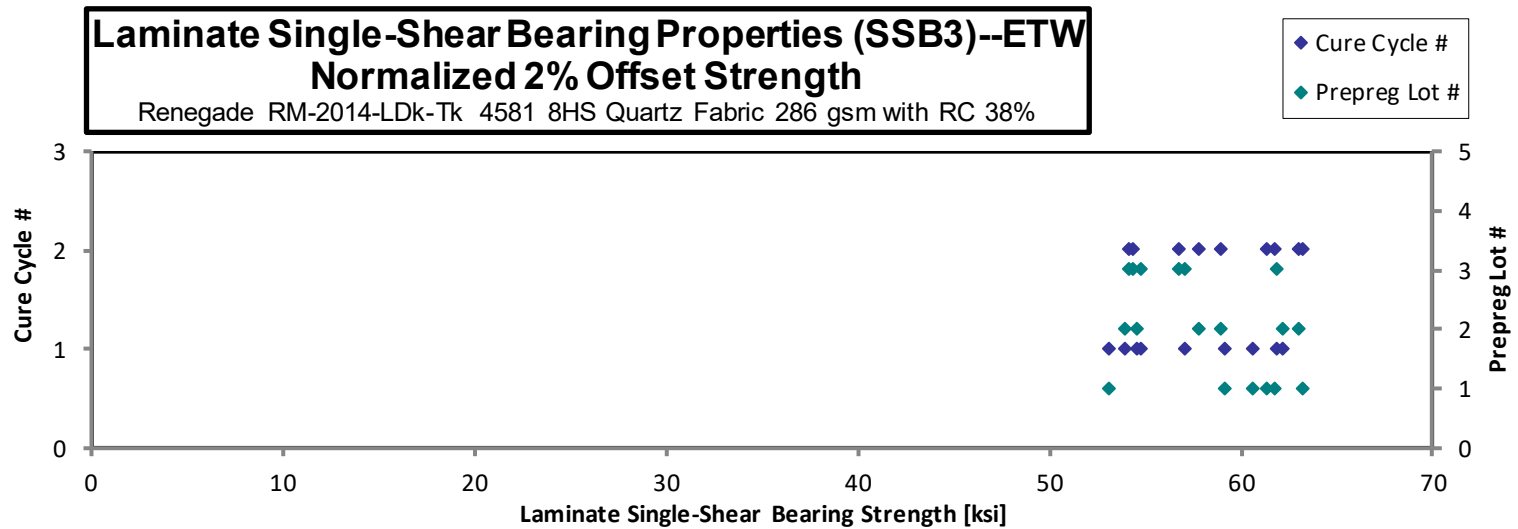
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-SSB3-A-C1-1-ETW-1	A	C1	1	1	53.32	54.61	0.1116	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-A-C1-1-ETW-2	A	C1	1	1	60.62	60.62	0.1121	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-A-C1-1-ETW-3	A	C1	1	1	59.12	59.26	0.1120	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-A-C2-1-ETW-1	A	C2	1	2	60.93	61.53	0.1128	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-A-C2-1-ETW-2	A	C2	1	2	62.52	62.70	0.1133	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-A-C2-1-ETW-3	A	C2	1	2	61.53	62.55	0.1125	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C1-1-ETW-1	B	C1	2	1	60.72	60.97	0.1147	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C1-1-ETW-2	B	C1	2	1	52.67	54.09	0.1146	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C1-1-ETW-3	B	C1	2	1	52.98	54.54	0.1153	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C2-1-ETW-1	B	C2	2	2	62.04	62.11	0.1137	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C2-1-ETW-2	B	C2	2	2	57.19	57.40	0.1132	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-B-C2-1-ETW-3	B	C2	2	2	58.44	59.92	0.1130	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C1-1-ETW-1	C	C1	3	1	61.88	62.22	0.1120	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C1-1-ETW-2	C	C1	3	1	56.83	57.35	0.1124	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C1-1-ETW-3	C	C1	3	1	54.66	57.53	0.1123	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C2-1-ETW-1	C	C2	3	2	56.97	57.97	0.1116	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C2-1-ETW-2	C	C2	3	2	54.06	54.84	0.1122	10	B1I
NTP2014Q1-RMC-R14-RS-SSB3-C-C2-1-ETW-3	C	C2	3	2	54.86	55.06	0.1111	10	B1I

Avg. t_{ply} [in]	2% Offset Strength _{norm} [ksi]	Ultimate Strength _{norm} [ksi]
0.01116	53.13	54.42
0.01121	60.67	60.67
0.01120	59.11	59.25
0.01128	61.39	61.99
0.01133	63.22	63.40
0.01125	61.81	62.83
0.01147	62.16	62.42
0.01146	53.90	55.35
0.01153	54.56	56.17
0.01137	63.01	63.07
0.01132	57.80	58.01
0.01130	58.94	60.43
0.01120	61.89	62.23
0.01124	57.04	57.55
0.01123	54.80	57.68
0.01116	56.75	57.75
0.01122	54.17	54.95
0.01111	54.41	54.61

Average 57.85 58.63
Standard Dev. 3.459 3.090
Coeff. of Var. [%] 5.979 5.270
Min. 52.67 54.09
Max. 62.52 62.70
Number of Spec. 18 18

Average_{norm} 0.01128 58.26 59.04
Standard Dev_{norm} 3.526 3.170
Coeff. of Var. [%]_{norm} 6.051 5.370
Min. 0.01111 53.13 54.42
Max. 0.01153 63.22 63.40
Number of Spec. 18 18



4.29 “25/50/25” Compression After Impact 1 Properties (CAI1)

Laminate Compression After Impact Properties (CAI1)--RTD Strength

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

normalizing
t_{ply} [in]
0.01120

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Measured Impact Energy (in-lbf)	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode
NTP2014Q1-RMC-R14-RS-CAI1-A-C1-1-RTD-1	A	C1	1	1	24.94	193.8	0.1360	12	M(A,L)GT
NTP2014Q1-RMC-R14-RS-CAI1-A-C1-1-RTD-2	A	C1	1	1	25.48	204.5	0.1359	12	M(A,L)GT
NTP2014Q1-RMC-R14-RS-CAI1-A-C1-1-RTD-3	A	C1	1	1	25.87	204.7	0.1363	12	M(A,L)GT
NTP2014Q1-RMC-R14-RS-CAI1-A-C1-1-RTD-4	A	C1	1	1	25.72	203.5	0.1349	12	M(A,L)GT
NTP2014Q1-RMC-R14-RS-CAI1-A-C1-1-RTD-5	A	C1	1	1	26.43	204.0	0.1357	12	M(A,L)GT
NTP2014Q1-RMC-R14-RS-CAI1-A-C1-1-RTD-6	A	C1	1	1	25.81	204.0	0.1364	12	M(A,L)GM
NTP2014Q1-RMC-R14-RS-CAI1-A-C1-1-RTD-8	A	C1	1	1	26.10	204.5	0.1357	12	M(A,L)GM

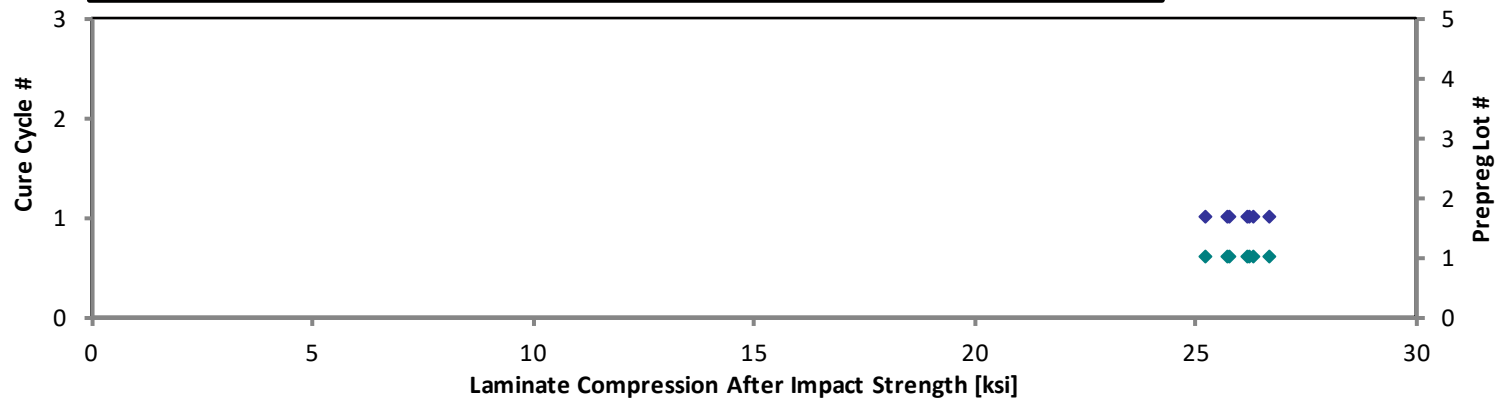
Avg. t _{ply} [in]	Strength _{norm} [ksi]
0.01133	25.23
0.01132	25.76
0.01136	26.23
0.01124	25.81
0.01131	26.69
0.01137	26.19
0.01131	26.35

Average 25.77
Standard Dev. 0.4724
Coeff. of Var. [%] 1.833
Min. 24.94
Max. 26.43
Number of Spec. 7

Average_{norm} 0.01132 26.04
Standard Dev_{norm} 0.4757
Coeff. of Var. [%]_{norm} 1.827
Min. 0.01124 25.23
Max. 0.01137 26.69
Number of Spec. 7 7

Laminate Compression After Impact Properties (CAI1)--RTD Normalized Strength

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%



4.30 Interlaminar Tension Properties (ILT)

Interlaminar Tension Properties (ILT)--CTD Strength

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

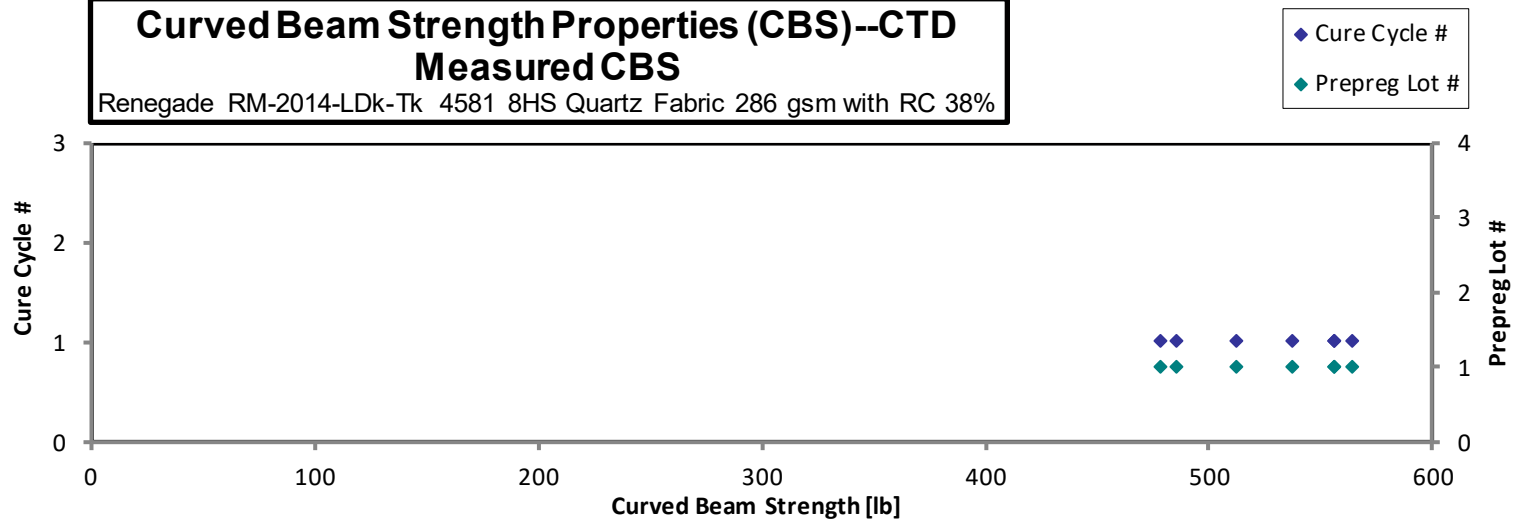
Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-CTD-1*	A	C1	1	1	485.8	9.498	0.2231	20	0.01116	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-CTD-2*	A	C1	1	1	564.3	11.11	0.2218	20	0.01109	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-CTD-3*	A	C1	1	1	556.3	10.97	0.2215	20	0.01108	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-CTD-4*	A	C1	1	1	537.7	10.59	0.2218	20	0.01109	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-CTD-5*	A	C1	1	1	556.3	10.96	0.2217	20	0.01108	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-CTD-6*	A	C1	1	1	478.5	9.423	0.2218	20	0.01109	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-CTD-7*	A	C1	1	1	512.3	10.15	0.2207	20	0.01104	ILT

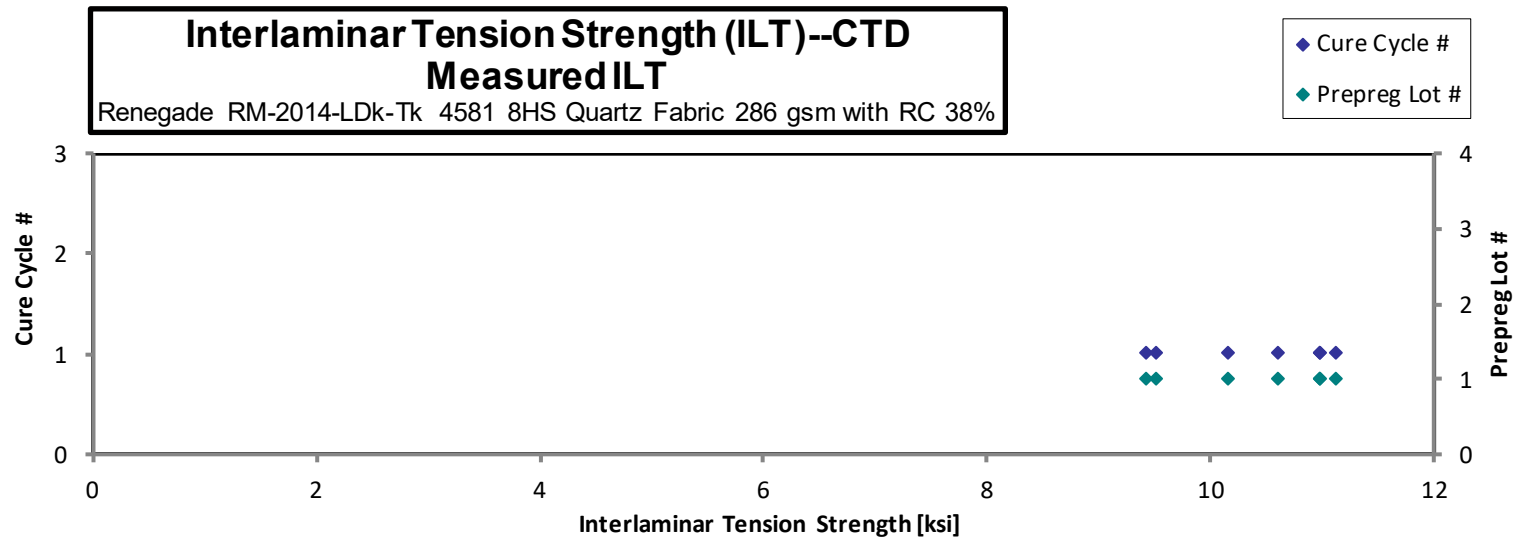
*Cross head displacement exceeds 5mm [0.2 in] prior to failure.

Average	527.3	10.39	Average	0.01109
Standard Dev.	35.31	0.7086	Standard Dev.	
Coeff. of Var. [%]	6.696	6.823	Coeff. of Var. [%]	
Min.	478.5	9.423	Min.	0.01104
Max.	564.3	11.11	Max.	0.01116
Number of Spec.	7	7	Number of Spec.	7

Curved Beam Strength Properties (CBS)--CTD Measured CBS

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%





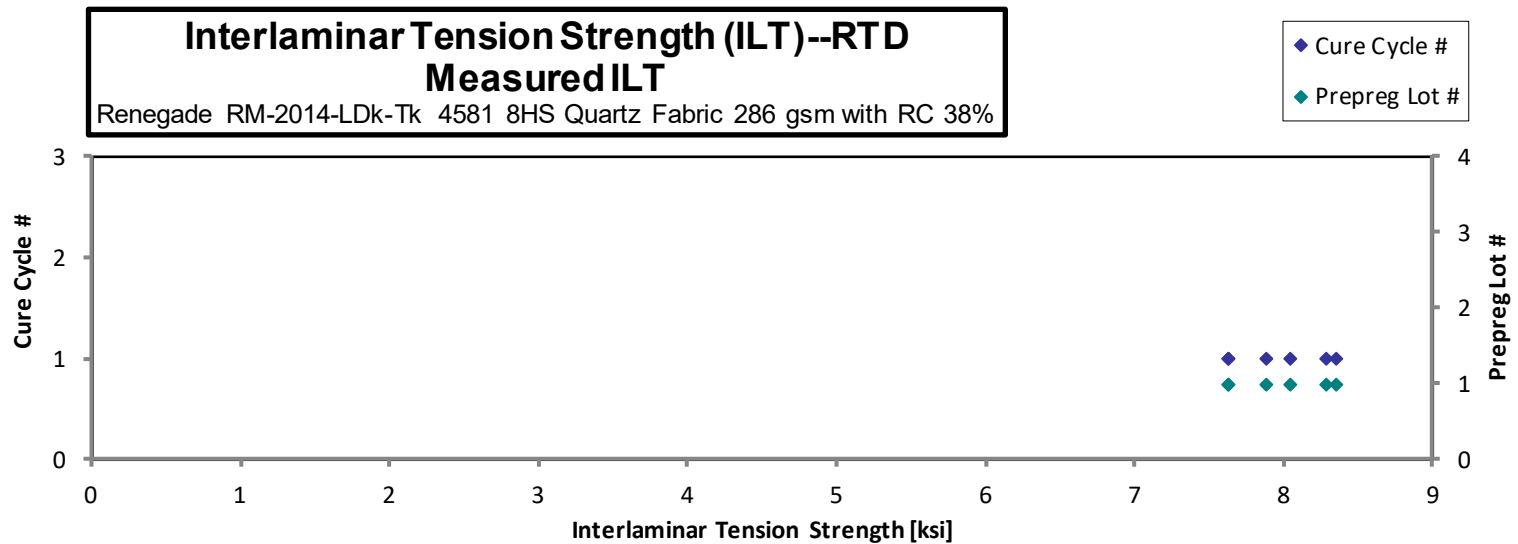
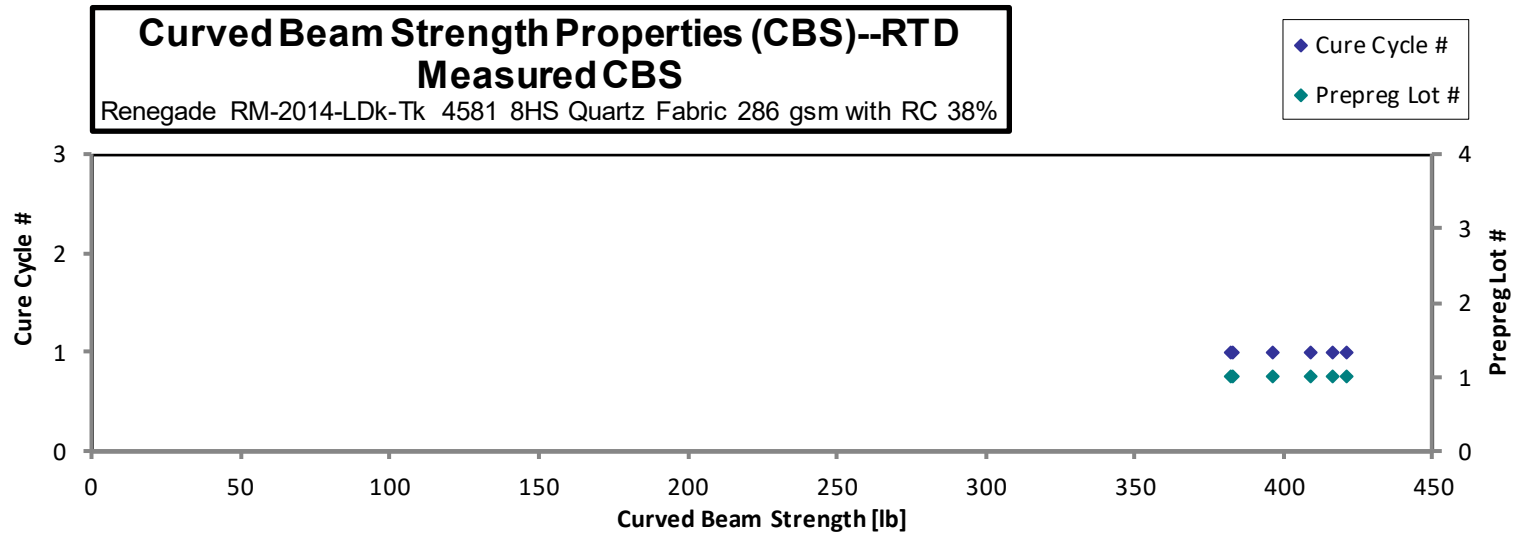
**Interlaminar Tension Properties (ILT)--RTD
Strength**

Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-RTD-1*	A	C1	1	1	382.8	7.636	0.2195	20	0.01098	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-RTD-2*	A	C1	1	1	382.6	7.640	0.2193	20	0.01097	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-RTD-3*	A	C1	1	1	396.7	7.890	0.2200	20	0.01100	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-RTD-4*	A	C1	1	1	416.4	8.294	0.2198	20	0.01099	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-RTD-5*	A	C1	1	1	408.9	8.048	0.2219	20	0.01110	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-RTD-6*	A	C1	1	1	420.9	8.364	0.2202	20	0.01101	ILT

*Cross head displacement exceeds 5mm [0.2 in] prior to failure.

Average	401.4	7.979	Average	0.01101
Standard Dev.	16.63	0.3139	Standard Dev.	
Coeff. of Var. [%]	4.143	3.935	Coeff. of Var. [%]	
Min.	382.6	7.636	Min.	0.01097
Max.	420.9	8.364	Max.	0.01110
Number of Spec.	6	6	Number of Spec.	6



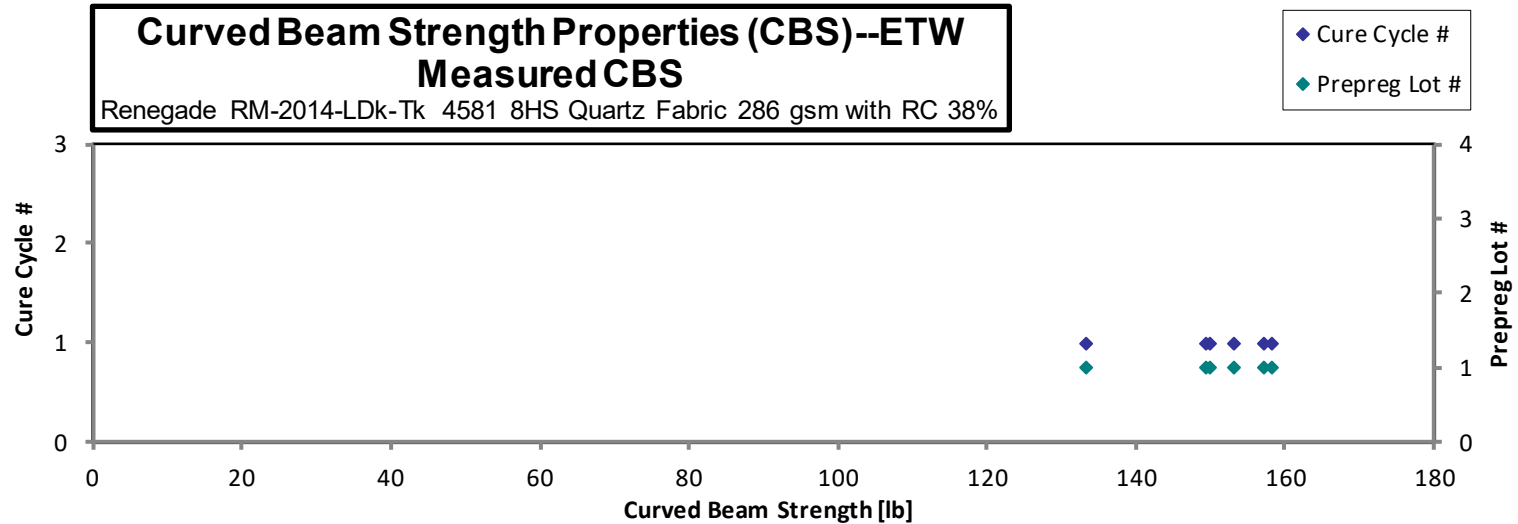
Interlaminar Tension Properties (ILT)--ETW Strength

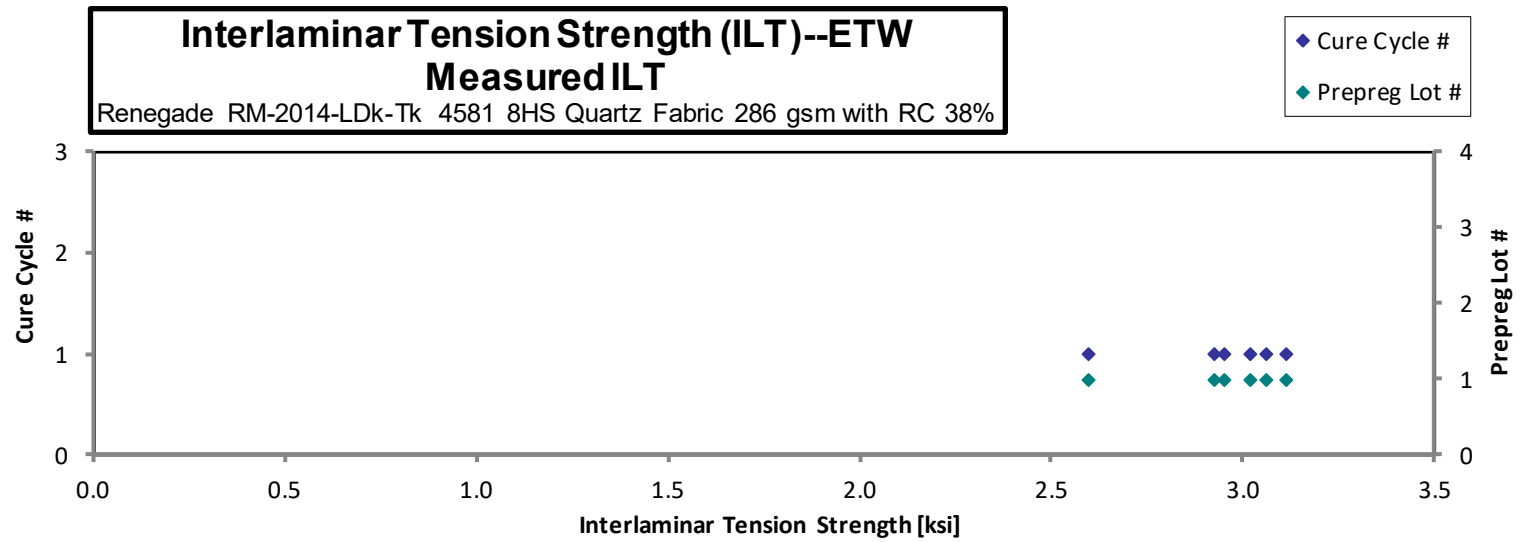
Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Renegade Batch #	Renegade Cure Cycle #	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-ETW-1*	A	C1	1	1	153.2	3.024	0.2214	20	0.01107	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-ETW-2*	A	C1	1	1	149.9	2.955	0.2216	20	0.01108	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-ETW-3*	A	C1	1	1	133.1	2.601	0.2232	20	0.01116	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-ETW-4*	A	C1	1	1	157.0	3.116	0.2203	20	0.01102	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-ETW-5*	A	C1	1	1	149.4	2.930	0.2226	20	0.01113	ILT
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1-ETW-6*	A	C1	1	1	158.2	3.065	0.2247	20	0.01123	ILT

*Cross head displacement exceeds 5mm [0.2 in] prior to failure.

Average	150.1	2.949	Average	0.01111
Standard Dev.	9.060	0.1836	Standard Dev.	
Coeff. of Var. [%]	6.035	6.227	Coeff. of Var. [%]	
Min.	133.1	2.601	Min.	0.01102
Max.	158.2	3.116	Max.	0.01123
Number of Spec.	6	6	Number of Spec.	6

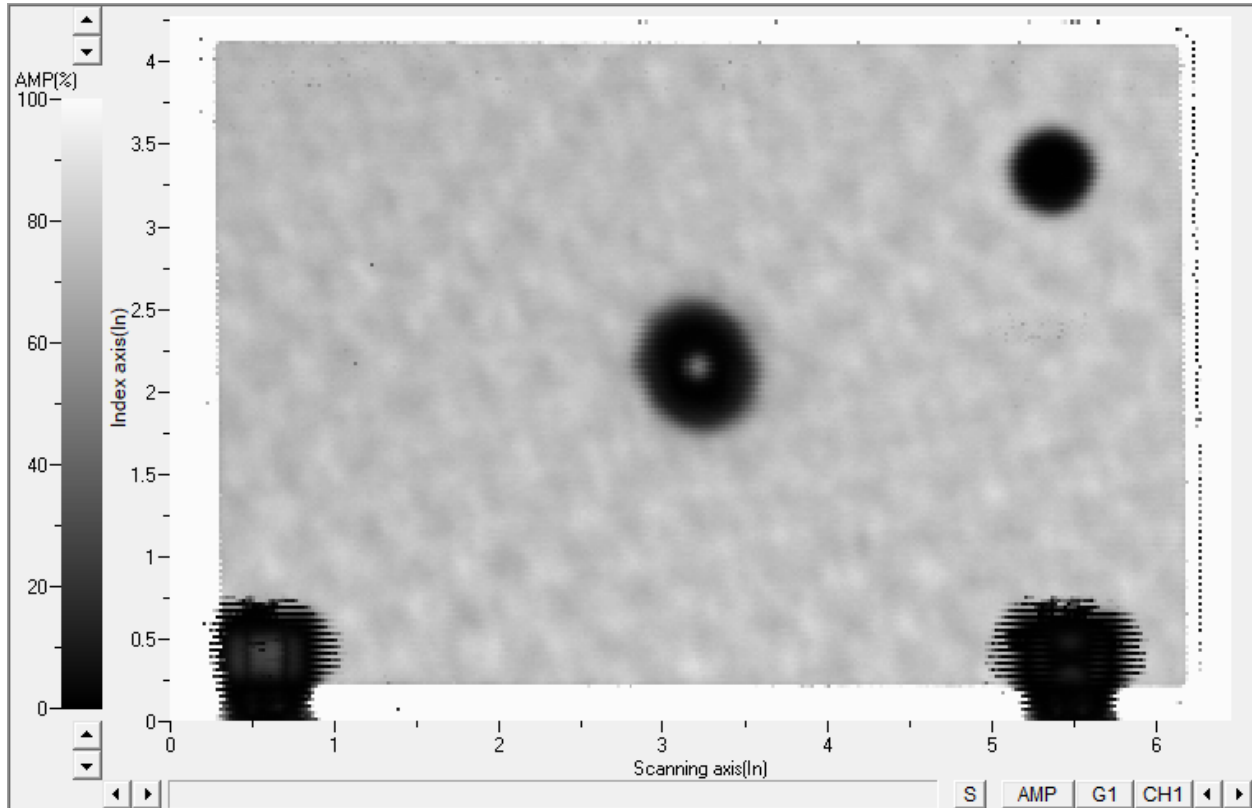




5. Additional Compression After Impact Data

Impactor Diameter: 0.625"

Representative of Damage Area:



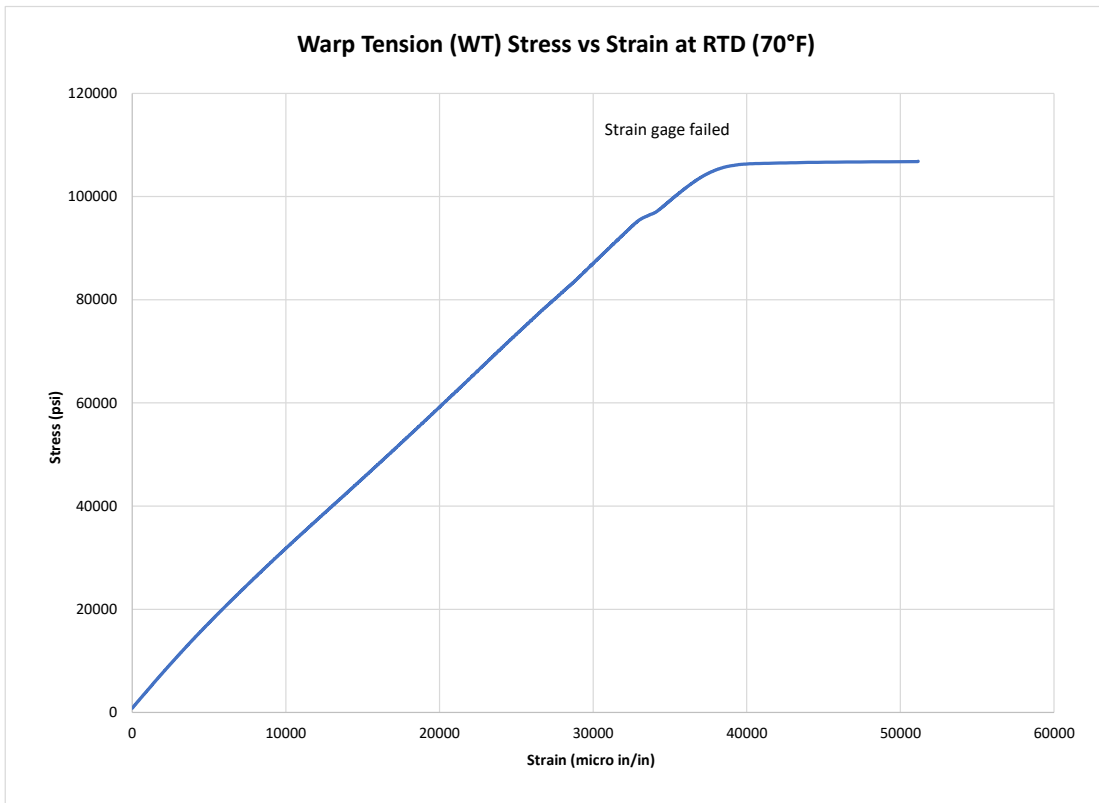
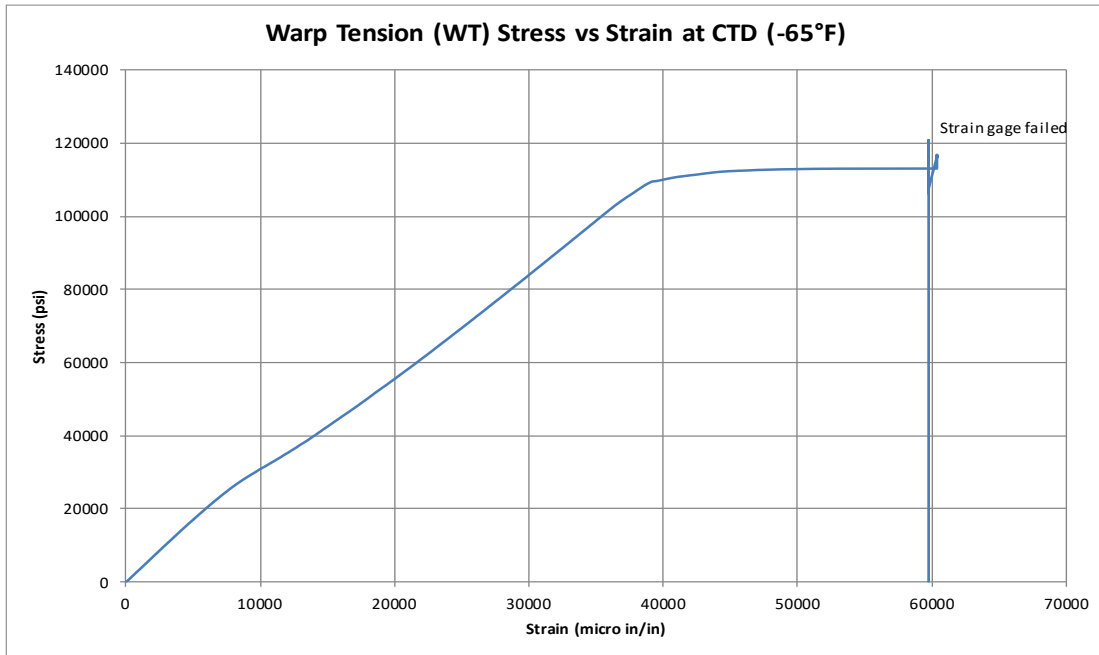
Note: Black areas around the edges are clamp areas.

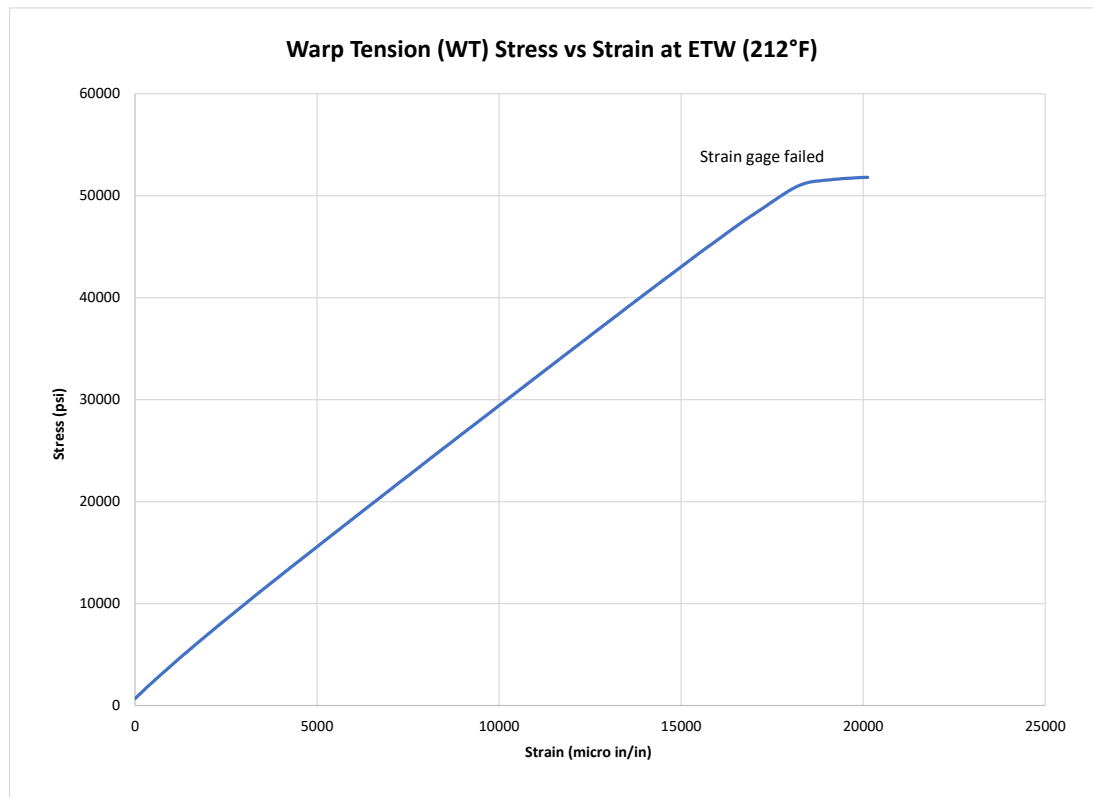
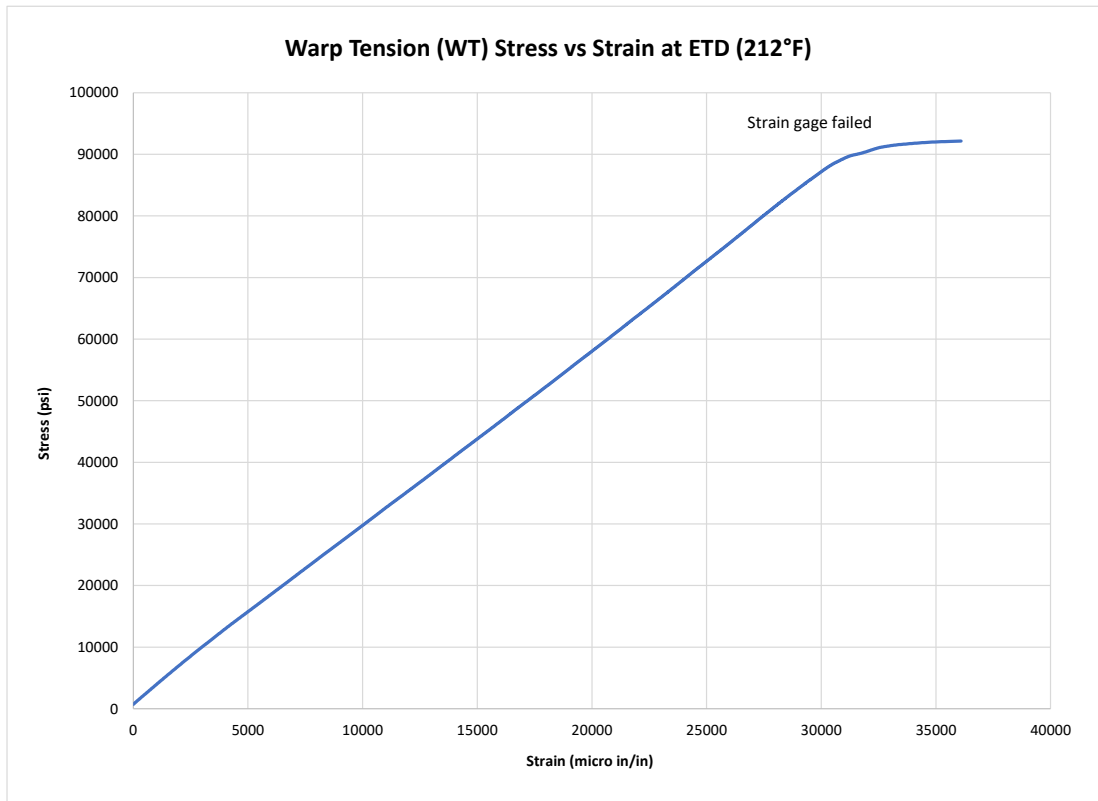
Damage Area and Dent Depth Summary:

Specimen ID	Damage Area (inch ²)	Dent Depth (inch)
CAI-A-C1-1-RTD-1	0.4344	0.0120
CAI-A-C1-1-RTD-2	0.4416	0.0100
CAI-A-C1-1-RTD-3	0.4352	0.0110
CAI-A-C1-1-RTD-4	0.4376	0.0110
CAI-A-C1-1-RTD-5	0.4308	0.0085
CAI-A-C1-1-RTD-6	0.4232	0.0115
CAI-A-C1-1-RTD-8	0.4236	0.0100

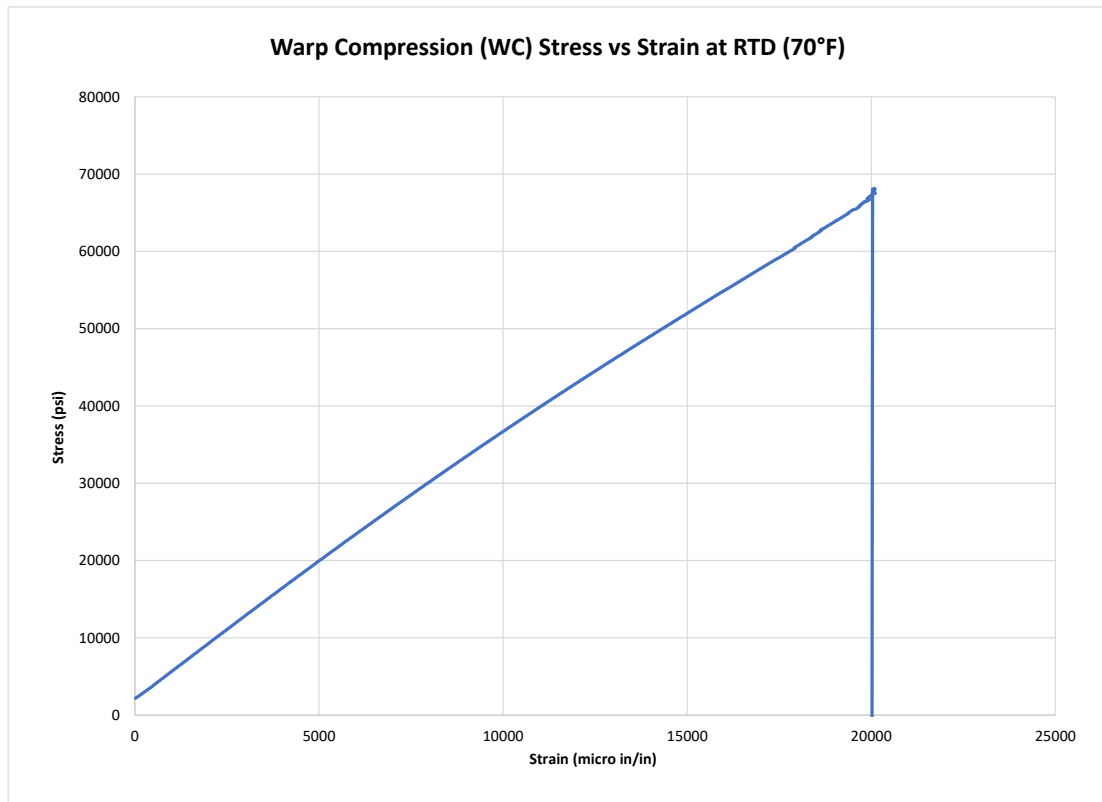
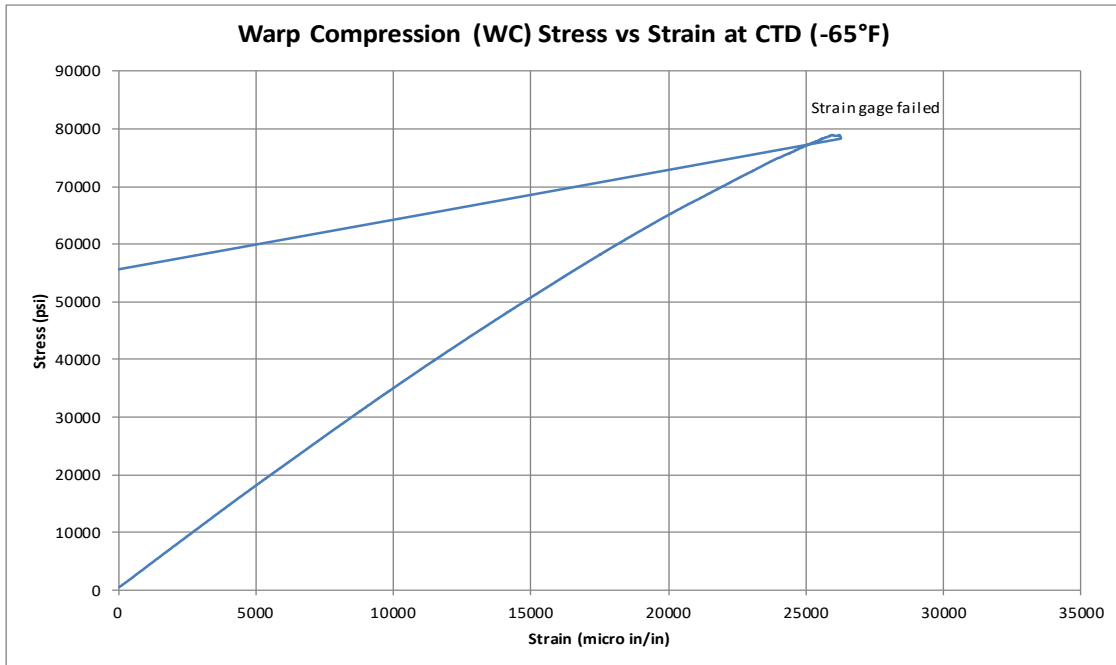
6. Full Stress vs. Strain Curve

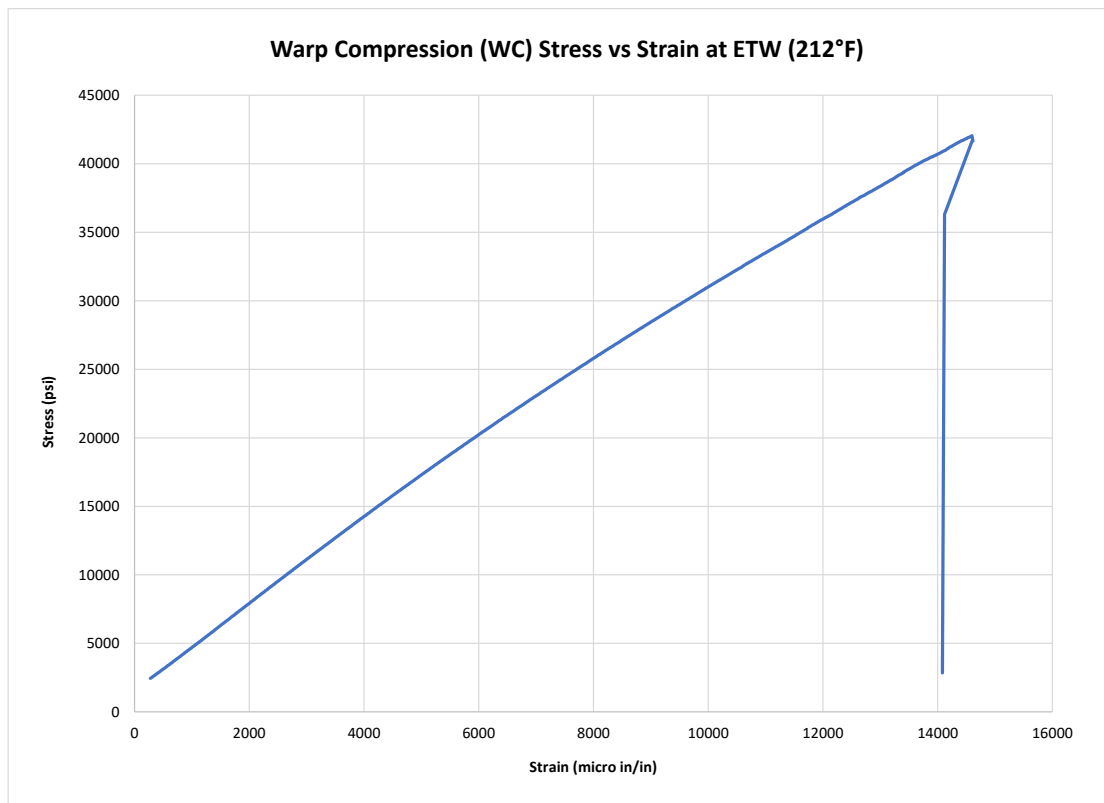
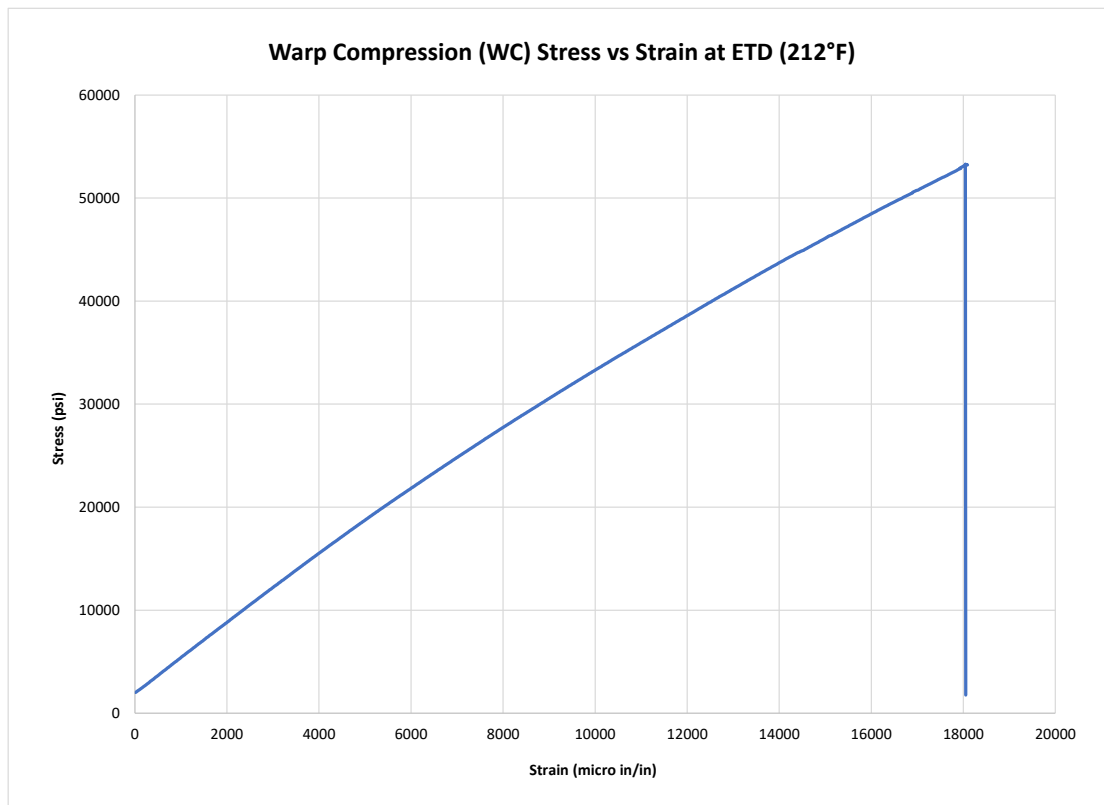
6.1 Warp Tension Properties (WT)



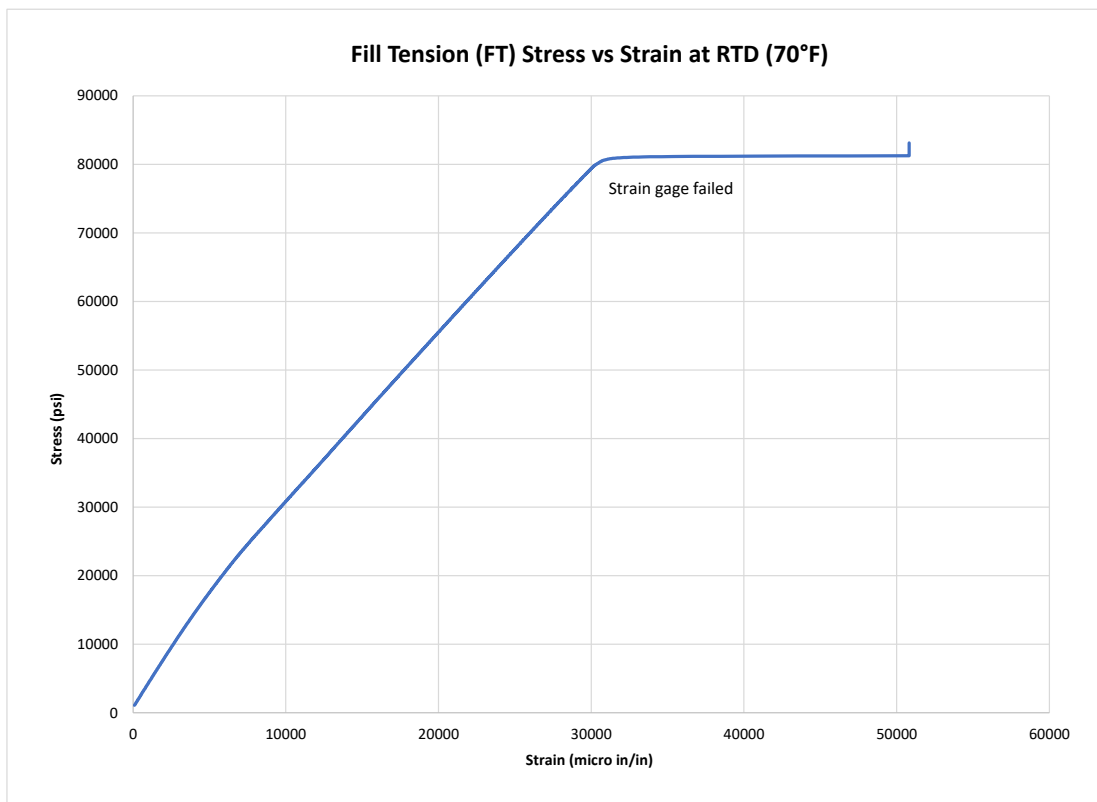
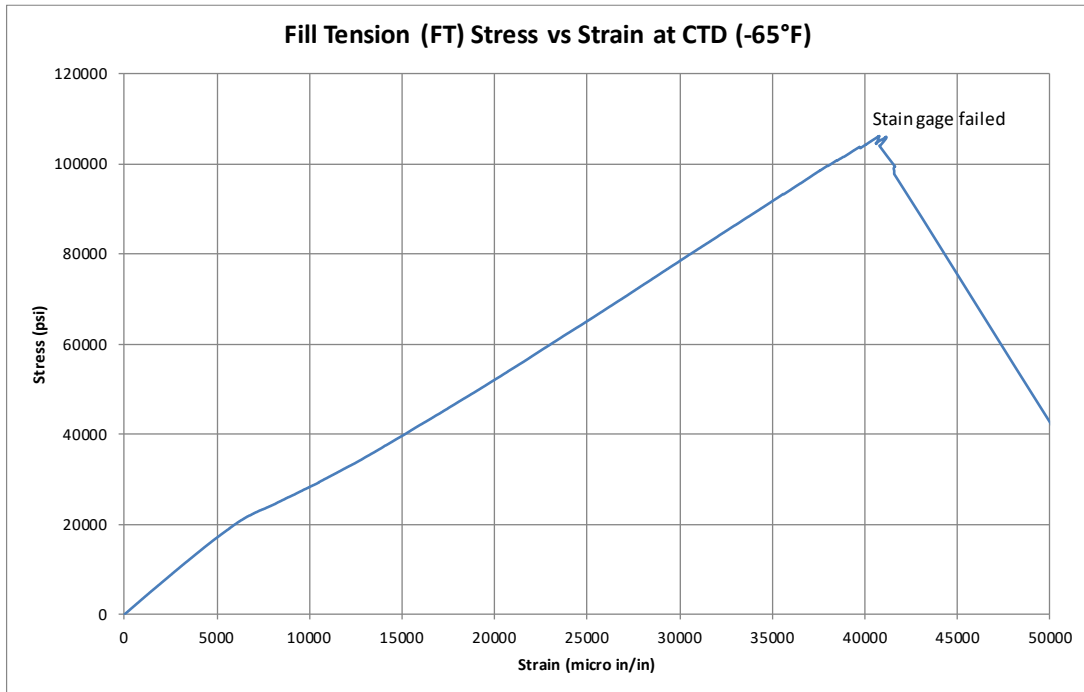


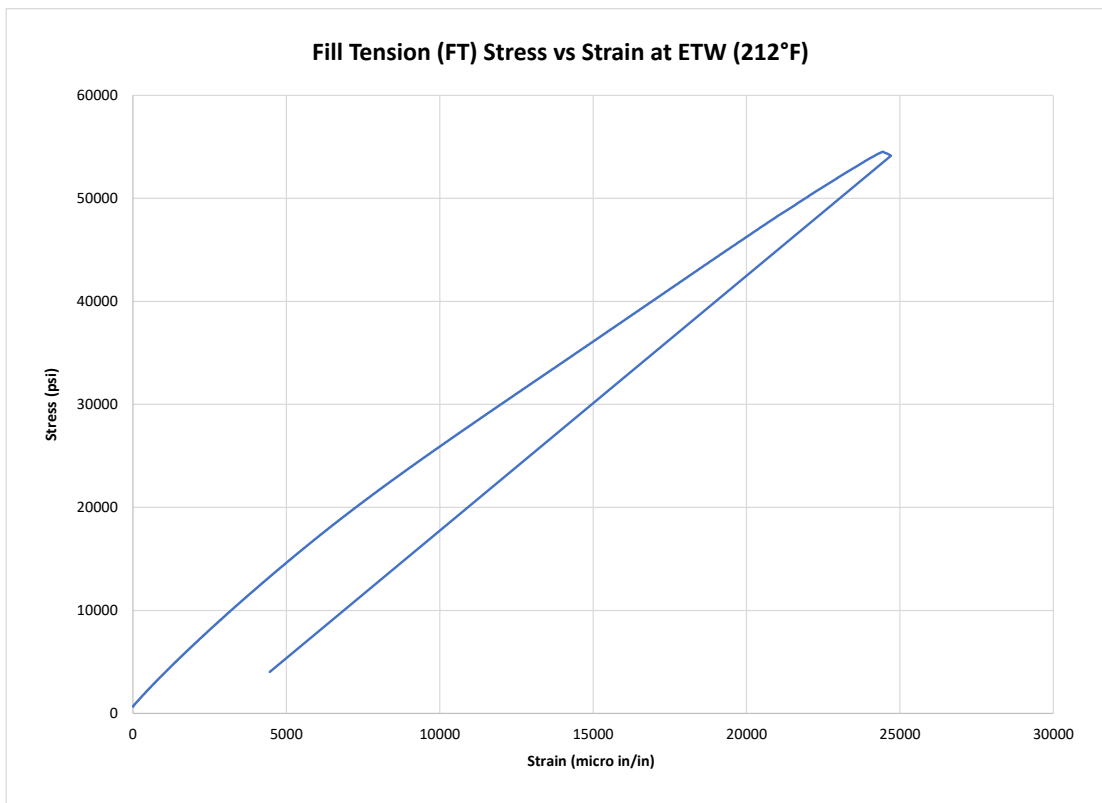
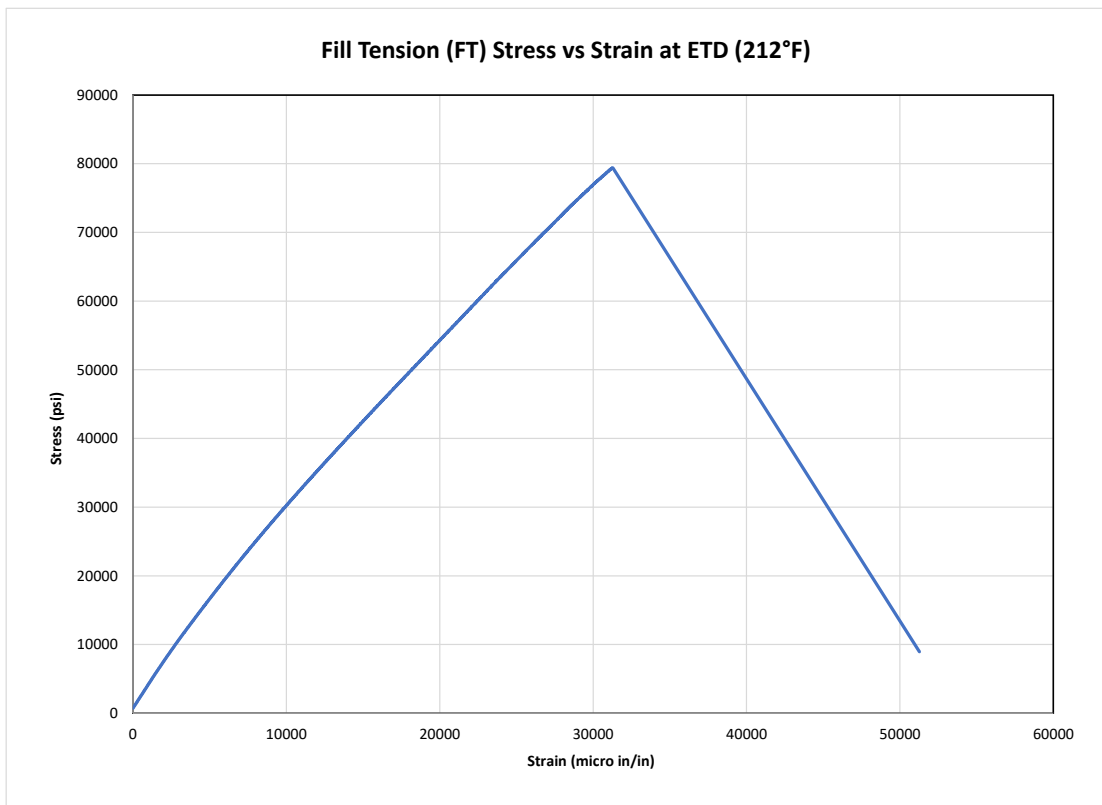
6.2 Warp Compression Properties (WC)



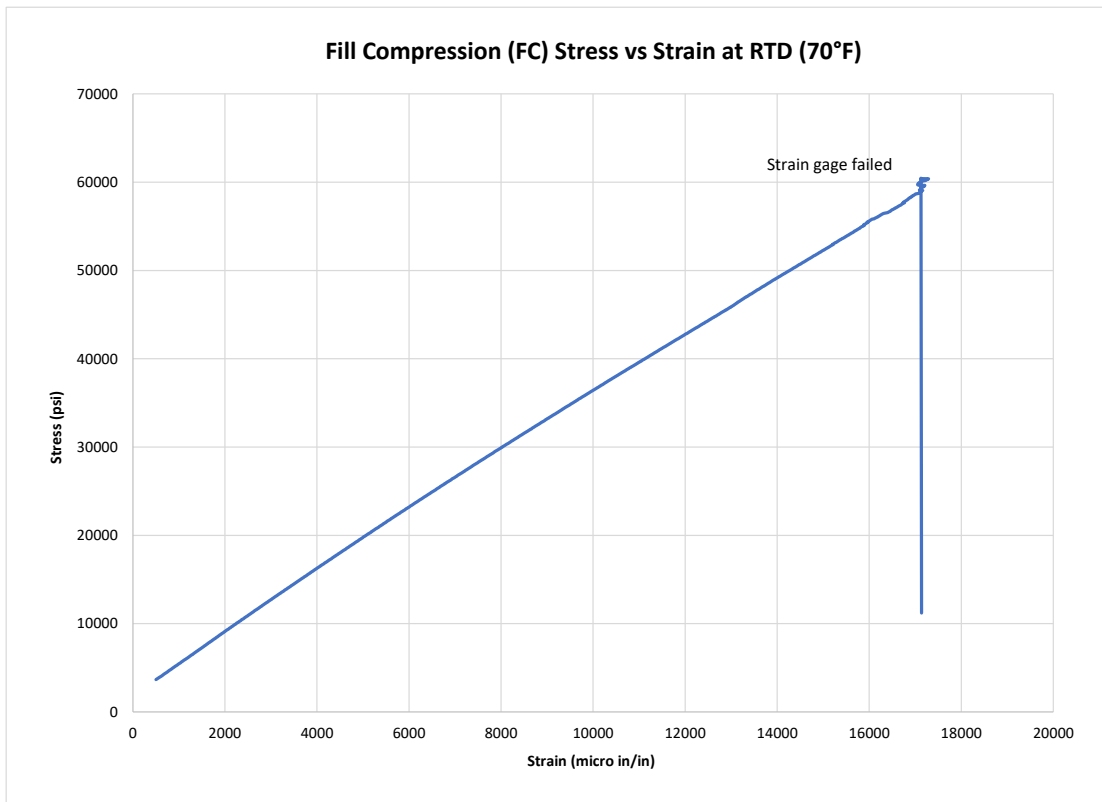
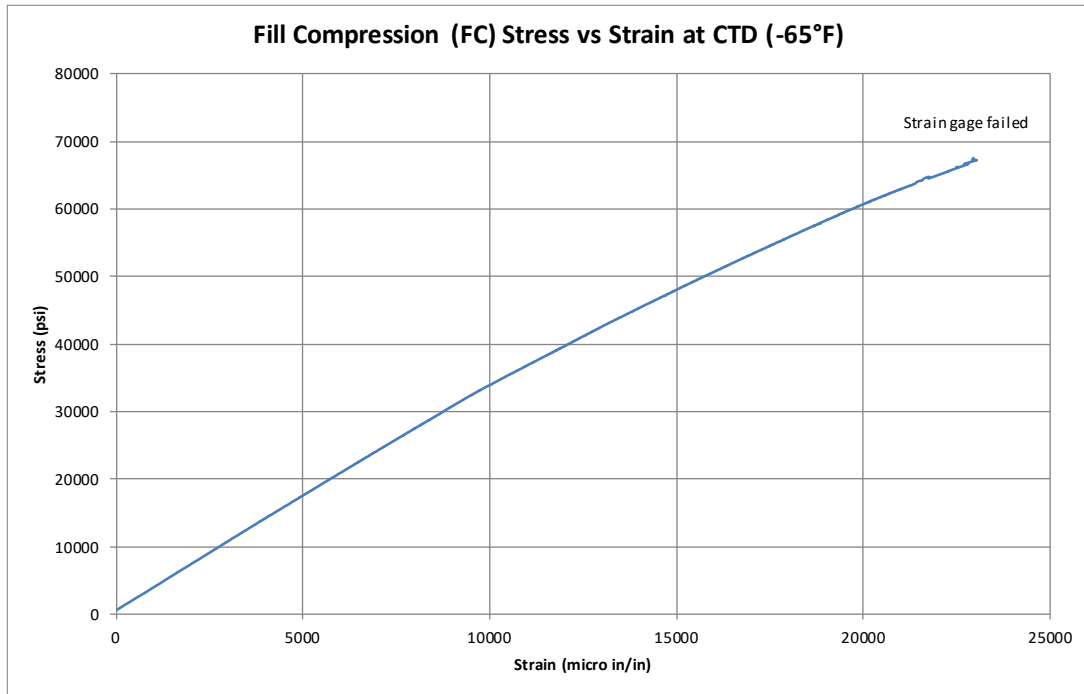


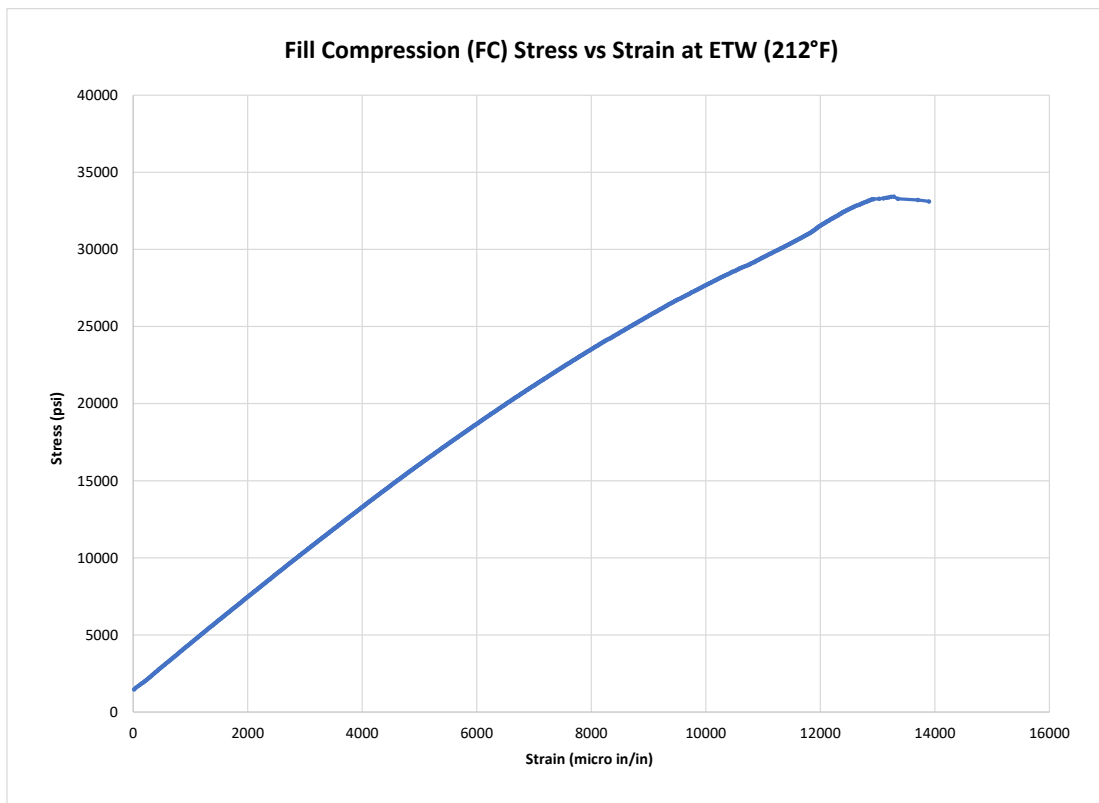
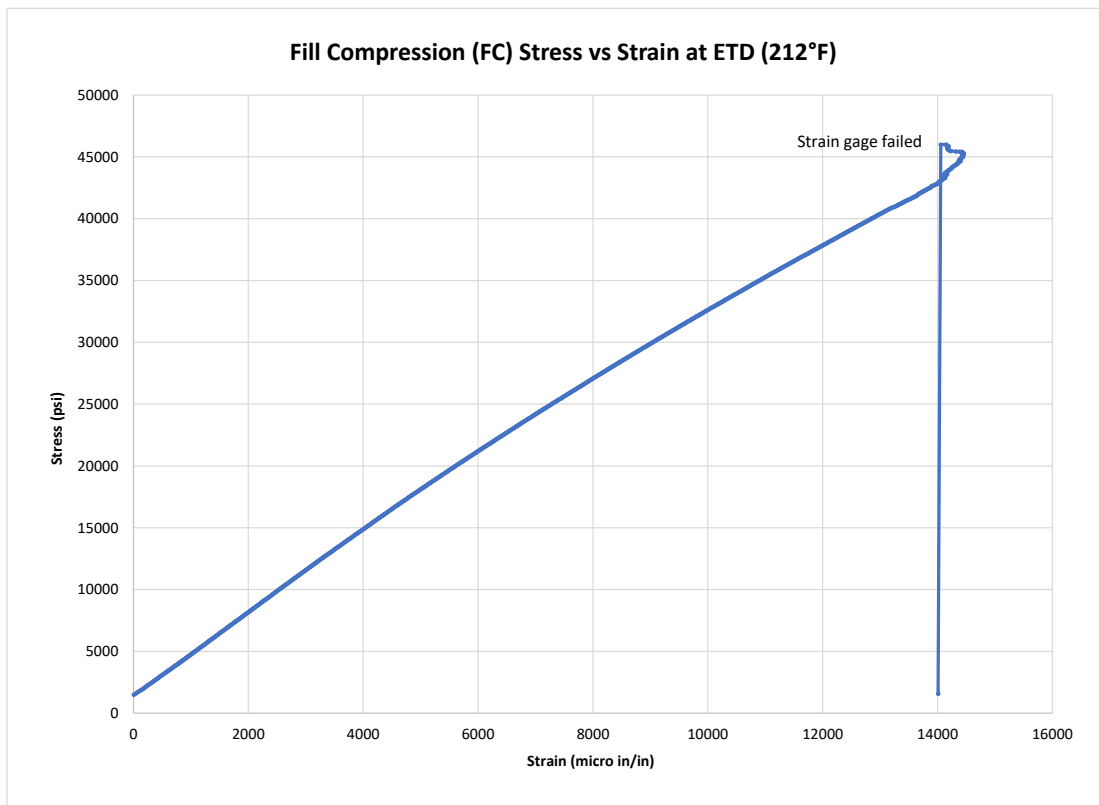
6.3 Fill Tension Properties (FT)



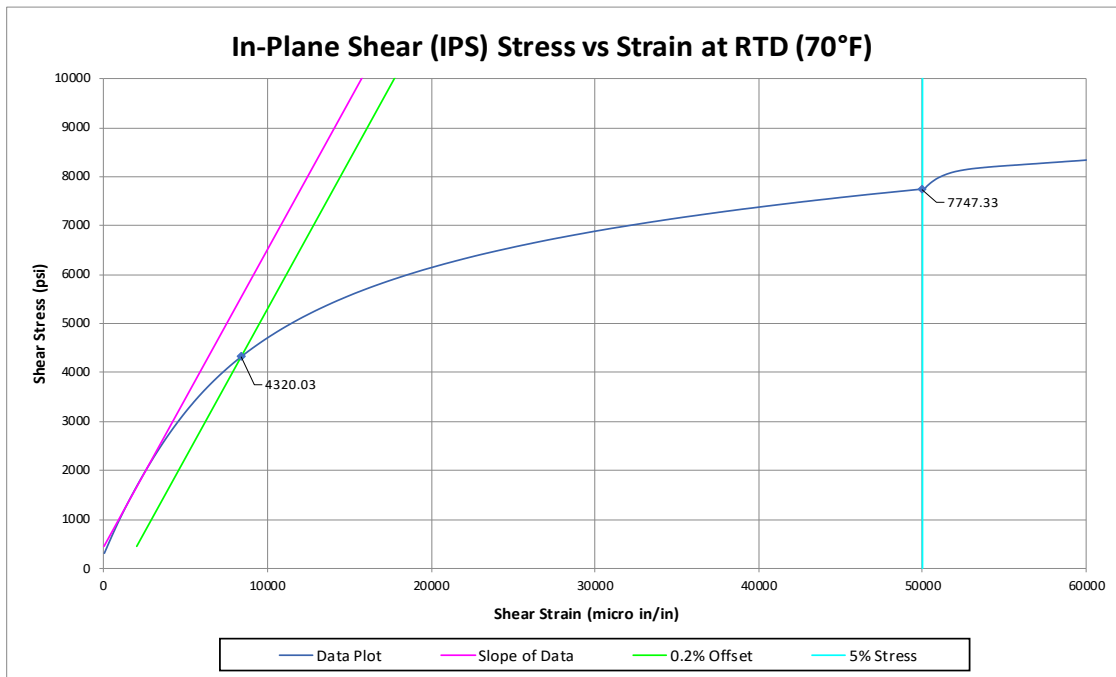
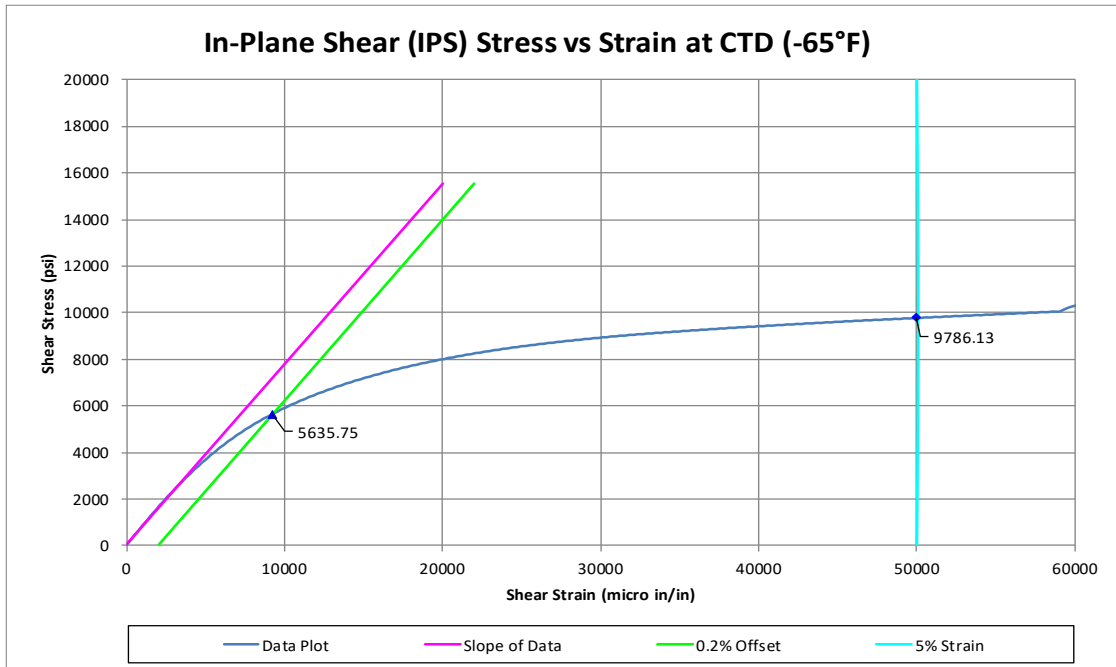


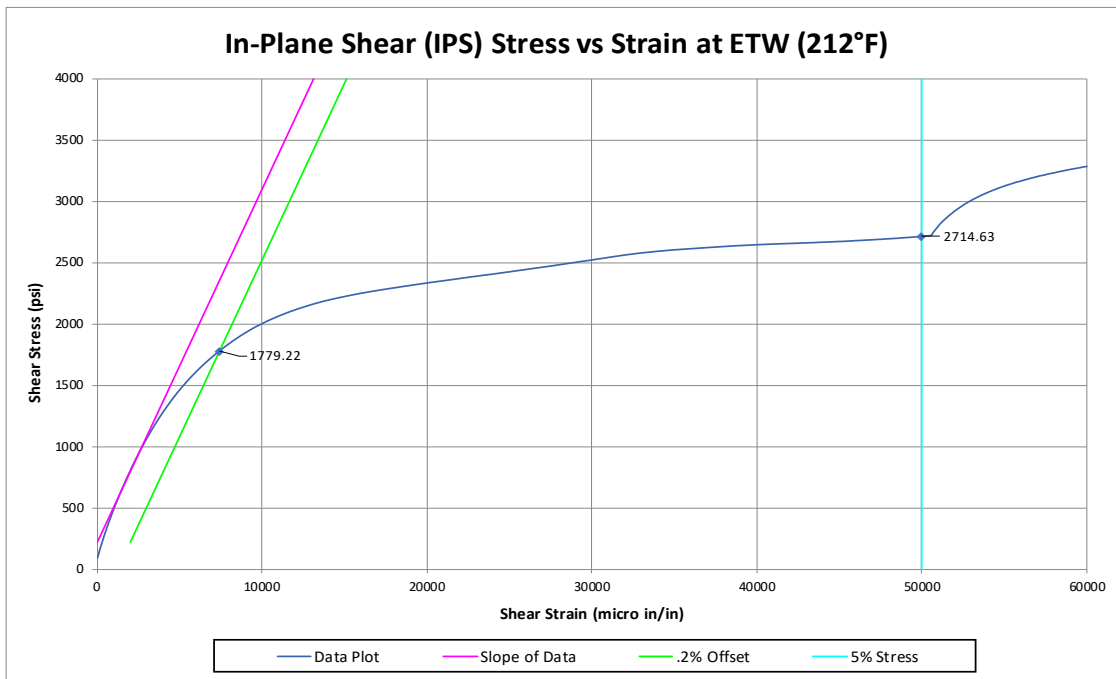
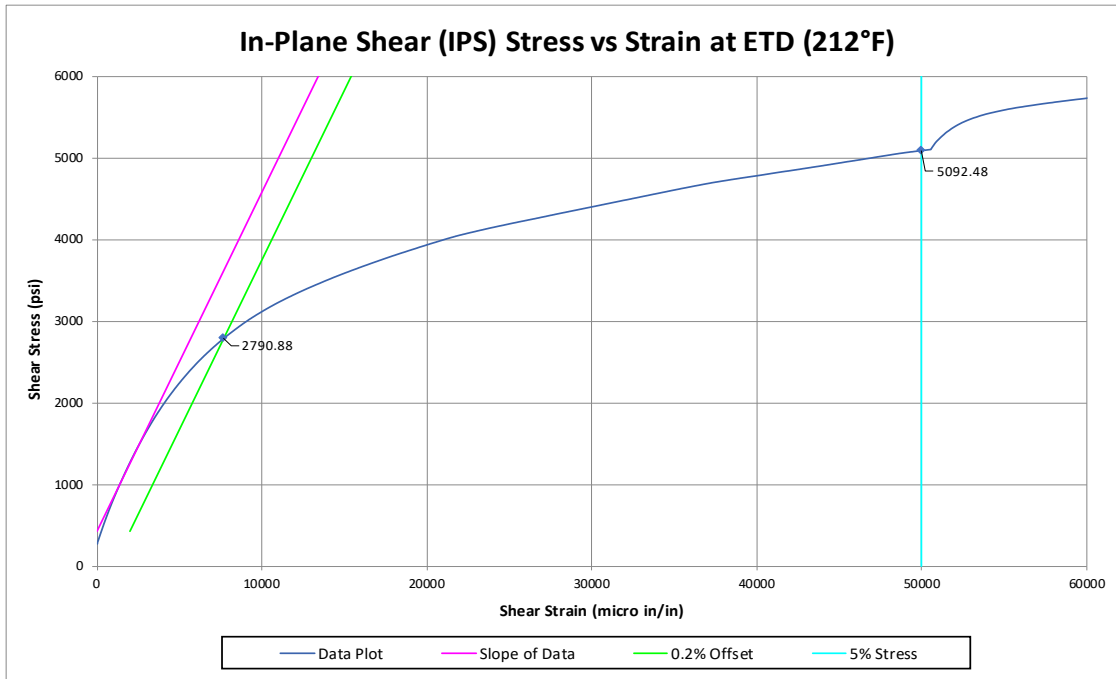
6.4 Fill Compression Properties (FC)



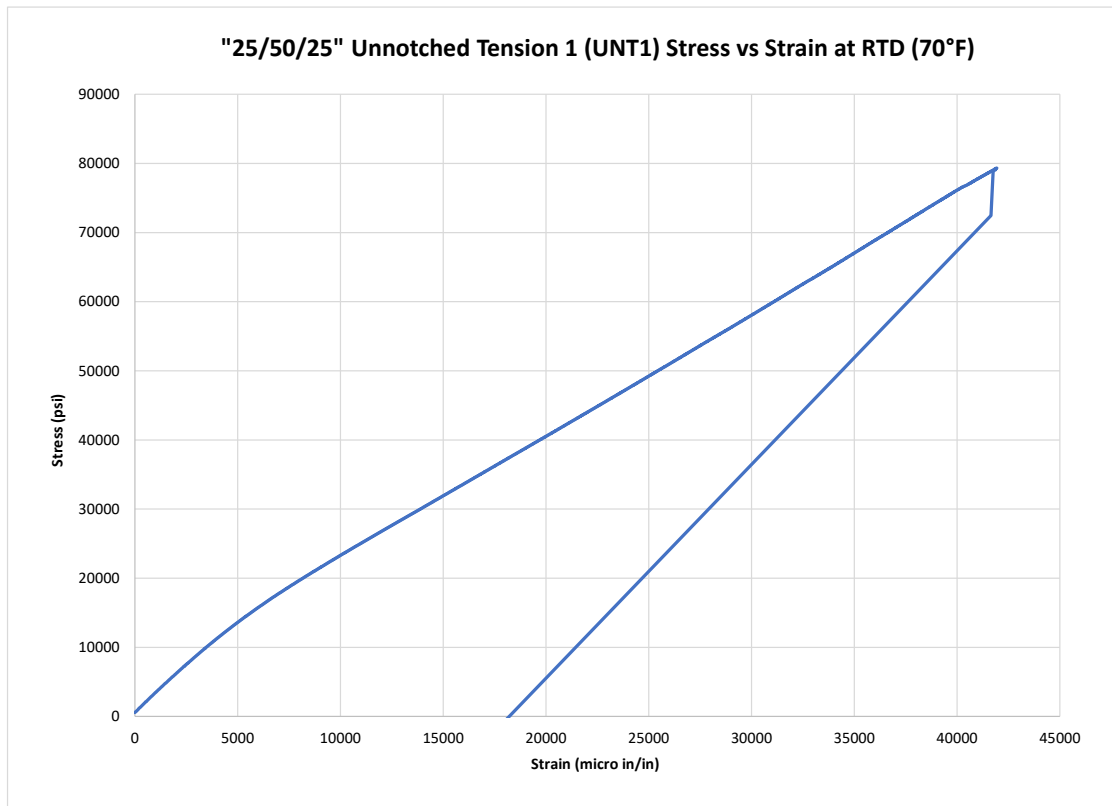
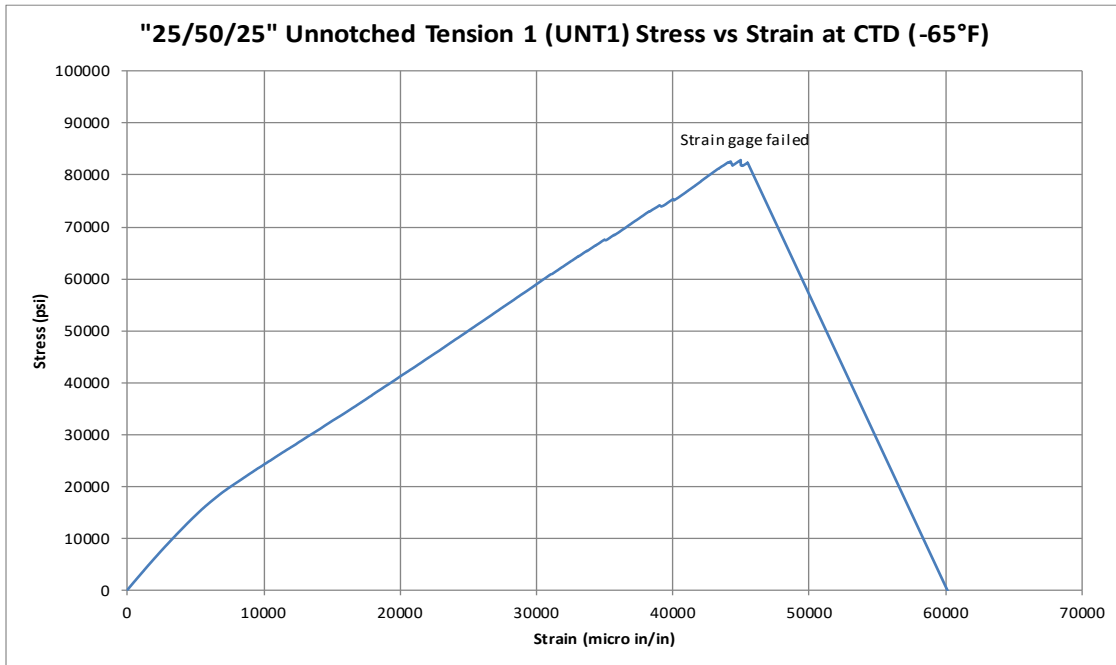


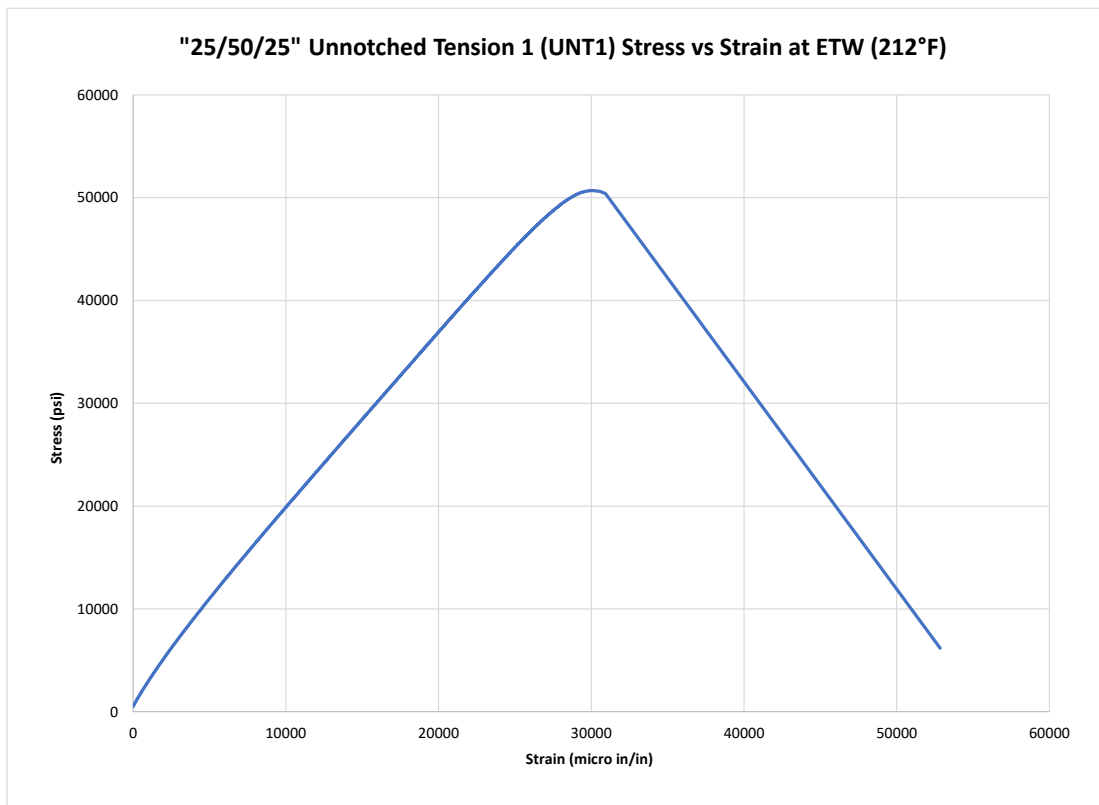
6.5 In-Plane Shear Properties (IPS)



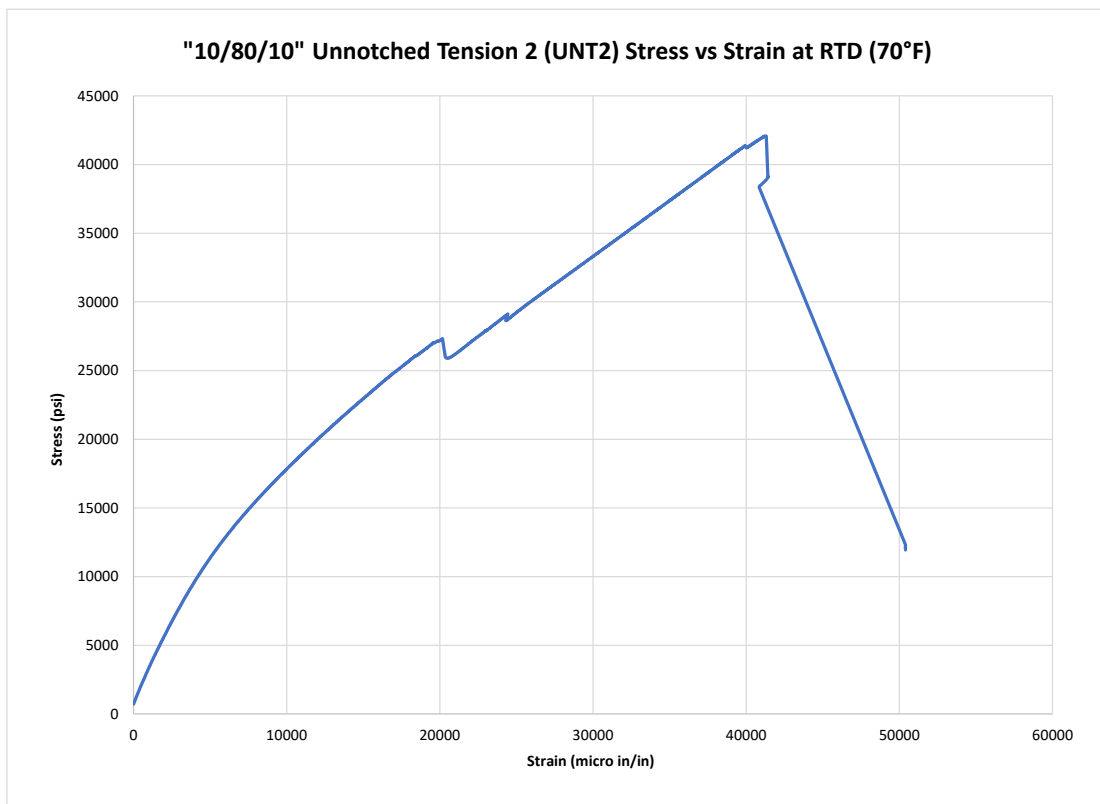
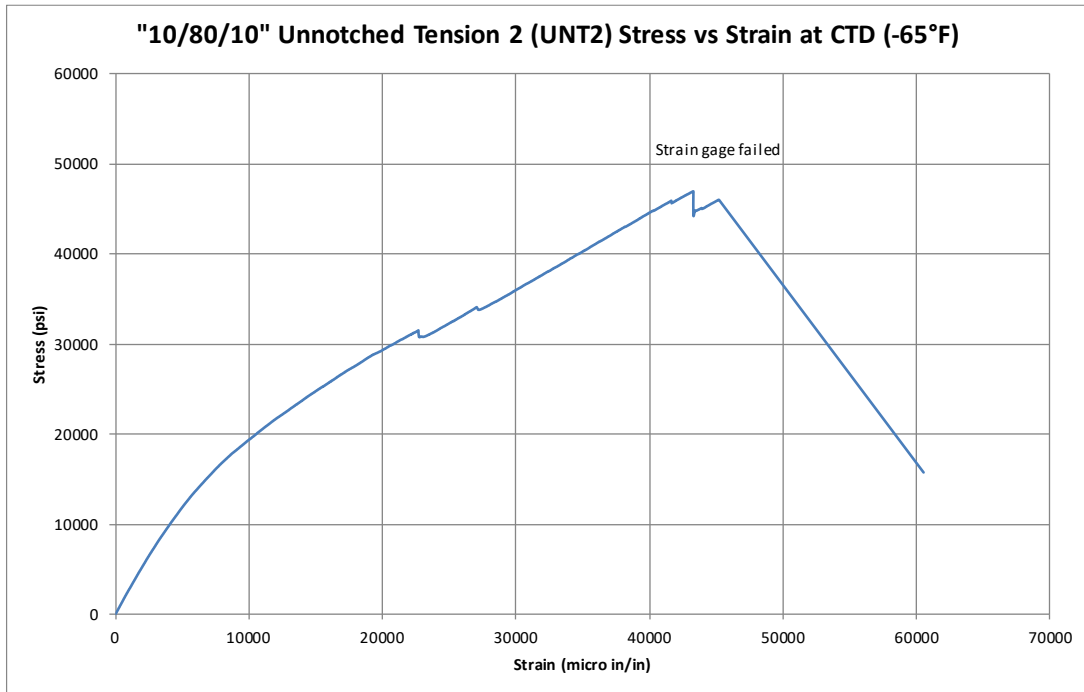


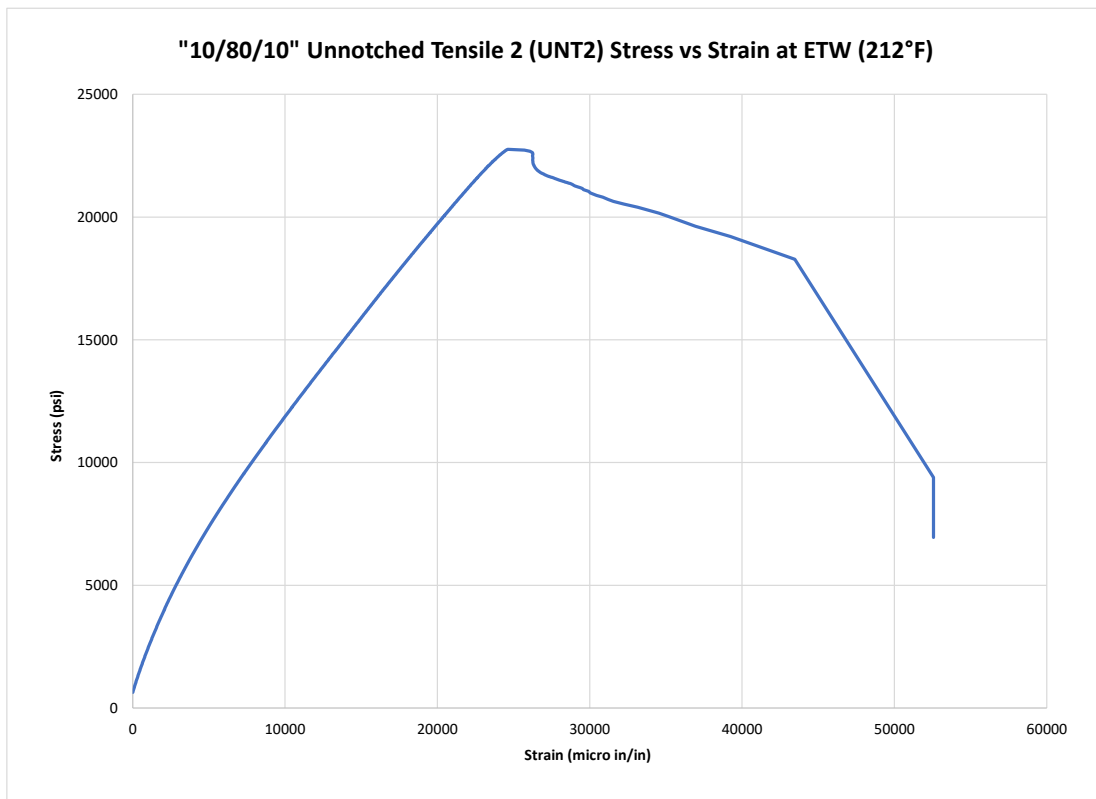
6.6 "25/50/25" Unnotched Tension 1 Properties (UNT1)



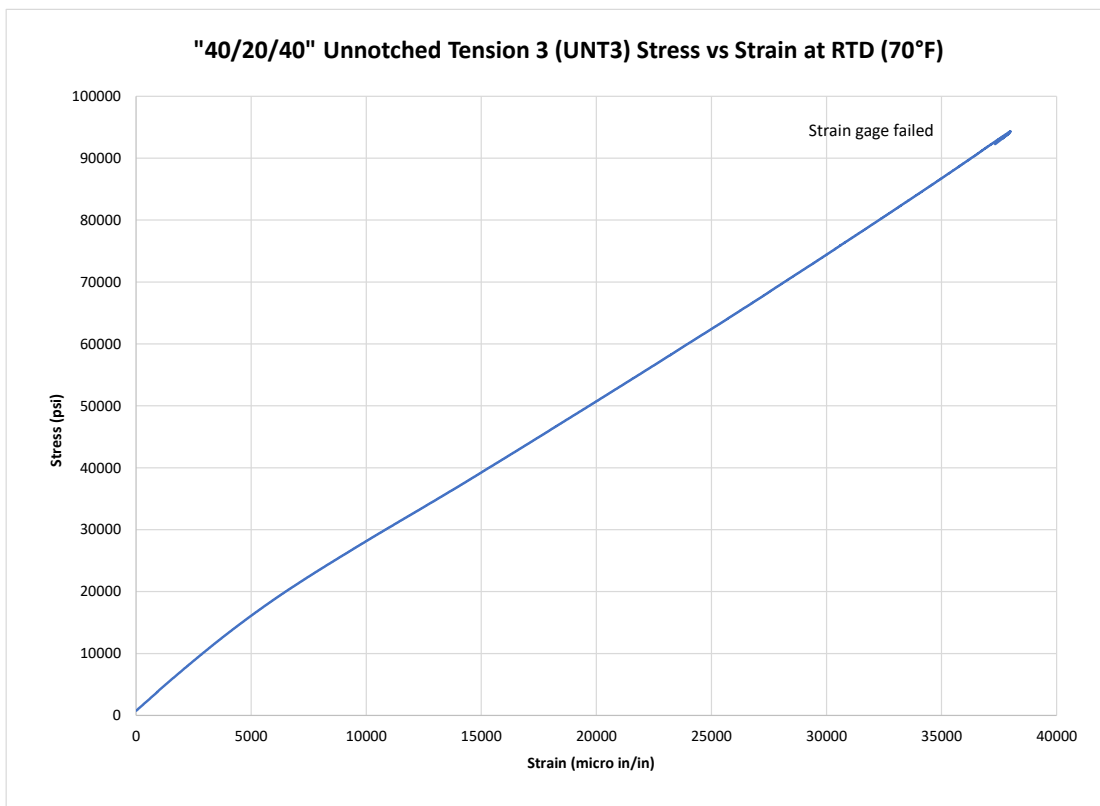
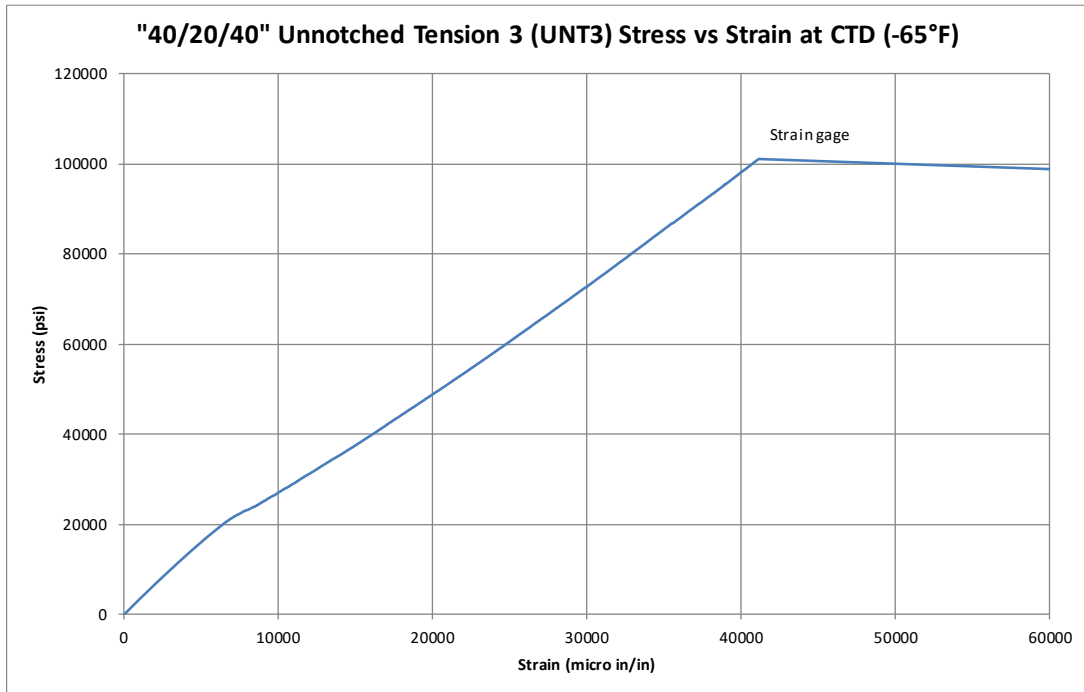


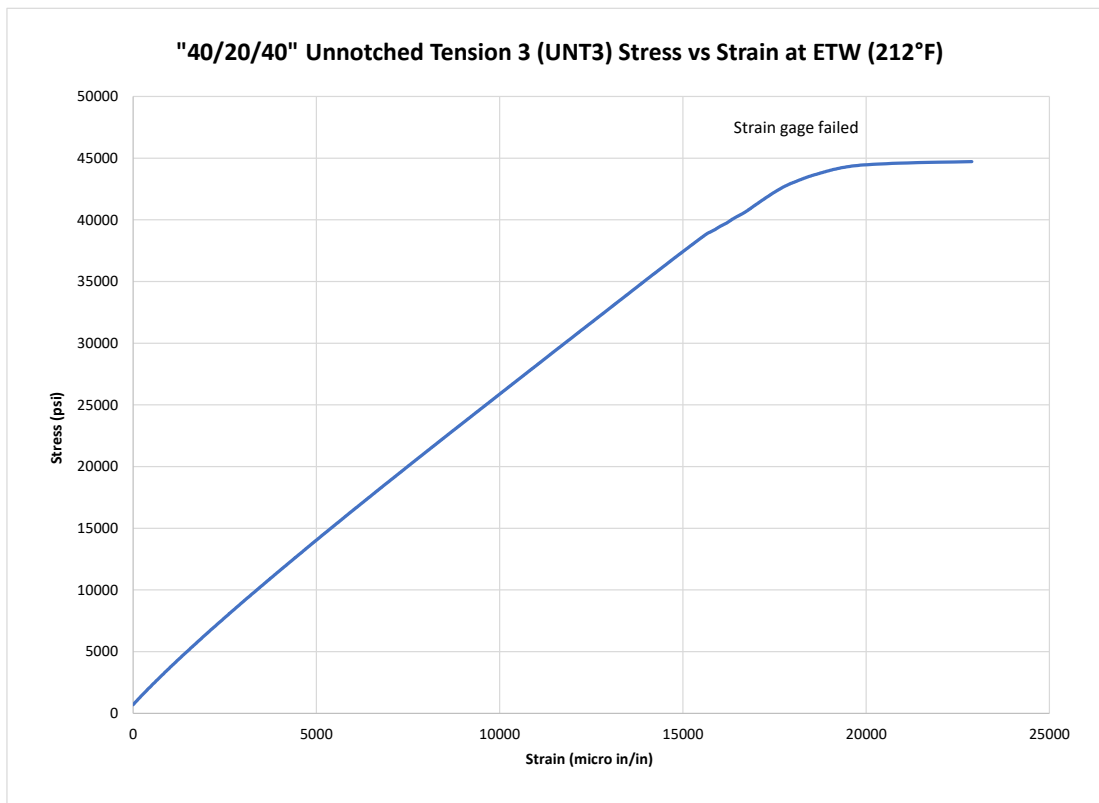
6.7 "10/80/10" Unnotched Tension 2 Properties (UNT2)



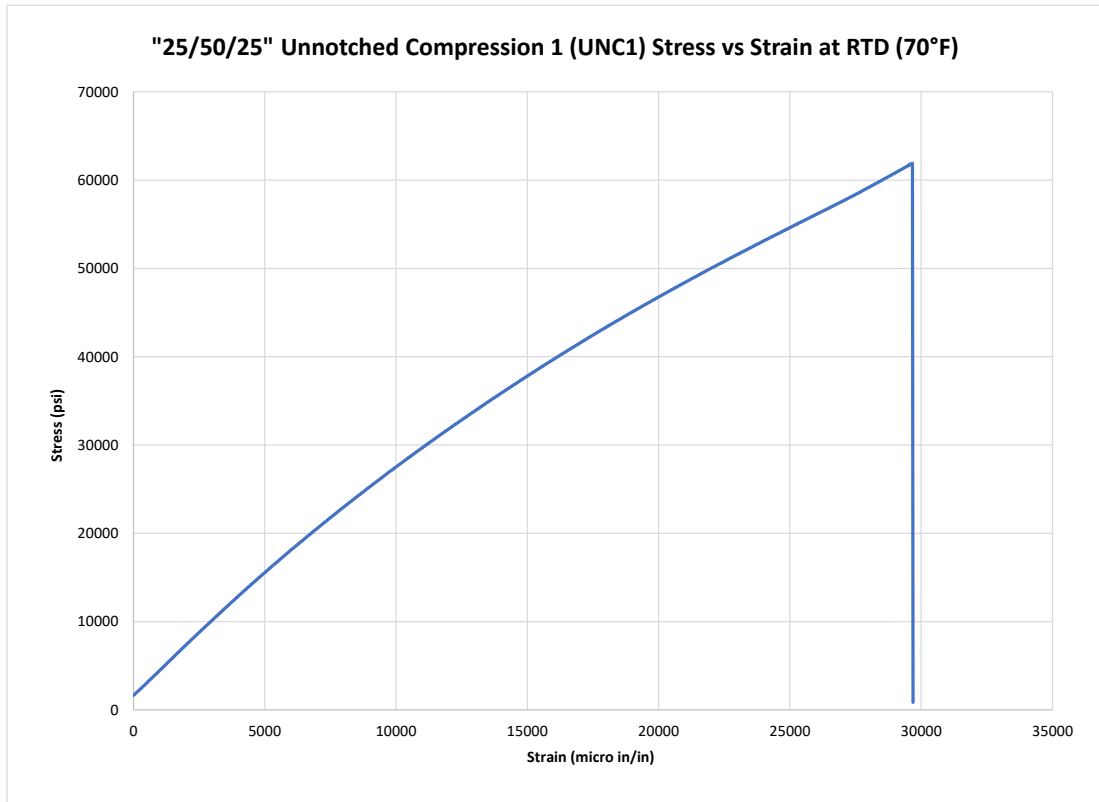


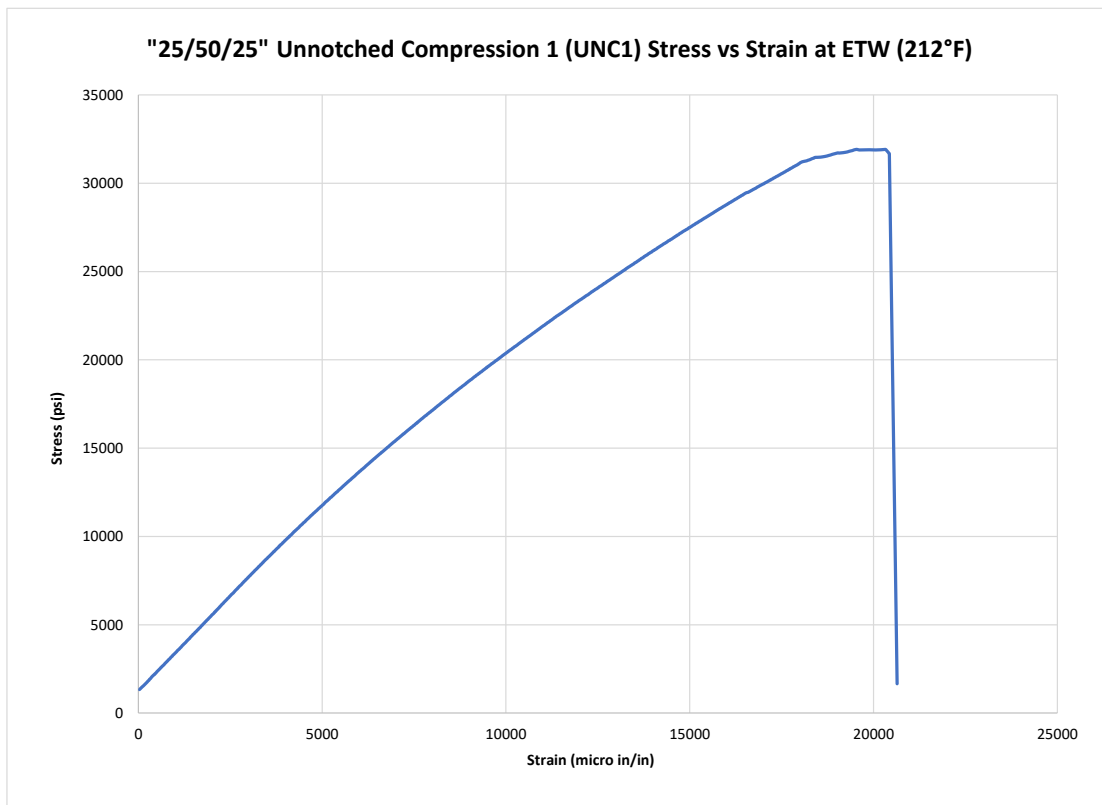
6.8 "40/20/40" Unnotched Tension 3 Properties (UNT3)



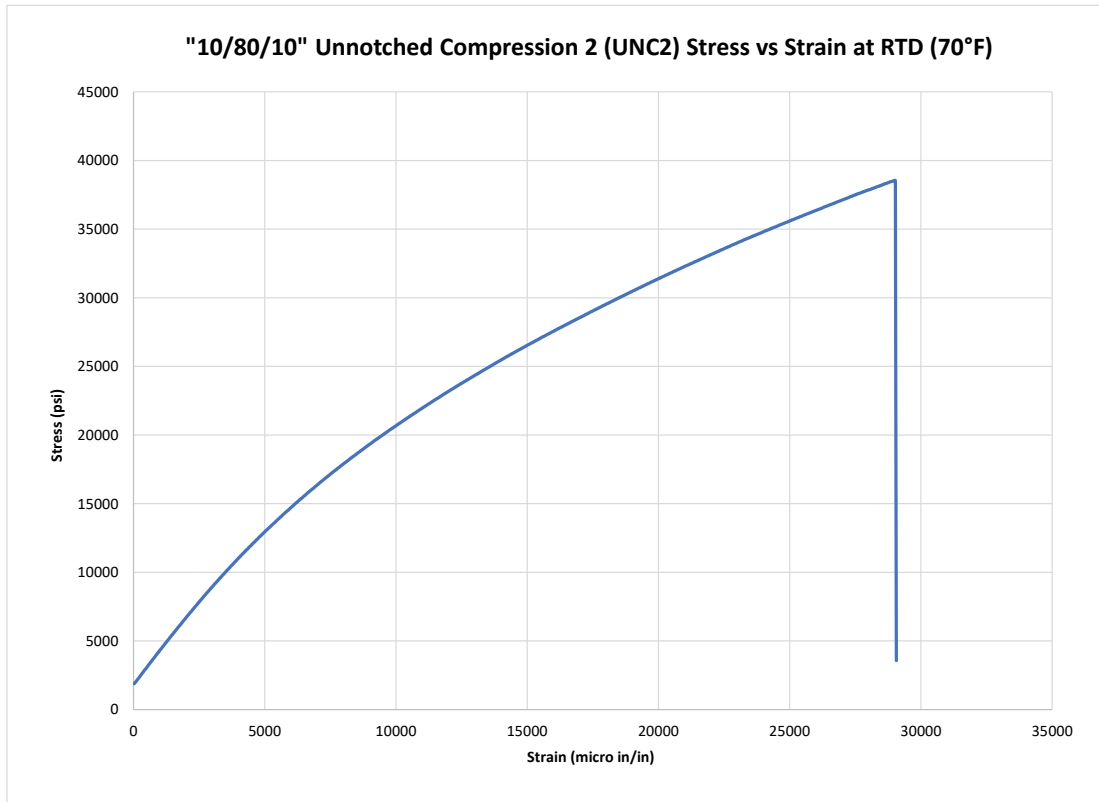


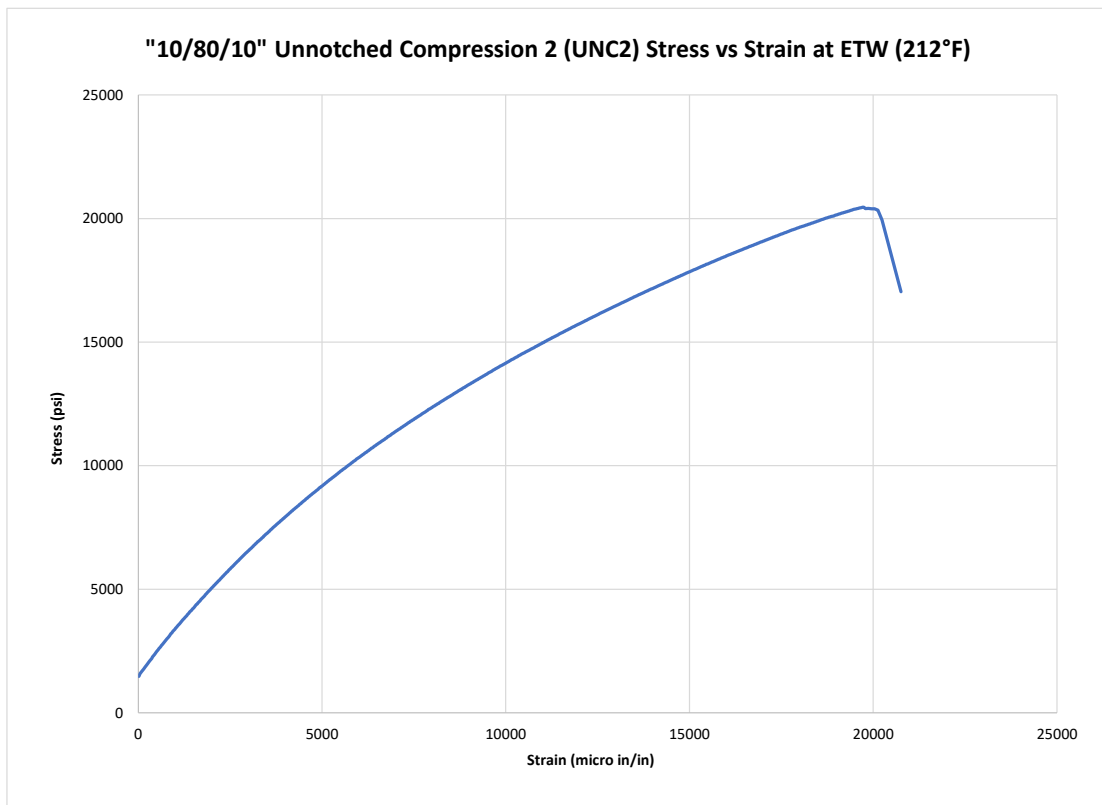
6.9 "25/50/25" Unnotched Compression 1 Properties (UNC1)



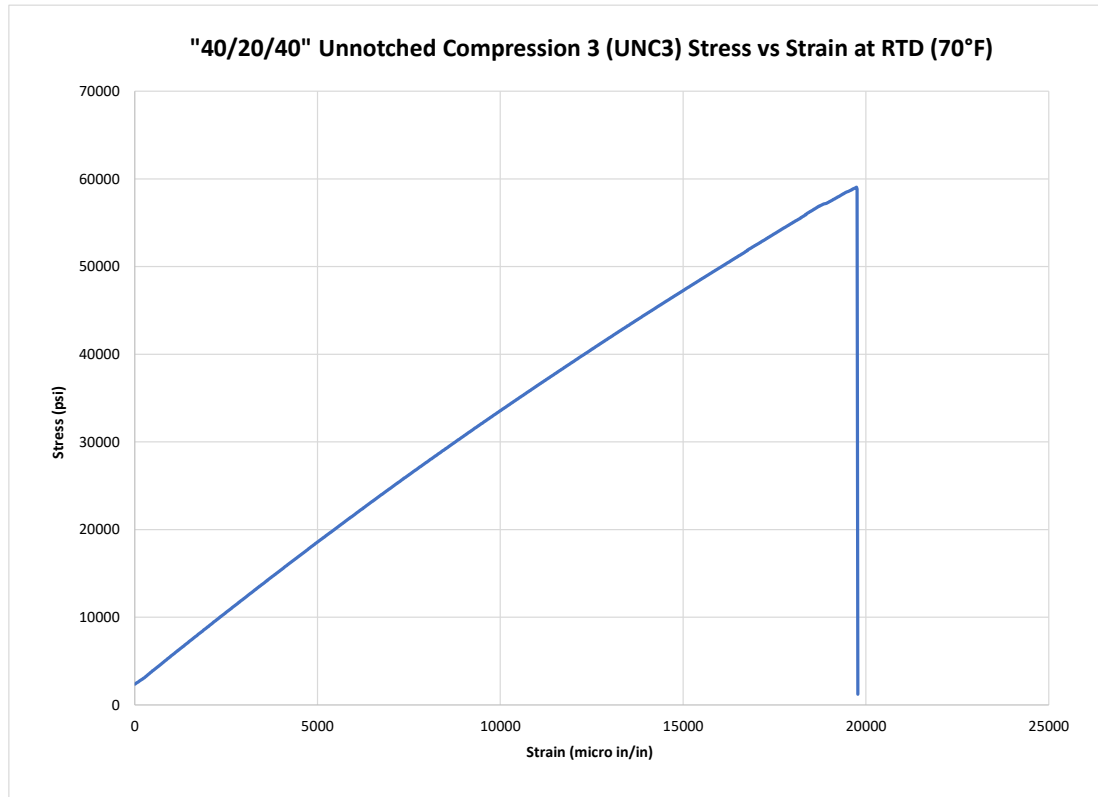


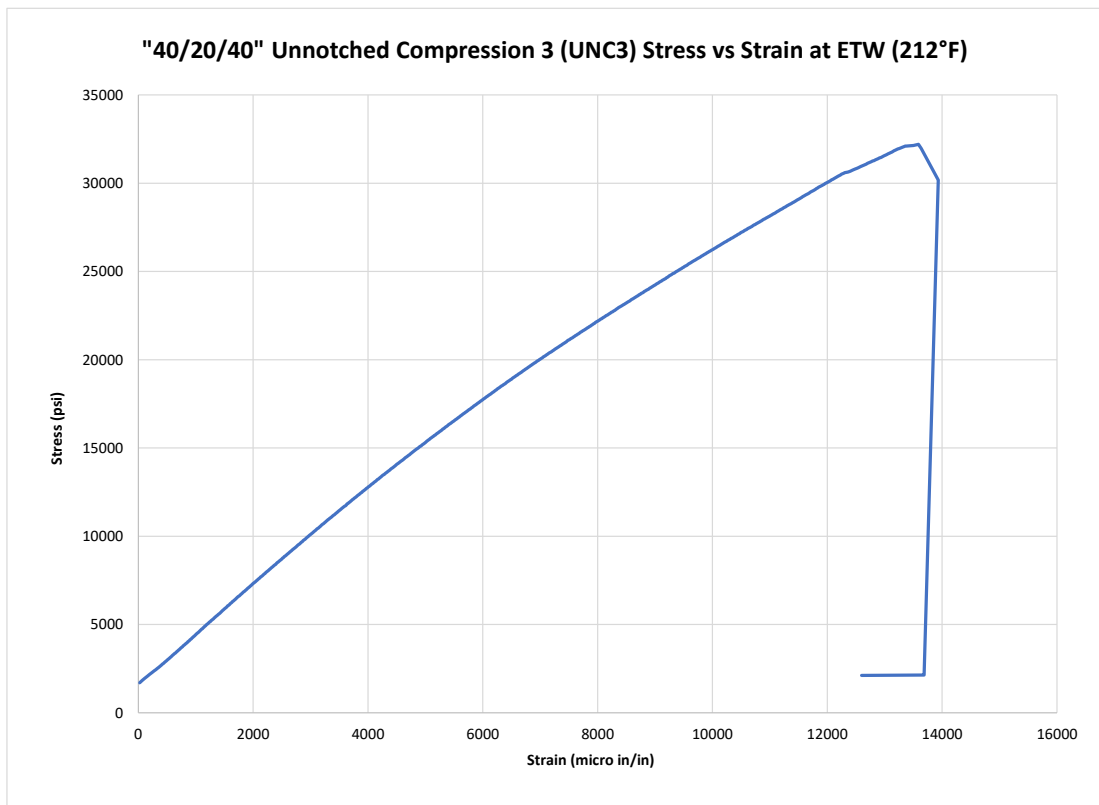
6.10 "10/80/10" Unnotched Compression 2 Properties (UNC2)





6.11 "40/20/40" Unnotched Compression 3 Properties (UNC3)

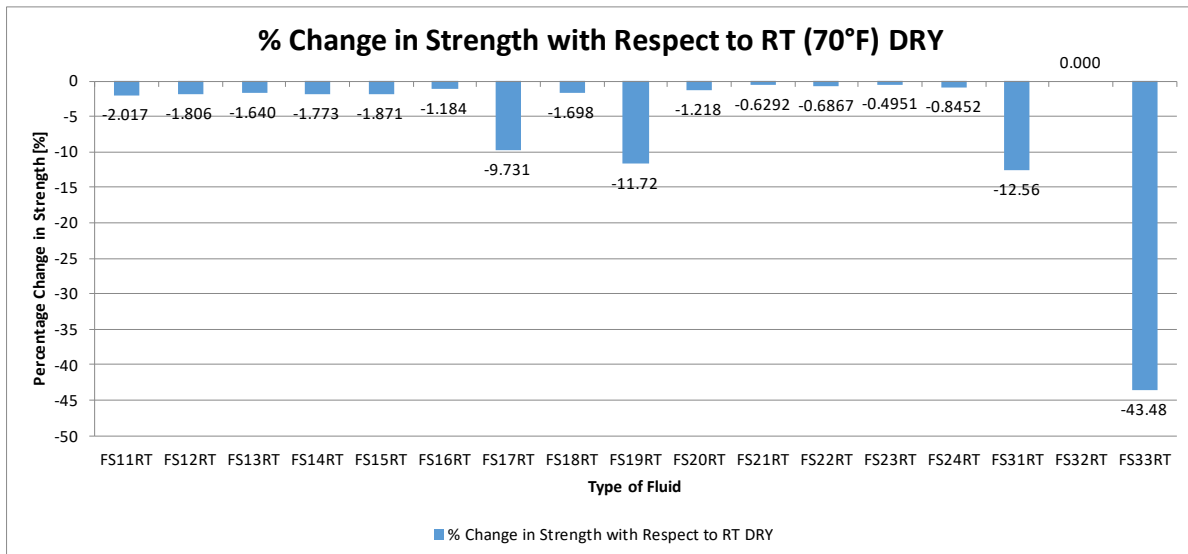
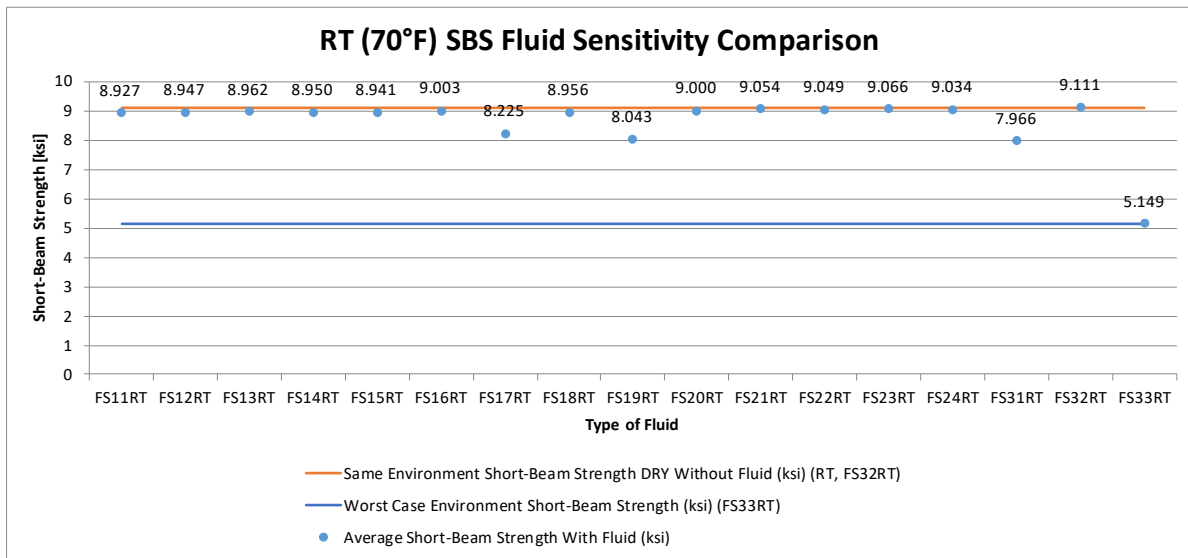




7. Fluid Sensitivity Comparison

7.1 Room Temperature Test Data

Code	Fluid	Exposure
FS11RT	100 Low lead Fuel (ASTM D910)	90 days min @ 70°F ± 10F
FS12RT	Jet A Fuel (ASTM D1655)	
FS13RT	MIL-PRF-5606 Hydraulic Oil	
FS14RT	MIL-PRF-83282 Hydraulic Oil	
FS15RT	MIL-PRF-7808 Engine Oil	
FS16RT	MIL-PRF-23699, Class STD Engine Oil	
FS17RT	Salt Water (ASTM D1141)	
FS18RT	Skydrol LD-4 (SAE AS1241, Type IV, Class I)	
FS19RT	50% Water w/ 50% Skydrol LD-4 (SAE AS1241, Type IV, Class I)	
FS20RT	Isopropyl Alcohol Deicing Agent (TT-I-735)	
FS21RT	MEK washing fluid (ASTM D740)	90 mins @ 70°F ± 10F
FS22RT	Polypropylene Glycol Deicer (Type I) SAE AMS 1424	
FS23RT	Isopropyl Alcohol Deicing (TT-I-735)	48±4 hrs @ 70°F ± 10F
FS24RT	Acetone	75±15 minutes @ 70°F ± 10F
FS31RT	Distilled Water	90 days min @ 70°F ± 10F
FS32RT	Dry	Per section 6.1 Test Plan
FS33RT	85% Relative Humidity	

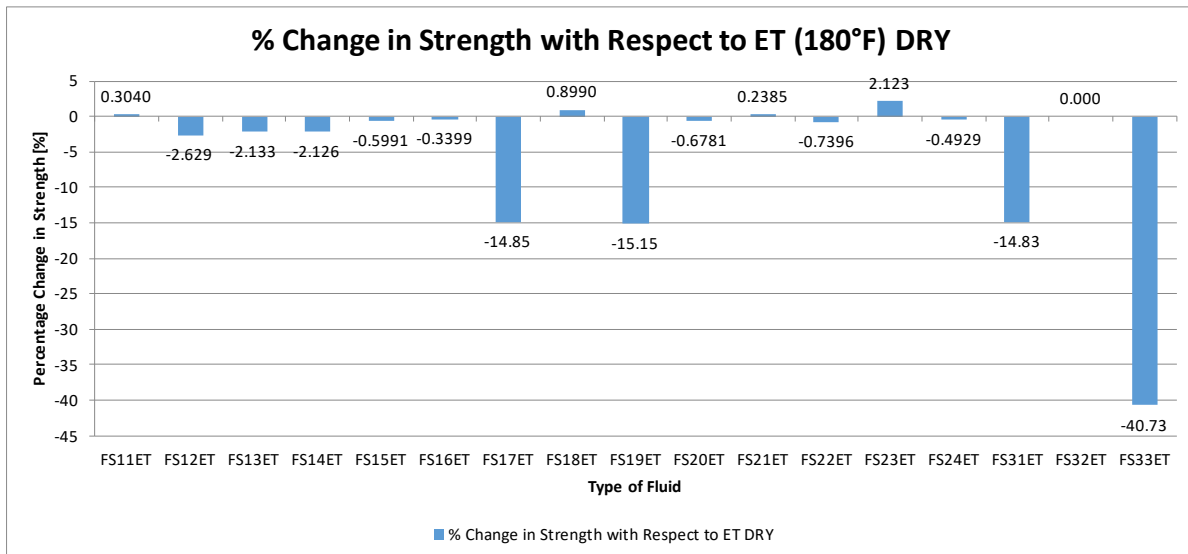
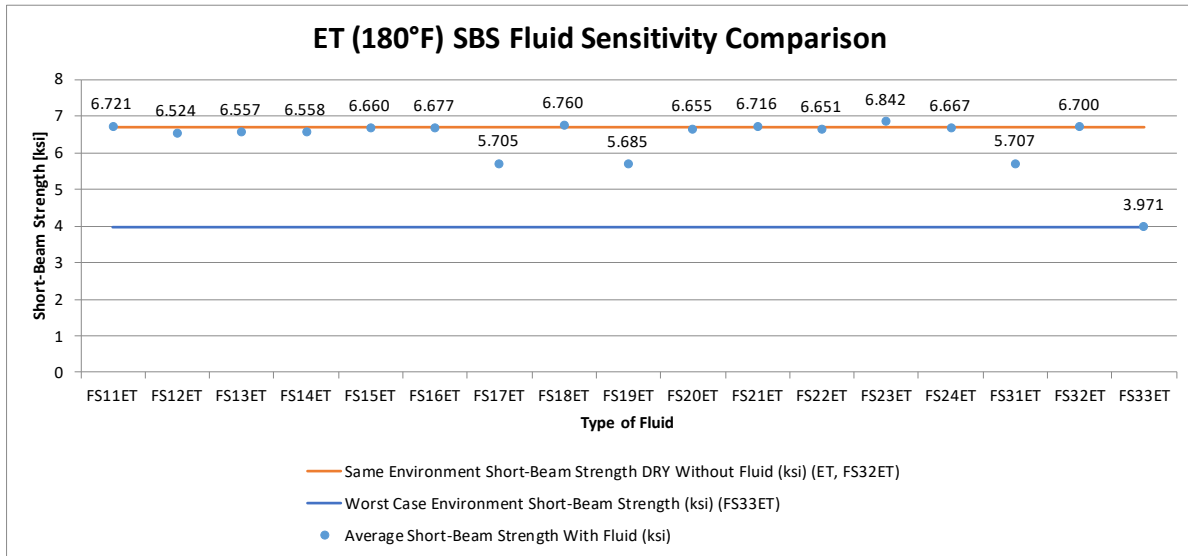


Fluid Sensitivity Screening
Short-Beam Strength Properties (FSSBS)--RT (70°F) Strength
 Renegade RM-2014-LDk-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

Specimen Number	Batch #	Cure Cycle	Prepreg Lot #	Fluid	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode	Average
FS11RT-1	B	C1	2	11	8.923	0.2272	20	0.01136	Interlaminar Shear	8.927
FS11RT-2	B	C1	2	11	8.936	0.2276	20	0.01138		
FS11RT-3	B	C1	2	11	8.920	0.2267	20	0.01134		
FS11RT-4	B	C1	2	11	8.912	0.2280	20	0.01140		
FS11RT-5	B	C1	2	11	8.945	0.2284	20	0.01142		
FS12RT-1	B	C1	2	12	8.996	0.2279	20	0.01140	Interlaminar Shear	8.947
FS12RT-2	B	C1	2	12	8.952	0.2275	20	0.01138		
FS12RT-3	B	C1	2	12	8.924	0.2278	20	0.01139		
FS12RT-4	B	C1	2	12	8.950	0.2276	20	0.01138		
FS12RT-5	B	C1	2	12	8.911	0.2294	20	0.01147		
FS13RT-1	B	C1	2	13	9.011	0.2263	20	0.01132	Interlaminar Shear	8.962
FS13RT-2	B	C1	2	13	8.923	0.2263	20	0.01132		
FS13RT-3	B	C1	2	13	8.950	0.2283	20	0.01141		
FS13RT-4	B	C1	2	13	8.971	0.2288	20	0.01144		
FS13RT-5	B	C1	2	13	8.954	0.2289	20	0.01144		
FS14RT-1	B	C1	2	14	8.918	0.2291	20	0.01146	Interlaminar Shear	8.950
FS14RT-2	B	C1	2	14	8.937	0.2292	20	0.01146		
FS14RT-3	B	C1	2	14	8.976	0.2286	20	0.01143		
FS14RT-4	B	C1	2	14	8.941	0.2285	20	0.01143		
FS14RT-5	B	C1	2	14	8.975	0.2285	20	0.01142		
FS15RT-1	B	C1	2	15	8.955	0.2280	20	0.01140	Interlaminar Shear	8.941
FS15RT-2	B	C1	2	15	8.950	0.2279	20	0.01139		
FS15RT-3	B	C1	2	15	8.927	0.2274	20	0.01137		
FS15RT-4	B	C1	2	15	8.882	0.2275	20	0.01138		
FS15RT-5	B	C1	2	15	8.990	0.2286	20	0.01143		
FS16RT-1	B	C1	2	16	9.038	0.2298	20	0.01149	Interlaminar Shear	9.003
FS16RT-2	B	C1	2	16	8.969	0.2297	20	0.01149		
FS16RT-3	B	C1	2	16	8.988	0.2299	20	0.01149		
FS16RT-4	B	C1	2	16	8.997	0.2297	20	0.01149		
FS16RT-5	B	C1	2	16	9.024	0.2295	20	0.01148		
FS17RT-1	B	C1	2	17	8.279	0.2287	20	0.01144	Interlaminar Shear	8.225
FS17RT-2	B	C1	2	17	8.196	0.2288	20	0.01144		
FS17RT-3	B	C1	2	17	8.180	0.2284	20	0.01142		
FS17RT-4	B	C1	2	17	8.201	0.2282	20	0.01141		
FS17RT-5	B	C1	2	17	8.267	0.2277	20	0.01139		
FS18RT-1	B	C1	2	18	8.907	0.2293	20	0.01147	Interlaminar Shear	8.956
FS18RT-2	B	C1	2	18	8.944	0.2295	20	0.01147		
FS18RT-3	B	C1	2	18	8.993	0.2296	20	0.01148		
FS18RT-4	B	C1	2	18	8.985	0.2298	20	0.01149		
FS18RT-5	B	C1	2	18	8.953	0.2299	20	0.01149		
FS19RT-1	B	C1	2	19	8.048	0.2295	20	0.01147	Interlaminar Shear	8.043
FS19RT-2	B	C1	2	19	8.022	0.2295	20	0.01147		
FS19RT-3	B	C1	2	19	7.994	0.2295	20	0.01147		
FS19RT-4	B	C1	2	19	8.119	0.2297	20	0.01149		
FS19RT-5	B	C1	2	19	8.033	0.2294	20	0.01147		
FS20RT-1	B	C1	2	20	8.926	0.2283	20	0.01141	Interlaminar Shear	9.000
FS20RT-2	B	C1	2	20	9.005	0.2288	20	0.01144		
FS20RT-3	B	C1	2	20	9.074	0.2293	20	0.01147		
FS20RT-4	B	C1	2	20	8.989	0.2298	20	0.01149		
FS20RT-5	B	C1	2	20	9.008	0.2298	20	0.01149		
FS21RT-1	B	C1	2	21	9.094	0.2299	20	0.01149	Interlaminar Shear	9.054
FS21RT-2	B	C1	2	21	9.116	0.2297	20	0.01149		
FS21RT-3	B	C1	2	21	8.997	0.2293	20	0.01146		
FS21RT-4	B	C1	2	21	9.083	0.2291	20	0.01145		
FS21RT-5	B	C1	2	21	8.981	0.2288	20	0.01144		
FS22RT-1	B	C1	2	22	9.077	0.2282	20	0.01141	Interlaminar Shear, Compression	9.049
FS22RT-2	B	C1	2	22	9.067	0.2276	20	0.01138		
FS22RT-3	B	C1	2	22	9.079	0.2280	20	0.01140		
FS22RT-4	B	C1	2	22	8.959	0.2286	20	0.01143		
FS22RT-5	B	C1	2	22	9.061	0.2294	20	0.01147		
FS23RT-1	B	C1	2	23	9.050	0.2296	20	0.01148	Interlaminar Shear, Compression	9.066
FS23RT-2	B	C1	2	23	9.041	0.2288	20	0.01144		
FS23RT-3	B	C1	2	23	9.103	0.2284	20	0.01142		
FS23RT-4	B	C1	2	23	9.148	0.2286	20	0.01143		
FS23RT-5	B	C1	2	23	8.988	0.2289	20	0.01145		
FS24RT-1	B	C1	2	24	8.964	0.2297	20	0.01149	Interlaminar Shear	9.034
FS24RT-2	B	C1	2	24	9.052	0.2296	20	0.01148		
FS24RT-3	B	C1	2	24	9.023	0.2298	20	0.01149		
FS24RT-4	B	C1	2	24	9.024	0.2277	20	0.01139		
FS24RT-5	B	C1	2	24	9.108	0.2274	20	0.01137		
FS31RT-1	B	C1	2	31	7.939	0.2293	20	0.01146	Interlaminar Shear	7.966
FS31RT-2	B	C1	2	31	7.920	0.2295	20	0.01147		
FS31RT-3	B	C1	2	31	8.004	0.2298	20	0.01149		
FS31RT-4	B	C1	2	31	7.971	0.2295	20	0.01148		
FS31RT-5	B	C1	2	31	7.997	0.2296	20	0.01148		
FS32RT-1	B	C1	2	32	9.064	0.2283	20	0.01141	Interlaminar Shear	9.111
FS32RT-2	B	C1	2	32	9.120	0.2281	20	0.01140		
FS32RT-3	B	C1	2	32	9.116	0.2282	20	0.01141		
FS32RT-4	B	C1	2	32	9.118	0.2282	20	0.01141		
FS32RT-5	B	C1	2	32	9.138	0.2279	20	0.01139		
FS33RT-1	B	C1	2	33	5.061	0.2279	20	0.01139	Interlaminar Shear	5.149
FS33RT-2	B	C1	2	33	5.361	0.2285	20	0.01143		
FS33RT-3	B	C1	2	33	5.119	0.2291	20	0.01145		
FS33RT-4	B	C1	2	33	4.965	0.2290	20	0.01145		
FS33RT-5	B	C1	2	33	5.239	0.2290	20	0.01145		

7.2 Elevated Temperature Test Data

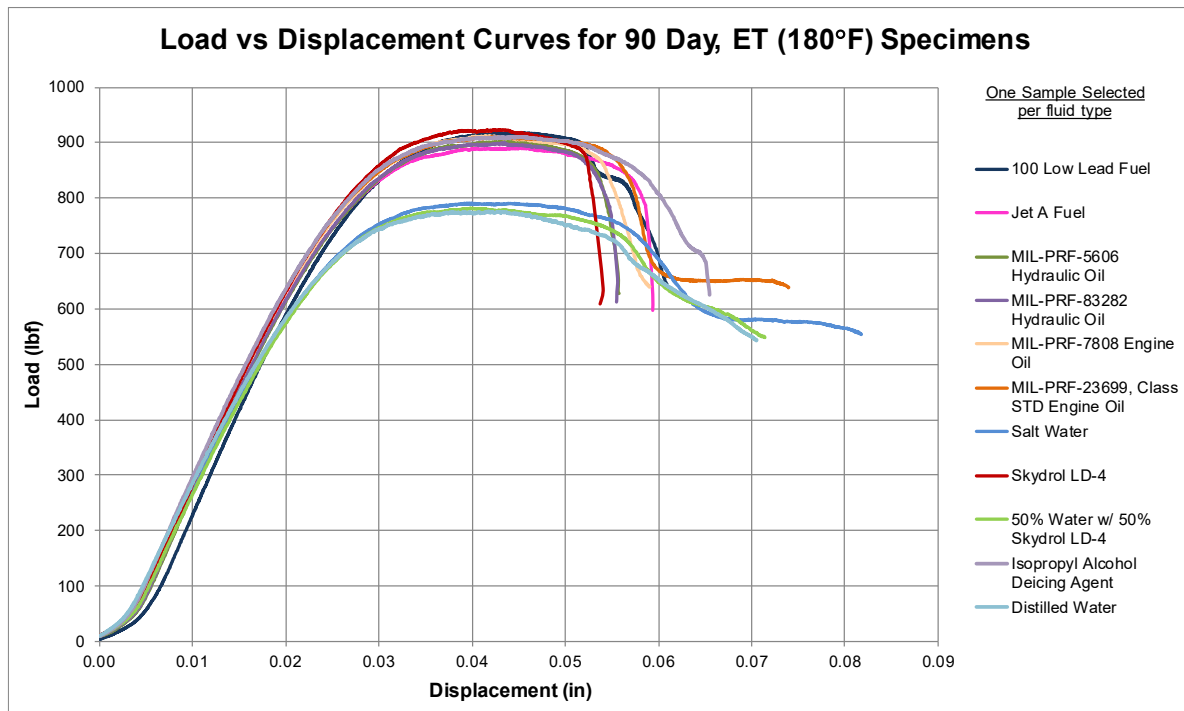
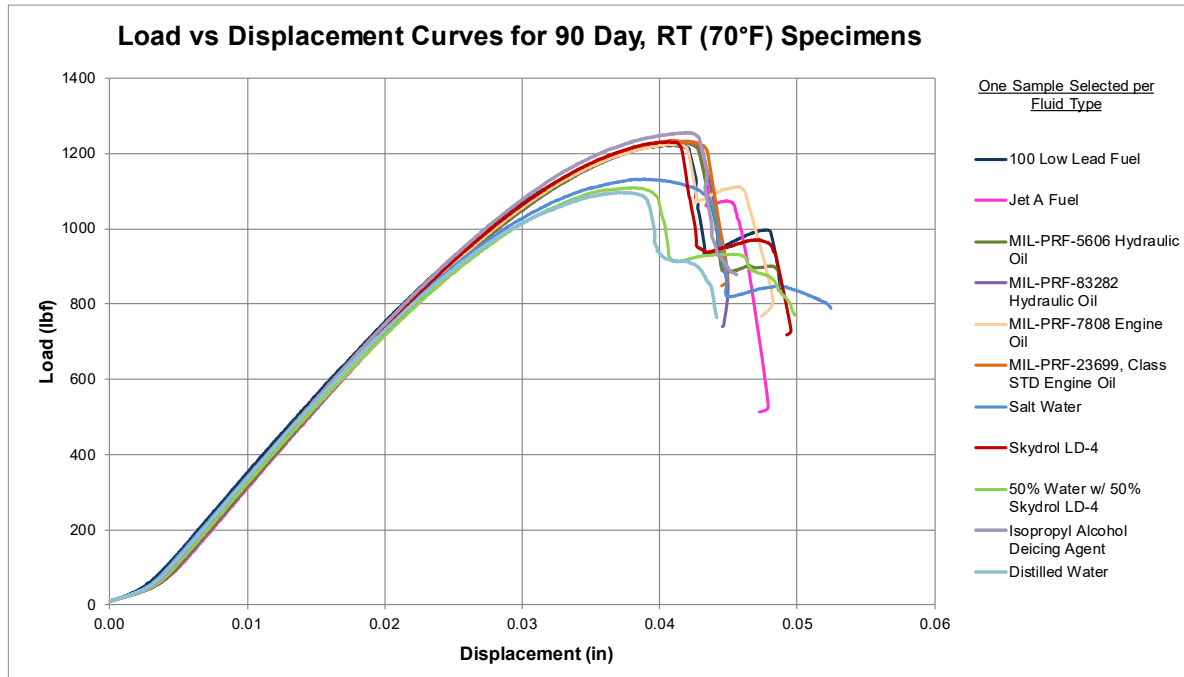
Code	Fluid	Exposure
FS11ET	100 Low lead Fuel (ASTM D910)	90 days min @ 70°F ± 10F
FS12ET	Jet A Fuel (ASTM D1655)	
FS13ET	MIL-PRF-5606 Hydraulic Oil	
FS14ET	MIL-PRF-83282 Hydraulic Oil	
FS15ET	MIL-PRF-7808 Engine Oil	
FS16ET	MIL-PRF-23699, Class STD Engine Oil	
FS17ET	Salt Water (ASTM D1141)	
FS18ET	Skydrol LD-4 (SAE AS1241, Type IV, Class I)	
FS19ET	50% Water w/ 50% Skydrol LD-4 (SAE AS1241, Type IV, Class I)	
FS20ET	Isopropyl Alcohol Deicing Agent (TT-I-735)	
FS21ET	MEK washing fluid (ASTM D740)	90 mins @ 70°F ± 10F
FS22ET	Polypropylene Glycol Deicer (Type I) SAE AMS 1424	
FS23ET	Isopropyl Alcohol Deicing (TT-I-735)	48±4 hrs @ 70°F ± 10F
FS24ET	Acetone	75±15 minutes @ 70°F ± 10F
FS31ET	Distilled Water	90 days min @ 70°F ± 10F
FS32ET	Dry	Per section 6.1 Test Plan
FS33ET	85% Relative Humidity	

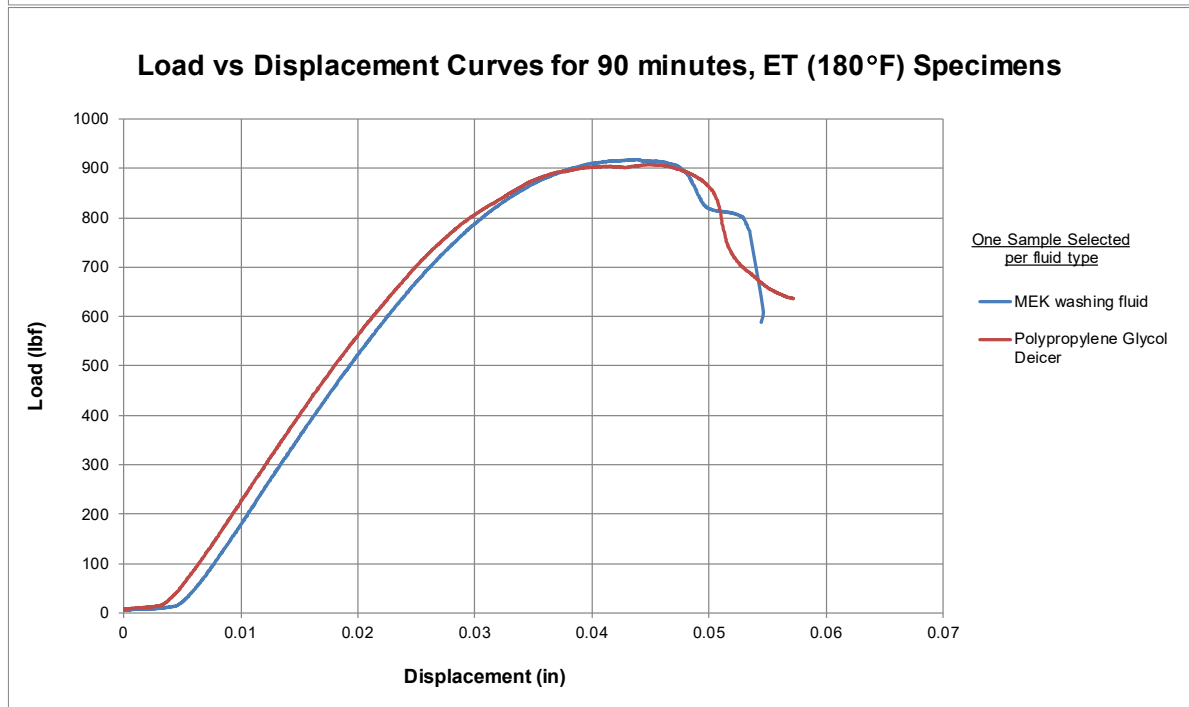
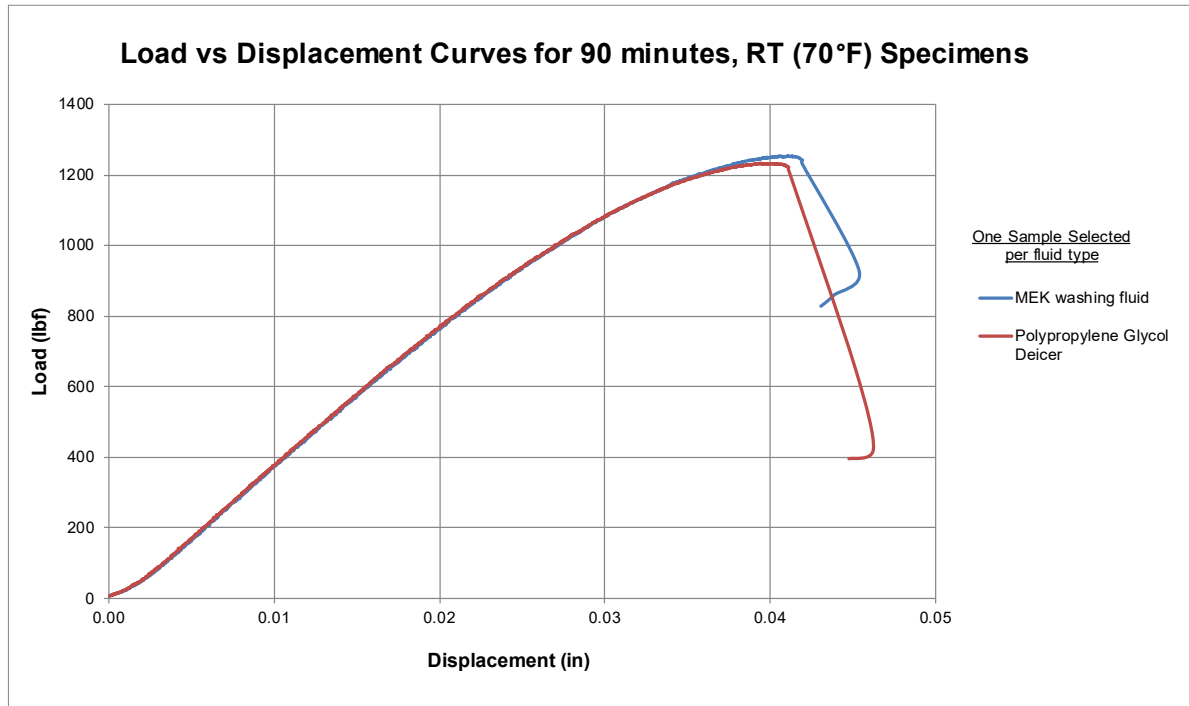


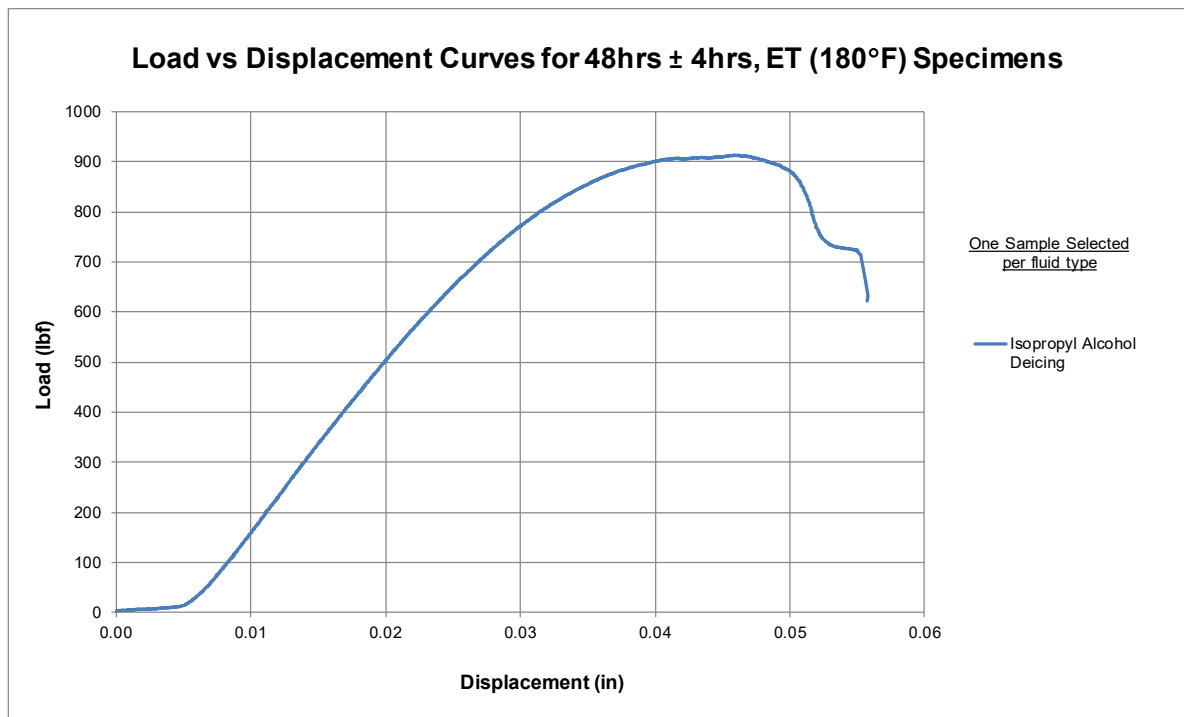
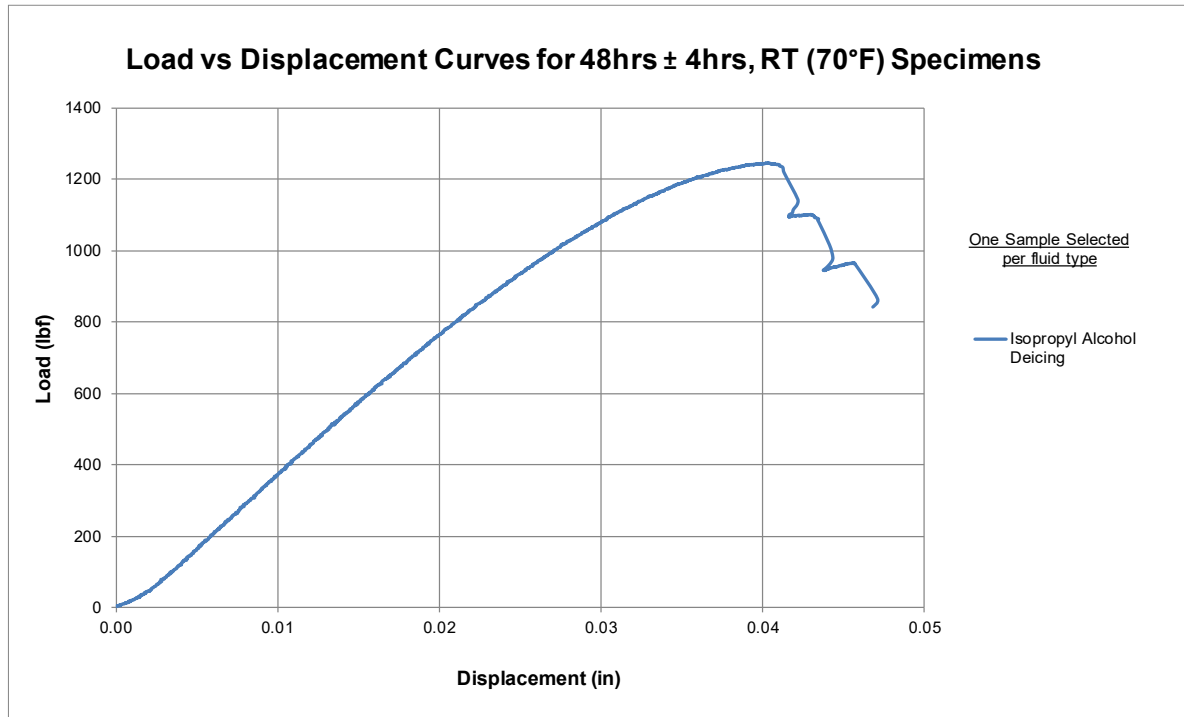
Fluid Sensitivity Screening
Short-Beam Strength Properties (FSSBS)--ET (180°F) Strength
 Renegade RM-2014-LDK-Tk 4581 8HS Quartz Fabric 286 gsm with RC 38%

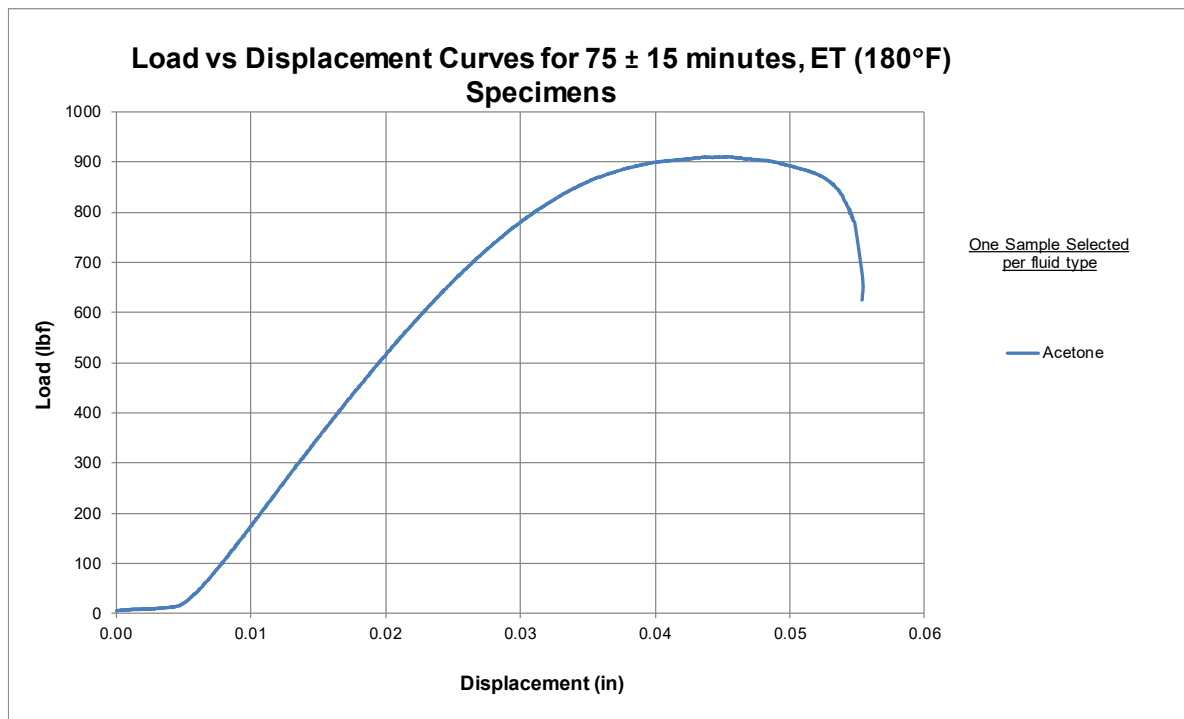
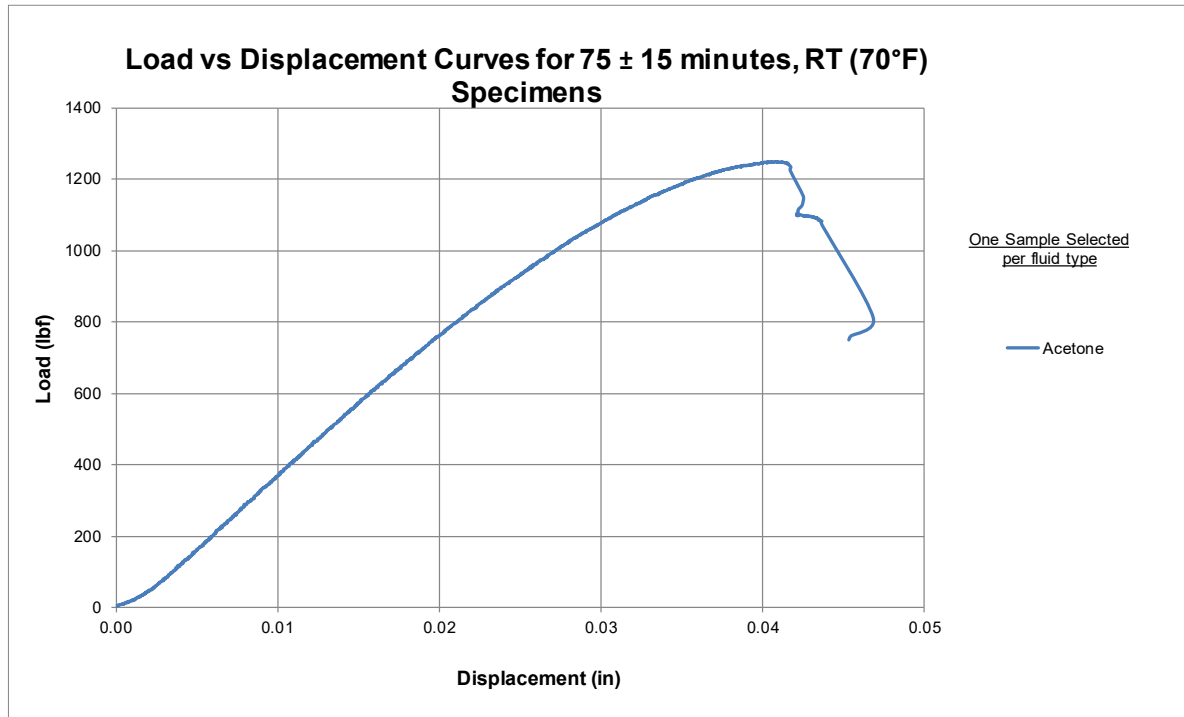
Specimen Number	Batch #	Cure Cycle	Prepreg Lot #	Fluid	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{90} [in]	Failure Mode	Average
FS11ET-1	B	C1	2	11	6.671	0.2288	20	0.01144	Interlaminar Shear, Inelastic Deformation	6.721
FS11ET-2	B	C1	2	11	6.663	0.2282	20	0.01141		
FS11ET-3	B	C1	2	11	6.875	0.2275	20	0.01138		
FS11ET-4	B	C1	2	11	6.800	0.2275	20	0.01138		
FS11ET-5	B	C1	2	11	6.595	0.2279	20	0.01139		
FS12ET-1	B	C1	2	12	6.529	0.2271	20	0.01136	Interlaminar Shear, Inelastic Deformation	6.524
FS12ET-2	B	C1	2	12	6.516	0.2275	20	0.01138		
FS12ET-3	B	C1	2	12	6.492	0.2269	20	0.01135		
FS12ET-4	B	C1	2	12	6.505	0.2282	20	0.01141		
FS12ET-5	B	C1	2	12	6.578	0.2285	20	0.01143		
FS13ET-1	B	C1	2	13	6.568	0.2285	20	0.01143	Interlaminar Shear, Inelastic Deformation	6.557
FS13ET-2	B	C1	2	13	6.556	0.2284	20	0.01142		
FS13ET-3	B	C1	2	13	6.572	0.2283	20	0.01141		
FS13ET-4	B	C1	2	13	6.557	0.2279	20	0.01139		
FS13ET-5	B	C1	2	13	6.534	0.2274	20	0.01137		
FS14ET-1	B	C1	2	14	6.517	0.2276	20	0.01138	Interlaminar Shear, Inelastic Deformation	6.558
FS14ET-2	B	C1	2	14	6.534	0.2275	20	0.01138		
FS14ET-3	B	C1	2	14	6.592	0.2269	20	0.01135		
FS14ET-4	B	C1	2	14	6.591	0.2269	20	0.01134		
FS14ET-5	B	C1	2	14	6.556	0.2268	20	0.01134		
FS15ET-1	B	C1	2	15	6.635	0.2286	20	0.01143	Interlaminar Shear, Inelastic Deformation	6.660
FS15ET-2	B	C1	2	15	6.663	0.2285	20	0.01143		
FS15ET-3	B	C1	2	15	6.654	0.2283	20	0.01142		
FS15ET-4	B	C1	2	15	6.681	0.2284	20	0.01142		
FS15ET-5	B	C1	2	15	6.667	0.2281	20	0.01140		
FS16ET-1	B	C1	2	16	6.694	0.2274	20	0.01137	Interlaminar Shear, Inelastic Deformation	6.677
FS16ET-2	B	C1	2	16	6.707	0.2278	20	0.01139		
FS16ET-3	B	C1	2	16	6.660	0.2274	20	0.01137		
FS16ET-4	B	C1	2	16	6.667	0.2275	20	0.01138		
FS16ET-5	B	C1	2	16	6.658	0.2270	20	0.01135		
FS17ET-1	B	C1	2	17	5.682	0.2276	20	0.01138	Interlaminar Shear, Inelastic Deformation	5.705
FS17ET-2	B	C1	2	17	5.653	0.2282	20	0.01141		
FS17ET-3	B	C1	2	17	5.675	0.2284	20	0.01142		
FS17ET-4	B	C1	2	17	5.762	0.2282	20	0.01141		
FS17ET-5	B	C1	2	17	5.754	0.2281	20	0.01141		
FS18ET-1	B	C1	2	18	6.806	0.2277	20	0.01139	Interlaminar Shear, Inelastic Deformation	6.760
FS18ET-2	B	C1	2	18	6.712	0.2274	20	0.01137		
FS18ET-3	B	C1	2	18	6.818	0.2278	20	0.01139		
FS18ET-4	B	C1	2	18	6.735	0.2280	20	0.01140		
FS18ET-5	B	C1	2	18	6.731	0.2285	20	0.01143		
FS19ET-1	B	C1	2	19	5.632	0.2287	20	0.01143	Interlaminar Shear, Inelastic Deformation	5.685
FS19ET-2	B	C1	2	19	5.694	0.2283	20	0.01141		
FS19ET-3	B	C1	2	19	5.664	0.2282	20	0.01141		
FS19ET-4	B	C1	2	19	5.739	0.2277	20	0.01138		
FS19ET-5	B	C1	2	19	5.695	0.2279	20	0.01140		
FS20ET-1	B	C1	2	20	6.655	0.2280	20	0.01140	Interlaminar Shear, Inelastic Deformation	6.655
FS20ET-2	B	C1	2	20	6.620	0.2276	20	0.01138		
FS20ET-3	B	C1	2	20	6.643	0.2276	20	0.01138		
FS20ET-4	B	C1	2	20	6.630	0.2275	20	0.01138		
FS20ET-5	B	C1	2	20	6.726	0.2282	20	0.01141		
FS21ET-1	B	C1	2	21	6.697	0.2287	20	0.01143	Interlaminar Shear, Compression	6.716
FS21ET-2	B	C1	2	21	6.761	0.2284	20	0.01142		
FS21ET-3	B	C1	2	21	6.687	0.2283	20	0.01141		
FS21ET-4	B	C1	2	21	6.671	0.2279	20	0.01140		
FS21ET-5	B	C1	2	21	6.764	0.2274	20	0.01137		
FS22ET-1	B	C1	2	22	6.635	0.2280	20	0.01140	Interlaminar Shear, Compression	6.651
FS22ET-2	B	C1	2	22	6.607	0.2275	20	0.01138		
FS22ET-3	B	C1	2	22	6.689	0.2274	20	0.01137		
FS22ET-4	B	C1	2	22	6.650	0.2273	20	0.01137		
FS22ET-5	B	C1	2	22	6.671	0.2271	20	0.01136		
FS23ET-1	B	C1	2	23	6.758	0.2281	20	0.01141	Interlaminar Shear, Compression	6.842
FS23ET-2	B	C1	2	23	6.652	0.2285	20	0.01143		
FS23ET-3	B	C1	2	23	6.756	0.2287	20	0.01144		
FS23ET-4	B	C1	2	23	7.110	0.2282	20	0.01141		
FS23ET-5	B	C1	2	23	6.937	0.2280	20	0.01140		
FS24ET-1	B	C1	2	24	6.671	0.2272	20	0.01136	Interlaminar Shear, Compression	6.667
FS24ET-2	B	C1	2	24	6.654	0.2273	20	0.01137		
FS24ET-3	B	C1	2	24	6.645	0.2273	20	0.01137		
FS24ET-4	B	C1	2	24	6.661	0.2274	20	0.01137		
FS24ET-5	B	C1	2	24	6.704	0.2273	20	0.01136		
FS31ET-1	B	C1	2	31	5.944	0.2277	20	0.01138	Interlaminar Shear, Inelastic Deformation	5.707
FS31ET-2	B	C1	2	31	5.632	0.2274	20	0.01137		
FS31ET-3	B	C1	2	31	5.675	0.2271	20	0.01135		
FS31ET-4	B	C1	2	31	5.693	0.2272	20	0.01136		
FS31ET-5	B	C1	2	31	5.667	0.2268	20	0.01134		
FS32ET-1	B	C1	2	32	5.630	0.2267	20	0.01134	Interlaminar Shear, Compression	6.700
FS32ET-2	B	C1	2	32	6.861	0.2272	20	0.01136		
FS32ET-3	B	C1	2	32	6.680	0.2271	20	0.01136		
FS32ET-4	B	C1	2	32	6.663	0.2275	20	0.01138		
FS32ET-5	B	C1	2	32	6.674	0.2278	20	0.01139		
FS33ET-1	B	C1	2	33	4.124	0.2266	20	0.01133	Interlaminar Shear	3.971
FS33ET-2	B	C1	2	33	3.922	0.2261	20	0.01131		
FS33ET-3	B	C1	2	33	3.849	0.2264	20	0.01132		
FS33ET-4	B	C1	2	33	4.067	0.2259	20	0.01130		
FS33ET-5	B	C1	2	33	3.895	0.2261	20	0.01130		

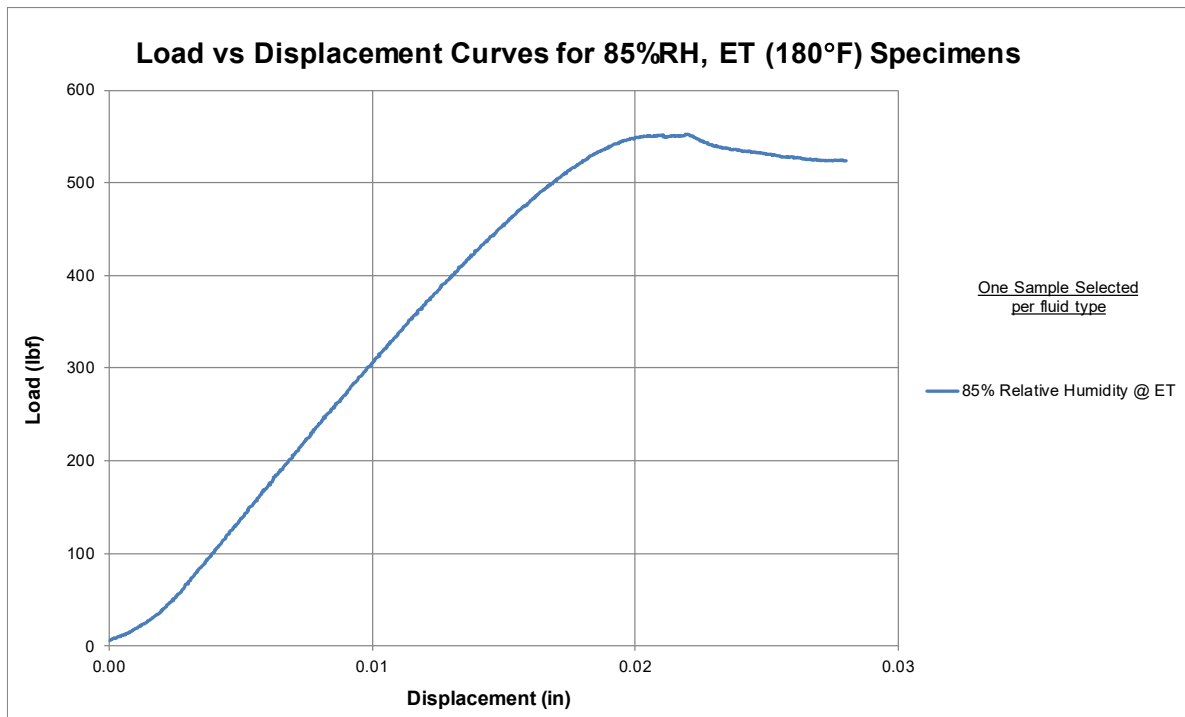
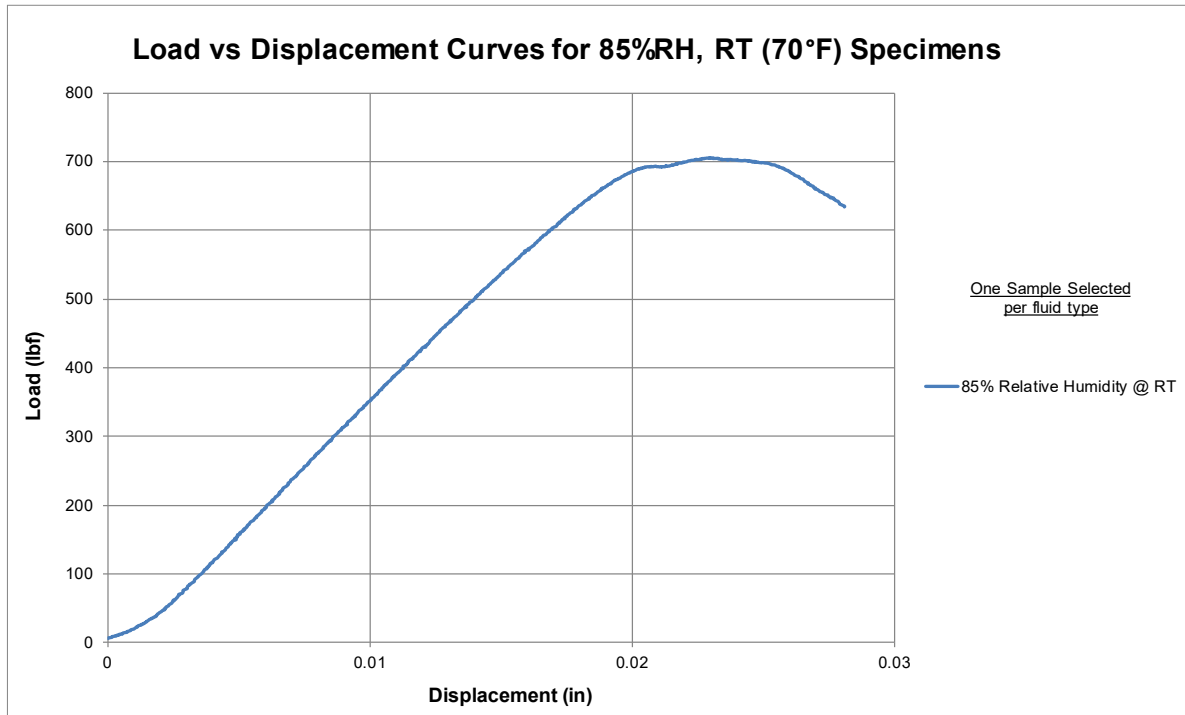
7.3 Load Displacement Curves





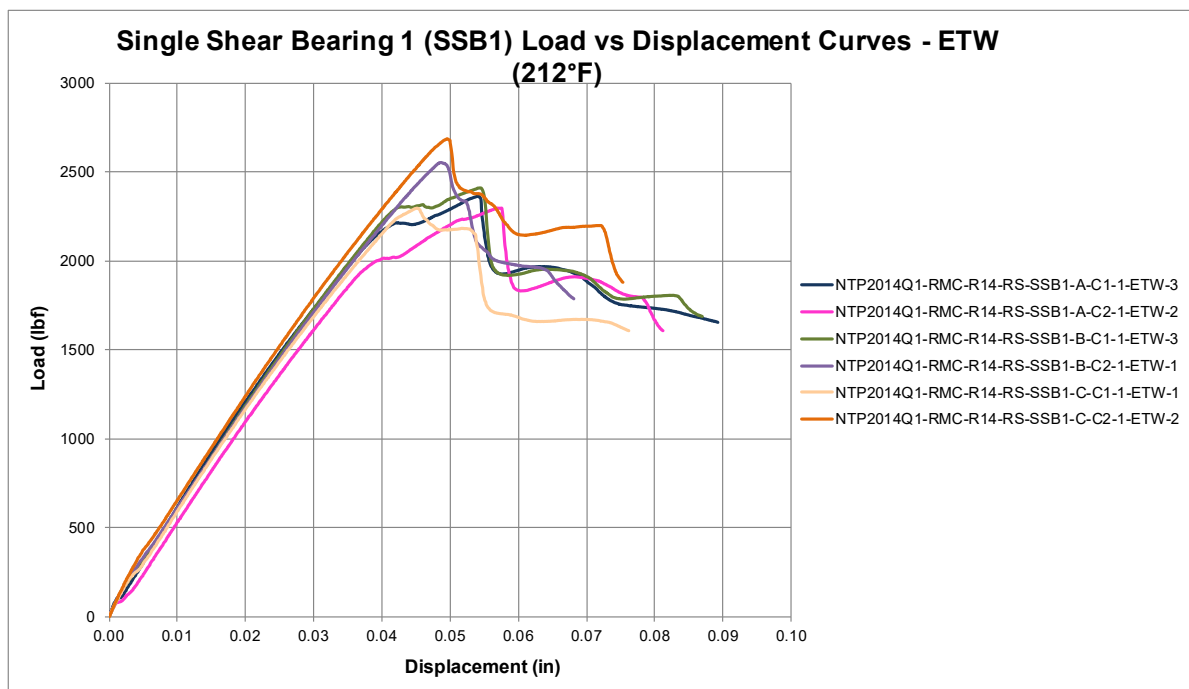
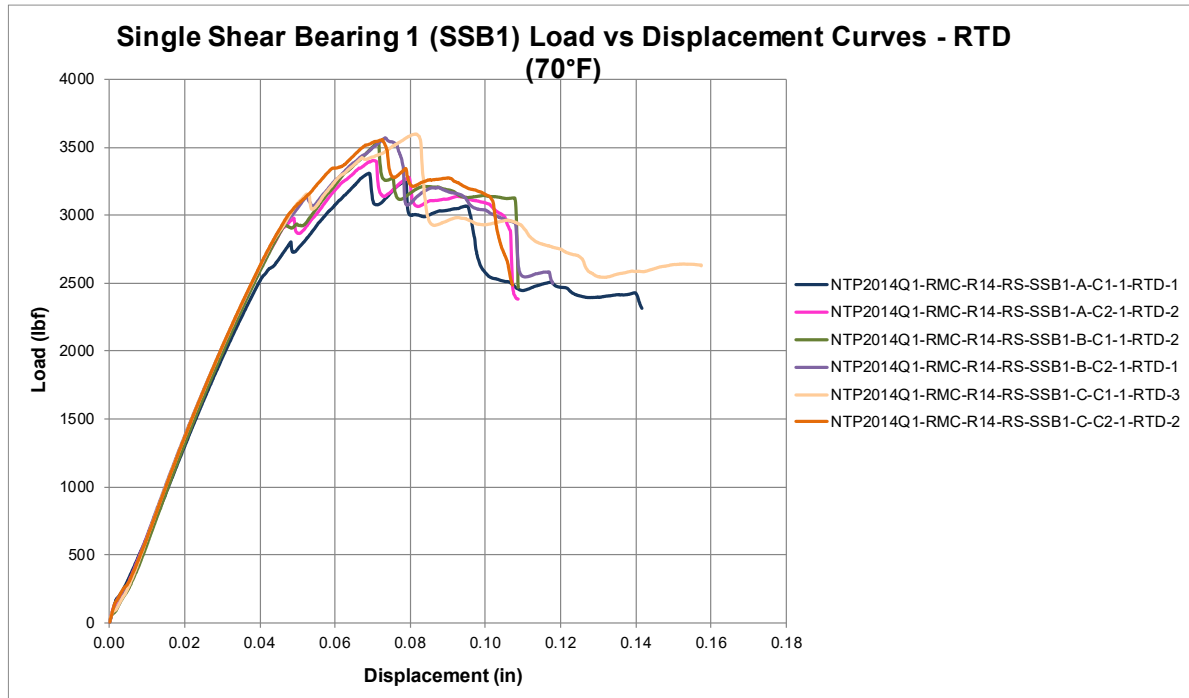




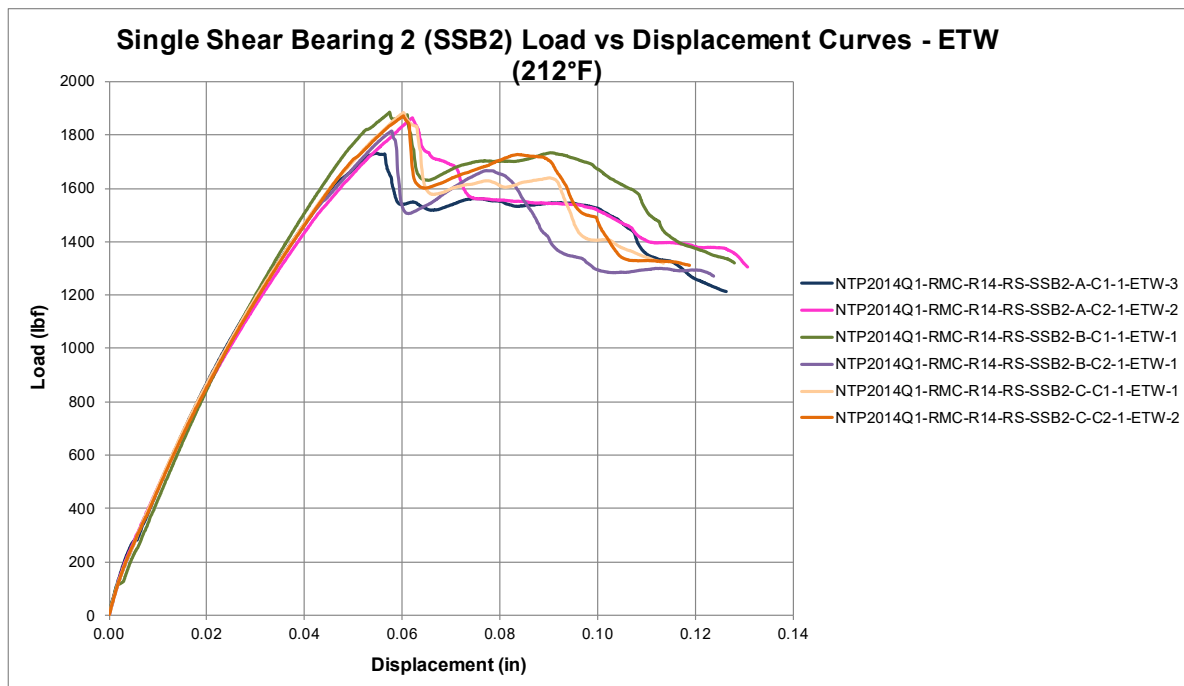
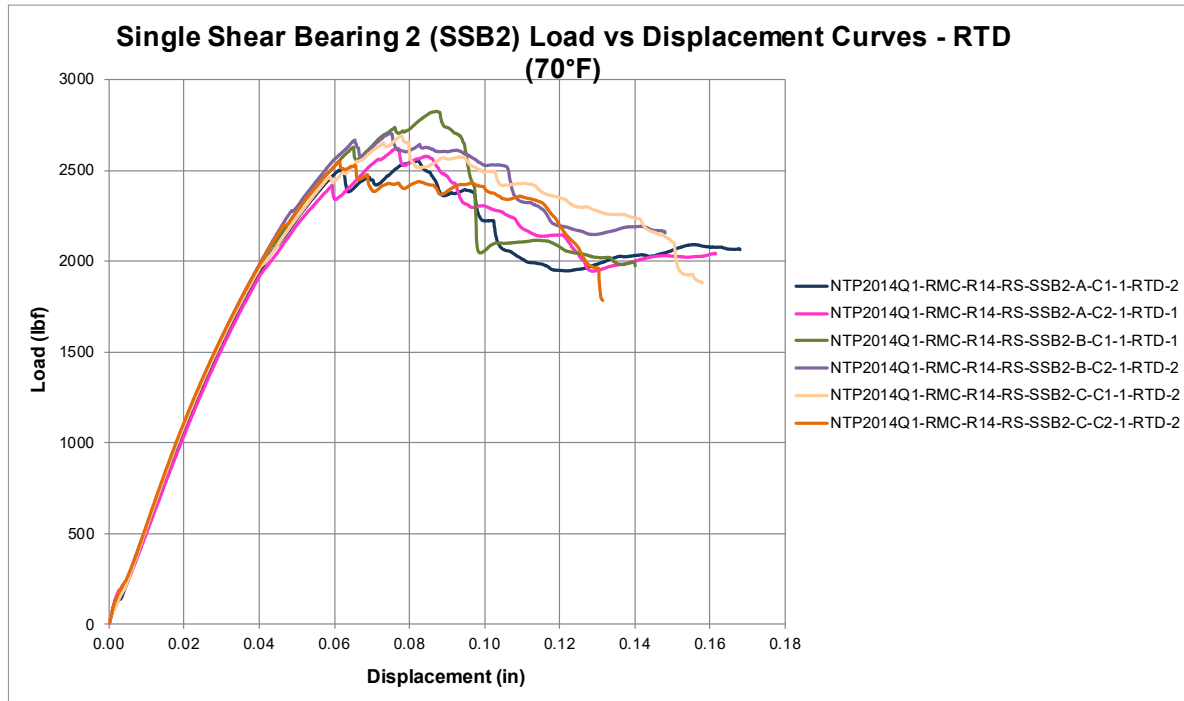


8. Load Displacement Curves - Single Shear Bearing (SSB)

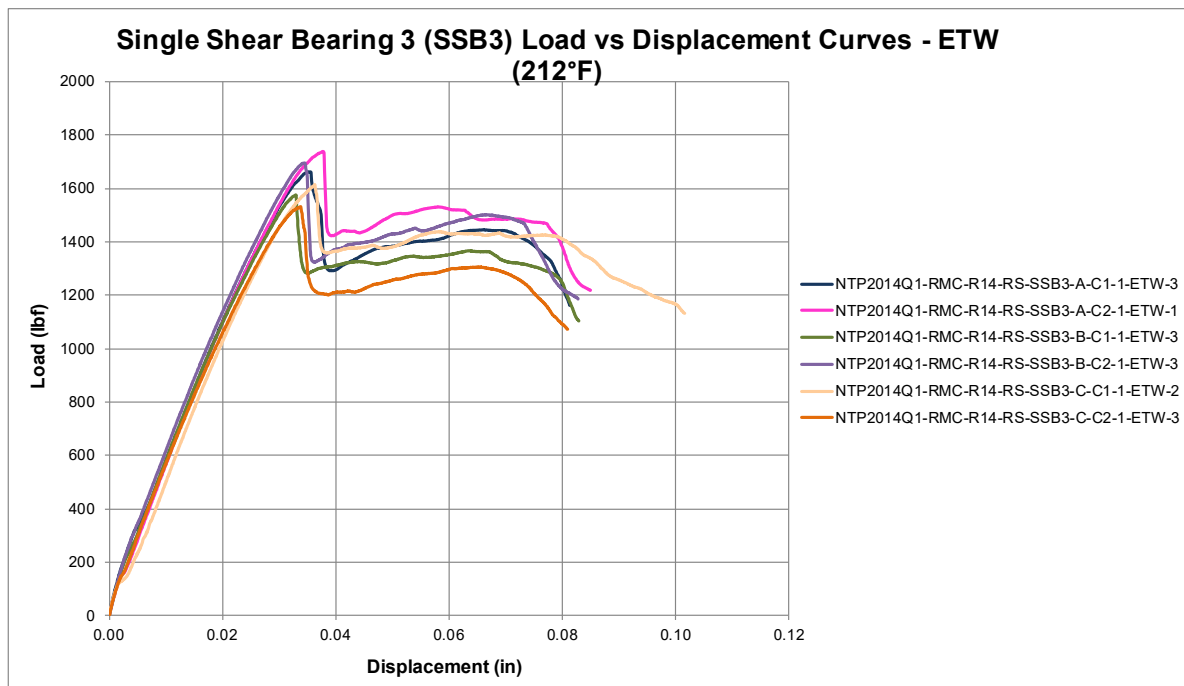
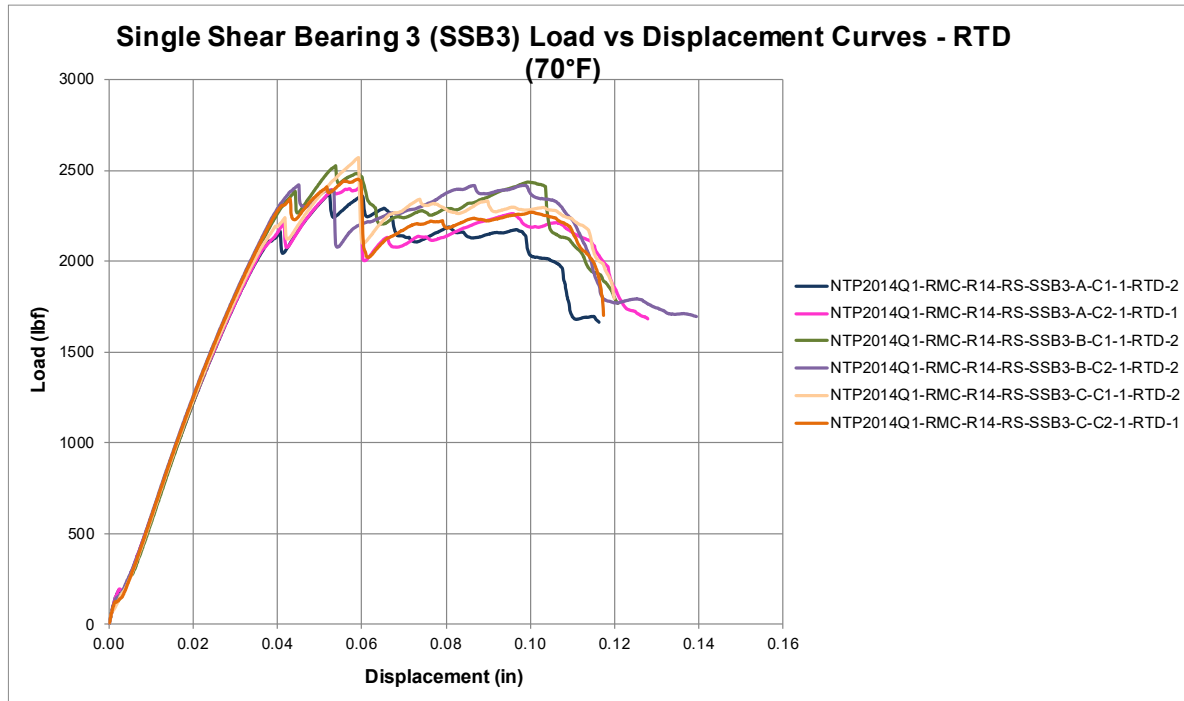
8.1 Single Shear Bearing 1 (SSB1)



8.2 Single Shear Bearing 2 (SSB2)

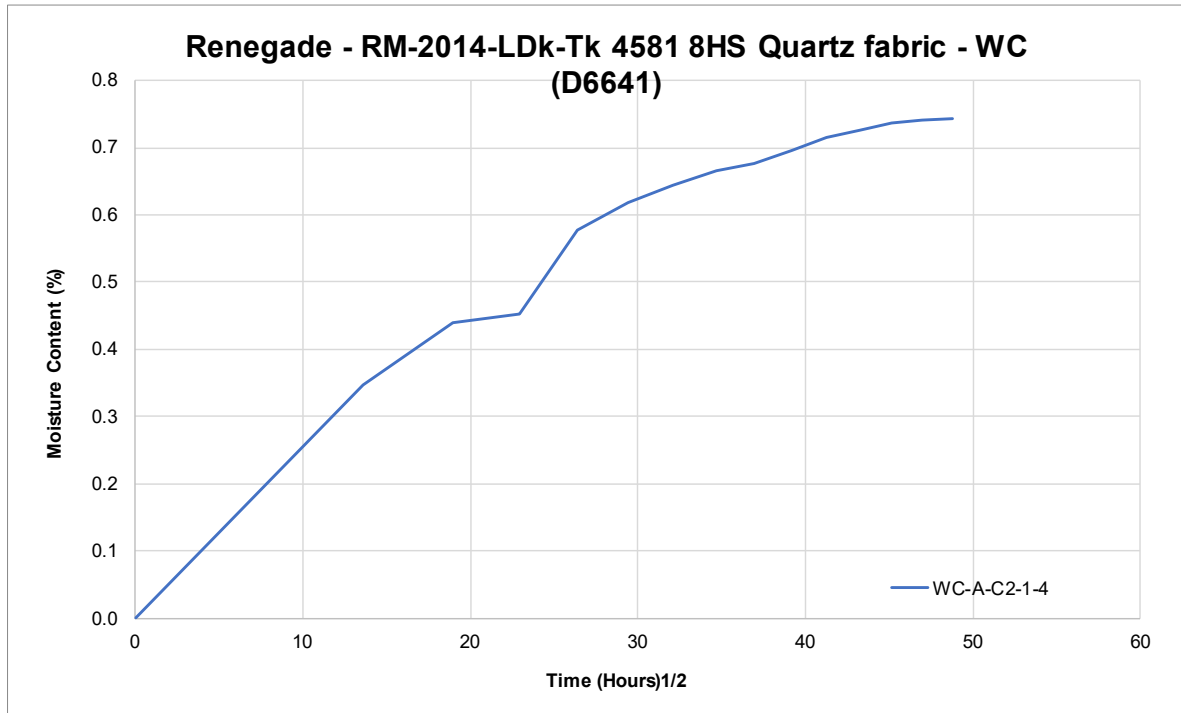


8.3 Single Shear Bearing 3 (SSB3)

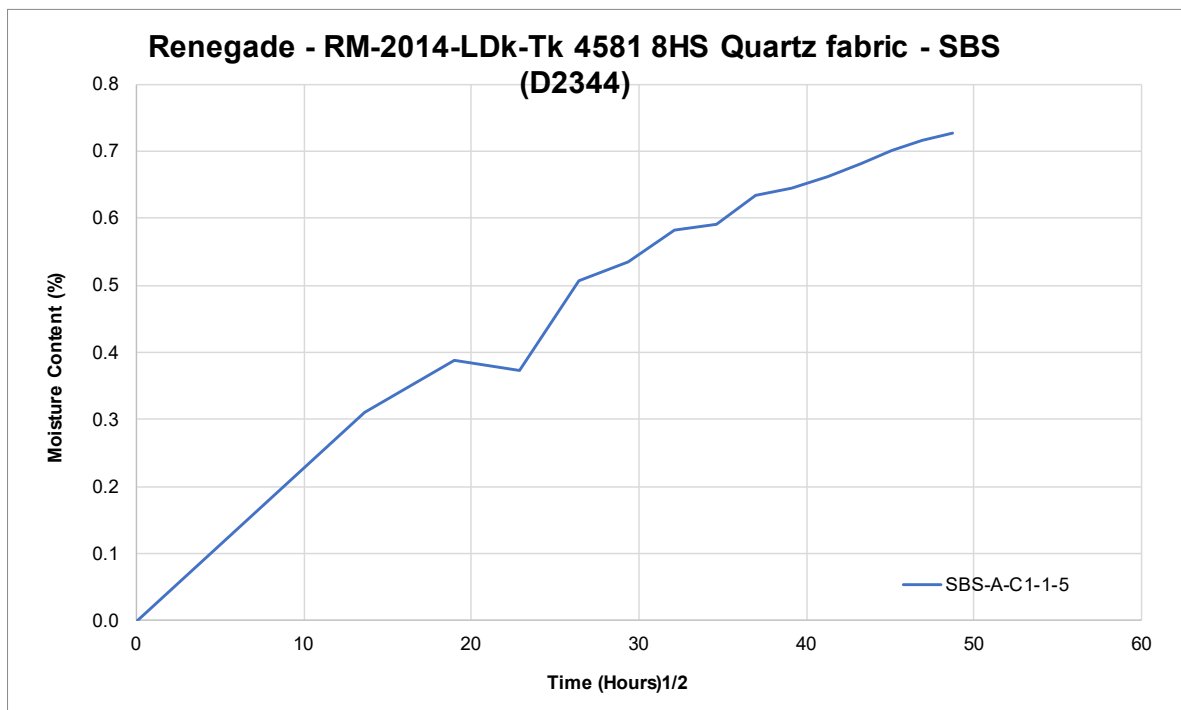


9. Moisture Conditioning Charts

9.1 Warp Compression – Thinnest Panel



9.2 Short Beam Strength – Thickest Panel



For “wet” mechanical test specimens, the drying procedures may not have completely dried the specimens prior to moisture conditioning, so the total amount of moisture absorbed by the specimens may be higher than those recorded in the moisture gain charts.

10. DMA Results

DMA Results Summary (3pt Bend)				
Renegade RM-2014-LDk-Tk 4581 8HS Qualification DMA Dry				
Sample ID	Onset Storage Modulus		Peak of Tangent Delta	
	T _g [°C]	T _g [°F]	T _g [°C]	T _g [°F]
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-DMA	143.14	289.65	162.70	324.86
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1-DMA	142.53	288.55	162.39	324.30
NTP2014Q1-RMC-R14-RS-UNC1-B-C1-1-DMA	142.68	288.82	161.19	322.14
NTP2014Q1-RMC-R14-RS-UNC1-B-C2-1-DMA	142.57	288.63	161.22	322.20
NTP2014Q1-RMC-R14-RS-UNC1-C-C1-1-DMA	143.30	289.94	163.29	325.92
NTP2014Q1-RMC-R14-RS-UNC1-C-C2-1-DMA	143.16	289.69	163.17	325.71
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-DMA	142.55	288.59	163.32	325.98
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-DMA	143.44	290.19	163.07	325.53
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-DMA	142.94	289.29	161.56	322.81
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-DMA	143.86	290.95	162.29	324.12
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-DMA	144.82	292.68	163.67	326.61
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-DMA	144.06	291.31	163.74	326.73
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-DMA	148.44	299.19	162.83	325.09
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-DMA	149.19	300.54	163.84	326.91
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-DMA	148.15	298.67	161.13	322.03
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-DMA	147.64	297.75	161.01	321.82
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-DMA	148.61	299.50	162.31	324.16
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-DMA	148.93	300.07	162.75	324.95
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-DMA	148.79	299.82	163.17	325.71
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-DMA	147.65	297.77	160.94	321.69
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-DMA	149.13	300.43	162.99	325.38
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-DMA	147.54	297.57	160.66	321.19
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-DMA	148.19	298.74	162.55	324.59
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-DMA	148.10	298.58	162.65	324.77
Average	145.81	294.46	162.44	324.38
Standard Deviation	2.68	4.83	0.97	1.75

DMA Results Summary (3pt Bend)				
Renegade RM-2014-LDk-Tk 4581 8HS Qualification DMA Wet				
Sample ID	Onset Storage Modulus		Peak of Tangent Delta	
	T _g [°C]	T _g [°F]	T _g [°C]	T _g [°F]
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-DMA	117.59	243.66	132.25	270.05
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1-DMA	117.28	243.10	132.38	270.28
NTP2014Q1-RMC-R14-RS-UNC1-B-C1-1-DMA	118.76	245.77	133.41	272.14
NTP2014Q1-RMC-R14-RS-UNC1-B-C2-1-DMA	119.05	246.29	133.65	272.57
NTP2014Q1-RMC-R14-RS-UNC1-C-C1-1-DMA	118.21	244.78	133.09	271.56
NTP2014Q1-RMC-R14-RS-UNC1-C-C2-1-DMA	117.91	244.24	132.87	271.17
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1-DMA	117.37	243.27	132.57	270.63
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1-DMA	118.23	244.81	132.91	271.24
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1-DMA	117.21	242.98	131.76	269.17
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1-DMA	117.17	242.91	131.51	268.72
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1-DMA	116.55	241.79	130.79	267.42
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1-DMA	116.35	241.43	131.16	268.09
NTP2014Q1-RMC-R14-RS-WC-A-C1-1-DMA	120.39	248.70	131.84	269.31
NTP2014Q1-RMC-R14-RS-WC-A-C2-1-DMA	120.58	249.04	131.77	269.19
NTP2014Q1-RMC-R14-RS-WC-B-C1-1-DMA	119.47	247.05	130.47	266.85
NTP2014Q1-RMC-R14-RS-WC-B-C2-1-DMA	119.61	247.30	130.19	266.34
NTP2014Q1-RMC-R14-RS-WC-C-C1-1-DMA	118.67	245.61	129.50	265.10
NTP2014Q1-RMC-R14-RS-WC-C-C2-1-DMA	119.07	246.33	129.76	265.57
NTP2014Q1-RMC-R14-RS-WT-A-C1-1-DMA	120.85	249.53	132.00	269.60
NTP2014Q1-RMC-R14-RS-WT-A-C2-1-DMA	120.98	249.76	132.14	269.85
NTP2014Q1-RMC-R14-RS-WT-B-C1-1-DMA	119.15	246.47	129.73	265.51
NTP2014Q1-RMC-R14-RS-WT-B-C2-1-DMA	119.48	247.06	130.11	266.20
NTP2014Q1-RMC-R14-RS-WT-C-C1-1-DMA	118.23	244.81	129.41	264.94
NTP2014Q1-RMC-R14-RS-WT-C-C2-1-DMA	118.55	245.39	129.65	265.37
Average	118.61	245.50	131.46	268.62
Standard Deviation	1.31	2.36	1.34	2.41

DMA Results Summary (Single Cantilever)				
Renegade RM-2014-LDk-Tk 4581 8HS Qualification DMA Dry				
Sample ID	Onset Storage Modulus		Peak of Tangent Delta	
	T _g [°C]	T _g [°F]	T _g [°C]	T _g [°F]
NTP2014Q1-RMC-R14-RS-WT-A-C2-1	158.4	317.0	174.0	345.2
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1	158.7	317.7	176.0	348.8
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1	158.7	317.6	176.0	348.8
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1	158.6	317.4	176.0	348.8
NTP2014Q1-RMC-R14-RS-WT-A-C1-1	159.6	319.4	174.0	345.2
NTP2014Q1-RMC-R14-RS-WC-A-C1-1	159.2	318.6	175.0	347.0
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1	158.8	317.8	176.0	348.8
NTP2014Q1-RMC-R14-RS-WC-A-C2-1	159.7	319.4	176.0	348.8
NTP2014Q1-RMC-R14-RS-WT-B-C1-1	158.8	317.9	174.0	345.2
NTP2014Q1-RMC-R14-RS-WC-B-C1-1	158.4	317.1	174.0	345.2
NTP2014Q1-RMC-R14-RS-WT-B-C2-1	158.9	318.1	175.0	347.0
NTP2014Q1-RMC-R14-RS-WC-B-C2-1	158.6	317.5	174.0	345.2
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1	157.9	316.3	175.0	347.0
NTP2014Q1-RMC-R14-RS-UNC1-B-C1-1	158.4	317.2	176.0	348.8
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1	158.6	317.5	176.0	348.8
NTP2014Q1-RMC-R14-RS-UNC1-B-C2-1	158.3	317.0	176.0	348.8
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1	159.2	318.5	176.0	348.8
NTP2014Q1-RMC-R14-RS-UNC1-C-C2-1	159.0	318.2	176.0	348.8
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1	159.0	318.2	176.0	348.8
NTP2014Q1-RMC-R14-RS-UNC1-C-C1-1	158.7	317.7	176.0	348.8
NTP2014Q1-RMC-R14-RS-WT-C-C2-1	159.4	319.0	176.0	348.8
NTP2014Q1-RMC-R14-RS-WC-C-C2-1	159.9	319.8	176.0	348.8
NTP2014Q1-RMC-R14-RS-WT-C-C1-1	159.2	318.6	175.0	347.0
NTP2014Q1-RMC-R14-RS-WC-C-C1-1	159.9	319.8	176.0	348.8
Average	158.9	318.1	175.4	347.8
Standard Deviation	0.5128	0.9231	0.8297	1.493

10.1 DMA Dry Batch A

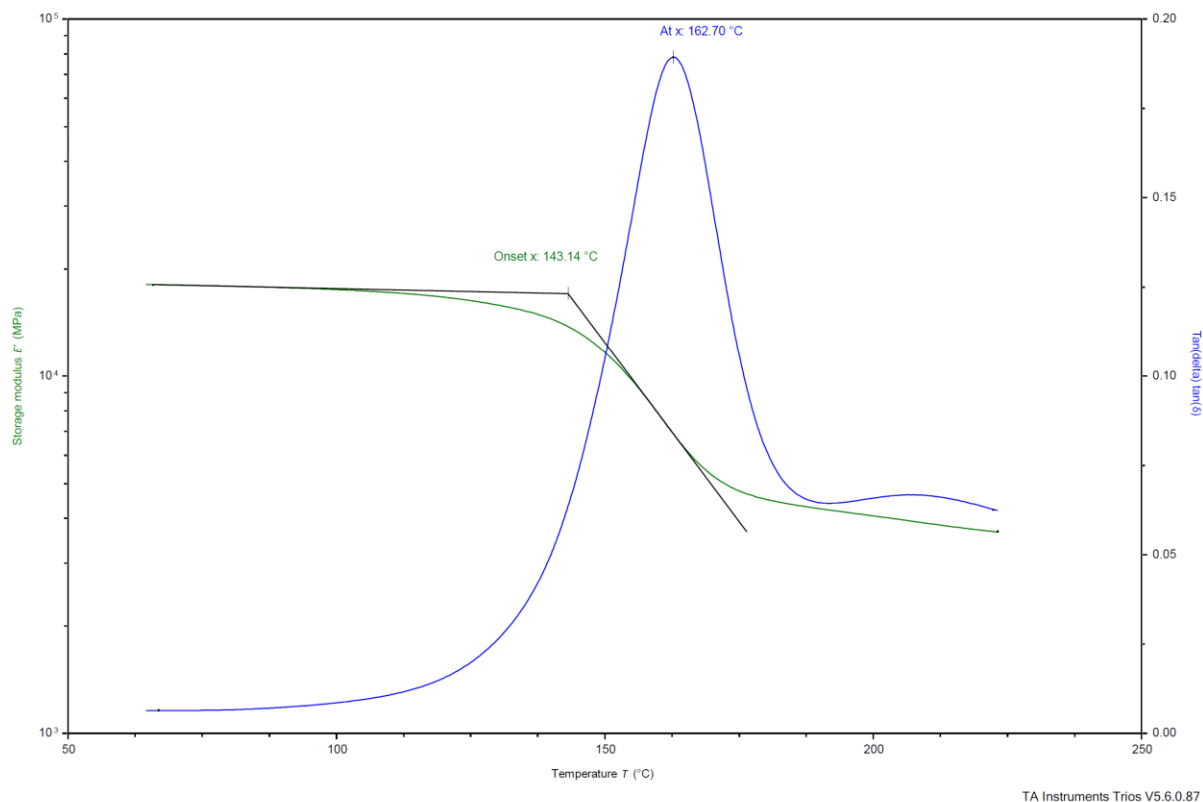
Tested with ASTM D7028 3pt Bend.

Sample: NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-DMA
Size: 50.00000 x 12.80000 x 3.41000 mm
Procedure name: Oscillation Temperature Ramp

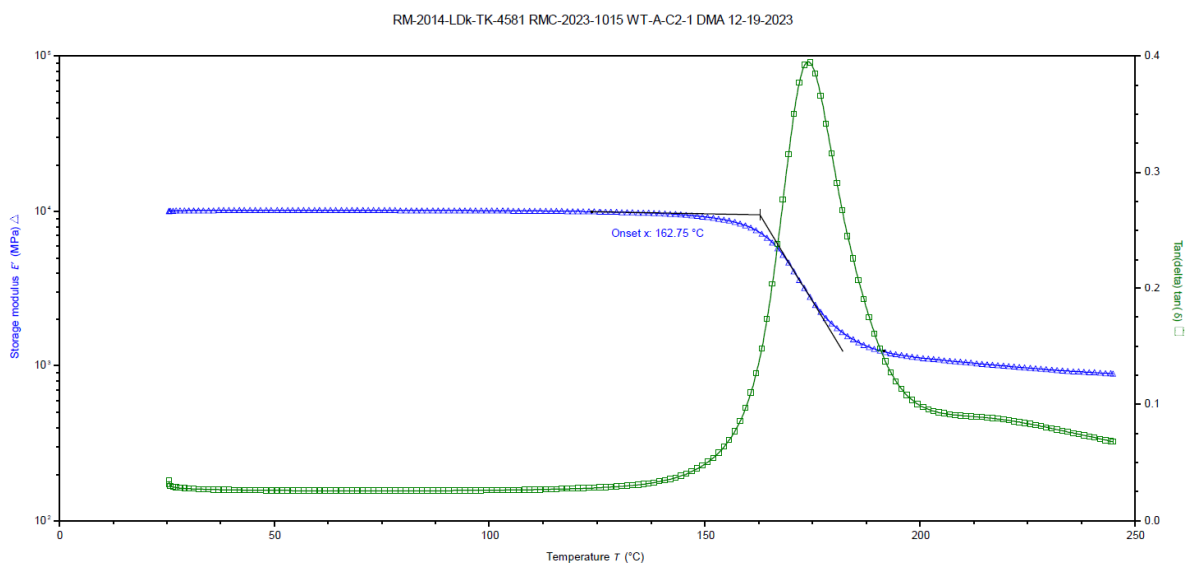
DMA850

File: NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-DMA
Operator: Ping
Run Date: 12/15/2023 2:20:34 PM
Instrument: DMA 850-0398

NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1-DMA

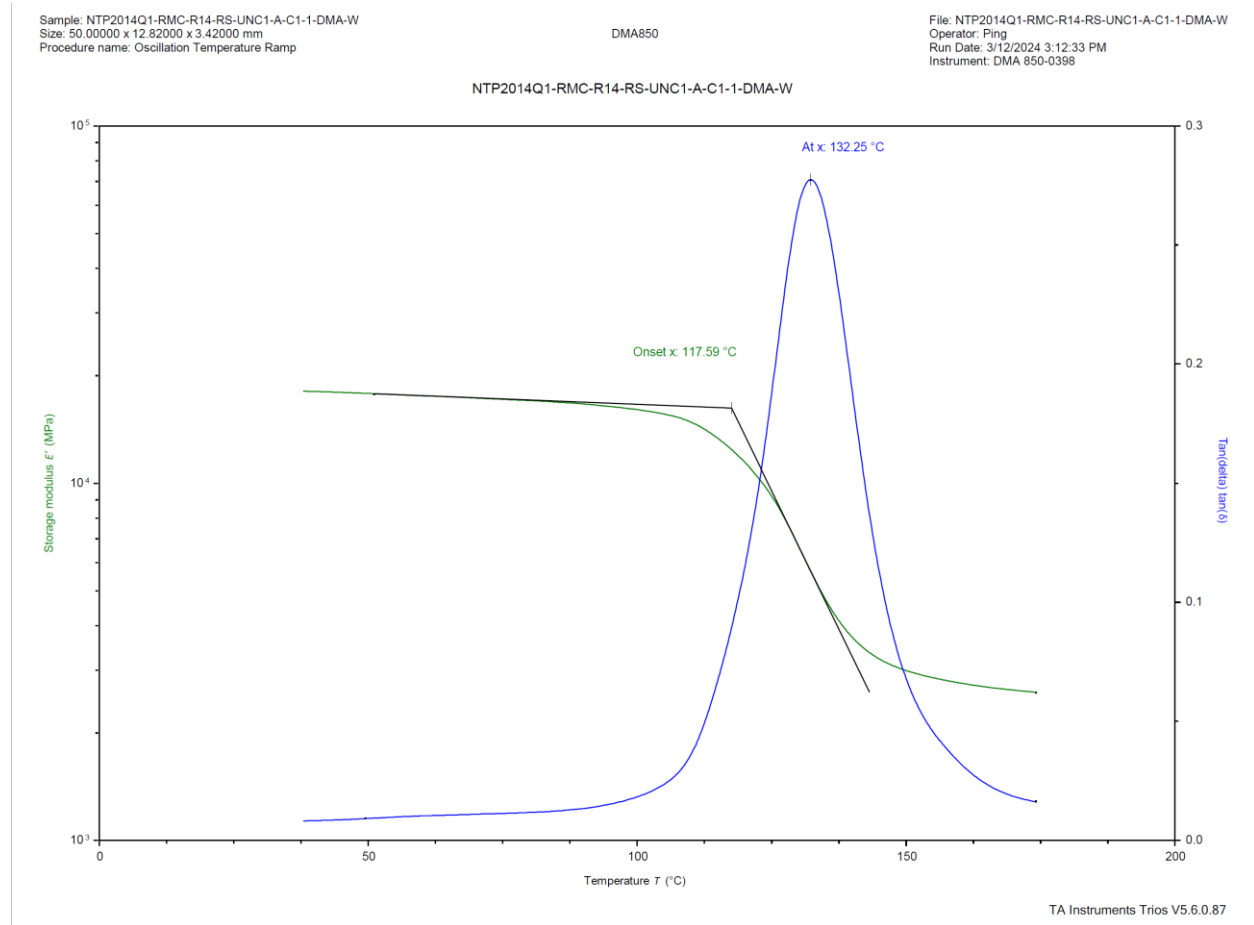


Tested with ASTM D7028 single cantilever.



10.2 DMA Wet Batch A

Tested with ASTM D7028 3pt Bend.



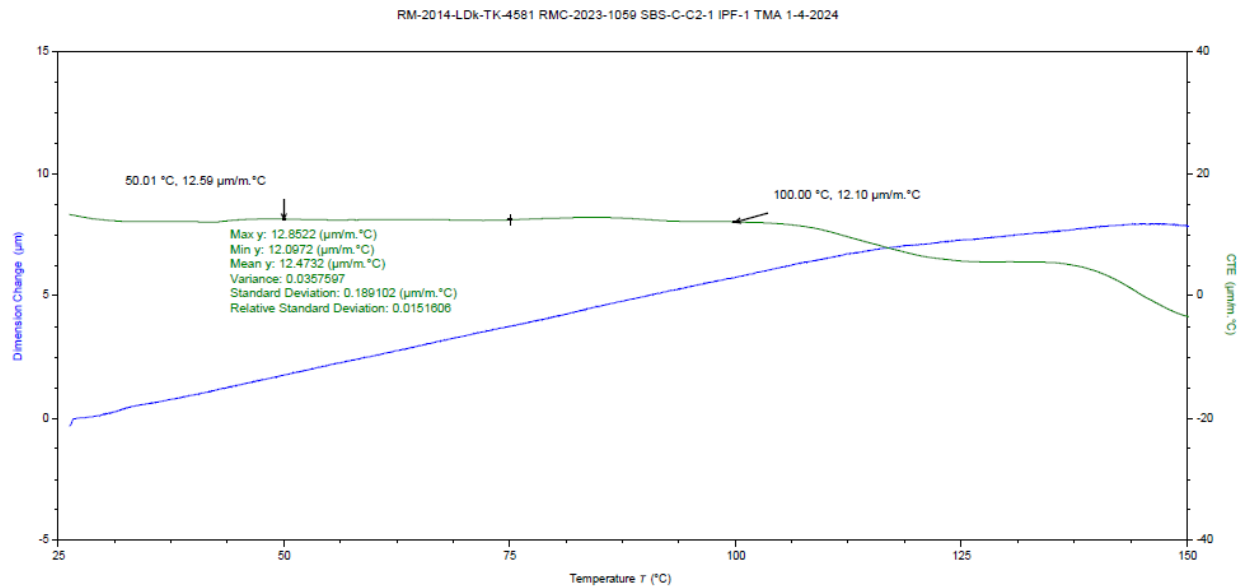
11. Coefficient of Thermal Expansion

TMA Results Summary Y Direction (90° or Fill) Renegade RM-2014-LDk-Tk 4581 8HS Qualification	
Specimen ID	Average CTE from 50-100°C (linear range) [μm/m.°C]
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1 IPF-5	10.69
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1 IPF-1	12.53
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1 IPF-2	12.24
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1 IPF-1	14.42
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1 IPF-2	12.63
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1 IPF-4	11.72
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1 IPF-1	12.47
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1 IPF-2	13.00
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1 IPF-3	12.38
Average	12.45
Standard Deviation	0.9936

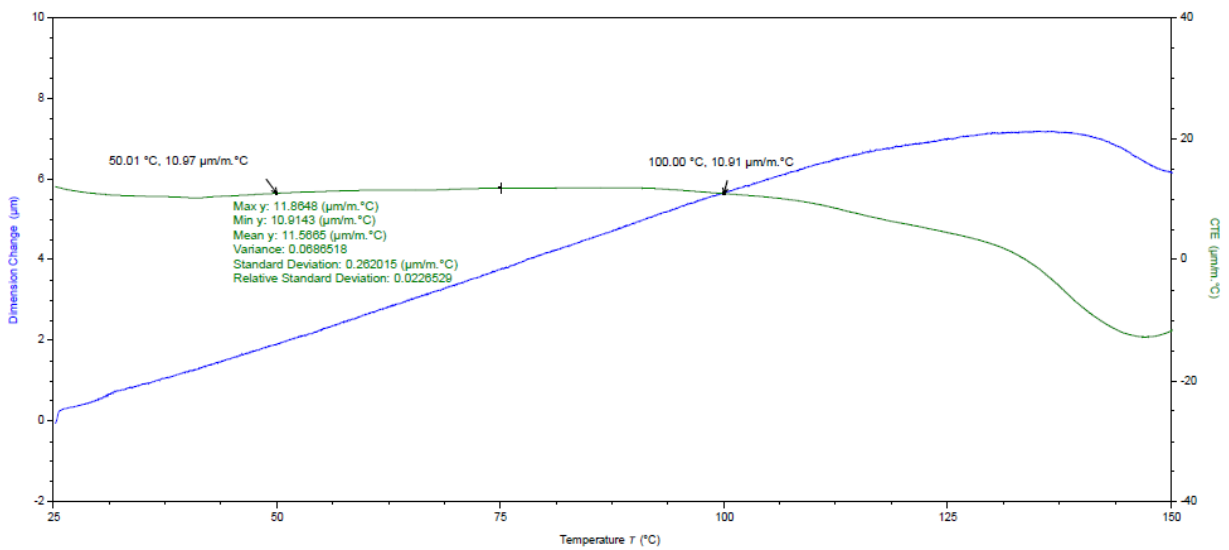
TMA Results Summary X Direction (0° or Warp) Renegade RM-2014-LDk-Tk 4581 8HS Qualification	
Specimen ID	Average CTE from 50-100°C (linear range) [μm/m.°C]
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1 IPW-1	12.18
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1 IPW-3	11.74
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1 IPW-4	11.09
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1 IPW-2	11.46
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1 IPW-5	9.551
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1 IPW-6	11.74
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1 IPW-1	11.57
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1 IPW-2	9.775
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1 IPW-3	11.88
Average	11.22
Standard Deviation	0.9341

TMA Results Summary X Direction (Thickness) Renegade RM-2014-LDk-Tk 4581 8HS Qualification	
Specimen ID	Average CTE from 50-100°C (linear range) [μm/m.°C]
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1 OOP-1	58.45
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1 OOP-2	57.62
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1 OOP-3	58.19
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1 OOP-1	53.59
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1 OOP-2	52.93
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1 OOP-3	52.46
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1 OOP-1	57.96
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1 OOP-2	54.08
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1 OOP-3	57.94
Average	55.91
Standard Deviation	2.560

11.1 CTE - Y Direction (90° or Fill) Batch C

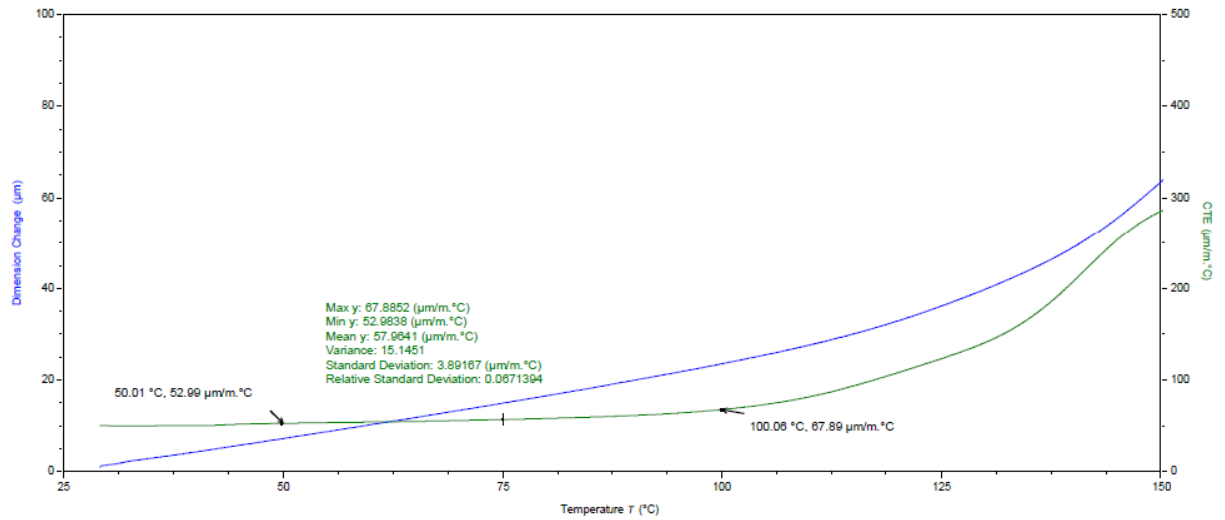


11.2 CTE - X Direction (0° or Warp) Batch C



11.3 CTE - X Direction (Thickness) Batch C

RM-2014-LDK-TK-4581 RMC-2023-1059 SBS-C-C2-1 OOP-1 TMA 12-27-2023



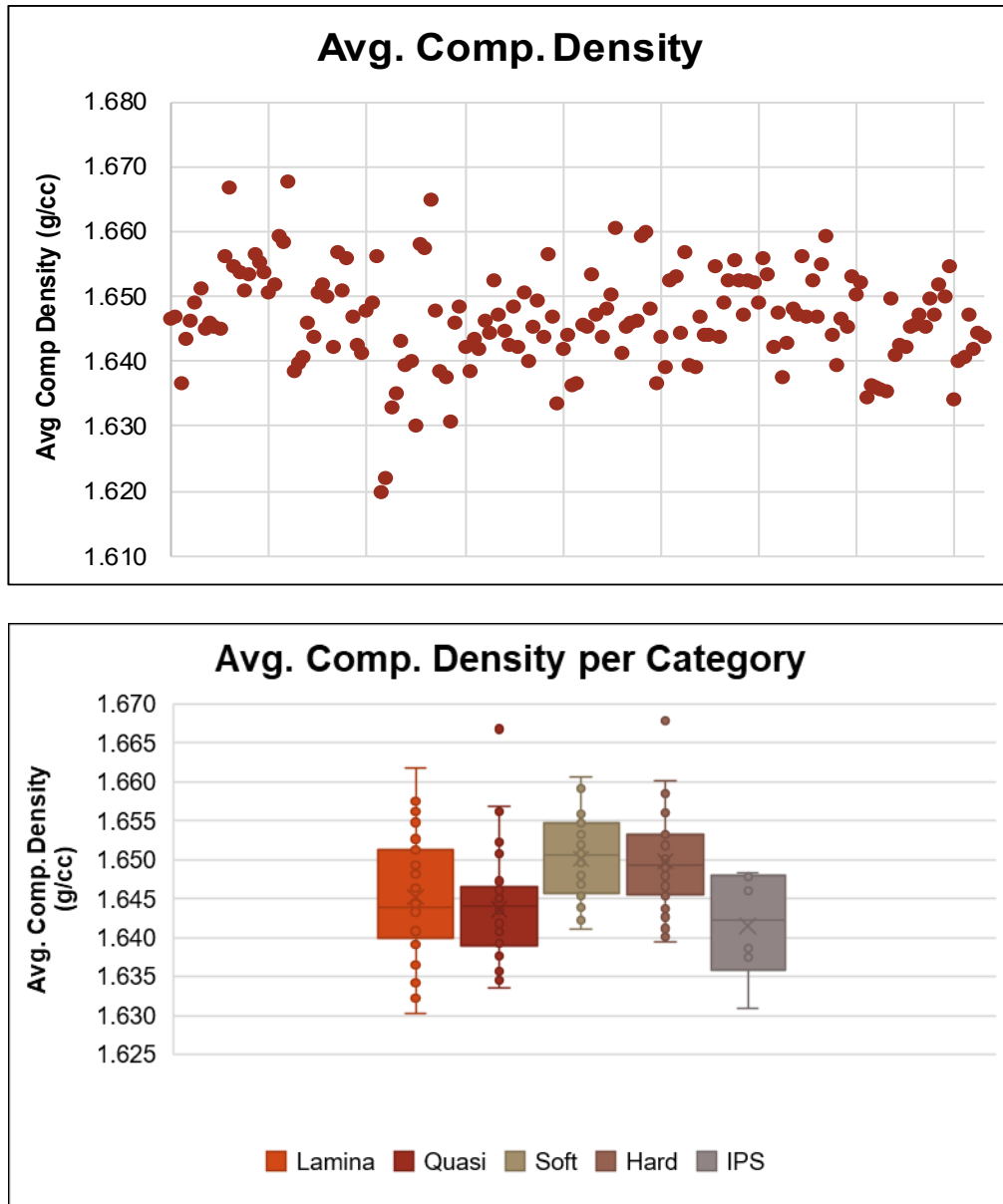
12. Physical Testing Results

Panel ID	Resin Content Average (% wt)	Fiber Volume Average (% vol)	Comp. Density Average (g/cc)	Cured Ply Thickness (CPT)
NTP2014Q1-RMC-R14-RS-CAI1-A-C1-1	36.84	47.27	1.647	0.01128
NTP2014Q1-RMC-R14-RS-FC-A-C1-1	36.66	47.41	1.647	0.01115
NTP2014Q1-RMC-R14-RS-FC-A-C2-1	37.55	46.46	1.637	0.01120
NTP2014Q1-RMC-R14-RS-FC-B-C1-1	37.11	46.98	1.643	0.01113
NTP2014Q1-RMC-R14-RS-FC-B-C2-1	37.03	47.13	1.646	0.01122
NTP2014Q1-RMC-R14-RS-FC-C-C1-1	36.08	47.48	1.649	0.01100
NTP2014Q1-RMC-R14-RS-FC-C-C2-1	35.63	47.70	1.651	0.01097
NTP2014Q1-RMC-R14-RS-FHC1-A-C1-1	36.95	47.12	1.645	0.01123
NTP2014Q1-RMC-R14-RS-FHC1-A-C2-1	36.26	47.17	1.646	0.01130
NTP2014Q1-RMC-R14-RS-FHC1-B-C1-1	36.99	47.13	1.645	0.01132
NTP2014Q1-RMC-R14-RS-FHC1-B-C2-1	36.87	47.21	1.645	0.01117
NTP2014Q1-RMC-R14-RS-FHC1-C-C1-1	36.77	48.04	1.656	0.01117
NTP2014Q1-RMC-R14-RS-FHC1-C-C2-1	37.28	49.10	1.667	0.01102
NTP2014Q1-RMC-R14-RS-FHC2-A-C1-1	36.35	47.95	1.655	0.01107
NTP2014Q1-RMC-R14-RS-FHC2-A-C2-1	36.36	47.85	1.654	0.01114
NTP2014Q1-RMC-R14-RS-FHC2-B-C1-1	36.47	47.68	1.651	0.01119
NTP2014Q1-RMC-R14-RS-FHC2-B-C2-1	36.32	47.85	1.653	0.01096
NTP2014Q1-RMC-R14-RS-FHC2-C-C1-1	35.90	48.25	1.657	0.01102
NTP2014Q1-RMC-R14-RS-FHC2-C-C2-1	35.96	48.05	1.655	0.01091
NTP2014Q1-RMC-R14-RS-FHC3-A-C1-1	36.68	47.84	1.654	0.01107
NTP2014Q1-RMC-R14-RS-FHC3-A-C2-1	35.76	47.51	1.651	0.01107
NTP2014Q1-RMC-R14-RS-FHC3-B-C1-1	36.31	47.83	1.652	0.01096
NTP2014Q1-RMC-R14-RS-FHC3-B-C2-1	35.64	48.55	1.660	0.01093
NTP2014Q1-RMC-R14-RS-FHC3-C-C1-1	36.66	48.32	1.659	0.01093
NTP2014Q1-RMC-R14-RS-FHC3-C-C2-1	36.44	49.25	1.668	0.01090
NTP2014Q1-RMC-R14-RS-FHT1-A-C1-1	37.84	46.30	1.639	0.01133
NTP2014Q1-RMC-R14-RS-FHT1-A-C2-1	37.62	46.49	1.640	0.01132
NTP2014Q1-RMC-R14-RS-FHT1-B-C1-1	37.40	46.69	1.641	0.01127
NTP2014Q1-RMC-R14-RS-FHT1-B-C2-1	37.03	47.11	1.646	0.01123
NTP2014Q1-RMC-R14-RS-FHT1-C-C1-1	36.90	47.00	1.644	0.01130
NTP2014Q1-RMC-R14-RS-FHT1-C-C2-1	36.82	47.63	1.651	0.01127
NTP2014Q1-RMC-R14-RS-FHT2-A-C1-1	36.69	47.56	1.652	0.01101
NTP2014Q1-RMC-R14-RS-FHT2-A-C2-1	36.71	47.47	1.650	0.01106
NTP2014Q1-RMC-R14-RS-FHT2-B-C1-1	37.22	46.86	1.642	0.01119
NTP2014Q1-RMC-R14-RS-FHT2-B-C2-1	36.01	48.19	1.657	0.01120
NTP2014Q1-RMC-R14-RS-FHT2-C-C1-1	36.32	47.83	1.651	0.01105
NTP2014Q1-RMC-R14-RS-FHT2-C-C2-1	36.32	48.39	1.656	0.01102
NTP2014Q1-RMC-R14-RS-FHT3-A-C1-1	36.89	47.24	1.647	0.01121
NTP2014Q1-RMC-R14-RS-FHT3-A-C2-1	37.77	46.96	1.643	0.01122
NTP2014Q1-RMC-R14-RS-FHT3-B-C1-1	37.36	46.73	1.641	0.01123
NTP2014Q1-RMC-R14-RS-FHT3-B-C2-1	36.81	47.33	1.648	0.01117
NTP2014Q1-RMC-R14-RS-FHT3-C-C1-1	37.76	47.69	1.649	0.01119
NTP2014Q1-RMC-R14-RS-FHT3-C-C2-1	37.83	48.36	1.656	0.01113
NTP2014Q1-RMC-R14-RS-FT-A-C1-1	37.07	47.01	1.643	0.01140
NTP2014Q1-RMC-R14-RS-FT-A-C2-1	37.59	46.50	1.639	0.01108
NTP2014Q1-RMC-R14-RS-FT-B-C1-1	37.52	46.58	1.640	0.01133
NTP2014Q1-RMC-R14-RS-FT-B-C2-1	38.51	45.57	1.630	0.01160
NTP2014Q1-RMC-R14-RS-FT-C-C1-1	36.74	48.31	1.658	0.01094
NTP2014Q1-RMC-R14-RS-FT-C-C2-1	36.59	48.25	1.658	0.01093
NTP2014Q1-RMC-R14-RS-ILT-A-C1-1	35.17	49.07	1.665	0.01073
NTP2014Q1-RMC-R14-RS-IPS-A-C1-1	36.61	47.48	1.648	0.01130
NTP2014Q1-RMC-R14-RS-IPS-A-C2-1	37.63	46.46	1.639	0.01119
NTP2014Q1-RMC-R14-RS-IPS-B-C1-1	37.51	46.51	1.638	0.01136
NTP2014Q1-RMC-R14-RS-IPS-B-C2-1	38.17	45.83	1.631	0.01152
NTP2014Q1-RMC-R14-RS-IPS-C-C1-1	36.11	47.21	1.646	0.01111

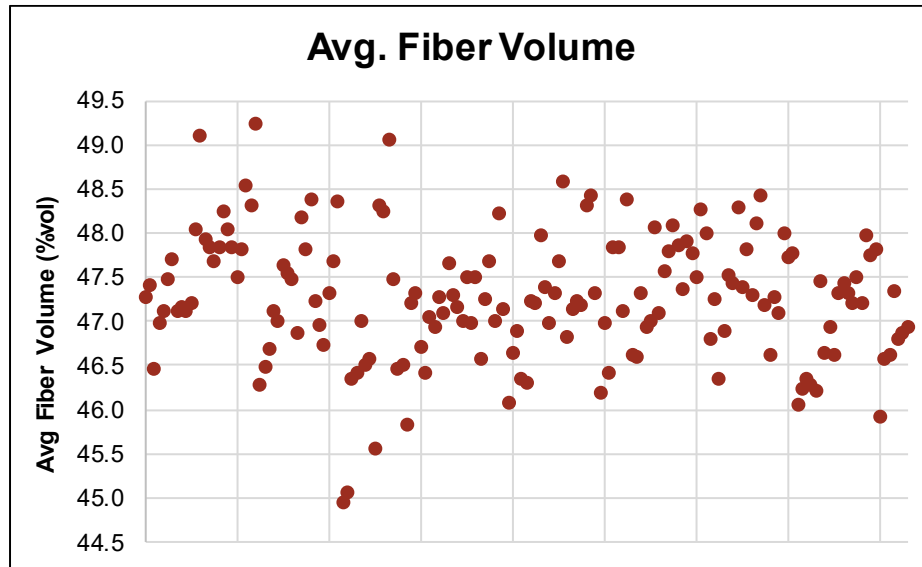
Panel ID	Resin Content Average (% wt)	Fiber Volume Average (% vol)	Comp. Density Average (g/cc)	Cured Ply Thickness (CPT)
NTP2014Q1-RMC-R14-RS-IPS-C-C2-1	36.35	47.34	1.648	0.01114
NTP2014Q1-RMC-R14-RS-OHC1-A-C1-1	37.41	46.72	1.642	0.01126
NTP2014Q1-RMC-R14-RS-OHC1-A-C2-1	37.66	46.43	1.639	0.01131
NTP2014Q1-RMC-R14-RS-OHC1-B-C1-1	37.01	47.06	1.644	0.01139
NTP2014Q1-RMC-R14-RS-OHC1-B-C2-1	37.10	46.94	1.642	0.01135
NTP2014Q1-RMC-R14-RS-OHC1-C-C1-1	36.56	47.28	1.646	0.01129
NTP2014Q1-RMC-R14-RS-OHC1-C-C2-1	36.65	47.11	1.644	0.01124
NTP2014Q1-RMC-R14-RS-OHC2-A-C1-1	36.54	47.67	1.653	0.01099
NTP2014Q1-RMC-R14-RS-OHC2-A-C2-1	36.84	47.29	1.647	0.01106
NTP2014Q1-RMC-R14-RS-OHC2-B-C1-1	36.91	47.17	1.645	0.01130
NTP2014Q1-RMC-R14-RS-OHC2-B-C2-1	37.03	47.02	1.643	0.01131
NTP2014Q1-RMC-R14-RS-OHC2-C-C1-1	36.03	47.50	1.648	0.01112
NTP2014Q1-RMC-R14-RS-OHC2-C-C2-1	35.77	46.98	1.642	0.01121
NTP2014Q1-RMC-R14-RS-OHC3-A-C1-1	36.68	47.51	1.651	0.01107
NTP2014Q1-RMC-R14-RS-OHC3-A-C2-1	37.53	46.57	1.640	0.01120
NTP2014Q1-RMC-R14-RS-OHC3-B-C1-1	36.83	47.25	1.645	0.01127
NTP2014Q1-RMC-R14-RS-OHC3-B-C2-1	36.39	47.69	1.649	0.01110
NTP2014Q1-RMC-R14-RS-OHC3-C-C1-1	36.11	47.00	1.644	0.01114
NTP2014Q1-RMC-R14-RS-OHC3-C-C2-1	36.38	48.22	1.657	0.01105
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1	37.02	47.14	1.647	0.01126
NTP2014Q1-RMC-R14-RS-OHT1-A-C1-1-R	37.95	46.07	1.634	0.01135
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1	37.50	46.65	1.642	0.01115
NTP2014Q1-RMC-R14-RS-OHT1-A-C2-1-R	37.26	46.89	1.644	0.01133
NTP2014Q1-RMC-R14-RS-OHT1-B-C1-1	37.64	46.36	1.636	0.01147
NTP2014Q1-RMC-R14-RS-OHT1-B-C2-1	37.74	46.31	1.637	0.01133
NTP2014Q1-RMC-R14-RS-OHT1-C-C1-1	36.84	47.24	1.646	0.01129
NTP2014Q1-RMC-R14-RS-OHT1-C-C2-1	36.86	47.22	1.645	0.01134
NTP2014Q1-RMC-R14-RS-OHT2-A-C1-1	36.16	47.98	1.653	0.01100
NTP2014Q1-RMC-R14-RS-OHT2-A-C2-1	36.71	47.39	1.647	0.01117
NTP2014Q1-RMC-R14-RS-OHT2-B-C1-1	37.12	46.99	1.644	0.01134
NTP2014Q1-RMC-R14-RS-OHT2-B-C2-1	36.81	47.34	1.648	0.01121
NTP2014Q1-RMC-R14-RS-OHT2-C-C1-1	36.43	47.69	1.650	0.01109
NTP2014Q1-RMC-R14-RS-OHT2-C-C2-1	35.63	48.59	1.661	0.01110
NTP2014Q1-RMC-R14-RS-OHT3-A-C1-1	37.24	46.82	1.641	0.01125
NTP2014Q1-RMC-R14-RS-OHT3-A-C2-1	36.69	47.15	1.645	0.01119
NTP2014Q1-RMC-R14-RS-OHT3-B-C1-1	36.88	47.23	1.646	0.01125
NTP2014Q1-RMC-R14-RS-OHT3-B-C2-1	36.95	47.18	1.646	0.01126
NTP2014Q1-RMC-R14-RS-OHT3-C-C1-1	35.93	48.33	1.659	0.01107
NTP2014Q1-RMC-R14-RS-OHT3-C-C2-1	35.81	48.44	1.660	0.01110
NTP2014Q1-RMC-R14-RS-SBS-A-C1-1	36.83	47.32	1.648	0.01107
NTP2014Q1-RMC-R14-RS-SBS-A-C2-1	37.90	46.20	1.637	0.01143
NTP2014Q1-RMC-R14-RS-SBS-B-C1-1	37.13	46.98	1.644	0.01121
NTP2014Q1-RMC-R14-RS-SBS-B-C2-1	37.70	46.42	1.639	0.01140
NTP2014Q1-RMC-R14-RS-SBS-C-C1-1	37.10	47.84	1.653	0.01107
NTP2014Q1-RMC-R14-RS-SBS-C-C2-1	36.52	47.85	1.653	0.01106
NTP2014Q1-RMC-R14-RS-SBSF-B-C1-1	36.97	47.11	1.644	0.01123
NTP2014Q1-RMC-R14-RS-SSB1-A-C1-1	35.76	48.38	1.657	0.01094
NTP2014Q1-RMC-R14-RS-SSB1-A-C2-1	37.45	46.61	1.639	0.01142
NTP2014Q1-RMC-R14-RS-SSB1-B-C1-1	37.47	46.59	1.639	0.01140
NTP2014Q1-RMC-R14-RS-SSB1-B-C2-1	36.77	47.34	1.647	0.01123
NTP2014Q1-RMC-R14-RS-SSB1-C-C1-1	36.26	46.95	1.644	0.01138
NTP2014Q1-RMC-R14-RS-SSB1-C-C2-1	35.70	47.01	1.644	0.01145
NTP2014Q1-RMC-R14-RS-SSB2-A-C1-1	36.09	48.07	1.655	0.01109
NTP2014Q1-RMC-R14-RS-SSB2-A-C2-1	36.96	47.11	1.644	0.01127
NTP2014Q1-RMC-R14-RS-SSB2-B-C1-1	36.52	47.58	1.649	0.01121

Panel ID	Resin Content Average (% wt)	Fiber Volume Average (% vol)	Comp. Density Average (g/cc)	Cured Ply Thickness (CPT)
NTP2014Q1-RMC-R14-RS-SSB2-B-C2-1	36.35	47.81	1.652	0.01126
NTP2014Q1-RMC-R14-RS-SSB2-C-C1-1	36.37	48.09	1.656	0.01113
NTP2014Q1-RMC-R14-RS-SSB2-C-C2-1	35.76	47.86	1.653	0.01121
NTP2014Q1-RMC-R14-RS-SSB3-A-C1-1	36.73	47.38	1.647	0.01124
NTP2014Q1-RMC-R14-RS-SSB3-A-C2-1	36.22	47.91	1.653	0.01122
NTP2014Q1-RMC-R14-RS-SSB3-B-C1-1	36.40	47.77	1.652	0.01127
NTP2014Q1-RMC-R14-RS-SSB3-B-C2-1	36.63	47.50	1.649	0.01121
NTP2014Q1-RMC-R14-RS-SSB3-C-C1-1	36.83	48.27	1.656	0.01119
NTP2014Q1-RMC-R14-RS-SSB3-C-C2-1	36.98	48.01	1.653	0.01102
NTP2014Q1-RMC-R14-RS-UNC1-A-C1-1	37.29	46.81	1.642	0.01113
NTP2014Q1-RMC-R14-RS-UNC1-A-C2-1	36.90	47.25	1.648	0.01103
NTP2014Q1-RMC-R14-RS-UNC1-B-C1-1	37.74	46.34	1.638	0.01134
NTP2014Q1-RMC-R14-RS-UNC1-B-C2-1	37.20	46.89	1.643	0.01124
NTP2014Q1-RMC-R14-RS-UNC1-C-C1-1	36.61	47.52	1.648	0.01116
NTP2014Q1-RMC-R14-RS-UNC1-C-C2-1	37.07	47.43	1.647	0.01120
NTP2014Q1-RMC-R14-RS-UNC2-A-C1-1	35.85	48.29	1.656	0.01082
NTP2014Q1-RMC-R14-RS-UNC2-A-C2-1	36.70	47.39	1.647	0.01106
NTP2014Q1-RMC-R14-RS-UNC2-B-C1-1	36.34	47.82	1.653	0.01096
NTP2014Q1-RMC-R14-RS-UNC2-B-C2-1	36.82	47.30	1.647	0.01110
NTP2014Q1-RMC-R14-RS-UNC2-C-C1-1	37.09	48.12	1.655	0.01093
NTP2014Q1-RMC-R14-RS-UNC2-C-C2-1	35.97	48.44	1.659	0.01085
NTP2014Q1-RMC-R14-RS-UNC3-A-C1-1	36.85	47.20	1.644	0.01109
NTP2014Q1-RMC-R14-RS-UNC3-A-C2-1	37.42	46.63	1.639	0.01123
NTP2014Q1-RMC-R14-RS-UNC3-B-C1-1	36.83	47.28	1.647	0.01112
NTP2014Q1-RMC-R14-RS-UNC3-B-C2-1	37.02	47.10	1.645	0.01111
NTP2014Q1-RMC-R14-RS-UNC3-C-C1-1	36.19	48.01	1.653	0.01092
NTP2014Q1-RMC-R14-RS-UNC3-C-C2-1	35.19	47.72	1.650	0.01106
NTP2014Q1-RMC-R14-RS-UNT1-A-C1-1	36.39	47.78	1.652	0.01100
NTP2014Q1-RMC-R14-RS-UNT1-A-C2-1	38.01	46.06	1.634	0.01138
NTP2014Q1-RMC-R14-RS-UNT1-B-C1-1	37.82	46.25	1.636	0.01141
NTP2014Q1-RMC-R14-RS-UNT1-B-C2-1	37.68	46.34	1.636	0.01147
NTP2014Q1-RMC-R14-RS-UNT1-C-C1-1	35.93	46.27	1.636	0.01140
NTP2014Q1-RMC-R14-RS-UNT1-C-C2-1	36.14	46.22	1.636	0.01151
NTP2014Q1-RMC-R14-RS-UNT2-A-C1-1	36.70	47.47	1.650	0.01101
NTP2014Q1-RMC-R14-RS-UNT2-A-C2-1	37.48	46.64	1.641	0.01128
NTP2014Q1-RMC-R14-RS-UNT2-B-C1-1	37.12	46.95	1.643	0.01126
NTP2014Q1-RMC-R14-RS-UNT2-B-C2-1	37.54	46.62	1.642	0.01138
NTP2014Q1-RMC-R14-RS-UNT2-C-C1-1	35.90	47.32	1.645	0.01113
NTP2014Q1-RMC-R14-RS-UNT2-C-C2-1	35.03	47.43	1.646	0.01106
NTP2014Q1-RMC-R14-RS-UNT3-A-C1-1	36.81	47.32	1.647	0.01108
NTP2014Q1-RMC-R14-RS-UNT3-A-C2-1	36.89	47.21	1.645	0.01116
NTP2014Q1-RMC-R14-RS-UNT3-B-C1-1	36.65	47.50	1.650	0.01127
NTP2014Q1-RMC-R14-RS-UNT3-B-C2-1	36.93	47.22	1.647	0.01118
NTP2014Q1-RMC-R14-RS-UNT3-C-C1-1	37.17	47.97	1.652	0.01095
NTP2014Q1-RMC-R14-RS-UNT3-C-C2-1	37.09	47.74	1.650	0.01093
NTP2014Q1-RMC-R14-RS-WC-A-C1-1	36.41	47.83	1.655	0.01101
NTP2014Q1-RMC-R14-RS-WC-A-C2-1	38.19	45.92	1.634	0.01131
NTP2014Q1-RMC-R14-RS-WC-B-C1-1	37.51	46.58	1.640	0.01127
NTP2014Q1-RMC-R14-RS-WC-B-C2-1	37.50	46.61	1.641	0.01133
NTP2014Q1-RMC-R14-RS-WC-C-C1-1	36.09	47.34	1.647	0.01116
NTP2014Q1-RMC-R14-RS-WC-C-C2-1	36.28	46.81	1.642	0.01128
NTP2014Q1-RMC-R14-RS-WT-A-C1-1	37.30	46.86	1.644	0.01147
NTP2014Q1-RMC-R14-RS-WT-A-C2-1	37.20	46.93	1.644	0.01115
NTP2014Q1-RMC-R14-RS-WT-B-C1-1	37.33	46.82	1.644	0.01119
NTP2014Q1-RMC-R14-RS-WT-B-C2-1	38.28	45.79	1.632	0.01146
NTP2014Q1-RMC-R14-RS-WT-C-C1-1	35.87	48.12	1.656	0.01101
NTP2014Q1-RMC-R14-RS-WT-C-C2-1	36.12	48.62	1.662	0.01090
Average	36.80	47.31	1.647	0.01118
Standard Deviation	0.6535	0.6838	0.007082	0.0001559
No. Specimens	167	167	167	167

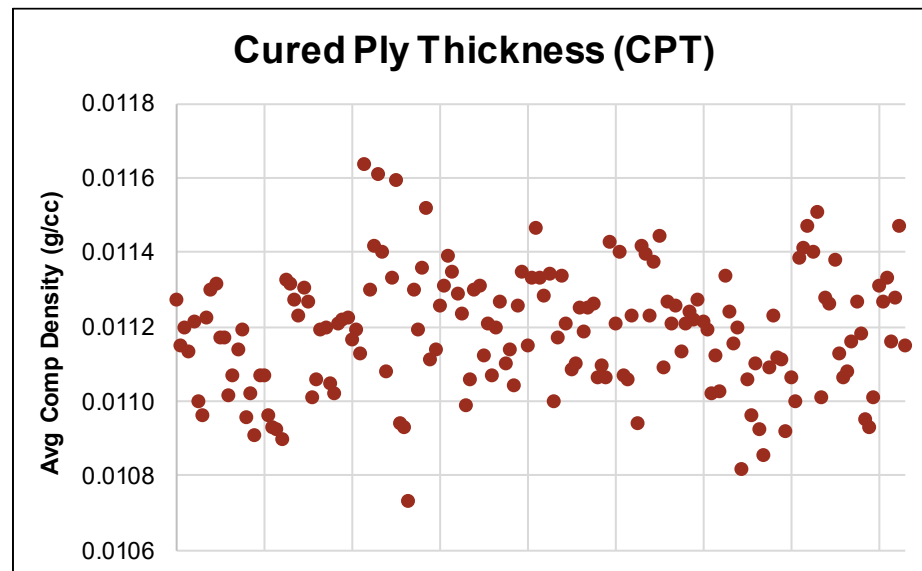
12.1 Density



12.2 Fiber Volume



12.3 Cured Ply Thickness (CPT)



13. Deviations

N/A