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Additively Manufactured HexPEKK ® - 100 Polymer Material Qualification 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 additively manufactured material 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 material property data have been generated with NCAMP oversight in accordance with NCAMP Standard Operating Procedures NSP 100; the 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, build orientation, 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 or 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 a 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, Additively Manufactured HexPekk-100 Qualification Statistical Analysis Report NCP-RP-2023-005 Rev N/C. The qualification material was procured to NCAMP Material Specification NMS 800/1 Rev N/C dated October 25, 2021. The qualification test coupons were manufactured in accordance with NCAMP Process Specification NPS 89800 Rev dated October 25, 2021. The NCAMP Test Plan NTP AM-9801Q1 was used for this qualification program. Newer revisions of the material and process specification may contain more current information and process parameters but any variation from the qualification program should be carefully considered.

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 800/1. NMS 800/1 may have additional requirements that are listed in its material process control document (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 800/1.* NMS 800/1 is a free, publicly available, non-proprietary aerospace industry material specification.

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

1.2 Symbols Used

Acronyms and Definitions

AM	Additive Manufacturing / Additively Manufactured
ASTM	American Society for Testing and Materials
B – Basis	95% lower confidence limit on the tenth population percentile
CV	Coefficient of variation
CTA	cold temperature ambient
ETA1	elevated temperature ambient 180F
ETA2	elevated temperature ambient 250F
ETW	elevated temperature wet
RTA	room temperature ambient
wet	specimen with an “equilibrium” moisture content
T, RH	temperature, relative humidity

1.3 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 D638-14 – Standard Test Method for Tensile Properties of Plastics
- ASTM D695-15 – Standard Test Method for Compressive Properties of Rigid Plastics
- ASTM D732-17 - Standard Test Method for Shear Strength of Plastic by Punch Tool
- ASTM D790-17 – Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- ASTM D792-20 – Standard Test Method for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- ASTM D 3171-22 – Standard Test Method for Constituent Content of Composite Materials
- ASTM D3418-15 - Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry (DSC)
- ASTM D5379-12 – Standard Test Method for Shear Properties of Composite Materials by V-notched Beam Method.
- ASTM D5766/D5766M-11 – Standard Test Method for Open Hole Tensile Strength of Polymer Matrix Composite Laminates
- ASTM D5961/D5961M-17 – Standard Test Method for Bearing Response of Polymer Matrix Composite Laminates
- ASTM D6484/D6484M-20 – Standard Test Method for Open-Hole Compressive Strength of Polymer Matrix Composite Laminates
- ASTM D6742/D6742M-12 – 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 E831-19 - Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis
- NCAMP documents – NTP-AM-9801Q1, NMS 800, NPS 89800

1.4 Methodology

1.4.1 Process Definition

Figure 1-1 shows the specimens selection methodology. Specimens were oriented into two unique build nestings for each machine: resulting in 6 unique build nestings (layouts). Each unique build nesting was repeated three times on a machine. There were three material lot and three unique machines that provided the various machine print runs for the specimens. All process parameters were in accordance with NPS 89800. The combinations of material lot, machine serial, run sequence, and build location were recorded to provide complete traceability.

For each combination of test method, lot, and condition, the specimens were selected from a minimum of two separate runs (whether or not it is independent of machines) as shown in Figure 1-1 unless otherwise specified. The term "machine" means a single AM machine running a designed and specific process with a selected AM raw material through which mechanical test specimens were built.

The specimen selection methodology in Figure 1-1 will be presented in “Number of Lots and Number of Machines x Number of Runs x Number of Specimens” format throughout this document. Specifically, Figure 1-1 depicts a 3x2x3 specimen selection methodology. If more than 2 machines were required to obtain the minimum specimens, the additional machine(s) were labeled accordingly (see section 1.4.2), and approximately equal number of specimens were tested from each machine.

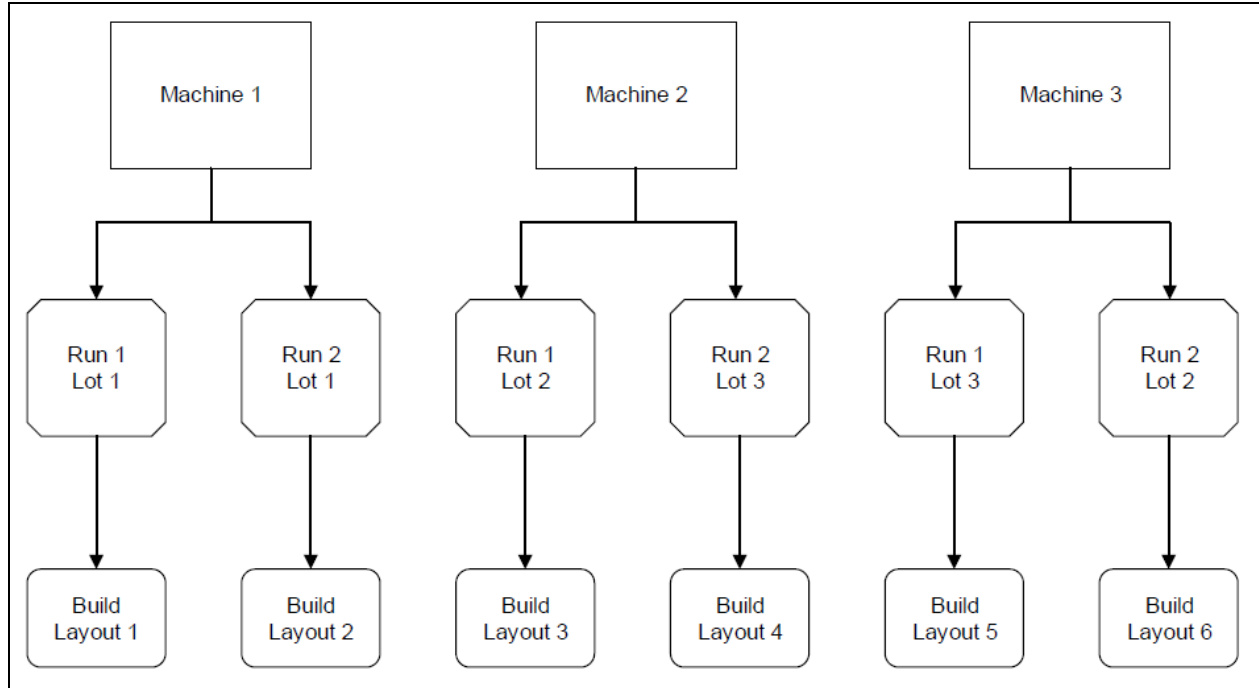


Figure 1-1: Specimen Selection Methodology

All specimens were printed in accordance with NCAMP Process Specification NPS 89800.

In order to facilitate individual specimen traceability, each individual specimen carries a unique specimen identifier as described in section 1.4.2 of this document. Figure 1-2 shows the print orientation of the test specimen. Figure 1-3 shows the printing zones of the chamber where Zones 1 and 3 lies towards the back of the chamber and Zones 2 and 4 are towards the front of the chamber. In addition to this, the vertical printing space is divided into a top and bottom space. To help in verifying build chamber location of specimen, a 2-character nomenclature shall be used to indicate the zone and vertical space where a specimen is printed, as described in Section 1.4.2. In the event a specimen cannot be fully nested into a single zone due to size, the majority volume will govern the selected zone.

1.4.2 NIAR-Specimen Naming Format

All specimens are uniquely identified by a reference system, cross referenced with descriptive identification information as follows:

Test Plan Document Number-AM Material Manufacturer ID-Material Code-Fabricator ID-Lot ID-Machine ID- Test Type-Specimen Location -Test Condition- Specimen Number.

For example, [NTPAM9801Q1-HL-HP100-HL-A-M1-02-XYT-2B-RTA-3] denotes AM Material Manufacturer: HL, AM Material Name: HP100, Fabricator: HL, Material Lot: A, Machine ID: M1 (may be Run ID in some cases), Job Number: 02, Test Type: XY Tension, Test Specimen Location: Zone 2, Bottom, Test Condition: Room Temperature Ambient, and Specimen Number: 3. The testing lab may assign a separate identification code but must reference the system and uniquely identify the specimens.

Test Directions, as illustrated in Figure 1-2, are the various axes the coupons.

Some coupons were retested to replace data points that have been omitted due to test anomalies. These specimens are distinguished with an (RB) at the end of their string name, i.e., following the specimen number.

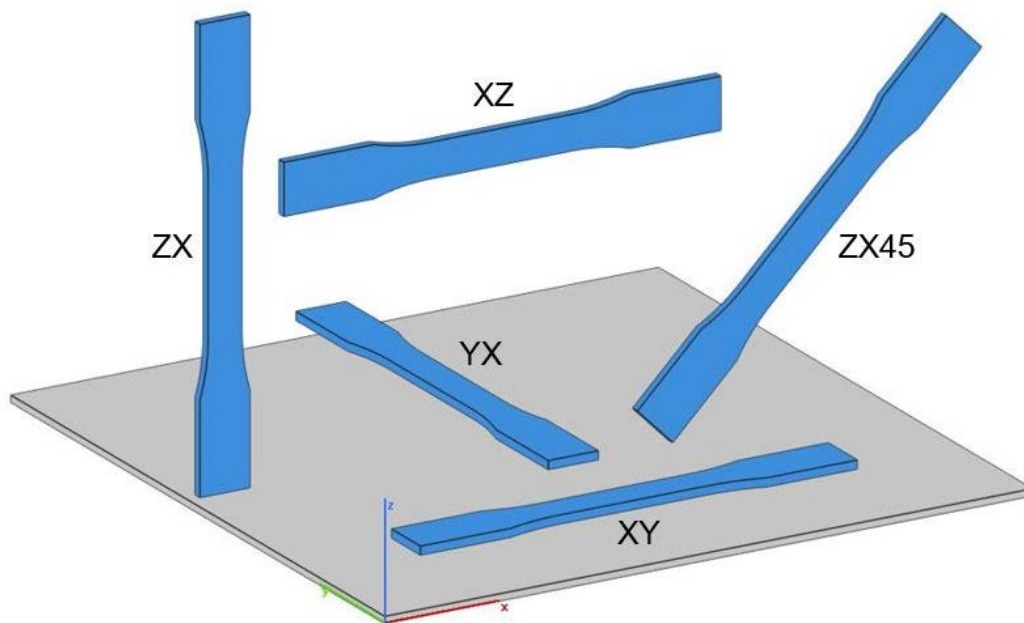


Figure 1-2: Specimen Build Orientation Diagram

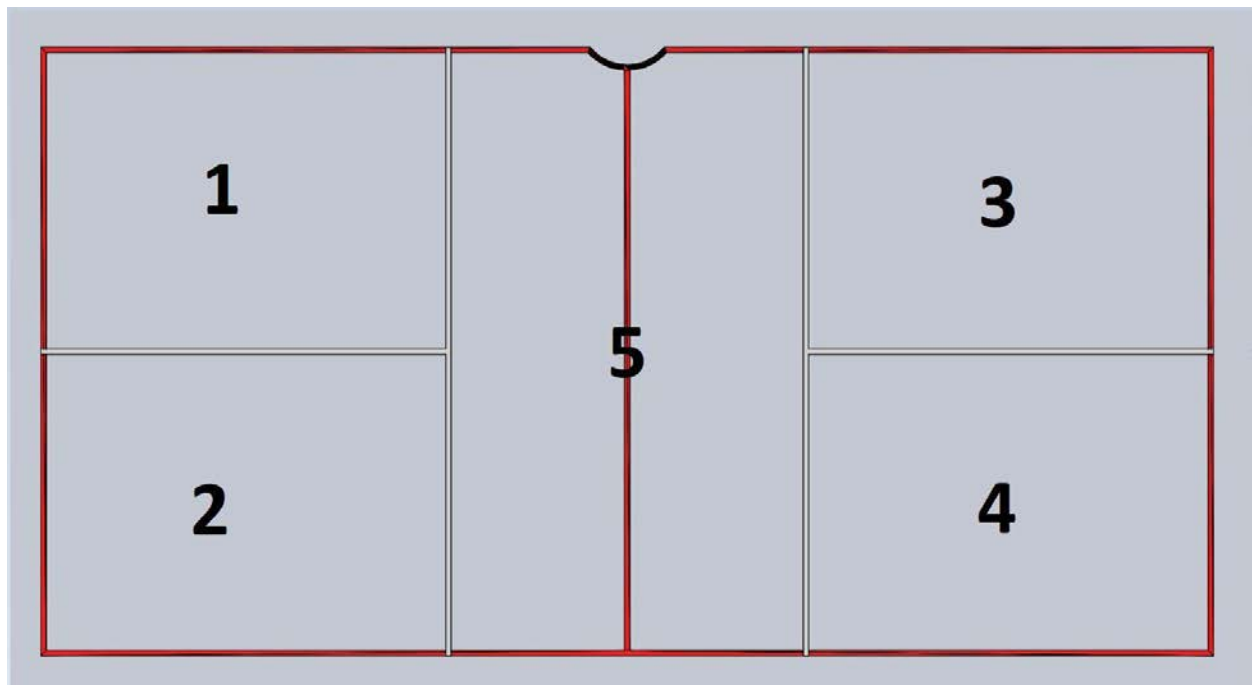


Figure 1-3: Printing Zone in Chamber (Top-down view)

1.4.3 Specimen & Testing Details

1.4.3.1 Tabbing

No tabs were used for this program.

1.4.3.2 Specimen Strain Device Used

Corresponding Gage ID can be obtained from Appendix 1 of NTP-AM-9801Q1.

Uniaxial gages were used on:

- Dogbone Tension (CTA),
- Compression Prism (CTA, RTA, ETA1, ETA2)

Uniaxial Extensometers were used on:

- Single Shear Bearing (RTA, ETA1, ETA2);
- Dogbone Tension (RTA, ETA1, ETA2);
- Filled Hole Compression (RTA);
- Open Hole Tension (RTA);

Deflectometers were used on:

- Flex (RTA, CTA, ETA1, ETA2)

1.4.3.3 Specimen Dimensions & Test Configuration

For filled-hole tension (FHT) tests, the fasteners were installed to 85 ± 5 in-lb above the prevailing torque. For filled-hole compression (FHC) and single-shear bearing (SSB) tests, the fasteners were installed to 30 ± 5 in-lb above the prevailing torque. 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:

NASM 21297-04004 bolts with MS 21084 nuts and MS 21206 washers for FHT, and FHC.

NASM 21297-04017 bolts with MS 21084 nuts and MS 21206 washers for SSB.

Open and Filled-Hole Tension specimens were printed and machined to 8.0" in length instead of 12.0".

1.4.4 Test Matrix

The tables below show the test matrices for each combination of test type and build orientation.

Test Type and Direction	Property	Number of Lots & Machines x Number of Runs x Number of Specimens				
		Test Temperature/Moisture Condition				
		CTA	RTA	180A	250A	250W
ASTM D638 (DF2) Tension XY (1)	Strength and Modulus	3x2x3	3x2x3	1x2x3	3x2x3	3x2x3
ASTM D638 (DF2) Tension YX (1)	Strength and Modulus	1x2x3	1x2x3			1x2x3
ASTM D638 (DF2) Tension XZ (1)	Strength and Modulus	1x2x3	1x2x3			1x2x3
ASTM D638 (DF2) Tension ZX (1)	Strength and Modulus	3x2x3	3x2x3	1x2x3	3x2x3	3x2x3
ASTM D638 (DF2) Tension ZX45 (1)	Strength and Modulus	1x2x3	1x2x3			1x2x3
ASTM D695 Compression XY (2,4) 1" right prism	Strength and Modulus	3x2x3	3x2x3	1x2x3	3x2x3	3x2x3
ASTM D695 Compression YX (2) 1" right prism	Strength and Modulus	1x2x3	1x2x3			1x2x3
ASTM D695 Compression ZX (2) 1" right prism	Strength and Modulus	3x2x3	3x2x3	1x2x3	3x2x3	3x2x3
ASTM D695 Compression ZX45 (2) 1" right prism	Strength and Modulus	1x2x3	1x2x3			1x2x3
ASTM D790 Flex (Proc. B) XY	Strength and Modulus	3x2x3	3x2x3	1x2x3	3x2x3	3x2x3
ASTM D790 Flex (Proc. B) YX	Strength and Modulus	1x2x3	1x2x3			1x2x3
ASTM D790 Flex (Proc. B) XZ	Strength and Modulus	1x2x3	1x2x3			1x2x3
ASTM D790 Flex (Proc. B) ZX	Strength and Modulus	3x2x3	3x2x3	1x2x3	3x2x3	3x2x3
ASTM D790 Flex (Proc. B)	Strength and	1x2x3	1x2x3			1x2x3

ZX45	Modulus					
ASTM D732 Shear XY (3,5)	Strength and Modulus	3x2x3	3x2x3	1x2x3	3x2x3	3x2x3
ASTM D732 Shear ZX (3,4)	Strength and Modulus	3x2x3	3x2x3	1x2x3	3x2x3	3x2x3
ASTM D732 Shear ZX45 (3)	Strength and Modulus	1x2x3	1x2x3			1x2x3

Table 1-1: Mechanical Test Matrix

- Note 1: See Appendix 2 of NTP-AM-9801Q1 for D638 modified DF2 geometry.
- Note 2: Specimens for ASTM D695 were printed oversized by 0.1” in length and width to allow for machining tolerance.
- Note 3: Notches/holes were machined, reamed, or dreamed.
- Note 4: Geometry is identical to that of XZ orientation. XZ was removed.
- Note 5: Geometry is identical to that of YX orientation. YX was removed.

Applicable to all specimens:

- All specimens were uniquely identified when printed and may be individually bagged with labels.
- All specimens were marked/labeled prior to machining.
- Where offset strength or modulus data is reported, the strain range was also reported.

Table 1-2 below summarizes additional tests, the laminate level testing. The five build orientations are XY, YX, XZ, ZX, and ZX45. The build orientations 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 orientations in a structure to be certified.

Table 1-2 also emphasizes properties and test condition combinations believed to constitute the worst case, which in general is hot wet for polymer matrix material properties.

Test Type	Property	Number of Lots & Machines x Number of Runs x Number of Specimens			
		Test Temperature/Moisture Condition			
		CTA	RTA	250/A	250W
ASTM D5766 Open Hole Tension XY (1)	Strength	3x2x3	3x2x3	3x2x3	3x2x3
ASTM D5766 Open Hole Tension YX (1)	Strength	1x2x3	1x2x3		1x2x3
ASTM D5766 Open Hole Tension XZ (1)	Strength	1x2x3	1x2x3		1x2x3
ASTM D5766 Open Hole Tension ZX (1)	Strength	3x2x3	3x2x3	3x2x3	3x2x3
ASTM D5766 Open Hole Tension ZX45 (1)	Strength	1x2x3	1x2x3		1x2x3
ASTM D6742 Filled Hole Tension XY (1,3)	Strength	3x2x3	3x2x3	3x2x3	3x2x3
ASTM D6742 Filled Hole Tension YX (1,3)	Strength	1x2x3	1x2x3		1x2x3
ASTM D6742 Filled Hole Tension XZ (1,3)	Strength	1x2x3	1x2x3		1x2x3
ASTM D6742 Filled Hole Tension ZX (1,3)	Strength	3x2x3	3x2x3	3x2x3	3x2x3
ASTM D6742 Filled Hole Tension ZX45 (1,3)	Strength	1x2x3	1x2x3		1x2x3
ASTM D6484 Open Hole Compression XY (1,2)	Offset Strength		1x2x3		1x2x3
ASTM D6484 Open Hole	Offset		1x2x3		1x2x3

Compression YX (1,2)	Strength				
ASTM D6484 Open Hole Compression XZ (1,2)	Offset Strength		1x2x3		1x2x3
ASTM D6484 Open Hole Compression ZX (1,2)	Offset Strength		1x2x3		1x2x3
ASTM D6484 Open Hole Compression ZX45 (1,2)	Offset Strength		1x2x3		1x2x3
ASTM D6742 Filled Hole Compression XY (1,2,3)	Offset Strength		1x2x3		1x2x3
ASTM D6742 Filled Hole Compression YX (1,2,3)	Offset Strength		1x2x3		1x2x3
ASTM D6742 Filled Hole Compression XZ (1,2,3)	Offset Strength		1x2x3		1x2x3
ASTM D6742 Filled Hole Compression ZX (1,2,3)	Offset Strength		1x2x3		1x2x3
ASTM D6742 Filled Hole Compression ZX45 (1,2,3)	Offset Strength		1x2x3		1x2x3
ASTM D5961 Procedure C Bearing XY	Strength & Deformation		3x2x3	3x2x3	3x2x3
ASTM D5961 Procedure C Bearing YX	Strength & Deformation		1x2x3		1x2x3
ASTM D5961 Procedure C Bearing XZ	Strength & Deformation		1x2x3		1x2x3
ASTM D5961 Procedure C Bearing ZX	Strength & Deformation		3x2x3	3x2x3	3x2x3
ASTM D5961 Procedure C Bearing ZX45	Strength & Deformation		1x2x3		1x2x3

Table 1-2: Mechanical Test Matrix (Design Guidance Properties)

- Note1: Notches/holes were machined, reamed, or dreamed. Hole configuration: 0.25” hole diameter, 1.5 inch width.
- Note 2: Specimens for ASTM D6484 and D6742 were printed oversized by 0.1” in length and width to allow for machining tolerance.
- Note 3: See section 1.4.3.3 for fastener callout.
- Applicable to all specimens:
- All specimens were uniquely identified when printed and may be individually bagged with labels.
 - All specimens were marked/labeled prior to machining
 - Where offset strength or modulus data is reported, the strain range is also reported.

1.4.5 Physical Testing

The properties in Table 1-3 were determined for each test type and build orientation. The tests were performed by the National Institute for Aviation Research (NIAR) Composites Laboratory or an approved laboratory under the supervision of NCAMP.

Property	Condition/Method (Note 1)	Min Replicates per Test Type and Build Orientation
Thickness	ASTM D3171-15/or applicable mechanical test method.	All data from mechanical test specimens
Density,	ASTM D792-13	Per Note 2
Photomicrograph (from density cubes)	CP6101 and CP6102	Per Note 2
CTE by TMA	ASTM E228/E831	Per Note 3
Glass Transition Temperature, T _g by DMA flexural loading	Dry and Wet – ASTM D7028	1 Dry, 1 Wet (Note 1 & 3)
Flammability Drip Time	FAR 25.853 (D) Appendix F, Part IV	Per Note 4
Flammability Extinguishing Time	FAR 25.853 (A), Appendix F, Part I, (a), 1, (i): 60 sec	Per Note 4
Flammability Burn Length	FAR 25.853 (A), Appendix F, Part I, (a), 1, (i): 60 sec	Per Note 4
NBS Smoke and Density	FAR 25.853 (D), Appendix F, PART V	Per Note 4
Heat Release Peak	FAR 25.853 (D) Appendix F, Part IV	Per Note 4

Table 1-3: Physical Testing Matrix

Notes 1: Minimum total of 18 dry and 18 wet for each material system.

2: tested on provided density cubes. Three specimens from each build were sampled with a minimum of 18 specimens.

3: Minimum of one specimen per lot and build orientation (XY and ZX). Only one build location is required.

4. Minimum of 3 specimens per build orientation (XY and ZX). Only one build location is required.

1.4.6 Environmental Conditioning

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

Test environments are defined as:

CTA = -65±5°F, ambient

RTA = 70±10°F, room temperature ambient

ETA1 = 180±5°F, ambient

ETA2 = 250±5°F, ambient

ETW = 250±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. In cases where excessive deformation occurred (such as compression), an appropriate failure mode may not have been obtained. All tested specimens were digitally photographed after each test in order to pictorially document failure modes.

Specimens were tested at ambient conditions. No drying was necessary for Cold, Elevated, or Room Temperature ambient testing. Ambient laboratory condition is defined as 70°F±10°F with less than 60% relative humidity. If temperature and humidity conditions were exceeding the limits, NCAMP representative were responsible to record and document them.

For wet conditioning, specimens were conditioned to equilibrium at 160°F±5°F and 85% ± 5%. Effective moisture equilibrium was achieved when the average moisture content of the traveler specimen changed by less than 0.02% for two consecutive readings which are 7 ±0.5 days apart and may be expressed by:

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

Where:

W_i = weight at current time

W_{i-1} = weight at previous time

W_b = baseline weight prior to conditioning

When representative specimens could not be measured to determine the moisture content (due to size), 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 pass the criteria for two consecutive readings which are 7 ± 0.5 days apart, the specimens were kept in the environmental chamber for up to an additional 60 days. Alternatively, the specimens may have been removed from the environmental chamber and placed in a sealed plastic bag along with a moist cotton towel for a maximum of 14 days until mechanical testing. Strain-gaged specimens were removed from the controlled environment for a maximum of 2 hours for application of gages in ambient laboratory conditions.

1.4.7 Non-ambient Testing

The chamber was of adequate size so that all test fixtures and load frame grips were contained within the chamber. For elevated temperature testing, the temperature chamber, test fixture, and grips were preheated to the specified temperature. Each specimen was heated to the required test temperature as verified by a thermocouple in direct contact with and taped to the specimen gage section. The heat-up time of the specimen did not exceed 5 minutes, unless otherwise specified in individual test summary sheets. The test was started 2^{+1}_{-0} minutes after the specimen reached the test temperature. During the test, the temperature, as measured on the specimen, was within $\pm 5^\circ\text{F}$ 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 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. A minimum of one specimen or representative coupon was used to measure the moisture loss for every combination of test temperature and print orientation.

1.4.8 Fluid Sensitivity Screening

Table 1-4 lists the requirements for fluid sensitivity screening. ASTM D638 tension modified DF2 geometry to be dried prior to testing the specimens. Five replicates per fluid from one AM material batch and only one machine was subjected to this test. Specimens were cleaned with a dry towel prior to the tests. In addition to tension strength, load versus displacement curves were plotted to aid in the identification of polymer 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 each AM material may have different solutions that are detrimental to its mechanical property capability. Should screening tests for fluid sensitivity indicate this to be the case, further testing of a particular solution may or may not be needed to confirm the detrimental effect.

<u>Extended Contact:</u>	Exposure	Test Condition	Code
100 Low Lead Aviation Fuel (ASTM D910)	90 days min. @ 70°F±10°F	70°F	TFS11RT
	90 days min. @ 70°F±10°F	250°F	TFS11ET
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	TFS12RT
	90 days min. @ 70°F±10°F	250°F	TFS12ET
MIL-PRF-5606 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	TFS13RT
	90 days min. @ 70°F±10°F	250°F	TFS13ET
MIL-PRF-83282 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	TFS14RT
	90 days min. @ 70°F±10°F	250°F	TFS14ET
MIL-PRF-7808 Engine Oil	90 days min. @ 70°F±10°F	70°F	TFS15RT
	90 days min. @ 70°F±10°F	250°F	TFS15ET
MIL-PRF-23699, Class STD Engine Oil	90 days min. @ 70°F±10°F	70°F	TFS16RT
	90 days min. @ 70°F±10°F	250°F	TFS16ET
Sea Water (ASTM D1141 or equiv.)	90 days min. @ 70°F±10°F	70°F	TFS17RT
	90 days min. @ 70°F±10°F	250°F	TFS17ET
Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	TFS18RT
	90 days min. @ 70°F±10°F	250°F	TFS18ET
50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	TFS19RT
	90 days min. @ 70°F±10°F	250°F	TFS19ET
<u>Short Duration Contact:</u>			
MEK washing fluid. ASTM D740	90 minutes min. @ 70°F±10°F	70°F	TFS21RT
	90 minutes min. @ 70°F±10°F	250°F	TFS21ET
Polypropylene Glycol Deicer (Type I) SAE AMS 1424	90 minutes min. @ 70°F±10°F	70°F	TFS22RT
	90 minutes min. @ 70°F±10°F	250°F	TFS22ET
Isopropyl Alcohol Deicing Agent	48±4 hours @70°F±10°F	70°F	TFS23RT

(TT-I-735)	48±4 hours @70°F±10°F	250°F	TFS23ET
<u>Control Tests:</u>			
Distilled Water	90 days min. at 70°F±10°F	70°F	TFS31RT
	90 days min. at 70°F±10°F	250°F	TFS31ET
Ambient	Ambient per section 7.1	70°F	TFS32RT
	Ambient per section 7.1	250°F	TFS32ET
85% Relative Humidity	Per section 7.1	70°F	TFS33RT
	Per section 7.1	250°F	TFS33ET

Table 1-4: Fluid Sensitivity Matrix

1.4.9 Inspection Verification

The qualification specimens 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. The inspection documentation, with required approval signatures are stored in hard copy as well as electronically.

1.4.10 Material Pedigree Information

The AM Data Collection Template includes the material pedigree information required, such as material and batch/lot information, as well as specimen fabrication record, environmental conditioning, test equipment, and test procedures. This template is in Microsoft Excel file format.

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2. Test Results for Additively Manufactured Polymer Material

2.1 Test Summary

Additively Manufactured Material:		Hexcel Hexpekk 100																									
Material Specification:		NMS 800/1																									
Process Specification:		NPS 89800																									
Tg(dry):		344.22 °F					Tg(wet): 332.95 °F					Tg Method: ASTM D7028															
Date of coupon manufacture		Mar 2022 - November 2022					Date of testing Date of data submittal					Feb 2023 - April 2023 TBD															
		XY Direction					YX Direction					XZ Direction					ZX Direction					ZX45 Direction					
		CTA	RTA	ETA1	ETA2	ETW	CTA	RTA	ETA1	ETA2	ETW	CTA	RTA	ETA1	ETA2	ETW	CTA	RTA	ETA1	ETA2	ETW	CTA	RTA	ETA1	ETA2	ETW	
Tension 0.2% Offset Yield Strength [ksi]		16.39	12.10	10.23	8.16	7.02	15.30	11.66	--	--	6.84	15.34	12.88	--	--	6.990	11.75	10.32	9.525	7.393	6.068		11.26	--	--	6.240	
Tension Strength [ksi]		16.56	15.78	13.16	9.92	8.59	14.40	15.34	--	--	8.29	15.37	16.28	--	--	8.612	10.67	11.25	10.61	8.326	7.041		10.36	11.86	--	--	7.455
Tension Modulus [Msi]		1.01	0.97	0.95	0.93	0.81	0.97	0.88	--	--	0.75	1.062	0.9180	--	--		0.8870	0.7110	0.6670	0.6540	0.1690		0.9380	0.7530	--	--	0.6560
Compression 2% Offset Strength [ksi]		34.56	35.80		16.18	14.61	34.05	25.09	--	--	14.00	--	--	--	--	--	35.58	25.64	19.85	16.14	14.66		33.56	24.92	--	--	14.11
Compression Strength [ksi]		35.12	25.92	20.60	16.94	17.30	34.53	25.35	--	--	17.47	--	--	--	--	--	35.95	25.89	20.19	17.30	17.32		34.05	25.06	--	--	18.73
Compression Modulus [Msi]		1.089	1.019	0.9760	0.9390	0.9080	1.008	0.9310	--	--	0.8340	--	--	--	--	--	0.9440	0.8710	0.8210	0.7930	0.7690		0.9640	0.8820	--	--	0.7900
Flexural Strength [ksi]		28.12	27.11	23.90	20.00	18.45	29.87	27.54	--	--	18.13	20.60	22.93	--	--	16.80	15.76	16.86	15.63	13.88	13.88		17.07	20.34	--	--	15.21
Flex 0.2% Offset Yield Strength [ksi]		29.34	25.19	20.69	14.52	13.74	30.83	24.77	--	--	12.99	--	22.19	--	--	12.18		18.81	17.60	12.12	11.40			20.60	--	--	11.41
Flex Modulus [Msi]		0.93	0.83	0.74	0.86	0.81	0.85	0.77	--	--	0.80	0.8330	0.7130	--	--	0.7170	0.6610	0.5940	0.5790	0.5840	0.5740		0.6510	0.6160	--	--	0.6090
Shear Strength [ksi]		16.91	13.57	11.24	9.71	8.94	--	--	--	--	--	--	--	--	--	--	15.79	12.95	10.55	9.030	8.530		15.61	13.19			8.830
OHT Strength [ksi]		10.06	8.71	--	7.08	6.38	8.96	8.03	--	--	6.40	9.660	8.783	--	--	6.704	7.324	6.676	--	5.606	5.356		8.942	7.854	--	--	6.011
FHT Strength [ksi]		16.75	14.62	--	9.62	7.98	16.62	14.60	--	--	7.51	16.06	14.92			7.660	11.12	11.28	--	7.675	6.511		13.19	13.17	--	--	6.687
OHC 0.2% Offset Strength [ksi]		--	14.40	--	--	10.04	--	--	--	--	9.31	--	14.35	--	--	9.562	--	14.18	--	--	10.32		--	14.06	--	--	9.448
OHC 1.0% Offset Strength [ksi]		--	--	--	--	12.06	--	--	--	--	11.30	--	--	--	--	11.31	--	18.59	--	--	11.71		--	17.50	--	--	11.01
OHC Modulus [Msi]		--	0.99	--	--	0.92	--	--	--	--	0.66	--	0.8700	--	--	0.8350	--	0.7360	--	--	0.7280			0.6660			0.7080
FHC 0.2% Offset Strength [ksi]		--	16.66	--	--	11.62	--	14.90	--	--	--	--	15.09	--	--	11.15	--	17.94	--	--	11.96		--	15.09	--	--	--
FHC 1.0% Offset Strength [ksi]		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--
FHC Modulus [Msi]		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--
SSB 2% Offset Strength [ksi]		--	--	36.93	33.67	30.57	--	--	--	--	29.82	--	--	--	--	30.04	--	--	--	--	27.17		--	--	--	--	27.70
SSB Ultimate Strength [ksi]		31.77	--	33.70	37.73	34.86	--	31.67	--	--	33.78	--	31.47	--	--	32.88	--	25.48	29.03	27.84	28.24		--	29.58	--	--	30.79

Table 2-1: Mechanical Testing Summary Data

2.2 Individual Test Summaries

2.2.1 XY Tension Properties (XYT)

Material:		HexPEKK®-100		Dogbone Tension Additively Manufactured HexPEKK - 100 Build Orientation: XY		
Machine Serial #:		EOS P800				
Test method:		ASTM D 638-14				
		Modulus calculation: 1000-3000 microstrain				
		CTA	RTA	ETA1	ETA2	ETW
Test Temperature [°F]		-65	70	180	250	250
Moisture Conditioning		Ambient	Ambient	Ambient	Ambient	Equilibrium
Equilibrium at T, RH						160 F,85%
		Measured	Measured	Measured	Measured	Measured
XYT 0.2% Offset Yield Strength [ksi]	Mean	16.39	12.10	10.23	8.157	7.020
	Minimum	15.61	11.73	9.874	6.879	6.072
	Maximum	17.94	12.48	10.54	8.542	7.371
	C.V.(%)	3.909	1.588	2.747	5.519	4.683
	No. Specimens	11	19	6	18	17
	No. Material Batches	3	3	1	3	3
XYT Strength [ksi]	Mean	16.56	15.78	13.16	9.919	8.593
	Minimum	14.09	14.46	12.50	8.767	7.649
	Maximum	18.35	16.91	13.61	10.52	9.830
	C.V.(%)	8.993	3.961	3.562	4.801	5.534
	No. Specimens	18	19	6	18	18
	No. Material Batches	3	3	1	3	3
XYT Modulus [Msi]	Mean	1.014	0.9685	0.9522	0.9316	0.8115
	Minimum	0.9186	0.9214	0.8594	0.8865	0.7273
	Maximum	1.073	1.014	1.031	1.022	0.8843
	C.V.(%)	3.733	2.536	6.630	3.602	4.325
	No. Specimens	18	19	6	18	18
	No. Material Batches	3	3	1	3	3

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2.2.2 YX Tension Properties (YXT)

Material:		HexPEKK®-100		Dogbone Tension Additively Manufactured HexPEKK - 100 Build Orientation: YX	
Machine Serial #:		EOS P800			
Test method:		ASTM D 638-14			
				Modulus calculation: 1000-3000 microstrain	
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Ambient	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
YXT 0.2% Offset Yield Strength [ksi]	Mean	15.30	11.66	6.836	
	Minimum	14.88	11.44	6.762	
	Maximum	15.73	11.94	6.903	
	C.V.(%)	3.959	1.840	0.7137	
	No. Specimens	2	6	6	
	No. Material Batches	1	1	1	
YXT Strength [ksi]	Mean	14.40	15.34	8.294	
	Minimum	12.66	14.38	8.104	
	Maximum	16.58	16.52	8.540	
	C.V.(%)	10.11	4.730	2.322	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	
YXT Modulus [Msi]	Mean	0.9648	0.8758	0.7515	
	Minimum	0.9306	0.8423	0.7352	
	Maximum	0.9849	0.9095	0.7622	
	C.V.(%)	1.971	2.574	1.193	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	

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2.2.3 XZ Tension Properties (XZT)

Material:		HexPEKK®-100		Dogbone Tension Additively Manufactured HexPEKK - 100 Build Orientation: XZ	
Machine Serial #:		EOS P800			
Test method:		ASTM D 638-14			
				Modulus calculation: 1000-3000 microstrain	
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
XZT 0.2% Offset Yield Strength [ksi]	Mean	15.34	12.88	6.990	
	Minimum	14.89	12.70	6.787	
	Maximum	15.67	13.16	7.165	
	C.V.(%)	2.162	1.415	2.076	
	No. Specimens	4	6	6	
	No. Material Batches	1	1	1	
XZT Strength [ksi]	Mean	15.37	16.28	8.612	
	Minimum	13.03	15.59	8.271	
	Maximum	16.85	16.87	8.978	
	C.V.(%)	9.447	2.543	3.030	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	
XZT Modulus [Msi]	Mean	1.062	0.9184	0.7895	
	Minimum	1.026	0.9068	0.7517	
	Maximum	1.085	0.9312	0.8249	
	C.V.(%)	2.082	1.090	3.383	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	

2.2.4 ZX Tension Properties (ZXT)

Material:		HexPEKK®-100				Dogbone Tension□ Additively Manufactured HexPEKK - 100□ □ Build Orientation: ZX	
Machine Serial #:		EOS P800					
Test method:		ASTM D 638-14					
		Modulus calculation: 1000-3000 microstrain					
		CTA	RTA	ETA1	ETA2	ETW	
Test Temperature [°F]		-65	70	180	250	250	
Moisture Conditioning		Ambient	Ambient	Ambient	Ambient	Equilibrium	
Equilibrium at T, RH						160 F,85%	
		Measured	Measured	Measured	Measured	Measured	
ZXT 0.2% Offset Yield Strength [ksi]	Mean	11.75	10.32	9.525	7.393	6.068	
	Minimum	11.03	9.387	9.280	5.830	5.681	
	Maximum	12.13	11.19	9.740	7.810	6.540	
	C.V.(%)	4.247	4.002	1.847	5.744	3.507	
	No. Specimens	4	17	6	18	18	
	No. Material Batches	3	3	1	3	3	
ZXT Strength [ksi]	Mean	10.66	11.25	10.61	8.326	7.041	
	Minimum	8.440	8.587	9.719	7.596	6.358	
	Maximum	13.25	12.67	11.34	8.812	7.495	
	C.V.(%)	11.64	8.251	5.390	4.889	4.384	
	No. Specimens	18	19	6	18	18	
	No. Material Batches	3	3	1	3	3	
ZXT Modulus [Msi]	Mean	0.8872	0.7114	0.6673	0.6538	0.6194	
	Minimum	0.7886	0.6627	0.6445	0.5682	0.5529	
	Maximum	1.133	0.8070	0.6881	0.6927	0.7101	
	C.V.(%)	8.312	5.291	2.446	4.912	6.203	
	No. Specimens	18	19	6	18	18	
	No. Material Batches	3	3	1	3	3	

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2.2.5 ZX45 Tension Properties (ZX45T)

Material:		Additively Manufactured HexPEKK - 100			Dogbone Tension ☐	
Machine Serial #:		EOS P800			Additively Manufactured HexPEKK - 100 ☐	
Test method:		ASTM D 638-14			Build Orientation: ZX45	
		Modulus calculation: 1000-3000 microstrain				
		CTA	RTA	ETW		
Test Temperature [°F]		-65	70	250		
Moisture Conditioning		Ambient	Ambient	Ambient		
Equilibrium at T, RH				160 F,85%		
		Measured	Measured	Measured		
ZX45T 0.2% Offset Yield Strength [ksi]	Mean		11.35	6.240		
	Minimum		10.96	5.891		
	Maximum		11.79	6.350		
	C.V.(%)		2.322	2.788		
	No. Specimens		6	6		
	No. Material Batches		1	1		
ZX45T Strength [ksi]	Mean	10.36	11.86	7.455		
	Minimum	9.398	11.32	7.005		
	Maximum	10.82	12.82	7.674		
	C.V.(%)	4.927	5.432	3.283		
	No. Specimens	6	6	6		
	No. Material Batches	1	1	1		
ZX45T Modulus [Msi]	Mean	0.9380	0.7534	0.6565		
	Minimum	0.8965	0.7338	0.6126		
	Maximum	1.032	0.7740	0.6772		
	C.V.(%)	5.614	2.075	3.746		
	No. Specimens	6	6	6		
	No. Material Batches	1	1	1		

0.2% OFFSET TENSILE YIELD STRENGTH ARE NOT REPORTED FOR SPECIMENS IN CTA CONDITION WHICH FAILED PRIOR TO OBTAINING 0.2% OFFSET STRAIN

2.2.6 XY Compression Properties (XYC)

Material: HexPEKK®-100			Compression Prism Cube Additively Manufactured HexPEKK - 100 Build Orientation: XY			
Machine Serial #: EOS P800						
Test method: ASTM D 695-15						
Modulus calculation: 2000-6000 microstrain						
	CTA	RTA	ETA1	ETA2	ETW	
Test Temperature [°F]	-65	70	180	250	250	
Moisture Conditioning	Ambient	Ambinet	Ambinet	Ambinet	Equilibrium	
Equilibrium at T, RH					160 F,85%	
	Measured	Measured	Measured	Measured	Measured	
XYC 2.0% Offset Strength [ksi]	Mean	34.56	25.80		14.61	
	Minimum	33.18	24.41		13.63	
	Maximum	35.77	26.32		15.58	
	C.V.(%)	1.751	1.961		3.291	
	No. Specimens	16	18		18	
	No. Material Batches	3	3		3	
XYC Compressive Strength [ksi]	Mean	35.12	25.92	20.60	16.94	17.30
	Minimum	33.80	24.44	19.86	16.07	16.26
	Maximum	36.66	26.48	21.77	17.83	19.53
	C.V.(%)	1.965	2.034	3.482	3.005	5.319
	No. Specimens	18	18	6	18	18
	No. Material Batches	3	3	1	3	3
XYC Modulus [Msi]	Mean	1.089	1.019	0.9763	0.9387	0.9076
	Minimum	1.019	0.9627	0.9460	0.8770	0.8557
	Maximum	1.193	1.077	0.9887	1.002	0.9297
	C.V.(%)	3.244	2.646	1.621	3.413	2.192
	No. Specimens	18	18	6	18	18
	No. Material Batches	3	3	1	3	3

** 2.0% offset Strength for ETA1 was not reported as the max load was achieved before the 2% strength threshold

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2.2.7 YX Compression Properties (YXC)

Material:		HexPEKK®-100		Compression Prism Cube Additively Manufactured HexPEKK - 100 Build Orientation: YX	
Machine Serial #:		EOS P800			
Test method:		ASTM D 695-15			
				Modulus calculation: 2000-6000 microstrain	
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
YXC 2.0% Offset Strength [ksi]	Mean	34.05	25.09	14.00	
	Minimum	33.37	24.41	13.67	
	Maximum	34.43	25.58	14.26	
	C.V.(%)	1.228	1.887	1.671	
	No. Specimens	5	6	6	
	No. Material Batches	1	1	1	
YXC Compressive Strength [ksi]	Mean	34.53	25.35	17.47	
	Minimum	33.88	24.54	15.94	
	Maximum	35.17	26.04	19.83	
	C.V.(%)	1.326	2.342	7.625	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	
YXC Modulus [Msi]	Mean	1.008	0.9310	0.8337	
	Minimum	0.9795	0.9140	0.8257	
	Maximum	1.031	0.9566	0.8456	
	C.V.(%)	2.109	1.733	0.9030	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	
YXC Bending [%]	Mean	1.175	3.173	12.74	
	Minimum	0.1095	1.346	3.804	
	Maximum	2.442	7.193	20.18	
	C.V.(%)	79.06	69.15	48.19	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	

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2.2.8 ZX Compression Properties (ZXC)

Material:		HexPEKK®-100				Compression Prism Cube Additively Manufactured HexPEKK - 100 Build Orientation: ZX					
Machine Serial #:		EOS P800									
Test method:		ASTM D 695-15									
		Modulus calculation: 2000-6000 microstrain									
		CTA		RTA		ETA1		ETA2		ETW	
Test Temperature [°F]		-65		70		180		250		250	
Moisture Conditioning		Ambient		Ambient		Ambient		Ambient		Equilibrium	
Equilibrium at T, RH										160 F,85%	
		Measured		Measured		Measured		Measured		Measured	
ZXC 2.0% Offset Strength [ksi]	Mean	35.58		25.64		19.85		16.13		14.66	
	Minimum	34.29		24.94		19.31		15.64		14.12	
	Maximum	36.25		26.32		20.20		16.49		15.54	
	C.V.(%)	1.583		1.716		1.821		1.670		2.442	
	No. Specimens	14		18		5		16		18	
	No. Material Batches	3		3		1		3		3	
ZXC Compressive Strength [ksi]	Mean	35.95		25.89		20.19		17.30		17.32	
	Minimum	34.58		25.04		19.51		16.23		15.58	
	Maximum	36.62		26.62		20.63		18.40		18.59	
	C.V.(%)	1.675		2.022		2.198		3.866		5.006	
	No. Specimens	18		18		6		18		18	
	No. Material Batches	3		3		1		3		3	
ZXC Modulus [Msi]	Mean	0.9442		0.8708		0.8213		0.7931		0.7695	
	Minimum	0.9119		0.8407		0.8004		0.7685		0.7484	
	Maximum	0.9932		0.8890		0.8494		0.8038		0.7850	
	C.V.(%)	2.134		1.601		2.120		1.203		1.513	
	No. Specimens	18		18		6		18		18	
	No. Material Batches	3		3		1		3		3	
ZXC Bending [%]	Mean	5.189		3.280		10.06		5.757		8.094	
	Minimum	0.4374		0.02363		2.106		0.04378		0.07144	
	Maximum	14.94		7.980		26.25		13.28		19.38	
	C.V.(%)	72.87		74.25		83.25		64.80		75.17	
	No. Specimens	18		18		6		18		18	
	No. Material Batches	3		3		1		3		3	

2.2.9 ZX45 Compression Properties (ZX45C)

Material:		HexPEKK®-100		Compression Prism Cube Additively Manufactured HexPEKK - 100 Build Orientation: ZX45	
Machine Serial #:		EOS P800			
Test method:		ASTM D 695-15			
		Modulus calculation: 2000-6000 microstrain			
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambinet	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
ZX45C 2.0% Offset Strength [ksi]	Mean	33.56	24.92	14.11	
	Minimum	33.25	24.47	13.87	
	Maximum	33.77	25.34	14.28	
	C.V.(%)	0.6003	1.442	1.078	
	No. Specimens	5	5	7	
	No. Material Batches	1	1	1	
ZX45C Compressive Strength [ksi]	Mean	34.05	25.06	18.73	
	Minimum	33.59	24.63	16.45	
	Maximum	34.42	25.52	22.14	
	C.V.(%)	1.058	1.312	9.678	
	No. Specimens	6	6	7	
	No. Material Batches	1	1	1	
ZX45C Modulus [Msi]	Mean	0.9639	0.8816	0.7905	
	Minimum	0.9317	0.8644	0.7766	
	Maximum	0.9863	0.8966	0.8081	
	C.V.(%)	1.998	1.353	1.281	
	No. Specimens	6	6	7	
	No. Material Batches	1	1	1	
ZX45C Bending [%]	Mean	4.420	3.043	5.866	
	Minimum	1.228	0.4212	0.8675	
	Maximum	7.439	4.268	11.003	
	C.V.(%)	61.33	50.12	58.22	
	No. Specimens	6	6	7	
	No. Material Batches	1	1	1	

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2.2.10 XY Flex Proc. B Properties (XYF)

Material: HexPEKK®-100			Flex Additively Manufactured HexPEKK - 100 Build Orientation: XY		
Machine Serial #: EOS P800					
Test method: ASTM D 790-17 (Proc B)			Modulus calculation: 5000-20000 microstrain		
	CTA	RTA	ETA1	ETA2	ETW
Test Temperature [°F]	-65	70	180	250	250
Moisture Conditioning	Ambient	Ambient	Ambient	Ambient	Equilibrium
Equilibrium at T, RH					160 F,85%
	Measured	Measured	Measured	Measured	Measured
XYF Flexural Strength [ksi]	Mean	28.11	27.11	23.90	20.00
	Minimum	22.81	23.42	21.50	18.06
	Maximum	32.27	29.55	25.74	20.94
	C.V.(%)	8.943	7.517	6.235	4.033
	No. Specimens	18	19	6	18
	No. Material Batches	3	3	1	3
XYF 0.2% Offset Yield Strength [ksi]	Mean	29.34	25.19	20.69	14.52
	Minimum	26.94	22.91	19.99	12.49
	Maximum	32.23	27.55	21.57	16.72
	C.V.(%)	8.725	5.178	2.910	7.052
	No. Specimens	5	18	6	18
	No. Material Batches	2	3	1	3
XYF Modulus [Msi]	Mean	0.9249	0.8249	0.7376	0.8568
	Minimum	0.8464	0.7660	0.7058	0.7749
	Maximum	1.022	0.8929	0.7572	0.9251
	C.V.(%)	5.245	4.194	3.119	5.746
	No. Specimens	18	19	6	18
	No. Material Batches	3	3	1	3

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2.2.11 YX Flex Proc. B Properties (YXF)

Material:		HexPEKK®-100		Flex Additively Manufactured HexPEKK - 100 Build Orientation: YX	
Machine Serial #:		EOS P800			
Test method:		ASTM D 790-17 (Proc B)			
				Modulus calculation: 5000-20000 microstrain	
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
YXF Flexural Strength [ksi]	Mean	29.87	27.54	18.13	
	Minimum	27.08	26.16	17.54	
	Maximum	32.28	28.56	18.45	
	C.V.(%)	6.622	3.626	2.020	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	
YXF 0.2% Offset Yield Strength [ksi]	Mean	30.83	24.77	12.99	
	Minimum	30.37	23.98	12.26	
	Maximum	31.58	25.24	13.56	
	C.V.(%)	2.121	1.905	4.357	
	No. Specimens	3	6	6	
	No. Material Batches	1	1	1	
YXF Modulus [Msi]	Mean	0.8479	0.7717	0.8028	
	Minimum	0.8232	0.7483	0.7890	
	Maximum	0.8795	0.7999	0.8379	
	C.V.(%)	2.865	2.365	2.223	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	

2.2.12 XZ Flex Proc B. Properties (XZF)

Material:		HexPEKK®-100		Flex Additively Manufactured HexPEKK - 100 Build Orientation: XZ	
Machine Serial #:		EOS P800			
Test method:		ASTM D 790-17 (Proc B)			
		Modulus calculation: 5000-20000 microstrain			
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
XZF Flexural Strength [ksi]	Mean	20.60	22.93	16.80	
	Minimum	19.26	22.50	16.21	
	Maximum	21.80	23.67	18.07	
	C.V.(%)	4.860	1.923	4.049	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	
XZF 0.2% Offset Yield Strength [ksi]	Mean		22.19	12.18	
	Minimum		21.43	11.06	
	Maximum		23.36	13.64	
	C.V.(%)		3.248	8.250	
	No. Specimens		6	6	
	No. Material Batches		1	1	
ZF Modulus [Msi]	Mean	0.8335	0.7135	0.7172	
	Minimum	0.7609	0.6851	0.6951	
	Maximum	0.8865	0.7514	0.7630	
	C.V.(%)	5.500	3.697	3.458	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	

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2.2.13 ZX Flex Proc. B Properties (ZXF)

Material: Additively Manufactured HexPEKK - 100			Flex Additively Manufactured HexPEKK - 100 Build Orientation: ZX		
Machine Serial #: EOS P800					
Test method: ASTM D 790-17Modulus calculation: 1000-3000 microstrain					
	CTA	RTA	ETA1	ETA2	ETW
Test Temperature [°F]	-65	70	180	250	250
Moisture Conditioning	Ambient	Ambient	Ambient	Ambient	Equilibrium
Equilibrium at T, RH					160 F,85%
	Measured	Measured	Measured	Measured	Measured
ZXF Flexural Strength [ksi]	Mean	15.76	16.86	15.63	13.88
	Minimum	13.46	13.57	14.48	12.21
	Maximum	18.59	19.34	17.83	14.89
	C.V.(%)	9.266	8.656	7.593	6.362
	No. Specimens	18	20	6	18
	No. Material Batches	3	3	1	3
ZXF 0.2% Offset Yield Strength [ksi]	Mean		18.81	17.59	12.12
	Minimum		18.54	0.000	10.32
	Maximum		19.08	0.000	13.71
	C.V.(%)		2.035	0.000	9.724
	No. Specimens		2	1	18
	No. Material Batches		1	1	3
ZXF Modulus [Msi]	Mean	0.6612	0.5937	0.5789	0.5843
	Minimum	0.5585	0.5324	0.5272	0.5011
	Maximum	0.7654	0.6745	0.6424	0.6708
	C.V.(%)	8.498	6.537	8.022	8.889
	No. Specimens	18	20	6	18
	No. Material Batches	3	3	1	3

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2.2.14 ZX45 Flex Proc. B Properties (ZX45F)

Material:		HexPEKK®-100		Flex Additively Manufactured HexPEKK - 100 Build Orientation: ZX45	
Machine Serial #:		EOS P800			
Test method:		ASTM D 790-17 (Proc B)			
				Modulus calculation: 5000-20000 microstrain	
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
ZX45F Flexural Strength [ksi]	Mean	17.07	20.34	15.21	
	Minimum	15.97	17.58	13.54	
	Maximum	18.11	21.90	16.17	
	C.V.(%)	5.211	7.586	6.977	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	
ZX45F 0.2% Offset Yield Strength [ksi]	Mean		20.60	11.41	
	Minimum		19.65	10.29	
	Maximum		21.90	12.55	
	C.V.(%)		4.591	6.677	
	No. Specimens		5	6	
	No. Material Batches		1	1	
ZX45F Modulus [Msi]	Mean	0.6511	0.6163	0.6091	
	Minimum	0.6254	0.5673	0.5594	
	Maximum	0.6692	0.6617	0.6710	
	C.V.(%)	2.420	5.459	7.309	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	

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2.2.15 XY Punch Shear Properties (XYPSH)

Material: HexPEKK®-100			Punch Shear Hole Additively Manufactured HexPEKK - 100 Build Orientation: XY		
Machine Serial #: EOS P800					
Test method: ASTM D 732					
	CTA	RTA	ETA1	ETA2	ETW
Test Temperature [°F]	-65	70	180	250	250
Moisture Conditioning	Dry	Dry	Dry	Dry	Equilibrium
Equilibrium at T, RH					160 F,85%
	Measured	Measured	Measured	Measured	Measured
Mean	16.91	13.57	11.24	9.707	8.944
Minimum	15.73	12.93	10.81	8.790	8.179
Maximum	17.72	14.17	11.57	10.83	9.838
XYPSH Strength [ksi] C.V.(%)	3.143	3.003	2.352	5.026	4.011
No. Specimens	18	19	6	18	18
No. Material Batches	3	3	1	3	3

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2.2.16 ZX Punch Shear Properties (ZXPSH)

Material: HexPEKK®-100			Punch Shear Hole Additively Manufactured HexPEKK - 100 Build Orientation: ZX			
Machine Serial #: EOS P800						
Test method: ASTM D732						
	CTA	RTA	ETA1	ETA2	ETW	
Test Temperature [°F]	-65	70	180	250	250	
Moisture Conditioning	Dry	Dry	Dry	Dry	Equilibrium	
Equilibrium at T, RH					160 F,85%	
	Measured	Measured	Measured	Measured	Measured	
ZXPSH Strength [ksi]	Mean	15.79	12.95	10.55	9.027	8.532
	Minimum	13.96	12.38	10.12	8.568	7.802
	Maximum	16.86	13.63	10.88	9.699	9.650
	C.V.(%)	4.466	2.963	2.980	3.463	5.011
	No. Specimens	18	18	6	18	18
	No. Material Batches	3	3	1	3	3

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2.2.17 ZX45 Punch Shear Properties (ZX45PSH)

Material:		HexPEKK®-100		Punch Shear Hole Additively Manufactured HexPEKK - 100 Build Orientation: ZX45	
Machine Serial #:		EOS P800			
Test method:		ASTM D732			
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Dry	Dry	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
Mean		15.61	13.19	8.827	
Minimum		14.58	12.74	8.775	
Maximum		16.88	13.62	8.883	
ZX45PSH Strength [ksi] C.V.(%)		6.325	2.666	0.530	
No. Specimens		5	5	4	
No. Material Batches		1	1	1	

2.2.18 XY Open-Hole Tension Properties (XYOHT)

Material: HexPEKK®-100		Open-Hole Tension☐ Additively Manufactured HexPEKK - 100☐ Machined Hole☐ Build Orientation: XY		
Machine Serial #: EOS P800				
Test method: ASTM D 5766-11				
	CTA	RTA	ETA2	ETW
Test Temperature [°F]	-65	70	250	250
Moisture Conditioning	Ambient	Ambient	Ambient	Equilibrium
Equilibrium at T, RH				160 F,85%
	Measured	Measured	Measured	Measured
Mean	10.06	8.712	7.079	6.379
Minimum	8.950	7.928	5.894	5.766
Maximum	11.16	9.757	8.003	6.717
XYOHT Strength [ksi] C.V.(%)	6.943	5.788	7.498	4.515
No. Specimens	18	20	18	18
No. Material Batches	3	3	3	3

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2.2.19 YX Open-Hole Tension Properties (YXOHT)

Material:		HexPEKK®-100		Open-Hole Tension Additively Manufactured HexPEKK - 100 Machined Hole Build Orientation: YX	
Machine Serial #:		EOS P800			
Test method:		ASTM D 5766-11			
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
Mean		8.959	8.028	6.397	
Minimum		8.752	7.646	6.115	
Maximum		9.200	8.474	6.773	
YXOHT Strength [ksi] C.V.(%)		1.788	3.461	4.376	
No. Specimens		6	6	6	
No. Material Batches		1	1	1	

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2.2.20 XZ Open-Hole Tension Properties (XZOHT)

Material: HexPEKK®-100		Open-Hole Tension ☐ Additively Manufactured HexPEKK - 100 ☐ Machined Hole ☐ Build Orientation: XZ			
Machine Serial #: EOS P800					
Test method: ASTM D 5766-11					
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
XZOHT Strength [ksi]	Mean	9.660	8.783	6.704	
	Minimum	9.094	8.129	6.178	
	Maximum	10.26	9.375	7.067	
	C.V.(%)	4.736	6.580	6.049	
	No. Specimens	6	6	6	
No. Material Batches	1	1	1		

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2.2.21 ZX Open-Hole Tension Properties (ZXOHT)

Material:		HexPEKK®-100		Open-Hole Tension Additively Manufactured HexPEKK - 100 Machined Hole Build Orientation: ZX	
Machine Serial #:		EOS P800			
Test method:		ASTM D 5766-11			
		CTA	RTA	ETA2	ETW
Test Temperature [°F]		-65	70	250	250
Moisture Conditioning		Ambient	Ambient	Ambient	Equilibrium
Equilibrium at T, RH					160 F,85%
		Measured	Measured	Measured	Measured
Mean		7.324	6.676	5.606	5.356
Minimum		4.973	5.870	4.808	4.654
Maximum		8.273	7.529	6.359	5.777
ZXOHT Strength [ksi] C.V.(%)		10.16	6.503	7.233	6.190
No. Specimens		18	18	18	18
No. Material Batches		3	3	3	3

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2.2.22 ZX45 Open-Hole Tension Properties (ZX45OHT)

Material:		HexPEKK®-100			Open-Hole Tension Additively Manufactured HexPEKK - 100 Machined Hole Build Orientation: ZX45
Machine Serial #:		EOS P800			
Test method:		ASTM D 5766-11			
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
ZX45OHT Strength [ksi]	Mean	8.942	7.854	6.011	
	Minimum	8.225	7.291	5.800	
	Maximum	9.867	8.231	6.402	
	C.V.(%)	6.513	4.623	3.486	
	No. Specimens	6	6	6	
	No. Material Batches	1	1	1	

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2.2.23 XY Filled-Hole Tension Properties (XYFHT)

Material:		HexPEKK®-100		Filled-Hole Tension ☐ Additively Manufactured HexPEKK - 100 ☐ ☐ Build Orientation: XY	
Machine Serial #:		EOS P800			
Test method:		ASTM D 6742			
		CTA	RTA	ETA2	ETW
Test Temperature [°F]		-65	70	250	250
Moisture Conditioning		Ambient	Ambient	Ambient	Equilibrium
Equilibrium at T, RH					160 F,85%
		Measured	Measured	Measured	Measured
Mean		16.75	14.62	9.615	7.980
Minimum		13.06	13.02	9.037	7.485
Maximum		18.21	15.67	10.21	8.701
XYFHT Strength [ksi] C.V.(%)		7.45	4.584	3.652	4.158
No. Specimens		18	18	18	18
No. Material Batches		3	3	3	3

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2.2.24 YX Filled-Hole Tension Properties (YXFHT)

Material:		HexPEKK®-100		Filled-Hole Tension Additively Manufactured HexPEKK - 100 Build Orientation: YX	
Machine Serial #:		EOS P800			
Test method:		ASTM D 6742			
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
Mean		16.62	14.60	7.509	
Minimum		15.19	13.86	7.288	
Maximum		17.50	15.16	7.818	
YXFHT Strength [ksi] C.V.(%)		5.142	3.688	2.849	
No. Specimens		6	6	6	
No. Material Batches		1	1	1	

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2.2.25 XZ Filled-Hole Tension Properties (XZFHT)

Material:		HexPEKK®-100			Filled-Hole Tension Additively Manufactured HexPEKK - 100 Build Orientation: XZ
Machine Serial #:		EOS P800			
Test method:		ASTM D 6742			
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
Mean		16.06	14.92	7.660	
Minimum		14.89	14.32	7.163	
Maximum		17.18	15.23	7.936	
XZFHT Strength [ksi] C.V.(%)		5.736	2.303	3.629	
No. Specimens		6	6	6	
No. Material Batches		1	1	1	

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2.2.26 ZX Filled-Hole Tension Properties (ZXFHT)

Material:		HexPEKK®-100		Filled-Hole Tension Additively Manufactured HexPEKK - 100 Build Orientation: ZX	
Machine Serial #:		EOS P800			
Test method:		ASTM D 6742			
		CTA	RTA	ETA2	ETW
Test Temperature [°F]		-65	70	250	250
Moisture Conditioning		Ambient	Ambient	Ambient	Equilibrium
Equilibrium at T, RH					160 F,85%
		Measured	Measured	Measured	Measured
Mean		11.12	11.28	7.675	6.511
Minimum		8.529	8.781	5.901	6.255
Maximum		12.73	12.54	8.108	6.908
ZXFHT Strength [ksi]	C.V.(%)	11.46	8.533	6.746	2.770
No. Specimens		18	20	18	18
No. Material Batches		3	3	3	3

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2.2.27 ZX45 Filled-Hole Tension Properties (ZX45FHT)

Material:		HexPEKK®-100		Filled-Hole Tension Additively Manufactured HexPEKK - 100 Build Orientation: ZX45	
Machine Serial #:		EOS P800			
Test method:		ASTM D 6742			
		CTA	RTA	ETW	
Test Temperature [°F]		-65	70	250	
Moisture Conditioning		Ambient	Ambient	Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured	Measured	Measured	
Mean		13.19	13.17	6.687	
Minimum		10.59	12.31	6.514	
Maximum		14.35	13.75	6.888	
ZX45FHT Strength [ksi] C.V.(%)		10.38	3.998	2.062	
No. Specimens		6	6	6	
No. Material Batches		1	1	1	

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2.2.28 XY Open-Hole Compression Properties (XYOHC)

Material:		HexPEKK®-100		Open-Hole Compression Additively Manufactured HexPEKK - 100 Machined Hole Build Orientation: XY	
Machine Serial #:		EOS P800			
Test method:		ASTM D 6484-14			
		Modulus calculation: 2000-6000 microstrain			
		RTA		ETW	
Test Temperature [°F]		70		250	
Moisture Conditioning		Ambient		Equilibrium	
Equilibrium at T, RH				160 F,85%	
		Measured		Measured	
XYOHC 0.2% Offset Strength [ksi]	Mean	14.40		10.04	
	Minimum	12.72		9.463	
	Maximum	15.44		10.68	
	C.V.(%)	6.334		5.269	
	No. Specimens	6		6	
	No. Material Batches	1		1	
XYOHC 1.0% Offset Strength [ksi]	Mean			12.06	
	Minimum			11.72	
	Maximum			12.68	
	C.V.(%)			2.942	
	No. Specimens			6	
	No. Material Batches			1	
XYOHC Modulus [Msi]	Mean	0.9865		0.9179	
	Minimum	0.7749		0.7955	
	Maximum	1.179		1.031	
	C.V.(%)	14.33		10.88	
	No. Specimens	6		6	
	No. Material Batches	1		1	

**1% Offset strength for RTA is not reported because the specimen failed before reaching 1% offset strain

2.2.29 YX Open-Hole Compression Properties (YXOHC)

Material:		HexPEKK®-100		Open-Hole Compression Additively Manufactured HexPEKK - 100 Machined Hole Build Orientation: YX	
Machine Serial #:		EOS P800			
Test method:		ASTM D 6484-14		Modulus calculation: 2000-6000 microstrain	
ETW					
Test Temperature [°F]		250			
Moisture Conditioning		Equilibrium			
Equilibrium at T, RH		160 F,85%			
		Measured			
YXOHC 0.2% Offset Strength [ksi]	Mean	9.308			
	Minimum	9.066			
	Maximum	9.644			
	C.V.(%)	2.446			
	No. Specimens	6			
	No. Material Batches	1			
YXOHC 1.0% Offset Strength [ksi]	Mean	11.30			
	Minimum	10.57			
	Maximum	11.62			
	C.V.(%)	3.463			
	No. Specimens	6			
	No. Material Batches	1			
YXOHC Modulus [Msi]	Mean	0.7601			
	Minimum	0.6941			
	Maximum	0.8586			
	C.V.(%)	9.134			
	No. Specimens	6			
	No. Material Batches	1			

2.2.30 XZ Open-Hole Compression Properties (XZOHC)

Material:		HexPEKK®-100		Open-Hole Compression Additively Manufactured HexPEKK - 100 Machined Hole Build Orientation: XZ	
Machine Serial #:		EOS P800			
Test method:		ASTM D 6484-14			
		Modulus calculation: 2000-6000 microstrain			
		RTA	ETW		
Test Temperature [°F]		70	250		
Moisture Conditioning		Ambient	Equilibrium		
Equilibrium at T, RH			160 F,85%		
		Measured	Measured		
XZOHC 0.2% Offset Strength [ksi]	Mean	14.35	9.562		
	Minimum	13.65	9.251		
	Maximum	15.51	10.12		
	C.V.(%)	4.415	3.331		
	No. Specimens	6	6		
	No. Material Batches	2	1		
XZOHC 1.0% Offset Strength [ksi]	Mean		11.31		
	Minimum		10.65		
	Maximum		11.86		
	C.V.(%)		3.772		
	No. Specimens		6		
	No. Material Batches		1		
XZOHC Modulus [Msi]	Mean	0.8699	0.8347		
	Minimum	0.8445	0.7502		
	Maximum	0.9221	0.8836		
	C.V.(%)	3.267	6.518		
	No. Specimens	6	6		
	No. Material Batches	2	1		

**1% Offset strength for RTA is not reported because the specimen failed before reaching 1% offset strain

2.2.31 ZX Open-Hole Compression Properties (ZXOHC)

Material:		HexPEKK®-100		Open-Hole Compression Additively Manufactured HexPEKK - 100 Machined Hole Build Orientation: ZX	
Machine Serial #:		EOS P800			
Test method:		ASTM D 6484-14			
		Modulus calculation: 2000-6000 microstrain			
		RTA	ETW		
Test Temperature [°F]		70	250		
Moisture Conditioning		Ambient	Equilibrium		
Equilibrium at T, RH			160 F,85%		
		Measured	Measured		
ZXOHC 0.2% Offset Strength [ksi]	Mean	14.18	10.32		
	Minimum	13.30	10.10		
	Maximum	14.70	10.60		
	C.V.(%)	3.994	1.952		
	No. Specimens	5	6		
	No. Material Batches	2	1		
ZXOHC 1.0% Offset Strength [ksi]	Mean	18.58	11.71		
	Minimum	18.34	11.29		
	Maximum	18.83	12.17		
	C.V.(%)	1.896	2.660		
	No. Specimens	2	6		
	No. Material Batches	2	1		
ZXOHC Modulus [Msi]	Mean	0.7362	0.7284		
	Minimum	0.6406	0.6994		
	Maximum	0.7903	0.7562		
	C.V.(%)	8.842	2.995		
	No. Specimens	5	6		
	No. Material Batches	2	1		

2.2.32 ZX45 Open-Hole Compression Properties (ZX45OHC)

Material: HexPEKK®-100 Machine Serial #: EOS P800 Test method: ASTM D 6484-14			Open-Hole Compression ☐ Additively Manufactured HexPEKK - 100 ☐ Machined Hole ☐ Build Orientation: ZX45	
Modulus calculation: 2000-6000 microstrain				
	RTA	ETW		
Test Temperature [°F]	70	250		
Moisture Conditioning	Ambient	Equilibrium		
Equilibrium at T, RH		160 F, 85%		
	Measured	Measured		
ZX45OHC 0.2% Offset Strength [ksi]	Mean	14.60	9.448	
	Minimum	12.57	9.002	
	Maximum	18.28	9.820	
	C.V.(%)	15.70	3.270	
	No. Specimens	5	6	
	No. Material Batches	2	1	
ZX45OHC 1.0% Offset Strength [ksi]	Mean	17.50	11.01	
	Minimum		10.37	
	Maximum		11.52	
	C.V.(%)		3.517	
	No. Specimens	1	6	
	No. Material Batches	1	1	
ZX45OHC Modulus [Msi]	Mean	0.6661	0.7077	
	Minimum	0.6470	0.6575	
	Maximum	0.6822	0.7721	
	C.V.(%)	2.487	7.256	
	No. Specimens	5	6	
	No. Material Batches	2	1	

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2.2.33 XY Filled-Hole Compression Properties (XYFHC)

Material: Additively Manufactured HexPEKK - 100		Filled-Hole Compression ☐ Additively Manufactured HexPEKK - 100 ☐ Build Orientation: XY			
Machine Serial #: EOS P800					
Test method: ASTM D 6742		Modulus calculation: 2000-6000 microstrain			
		RTA	ETW		
Test Temperature [°F]		70	250		
Moisture Conditioning		Ambient	Equilibrium		
Equilibrium at T, RH			160 F,85%		
		Measured	Measured		
XYFHC 0.2% Offset Filled Hole Compressive Strength [ksi]	Mean	16.66	11.62		
	Minimum	14.92	10.78		
	Maximum	17.94	12.58		
	C.V.(%)	6.523	5.802		
	No. Specimens	6	6		
	No. Material Batches	1	1		

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2.2.34 YX Filled-Hole Compression Properties (YXFHC)

Material:		Additively Manufactured HexPEKK - 100			Filled-Hole Compression Additively Manufactured HexPEKK - 100 Build Orientation: YX	
Machine Serial #:		EOS P800				
Test method:		ASTM D 6742		Modulus calculation: 2000-6000 microstrain		
RTA						
Test Temperature [°F]		70				
Moisture Conditioning		Ambient				
Equilibrium at T, RH						
		Measured				
YXFHC 0.2% Offset Filled Hole Compressive Strength [ksi]	Mean	14.90				
	Minimum	13.14				
	Maximum	16.56				
	C.V.(%)	8.094				
	No. Specimens	6				
	No. Material Batches	2				

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2.2.35 XZ Filled-Hole Compression Properties (XZFHC)

Material:		Additively Manufactured HexPEKK - 100		Filled-Hole Compression☐ Additively Manufactured HexPEKK - 100☐ ☐ Build Orientation: XZ	
Machine Serial #:		EOS P800			
Test method:		ASTM D 6742			
		Modulus calculation: 2000-6000 microstrain			
		RTA	ETW		
Test Temperature [°F]		70	250		
Moisture Conditioning		Ambient	Equilibrium		
Equilibrium at T, RH			160 F,85%		
		Measured	Measured		
XZFHC 0.2% Offset Filled Hole Compressive Strength [ksi]	Mean	15.09	11.15		
	Minimum	13.46	9.670		
	Maximum	17.52	12.18		
	C.V.(%)	9.210	7.778		
	No. Specimens	6	6		
	No. Material Batches	2	1		

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2.2.36 ZX Filled-Hole Compression Properties (ZXFHC)

Material: Additively Manufactured HexPEKK - 100		Filled-Hole Compression ☐ Additively Manufactured HexPEKK - 100 ☐ ☐ Build Orientation: ZX			
Machine Serial #: EOS P800					
Test method: ASTM D 6742					
		Modulus calculation: 2000-6000 microstrain			
		RTA	ETW		
Test Temperature [°F]		70	250		
Moisture Conditioning		Ambient	Equilibrium		
Equilibrium at T, RH			160 F,85%		
		Measured	Measured		
ZXFHC 0.2% Offset Filled Hole Compressive Strength [ksi]	Mean	17.94	11.96		
	Minimum	16.59	11.09		
	Maximum	19.05	12.99		
	C.V.(%)	5.590	5.620		
	No. Specimens	6	6		
	No. Material Batches	2	1		

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2.2.37 ZX45 Filled-Hole Compression Properties (ZX45FHC)

Material: Additively Manufactured HexPEKK - 100		Filled-Hole Compression☐ Additively Manufactured HexPEKK - 100☐ Build Orientation: ZX45		
Machine Serial #: EOS P800				
Test method: ASTM D 6742				
		Modulus calculation: 2000-6000 microstrain		
RTA				
Test Temperature [°F]	70			
Moisture Conditioning	Ambient			
Equilibrium at T, RH				
	Measured			
ZX45FHC 0.2% Offset Filled Hole Compressive Strength [ksi]	Mean	15.09		
	Minimum	14.04		
	Maximum	16.46		
	C.V.(%)	7.133		
	No. Specimens	6		
	No. Material Batches	2		

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2.2.38 XY Single-Shear Bearing Properties (XYSSB)

Material:		HexPEKK®-100			Bearing Procedure C Additively Manufactured HexPEKK - 100 Build Orientation: XY	
Machine Serial #:		EOS P800				
Test method:		ASTM D 5961-17				
		RTA	ETA1	ETA2	ETW	
Test Temperature [°F]		70	180	250	250	
Moisture Conditioning		Ambient	Ambient	Ambient	Equilibrium	
Equilibrium at T, RH					160 F,85%	
		Measured	Measured	Measured	Measured	
XYSSB 2% Offset Strength [ksi]	Mean		36.93	33.67	30.57	
	Minimum			31.71	28.04	
	Maximum			36.51	33.78	
	C.V.(%)			4.514	4.792	
	No. Specimens		1	12	18	
	No. Material Batches		1	2	3	
XYSSB Ultimate Strength [ksi]	Mean	31.77	33.70	37.73	34.86	
	Minimum	27.99	29.50	33.72	33.12	
	Maximum	35.74	41.99	40.90	37.26	
	C.V.(%)	6.528	12.80	4.804	3.512	
	No. Specimens	18	6	12	18	
	No. Material Batches	3	1	2	3	

**For RTA coupon, 2% Offset Strength was not reported as it occurred after obtaining max load

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2.2.39 YX Single-Shear Bearing Properties (YXSSB)

Material:		HexPEKK®-100		Bearing Procedure C Additively Manufactured HexPEKK - 100 Build Orientation: YX	
Machine Serial #:		EOS P800			
Test method:		ASTM D 5961-17			
		RTA	ETW		
Test Temperature [°F]		70	250		
Moisture Conditioning		Ambient	Equilibrium		
Equilibrium at T, RH			160 F,85%		
		Measured	Measured		
YXSSB 2% Offset Strength [ksi]	Mean		29.82		
	Minimum		29.66		
	Maximum		30.14		
	C.V.(%)		0.6595		
	No. Specimens		6		
	No. Material Batches		1		
YXSSB Ultimate Strength [ksi]	Mean	31.67	33.78		
	Minimum	28.34	32.94		
	Maximum	33.73	34.58		
	C.V.(%)	6.482	1.763		
	No. Specimens	6	6		
	No. Material Batches	1	1		

**For RTA coupon, 2% Offset Strength was not reported as it occurred after obtaining max load

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2.2.40 XZ Single-Shear Bearing Properties (XZSSB)

Material:		HexPEKK®-100		Bearing Procedure C Additively Manufactured HexPEKK - 100 Build Orientation: XZ	
Machine Serial #:		EOS P800			
Test method:		ASTM D 5961-17			
		RTA	ETW		
Test Temperature [°F]		70	250		
Moisture Conditioning		Ambient	Equilibrium		
Equilibrium at T, RH			160 F,85%		
		Measured	Measured		
XZSSB 2% Offset Strength [ksi]	Mean		30.04		
	Minimum		27.43		
	Maximum		32.00		
	C.V.(%)		5.830		
	No. Specimens		6		
	No. Material Batches		1		
XZSSB Ultimate Strength [ksi]	Mean	31.47	32.88		
	Minimum	28.38	29.56		
	Maximum	34.14	36.16		
	C.V.(%)	6.956	7.416		
	No. Specimens	6	6		
	No. Material Batches	1	1		

**For RTA coupon, 2% Offset Strength was not reported as it occurred after obtaining max load

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2.2.41 ZX Single-Shear Bearing Properties (ZXSSB)

Material:		HexPEKK®-100			Bearing Procedure C Additively Manufactured HexPEKK - 100 Build Orientation: ZX
Machine Serial #:		EOS P800			
Test method:		ASTM D 5961-17			
		RTA	ETA1	ETA2	ETW
Test Temperature [°F]		70	180	250	250
Moisture Conditioning		Ambient	Ambient	Ambient	Equilibrium
Equilibrium at T, RH					160 F,85%
		Measured	Measured	Measured	Measured
ZXSSB 2% Offset Strength [ksi]	Mean			31.60	27.17
	Minimum			29.67	24.96
	Maximum			33.60	30.05
	C.V.(%)			4.489	5.159
	No. Specimens			6	16
	No. Material Batches			3	3
ZXSSB Ultimate Strength [ksi]	Mean	25.48	29.03	27.84	28.24
	Minimum	21.86	25.36	21.43	22.00
	Maximum	29.46	35.90	35.46	33.36
	C.V.(%)	9.043	20.51	16.01	11.64
	No. Specimens	21	3	15	21
	No. Material Batches	3	1	3	3

**For RTA and ETA1 coupons, 2% Offset Strength was not reported as it occurred after obtaining max load

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2.2.42 ZX45 Single-Shear Bearing Properties (ZX45SSB)

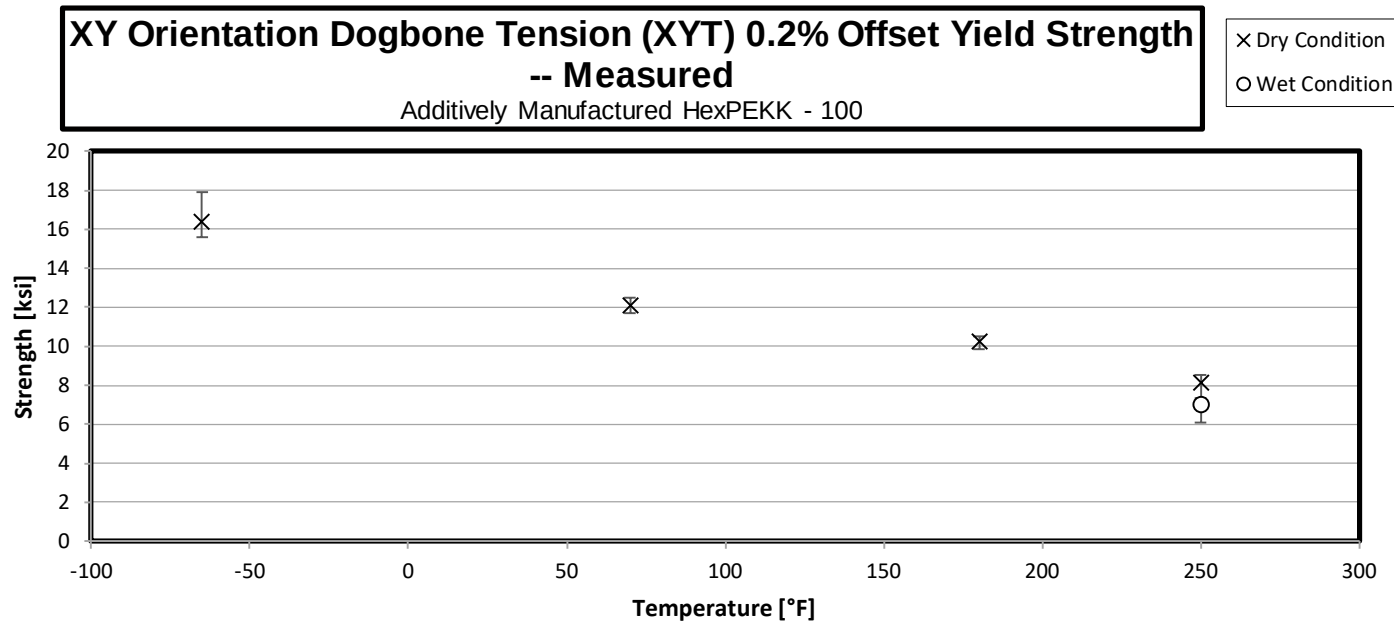
Material:		HexPEKK®-100		Bearing Procedure C Additively Manufactured HexPEKK - 100 Build Orientation: ZX45	
Machine Serial #:		EOS P800			
Test method:		ASTM D 5961-17			
		RTA	ETW		
Test Temperature [°F]		70	250		
Moisture Conditioning		Ambient	Equilibrium		
Equilibrium at T, RH			160 F,85%		
		Measured	Measured		
ZX45SSB 2% Offset Strength [ksi]	Mean		27.70		
	Minimum		26.87		
	Maximum		28.67		
	C.V.(%)		2.965		
	No. Specimens		5		
	No. Material Batches		1		
ZX45SSB Ultimate Strength [ksi]	Mean	29.58	30.79		
	Minimum	27.98	25.64		
	Maximum	32.60	32.80		
	C.V.(%)	5.714	8.834		
	No. Specimens	6	6		
	No. Material Batches	1	1		

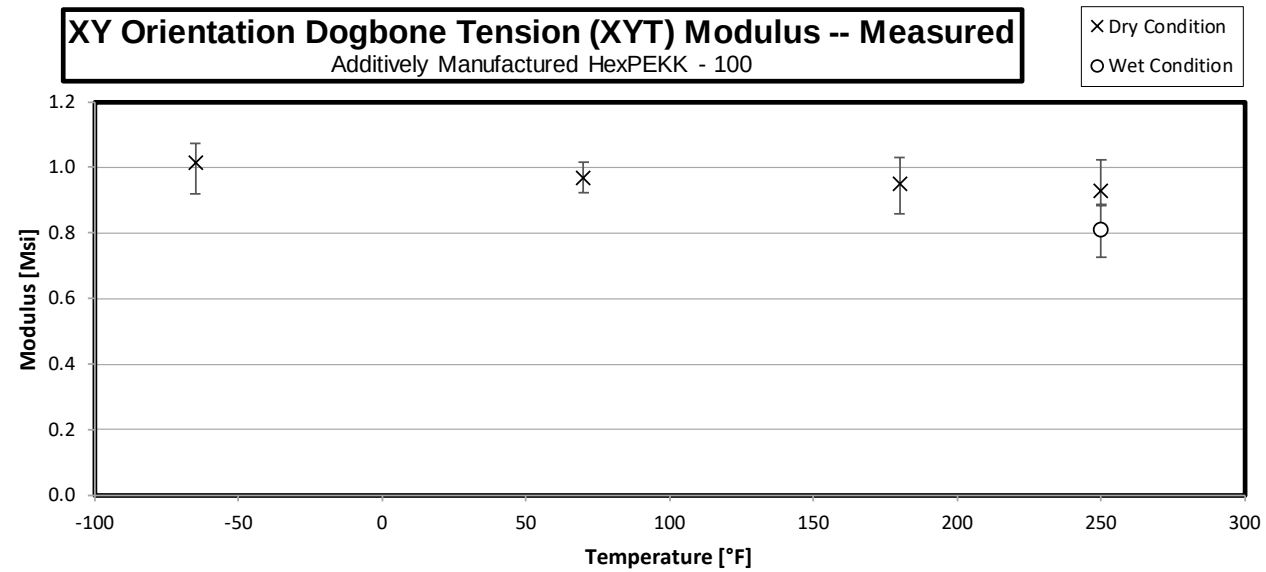
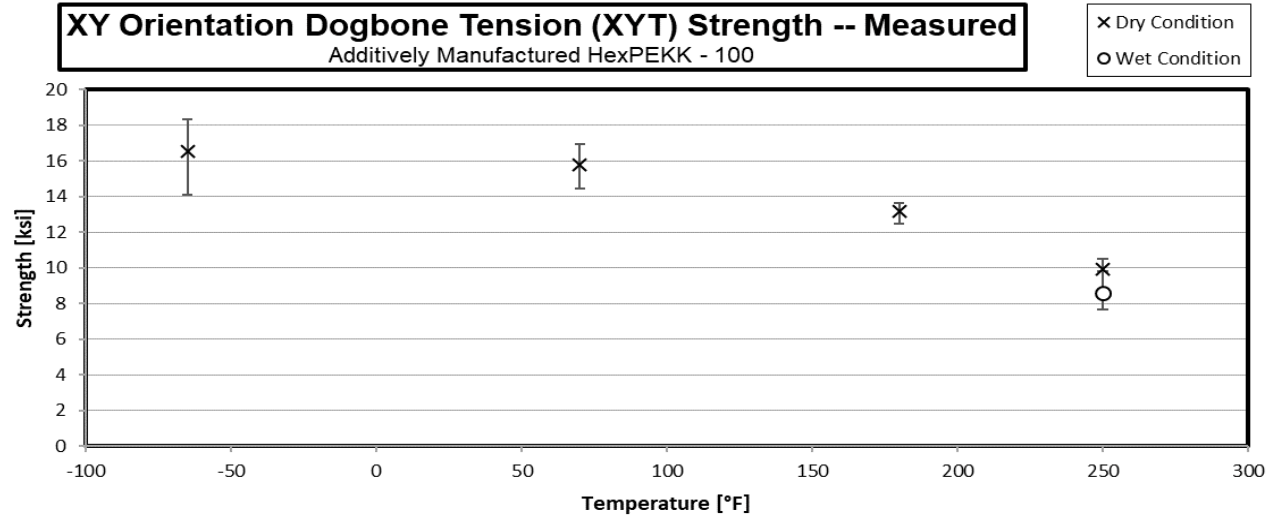
**For RTA coupon, 2% Offset Strength was not reported as it occurred after obtaining max load

3. Individual Test Charts

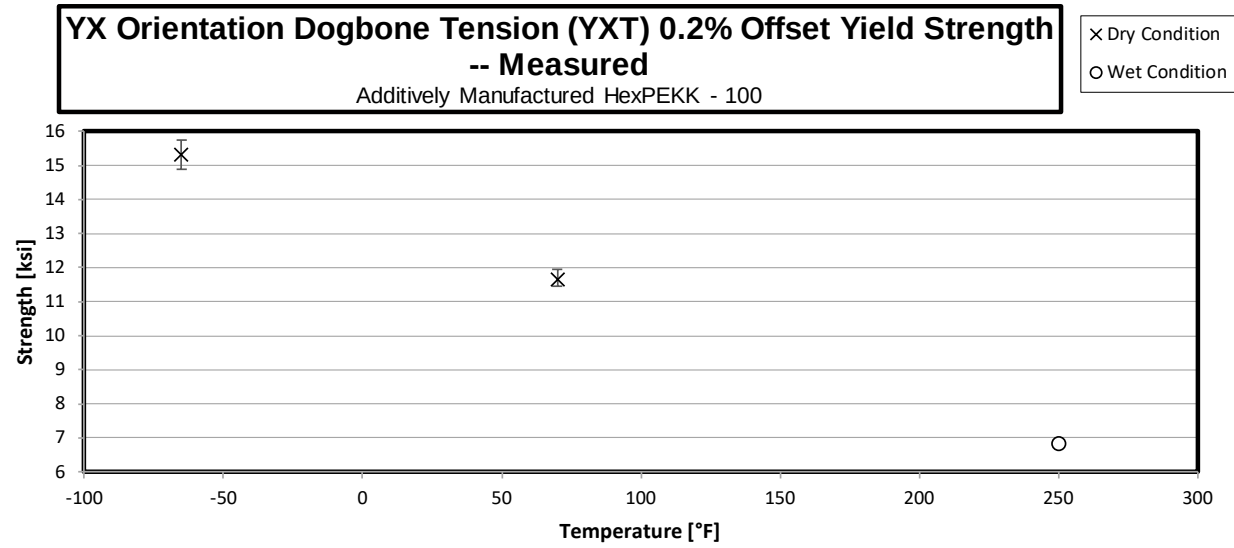
These charts combine all three batches of data and plot the minimum and maximum modulus and strength range based on the test temperature.

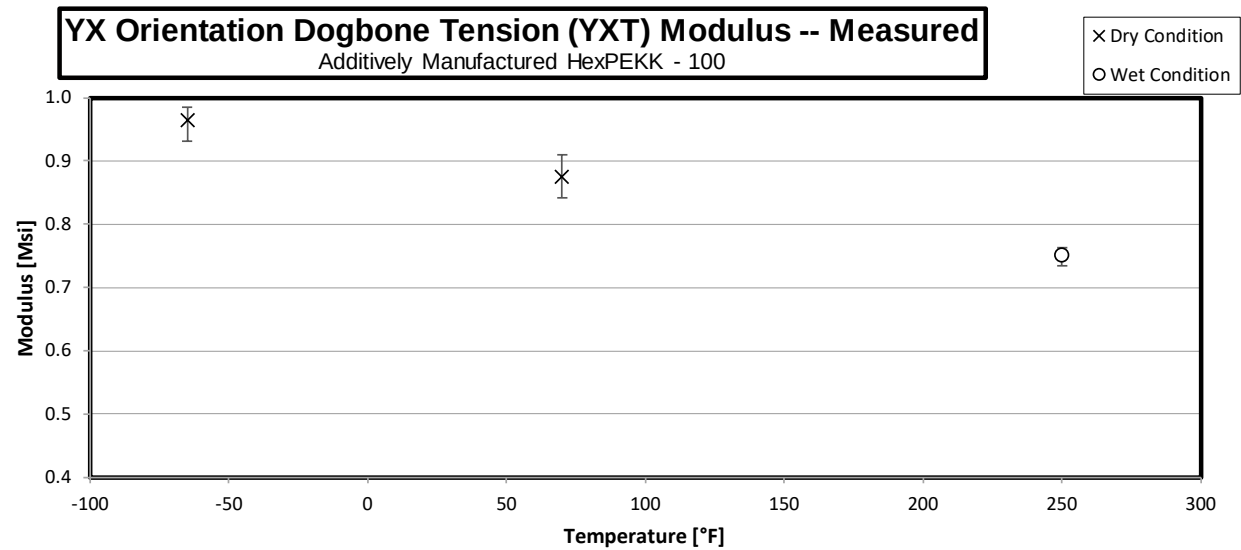
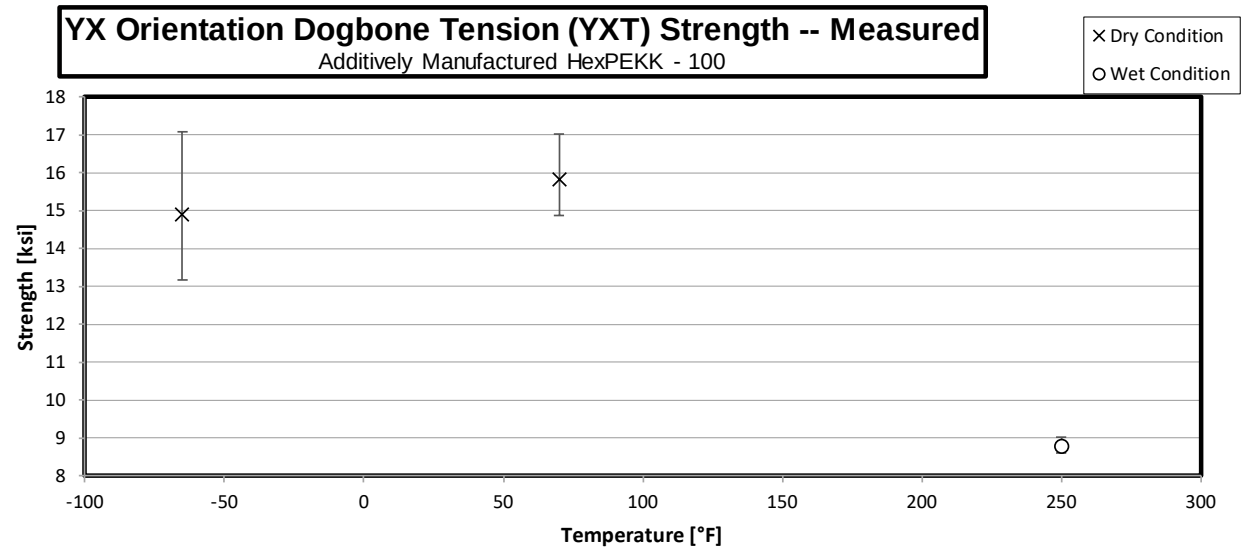
3.1 XY Tension Properties (XYT)



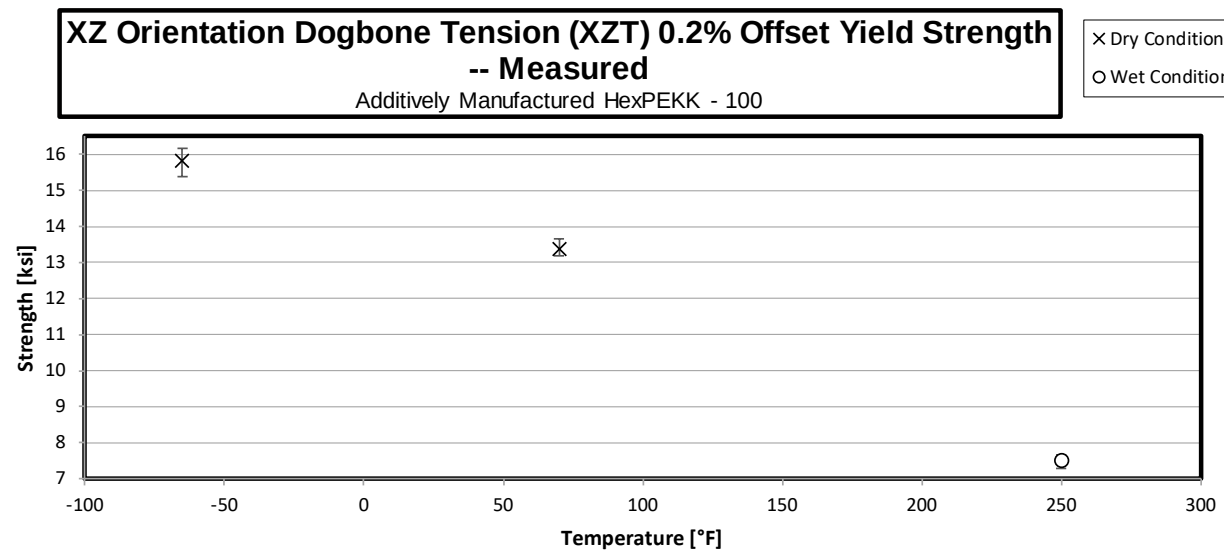


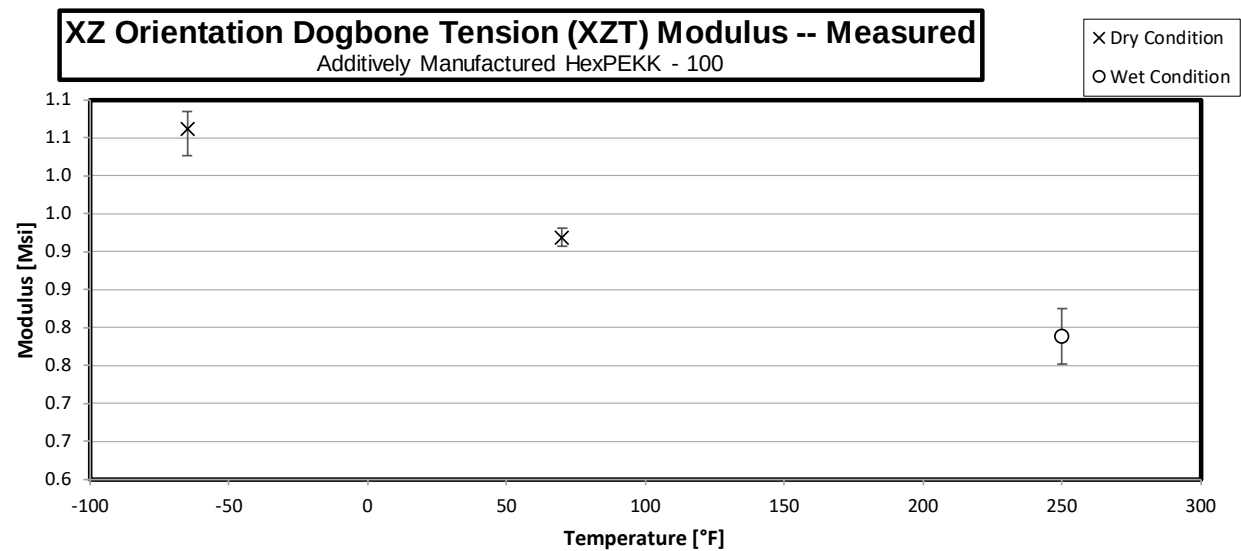
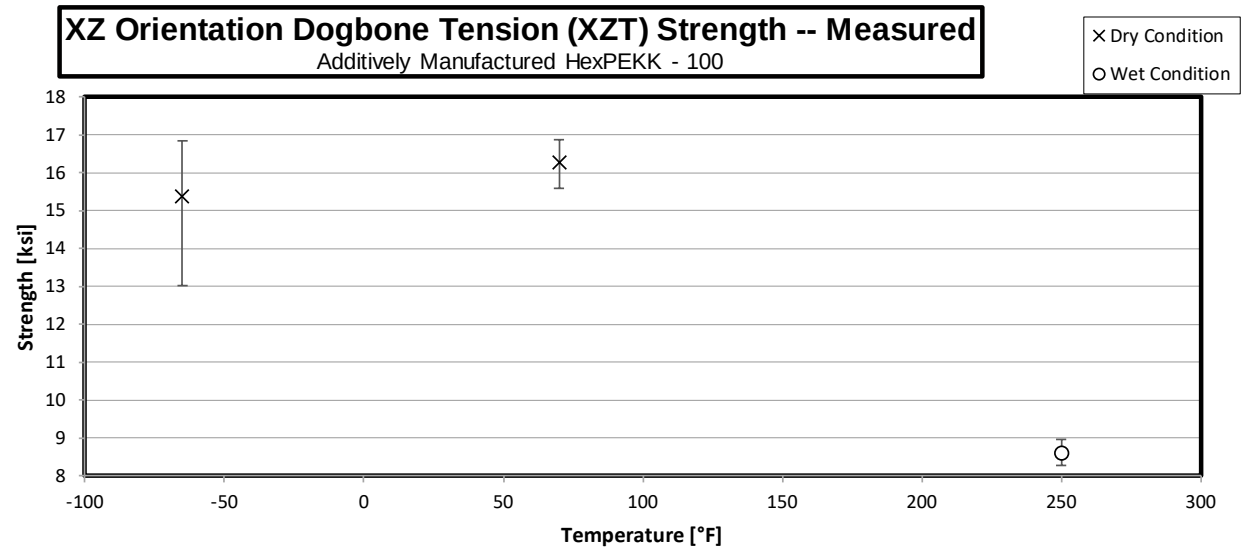
3.2 YX Tension Properties (YXT)



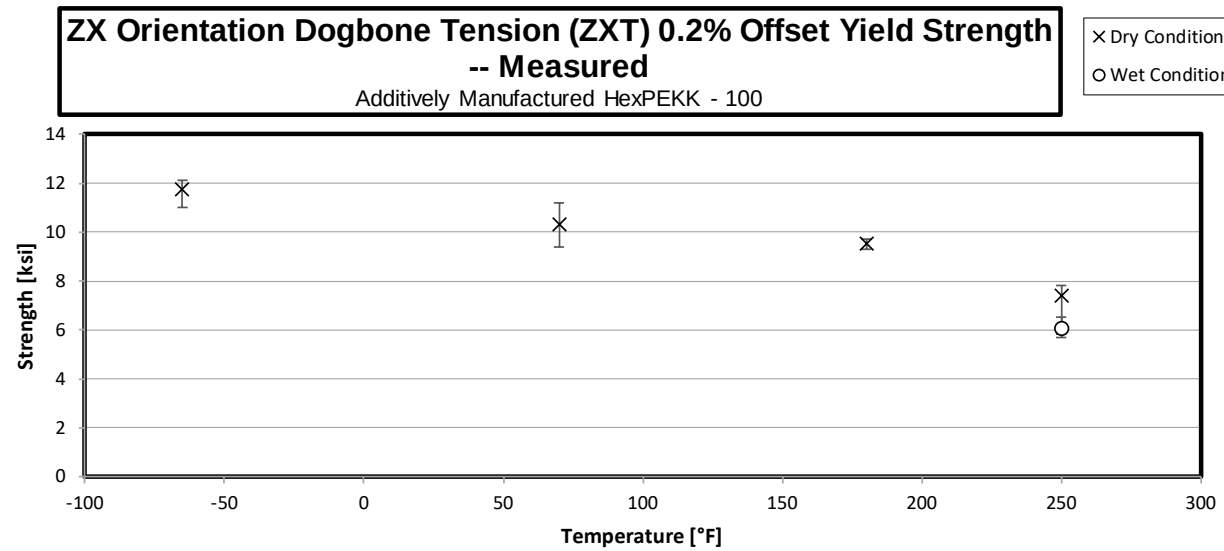


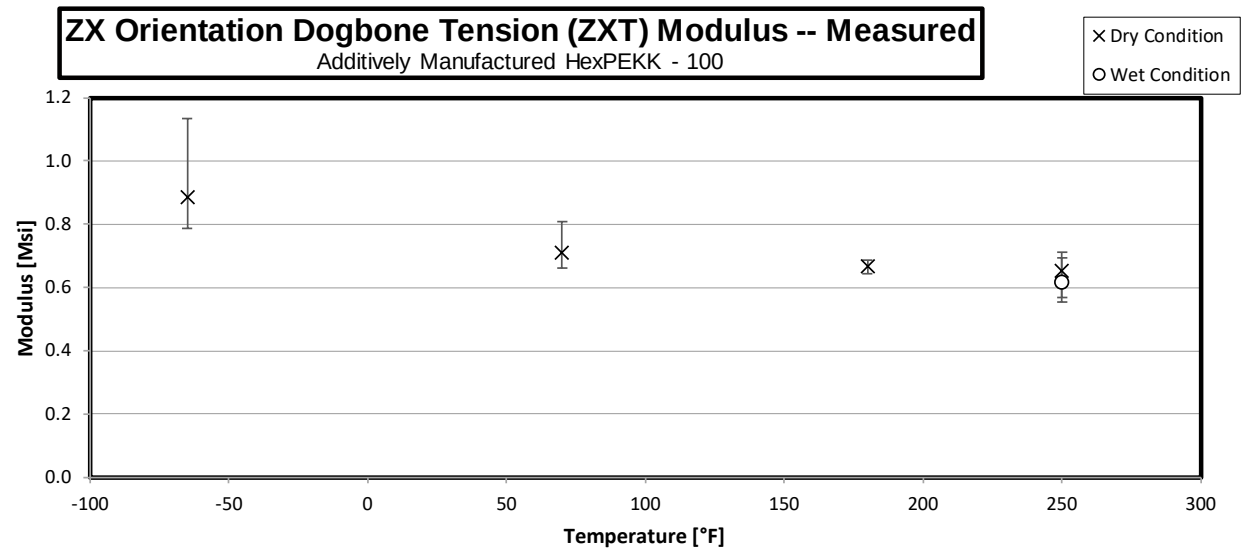
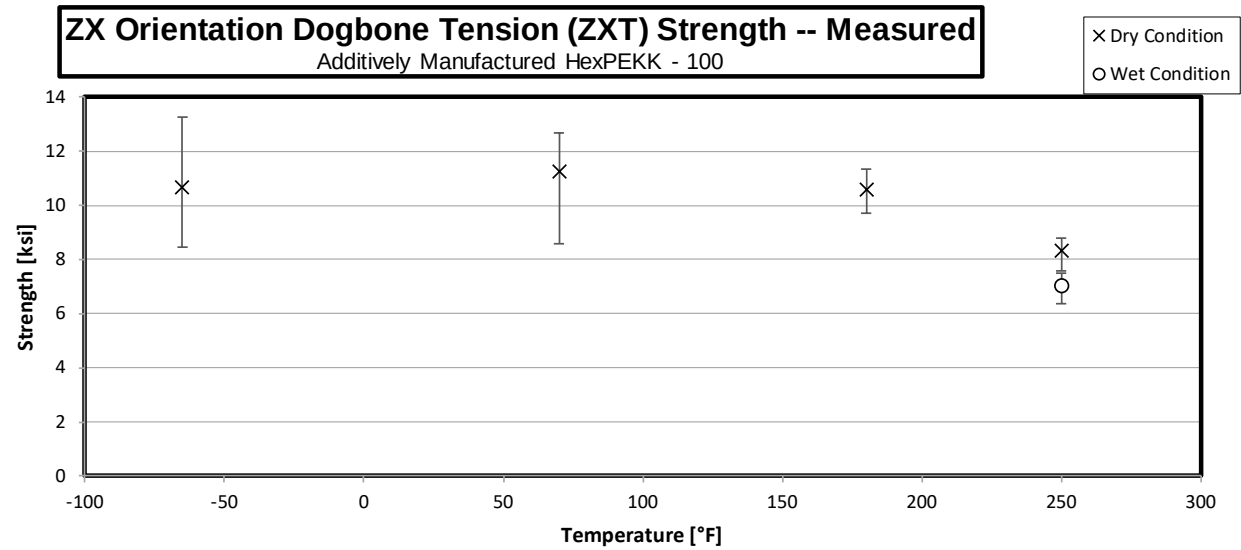
3.3 XZ Tension Properties (XZT)



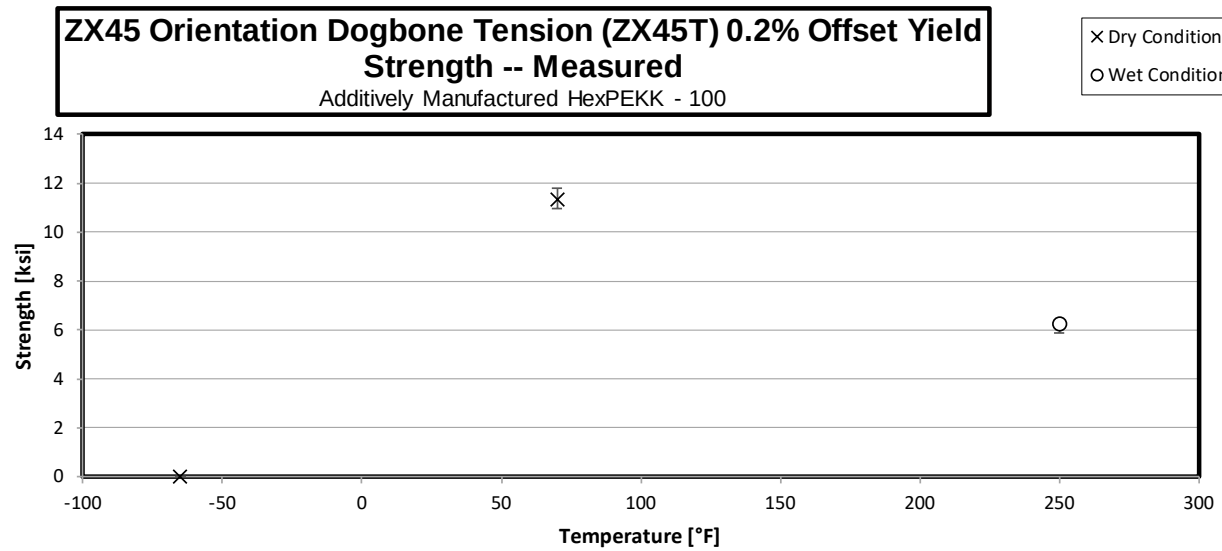


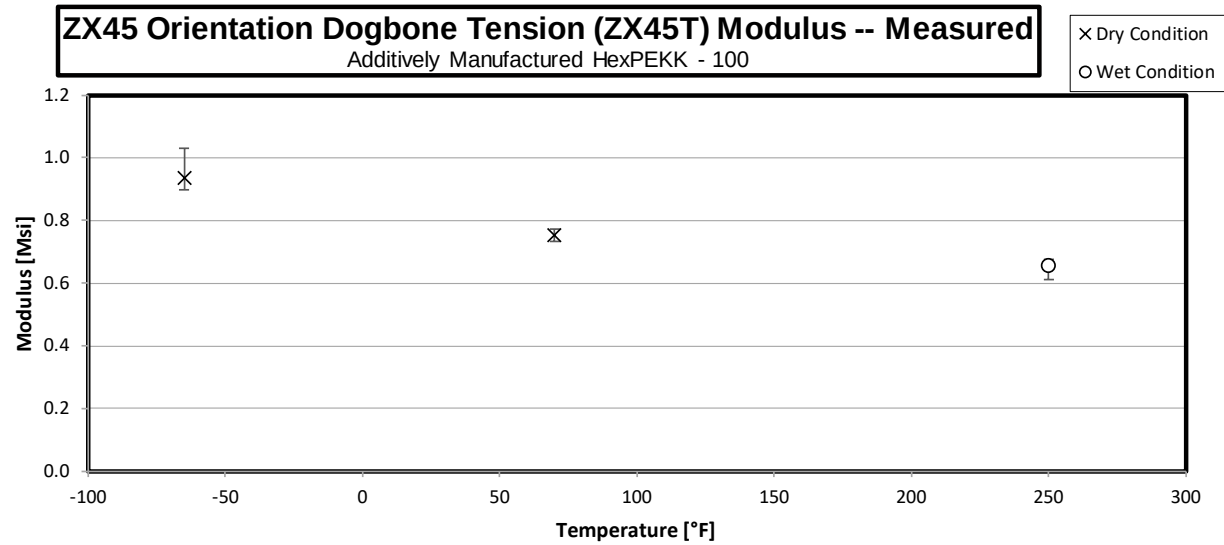
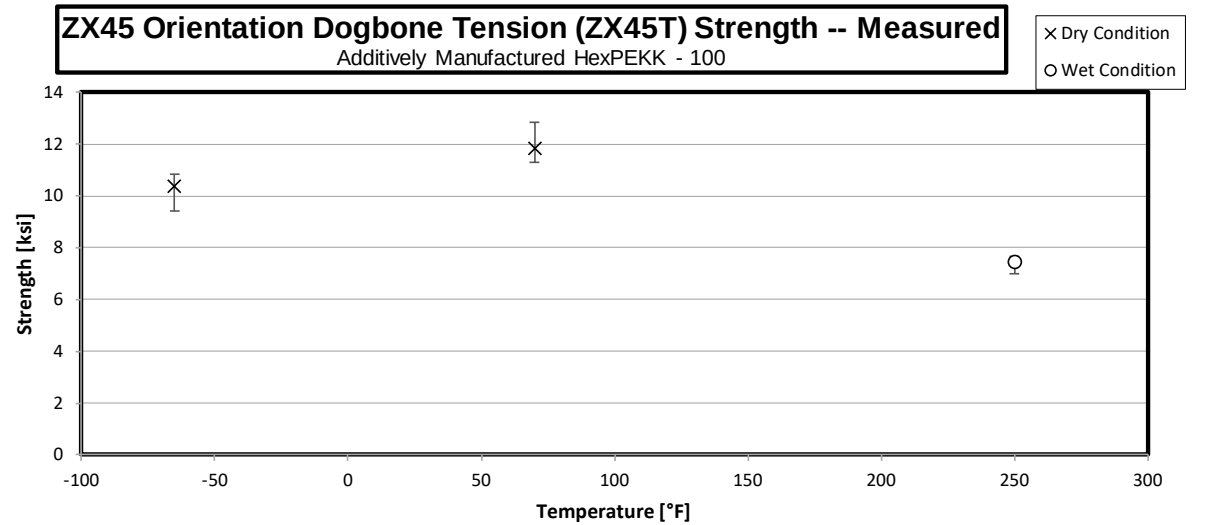
3.4 ZX Tension Properties (ZXT)



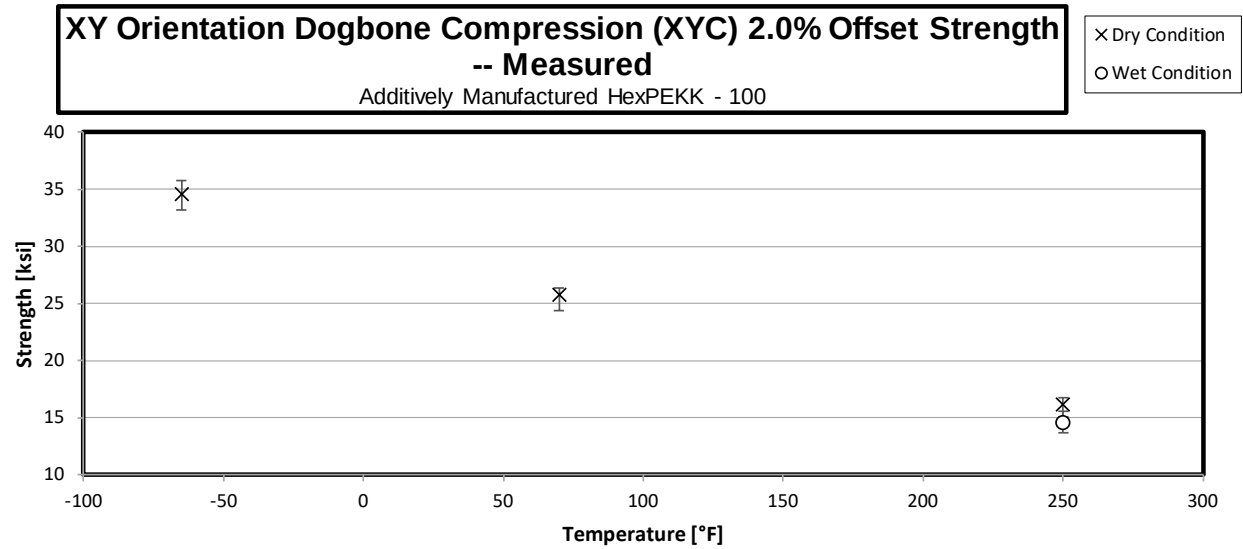


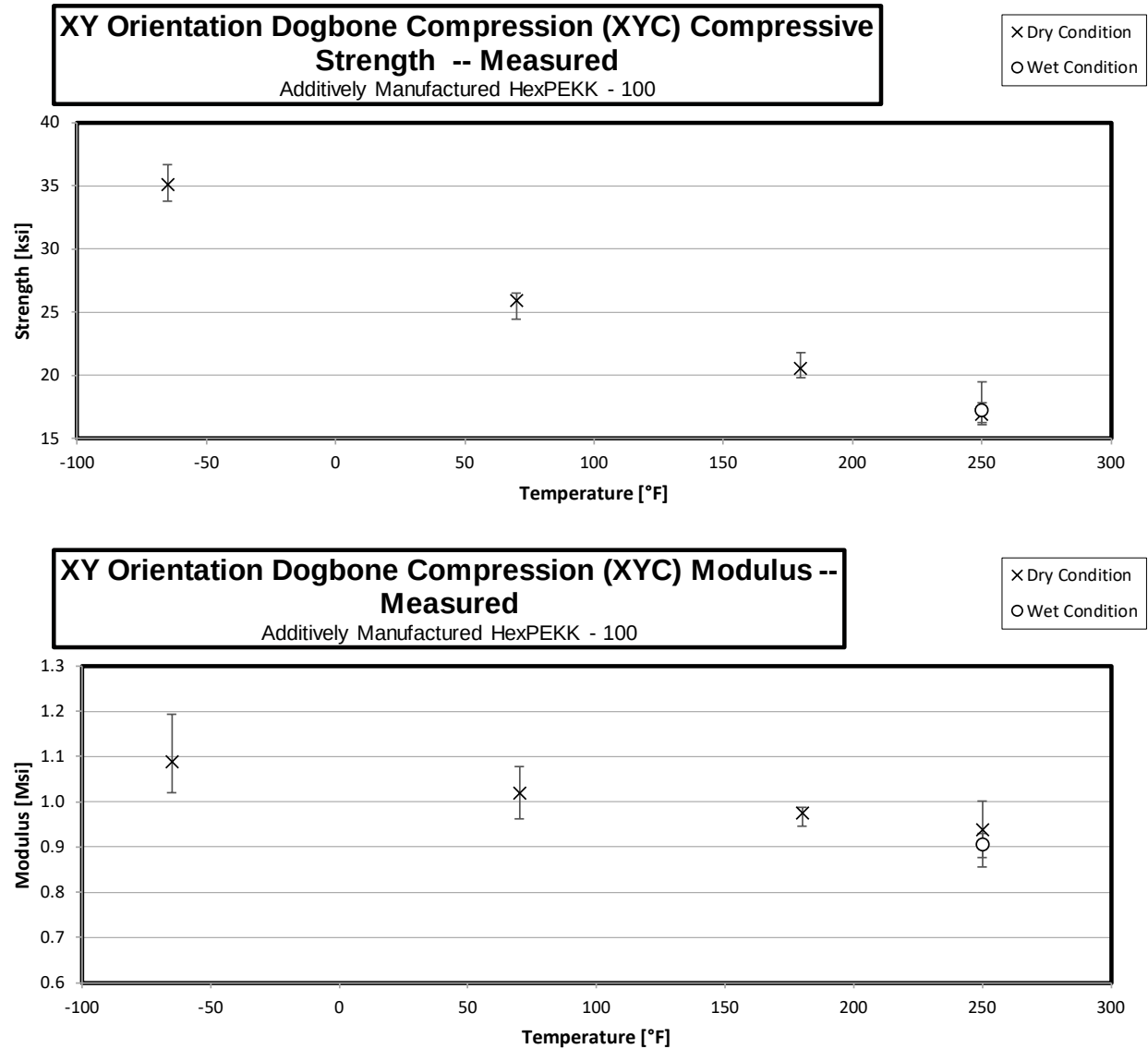
3.5 ZX45 Tension Properties (ZX45T)



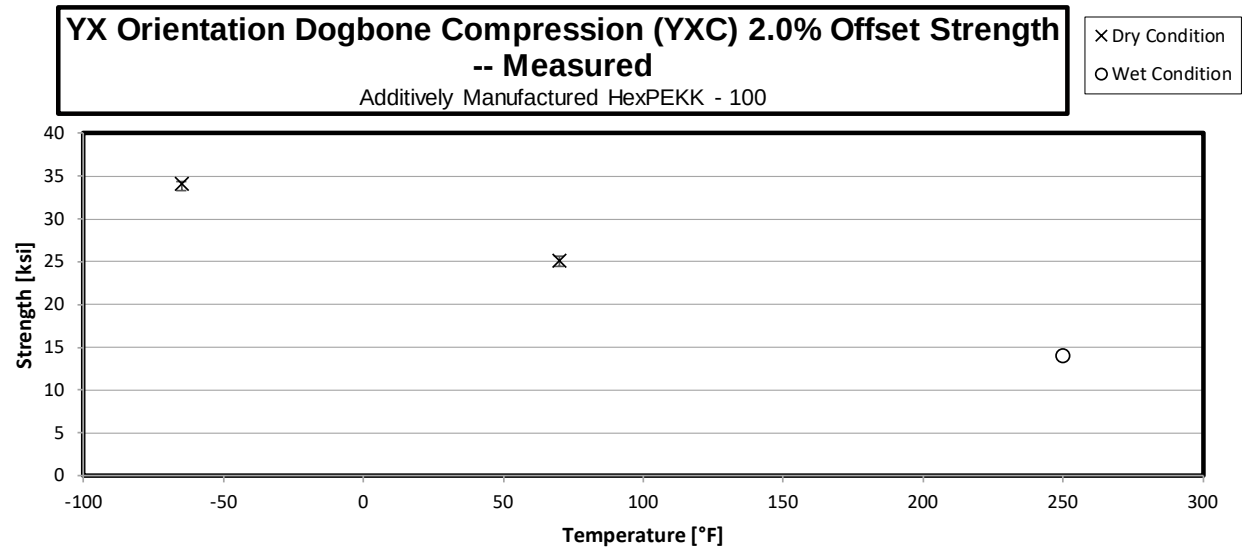


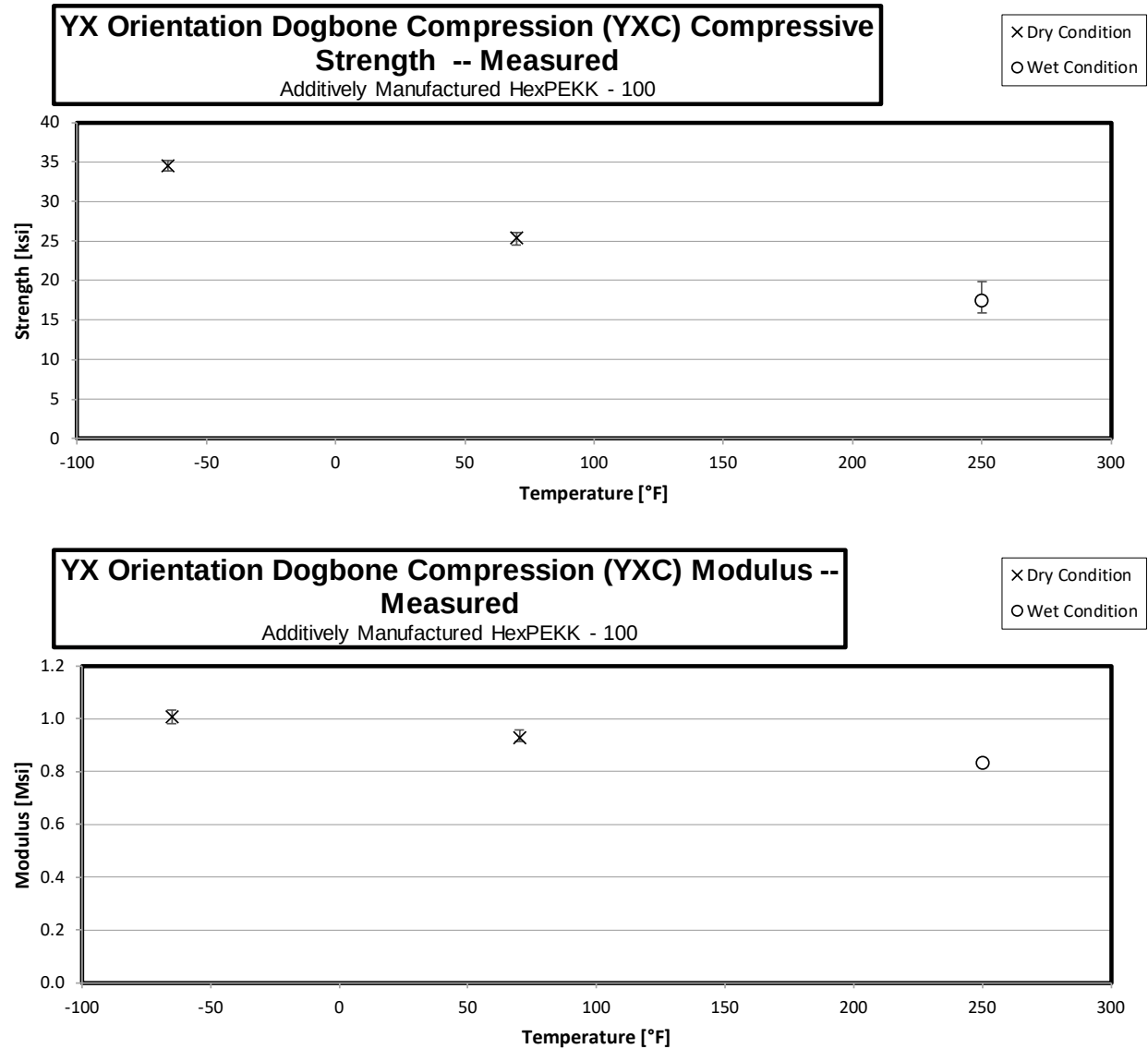
3.6 XY Compression Properties (XYC)



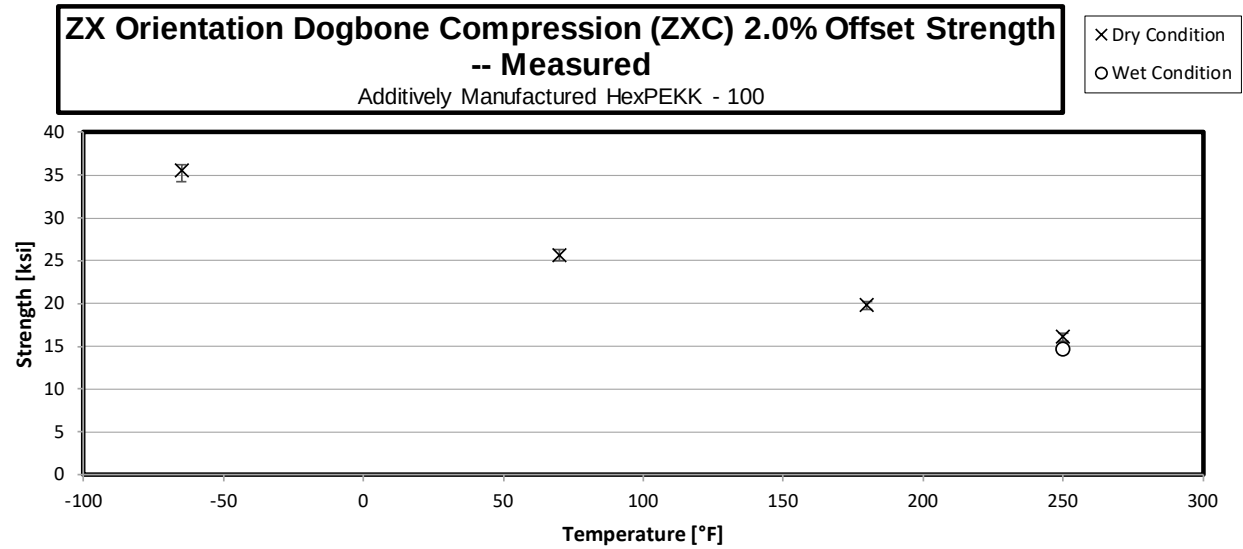


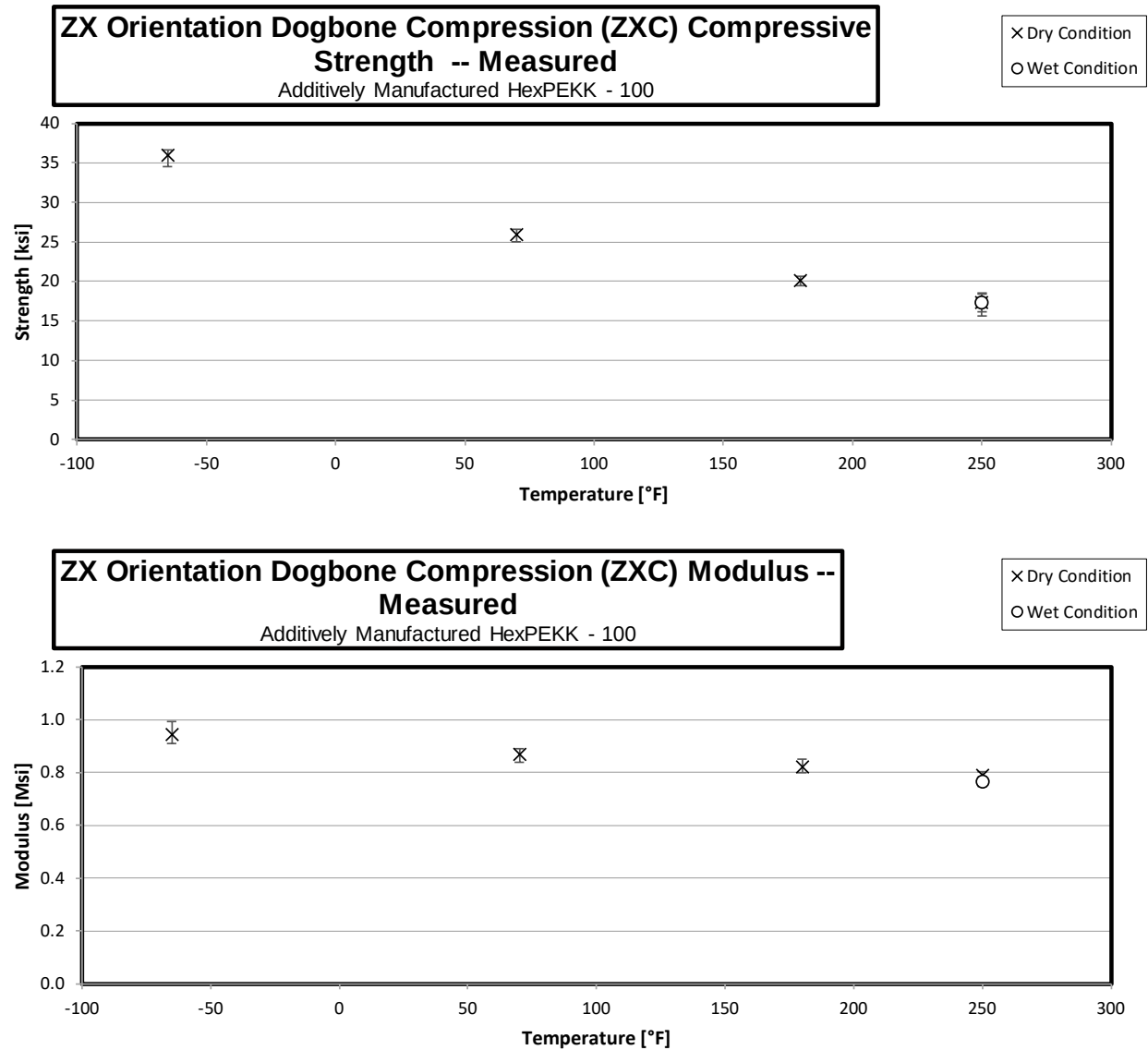
3.7 YX Compression Properties (YXC)



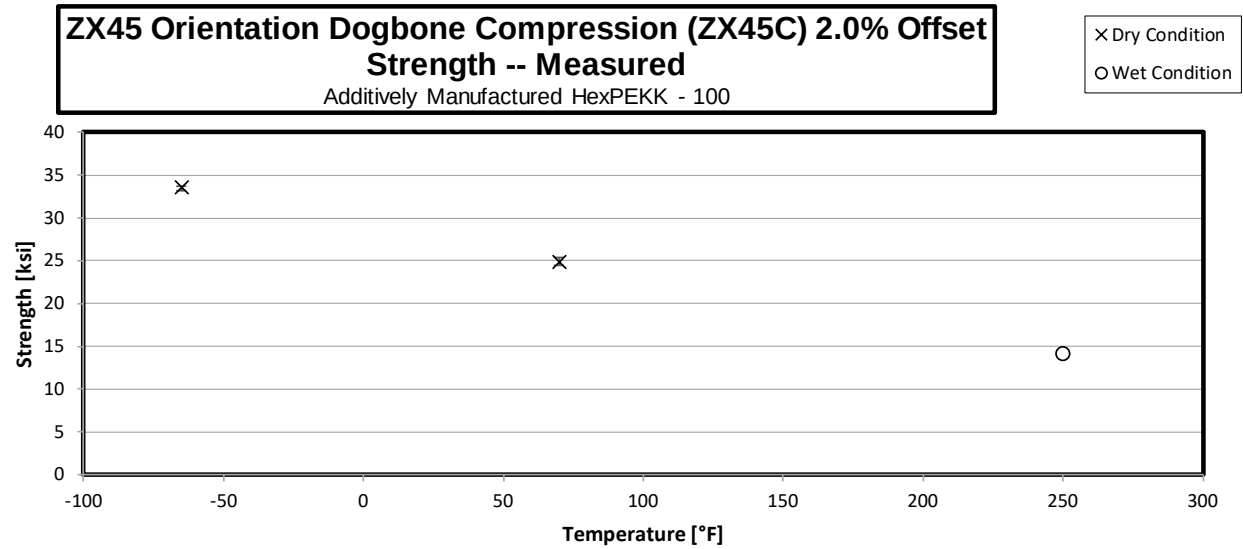


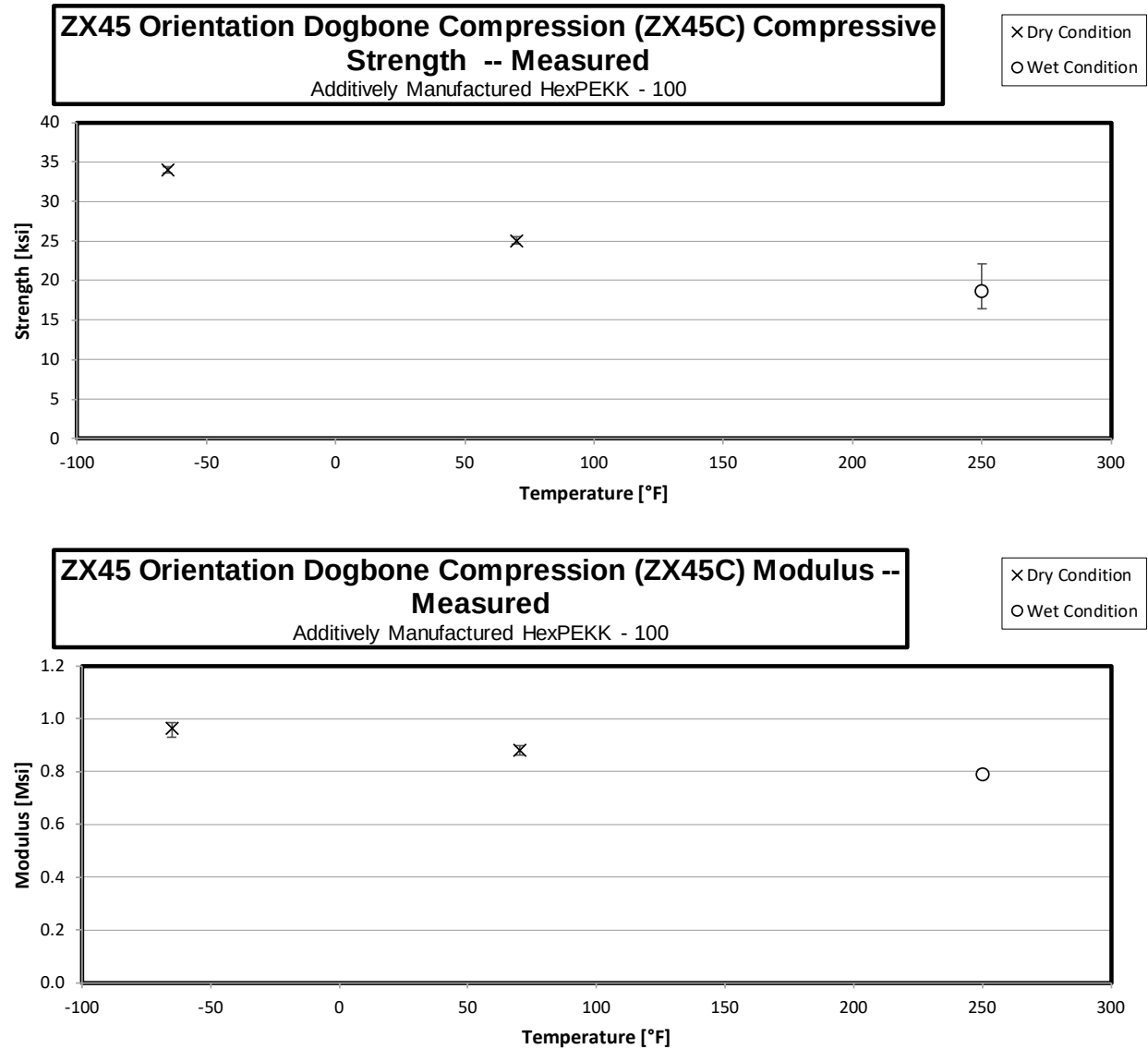
3.8 ZX Compression Properties (ZXC)



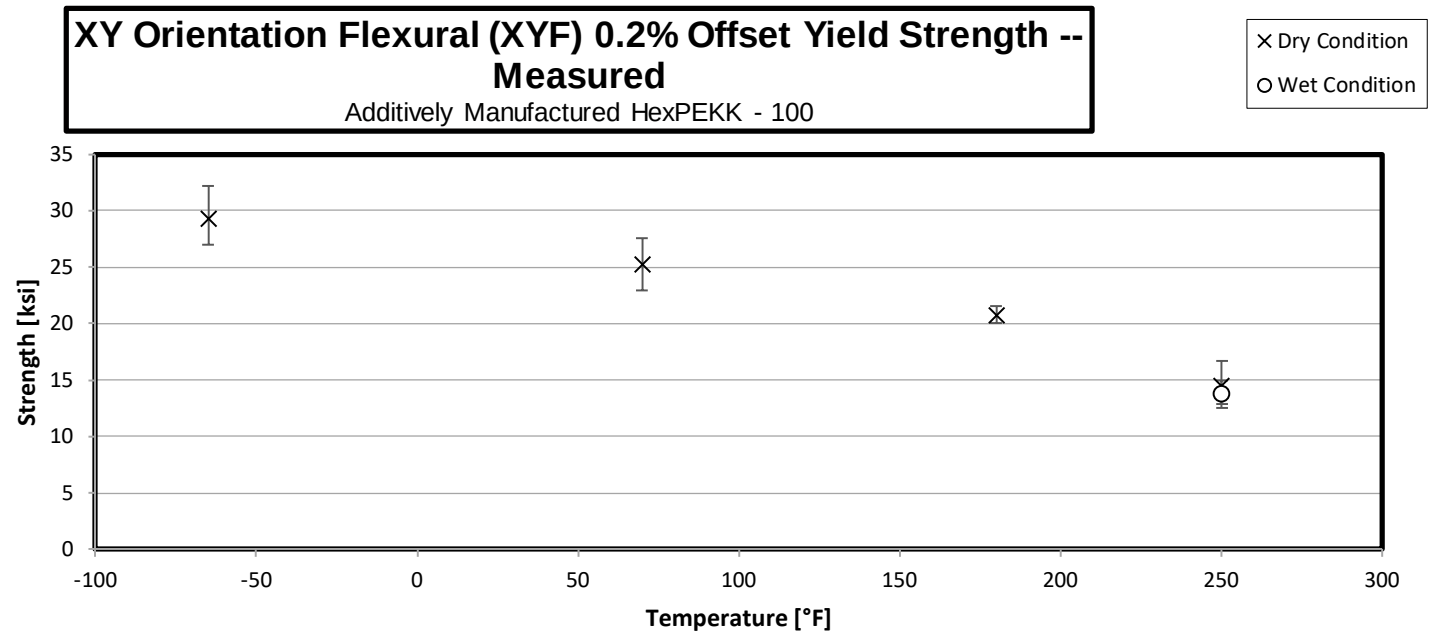


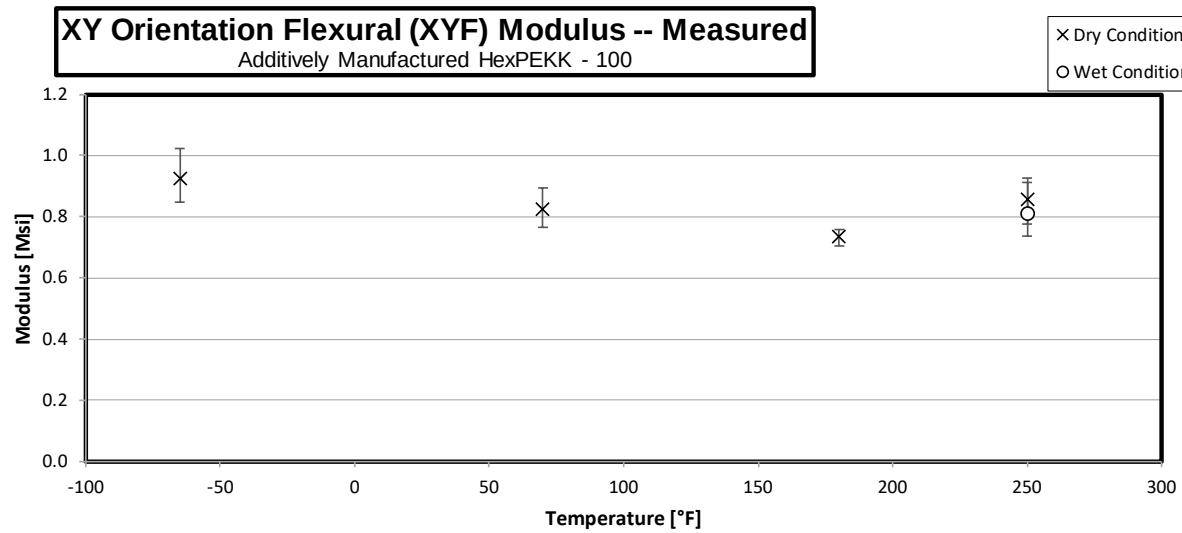
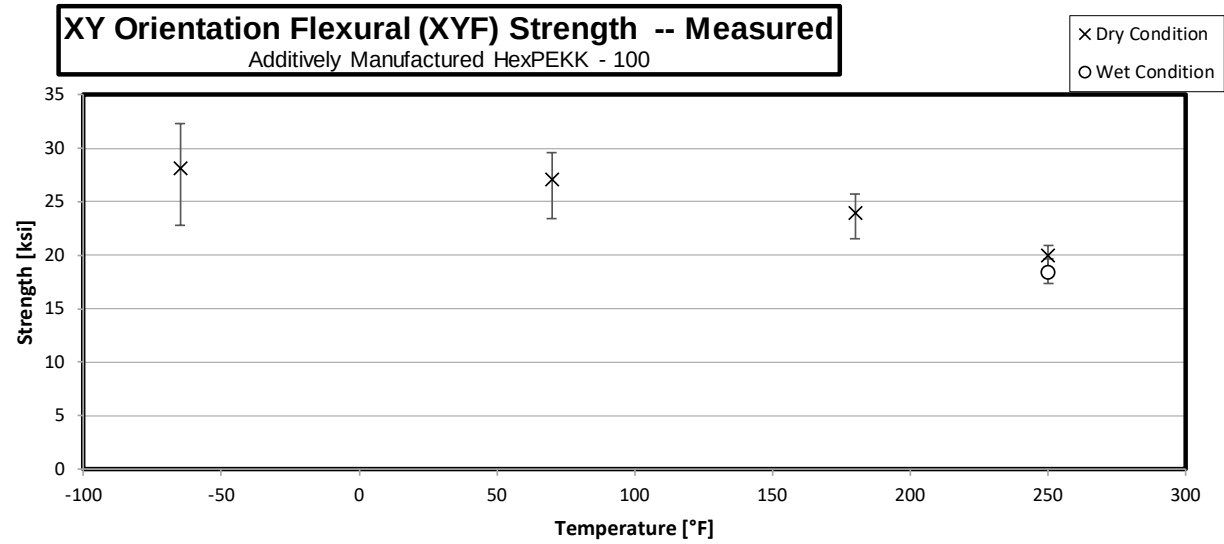
3.9 ZX45 Compression Properties (ZX45C)



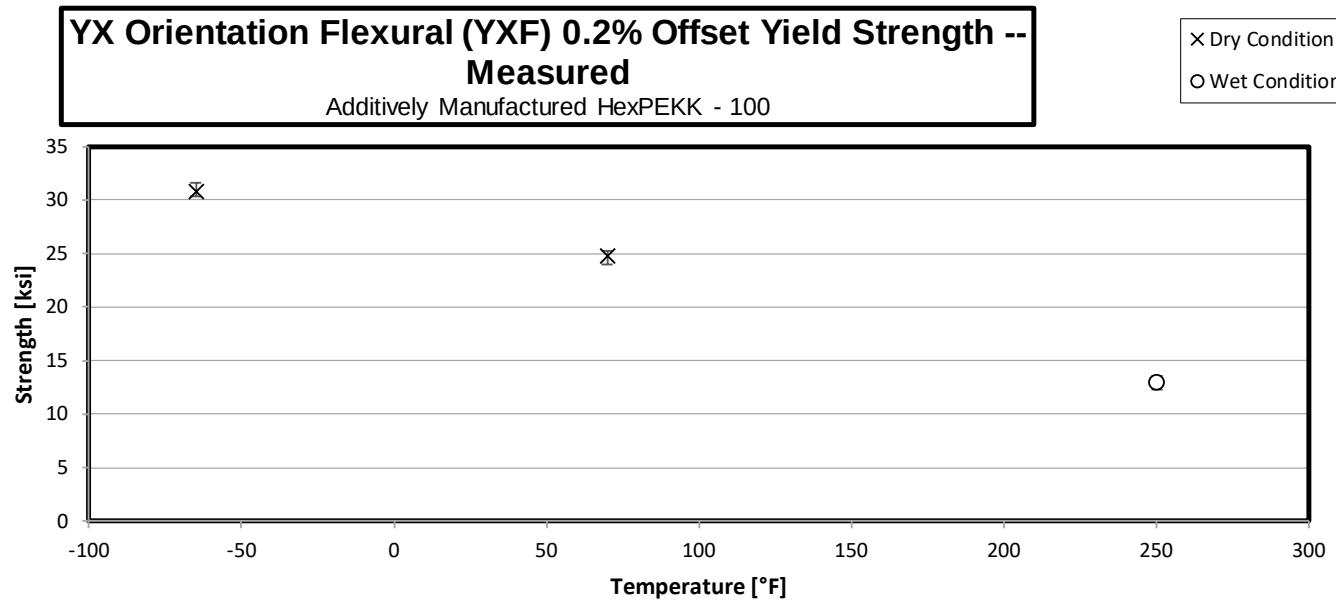


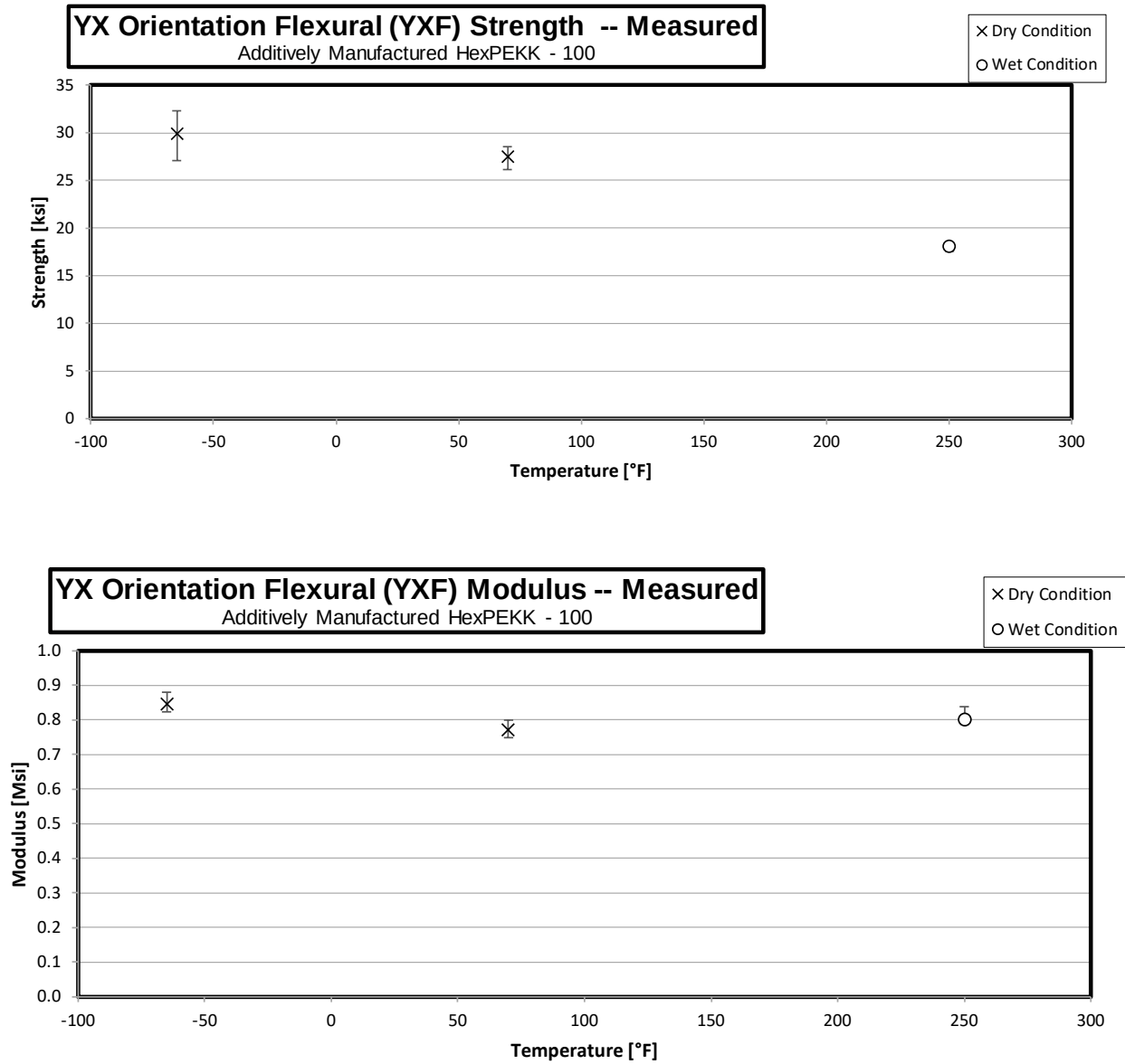
3.10 XY Flex Properties (XYF)



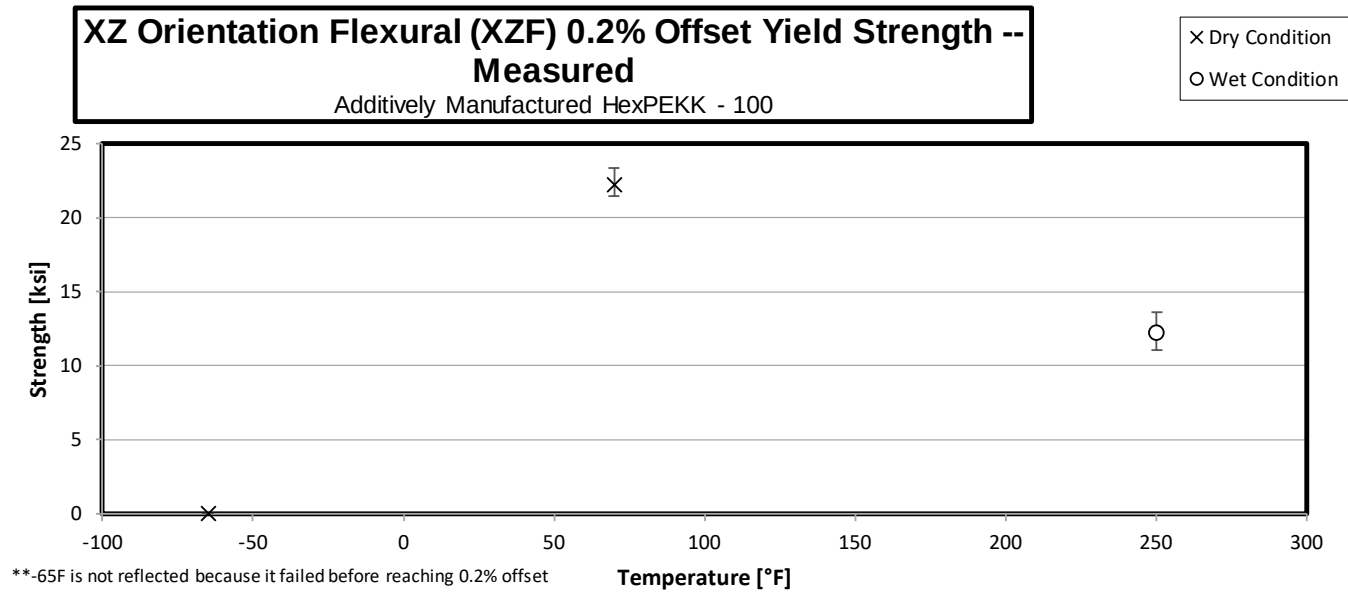


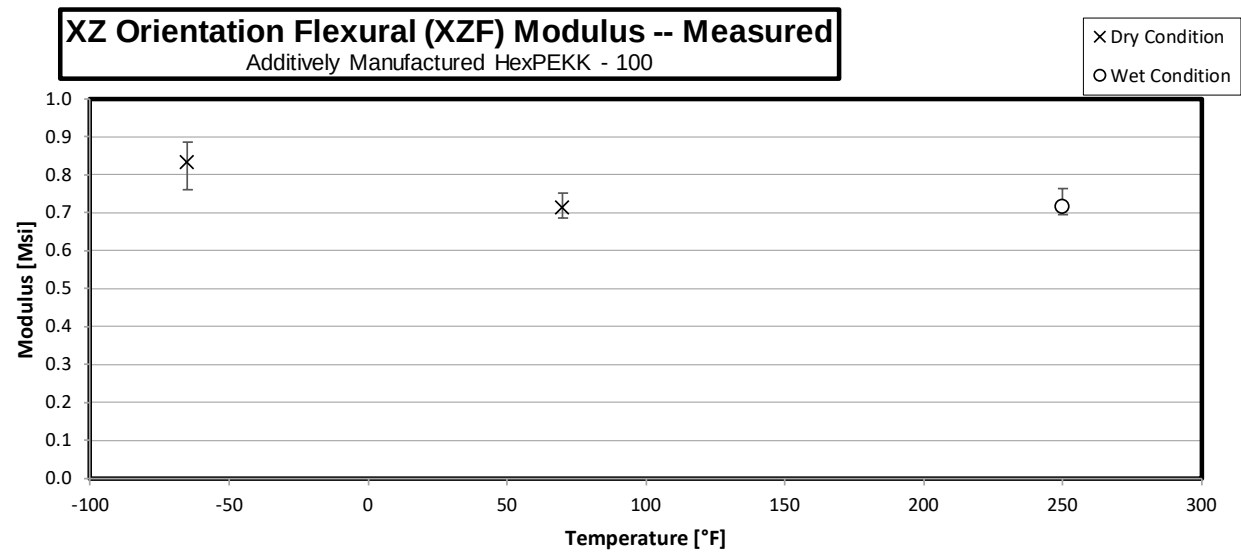
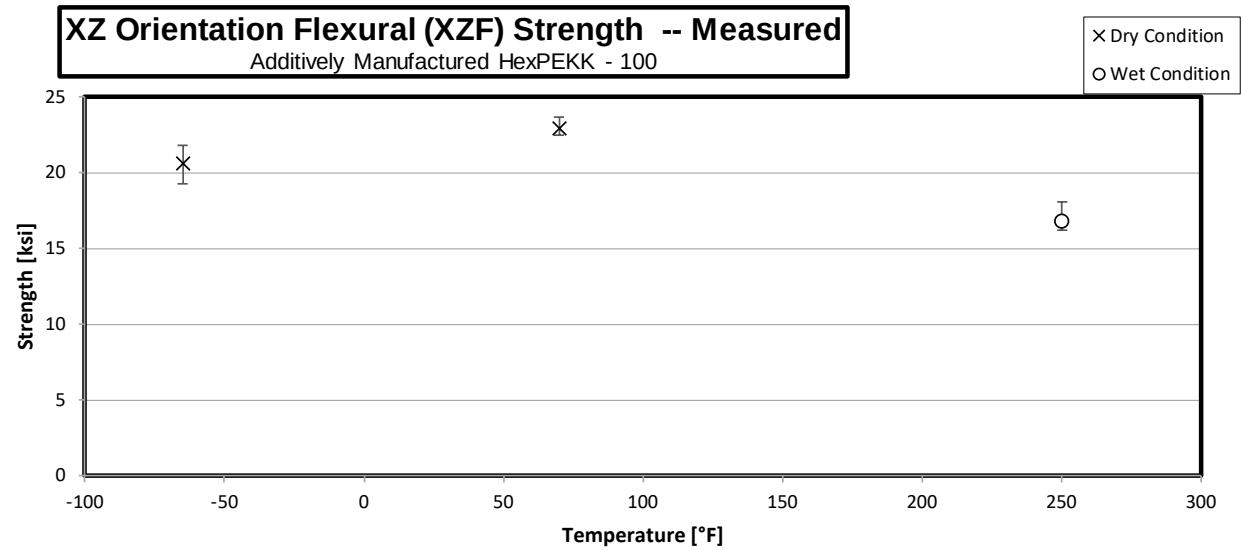
3.11 YX Flex Properties (YXF)



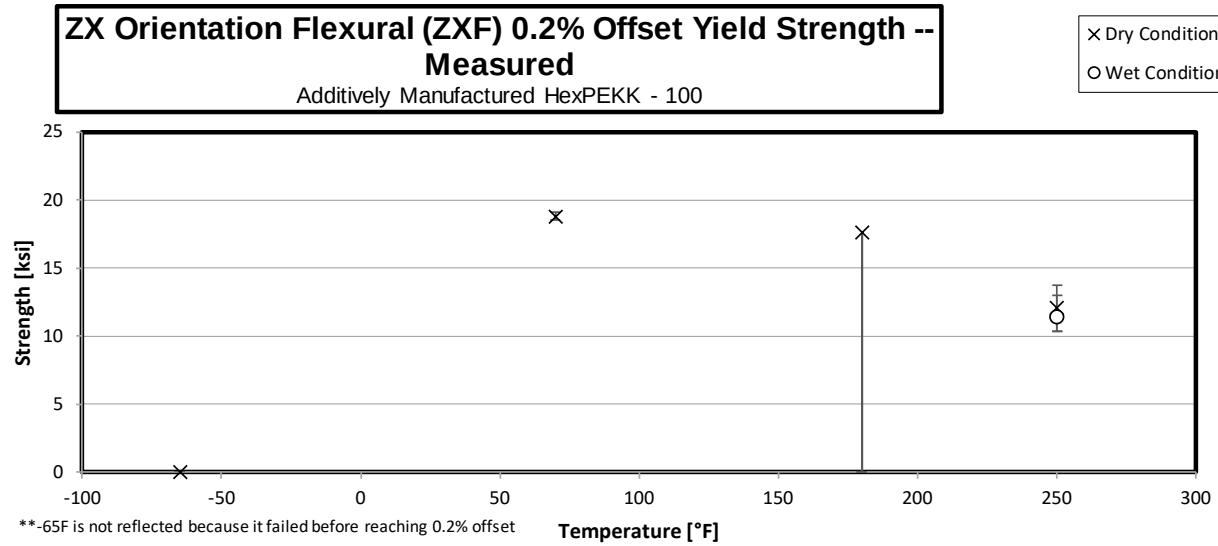


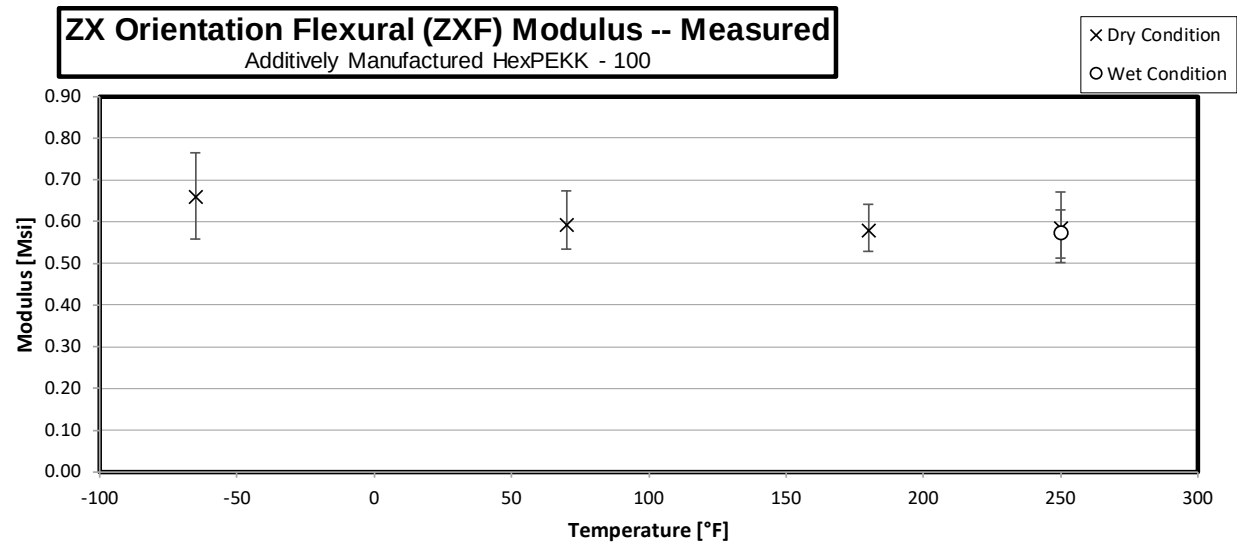
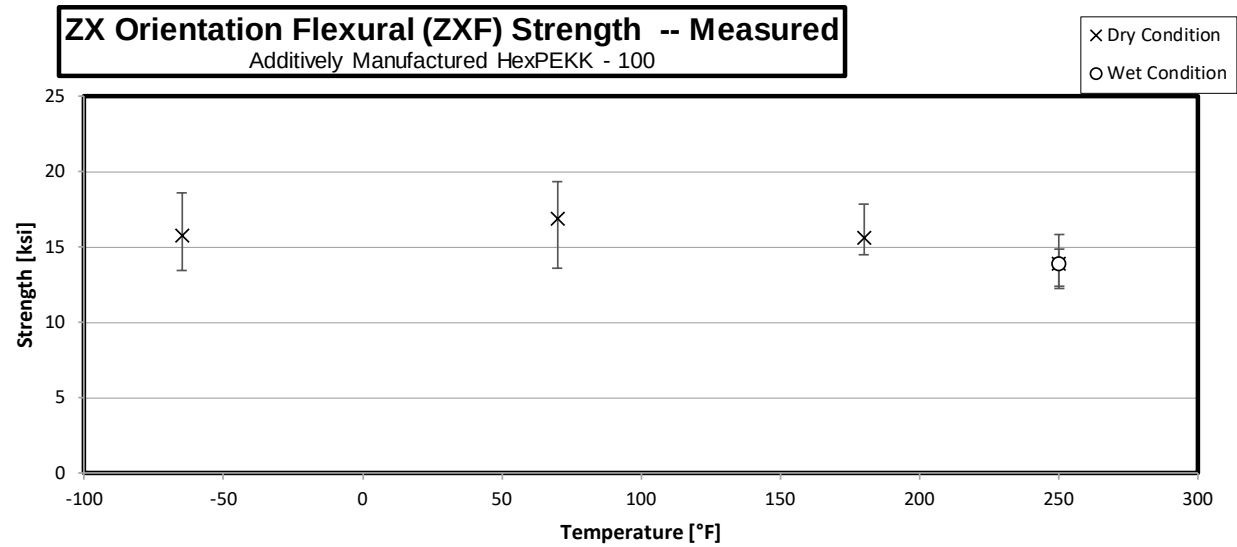
3.12 XZ Flex Properties (XZF)



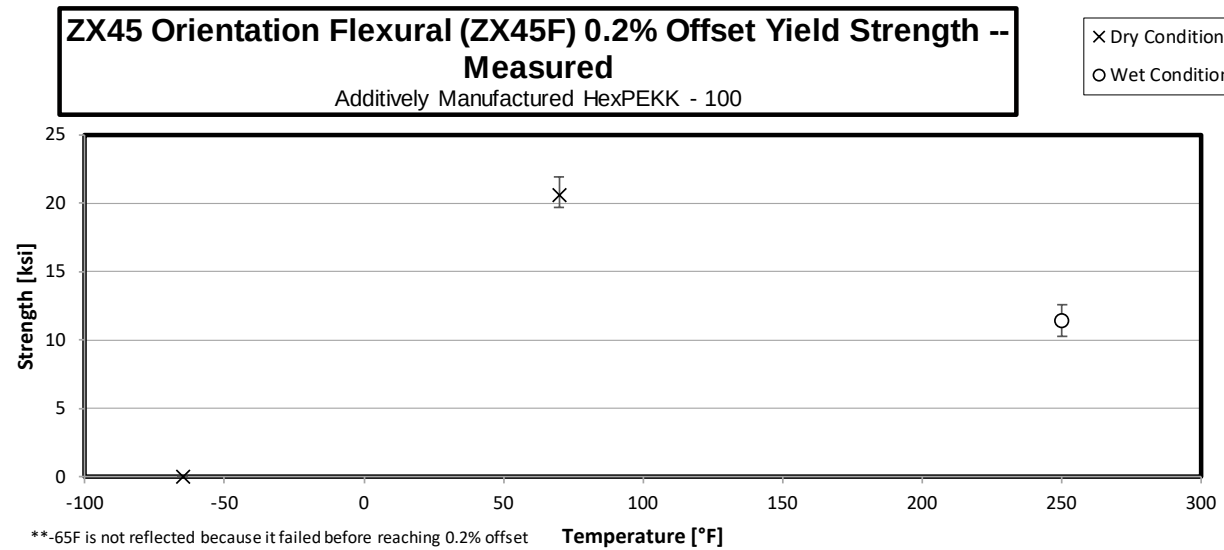


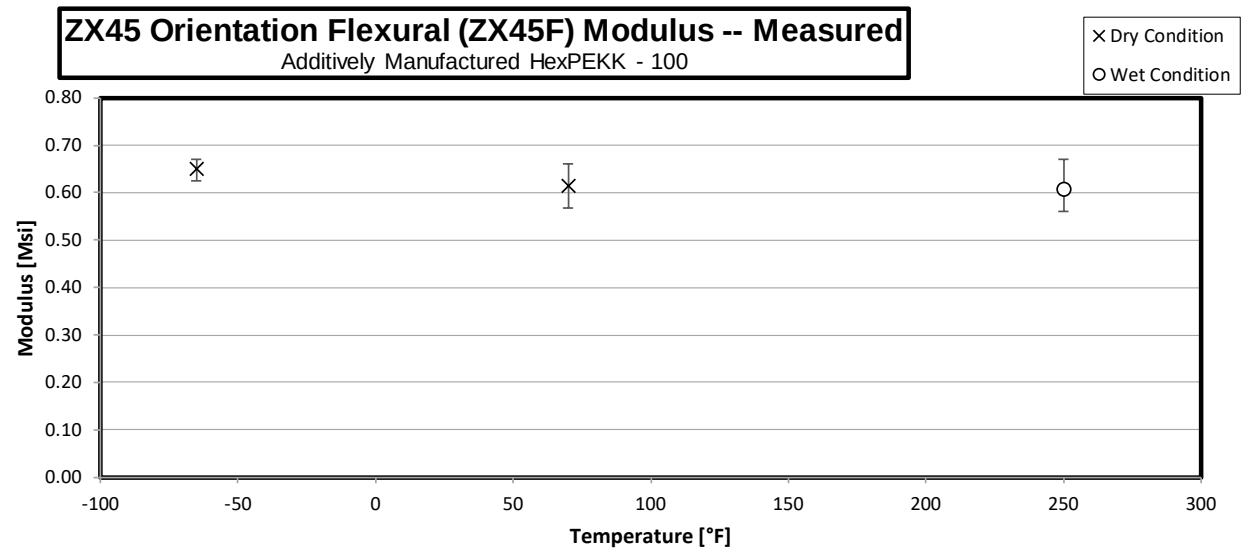
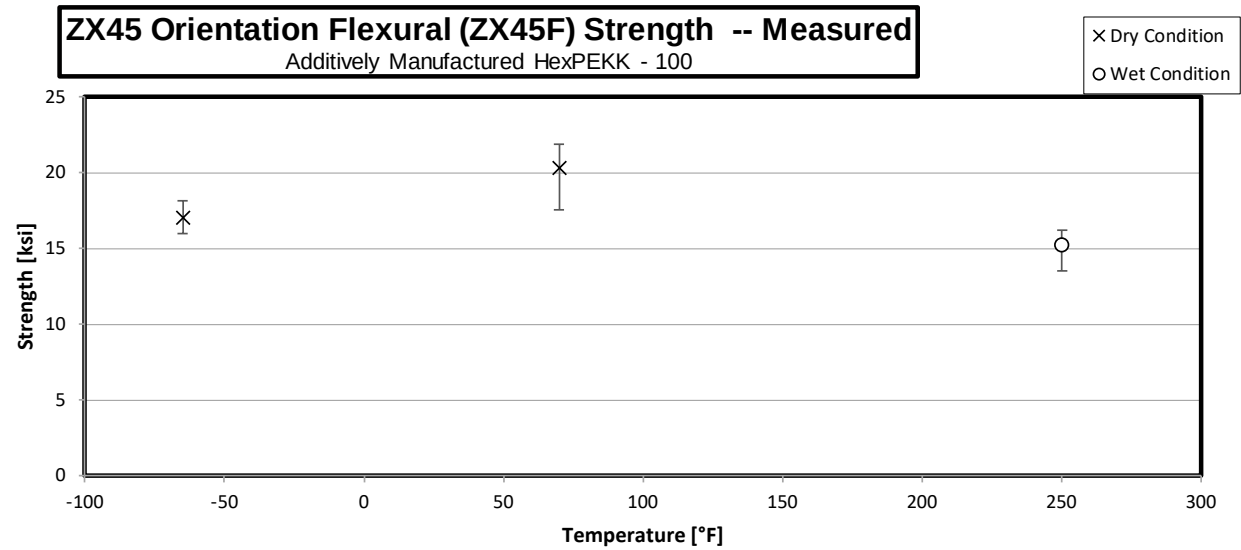
3.13 ZX Flex Properties (ZXF)



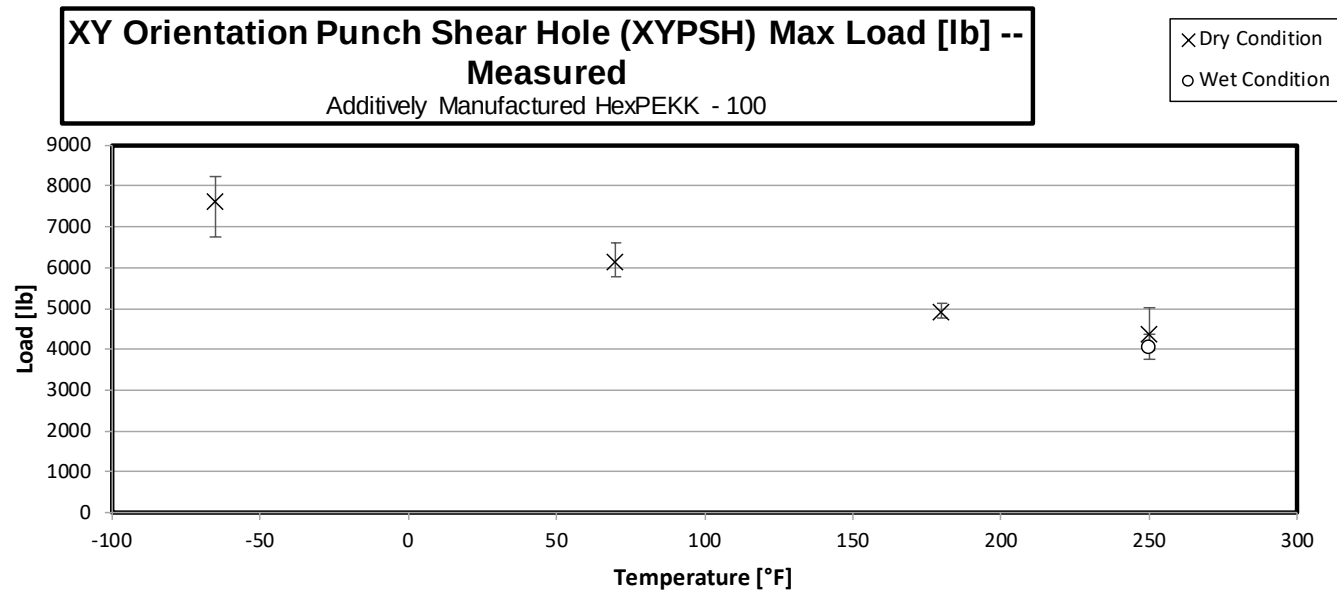


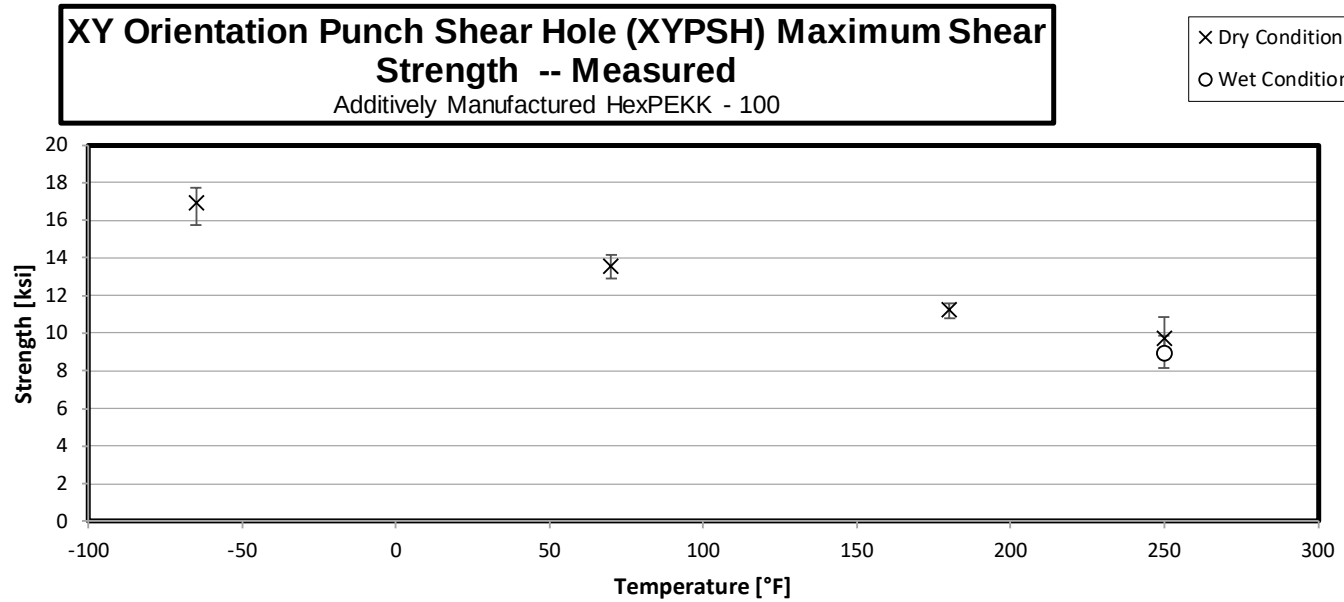
3.14 ZX45 Flex Properties (ZX45F)



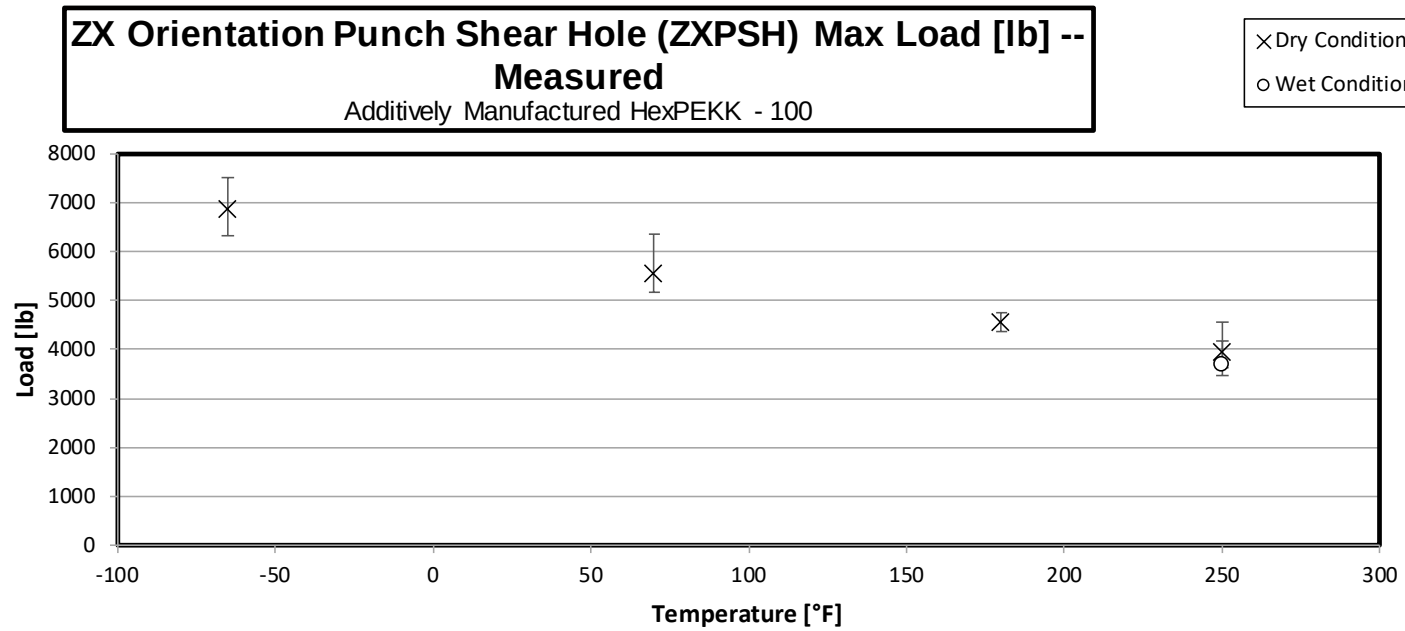


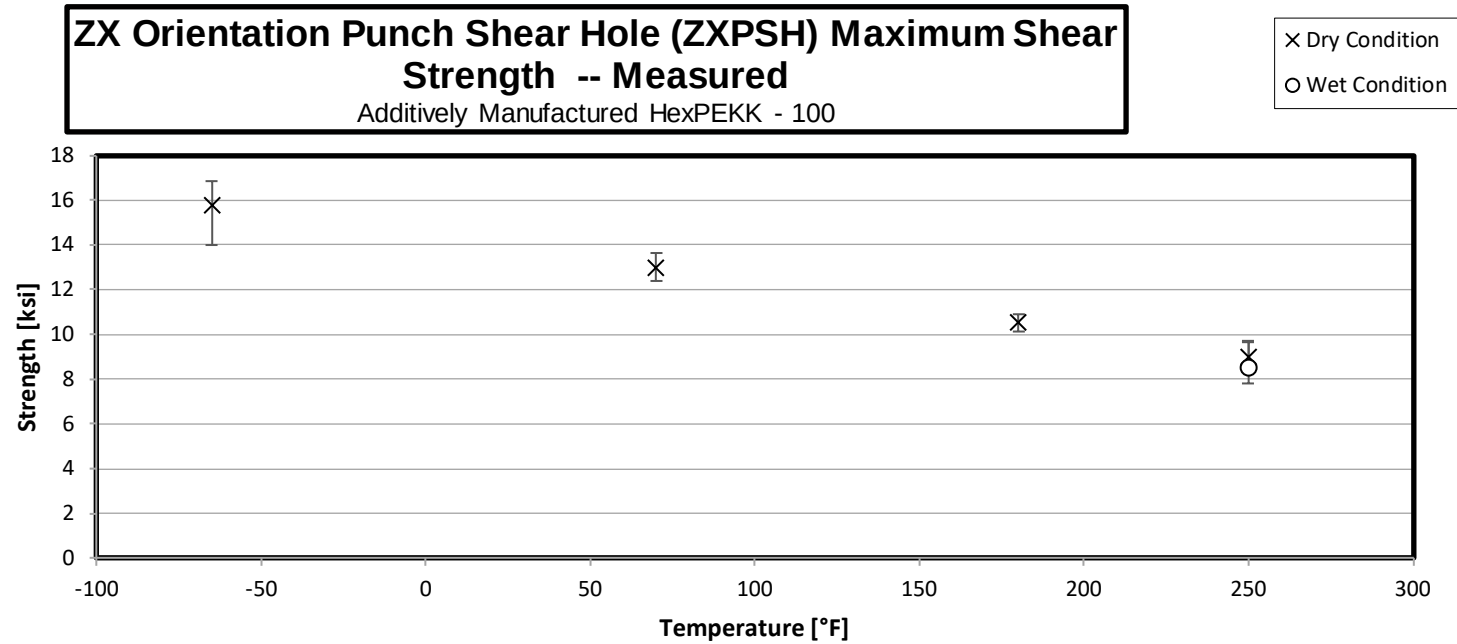
3.15 XY Punch Shear Properties (XYPSH)



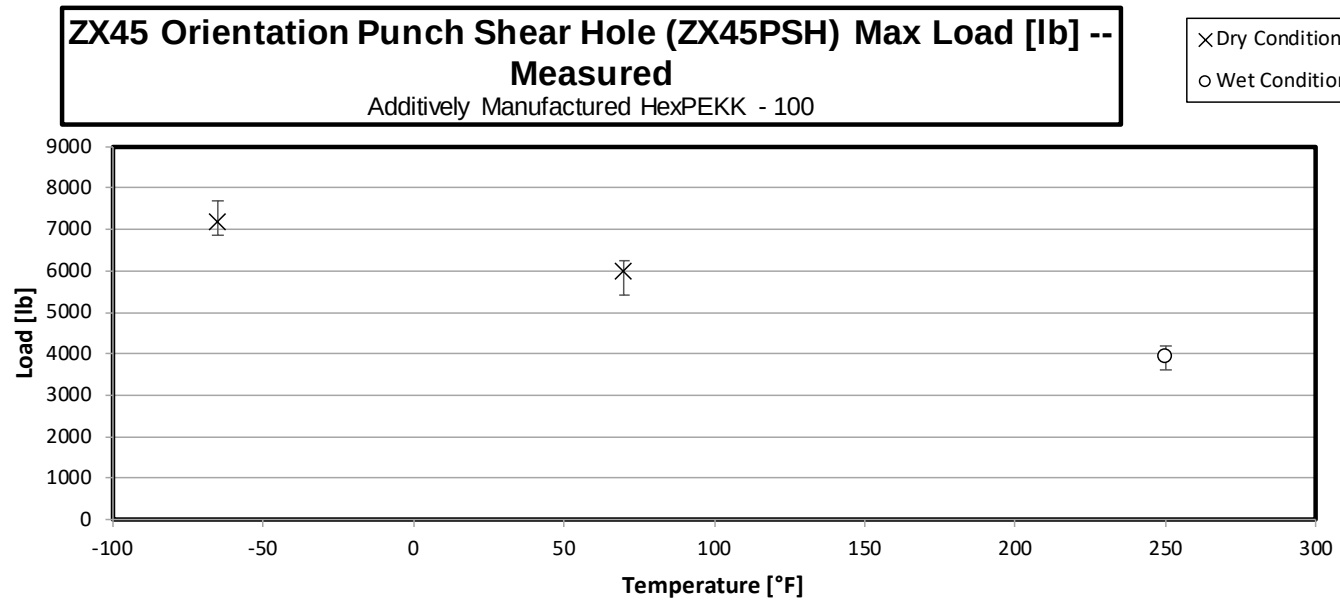


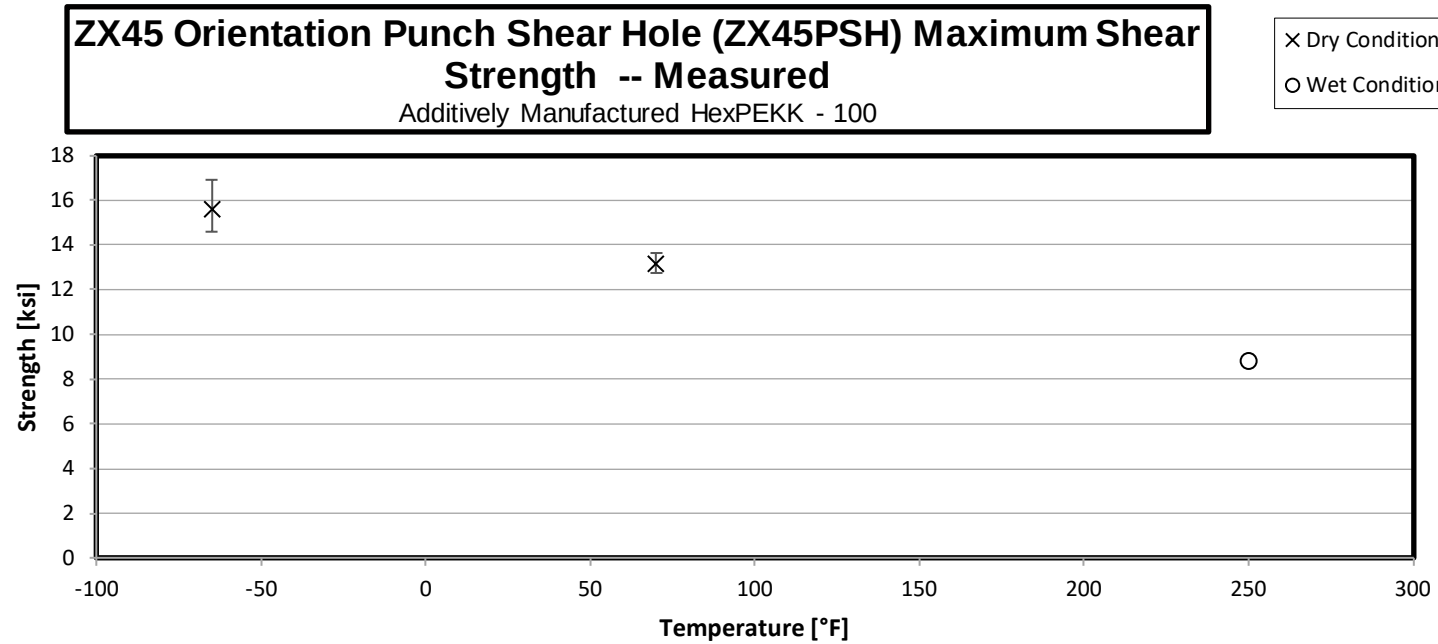
3.16 ZX Punch Shear Properties (ZXPSH)



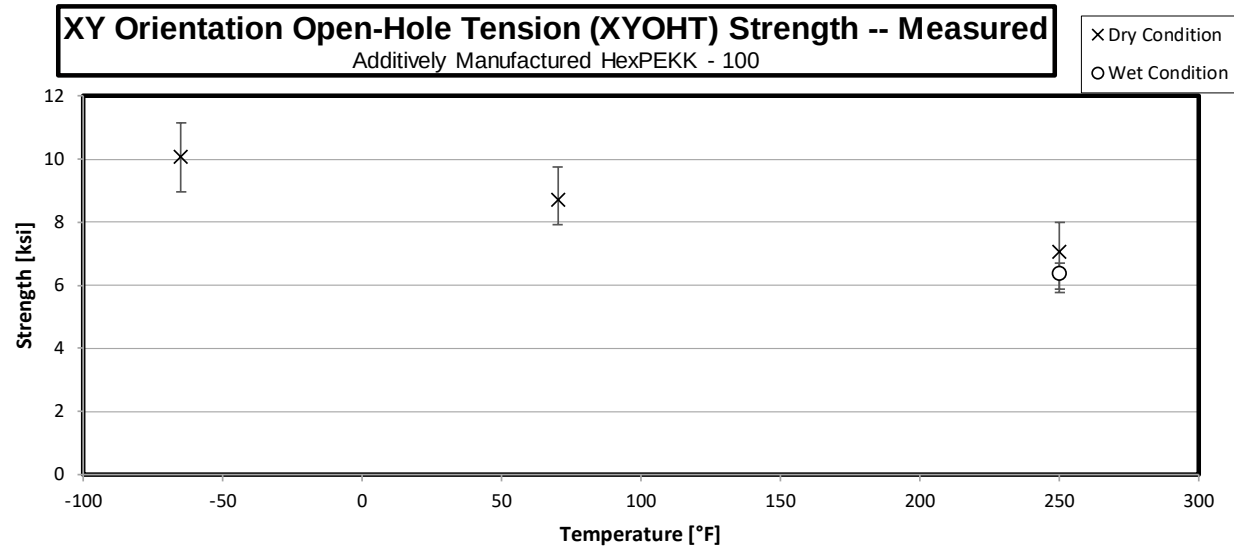


3.17 ZX45 Punch Shear Properties (ZX45PSH)

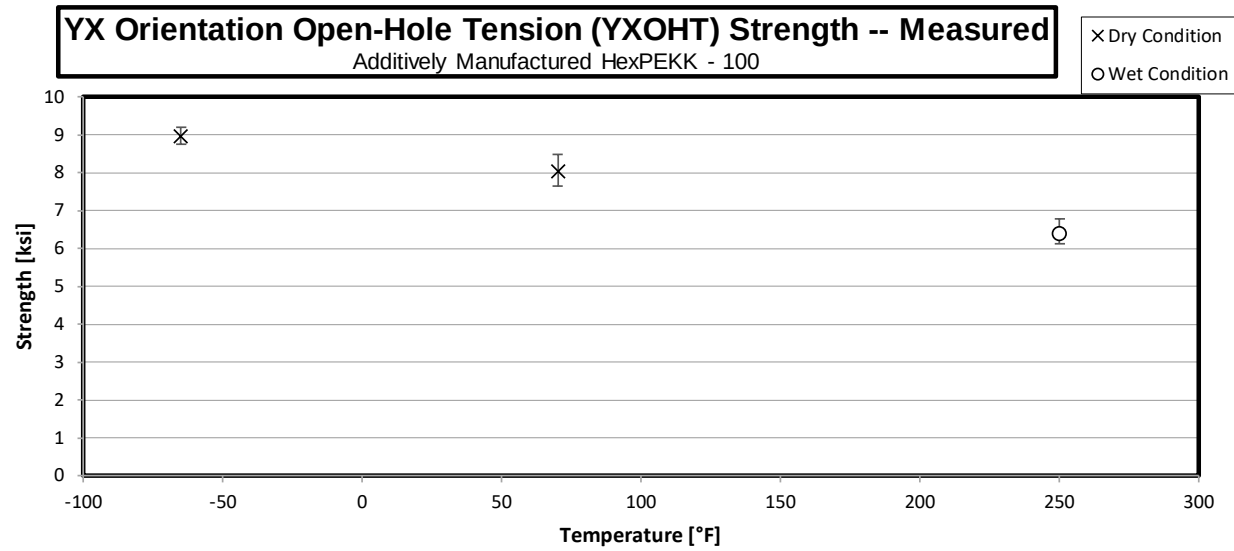




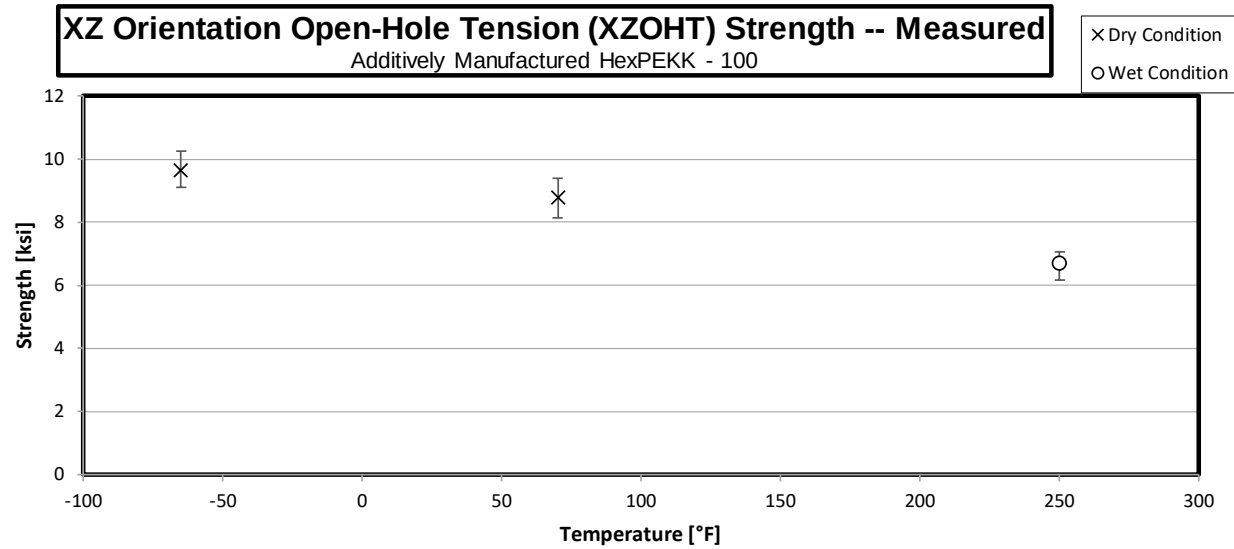
3.18 XY Open-Hole Tension Properties (XYOHT)



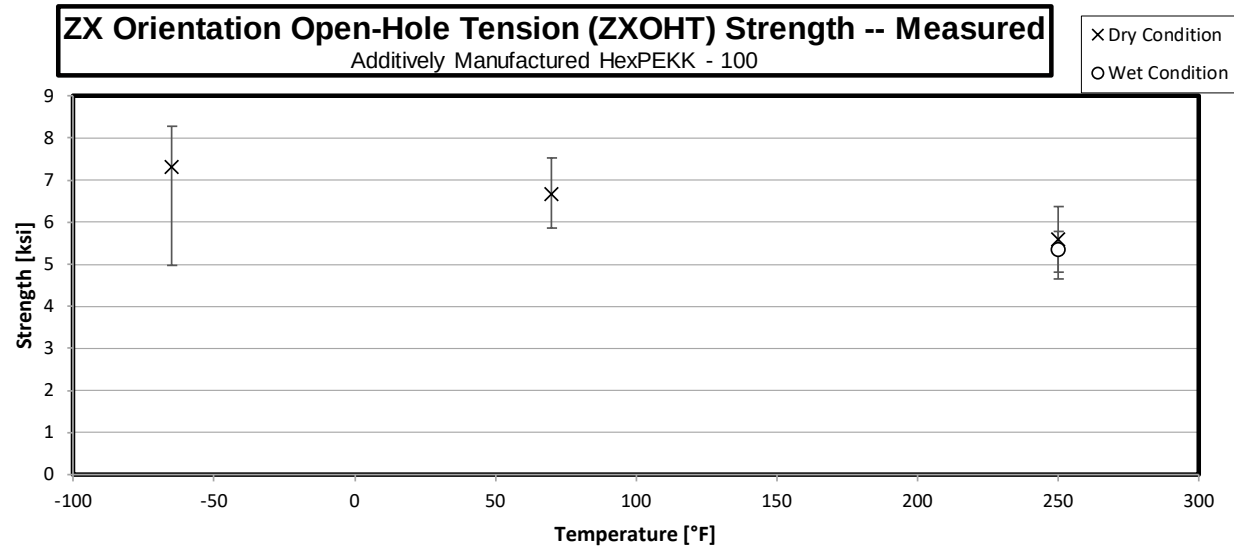
3.19 YX Open-Hole Tension Properties (YXOHT)



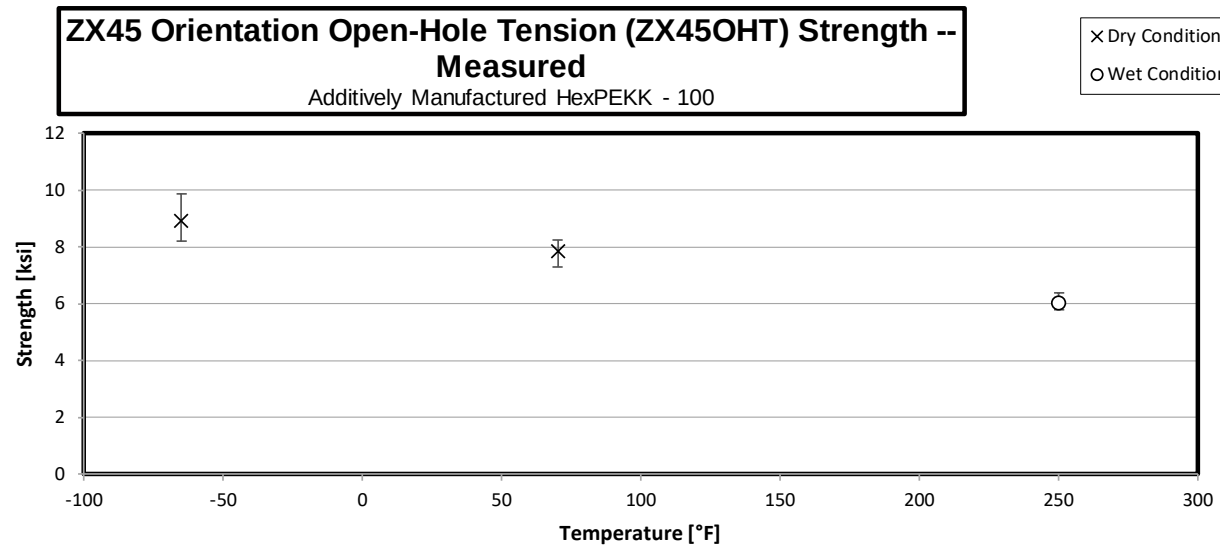
3.20 XZ Open-Hole Tension Properties (XZOHT)



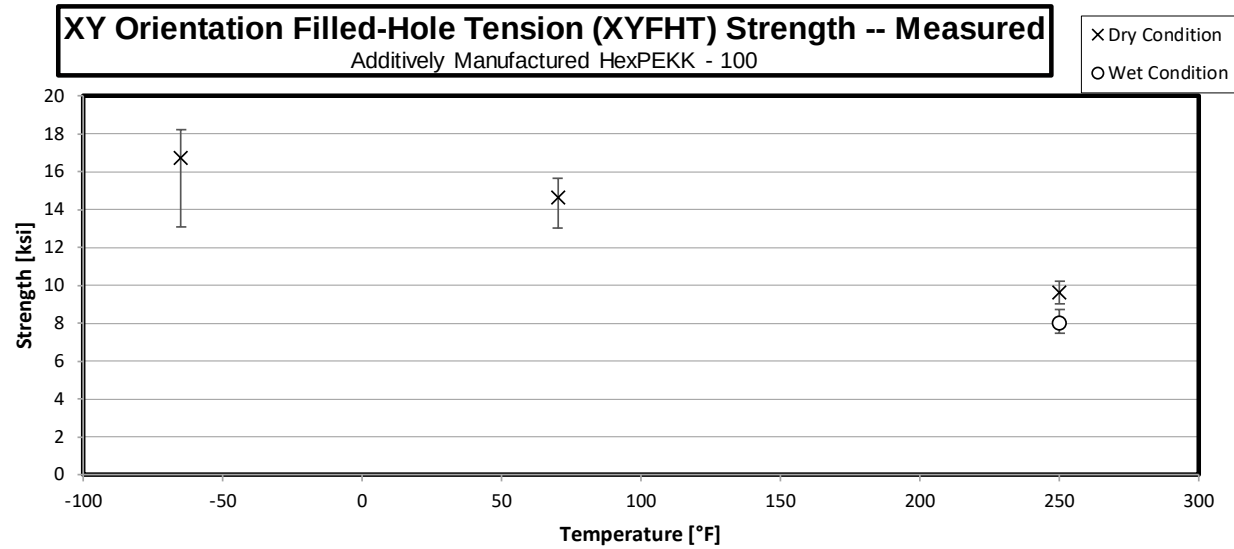
3.21 ZX Open-Hole Tension Properties (ZXOHT)



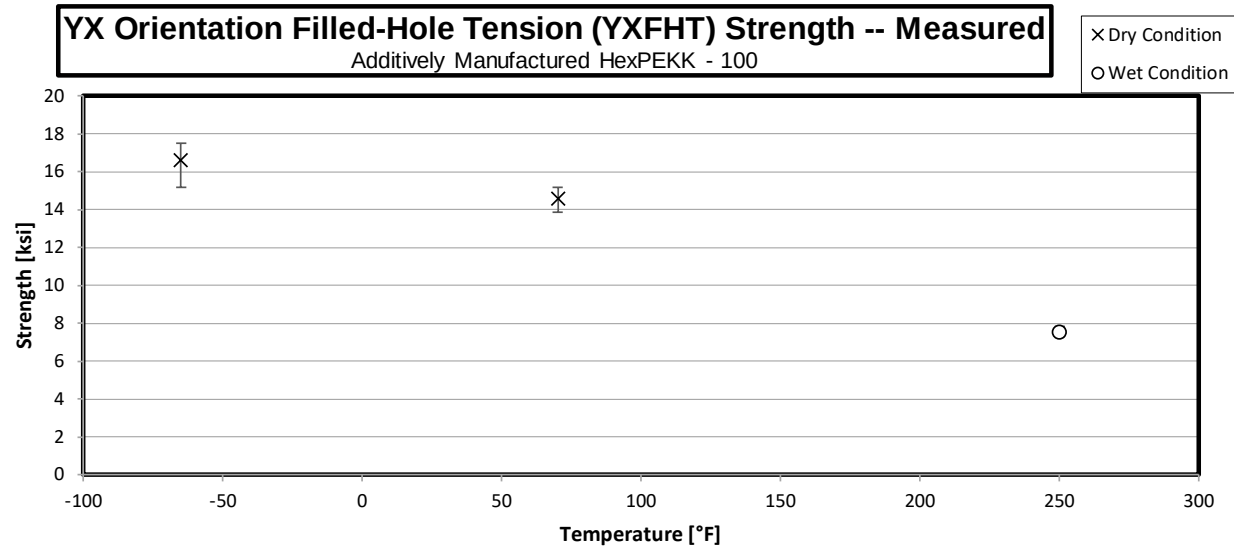
3.22 ZX45 Open-Hole Tension Properties (ZX45OHT)



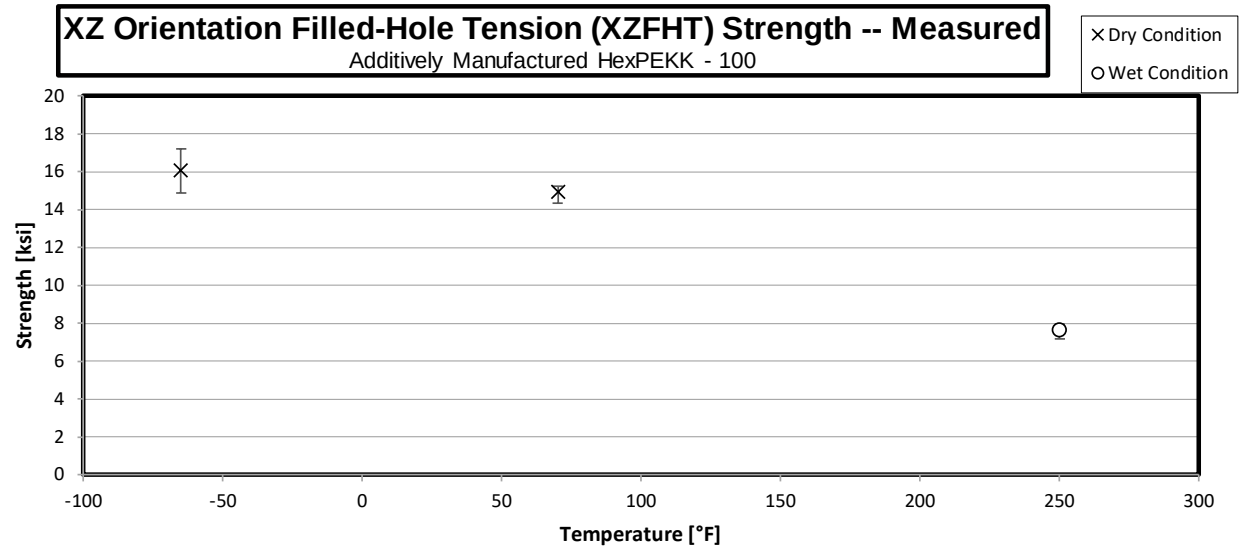
3.23 XY Filled-Hole Tension Properties (XYFHT)



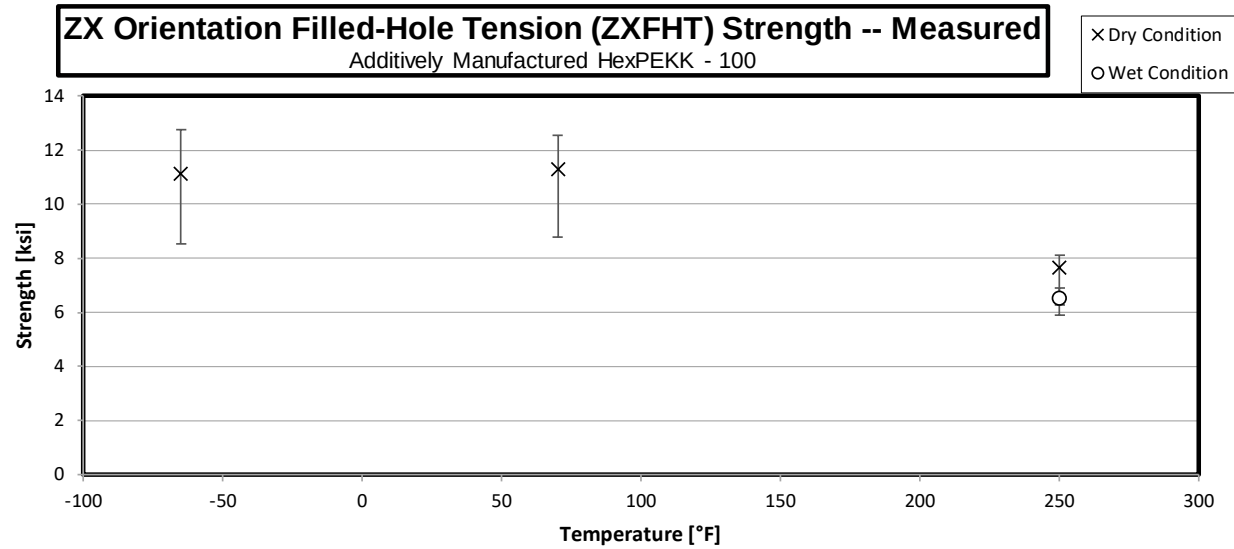
3.24 YX Filled-Hole Tension Properties (YXFHT)



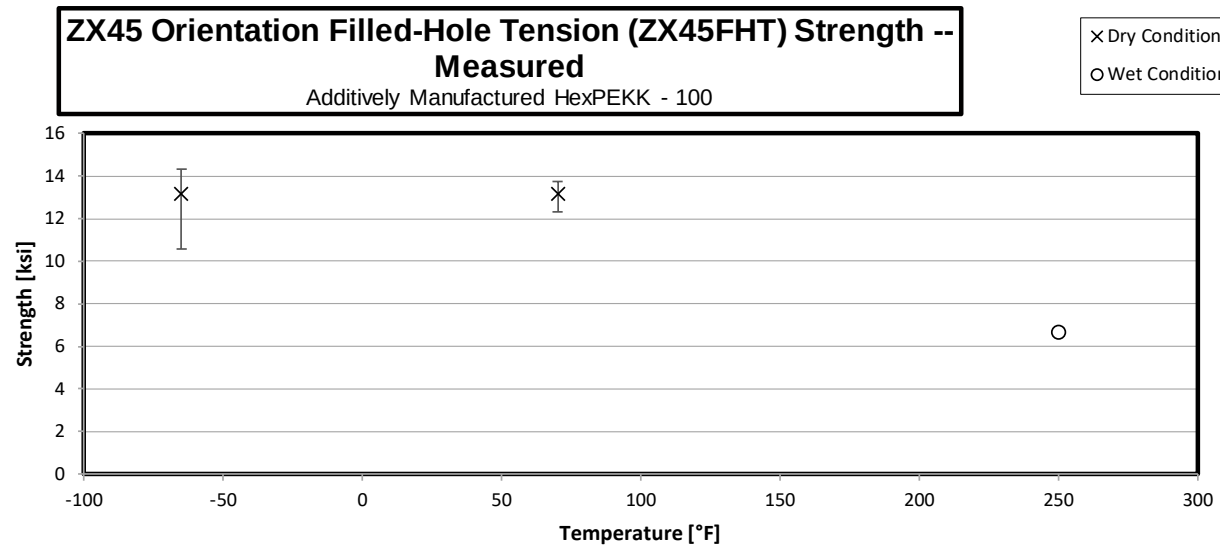
3.25 XZ Filled-Hole Tension Properties (XZFHT)



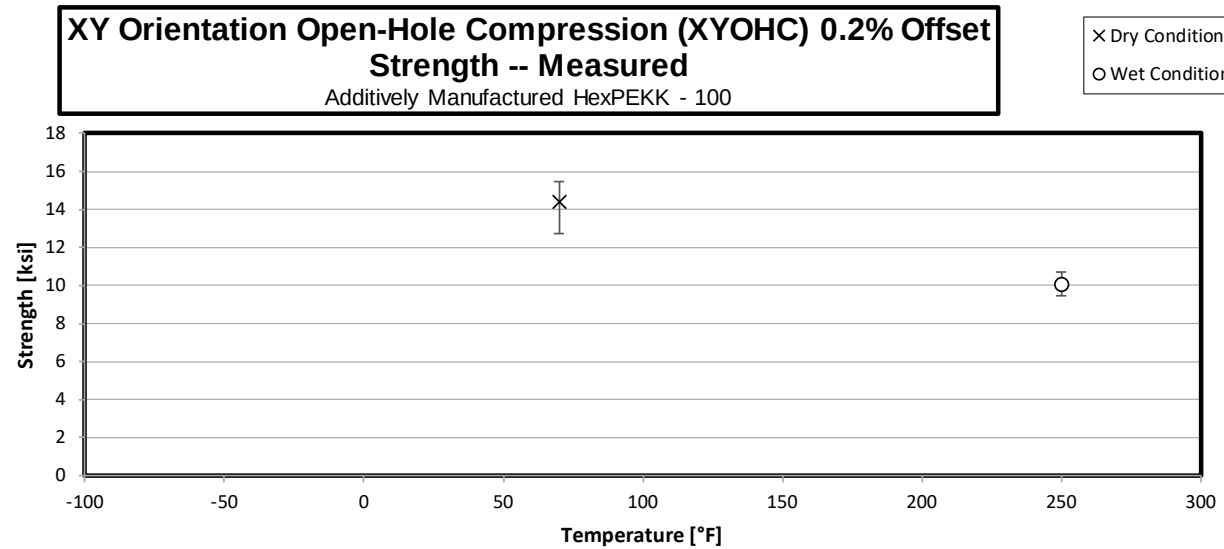
3.26 ZX Filled-Hole Tension Properties (ZXFHT)

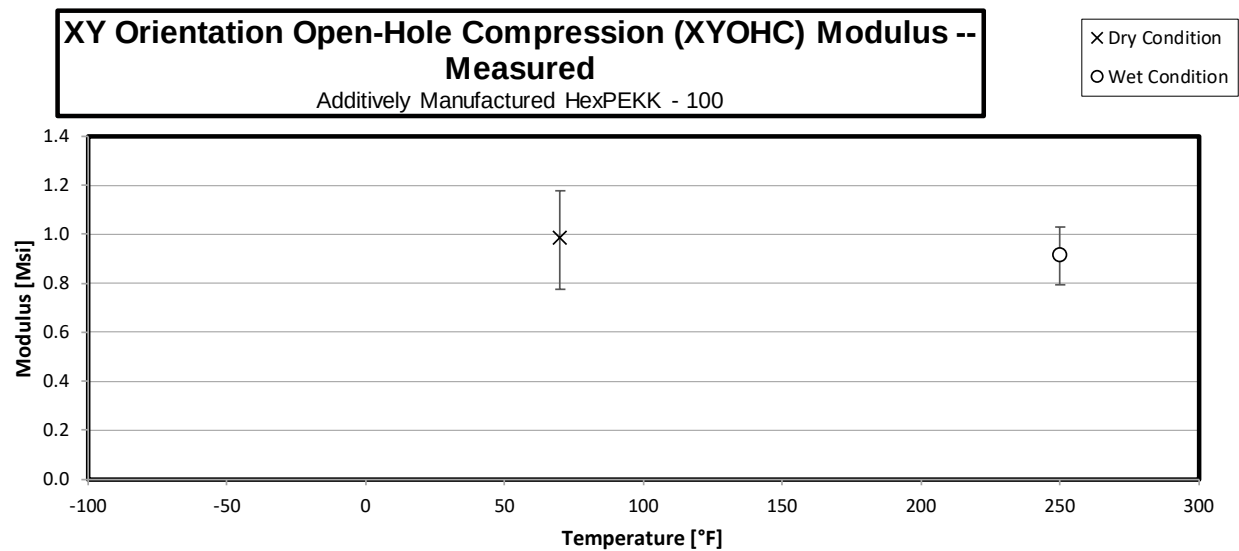
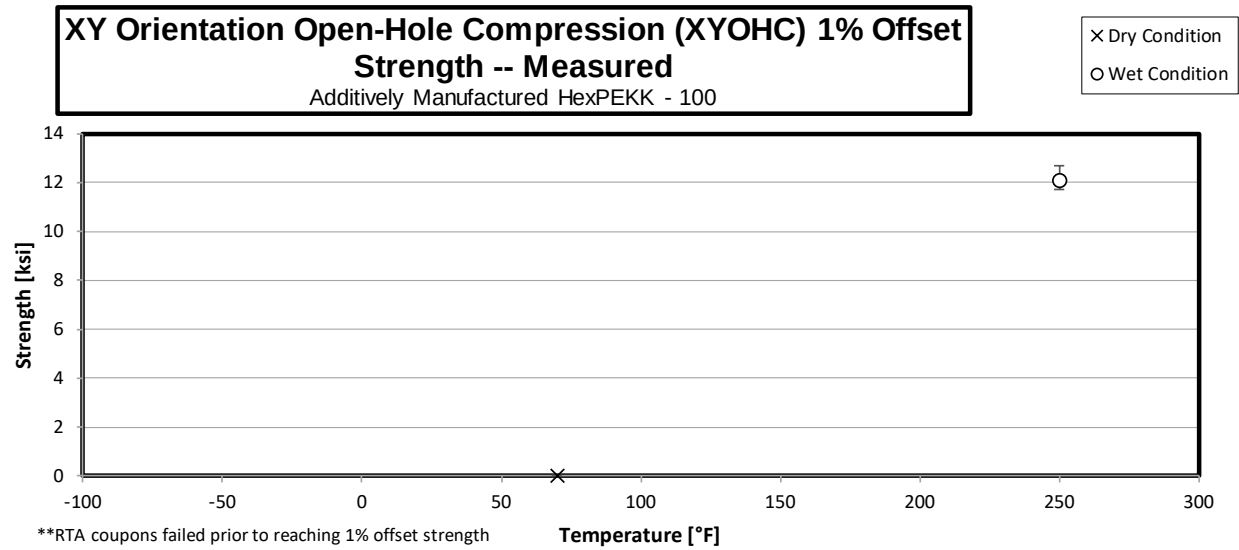


3.27 ZX45 Filled-Hole Tension Properties (ZX45FHT)

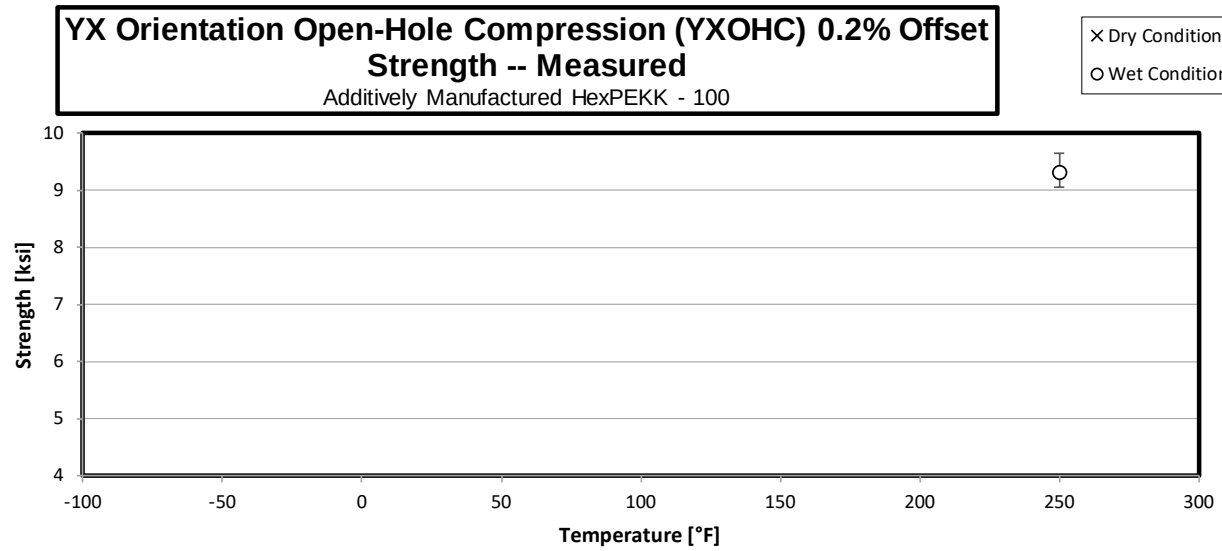


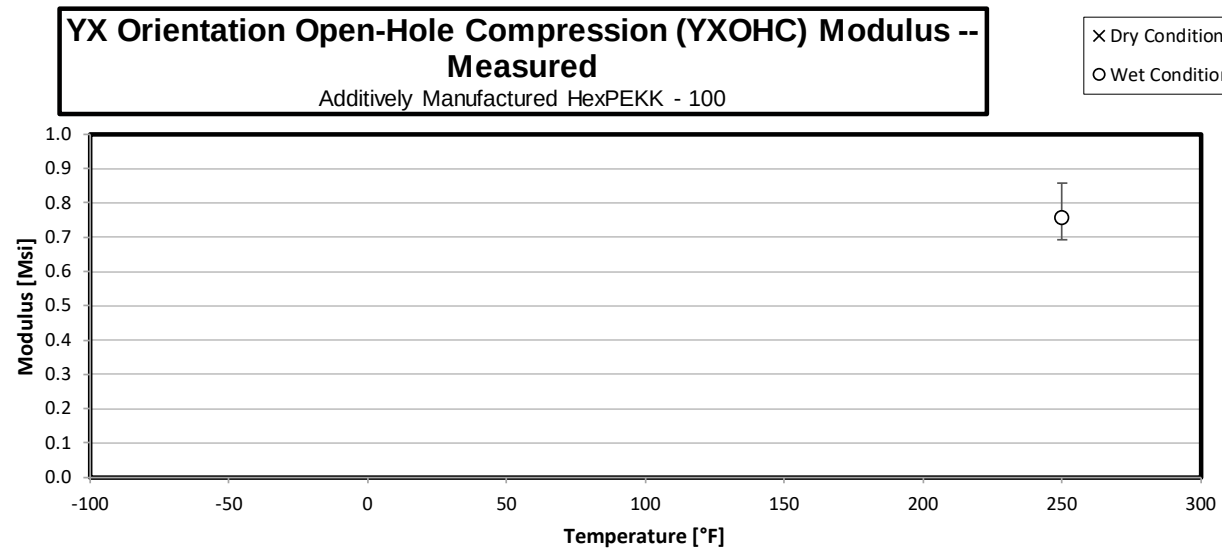
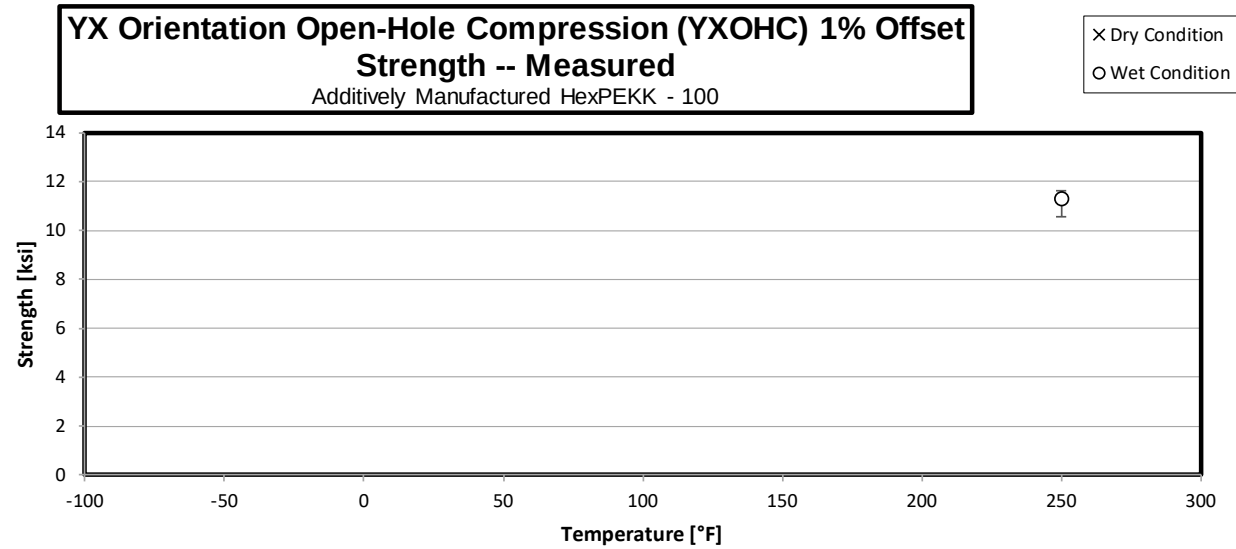
3.28 XY Open-Hole Compression Properties (XYOHC)



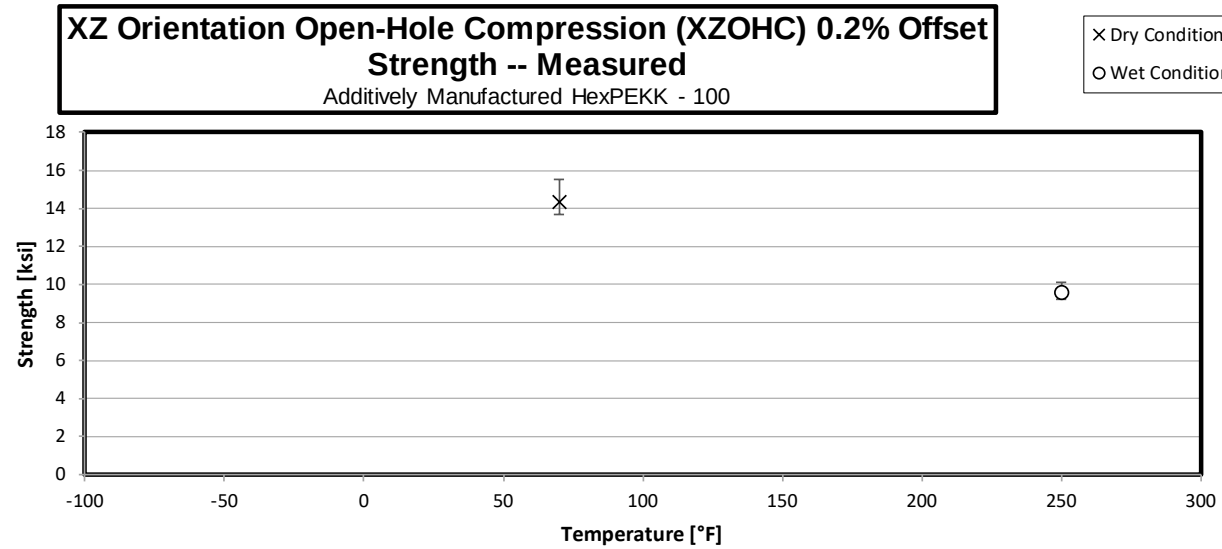


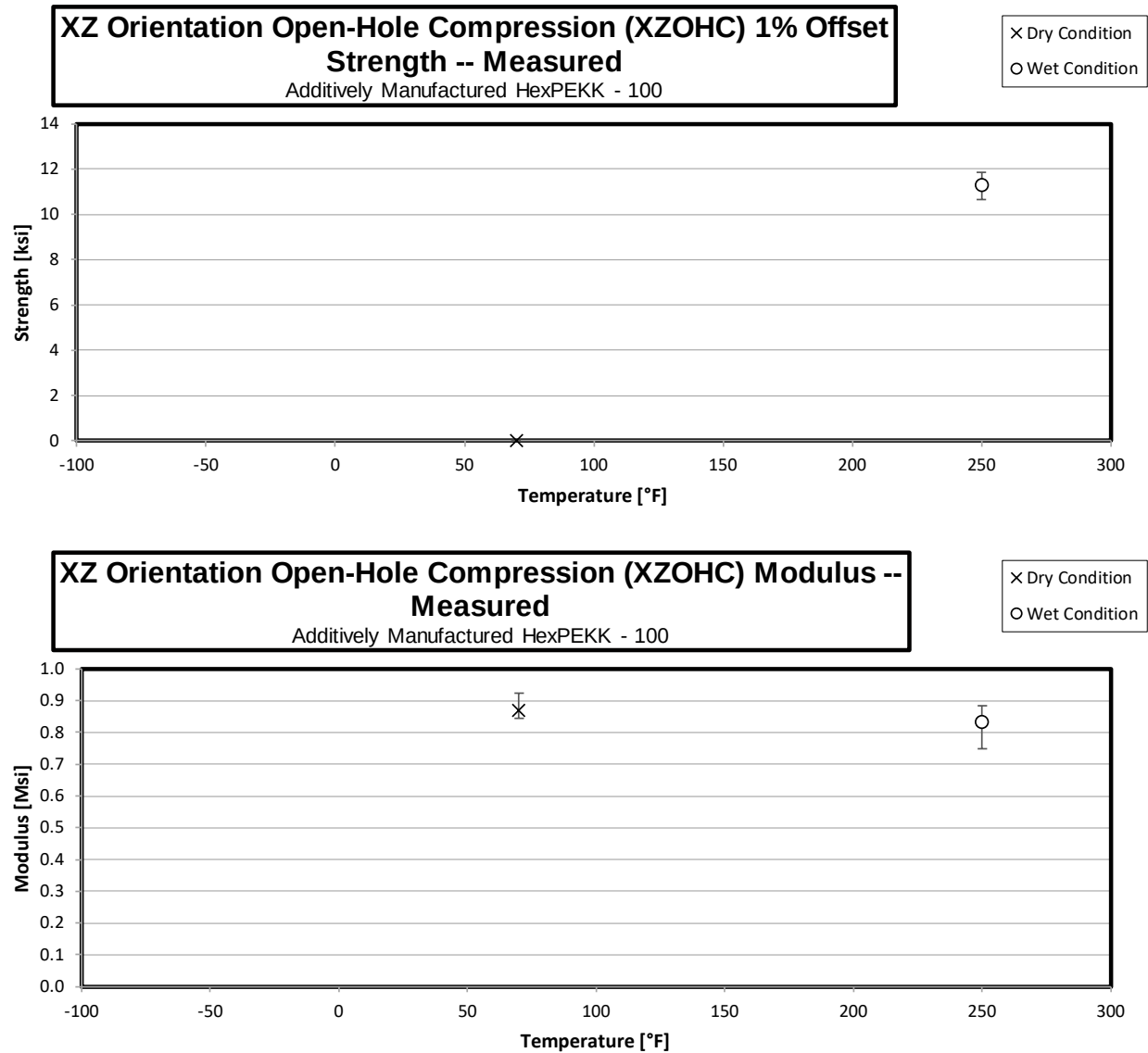
3.29 YX Open-Hole Compression Properties (YXOHC)



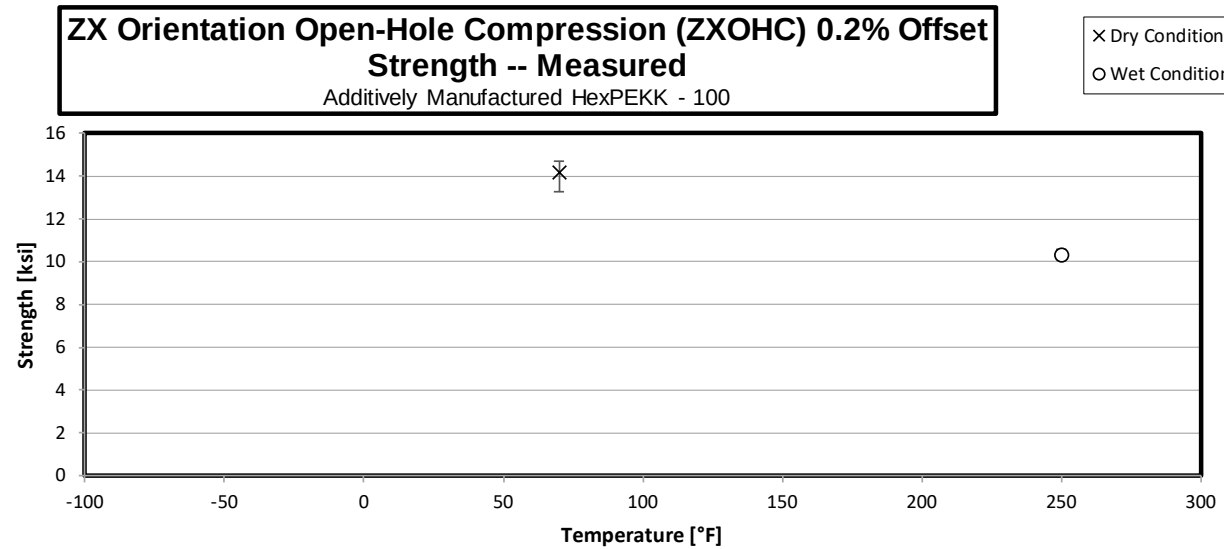


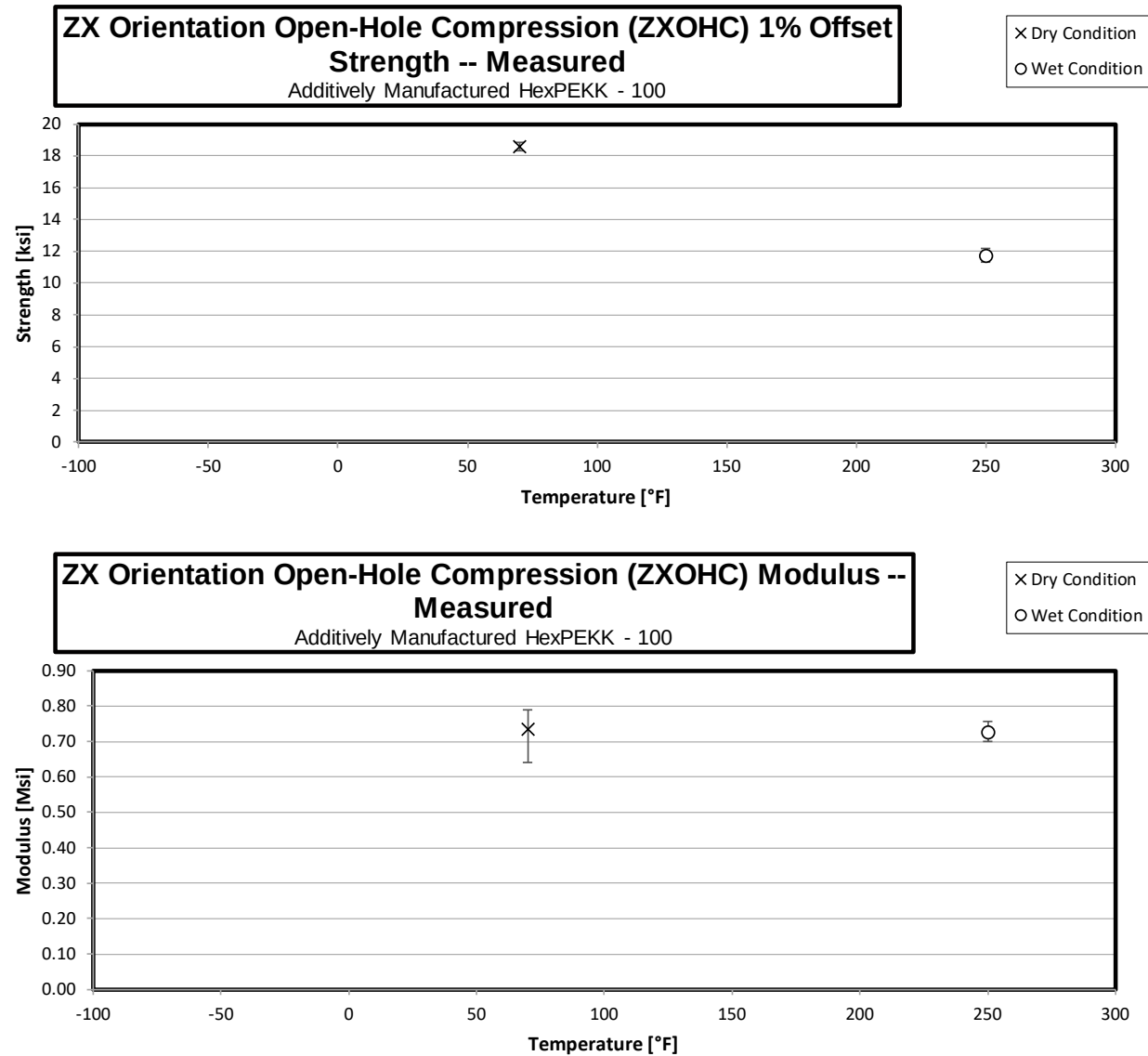
3.30 XZ Open-Hole Compression Properties (XZOHC)



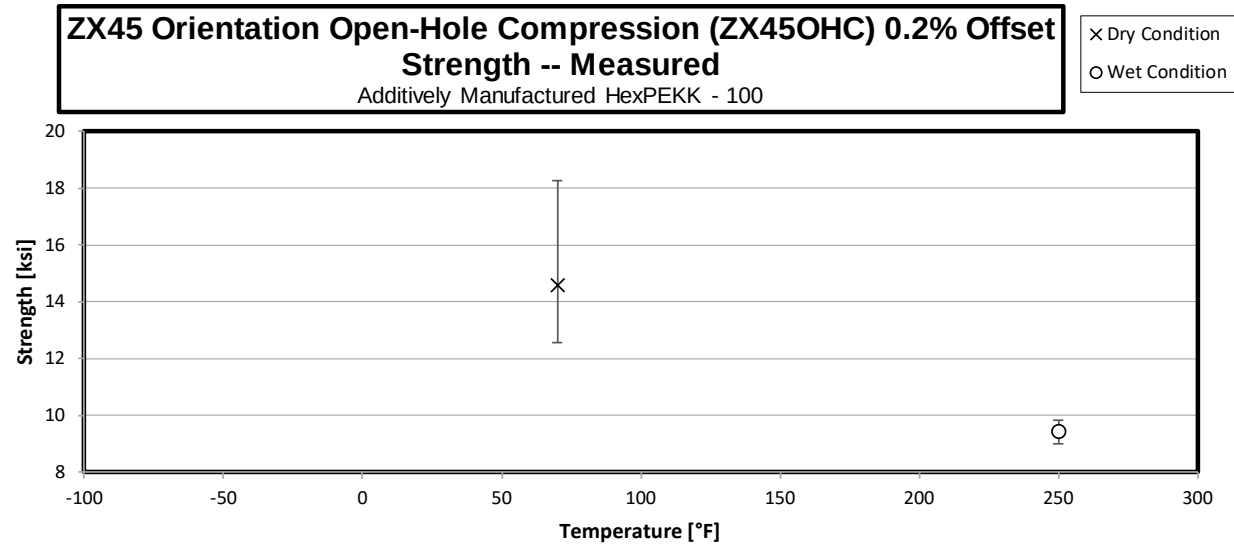


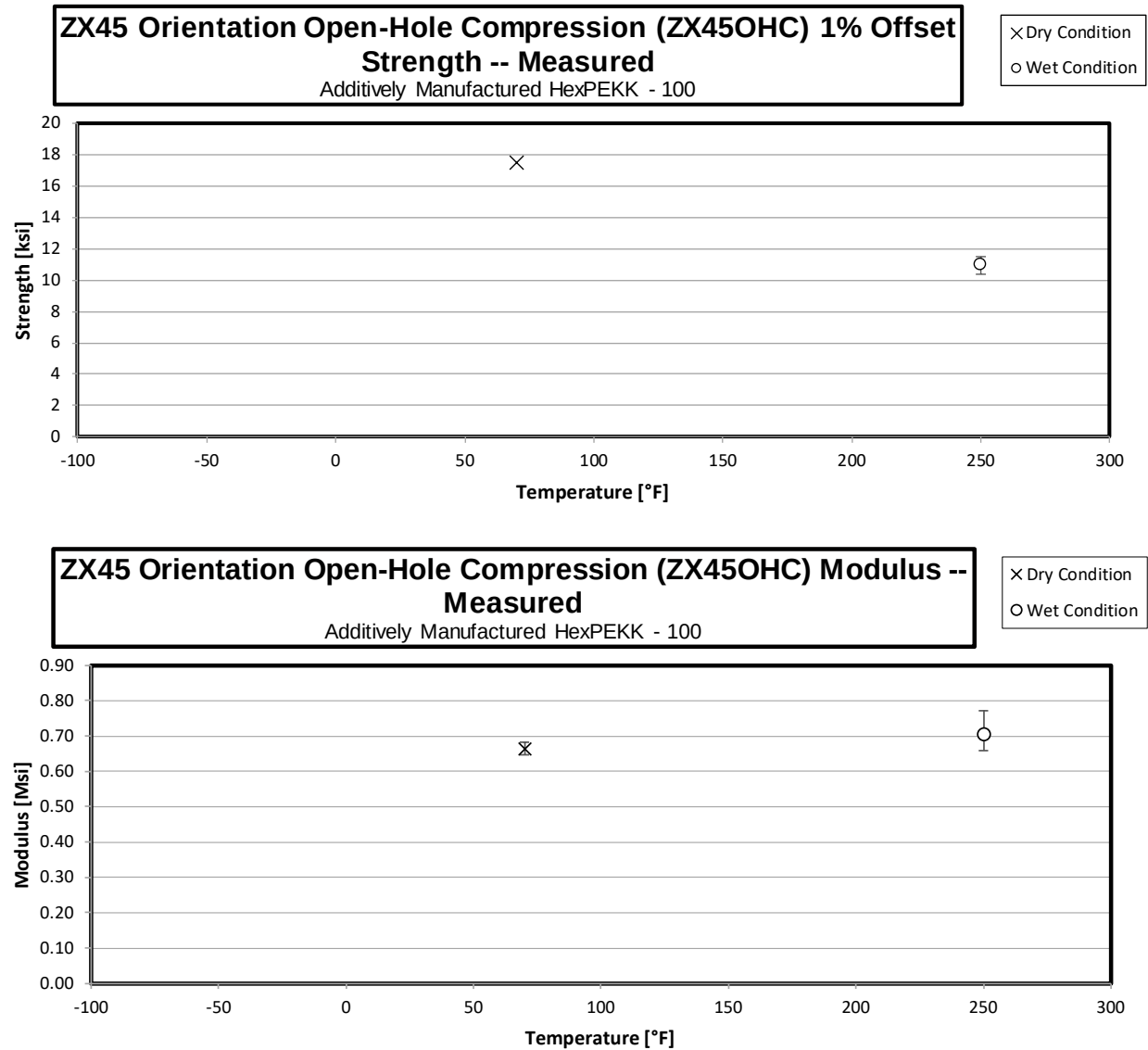
3.31 ZX Open-Hole Compression Properties (ZXOHC)



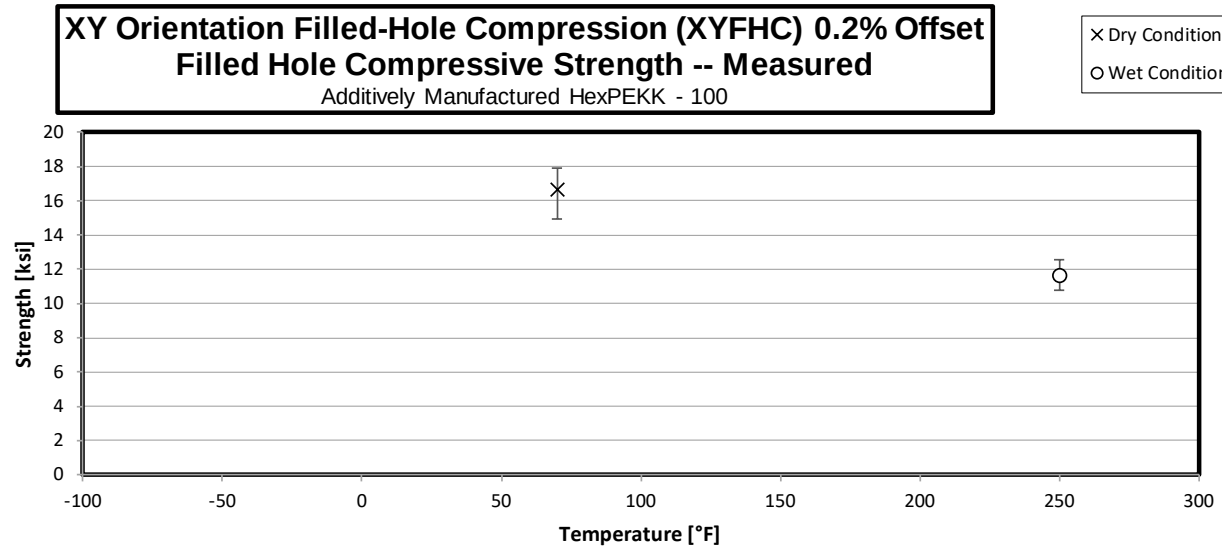


3.32 ZX45 Open-Hole Compression Properties (ZX45OHC)

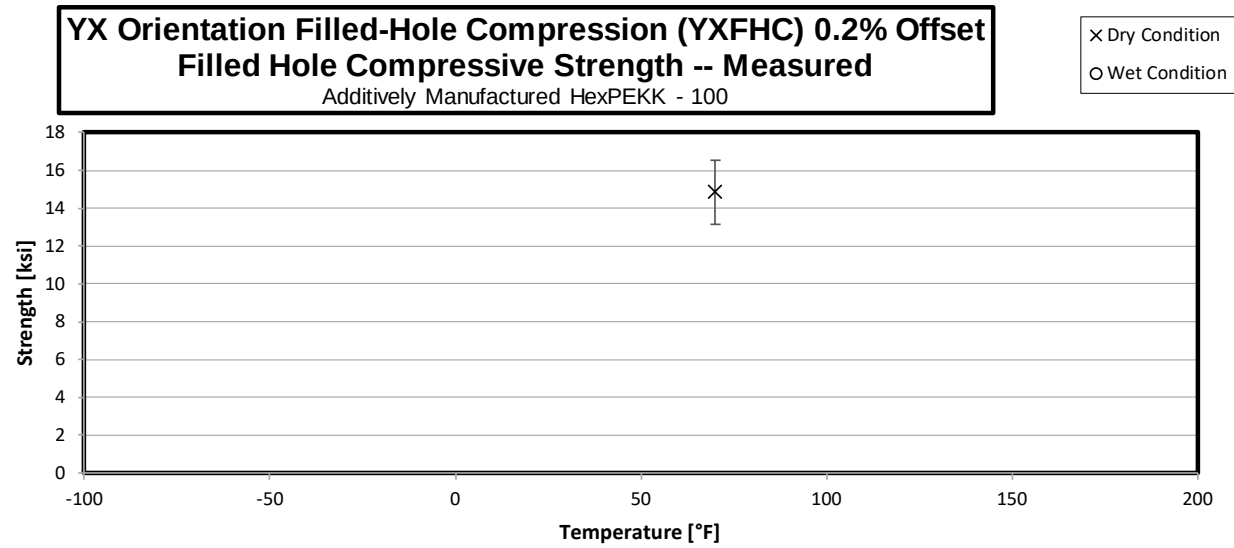




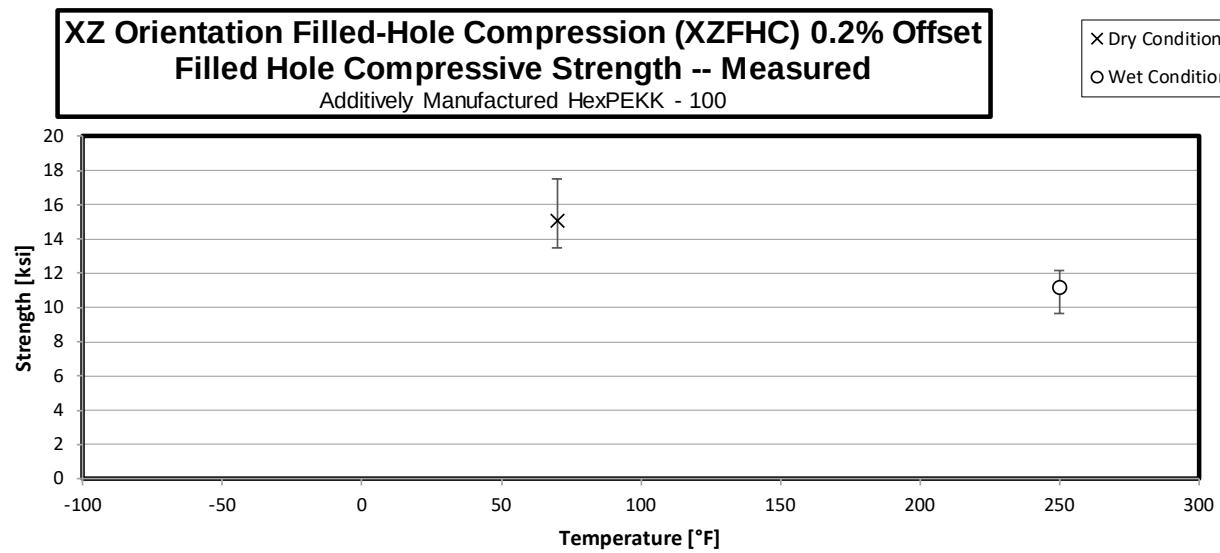
3.33 XY Filled-Hole Compression Properties (XYFHC)



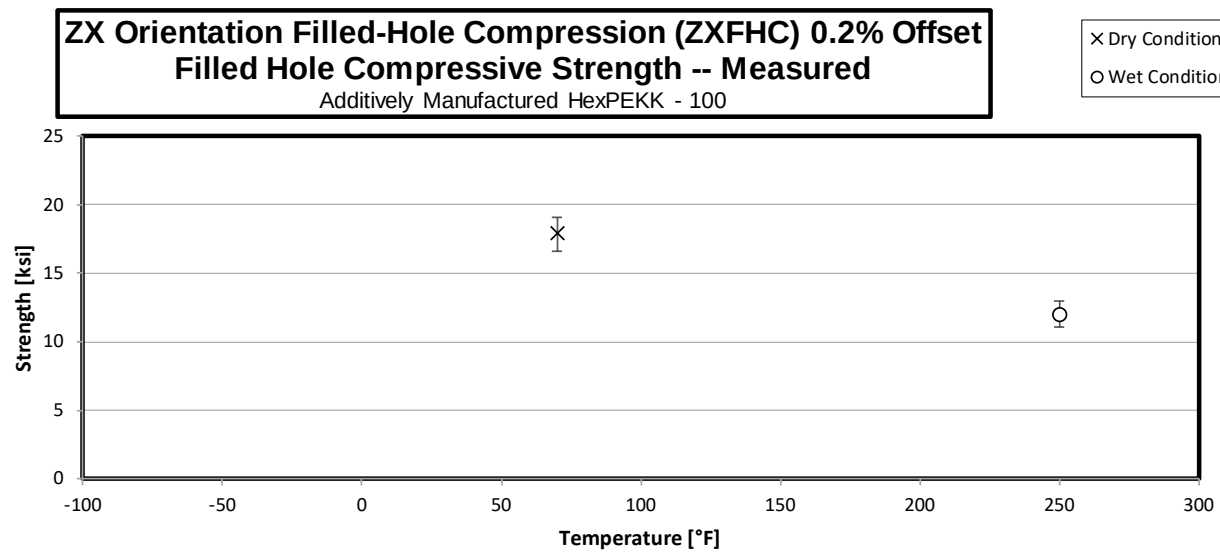
3.34 YX Filled-Hole Compression Properties (YXFHC)



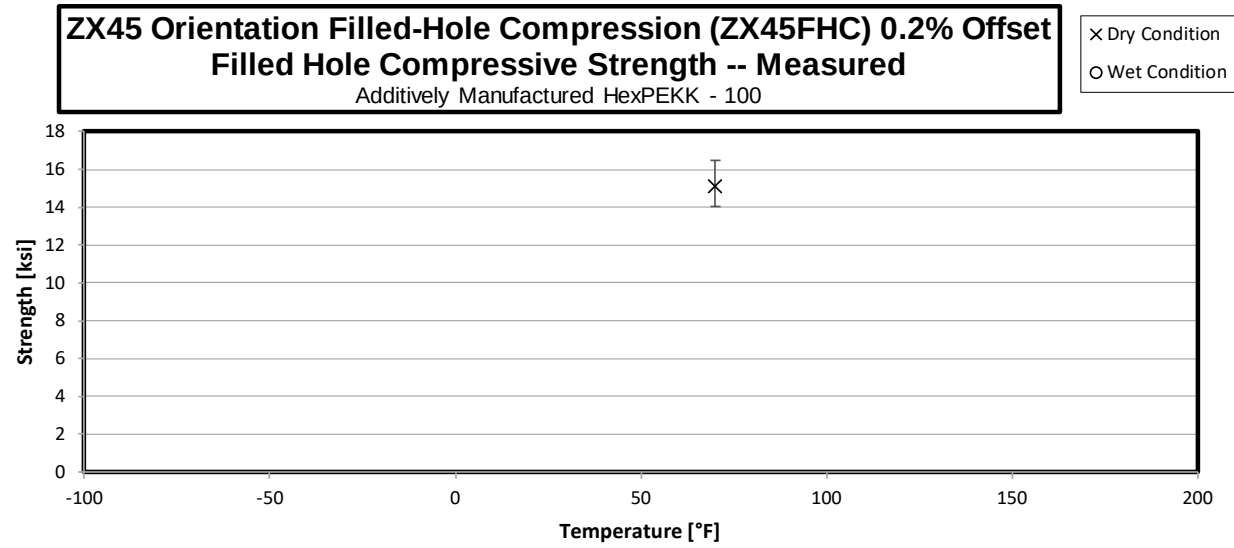
3.35 XZ Filled-Hole Compression Properties (XZFHC)



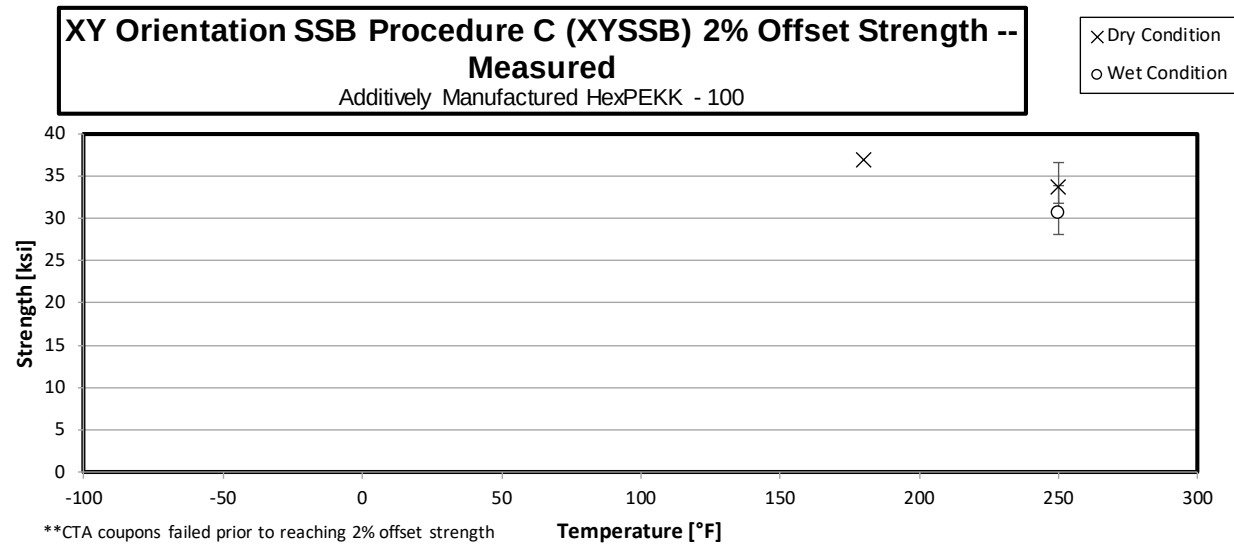
3.36 ZX Filled-Hole Compression Properties (ZXFHC)

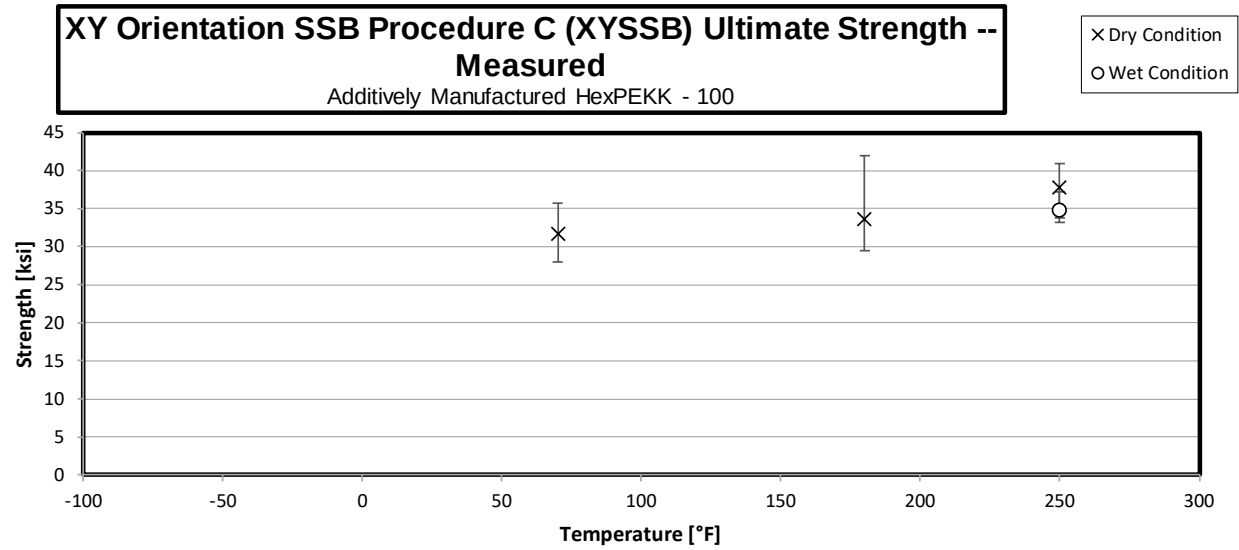


3.37 ZX45 Filled-Hole Compression Properties (ZX45FHC)

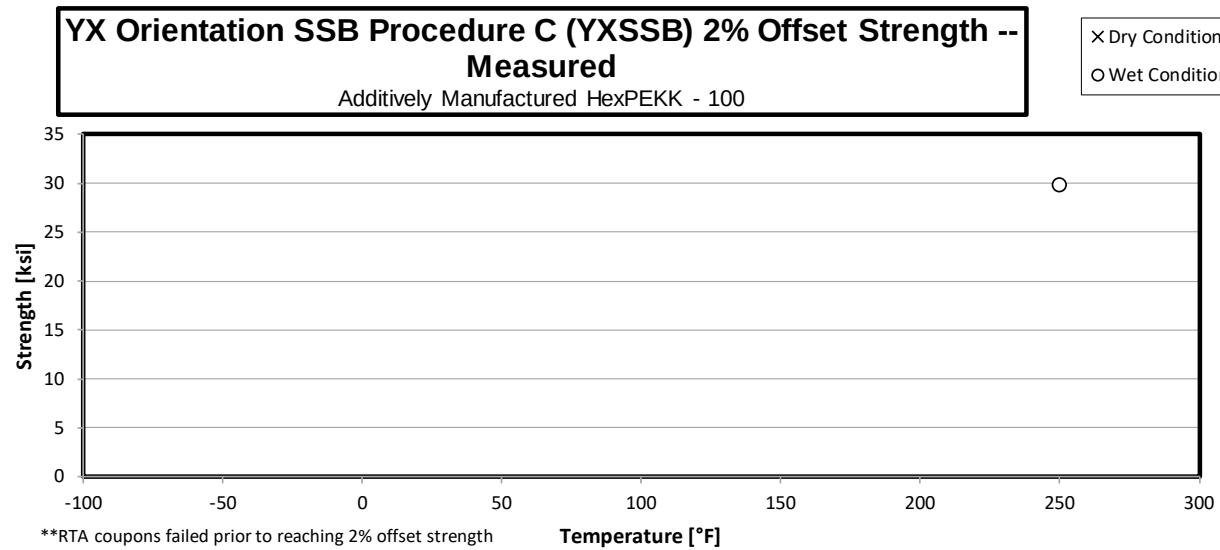


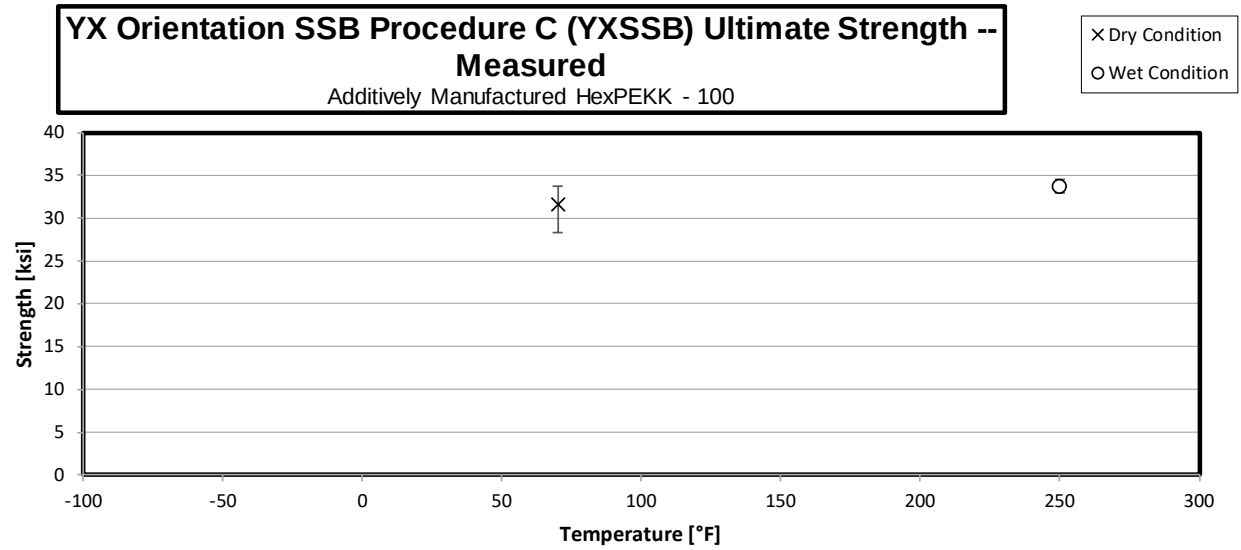
3.38 XY Single-Shear Bearing Properties (XYSSB)



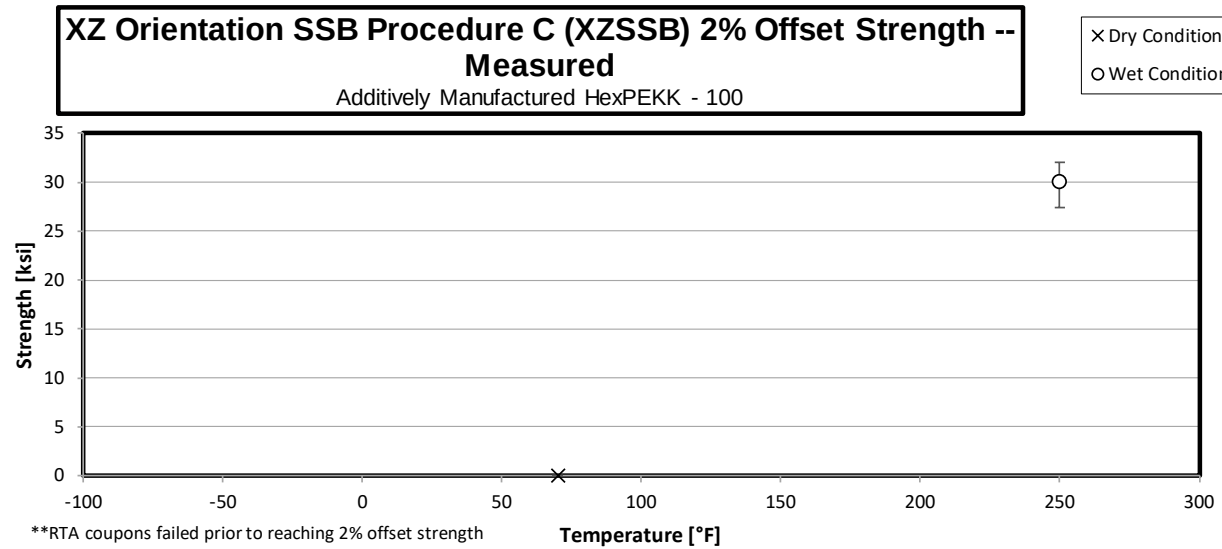


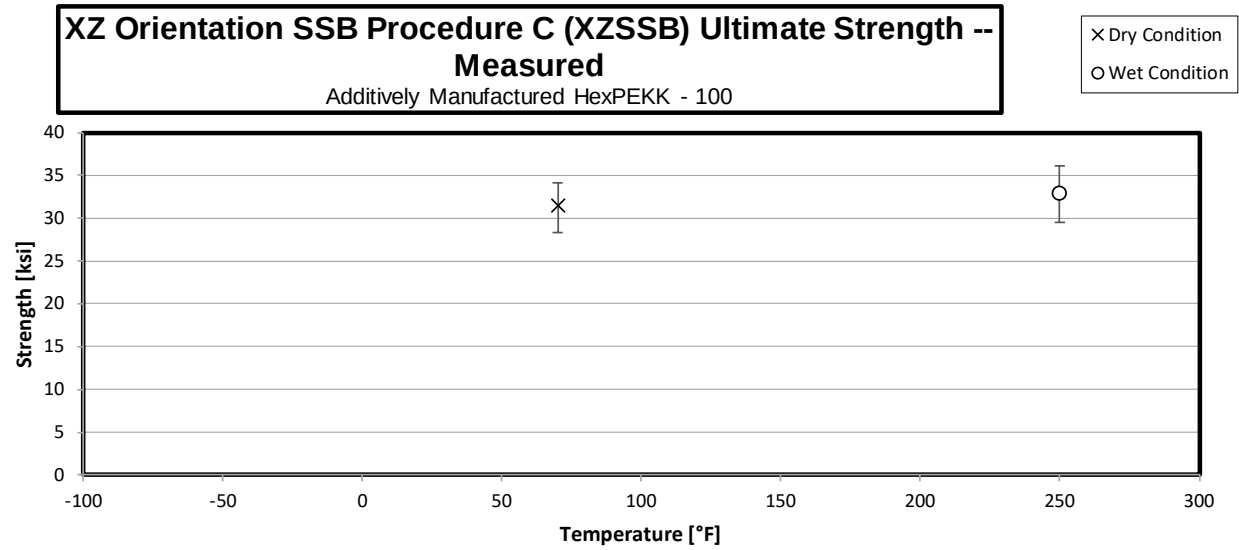
3.39 YX Single-Shear Bearing Properties (YXSSB)



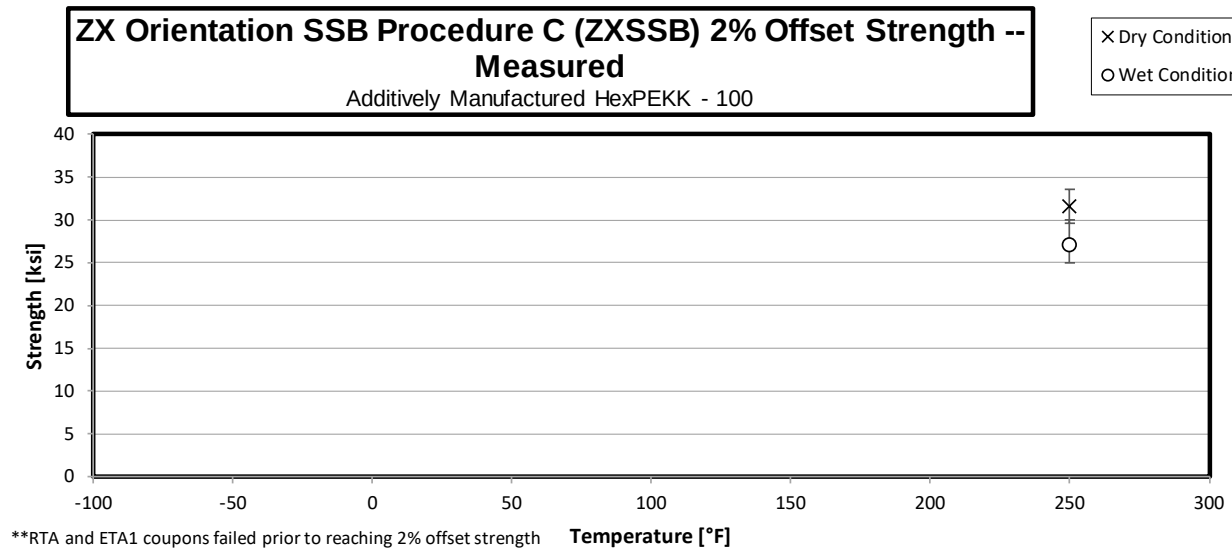


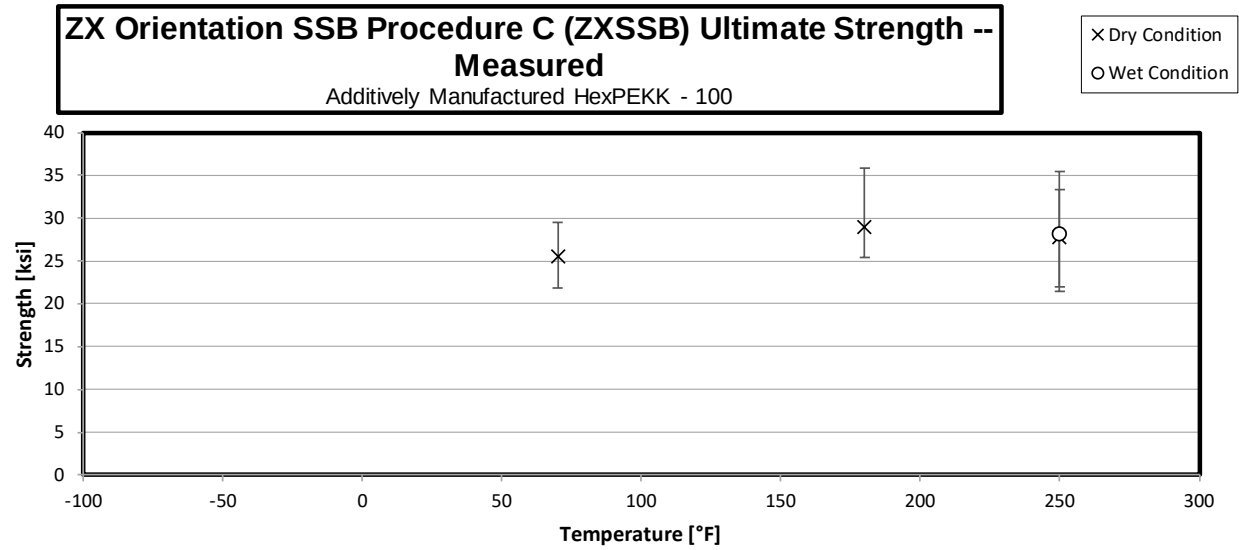
3.40 XZ Single-Shear Bearing Properties (XZSSB)



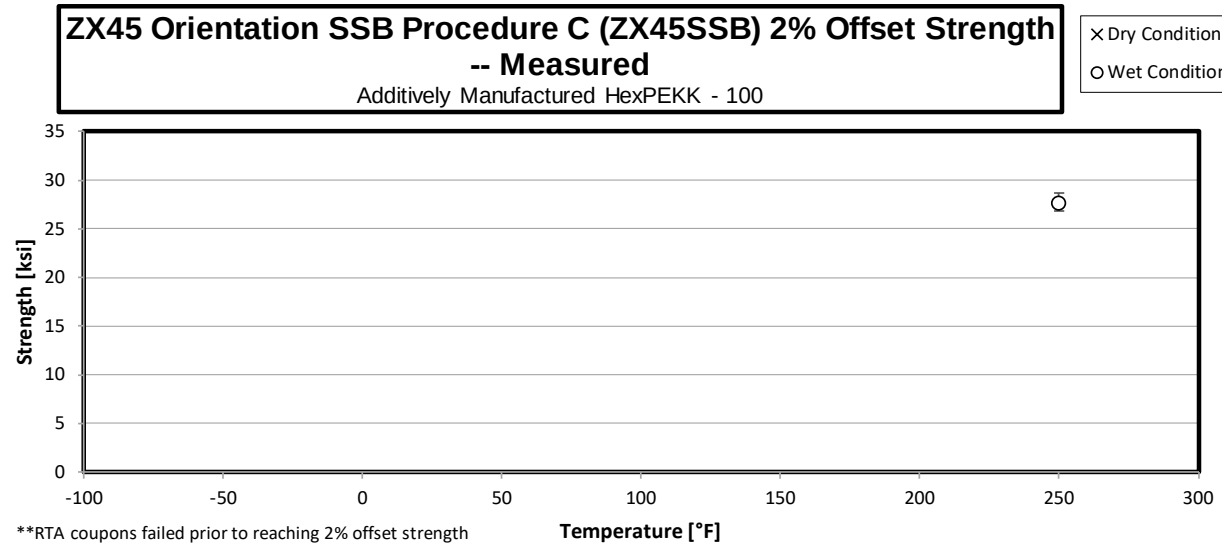


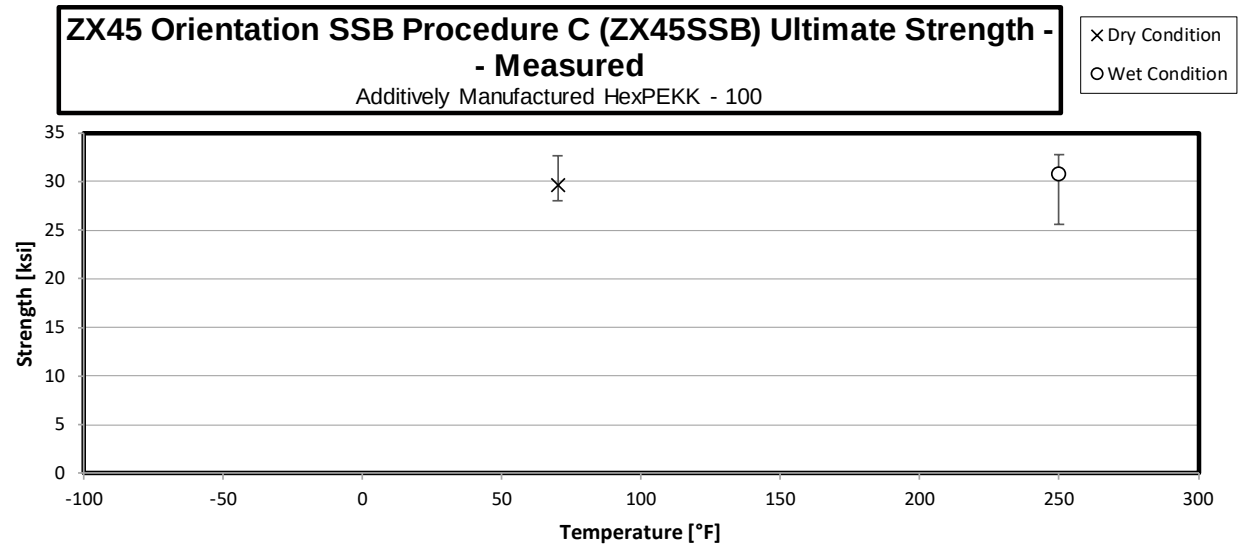
3.41 ZX Single-Shear Bearing Properties (ZXSSB)





3.42 ZX45 Single-Shear Bearing Properties (ZX45SSB)





4. Raw Data

Excessive specimen deformation and failure along the length of the coupon was observed for ASTM D6484 Open-Hole Compression and ASTM D6742 Filled-Hole Compression; hence appropriate failure modes were not obtained.

4.1 XY Tension Properties (XT)

XY Orientation Dogbone Tension Properties (XYT)--CTA□

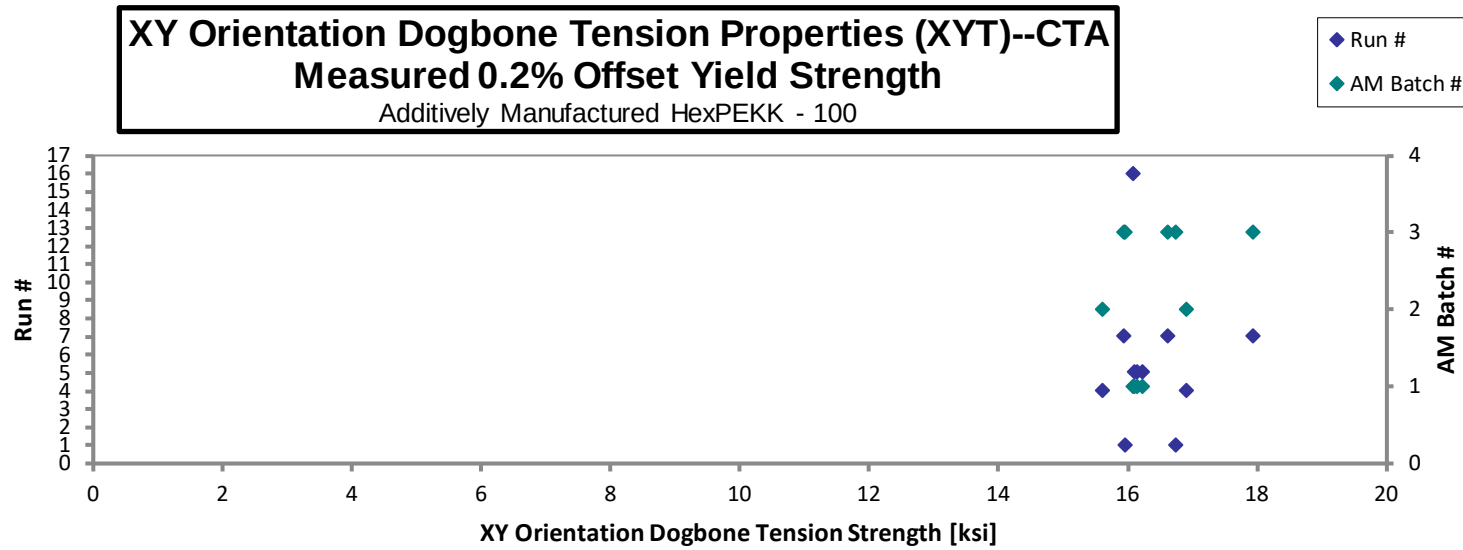
Strength & Modulus□

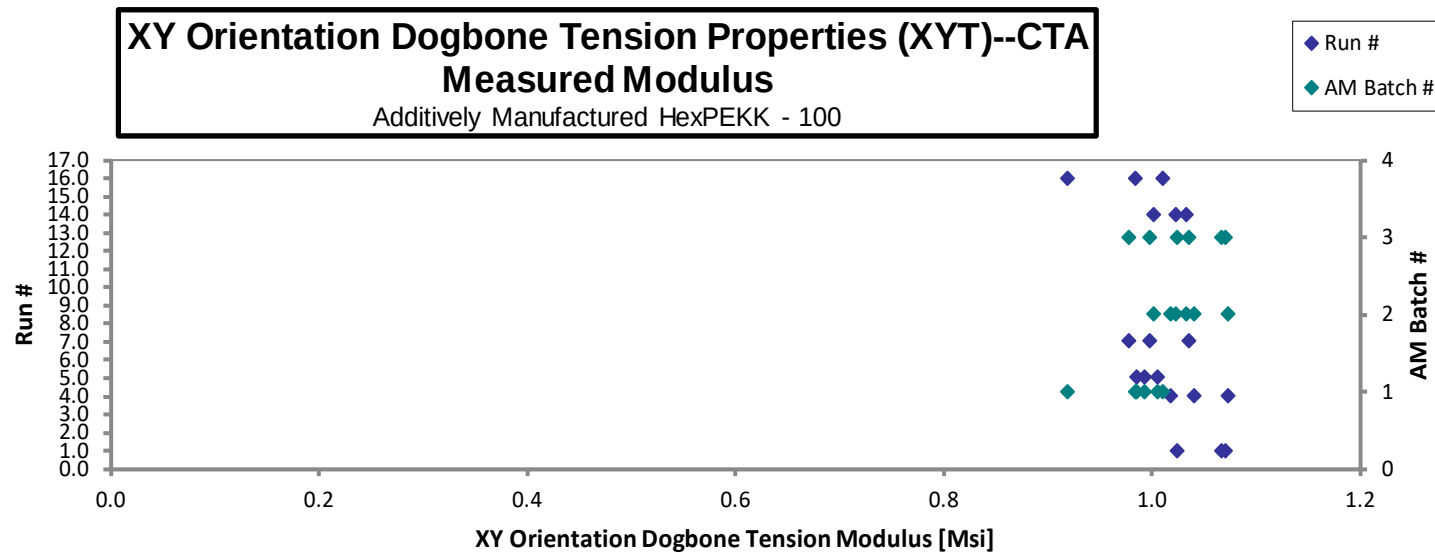
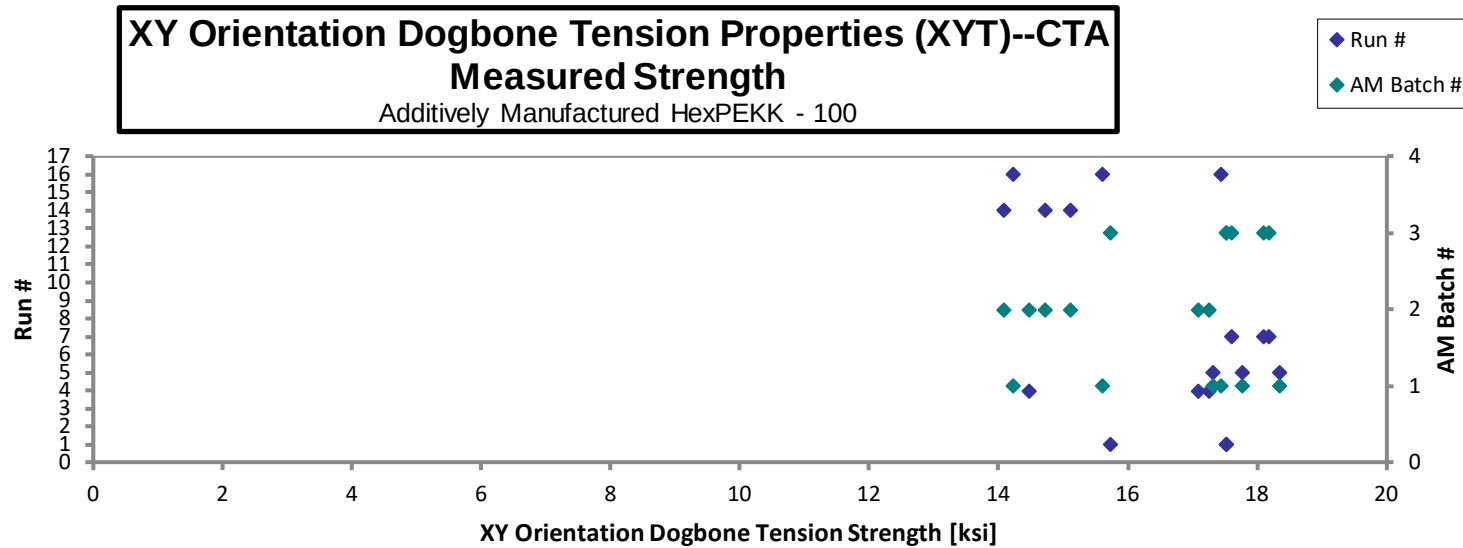
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-XYT-4B-CTA-1	1	16		15.60	1.010	0.1476	FAILURE AT GAGE SECTION
HL-A-R16-10-XYT-5B-CTA-3	1	16	16.09	17.45	0.9838	0.1620	FAILURE AT GAGE SECTION
HL-A-R16-10-XYT-1T-CTA-5	1	16		14.23	0.9186	0.1595	FAILURE AT GAGE SECTION
HL-A-R5-15-XYT-1B-CTA-1	1	5	16.23	18.35	1.005	0.1488	FAILURE AT GAGE SECTION
HL-A-R5-15-XYT-4T-CTA-3	1	5	16.11	17.77	0.9932	0.1470	FAILURE AT GAGE SECTION
HL-A-R5-15-XYT-5T-CTA-5	1	5	16.15	17.33	0.9855	0.1457	FAILURE AT GAGE SECTION
HL-B-R14-17-XYT-3B-CTA-2	2	14		15.10	1.033	0.1412	FAILURE AT GAGE SECTION
HL-B-R14-17-XYT-5B-CTA-4	2	14		14.72	1.023	0.1453	FAILURE AT GAGE SECTION
HL-B-R14-17-XYT-2T-CTA-6	2	14		14.09	1.001	0.1462	FAILURE AT GAGE SECTION
HL-B-R4-7-XYT-2B-CTA-1	2	4		14.48	1.017	0.1413	FAILURE AT GAGE AND GRIP SECTION
HL-B-R4-7-XYT-3T-CTA-3	2	4	15.61	17.08	1.073	0.1480	FAILURE AT GAGE SECTION
HL-B-R4-7-XYT-5T-CTA-5	2	4	16.90	17.25	1.041	0.1422	FAILURE AT GAGE SECTION
HL-C-R1-1-XYT-2B-CTA-1	3	1		15.73	1.067	0.1360	FAILURE AT GAGE SECTION
HL-C-R1-1-XYT-5B-CTA-3	3	1	16.74	17.51	1.071	0.1412	FAILURE AT GAGE SECTION
HL-C-R1-1-XYT-3T-CTA-5	3	1	15.95	17.52	1.024	0.1463	FAILURE AT GAGE SECTION
HL-C-R7-4-XYT-4B-CTA-1	3	7	15.93	17.61	1.035	0.1453	FAILURE AT GAGE AND FILLET SECTION
HL-C-R7-4-XYT-1T-CTA-3	3	7	16.62	18.18	0.9783	0.1415	FAILURE AT GAGE SECTION
HL-C-R7-4-XYT-5T-CTA-5	3	7	17.94	18.10	0.9986	0.1446	FAILURE AT GAGE SECTION

**0.2% offset yield strength was not reported for some coupons as they failed prior to reaching 0.2%

Average	16.39	16.56	1.014	0.1461
Standard Dev.	0.641	1.489	0.03787	
Coeff. of Var. [%]	3.909	8.993	3.733	
Min.	15.61	14.09	0.9186	0.1360
Max.	17.94	18.35	1.073	0.1620
Number of Spec.	11	18	18	18



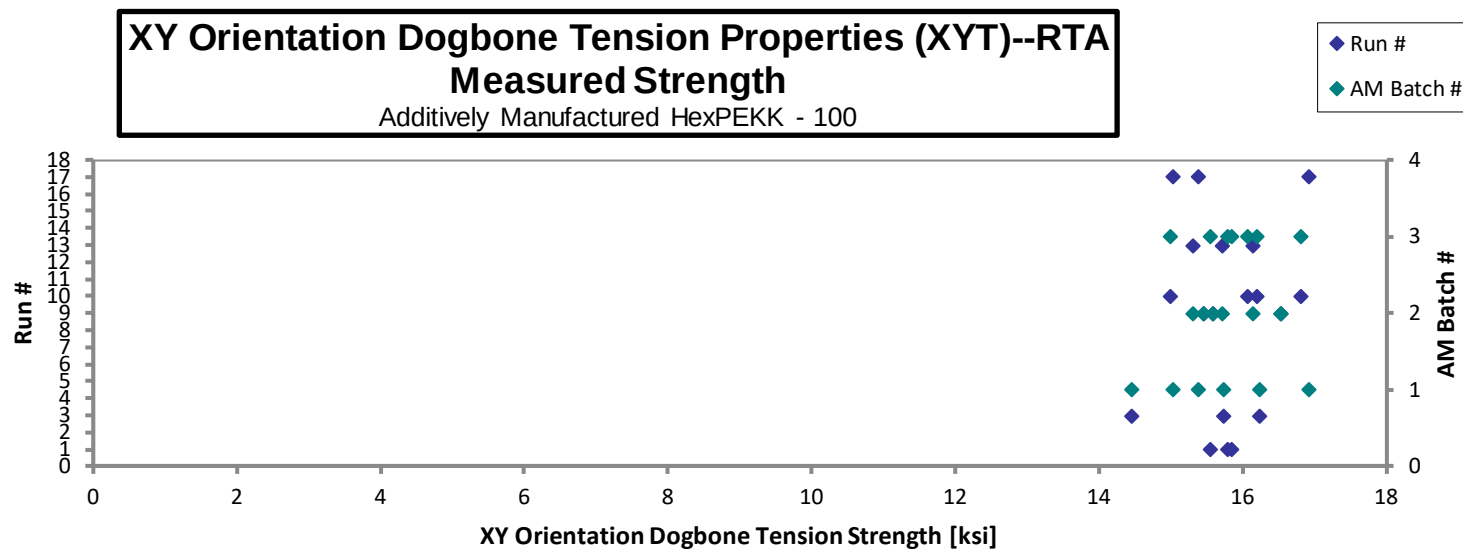
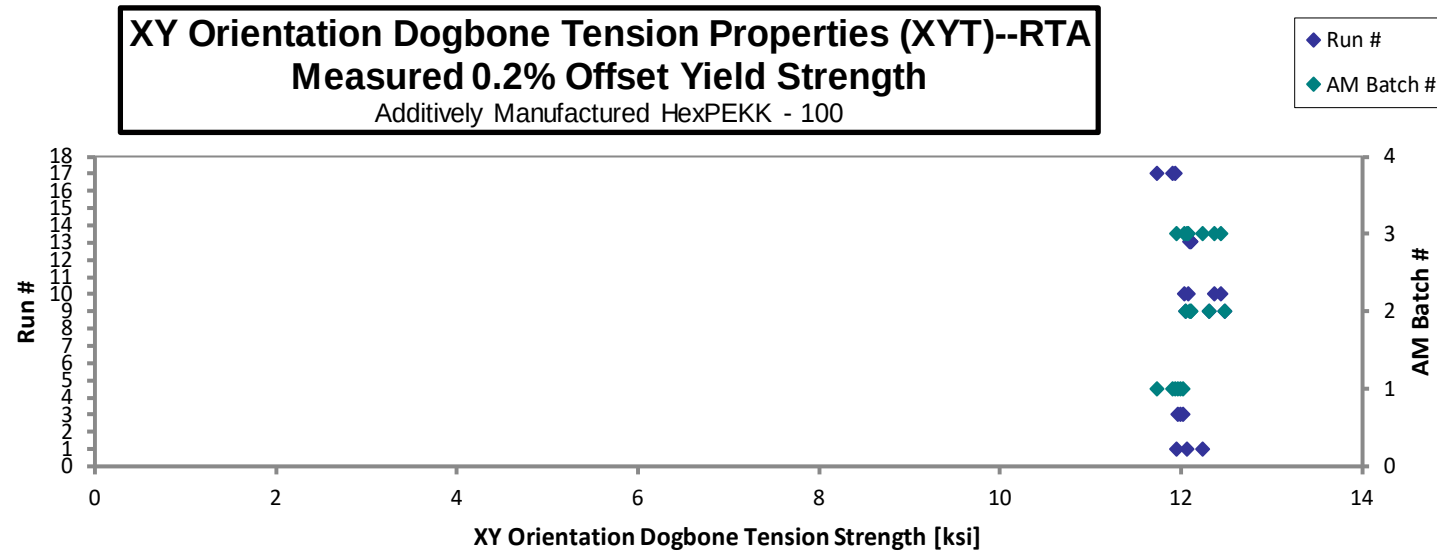


XY Orientation Dogbone Tension Properties (XYT)--RTA**Strength & Modulus**

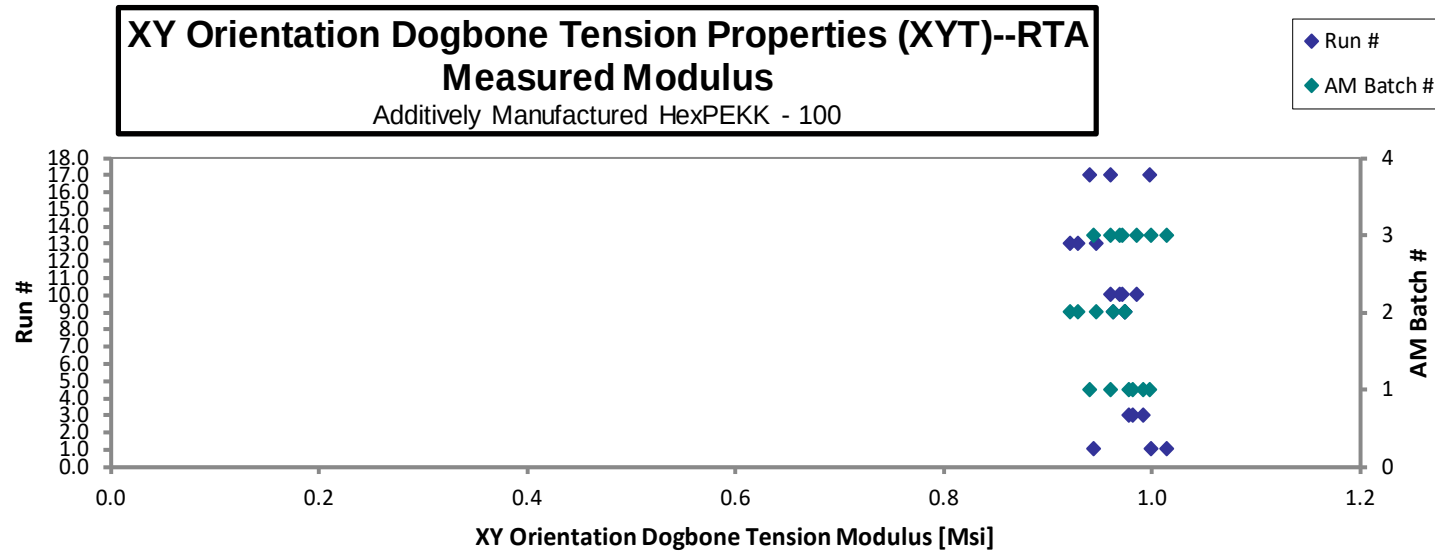
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-XYT-4B-RTA-1	1	17	11.91	16.91	0.9985	0.1449	FAILURE AT GAGE SECTION
HL-A-R17-11-XYT-5B-RTA-3	1	17	11.94	15.38	0.9603	0.1608	FAILURE AT GAGE AND FILLET SECTION
HL-A-R17-11-XYT-1T-RTA-4	1	17	11.73	15.02	0.9407	0.1641	FAILURE AT GAGE SECTION
HL-A-R3-14-XYT-1B-RTA-1	1	3	12.00	16.24	0.9775	0.1501	FAILURE AT GAGE SECTION
HL-A-R3-14-XYT-4T-RTA-4	1	3	11.97	14.46	0.9912	0.1444	FAILURE AT GAGE SECTION
HL-A-R3-14-XYT-5T-RTA-6	1	3	12.02	15.73	0.9811	0.1484	FAILURE AT GAGE SECTION
HL-B-R13-9-XYT-2B-RTA-1	2	13	12.09	15.71	0.9214	0.1536	FAILURE AT GAGE SECTION
HL-B-R13-9-XYT-3T-RTA-3	2	13	12.11	15.30	0.9294	0.1556	FAILURE AT GAGE SECTION
HL-B-R13-9-XYT-5T-RTA-5	2	13	12.10	16.14	0.9466	0.1634	FAILURE AT GAGE SECTION
HL-B-R9-16-XYT-3B-RTA-1	2	9	12.31	16.52	0.9737	0.1423	FAILURE AT GAGE AND FILLET SECTION
HL-B-R9-16-XYT-5B-RTA-3	2	9	12.48	15.59	0.9634	0.1523	FAILURE AT GAGE AND FILLET SECTION
HL-B-R9-16-XYT-2T-RTA-5	2	9	12.05	15.46	0.9743	0.1416	FAILURE AT FILLET SECTION
HL-C-R1-1-XYT-2B-RTA-2	3	1	12.25	15.84	1.0145	0.1359	FAILURE AT GAGE SECTION
HL-C-R1-1-XYT-5B-RTA-4	3	1	12.07	15.79	0.9993	0.1404	FAILURE AT GAGE SECTION
HL-C-R1-1-XYT-3T-RTA-6	3	1	11.96	15.56	0.9437	0.1484	FAILURE AT GAGE SECTION
HL-C-R10-5-XYT-4B-RTA-1	3	10	12.37	16.08	0.9856	0.1450	FAILURE AT GAGE SECTION
HL-C-R10-5-XYT-4B-RTA-2	3	10	12.03	16.20	0.9714	0.1491	FAILURE AT GAGE SECTION
HL-C-R10-5-XYT-1T-RTA-3	3	10	12.08	15.00	0.9600	0.1445	FAILURE AT FILLET SECTION
HL-C-R10-5-XYT-5T-RTA-5	3	10	12.44	16.81	0.9692	0.1501	FAILURE AT GAGE SECTION

Average	12.10	15.78	0.9685	0.1492
Standard Dev.	0.1921	0.6248	0.02456	
Coeff. of Var. [%]	1.588	3.961	2.536	
Min.	11.73	14.46	0.9214	0.1359
Max.	12.48	16.91	1.014	0.1641
Number of Spec.	19	19	19	19



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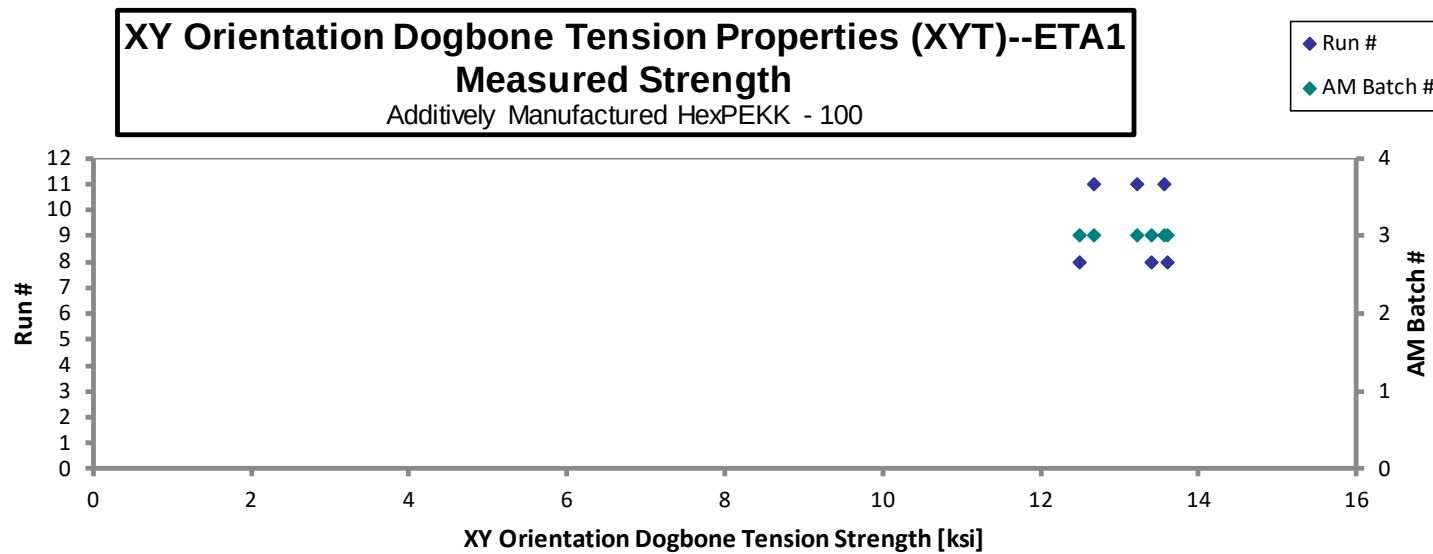
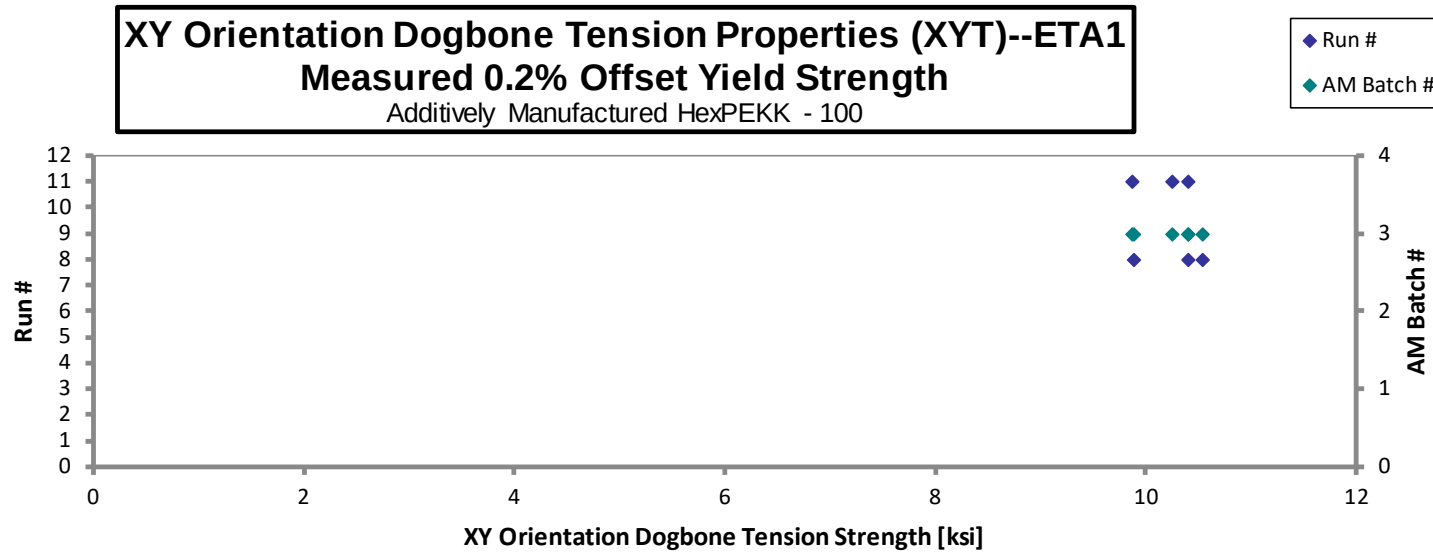


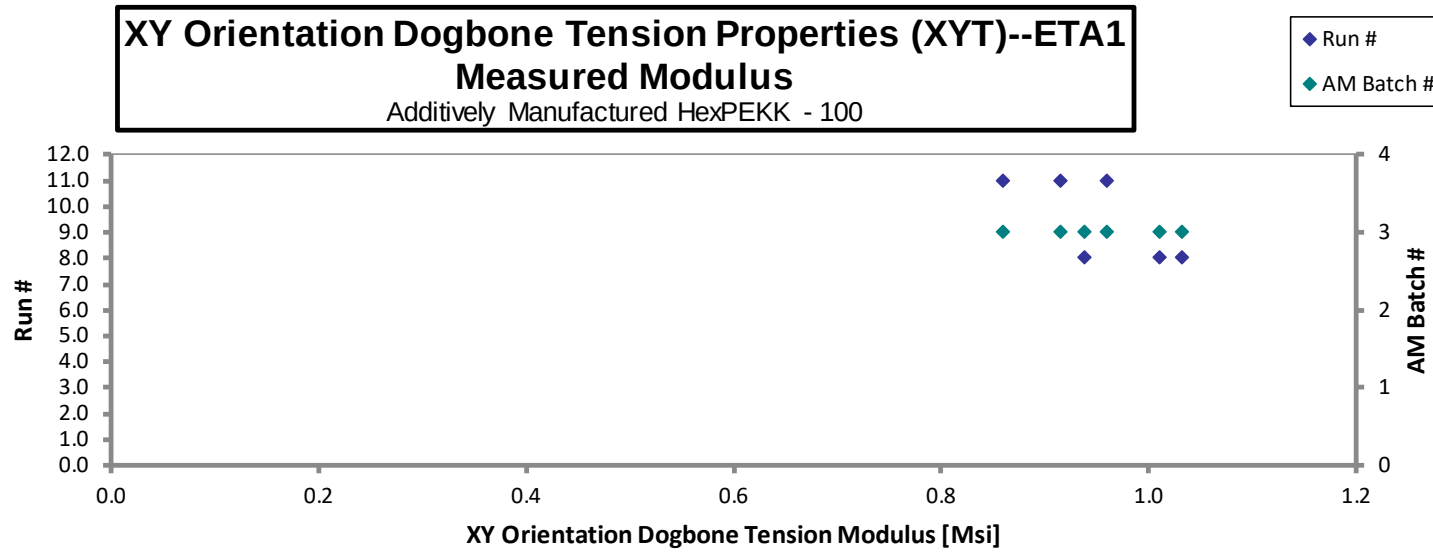
XY Orientation Dogbone Tension Properties (XYT)--ETA1
Strength & Modulus

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R11-6-XYT-4B-ETA1-1	3	11	10.25	13.21	0.8594	0.1456	FAILURE AT GAGE SECTION
HL-C-R11-6-XYT-1T-ETA1-3	3	11	9.874	12.68	0.9143	0.1419	FAILURE AT GAGE SECTION
HL-C-R11-6-XYT-5T-ETA1-5	3	11	10.40	13.57	0.9594	0.1486	FAILURE AT GAGE SECTION
HL-C-R8-2-XYT-2B-ETA1-2	3	8	10.40	13.61	1.031	0.1375	FAILURE AT GAGE SECTION
HL-C-R8-2-XYT-5B-ETA1-4	3	8	10.54	13.41	1.010	0.1445	FAILURE AT GAGE SECTION
HL-C-R8-2-XYT-3T-ETA1-6	3	8	9.893	12.50	0.9385	0.1506	FAILURE AT GAGE SECTION

Average	10.23	13.16	0.9522	0.1448
Standard Dev.	0.2809	0.4690	0.06313	
Coeff. of Var. [%]	2.747	3.562	6.630	
Min.	9.874	12.50	0.8594	0.1375
Max.	10.54	13.61	1.031	0.1506
Number of Spec.	6	6	6	6



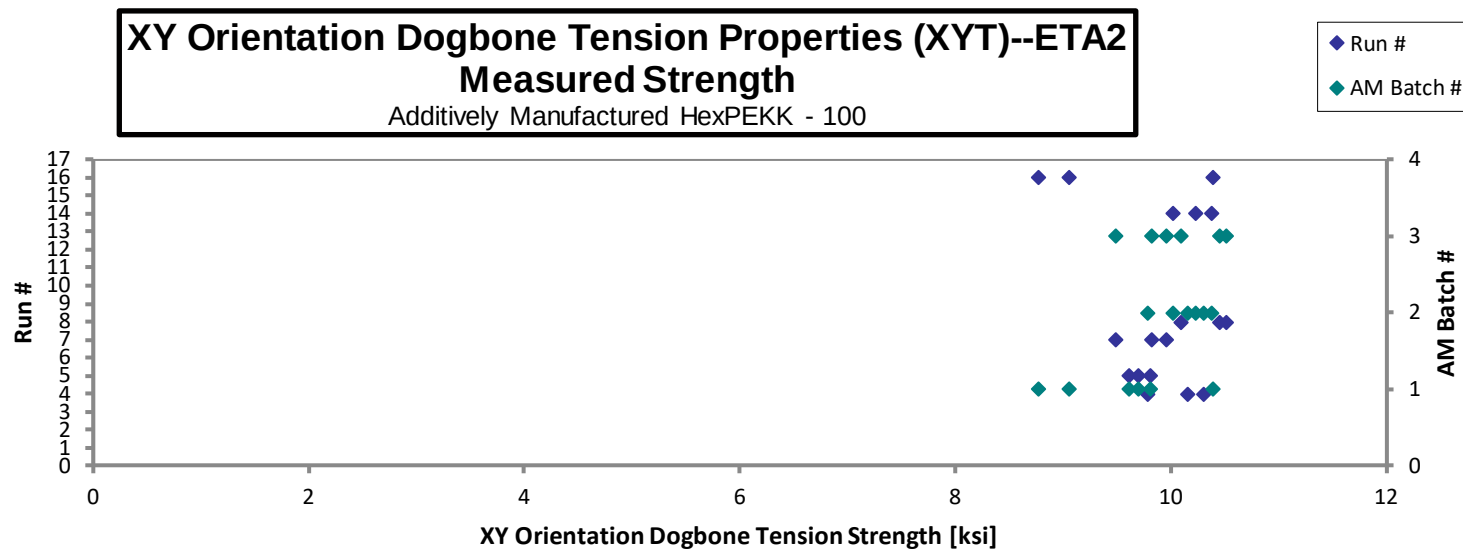
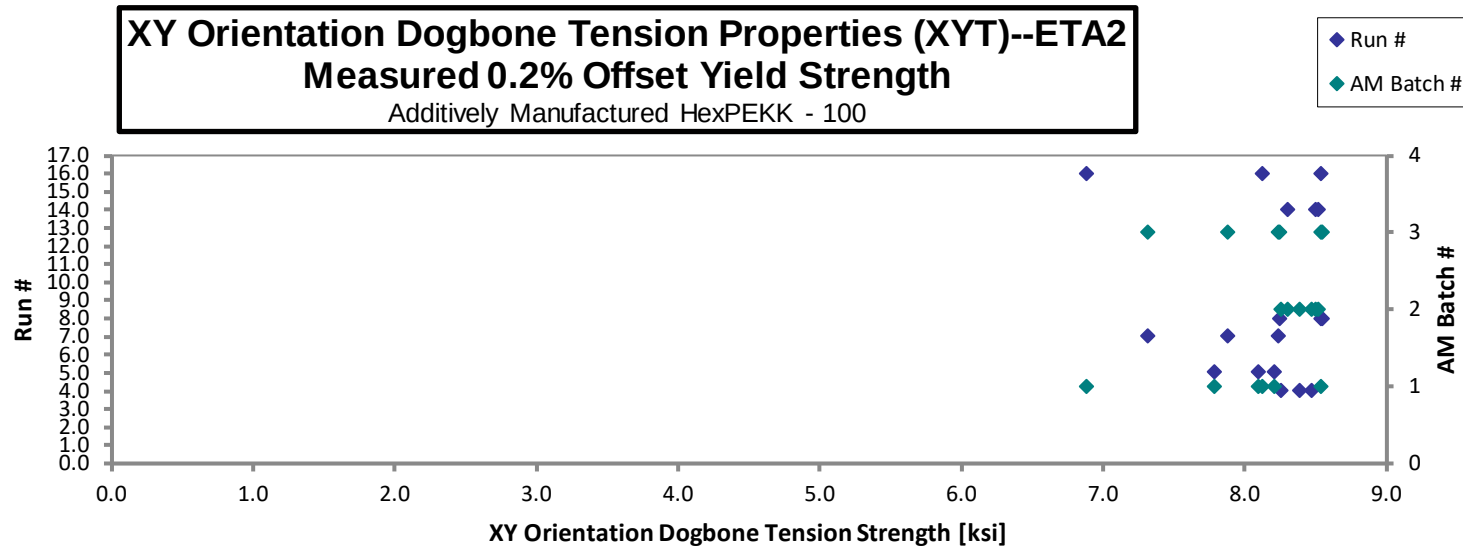


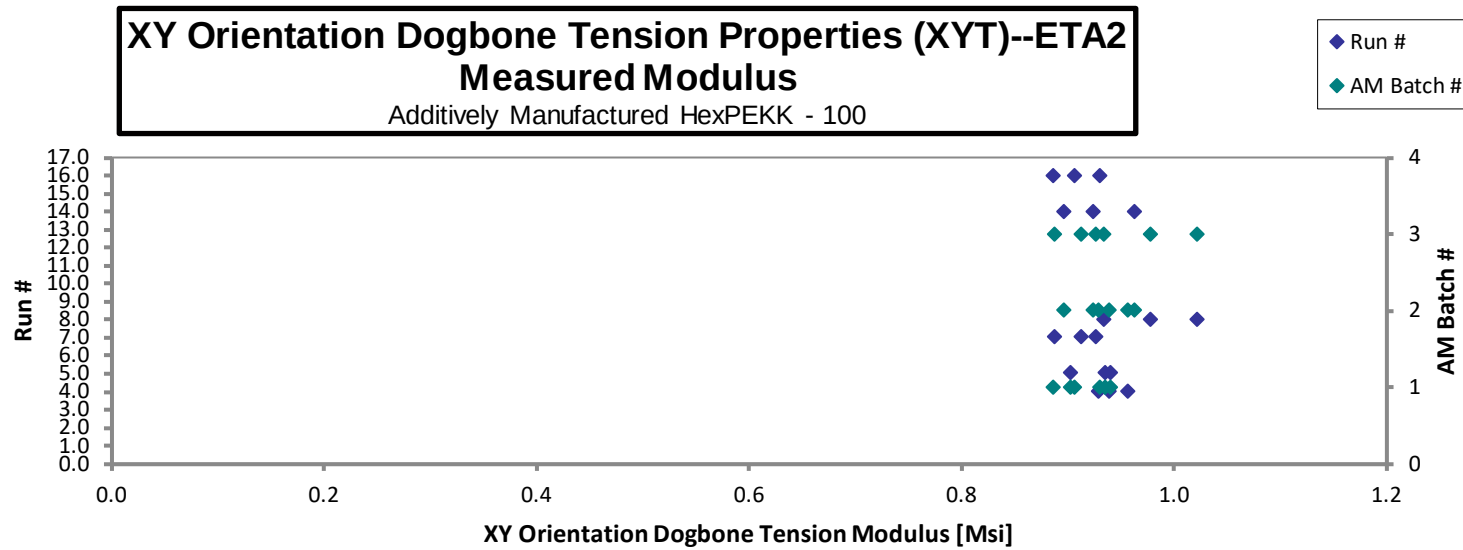
XY Orientation Dogbone Tension Properties (XYT)--ETA2
Strength & Modulus

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-XYT-4B-ETA2-2	1	16	8.538	10.40	0.9299	0.1499	FAILURE AT GAGE SECTION
HL-A-R16-10-XYT-1T-ETA2-4	1	16	8.125	9.059	0.9061	0.1630	FAILURE AT FILLET SECTION
HL-A-R16-10-XYT-5T-ETA2-6	1	16	6.879	8.767	0.8865	0.1618	FAILURE AT GAGE SECTION
HL-A-R5-15-XYT-1B-ETA2-2	1	5	8.205	9.809	0.9028	0.1512	FAILURE AT GAGE SECTION
HL-A-R5-15-XYT-4T-ETA2-4	1	5	8.092	9.612	0.9398	0.1440	FAILURE AT GAGE SECTION
HL-A-R5-15-XYT-5T-ETA2-6	1	5	7.785	9.703	0.9352	0.1459	FAILURE AT GAGE SECTION
HL-B-R14-17-XYT-3B-ETA2-1	2	14	8.523	10.38	0.9237	0.1395	FAILURE AT GAGE SECTION
HL-B-R14-17-XYT-5B-ETA2-3	2	14	8.504	10.23	0.9625	0.1497	FAILURE AT GAGE SECTION
HL-B-R14-17-XYT-2T-ETA2-5	2	14	8.300	10.02	0.8964	0.1388	FAILURE AT GAGE SECTION
HL-B-R4-7-XYT-2B-ETA2-2	2	4	8.383	10.15	0.9290	0.1415	FAILURE AT GAGE SECTION
HL-B-R4-7-XYT-3T-ETA2-4	2	4	8.256	9.781	0.9561	0.1492	FAILURE AT GAGE SECTION
HL-B-R4-7-XYT-5T-ETA2-6	2	4	8.468	10.31	0.9395	0.1411	FAILURE AT GAGE SECTION
HL-C-R7-4-XYT-4B-ETA2-2	3	7	8.235	9.964	0.9130	0.1443	FAILURE AT GAGE SECTION
HL-C-R7-4-XYT-1T-ETA2-4	3	7	7.879	9.485	0.9271	0.1430	FAILURE AT GAGE SECTION
HL-C-R7-4-XYT-5T-ETA2-6	3	7	7.318	9.826	0.8876	0.1465	FAILURE AT GAGE SECTION
HL-C-R8-2-XYT-2B-ETA2-1	3	8	8.539	10.45	0.9784	0.1384	FAILURE AT GAGE SECTION
HL-C-R8-2-XYT-5B-ETA2-3	3	8	8.542	10.52	1.022	0.145	FAILURE AT GAGE SECTION
HL-C-R8-2-XYT-3T-ETA2-5	3	8	8.249	10.09	0.9339	0.1465	FAILURE AT GAGE SECTION

Average	8.157	9.919	0.9316	0.1466
Standard Dev.	0.4502	0.4762	0.0336	
Coeff. of Var. [%]	5.519	4.801	3.602	
Min.	6.879	8.767	0.8865	0.1384
Max.	8.542	10.52	1.022	0.1630
Number of Spec.	18	18	18	18





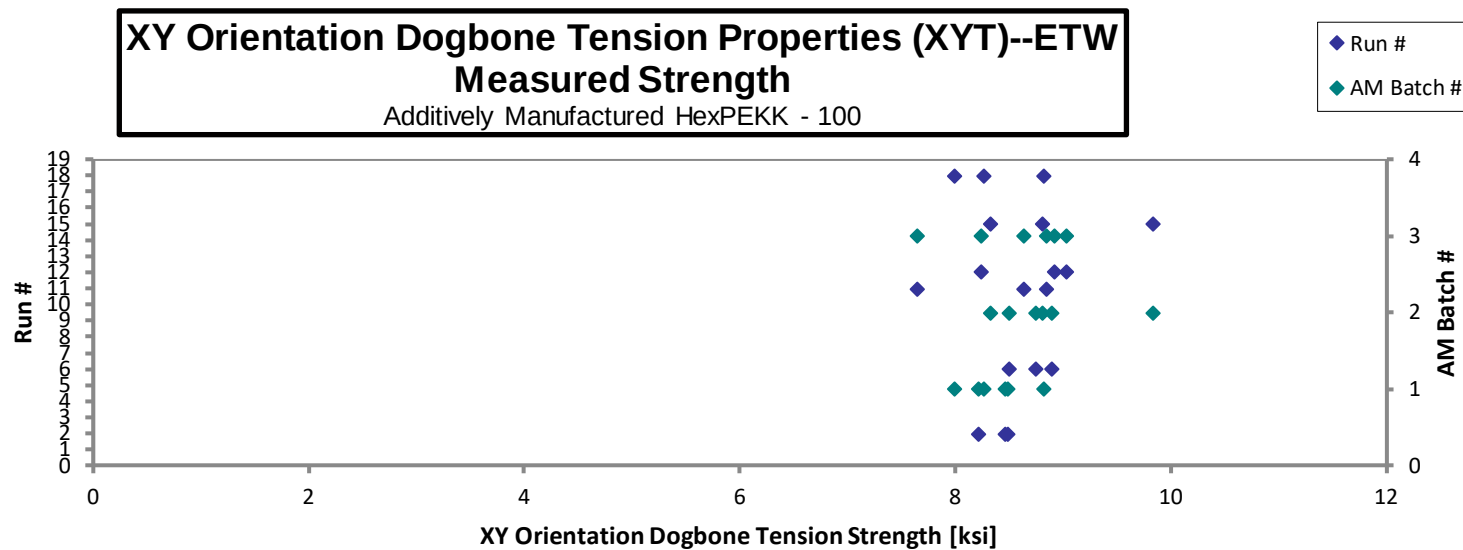
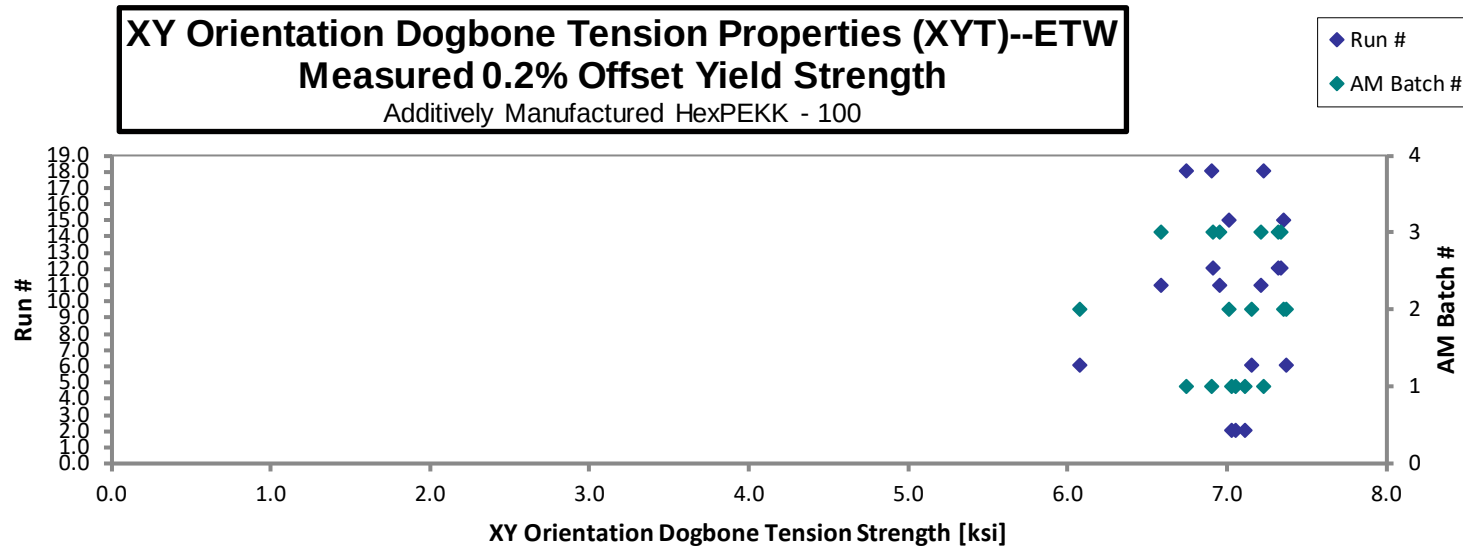
XY Orientation Dogbone Tension Properties (XYT)--ETW**Strength & Modulus**

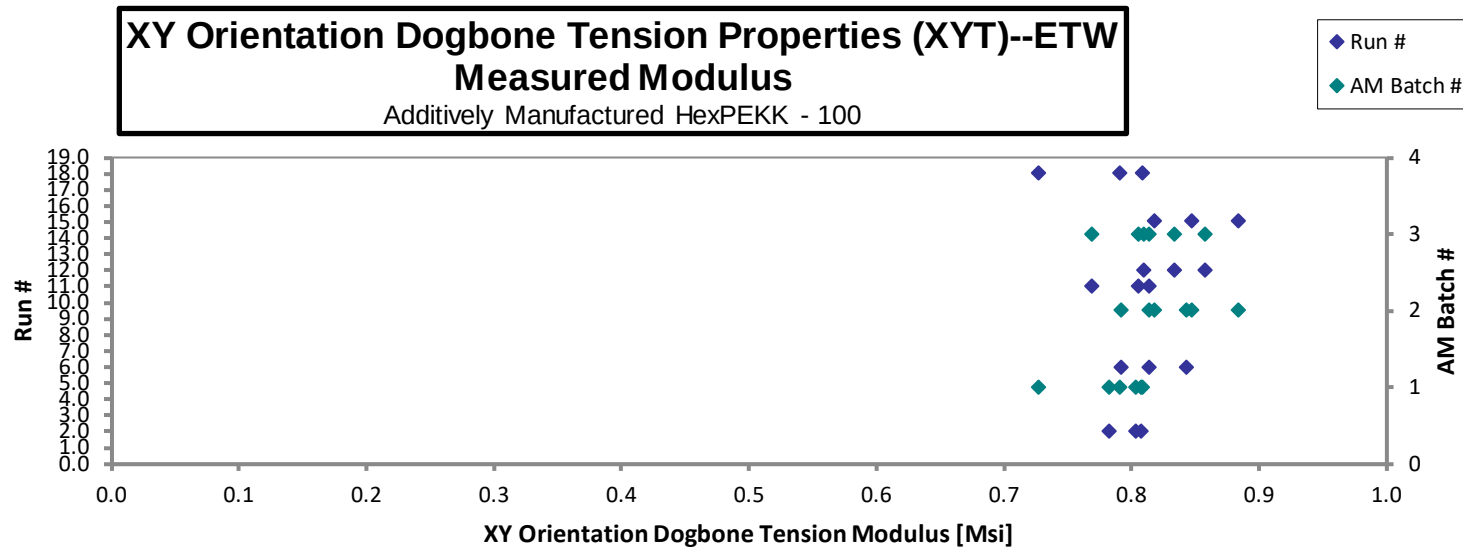
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-XYT-4B-ETW-2	1	18	7.231	8.821	0.8091	0.1471	FAILURE AT GAGE SECTION
HL-A-R18-12-XYT-1T-ETW-5	1	18	6.901	7.989	0.7273	0.1696	FAILURE AT GAGE SECTION
HL-A-R18-12-XYT-5T-ETW-6	1	18	6.746	8.270	0.7908	0.1589	FAILURE AT GAGE SECTION
HL-A-R2-13-XYT-1B-ETW-1	1	2	7.025	8.466	0.7821	0.1532	FAILURE AT GAGE SECTION
HL-A-R2-13-XYT-4T-ETW-3	1	2	7.109	8.212	0.8073	0.1471	FAILURE AT GAGE SECTION
HL-A-R2-13-XYT-5T-ETW-5	1	2	7.051	8.484	0.8037	0.1454	FAILURE AT GAGE SECTION
HL-B-R15-18-XYT-3B-ETW-2	2	15		9.830	0.8843	0.1389	FAILURE AT GAGE SECTION
HL-B-R15-18-XYT-5B-ETW-4	2	15	7.355	8.813	0.8470	0.1456	FAILURE AT GAGE SECTION
HL-B-R15-18-XYT-2T-ETW-6	2	15	7.013	8.323	0.8176	0.1435	FAILURE AT GAGE SECTION
HL-B-R6-8-XYT-2B-ETW-2	2	6	7.371	8.898	0.8435	0.1383	FAILURE AT GAGE SECTION
HL-B-R6-8-XYT-3T-ETW-4	2	6	7.156	8.505	0.8143	0.1479	FAILURE AT GAGE SECTION
HL-B-R6-8-XYT-5T-ETW-6	2	6	6.072	8.746	0.7921	0.1392	FAILURE AT GAGE SECTION
HL-C-R11-6-XYT-4B-ETW-2	3	11	7.212	8.641	0.8137	0.1460	FAILURE AT GAGE SECTION
HL-C-R11-6-XYT-1T-ETW-4	3	11	6.584	7.649	0.7684	0.1426	FAILURE AT GAGE SECTION
HL-C-R11-6-XYT-5T-ETW-6	3	11	6.952	8.844	0.8058	0.1474	FAILURE AT GAGE SECTION
HL-C-R12-3-XYT-2B-ETW-1	3	12	7.335	8.916	0.8574	0.1388	FAILURE AT GAGE SECTION
HL-C-R12-3-XYT-5B-ETW-3	3	12	7.323	9.029	0.8333	0.1465	FAILURE AT GAGE SECTION
HL-C-R12-3-XYT-3T-ETW-5	3	12	6.910	8.240	0.8100	0.1470	FAILURE AT GAGE SECTION

****0.2% offset yield strength was not reported for some coupons as they failed prior to reaching 0.2%**

Average	7.020	8.593	0.8115	0.1468
Standard Dev.	0.3287	0.4756	0.03510	
Coeff. of Var. [%]	4.683	5.534	4.325	
Min.	6.072	7.649	0.7273	0.1383
Max.	7.371	9.830	0.8843	0.1696
Number of Spec.	17	18	18	18





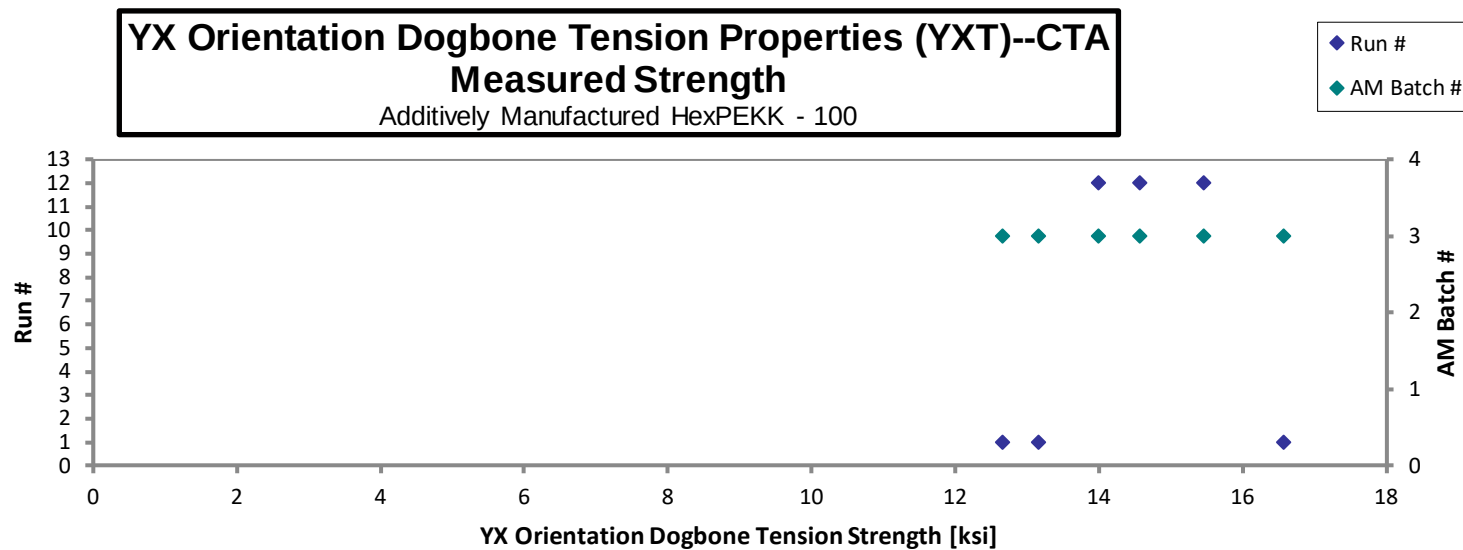
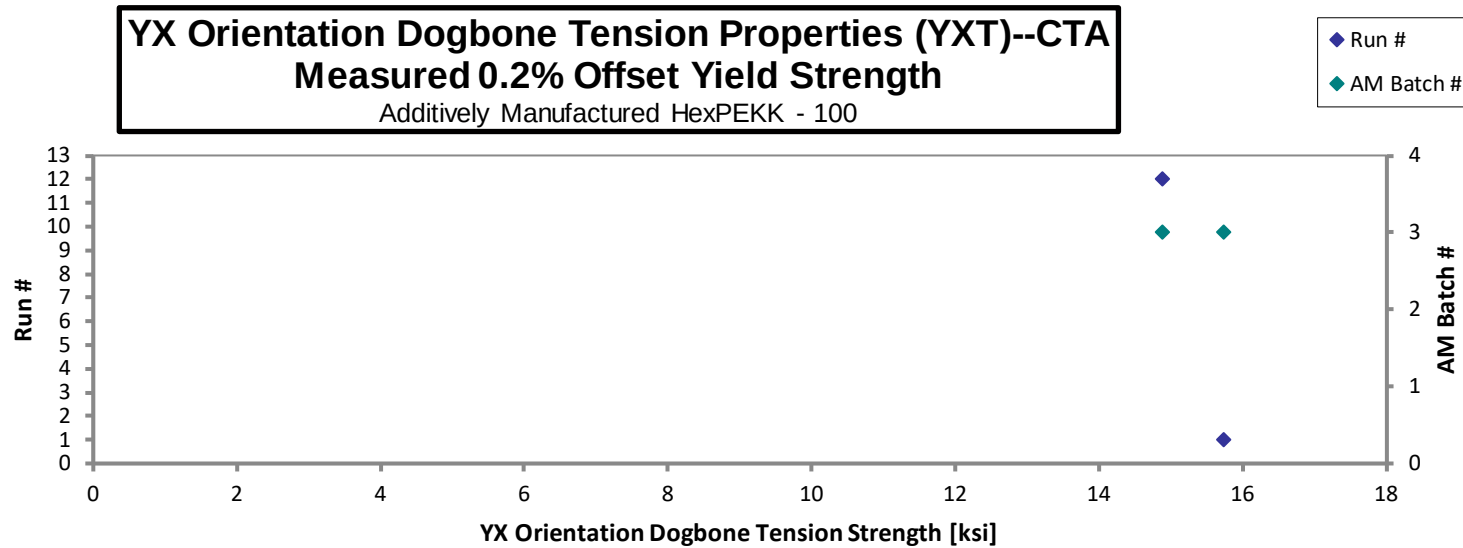
4.2 YX Tension Properties (YXT)

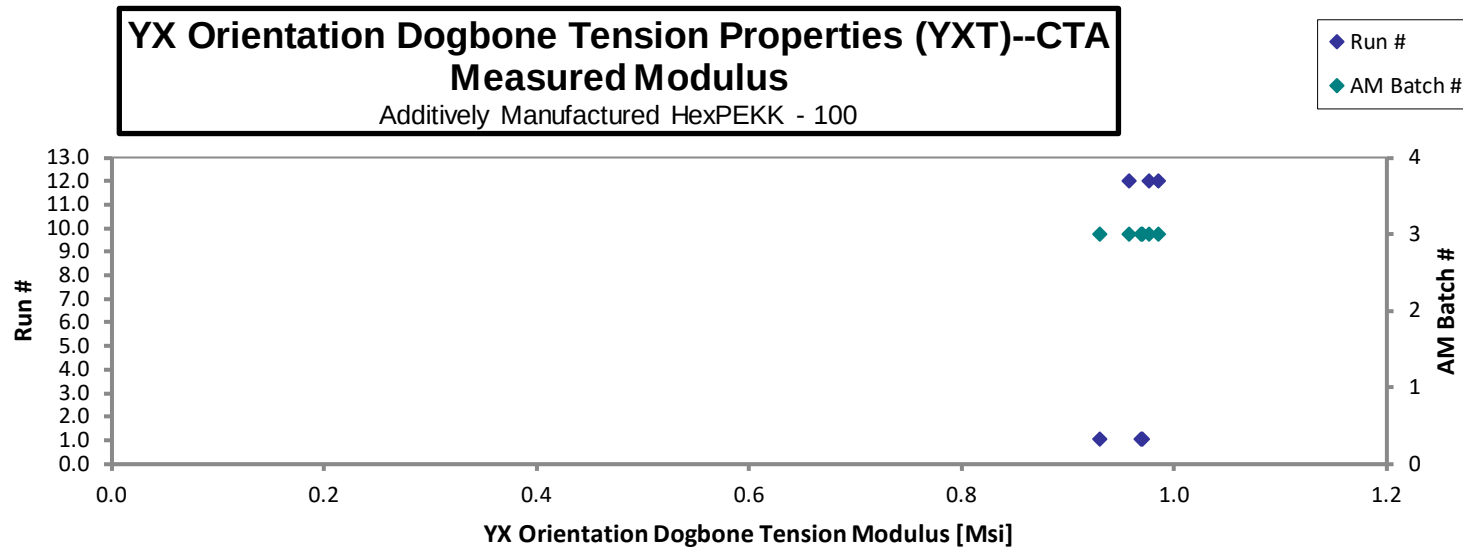
YX Orientation Dogbone Tension Properties (YXT)--CTA□ Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R1-1-YXT-4T-CTA-13	3	1	15.73	16.58	0.9306	0.1489	FAILURE AT GAGE SECTION
HL-C-R1-1-YXT-1B-CTA-7	3	1		12.66	0.9703	0.1393	FAILURE AT GAGE SECTION
HL-C-R1-1-YXT-3B-CTA-9	3	1		13.15	0.9690	0.1475	FAILURE AT GAGE SECTION
HL-C-R12-3-YXT-3B-CTA-10	3	12		14.00	0.9576	0.1507	FAILURE AT GAGE SECTION
HL-C-R12-3-YXT-2T-CTA-11	3	12		14.57	0.9766	0.1391	FAILURE AT GAGE SECTION
HL-C-R12-3-YXT-1B-CTA-8	3	12	14.88	15.45	0.9849	0.1394	FAILURE AT GAGE SECTION

**0.2% offset yield strength was not reported for some coupons as they failed prior to reaching 0.2%	Average	15.30	14.40	0.9648	0.1442
	Standard Dev.	0.6059	1.456	0.01902	
	Coeff. of Var. [%]	3.959	10.11	1.971	
	Min.	14.88	12.66	0.9306	0.1391
	Max.	15.73	16.58	0.9849	0.1507
	Number of Spec.	2	6	6	6



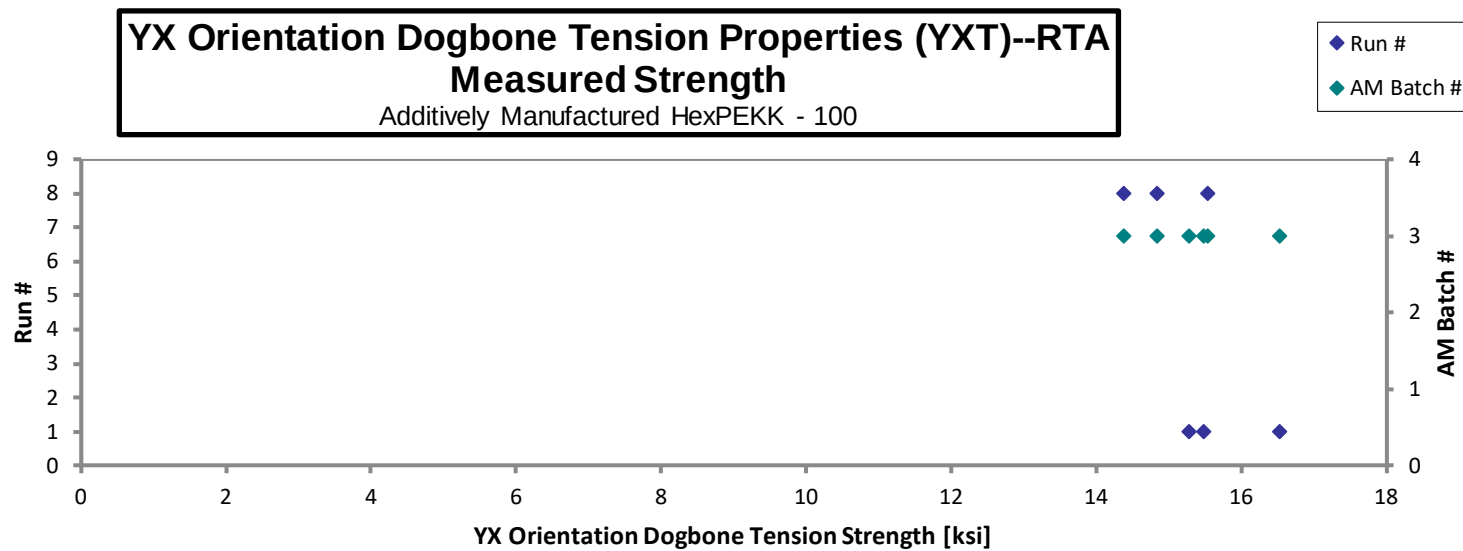
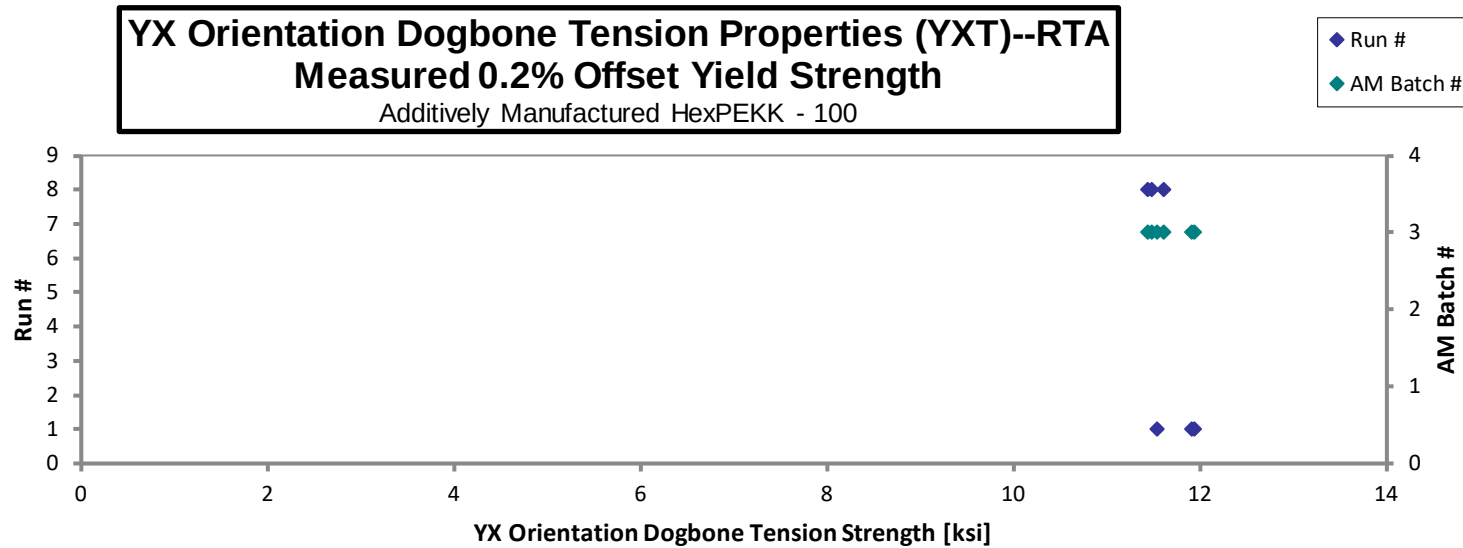


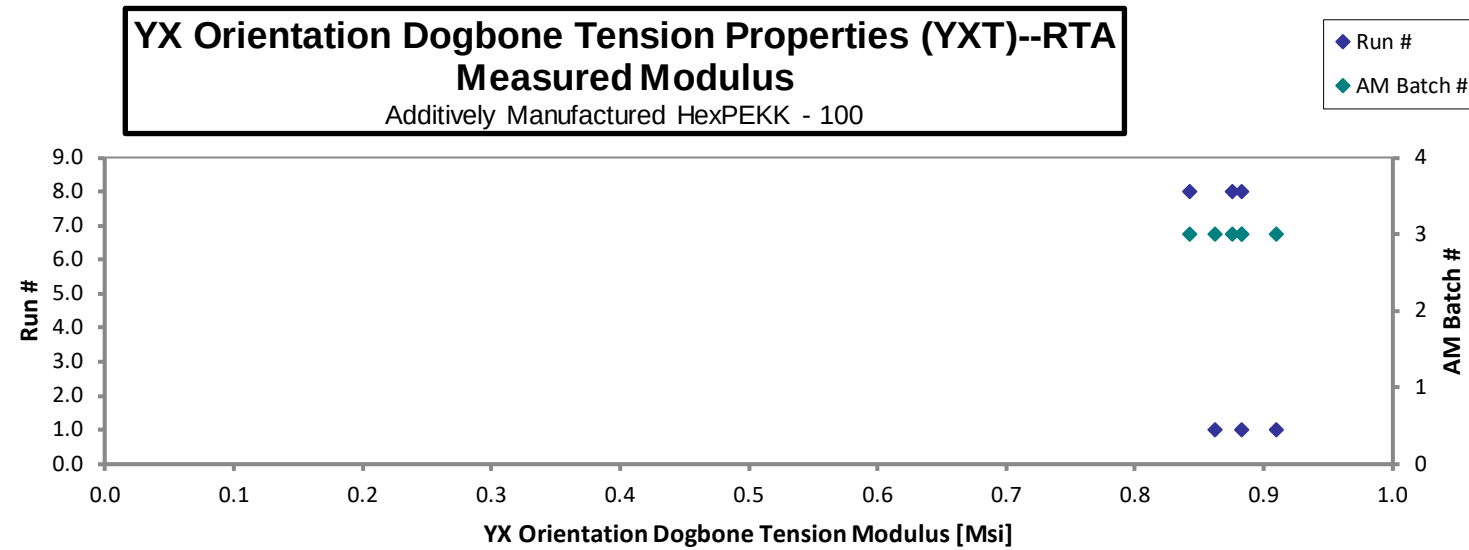
YX Orientation Dogbone Tension Properties (YXT)--RTA□ Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R1-1-YXT-3B-RTA-10	3	1	11.91	16.52	0.8620	0.1455	FAILURE AT GAGE SECTION
HL-C-R1-1-YXT-2T-RTA-11	3	1	11.54	15.28	0.9095	0.1397	FAILURE AT GAGE SECTION
HL-C-R1-1-YXT-1B-RTA-8	3	1	11.94	15.48	0.8826	0.1428	FAILURE AT GAGE SECTION
HL-C-R8-2-YXT-2T-RTA-12	3	8	11.61	14.38	0.8423	0.1414	FAILURE AT GAGE SECTION
HL-C-R8-2-YXT-4T-RTA-14	3	8	11.49	14.85	0.8756	0.1513	FAILURE AT GAGE SECTION
HL-C-R8-2-YXT-1B-RTA-7	3	8	11.44	15.53	0.8828	0.1416	FAILURE AT GAGE SECTION

Average	11.66	15.34	0.8758	0.1437
Standard Dev.	0.2144	0.7256	0.02254	
Coeff. of Var. [%]	1.840	4.730	2.574	
Min.	11.44	14.38	0.8423	0.1397
Max.	11.94	16.52	0.9095	0.1513
Number of Spec.	6	6	6	6



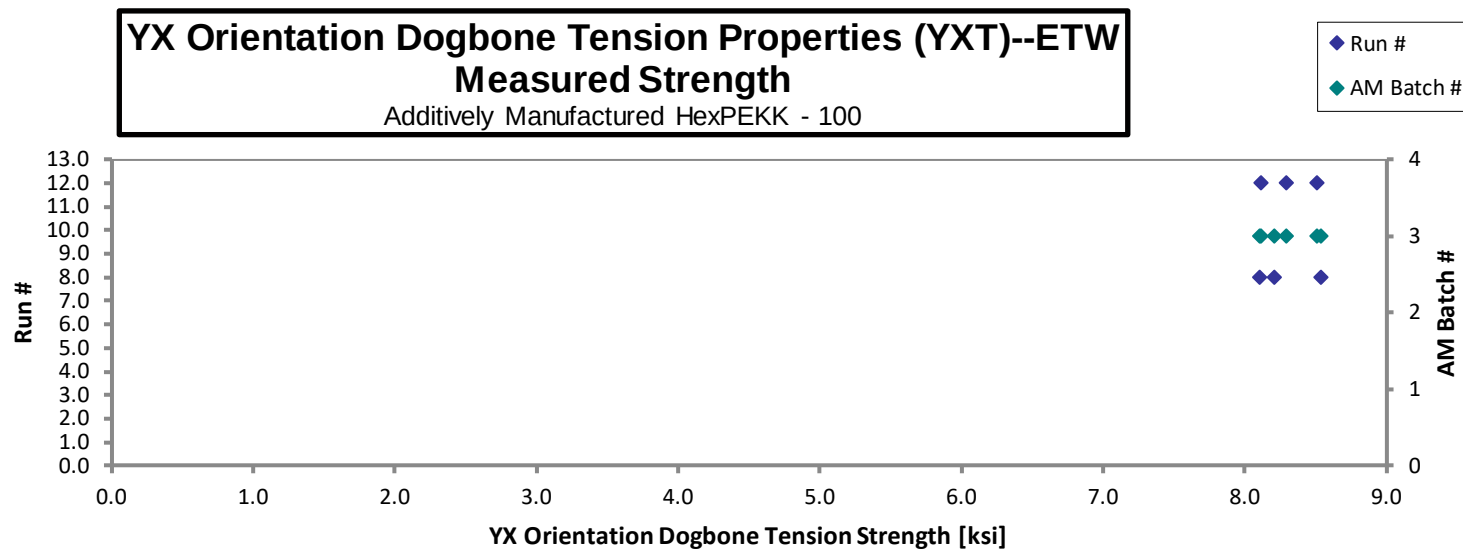
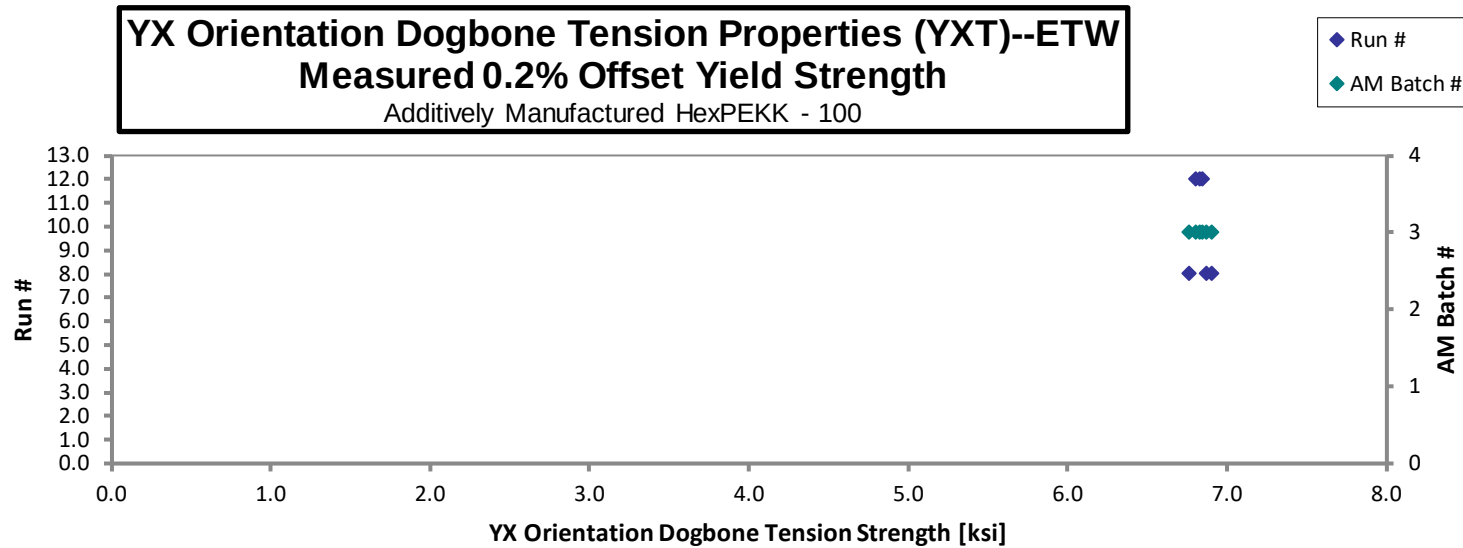


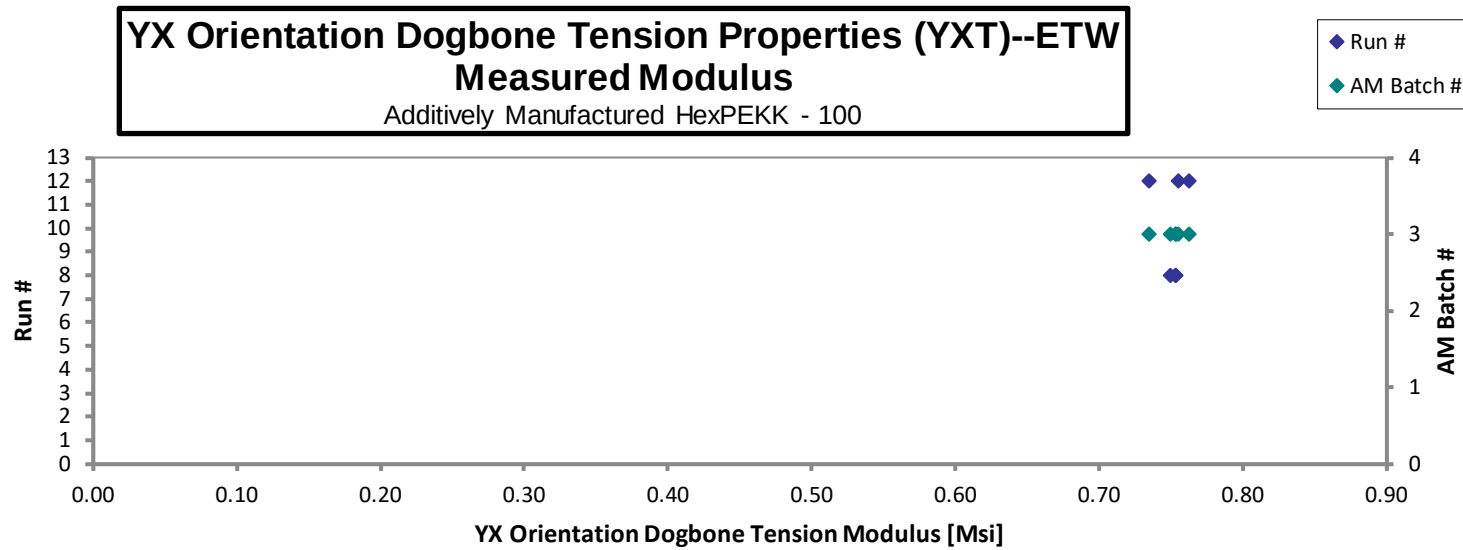
YX Orientation Dogbone Tension Properties (YXT)--ETW **Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R12-3-YXT-2T-ETW-12	3	12	6.844	8.111	0.7622	0.1410	FAILURE AT GAGE SECTION
HL-C-R12-3-YXT-4T-ETW-14	3	12	6.807	8.294	0.7352	0.1483	FAILURE AT GAGE SECTION
HL-C-R12-3-YXT-1B-ETW-7	3	12	6.833	8.512	0.7556	0.1443	FAILURE AT GAGE SECTION
HL-C-R8-2-YXT-3B-ETW-10	3	8	6.903	8.540	0.7530	0.1513	FAILURE AT GAGE SECTION
HL-C-R8-2-YXT-2T-ETW-11	3	8	6.868	8.104	0.7498	0.1426	FAILURE AT GAGE SECTION
HL-C-R8-2-YXT-1B-ETW-8	3	8	6.762	8.204	0.7530	0.1459	FAILURE AT GAGE SECTION

Average	6.836	8.294	0.7515	0.1456
Standard Dev.	0.04879	0.1926	0.008968	
Coeff. of Var. [%]	0.7137	2.322	1.193	
Min.	6.762	8.104	0.7352	0.1410
Max.	6.903	8.540	0.7622	0.1513
Number of Spec.	6	6	6	6





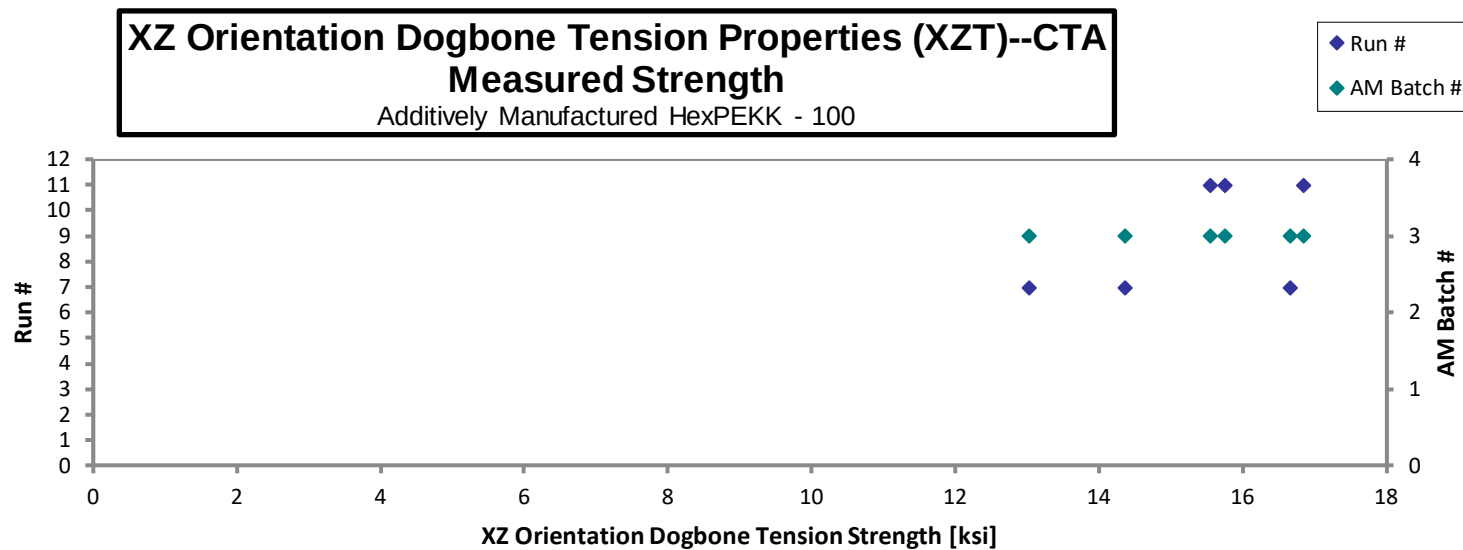
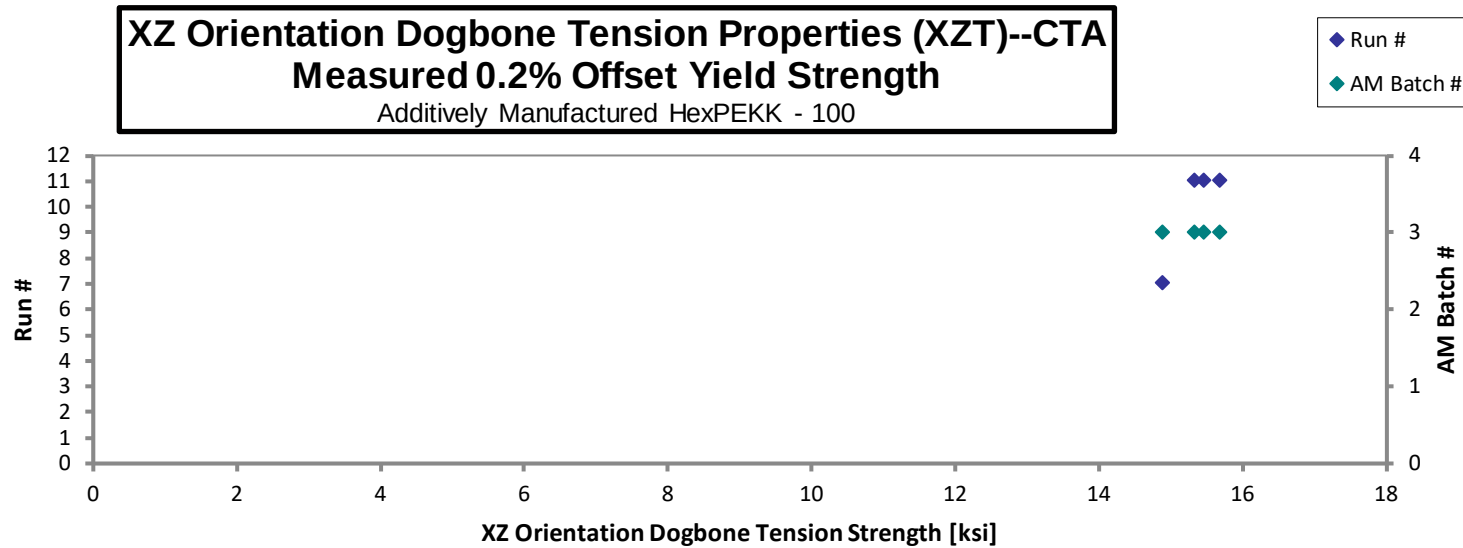
4.3 XZ Tension Properties (XZT)

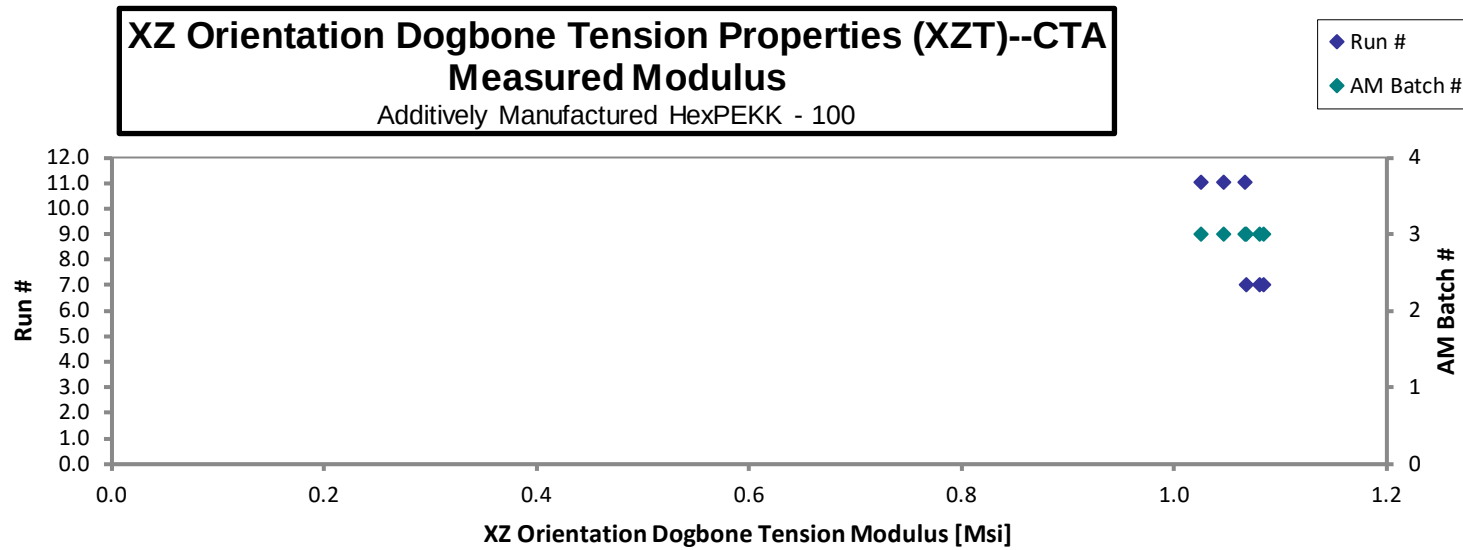
XZ Orientation Dogbone Tension Properties (XZT)--CTA□ Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R11-6-XZT-3B-CTA-10	3	11	15.33	15.55	1.026	0.1395	FAILURE AT GAGE SECTION
HL-C-R11-6-XZT-2T-CTA-11	3	11	15.67	15.76	1.047	0.1341	FAILURE AT GAGE SECTION
HL-C-R11-6-XZT-1B-CTA-8	3	11	15.45	16.85	1.067	0.1335	FAILURE AT GAGE SECTION
HL-C-R7-4-XZT-4T-CTA-13	3	7	14.89	16.66	1.080	0.1376	FAILURE AT GAGE SECTION
HL-C-R7-4-XZT-1B-CTA-7	3	7		13.03	1.085	0.1311	FAILURE AT GAGE SECTION
HL-C-R7-4-XZT-3B-CTA-9	3	7		14.36	1.068	0.1391	FAILURE AT GAGE SECTION

**0.2% offset yield strength was not reported for some coupons as they failed prior to reaching 0.2%	Average	15.34	15.37	1.062	0.1358
	Standard Dev.	0.3316	1.452	0.02212	
	Coeff. of Var. [%]	2.162	9.447	2.082	
	Min.	14.89	13.03	1.026	0.1311
	Max.	15.67	16.85	1.085	0.1395
	Number of Spec.	4	6	6	6



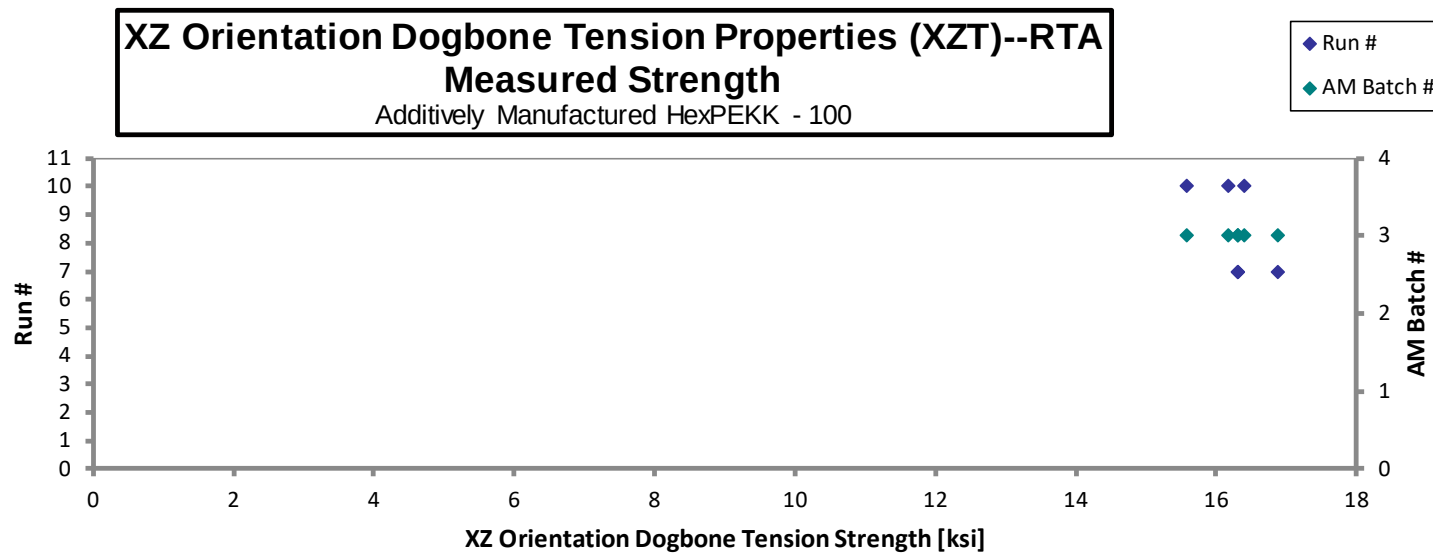
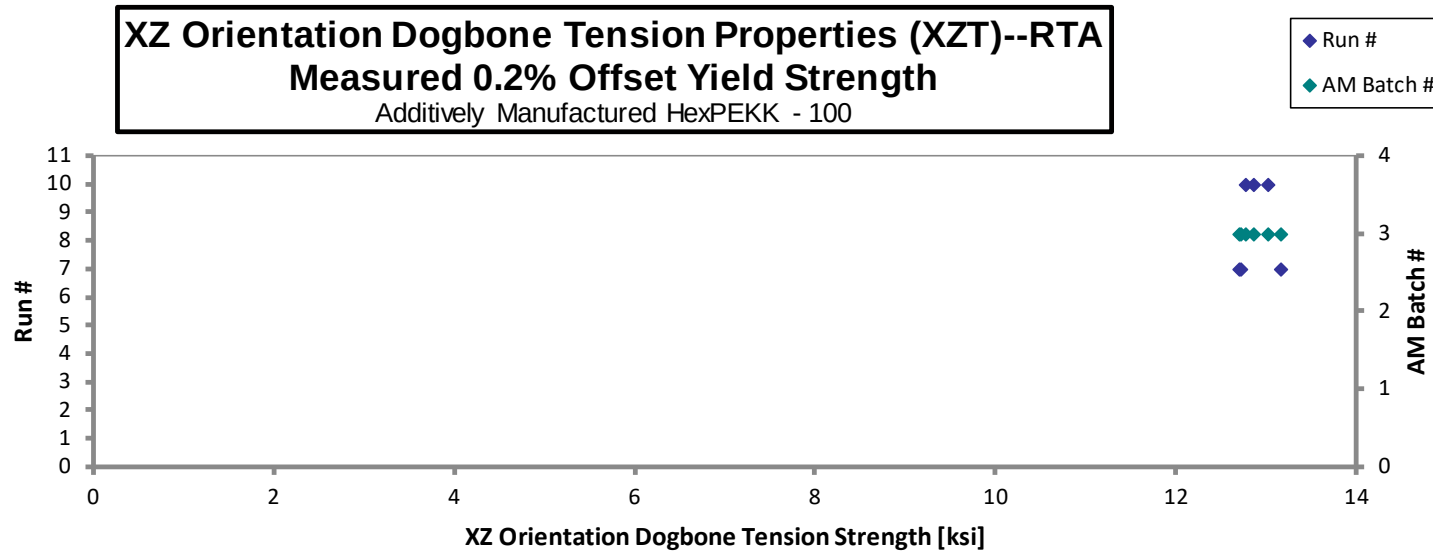


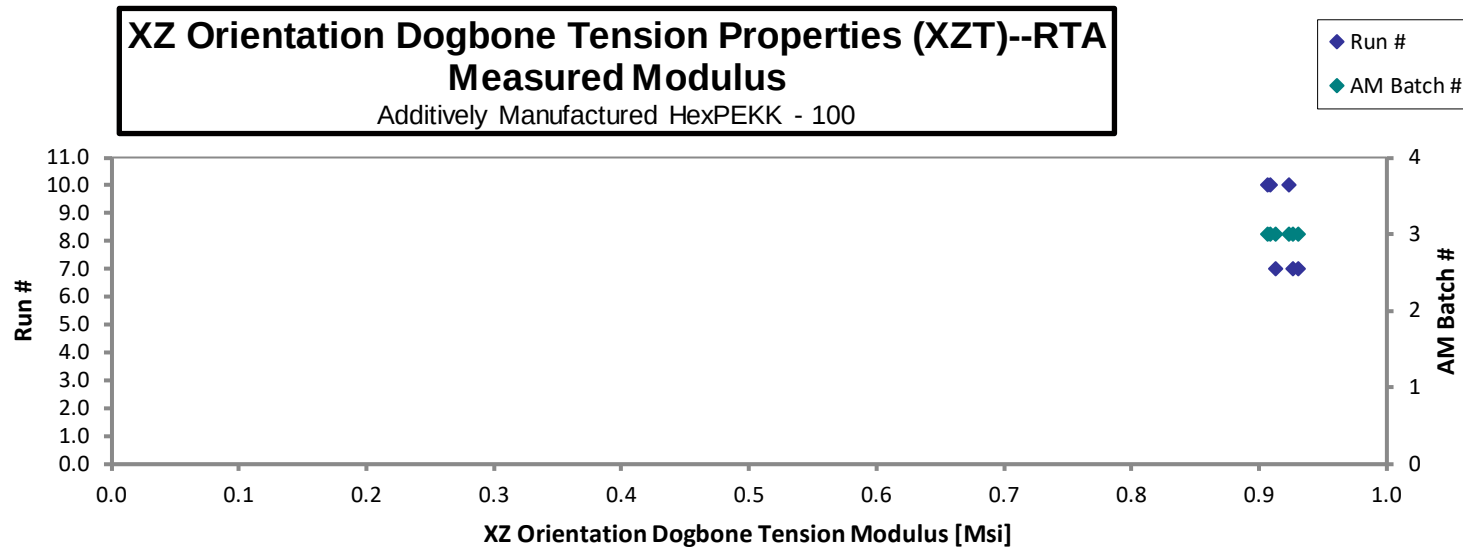
XZ Orientation Dogbone Tension Properties (XZT)--RTA□ Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R10-5-XZT-4T-RTA-14	3	10	12.86	15.59	0.9236	0.1370	FAILURE AT GAGE SECTION
HL-C-R10-5-XZT-1B-RTA-7	3	10	12.78	16.40	0.9068	0.1366	FAILURE AT GAGE SECTION
HL-C-R10-5-XZT-3B-RTA-9	3	10	13.02	16.17	0.9090	0.1387	FAILURE AT GAGE SECTION
HL-C-R7-4-XZT-3B-RTA-10	3	7	12.73	16.32	0.9135	0.1385	FAILURE AT GAGE SECTION
HL-C-R7-4-XZT-2T-RTA-11	3	7	12.70	16.31	0.9264	0.1331	FAILURE AT GAGE SECTION
HL-C-R7-4-XZT-1B-RTA-8	3	7	13.16	16.87	0.9312	0.1318	FAILURE AT GAGE SECTION

Average	12.88	16.28	0.9184	0.1359
Standard Dev.	0.1822	0.4139	0.01001	
Coeff. of Var. [%]	1.415	2.543	1.090	
Min.	12.70	15.59	0.9068	0.1318
Max.	13.16	16.87	0.9312	0.1387
Number of Spec.	6	6	6	6



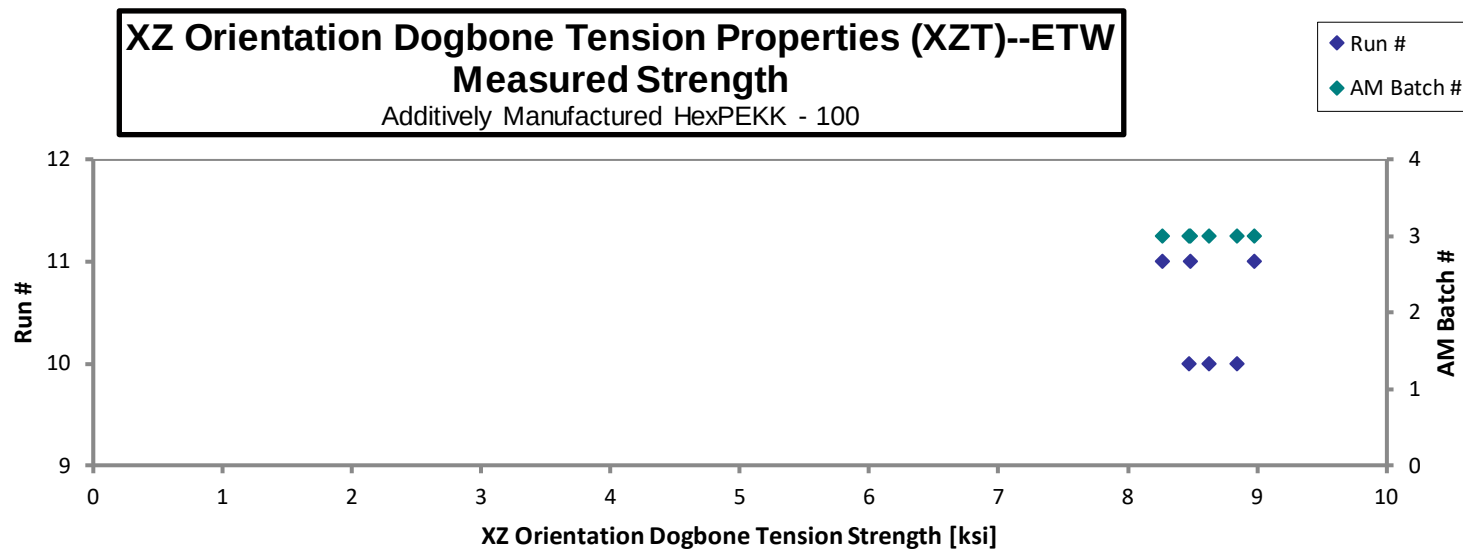
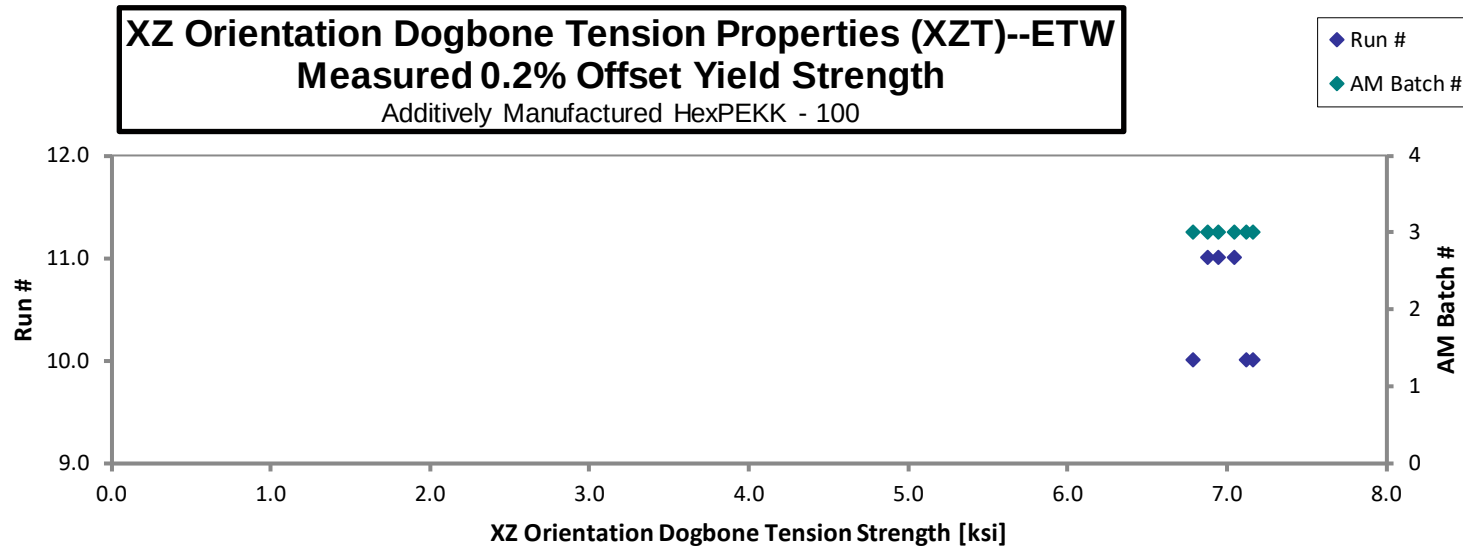


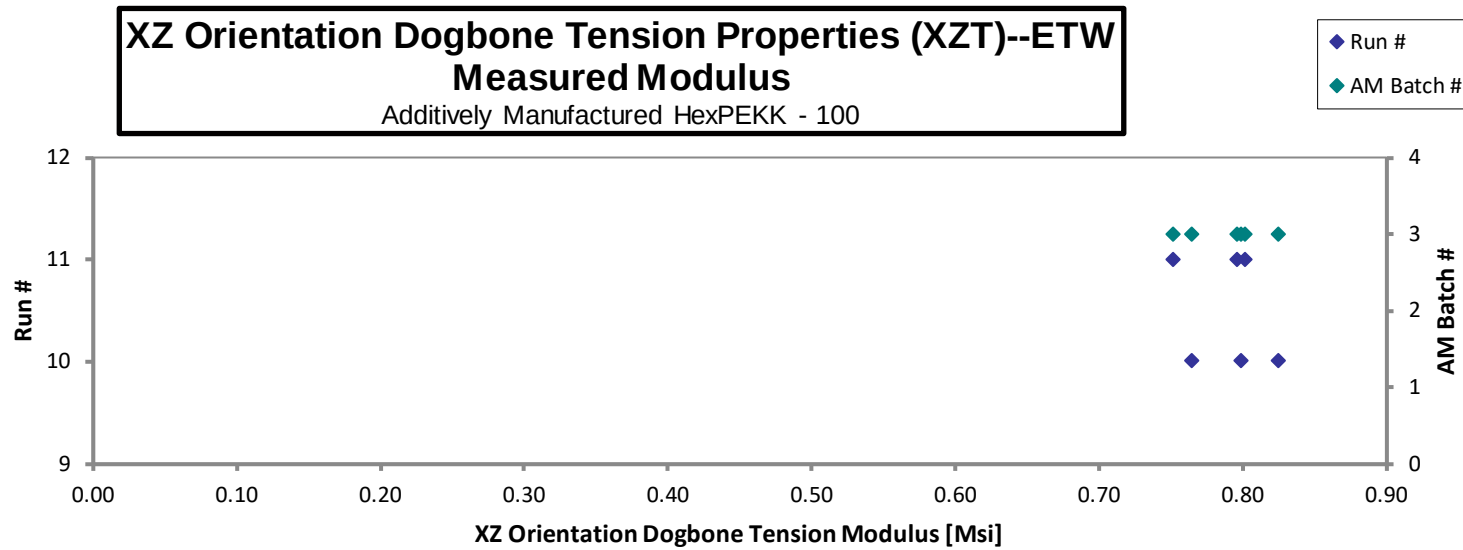
XZ Orientation Dogbone Tension Properties (XZT)--ETW□ Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R10-5-XZT-3B-ETW-10	3	10	6.787	8.472	0.7647	0.1440	FAILURE AT GAGE SECTION
HL-C-R10-5-XZT-2T-ETW-11	3	10	7.117	8.629	0.7985	0.1366	FAILURE AT GAGE SECTION
HL-C-R10-5-XZT-1B-ETW-8	3	10	7.165	8.841	0.8249	0.1364	FAILURE AT GAGE SECTION
HL-C-R11-6-XZT-4T-ETW-14	3	11	6.946	8.271	0.7962	0.1366	FAILURE AT GAGE SECTION
HL-C-R11-6-XZT-1B-ETW-7	3	11	7.047	8.978	0.8012	0.1329	FAILURE AT GAGE SECTION
HL-C-R11-6-XZT-3B-ETW-9	3	11	6.879	8.480	0.7517	0.1399	FAILURE AT GAGE SECTION

Average	6.990	8.612	0.7895	0.1377
Standard Dev.	0.1451	0.2609	0.02671	
Coeff. of Var. [%]	2.076	3.030	3.383	
Min.	6.787	8.271	0.7517	0.1329
Max.	7.165	8.978	0.8249	0.1440
Number of Spec.	6	6	6	6





4.4 ZX Tension Properties (ZXT)

ZX Orientation Dogbone Tension Properties (ZXT)--CTA□

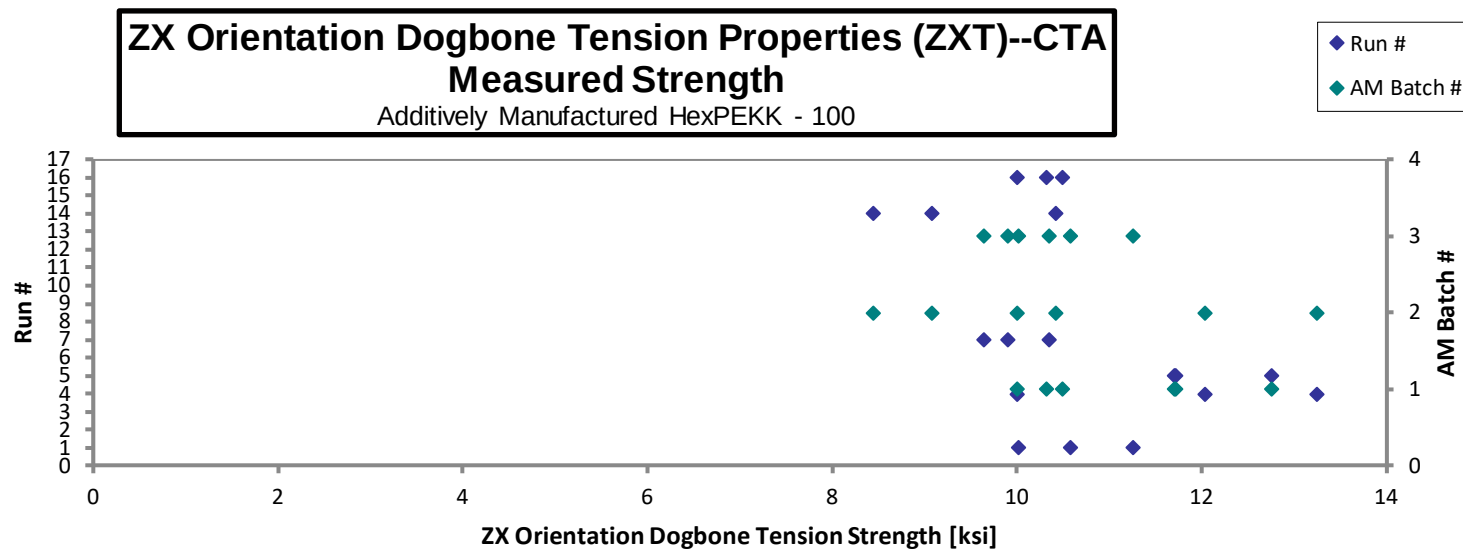
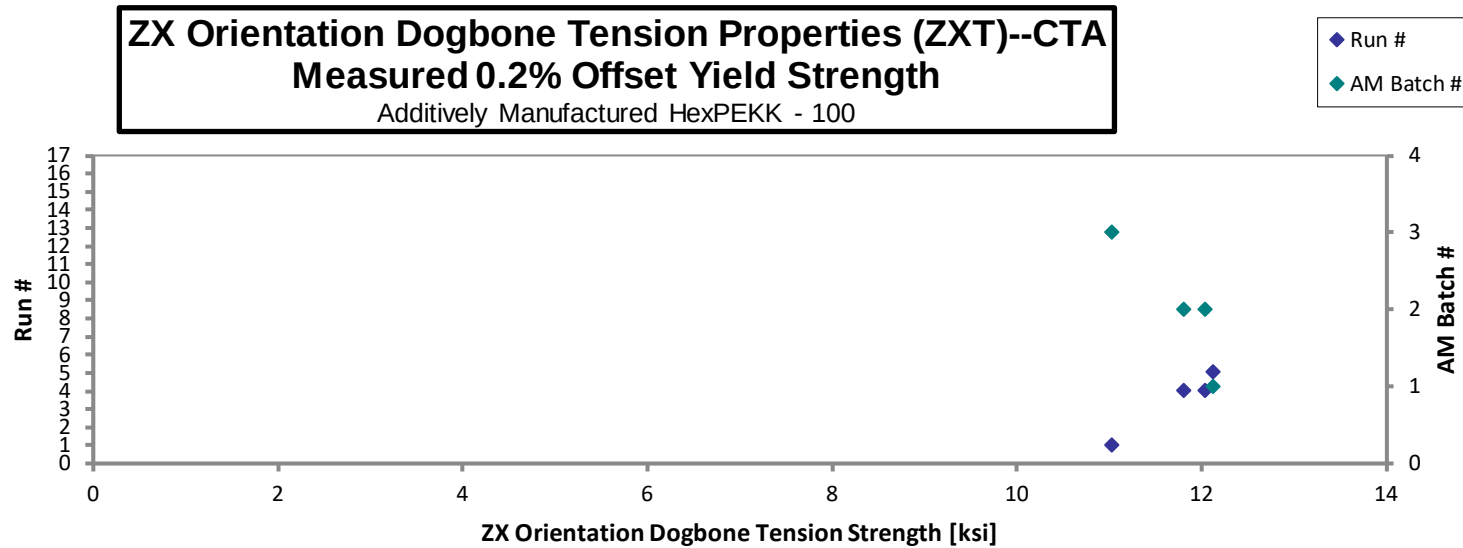
Strength & Modulus□

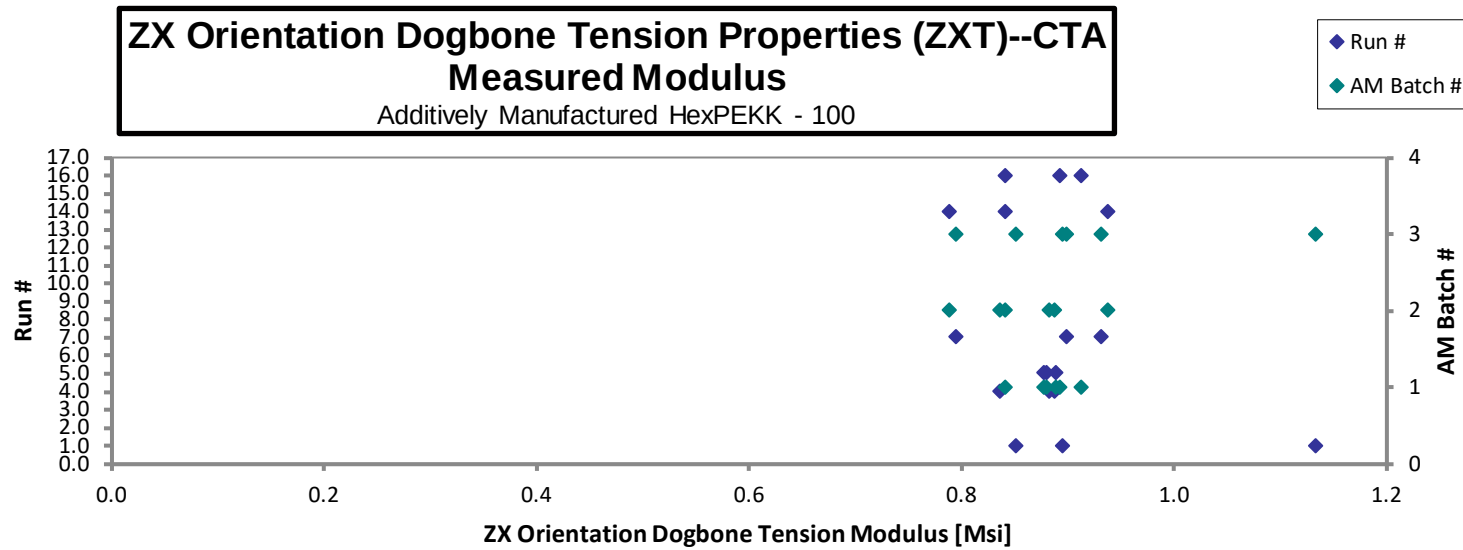
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXT-5T-CTA-11	1	16		9.996	0.9124	0.1489	FAILURE AT GAGE SECTION
HL-A-R16-10-ZXT-3B-CTA-7	1	16		10.32	0.8920	0.1518	FAILURE AT GAGE SECTION
HL-A-R16-10-ZXT-2T-CTA-9	1	16		10.49	0.8411	0.1447	FAILURE AT GAGE SECTION
HL-A-R5-15-ZXT-5B-CTA-10	1	5		11.70	0.8773	0.1397	FAILURE AT GAGE SECTION
HL-A-R5-15-ZXT-3T-CTA-12	1	5		11.72	0.8802	0.1380	FAILURE AT GAGE SECTION
HL-A-R5-15-ZXT-4B-CTA-8	1	5	12.13	12.76	0.8886	0.1370	FAILURE AT GAGE SECTION
HL-B-R14-17-ZXT-4T-CTA-11	2	14		9.082	0.7886	0.1345	FAILURE AT GAGE SECTION
HL-B-R14-17-ZXT-1B-CTA-7	2	14		8.440	0.9376	0.1474	FAILURE AT GAGE SECTION
HL-B-R14-17-ZXT-5B-CTA-9	2	14		10.42	0.8417	0.1345	FAILURE AT GAGE SECTION
HL-B-R4-7-ZXT-5T-CTA-11	2	4	11.80	13.25	0.8882	0.1415	FAILURE AT GAGE SECTION
HL-B-R4-7-ZXT-1T-CTA-7	2	4		9.999	0.8822	0.1390	FAILURE AT GAGE SECTION
HL-B-R4-7-ZXT-4B-CTA-9	2	4	12.03	12.03	0.8359	0.1448	FAILURE AT GAGE SECTION
HL-C-R1-1-ZXT-1T-CTA-15	3	1		10.01	0.8509	0.1409	FAILURE AT GAGE SECTION
HL-C-R1-1-ZXT-4B-CTA-17	3	1	11.03	11.26	1.133	0.1424	FAILURE AT GAGE SECTION
HL-C-R1-1-ZXT-5T-CTA-19	3	1		10.58	0.8948	0.1375	FAILURE AT GAGE SECTION
HL-C-R7-4-ZXT-2B-CTA-15	3	7		9.903	0.7949	0.1385	FAILURE AT GAGE SECTION
HL-C-R7-4-ZXT-3T-CTA-17	3	7		9.646	0.9316	0.1382	FAILURE AT GAGE SECTION
HL-C-R7-4-ZXT-5T-CTA-19	3	7		10.35	0.8988	0.1426	FAILURE AT GAGE SECTION

**0.2% offset yield strength was not reported for some coupons as they failed prior to reaching 0.2%

Average	11.75	10.66	0.8872	0.1412
Standard Dev.	0.4990	1.242	0.07375	
Coeff. of Var. [%]	4.247	11.64	8.312	
Min.	11.03	8.440	0.7886	0.1345
Max.	12.13	13.25	1.133	0.1518
Number of Spec.	4	18	18	18





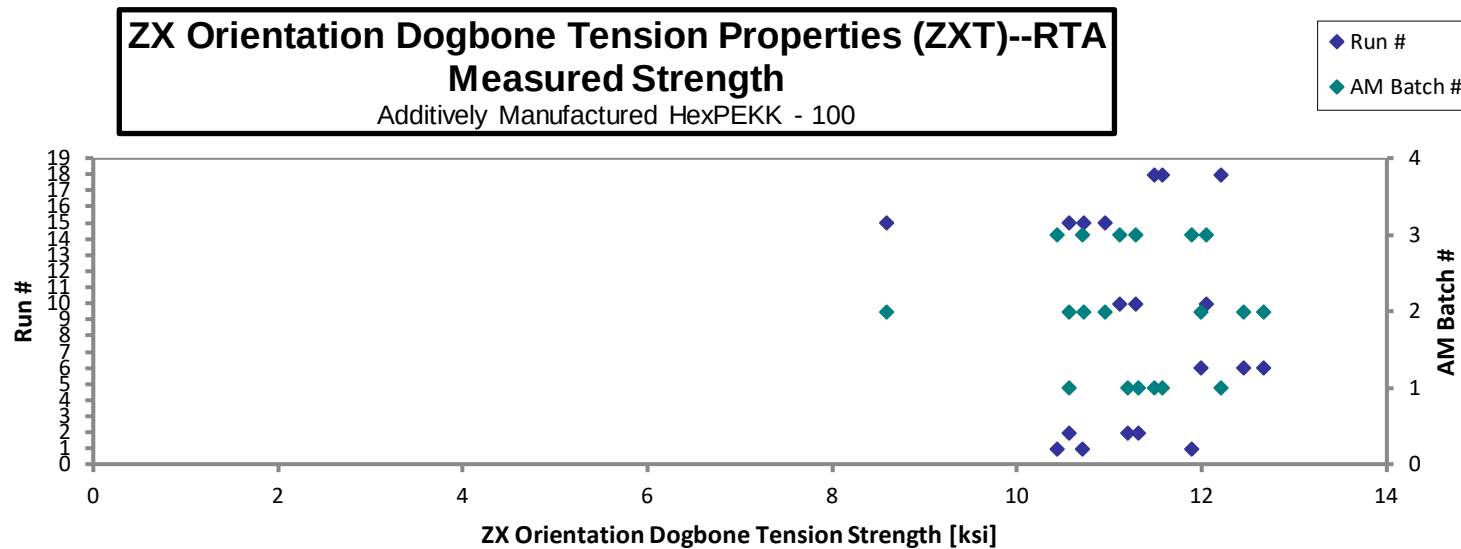
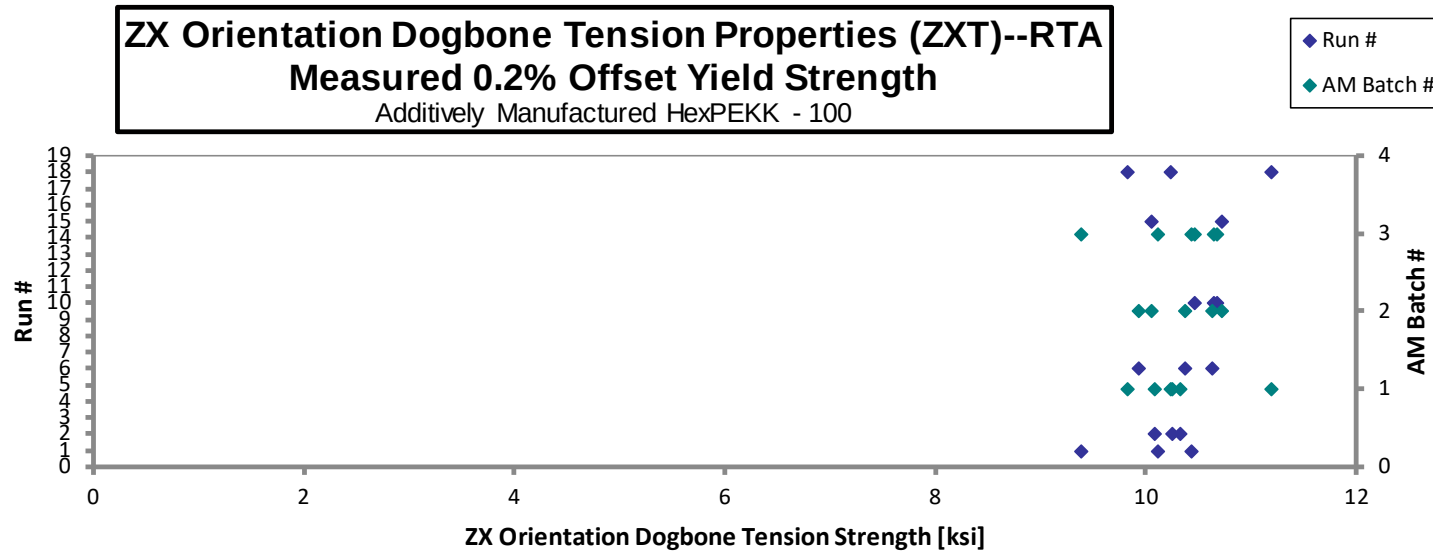
ZX Orientation Dogbone Tension Properties (ZXT)--RTA**Strength & Modulus**

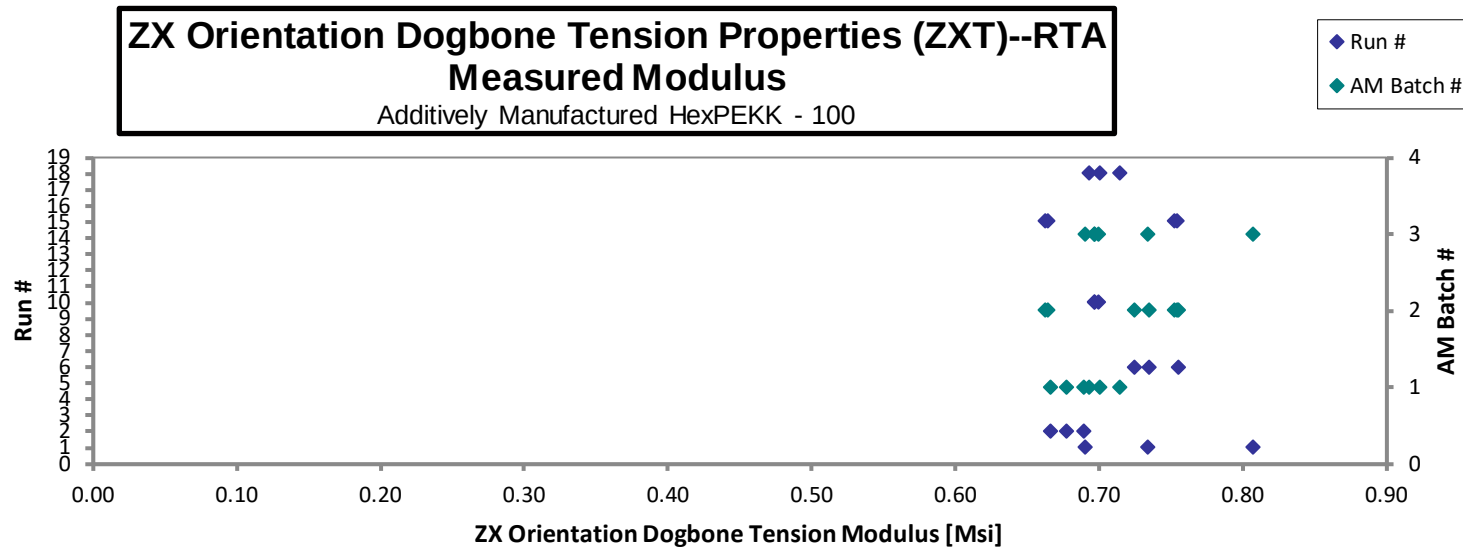
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-ZXT-5T-RTA-11	1	18	9.824	12.21	0.6934	0.1490	FAILURE AT GAGE SECTION
HL-A-R18-12-ZXT-3B-RTA-7	1	18	11.19	11.49	0.7009	0.1508	FAILURE AT GAGE AND FILLET SECTION
HL-A-R18-12-ZXT-2T-RTA-9	1	18	10.23	11.58	0.7146	0.1445	FAILURE AT GAGE SECTION
HL-A-R2-13-ZXT-3T-RTA-11	1	2	10.24	10.56	0.6665	0.1421	FAILURE AT GAGE SECTION
HL-A-R2-13-ZXT-4B-RTA-7	1	2	10.34	11.20	0.6776	0.1422	FAILURE AT GAGE AND FILLET SECTION
HL-A-R2-13-ZXT-5B-RTA-9	1	2	10.08	11.32	0.6891	0.1431	FAILURE AT GAGE SECTION
HL-B-R15-18-ZXT-5B-RTA-10	2	15		8.587	0.7539	0.1347	FAILURE AT GAGE SECTION
HL-B-R15-18-ZXT-4T-RTA-12	2	15	10.06	10.96	0.7528	0.1321	FAILURE AT GAGE SECTION
HL-B-R15-18-ZXT-1B-RTA-7	2	15		10.56	0.6627	0.1422	FAILURE AT GAGE SECTION
HL-B-R15-18-ZXT-1B-RTA-8	2	15	10.72	10.72	0.6647	0.1418	FAILURE AT GAGE SECTION
HL-B-R6-8-ZXT-5T-RTA-11	2	6	9.940	11.99	0.7246	0.1403	FAILURE AT GAGE SECTION
HL-B-R6-8-ZXT-1T-RTA-7	2	6	10.38	12.45	0.7556	0.1342	FAILURE AT GAGE SECTION
HL-B-R6-8-ZXT-4B-RTA-9	2	6	10.63	12.67	0.7353	0.1404	FAILURE AT GAGE SECTION
HL-C-R1-1-ZXT-1T-RTA-16	3	1	10.43	10.44	0.6906	0.1401	FAILURE AT GAGE SECTION
HL-C-R1-1-ZXT-4B-RTA-18	3	1	9.387	10.71	0.8070	0.1422	FAILURE AT GAGE SECTION
HL-C-R1-1-ZXT-5T-RTA-20	3	1	10.12	11.89	0.7338	0.1382	FAILURE AT GAGE SECTION
HL-C-R10-5-ZXT-2B-RTA-16	3	10	10.65	12.05	0.6968	0.1459	FAILURE AT GAGE SECTION
HL-C-R10-5-ZXT-3T-RTA-18	3	10	10.68	11.11	0.6970	0.1426	FAILURE AT GAGE AND FILLET SECTION
HL-C-R10-5-ZXT-5T-RTA-20	3	10	10.47	11.28	0.6991	0.1443	FAILURE AT GAGE SECTION

**0.2% offset yield strength was not reported for some coupons as they failed prior to reaching 0.2%

Average	10.32	11.25	0.7114	0.1416
Standard Dev.	0.4128	0.9283	0.03764	
Coeff. of Var. [%]	4.002	8.251	5.291	
Min.	9.387	8.587	0.6627	0.1321
Max.	11.19	12.67	0.8070	0.1508
Number of Spec.	17	19	19	19



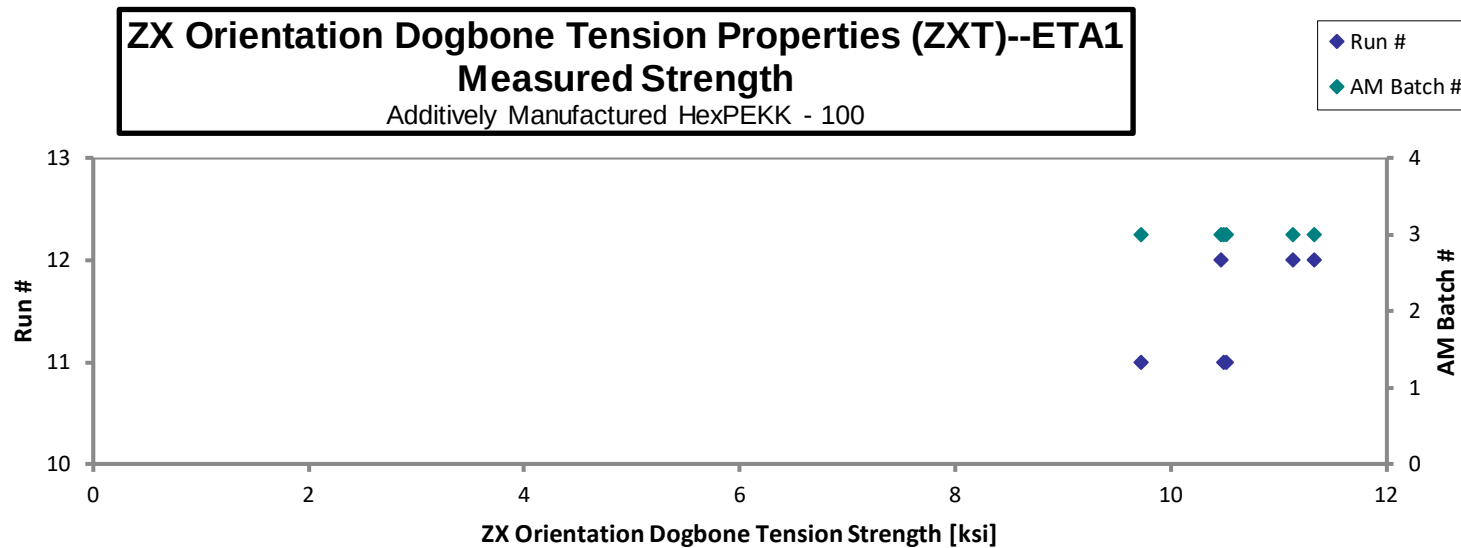
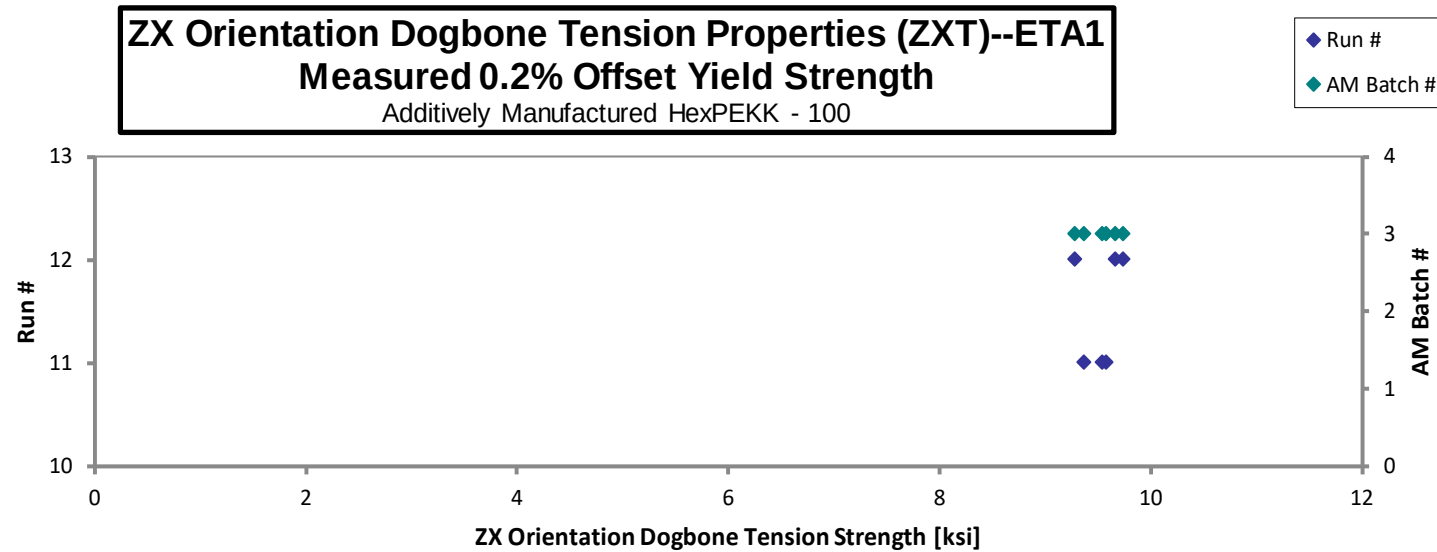


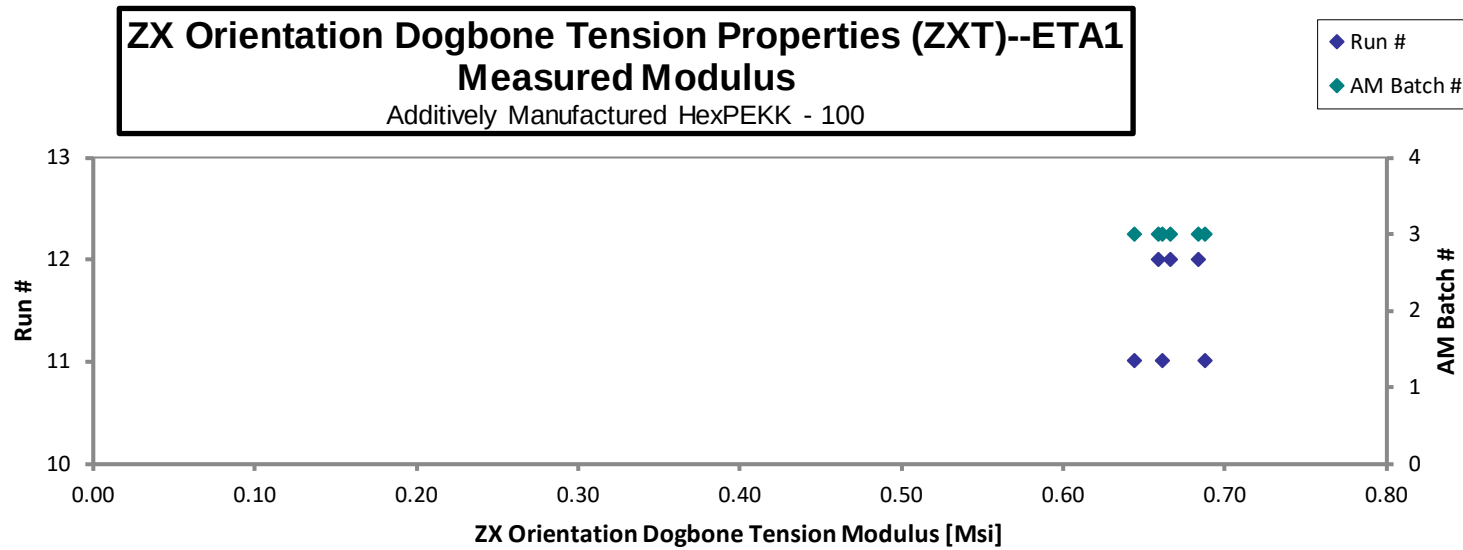
ZX Orientation Dogbone Tension Properties (ZXT)--ETA1 □ Strength & Modulus □

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R11-6-ZXT-2B-ETA1-15	3	11	9.537	10.51	0.6881	0.1418	FAILURE AT GAGE SECTION
HL-C-R11-6-ZXT-3T-ETA1-17	3	11	9.570	9.719	0.6445	0.1380	FAILURE AT GAGE SECTION
HL-C-R11-6-ZXT-5T-ETA1-19	3	11	9.359	10.49	0.6616	0.1410	FAILURE AT GAGE SECTION
HL-C-R12-3-ZXT-1T-ETA1-16	3	12	9.663	11.13	0.6661	0.1437	FAILURE AT GAGE SECTION
HL-C-R12-3-ZXT-4B-ETA1-18	3	12	9.740	10.46	0.6592	0.1447	FAILURE AT GAGE SECTION
HL-C-R12-3-ZXT-5T-ETA1-20	3	12	9.280	11.34	0.6840	0.1415	FAILURE AT GAGE SECTION

Average	9.525	10.61	0.6673	0.1418
Standard Dev.	0.1760	0.5718	0.01632	
Coeff. of Var. [%]	1.847	5.390	2.446	
Min.	9.280	9.719	0.6445	0.1380
Max.	9.740	11.34	0.6881	0.1447
Number of Spec.	6	6	6	6



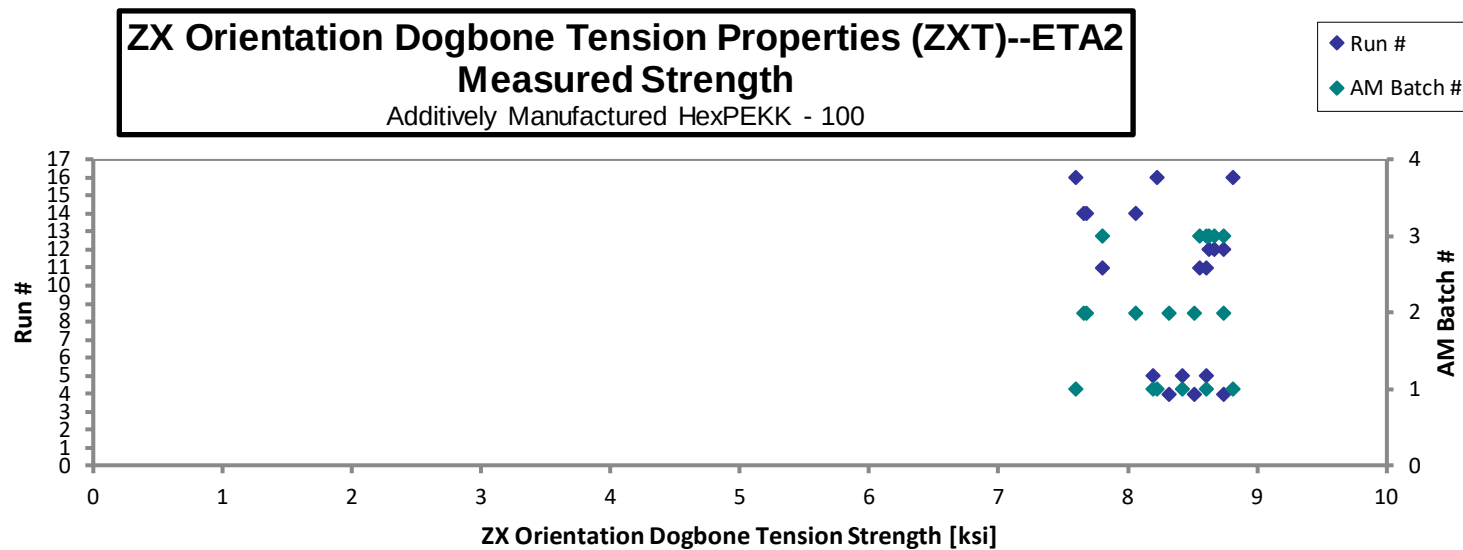
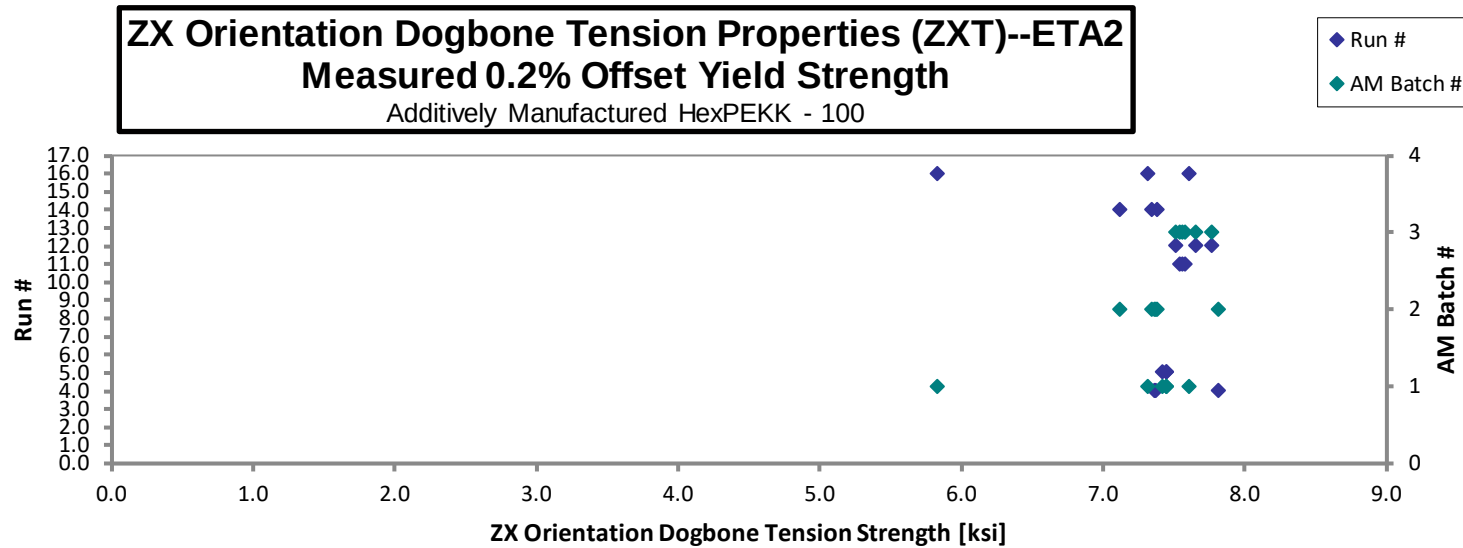


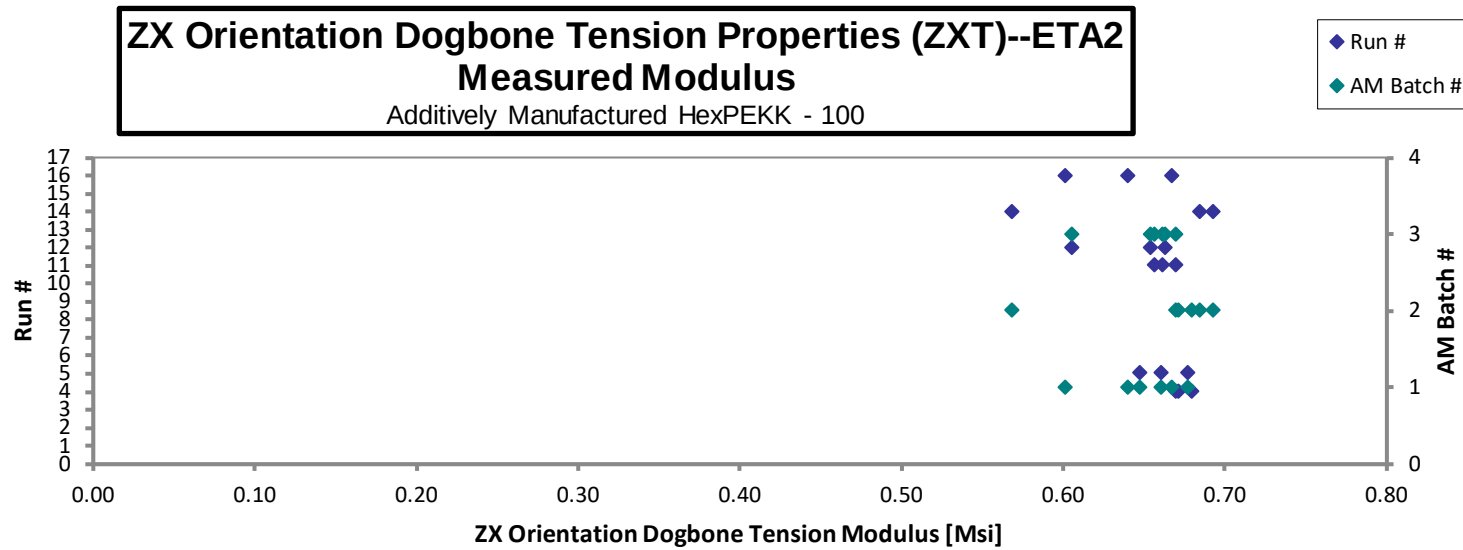
ZX Orientation Dogbone Tension Properties (ZXT)--ETA2**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXT-2T-ETA2-10	1	16	7.312	8.227	0.6399	0.1480	FAILURE AT GAGE SECTION
HL-A-R16-10-ZXT-5T-ETA2-12	1	16	5.830	7.596	0.6011	0.1515	FAILURE AT GAGE SECTION
HL-A-R16-10-ZXT-3B-ETA2-8	1	16	7.610	8.812	0.6671	0.1526	FAILURE AT GAGE SECTION
HL-A-R5-15-ZXT-3T-ETA2-11	1	5	7.418	8.198	0.6608	0.1378	FAILURE AT GAGE SECTION
HL-A-R5-15-ZXT-4B-ETA2-7	1	5	7.449	8.613	0.6767	0.1388	FAILURE AT GAGE SECTION
HL-A-R5-15-ZXT-5B-ETA2-9	1	5	7.443	8.421	0.6478	0.1431	FAILURE AT GAGE SECTION
HL-B-R14-17-ZXT-5B-ETA2-10	2	14	7.385	7.656	0.6848	0.1343	FAILURE AT GAGE SECTION
HL-B-R14-17-ZXT-4T-ETA2-12	2	14	7.344	8.061	0.6927	0.1331	FAILURE AT GAGE SECTION
HL-B-R14-17-ZXT-1B-ETA2-8	2	14	7.122	7.680	0.5682	0.1441	FAILURE AT GAGE SECTION
HL-B-R4-7-ZXT-4B-ETA2-10	2	4	7.368	8.516	0.6700	0.1430	FAILURE AT GAGE SECTION
HL-B-R4-7-ZXT-5T-ETA2-12	2	4	7.361	8.318	0.6794	0.1410	FAILURE AT GAGE SECTION
HL-B-R4-7-ZXT-1T-ETA2-8	2	4	7.810	8.744	0.6710	0.1341	FAILURE AT GAGE SECTION
HL-C-R11-6-ZXT-2B-ETA2-16	3	11	7.545	8.613	0.6698	0.1416	FAILURE AT GAGE SECTION
HL-C-R11-6-ZXT-3T-ETA2-18	3	11	7.556	7.809	0.6611	0.1377	FAILURE AT GAGE SECTION
HL-C-R11-6-ZXT-5T-ETA2-20	3	11	7.578	8.561	0.6565	0.1412	FAILURE AT GAGE SECTION
HL-C-R12-3-ZXT-1T-ETA2-15	3	12	7.654	8.738	0.6630	0.1417	FAILURE AT GAGE SECTION
HL-C-R12-3-ZXT-4B-ETA2-17	3	12	7.771	8.631	0.6053	0.1448	FAILURE AT GAGE SECTION
HL-C-R12-3-ZXT-5T-ETA2-19	3	12	7.514	8.667	0.6537	0.1414	FAILURE AT GAGE SECTION

Average	7.393	8.326	0.6538	0.1416
Standard Dev.	0.4246	0.4070	0.03211	
Coeff. of Var. [%]	5.744	4.889	4.912	
Min.	5.830	7.596	0.5682	0.1331
Max.	7.810	8.812	0.6927	0.1526
Number of Spec.	18	18	18	18



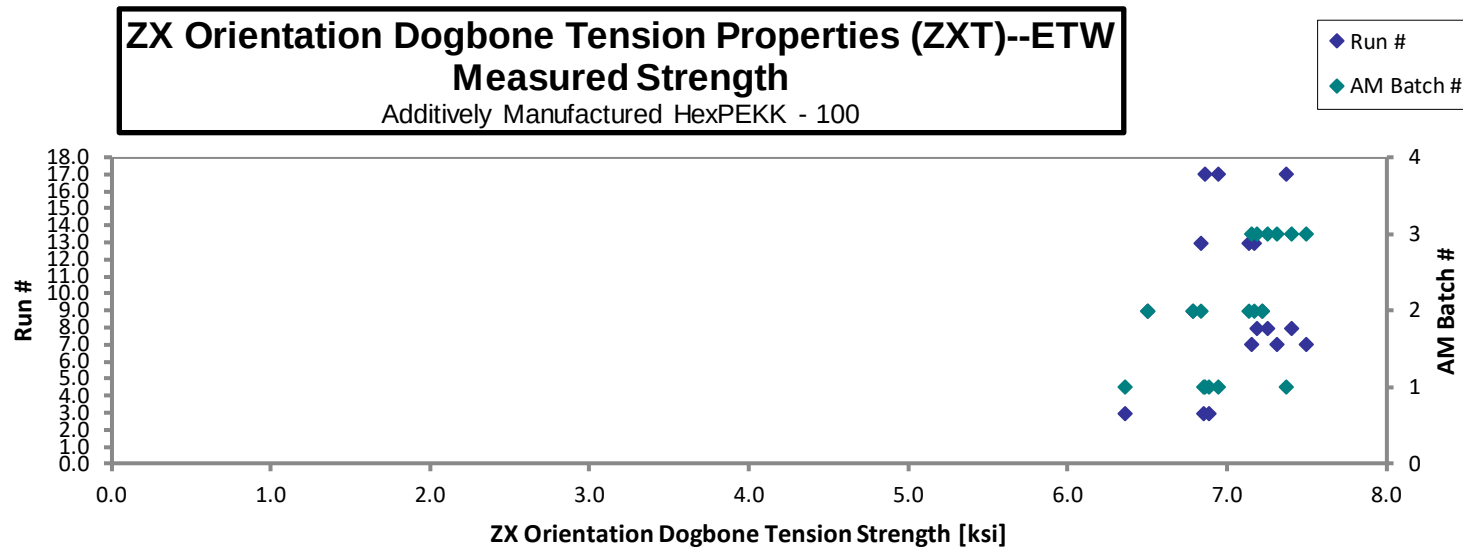
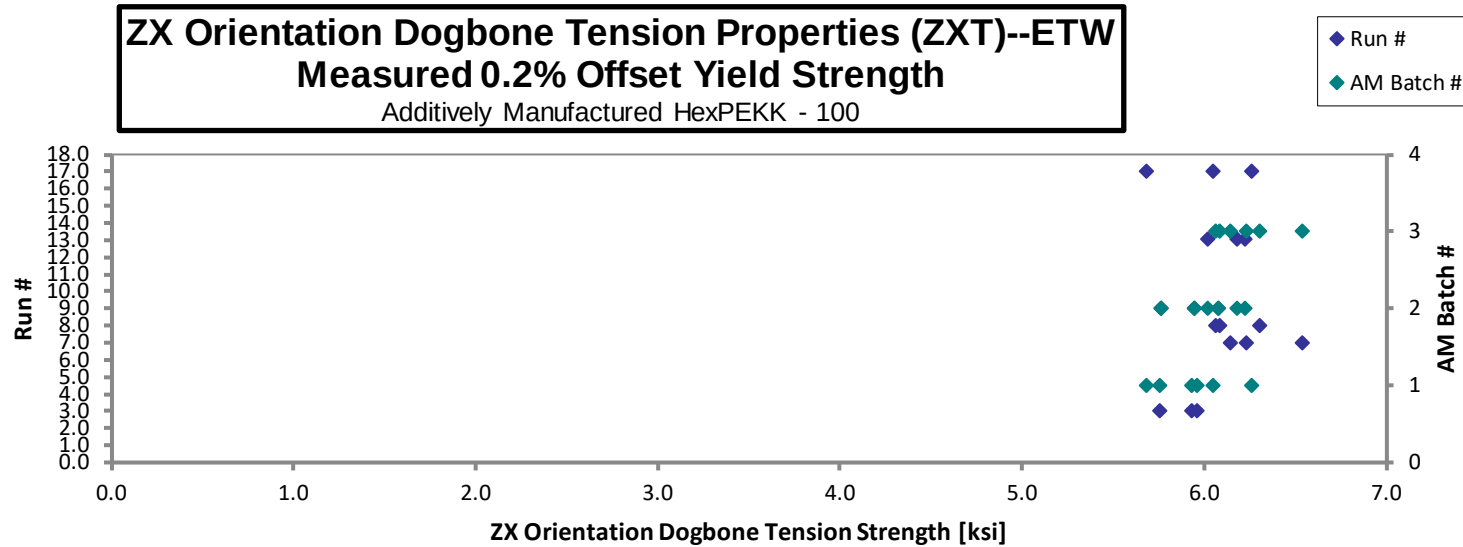


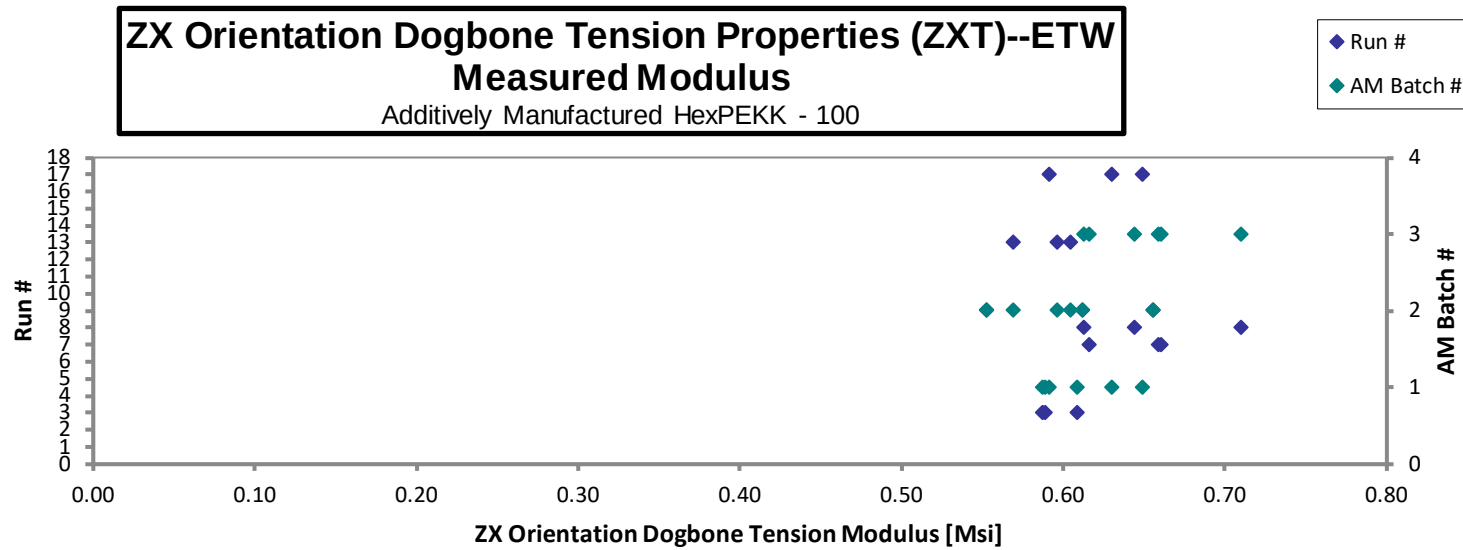
ZX Orientation Dogbone Tension Properties (ZXT)--ETW**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-ZXT-2T-ETW-10	1	17	6.051	6.949	0.6302	0.1464	FAILURE AT GAGE SECTION
HL-A-R17-11-ZXT-5T-ETW-12	1	17	5.681	6.862	0.5912	0.1501	FAILURE AT GAGE SECTION
HL-A-R17-11-ZXT-3B-ETW-8	1	17	6.259	7.368	0.6488	0.1511	FAILURE AT GAGE SECTION
HL-A-R3-14-ZXT-5B-ETW-10	1	3	5.931	6.856	0.5869	0.1465	FAILURE AT GAGE SECTION
HL-A-R3-14-ZXT-3T-ETW-12	1	3	5.759	6.358	0.5892	0.1461	FAILURE AT GAGE SECTION
HL-A-R3-14-ZXT-4B-ETW-8	1	3	5.964	6.887	0.6088	0.1442	FAILURE AT GAGE SECTION
HL-B-R13-9-ZXT-4B-ETW-10	2	13	6.183	7.174	0.5964	0.1467	FAILURE AT GAGE SECTION
HL-B-R13-9-ZXT-5T-ETW-12	2	13	6.225	7.134	0.6042	0.1443	FAILURE AT GAGE SECTION
HL-B-R13-9-ZXT-1T-ETW-8	2	13	6.020	6.837	0.5692	0.1549	FAILURE AT GAGE SECTION
HL-B-R9-16-ZXT-4T-ETW-11	2	9	5.765	6.499	0.5529	0.1364	FAILURE AT GAGE SECTION
HL-B-R9-16-ZXT-1B-ETW-7	2	9	5.944	6.790	0.6560	0.1464	FAILURE AT GAGE SECTION
HL-B-R9-16-ZXT-5B-ETW-9	2	9	6.075	7.223	0.6118	0.1347	FAILURE AT GAGE SECTION
HL-C-R7-4-ZXT-2B-ETW-16	3	7	6.540	7.495	0.6165	0.1378	FAILURE AT GAGE SECTION
HL-C-R7-4-ZXT-3T-ETW-18	3	7	6.141	7.158	0.6588	0.1370	FAILURE AT GAGE SECTION
HL-C-R7-4-ZXT-5T-ETW-20	3	7	6.228	7.311	0.6604	0.1377	FAILURE AT GAGE SECTION
HL-C-R8-2-ZXT-1T-ETW-15	3	8	6.306	7.403	0.6442	0.1436	FAILURE AT GAGE SECTION
HL-C-R8-2-ZXT-4B-ETW-17	3	8	6.087	7.189	0.7101	0.1474	FAILURE AT GAGE SECTION
HL-C-R8-2-ZXT-5T-ETW-19	3	8	6.064	7.253	0.6130	0.1428	FAILURE AT GAGE SECTION

Average	6.068	7.041	0.6194	0.1441
Standard Dev.	0.2128	0.3087	0.03842	
Coeff. of Var. [%]	3.507	4.384	6.203	
Min.	5.681	6.358	0.5529	0.1347
Max.	6.540	7.495	0.7101	0.1549
Number of Spec.	18	18	18	18





4.5 ZX45 Tension Properties (ZX45T)

ZX45 Orientation Dogbone Tension Properties (ZX45T)--CTA□
Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R13-9-ZX45T-1B-CTA-14	2	13		10.82	0.8965	0.1558	FAILURE AT GAGE SECTION
HL-B-R13-9-ZX45T-3B-CTA-16	2	13		10.43	0.9388	0.1553	FAILURE AT GAGE SECTION
HL-B-R13-9-ZX45T-2T-CTA-20	2	13		9.398	0.9027	0.1509	FAILURE AT GAGE SECTION
HL-B-R4-7-ZX45T-1B-CTA-13	2	4		10.33	0.9603	0.1389	FAILURE AT GAGE SECTION
HL-B-R4-7-ZX45T-3B-CTA-15	2	4		10.42	1.032	0.1444	FAILURE AT GAGE SECTION
HL-B-R4-7-ZX45T-5B-CTA-17	2	4		10.75	0.8980	0.1433	FAILURE AT GAGE SECTION

Average
Standard Dev.
Coeff. of Var. [%]
Min.
Max.
Number of Spec.

0

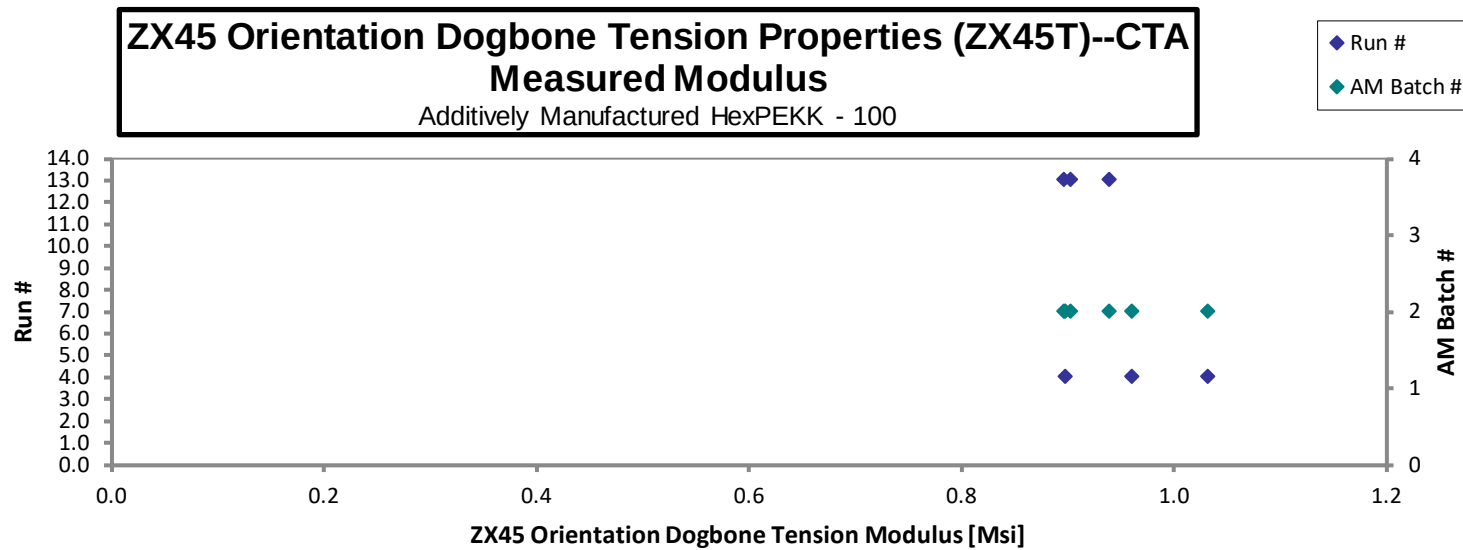
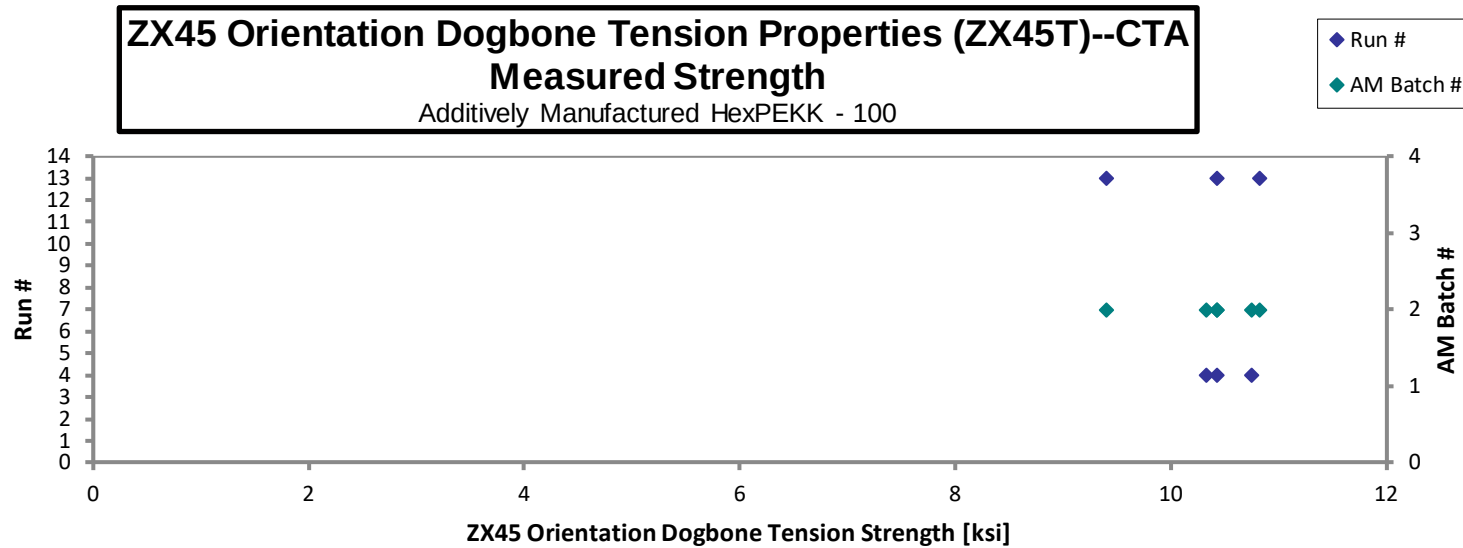
10.36
0.5104
4.927
9.398
10.82
6

0.9380
0.05266
5.614
0.8965
1.032
6

0.1481

0.1389
0.1558
6

****Coupons fail before
achieving 0.2%Yield Strength**

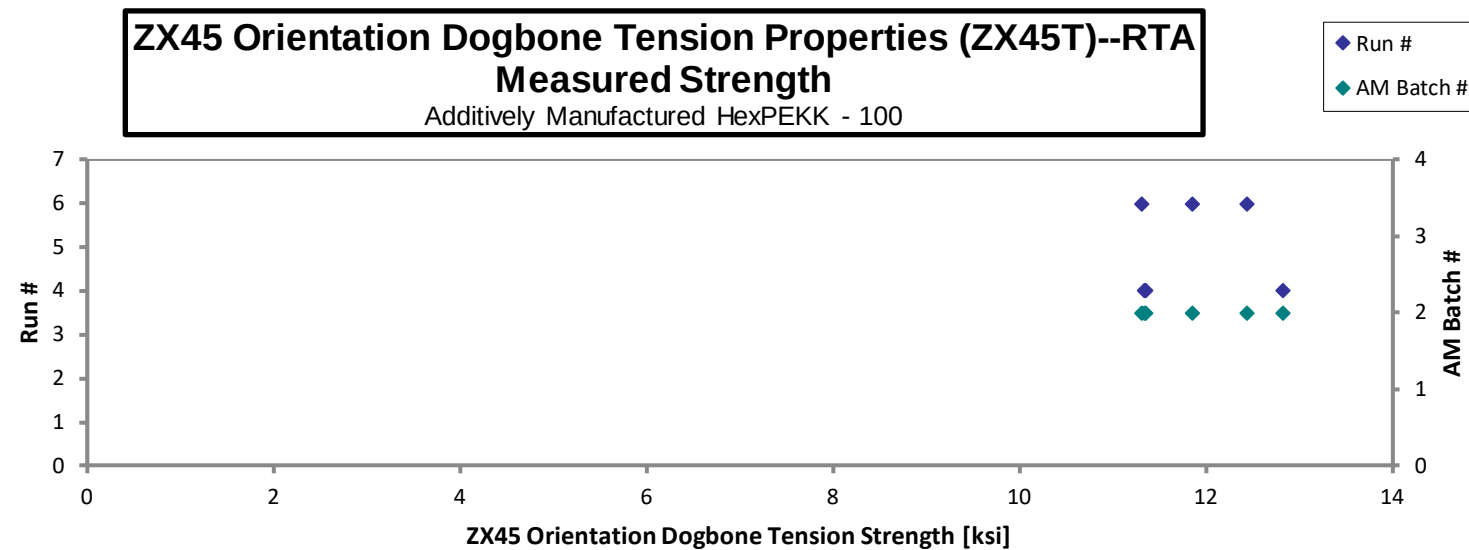
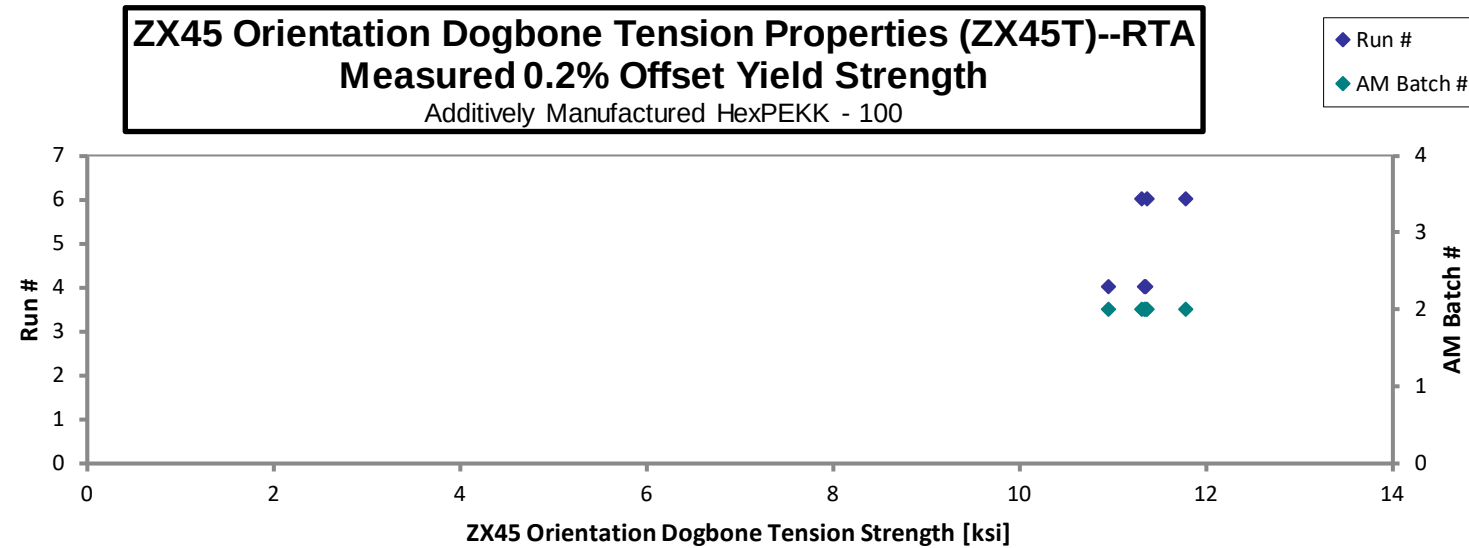


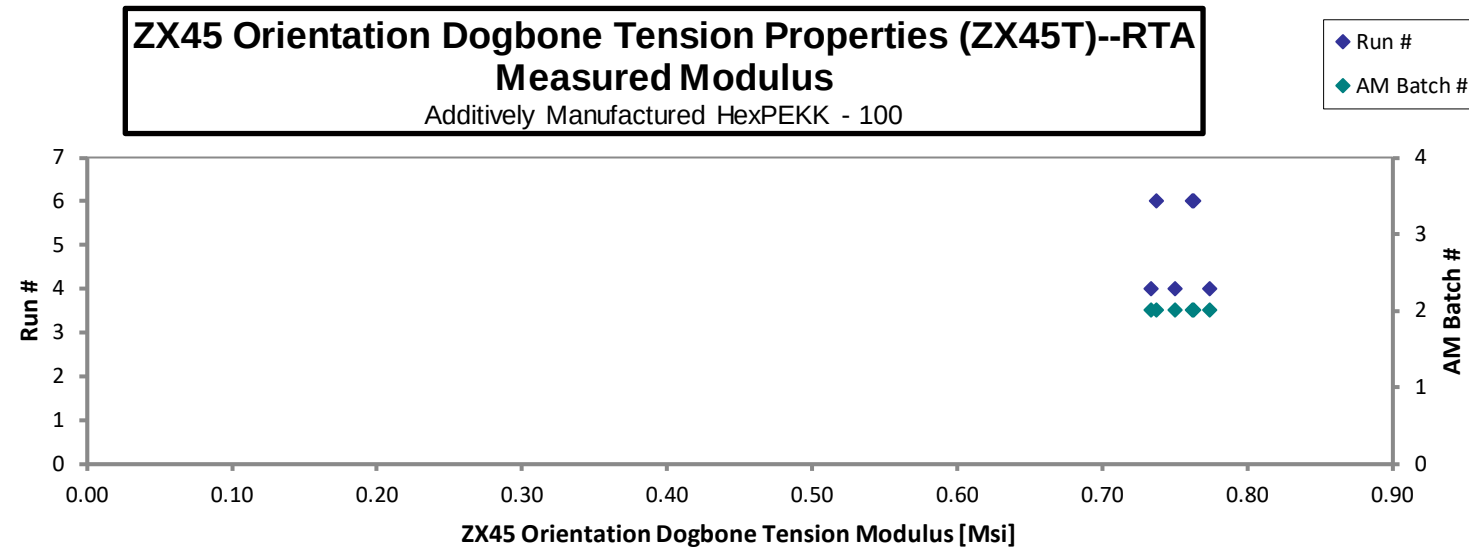
ZX45 Orientation Dogbone Tension Properties (ZX45T)--RTA
Strength & Modulus

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R4-7-ZX45T-1B-RTA-14	2	4	11.36	11.36	0.7505	0.1379	FAILURE AT GAGE SECTION
HL-B-R4-7-ZX45T-3B-RTA-16	2	4	11.34	11.34	0.7338	0.1436	FAILURE AT GAGE SECTION
HL-B-R4-7-ZX45T-5B-RTA-18	2	4	10.96	12.82	0.7740	0.1445	FAILURE AT GAGE SECTION
HL-B-R6-8-ZX45T-3B-RTA-15	2	6	11.79	12.43	0.7377	0.1431	FAILURE AT GAGE SECTION
HL-B-R6-8-ZX45T-5B-RTA-17	2	6	11.37	11.86	0.7627	0.1419	FAILURE AT GAGE SECTION
HL-B-R6-8-ZX45T-2T-RTA-19	2	6	11.32	11.32	0.7619	0.1372	FAILURE AT GAGE SECTION

Average	11.35	11.86	0.7534	0.1414
Standard Dev.	0.2636	0.6441	0.01564	
Coeff. of Var. [%]	2.322	5.432	2.075	
Min.	10.96	11.32	0.7338	0.1372
Max.	11.79	12.82	0.7740	0.1445
Number of Spec.	6	6	6	6



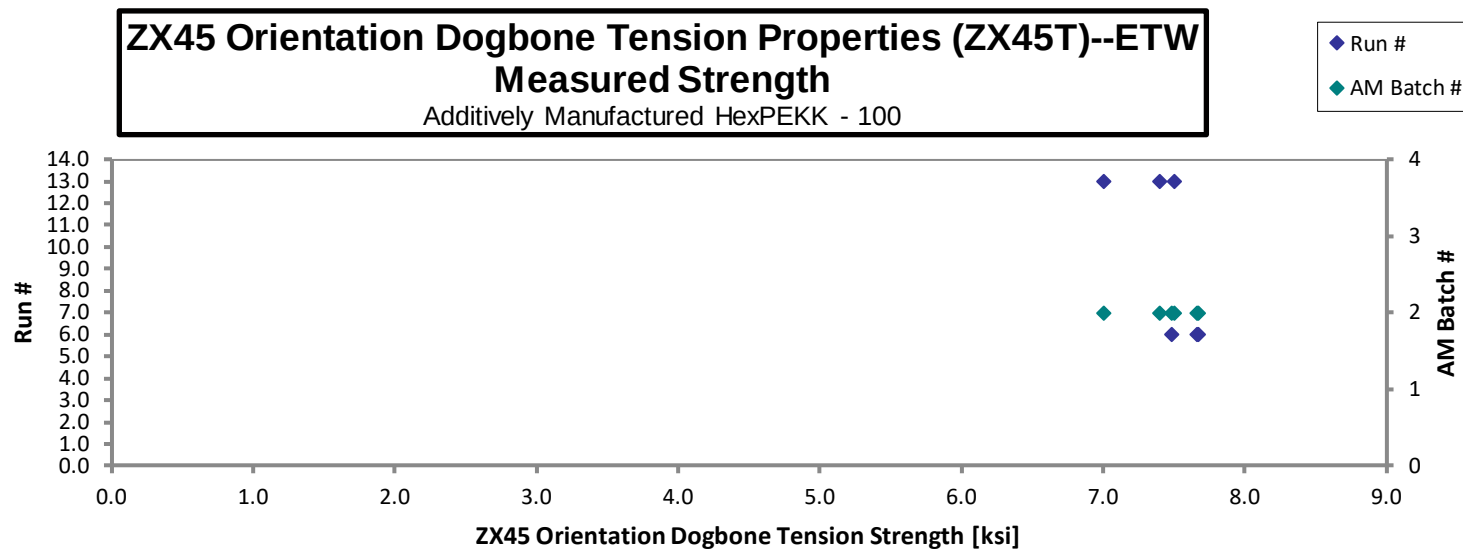
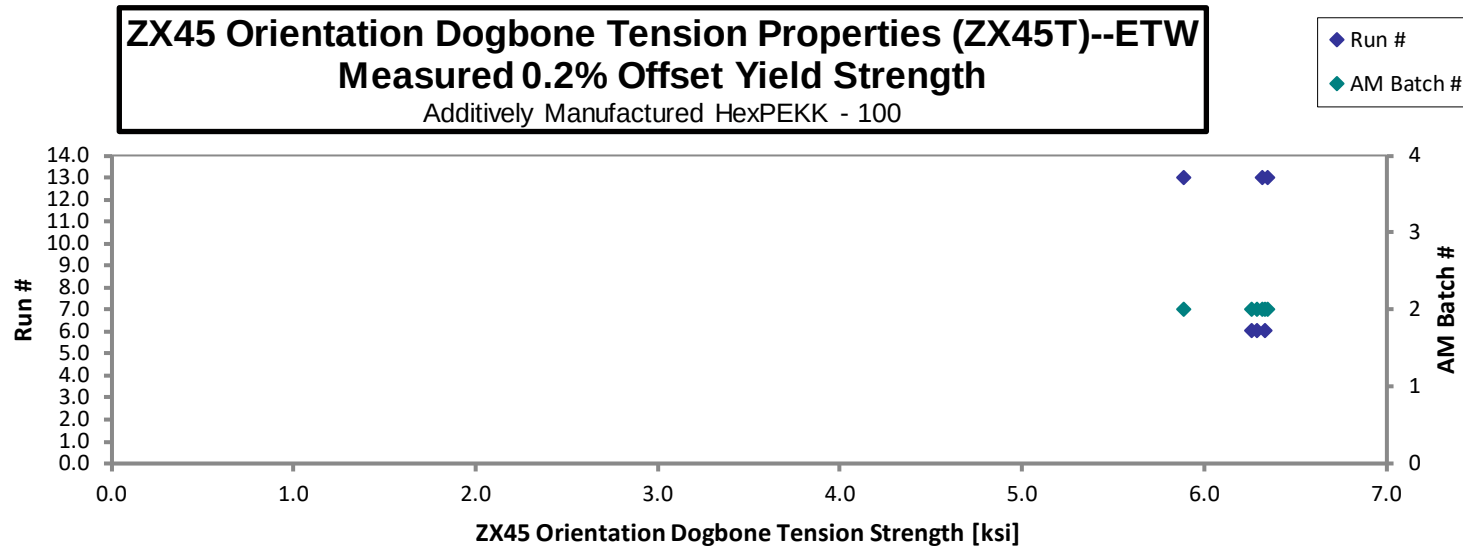


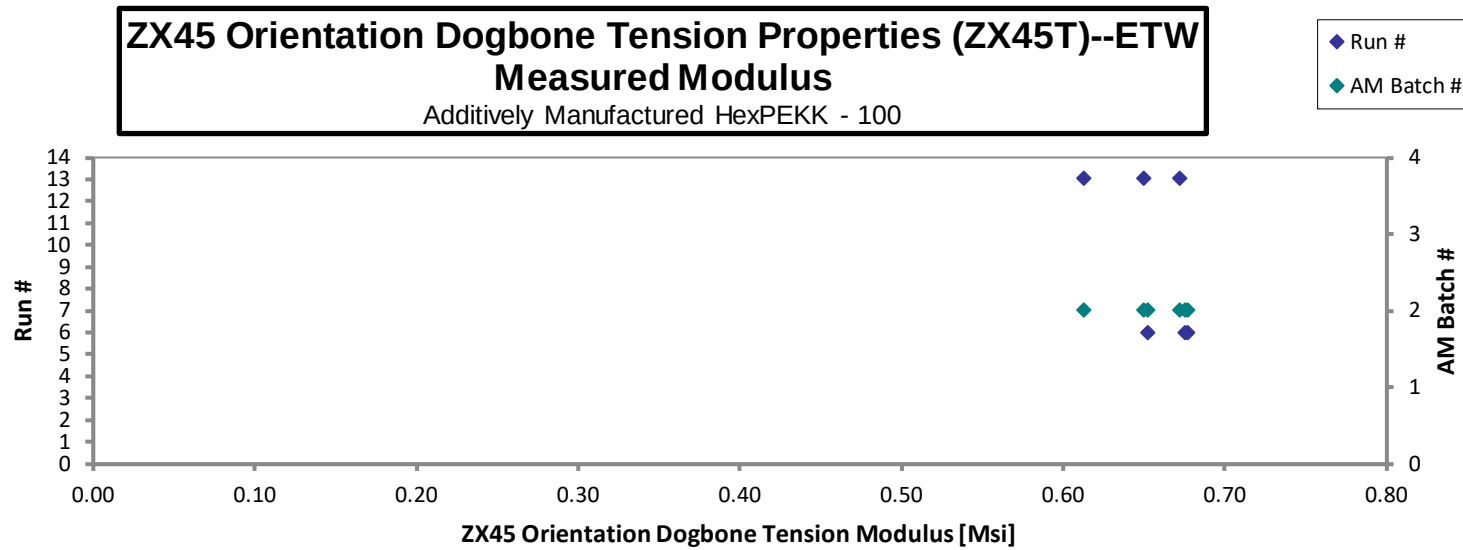
ZX45 Orientation Dogbone Tension Properties (ZX45T)--ETW□ Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Yield Strength [ksi]	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R13-9-ZX45T-3B-ETW-15	2	13	6.320	7.506	0.6720	0.1545	FAILURE AT GAGE SECTION
HL-B-R13-9-ZX45T-5B-ETW-17	2	13	6.350	7.400	0.6497	0.1420	FAILURE AT GAGE SECTION
HL-B-R13-9-ZX45T-2T-ETW-19	2	13	5.891	7.005	0.6126	0.1520	FAILURE AT GAGE SECTION
HL-B-R6-8-ZX45T-1B-ETW-14	2	6	6.330	7.661	0.6520	0.1382	FAILURE AT GAGE SECTION
HL-B-R6-8-ZX45T-3B-ETW-16	2	6	6.259	7.484	0.6753	0.1428	FAILURE AT GAGE SECTION
HL-B-R6-8-ZX45T-5B-ETW-18	2	6	6.288	7.674	0.6772	0.1420	FAILURE AT GAGE SECTION

Average	6.240	7.455	0.6565	0.1452
Standard Dev.	0.1740	0.2447	0.02459	
Coeff. of Var. [%]	2.788	3.283	3.746	
Min.	5.891	7.005	0.6126	0.1382
Max.	6.350	7.674	0.6772	0.1545
Number of Spec.	6	6	6	6





4.6 XY Compression Properties (XYC)

XY Orientation Dogbone Compression Properties (XYC)--CTA□

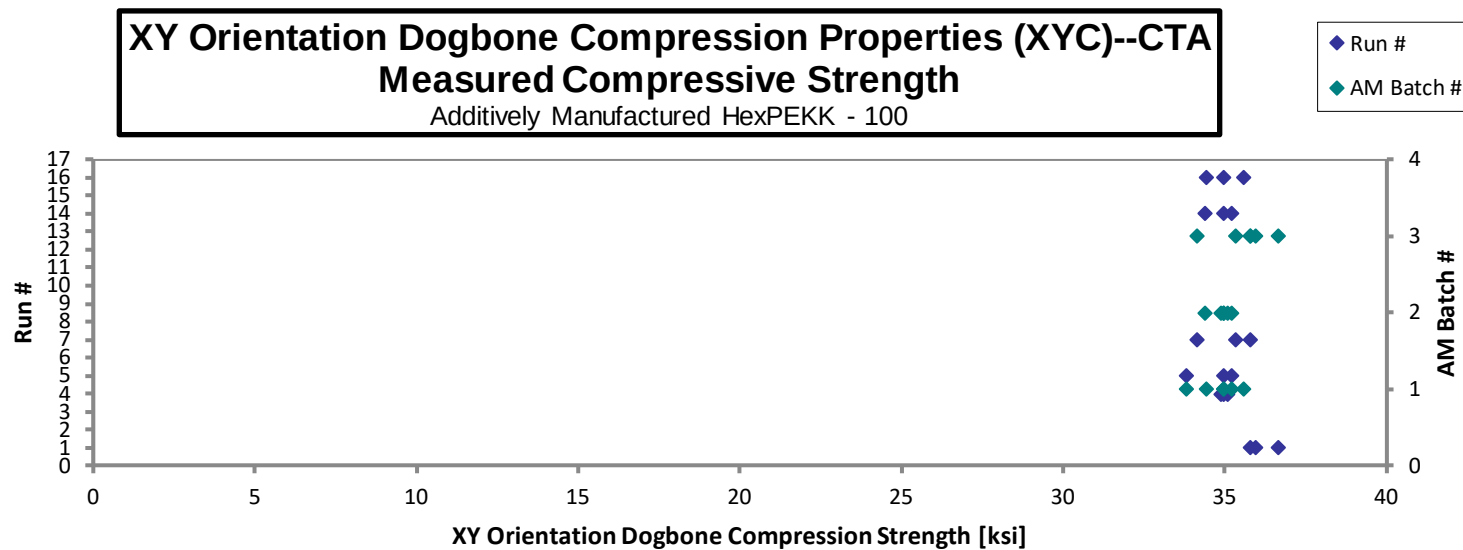
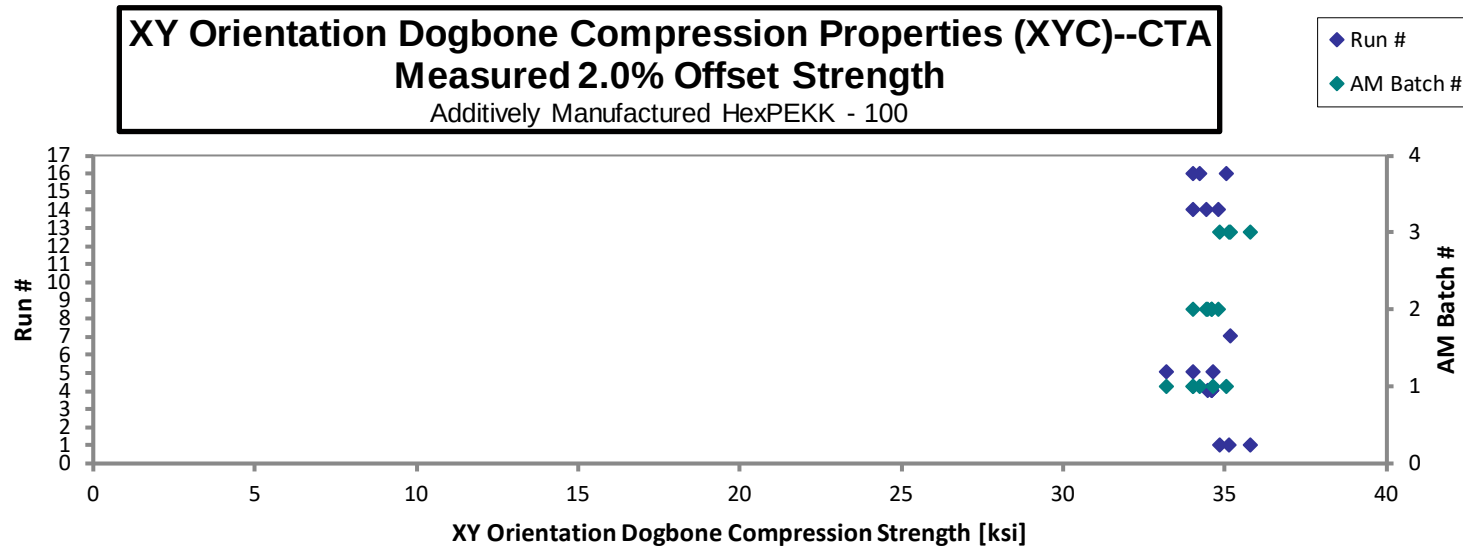
Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-XYC-2B-CTA-1	1	16	34.21	34.96	1.081	1.988	0.5014	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-XYC-3B-CTA-3	1	16	34.01	34.41	1.064	5.168	0.5019	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-XYC-5T-CTA-5	1	16	35.06	35.60	1.093	10.97	0.5012	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-XYC-3B-CTA-2	1	5	34.66	35.21	1.084	2.623	0.5007	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-XYC-2T-CTA-4	1	5	33.18	33.80	1.059	3.186	0.5007	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-XYC-5T-CTA-6	1	5	34.01	34.97	1.083	2.798	0.5007	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-XYC-3B-CTA-1	2	14	34.44	34.97	1.089	5.892	0.5005	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-XYC-5B-CTA-3	2	14	34.81	35.21	1.099	1.455	0.4996	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-XYC-2T-CTA-5	2	14	34.04	34.40	1.061	1.945	0.5006	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-XYC-2B-CTA-1	2	4	34.58	34.89	1.105	3.506	0.5032	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-XYC-4B-CTA-3	2	4	34.60	35.09	1.062	6.649	0.5039	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-XYC-1T-CTA-5	2	4	34.48	34.97	1.093	0.3358	0.5038	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-XYC-5B-CTA-1	3	1	35.13	35.96	1.193	24.28	0.4945	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-XYC-3T-CTA-3	3	1	35.77	36.66	1.126	9.836	0.4940	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-XYC-1T-CTA-5	3	1	34.84	35.77	1.111	2.231	0.4948	UNIFORM COMPRESSIVE FAILURE
HL-C-R7-4-XYC-2B-CTA-1	3	7	35.16	35.78	1.103	0.2447	0.5034	UNIFORM COMPRESSIVE FAILURE
HL-C-R7-4-XYC-3T-CTA-3	3	7		34.15	1.019	7.958	0.5035	UNIFORM COMPRESSIVE FAILURE
HL-C-R7-4-XYC-5T-CTA-5	3	7		35.36	1.084	4.057	0.5035	UNIFORM COMPRESSIVE FAILURE

Average	34.56	35.12	1.089	5.285	0.5007
Standard Dev.	0.6051	0.6903	0.03534	5.645	
Coeff. of Var. [%]	1.751	1.965	3.244	106.8	
Min.	33.18	33.80	1.019	0.2447	0.4940
Max.	35.77	36.66	1.193	24.28	0.5039
Number of Spec.	16	18	18	18	18

****For the last 2 coupons, the specimen failed prior to achieving 2% offset strength**

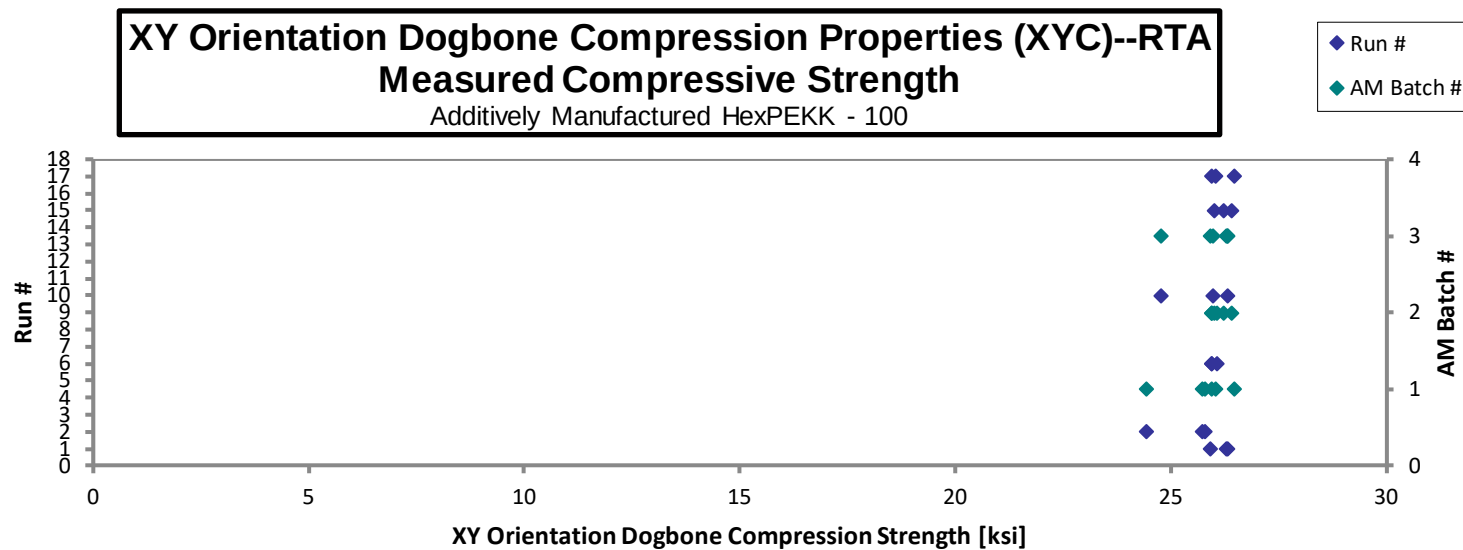
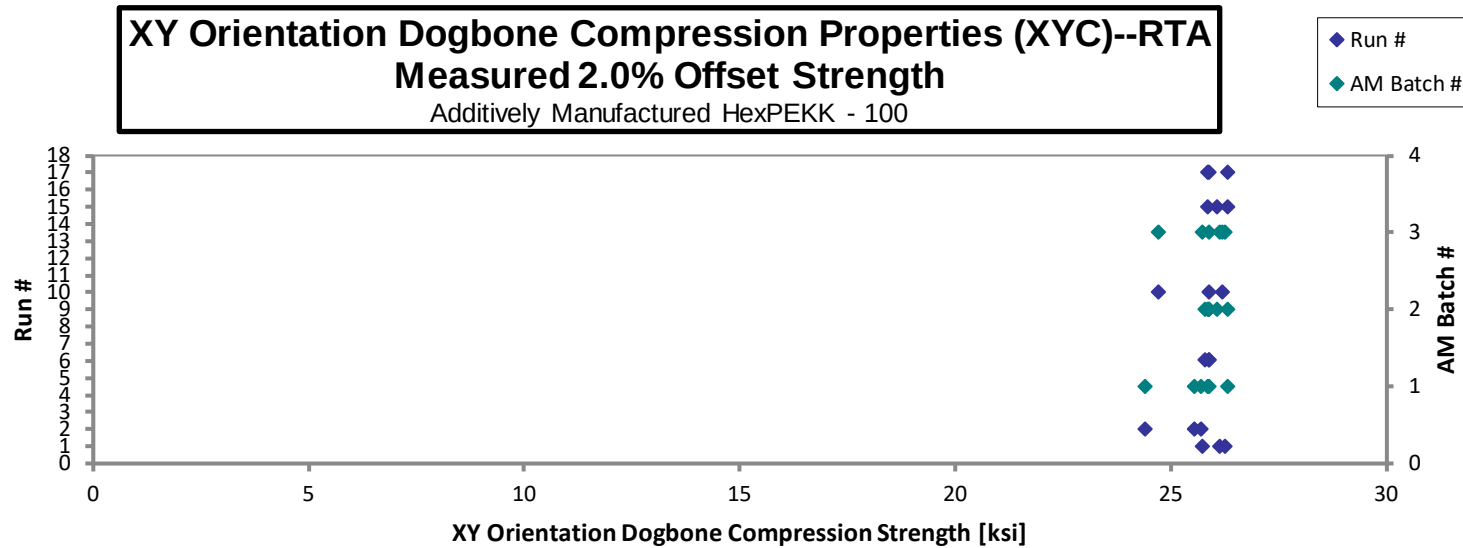


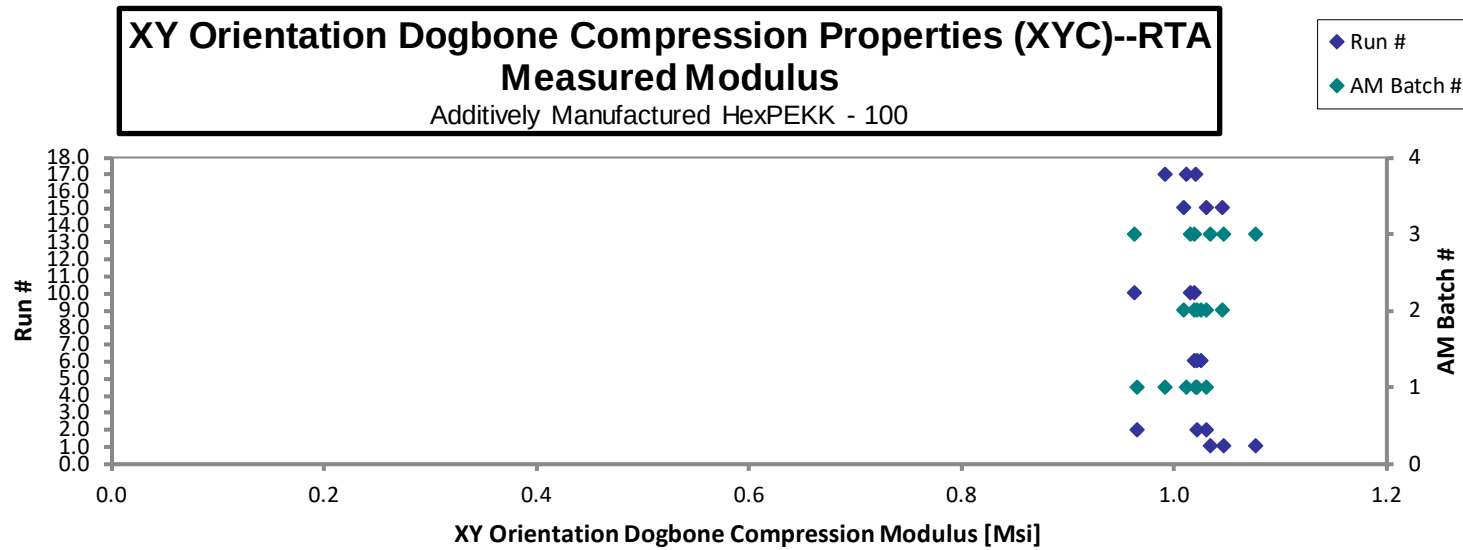
XY Orientation Dogbone Compression Properties (XYC)--RTA**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-XYC-2B-RTA-1	1	17	25.90	26.05	0.9923	1.686	0.4990	UNIFORM COMPRESSIVE FAILURE
HL-A-R17-11-XYC-3B-RTA-3	1	17	26.32	26.48	1.012	0.5099	0.5004	UNIFORM COMPRESSIVE FAILURE
HL-A-R17-11-XYC-5T-RTA-5	1	17	25.86	25.94	1.021	4.754	0.5003	UNIFORM COMPRESSIVE FAILURE
HL-A-R2-13-XYC-3B-RTA-1	1	2	25.70	25.78	1.031	2.259	0.4852	UNIFORM COMPRESSIVE FAILURE
HL-A-R2-13-XYC-2T-RTA-4	1	2	24.41	24.44	0.9649	10.297	0.4853	UNIFORM COMPRESSIVE FAILURE
HL-A-R2-13-XYC-5T-RTA-6	1	2	25.54	25.73	1.021	10.973	0.4853	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-XYC-3B-RTA-2	2	15	26.08	26.21	1.030	3.649	0.5010	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-XYC-2T-RTA-5	2	15	25.85	26.02	1.009	2.235	0.5013	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-XYC-5T-RTA-6	2	15	26.31	26.41	1.046	3.219	0.5013	UNIFORM COMPRESSIVE FAILURE
HL-B-R6-8-XYC-2B-RTA-2	2	6	25.89	25.94	1.019	4.489	0.5015	UNIFORM COMPRESSIVE FAILURE
HL-B-R6-8-XYC-4B-RTA-4	2	6	25.90	26.07	1.022	1.510	0.5018	UNIFORM COMPRESSIVE FAILURE
HL-B-R6-8-XYC-1T-RTA-6	2	6	25.80	25.95	1.025	0.4981	0.4997	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-XYC-5B-RTA-2	3	1	26.25	26.33	1.035	2.958	0.4947	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-XYC-3T-RTA-4	3	1	26.13	26.30	1.047	1.134	0.4947	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-XYC-1T-RTA-6	3	1	25.73	25.90	1.077	1.684	0.4949	UNIFORM COMPRESSIVE FAILURE
HL-C-R10-5-XYC-2B-RTA-1	3	10	26.21	26.32	1.019	3.015	0.5037	UNIFORM COMPRESSIVE FAILURE
HL-C-R10-5-XYC-3T-RTA-3	3	10	24.71	24.77	0.9627	1.921	0.5032	UNIFORM COMPRESSIVE FAILURE
HL-C-R10-5-XYC-5T-RTA-5	3	10	25.89	25.99	1.016	4.627	0.5029	UNIFORM COMPRESSIVE FAILURE

Average	25.80	25.92	1.019	3.412	0.4976
Standard Dev.	0.5061	0.5273	0.02697	2.931	
Coeff. of Var. [%]	1.961	2.034	2.646	85.91	
Min.	24.41	24.44	0.9627	0.4981	0.4852
Max.	26.32	26.48	1.077	10.97	0.5037
Number of Spec.	18	18	18	18	18





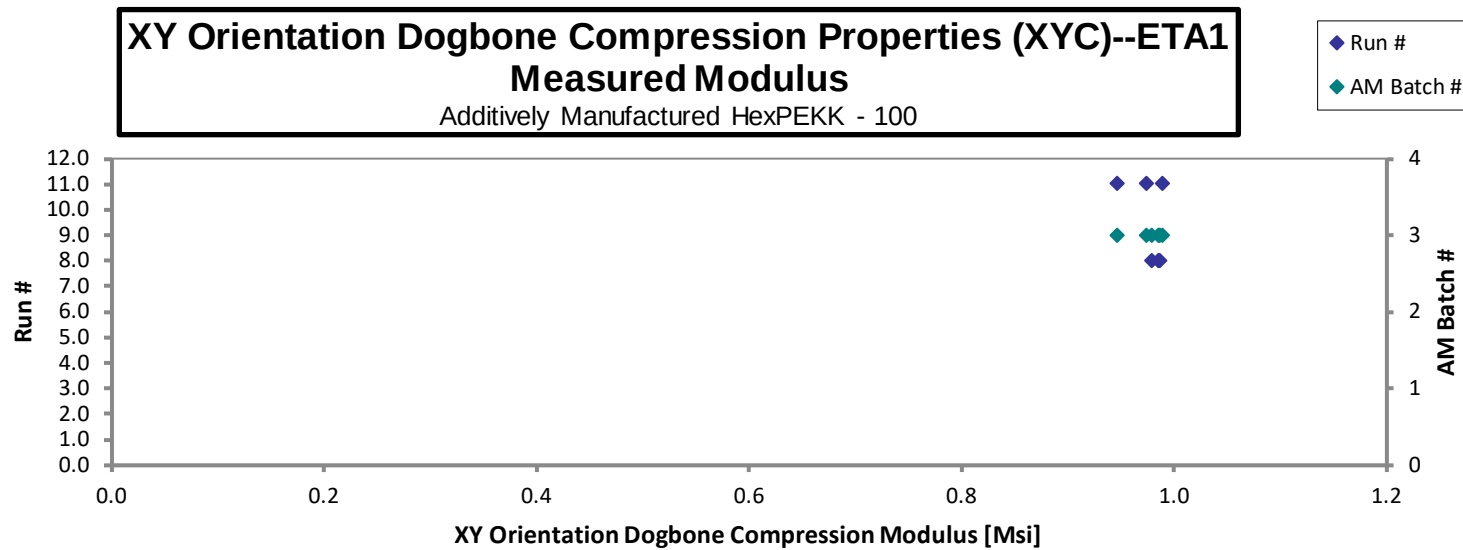
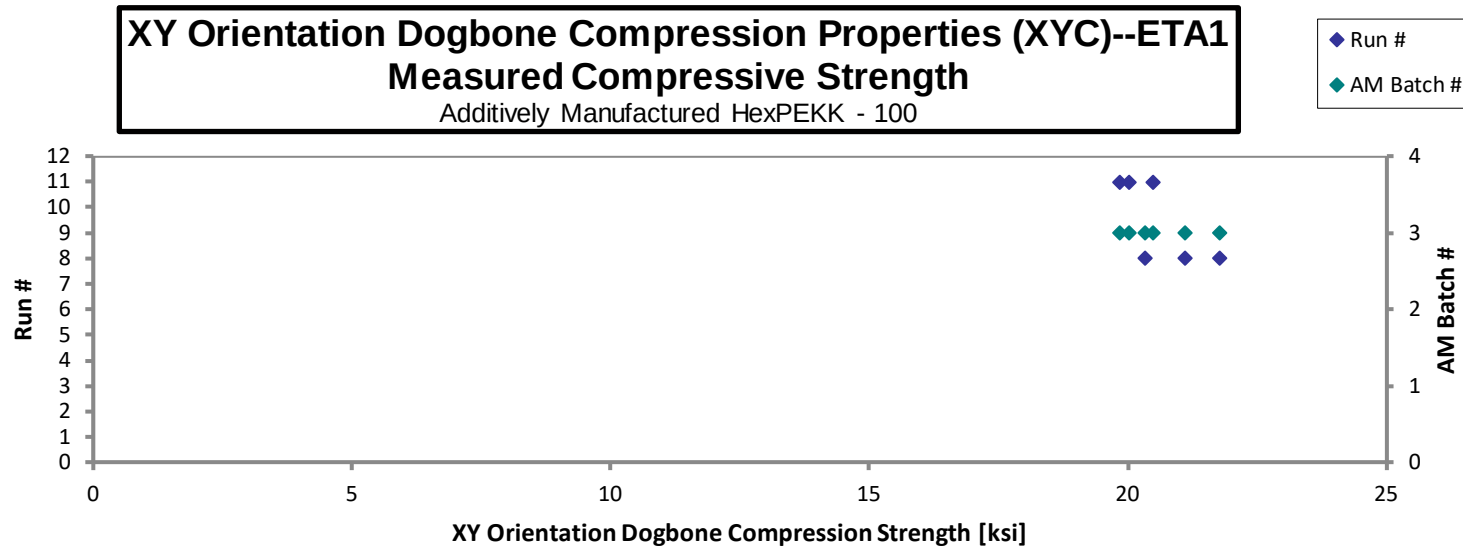
XY Orientation Dogbone Compression Properties (XYC)--ETA1**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R11-6-XYC-2B-ETA1-2	3	11		20.49	0.9887	9.090	0.5041	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-XYC-3T-ETA1-4	3	11		19.86	0.9460	5.747	0.5040	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-XYC-5T-ETA1-6	3	11		20.03	0.9736	4.001	0.5021	UNIFORM COMPRESSIVE FAILURE
HL-C-R8-2-XYC-5B-ETA1-2	3	8		20.35	0.9848	8.676	0.5015	UNIFORM COMPRESSIVE FAILURE
HL-C-R8-2-XYC-3T-ETA1-4	3	8		21.11	0.9861	6.758	0.5021	UNIFORM COMPRESSIVE FAILURE
HL-C-R8-2-XYC-2T-ETA1-6	3	8		21.77	0.9785	5.056	0.5021	UNIFORM COMPRESSIVE FAILURE

Average	20.60	0.9763	6.555	0.5026
Standard Dev.	0.7173	0.01582	2.019	
Coeff. of Var. [%]	3.482	1.621	30.81	
Min.	19.86	0.9460	4.001	0.5015
Max.	21.77	0.9887	9.090	0.5041
Number of Spec.	0	6	6	6

*2% offset is not reported as the coupon failed prior to that



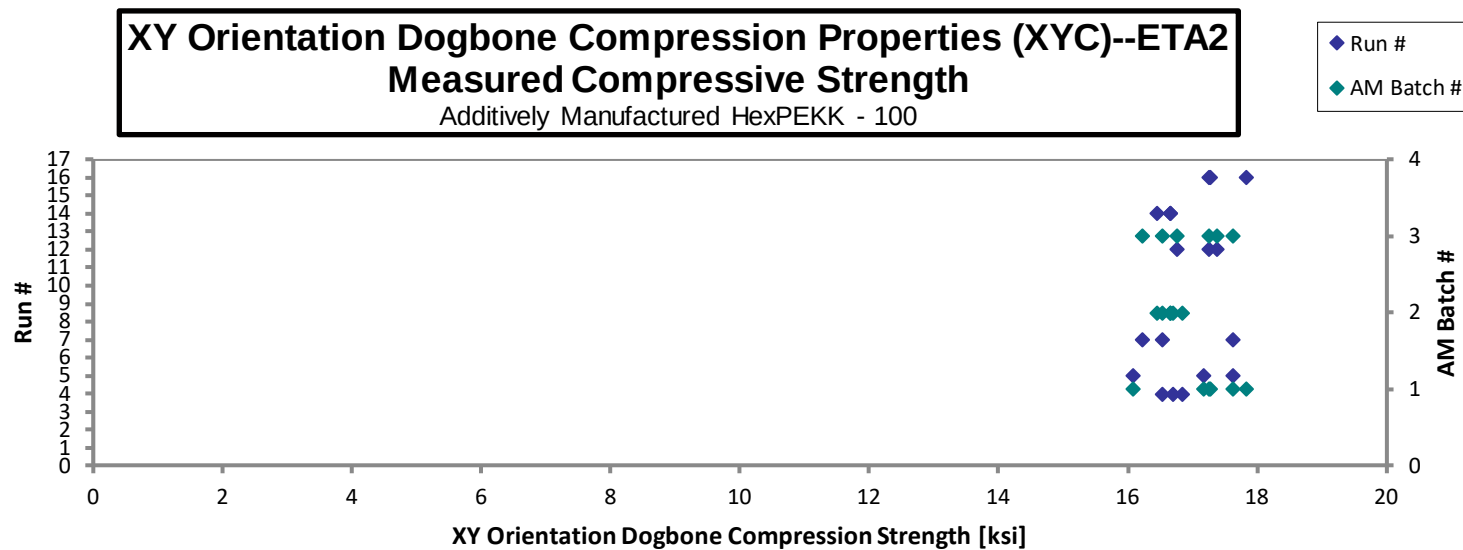
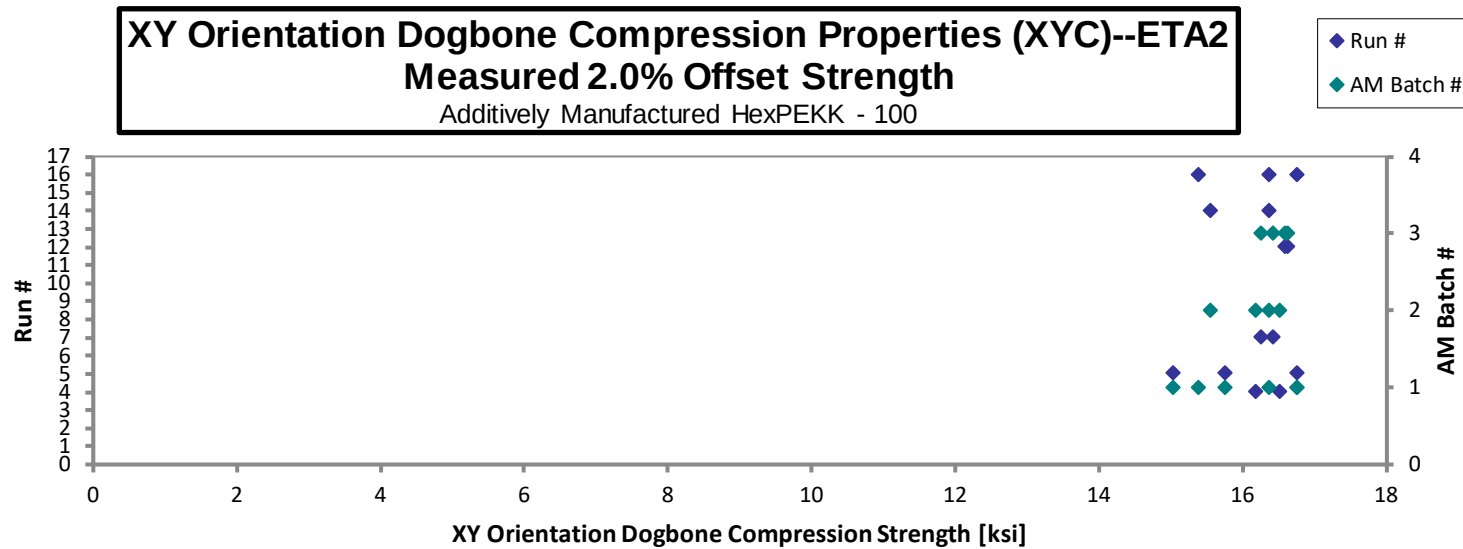
XY Orientation Dogbone Compression Properties (XYC)--ETA2
Strength & Modulus

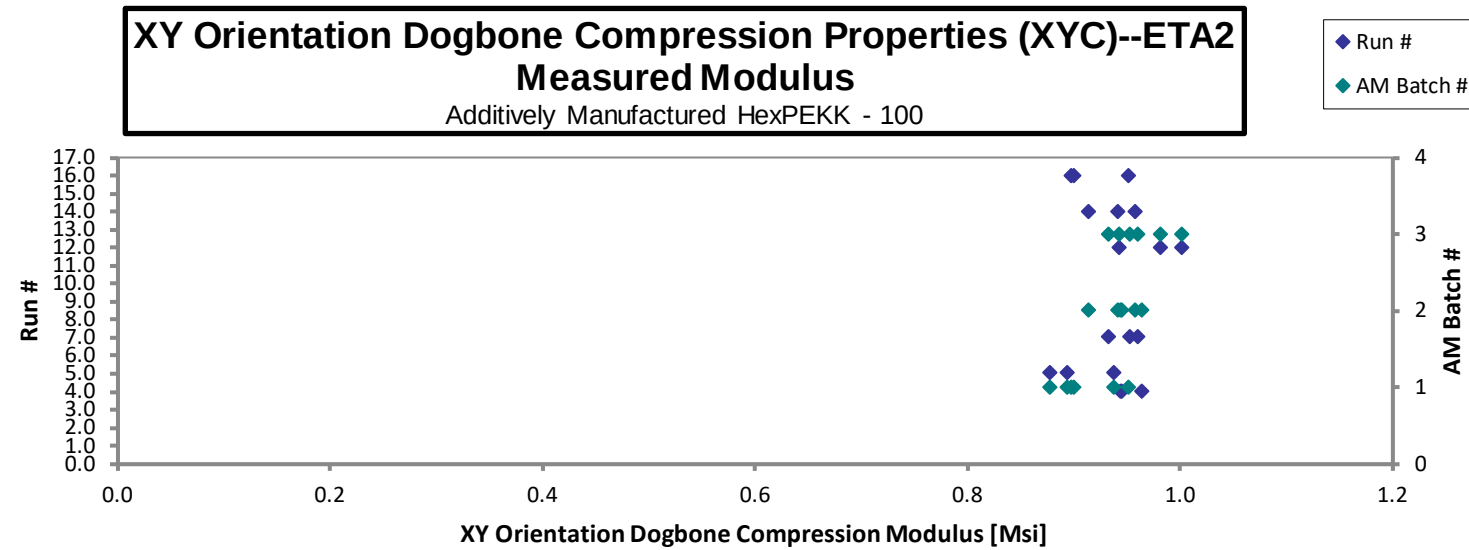
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-XYC-2B-ETA2-2	1	16	16.37	17.83	0.9002	4.347	0.5034	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-XYC-3B-ETA2-4	1	16	16.75	17.29	0.9514	1.082	0.5037	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-XYC-5T-ETA2-6	1	16	15.38	17.25	0.8982	5.120	0.5043	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-XYC-3B-ETA2-1	1	5	16.76	17.62	0.9375	11.78	0.4997	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-XYC-5B-ETA2-3	1	5	15.02	17.17	0.8770	5.351	0.5006	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-XYC-2T-ETA2-5	1	5	15.75	16.07	0.8935	6.543	0.4998	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-XYC-3B-ETA2-2	2	14		16.45	0.9418	5.876	0.4995	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-XYC-2T-ETA2-4	2	14	15.54	16.65	0.9139	2.280	0.4989	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-XYC-5T-ETA2-6	2	14	16.37	16.65	0.9581	0.05081	0.5001	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-XYC-2B-ETA2-2	2	4	16.51	16.85	0.9640	0.3151	0.5040	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-XYC-4B-ETA2-4	2	4		16.54	0.9449	8.572	0.5035	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-XYC-1T-ETA2-6	2	4	16.18	16.70	0.9435	5.739	0.5038	UNIFORM COMPRESSIVE FAILURE
HL-C-R12-3-XYC-5B-ETA2-1	3	12		16.77	0.9819	3.782	0.4995	UNIFORM COMPRESSIVE FAILURE
HL-C-R12-3-XYC-3T-ETA2-3	3	12	16.62	17.39	1.002	7.118	0.4998	UNIFORM COMPRESSIVE FAILURE
HL-C-R12-3-XYC-1T-ETA2-5	3	12	16.59	17.26	0.9422	3.084	0.4998	UNIFORM COMPRESSIVE FAILURE
HL-C-R7-4-XYC-2B-ETA2-2	3	7	16.43	17.63	0.9528	11.97	0.5033	UNIFORM COMPRESSIVE FAILURE
HL-C-R7-4-XYC-3T-ETA2-4	3	7		16.22	0.9323	3.821	0.5042	UNIFORM COMPRESSIVE FAILURE
HL-C-R7-4-XYC-5T-ETA2-6	3	7	16.26	16.53	0.9605	2.124	0.5033	UNIFORM COMPRESSIVE FAILURE

Average	16.18	16.94	0.9387	4.942	0.5017
Standard Dev.	0.5439	0.5089	0.03203	3.430	
Coeff. of Var. [%]	3.362	3.005	3.413	69.41	
Min.	15.02	16.07	0.8770	0.05081	0.4989
Max.	16.76	17.83	1.002	11.97	0.5043
Number of Spec.	14	18	18	18	18

*2% offset is not reported for some cases as the coupon failed prior to that



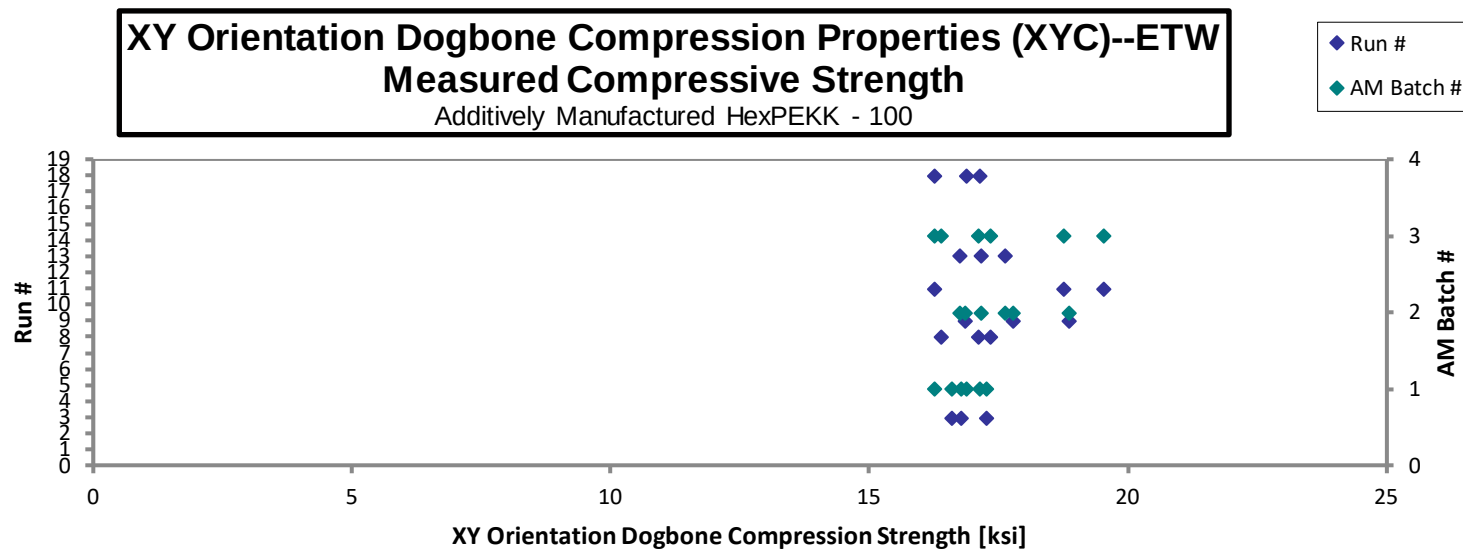
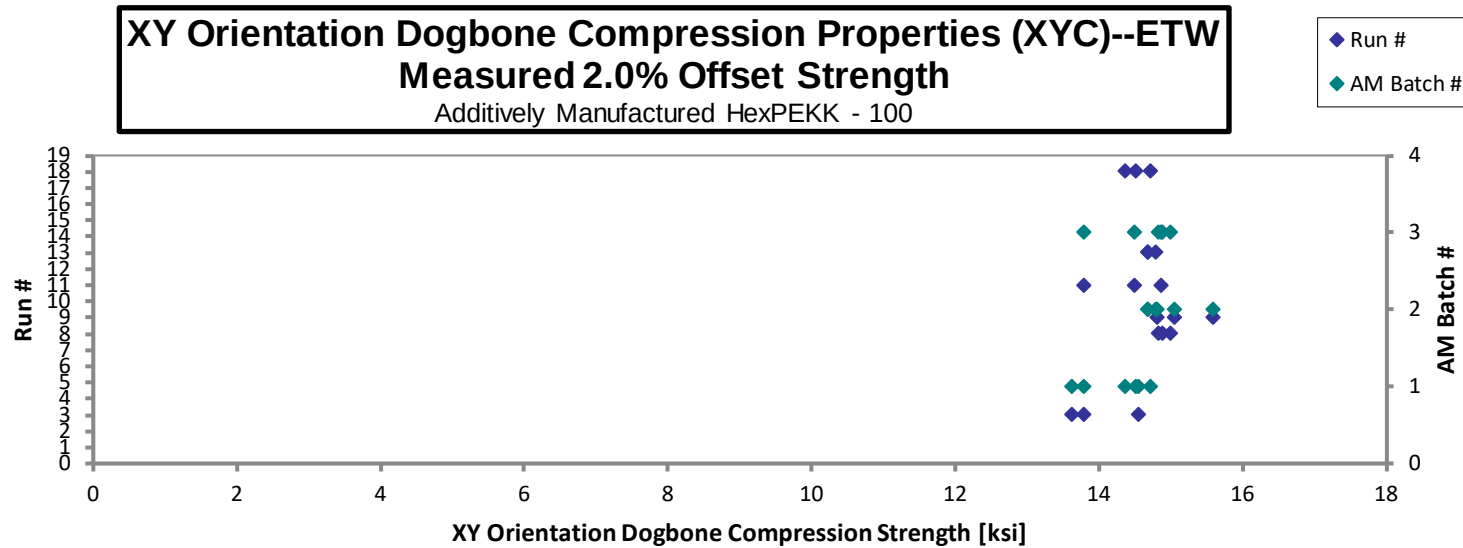


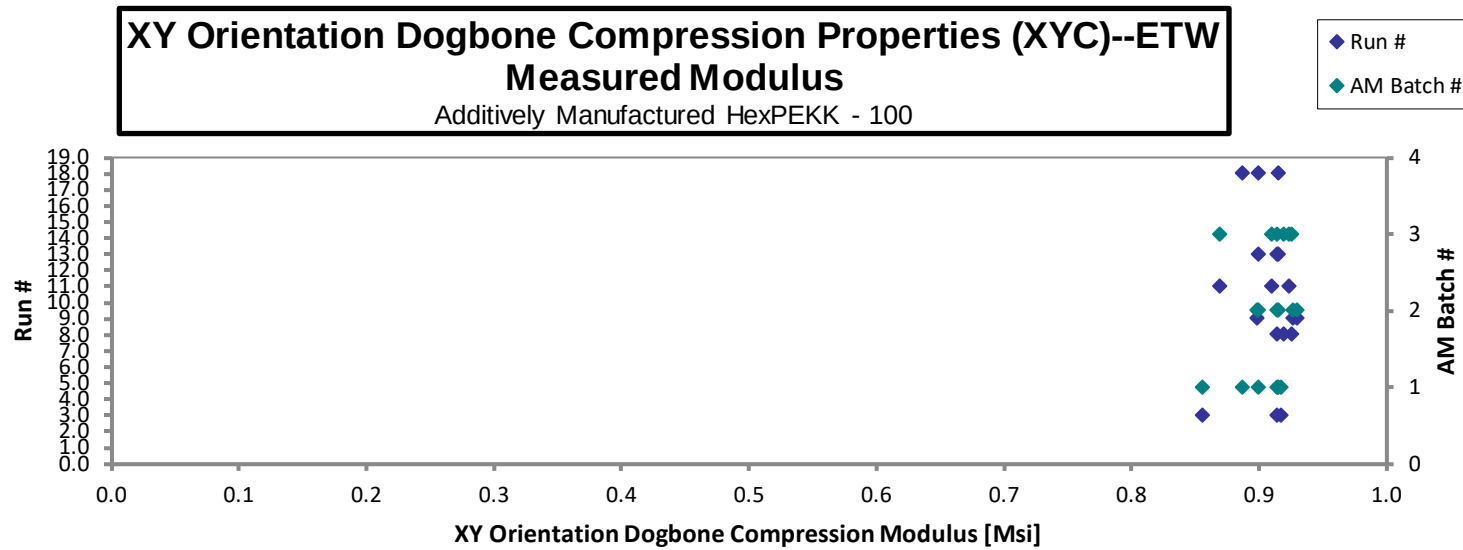
XY Orientation Dogbone Compression Properties (XYC)--ETW**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-XYC-2B-ETW-2	1	18	14.50	17.14	0.8875	4.605	0.5002	UNIFORM COMPRESSIVE FAILURE
HL-A-R18-12-XYC-3B-ETW-4	1	18	14.72	16.89	0.8993	3.979	0.5004	UNIFORM COMPRESSIVE FAILURE
HL-A-R18-12-XYC-5T-ETW-5	1	18	14.37	16.26	0.9157	5.600	0.5002	UNIFORM COMPRESSIVE FAILURE
HL-A-R3-14-XYC-3B-ETW-2	1	3	14.55	16.77	0.9175	0.7741	0.5022	UNIFORM COMPRESSIVE FAILURE
HL-A-R3-14-XYC-5B-ETW-3	1	3	13.79	17.27	0.9140	0.08614	0.5039	UNIFORM COMPRESSIVE FAILURE
HL-A-R3-14-XYC-2T-ETW-4	1	3	13.63	16.59	0.8557	6.528	0.5042	UNIFORM COMPRESSIVE FAILURE
HL-B-R13-9-XYC-2B-ETW-1	2	13	14.69	16.76	0.8993	0.7110	0.5031	UNIFORM COMPRESSIVE FAILURE
HL-B-R13-9-XYC-4B-ETW-3	2	13	14.68	17.64	0.9151	8.653	0.5046	UNIFORM COMPRESSIVE FAILURE
HL-B-R13-9-XYC-4B-ETW-4	2	13	14.78	17.16	0.9143	3.468	0.5007	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-XYC-3B-ETW-1	2	9	15.58	17.77	0.9297	4.254	0.5022	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-XYC-3B-ETW-2	2	9	15.05	18.87	0.9269	8.501	0.5017	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-XYC-5B-ETW-3	2	9	14.80	16.87	0.8988	11.01	0.5012	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-XYC-2B-ETW-1	3	11	14.86	19.53	0.9241	7.888	0.5040	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-XYC-3T-ETW-3	3	11	13.79	16.26	0.8695	7.578	0.5025	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-XYC-5T-ETW-5	3	11	14.50	18.77	0.9098	11.77	0.5032	UNIFORM COMPRESSIVE FAILURE
HL-C-R8-2-XYC-5B-ETW-1	3	8	14.99	16.41	0.9257	12.55	0.5006	UNIFORM COMPRESSIVE FAILURE
HL-C-R8-2-XYC-3T-ETW-3	3	8	14.88	17.11	0.9193	16.29	0.5015	UNIFORM COMPRESSIVE FAILURE
HL-C-R8-2-XYC-1T-ETW-5	3	8	14.82	17.34	0.9147	4.973	0.5016	UNIFORM COMPRESSIVE FAILURE

Average	14.61	17.30	0.9076	6.623	0.5021
Standard Dev.	0.4808	0.9203	0.01990	4.384	
Coeff. of Var. [%]	3.291	5.319	2.192	66.20	
Min.	13.63	16.26	0.8557	0.08614	0.5002
Max.	15.58	19.53	0.9297	16.29	0.5046
Number of Spec.	18	18	18	18	18





4.7 YX Compression Properties (YXC)

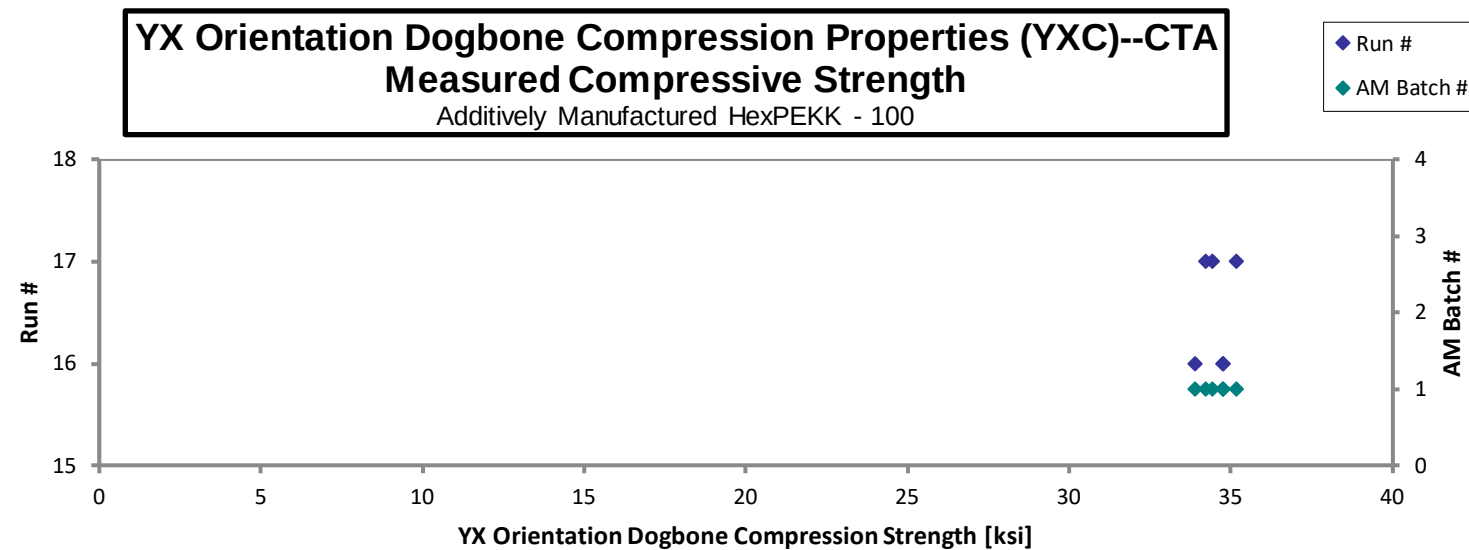
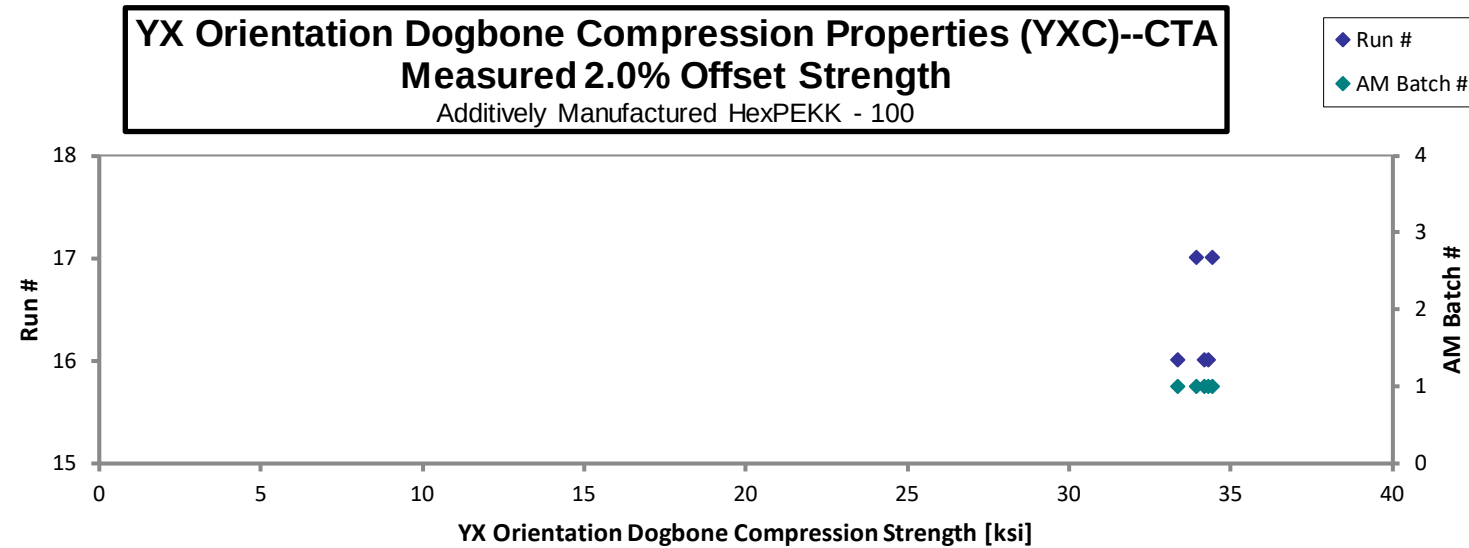
YX Orientation Dogbone Compression Properties (YXC)--CTA□ Strength & Modulus□

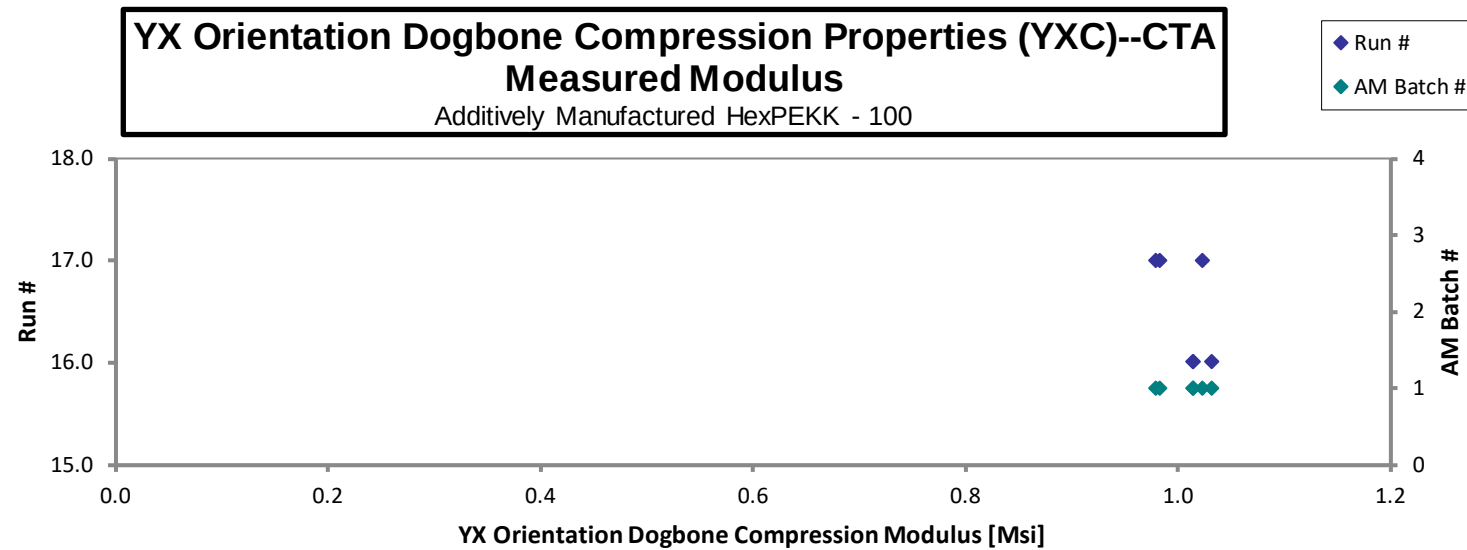
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-YXC-1T-CTA-11	1	16	33.37	33.88	1.015	2.145	0.5016	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-YXC-2B-CTA-7	1	16	34.18	34.74	1.014	0.5312	0.5009	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-YXC-5B-CTA-9	1	16	34.31	34.76	1.031	0.1095	0.5004	UNIFORM COMPRESSIVE FAILURE
HL-A-R17-11-YXC-5B-CTA-10	1	17		34.43	1.023	1.106	0.5004	UNIFORM COMPRESSIVE FAILURE
HL-A-R17-11-YXC-3T-CTA-14	1	17	33.94	34.20	0.9795	0.7146	0.5000	UNIFORM COMPRESSIVE FAILURE
HL-A-R17-11-YXC-2B-CTA-8	1	17	34.43	35.17	0.9835	2.442	0.5000	UNIFORM COMPRESSIVE FAILURE

Average	34.05	34.53	1.008	1.175	0.5005
Standard Dev.	0.4182	0.4579	0.02125	0.9288	
Coeff. of Var. [%]	1.228	1.326	2.109	79.06	
Min.	33.37	33.88	0.9795	0.1095	0.5000
Max.	34.43	35.17	1.031	2.442	0.5016
Number of Spec.	5	6	6	6	6

*2% Offset is not reported for some cases as the coupon failed prior to that



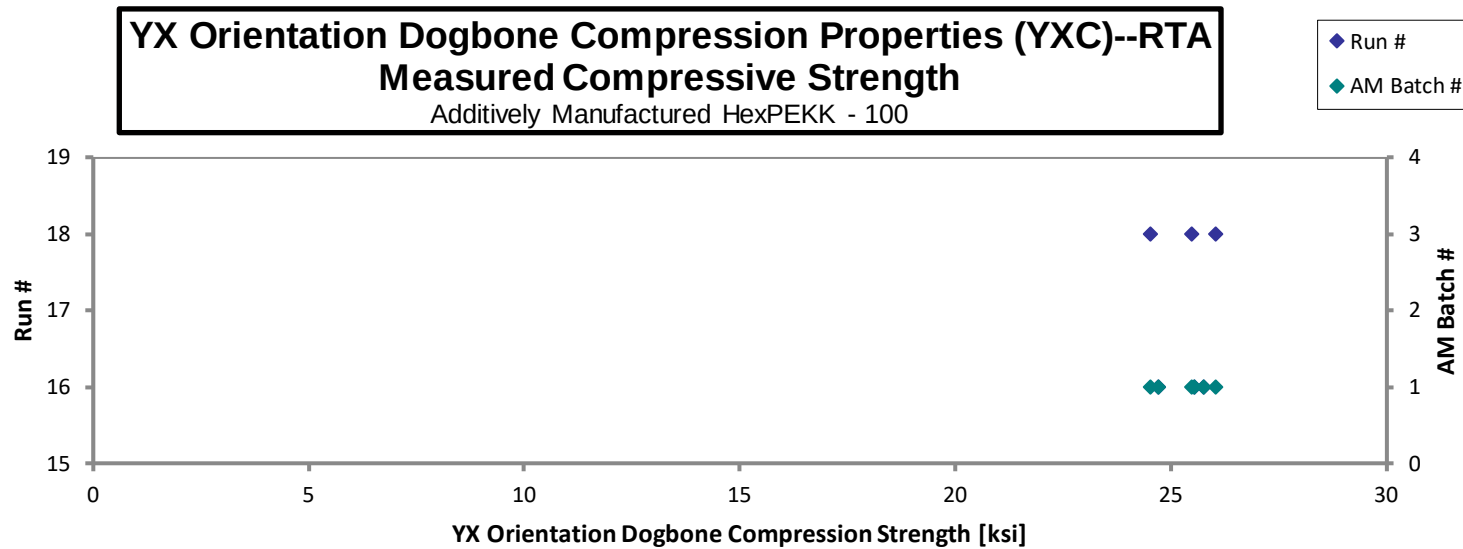


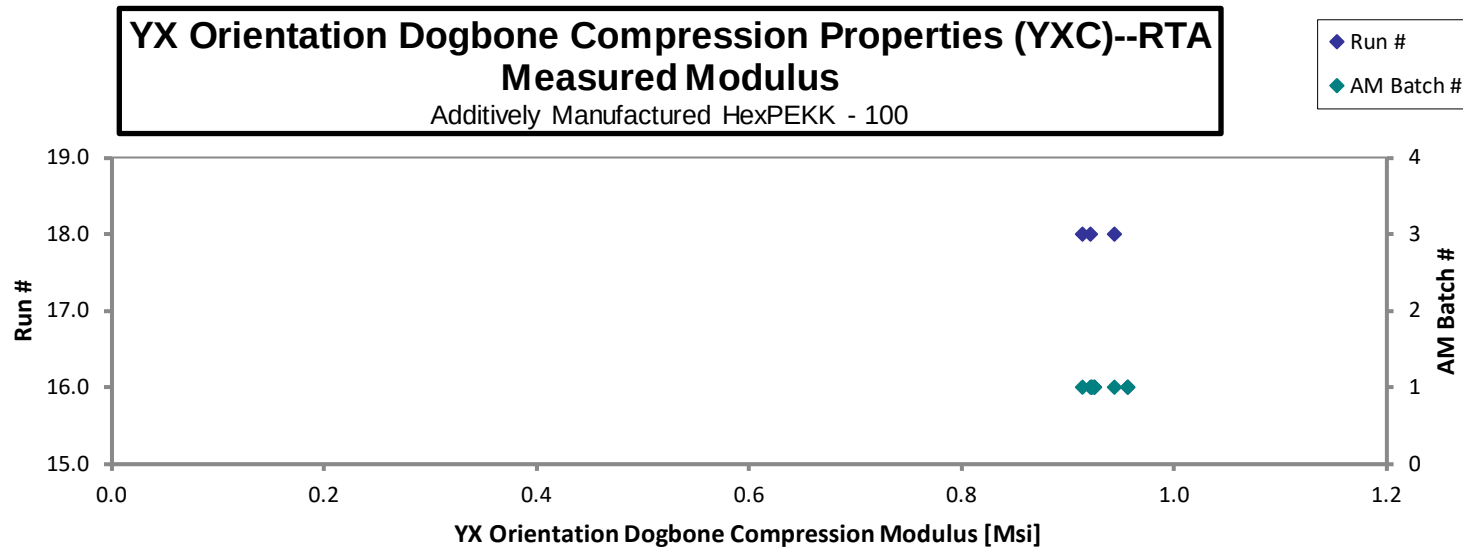
YX Orientation Dogbone Compression Properties (YXC)--RTA**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-YXC-5B-RTA-10	1	16	25.58	25.76	0.9566	1.435	0.5029	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-YXC-1T-RTA-12	1	16	25.18	25.54	0.9258	3.386	0.5026	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-YXC-3T-RTA-13	1	16	24.61	24.72	0.9232	1.346	0.5027	UNIFORM COMPRESSIVE FAILURE
HL-A-R18-12-YXC-1T-RTA-11	1	18	24.41	24.54	0.9140	7.193	0.5042	UNIFORM COMPRESSIVE FAILURE
HL-A-R18-12-YXC-2B-RTA-7	1	18	25.32	25.49	0.9217	3.636	0.5041	UNIFORM COMPRESSIVE FAILURE
HL-A-R18-12-YXC-5B-RTA-9	1	18	25.43	26.04	0.9446	2.039	0.5041	UNIFORM COMPRESSIVE FAILURE

Average	25.09	25.35	0.9310	3.173	0.5034
Standard Dev.	0.4735	0.5938	0.01613	2.194	
Coeff. of Var. [%]	1.887	2.342	1.733	69.15	
Min.	24.41	24.54	0.9140	1.346	0.5026
Max.	25.58	26.04	0.9566	7.193	0.5042
Number of Spec.	6	6	6	6	6



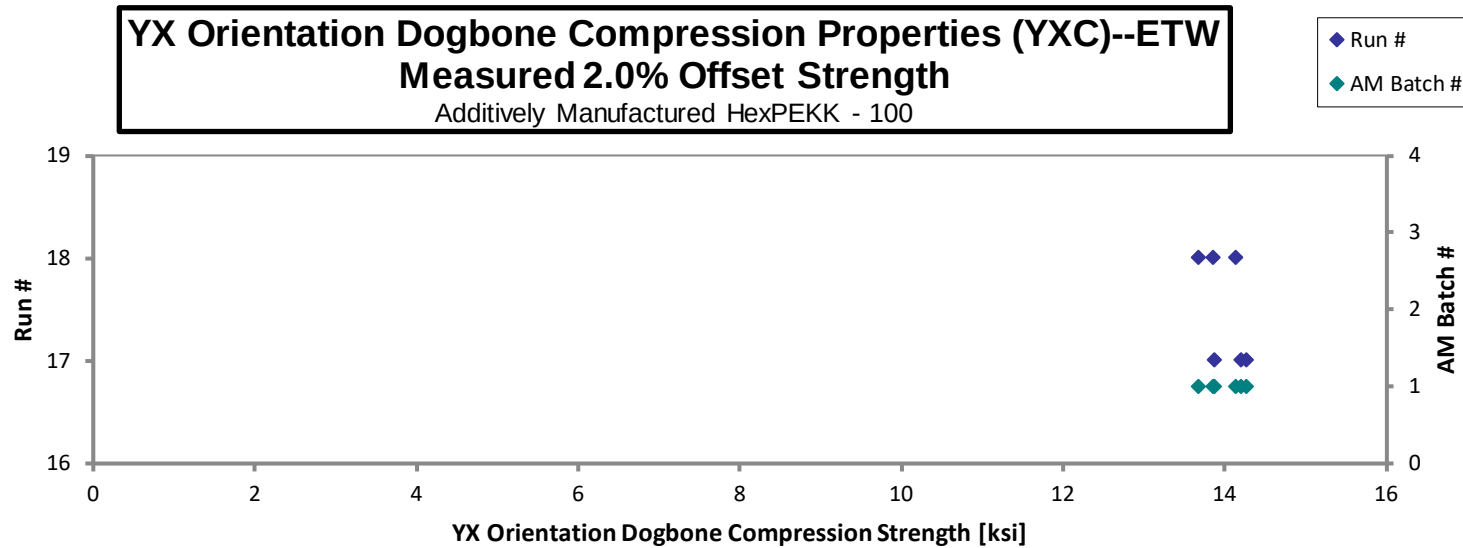


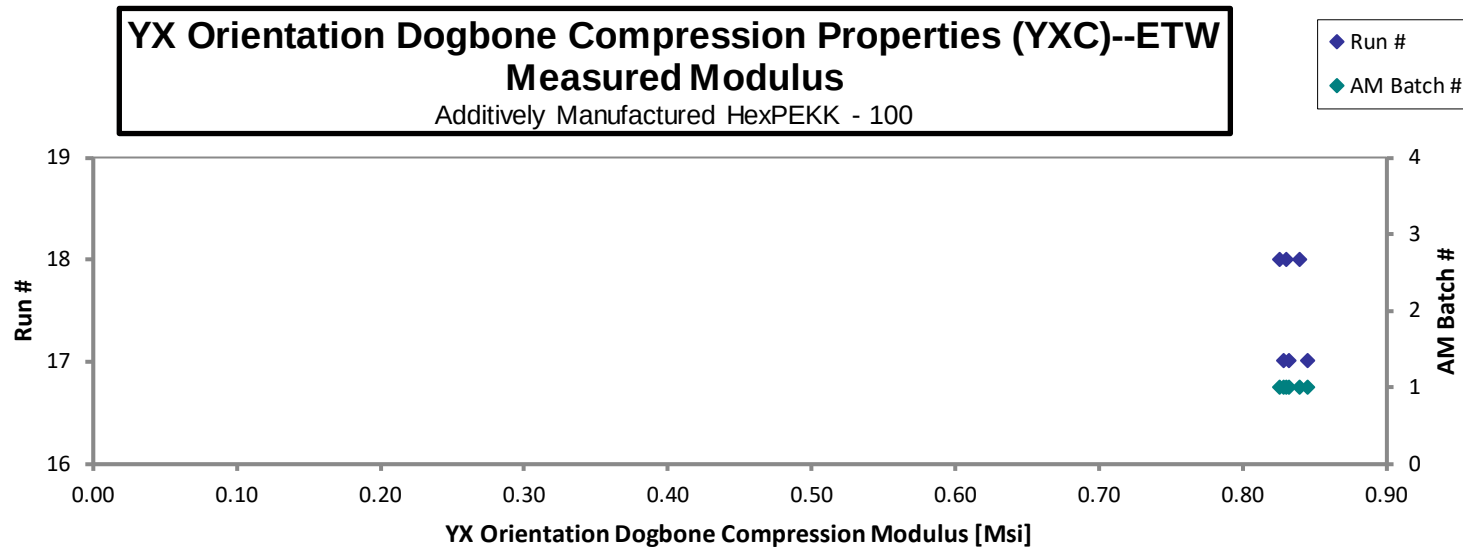
YX Orientation Dogbone Compression Properties (YXC)--ETW**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-YXC-1T-ETW-11	1	17	13.87	15.94	0.8280	10.20	0.5008	UNIFORM COMPRESSIVE FAILURE
HL-A-R17-11-YXC-2B-ETW-7	1	17	14.26	16.91	0.8325	18.68	0.5008	UNIFORM COMPRESSIVE FAILURE
HL-A-R17-11-YXC-5B-ETW-9	1	17	14.19	17.57	0.8456	20.18	0.5005	UNIFORM COMPRESSIVE FAILURE
HL-A-R18-12-YXC-5B-ETW-10	1	18	14.14	16.75	0.8397	9.571	0.5040	UNIFORM COMPRESSIVE FAILURE
HL-A-R18-12-YXC-3T-ETW-14	1	18	13.85	19.83	0.8307	3.804	0.5045	UNIFORM COMPRESSIVE FAILURE
HL-A-R18-12-YXC-2B-ETW-8	1	18	13.67	17.81	0.8257	14.03	0.5040	UNIFORM COMPRESSIVE FAILURE

Average	14.00	17.47	0.8337	12.74	0.5024
Standard Dev.	0.2338	1.332	0.007528	6.141	
Coeff. of Var. [%]	1.671	7.625	0.9030	48.19	
Min.	13.67	15.94	0.8257	3.804	0.5005
Max.	14.26	19.83	0.8456	20.18	0.5045
Number of Spec.	6	6	6	6	6





4.8 ZX Compression Properties (ZXC)

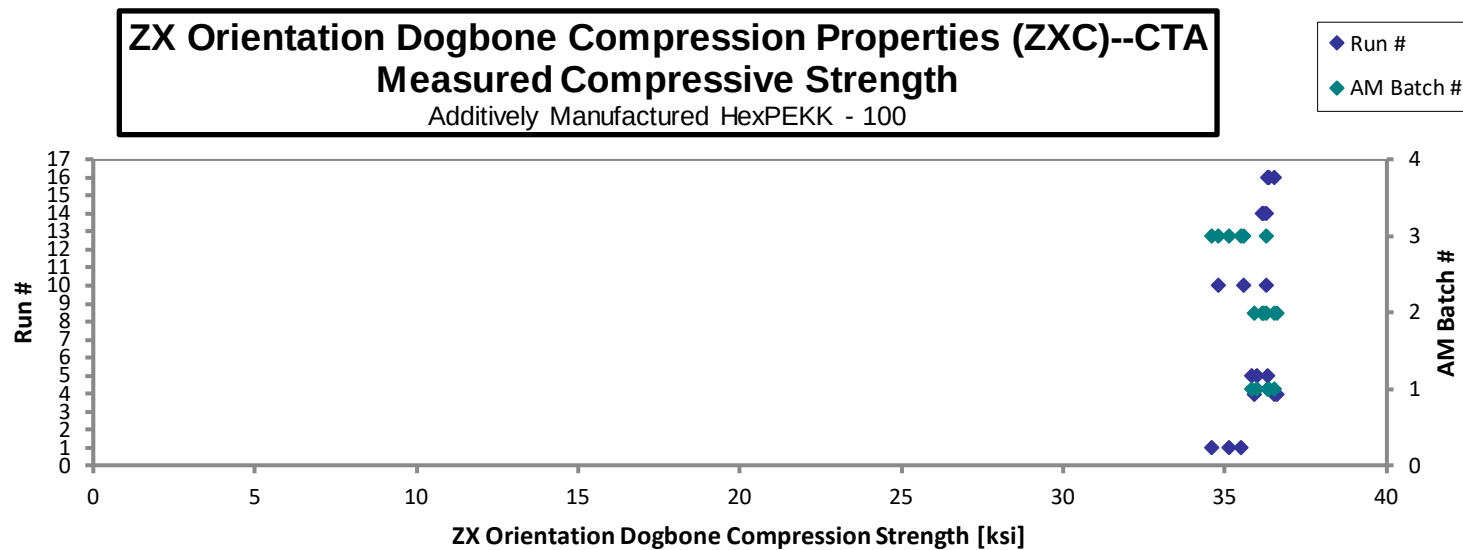
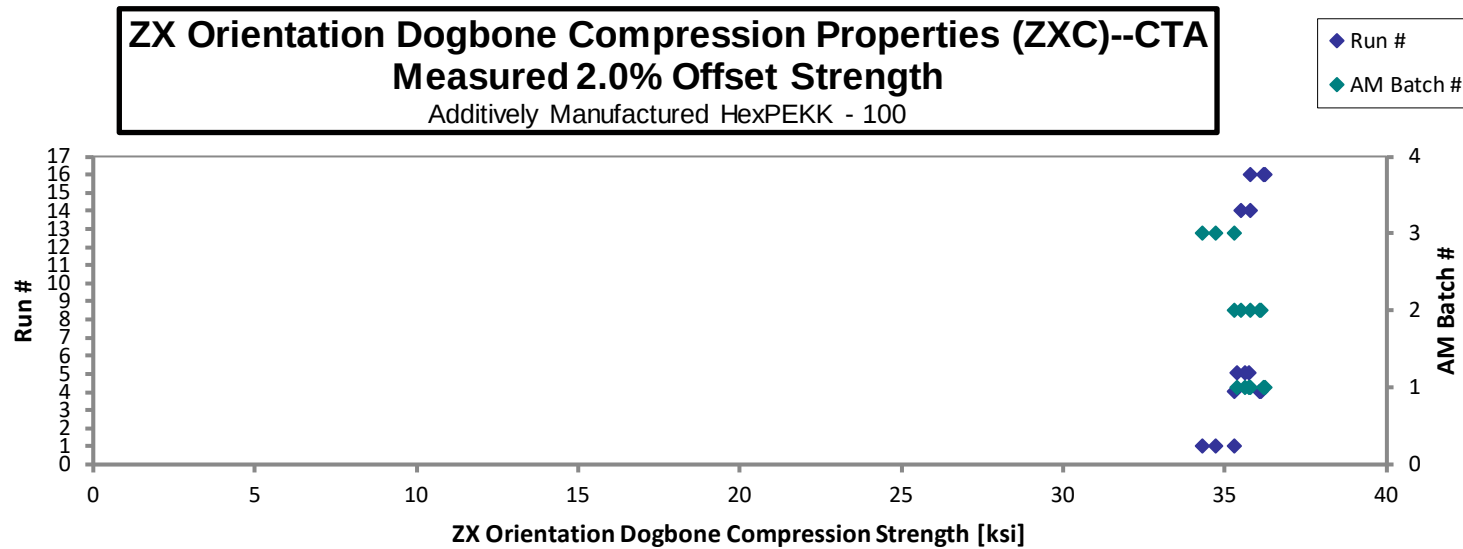
ZX Orientation Dogbone Compression Properties (ZXC)--CTA□

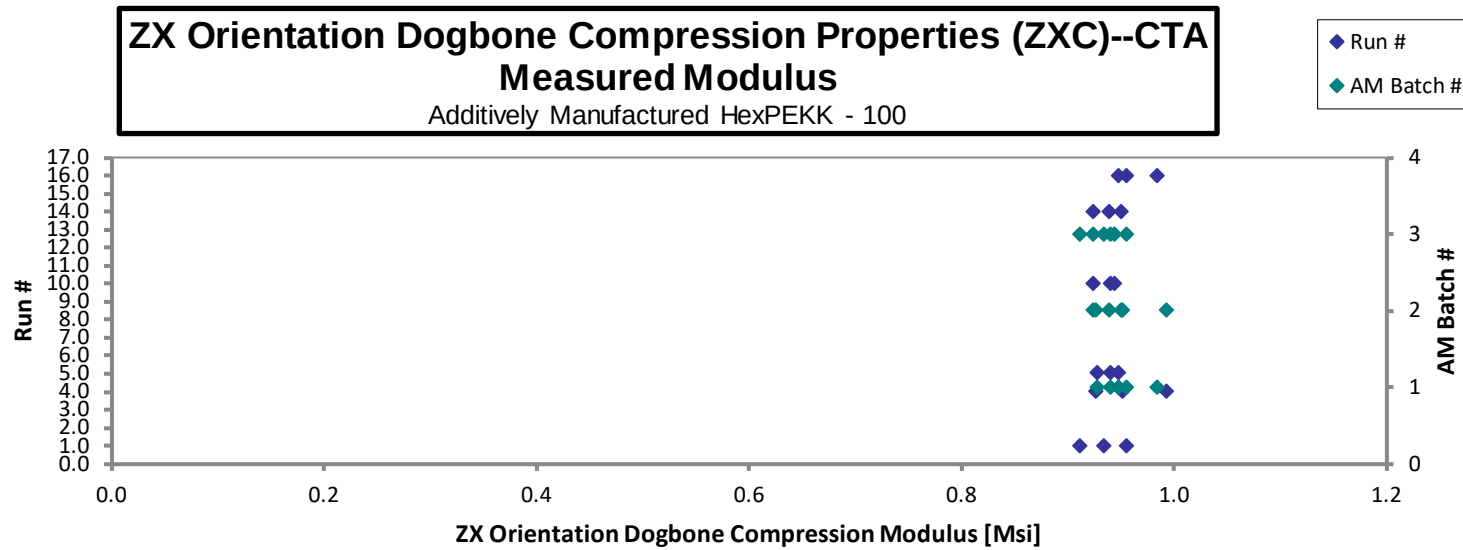
Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXC-4B-CTA-15	1	16	35.81	36.33	0.9840	14.94	0.5022	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-ZXC-1T-CTA-17	1	16	36.25	36.54	0.9551	6.388	0.5013	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-ZXC-2B-CTA-19	1	16	36.19	36.38	0.9479	6.358	0.5004	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-ZXC-5T-CTA-11	1	5	35.36	35.84	0.9278	6.578	0.5010	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-ZXC-4B-CTA-7	1	5	35.76	36.31	0.9479	3.819	0.5009	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-ZXC-1T-CTA-9	1	5	35.64	36.01	0.9402	5.125	0.5014	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZXC-2T-CTA-10	2	14	35.49	36.18	0.9387	2.948	0.5041	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZXC-5T-CTA-12	2	14	35.79	36.29	0.9244	6.831	0.5042	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZXC-3B-CTA-8	2	14		36.20	0.9497	5.286	0.5045	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-ZXC-4B-CTA-11	2	4	35.31	35.92	0.9932	10.09	0.5036	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-ZXC-2B-CTA-7	2	4	36.07	36.54	0.9511	5.709	0.5045	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-ZXC-3T-CTA-9	2	4	36.12	36.62	0.9266	10.13	0.5041	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-ZXC-3T-CTA-11	3	1	35.30	35.49	0.9340	2.418	0.4941	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-ZXC-5B-CTA-7	3	1	34.70	35.11	0.9548	0.6092	0.4945	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-ZXC-2T-CTA-9	3	1	34.29	34.58	0.9119	1.885	0.4946	UNIFORM COMPRESSIVE FAILURE
HL-C-R10-5-ZXC-1T-CTA-10	3	10		34.81	0.9242	2.779	0.5036	UNIFORM COMPRESSIVE FAILURE
HL-C-R10-5-ZXC-4T-CTA-11	3	10		35.60	0.9398	0.4374	0.5033	UNIFORM COMPRESSIVE FAILURE
HL-C-R10-5-ZXC-5B-CTA-8	3	10		36.28	0.9436	1.068	0.5039	UNIFORM COMPRESSIVE FAILURE

Average	35.58	35.95	0.9442	5.189	0.5014	*2% offset is not reported for build 10 coupons as the coupon failed prior to that
Standard Dev.	0.5633	0.6022	0.02015	3.781		
Coeff. of Var. [%]	1.583	1.675	2.134	72.87		
Min.	34.29	34.58	0.9119	0.4374	0.4941	
Max.	36.25	36.62	0.9932	14.94	0.5045	
Number of Spec.	14	18	18	18	18	



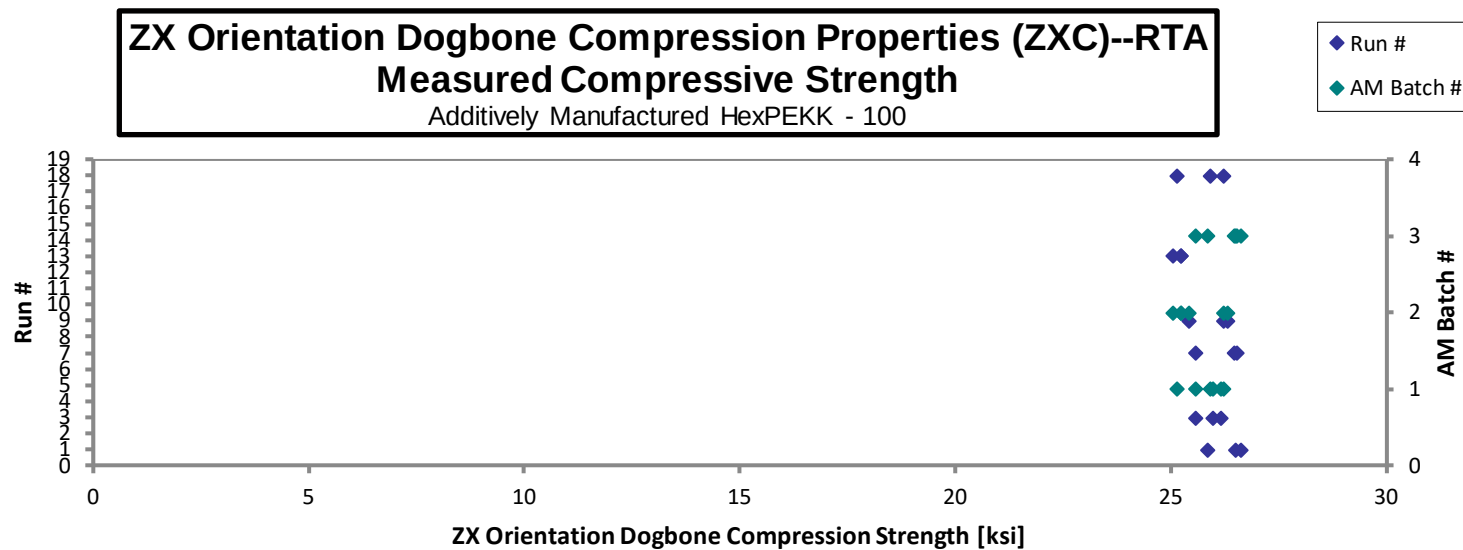
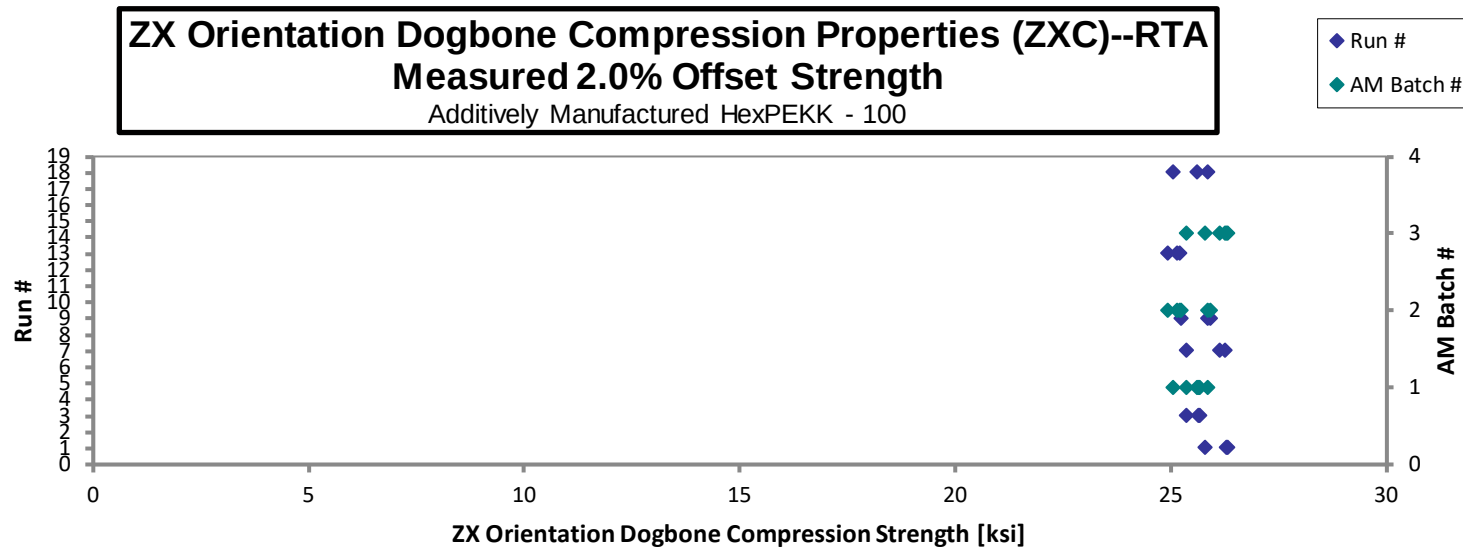


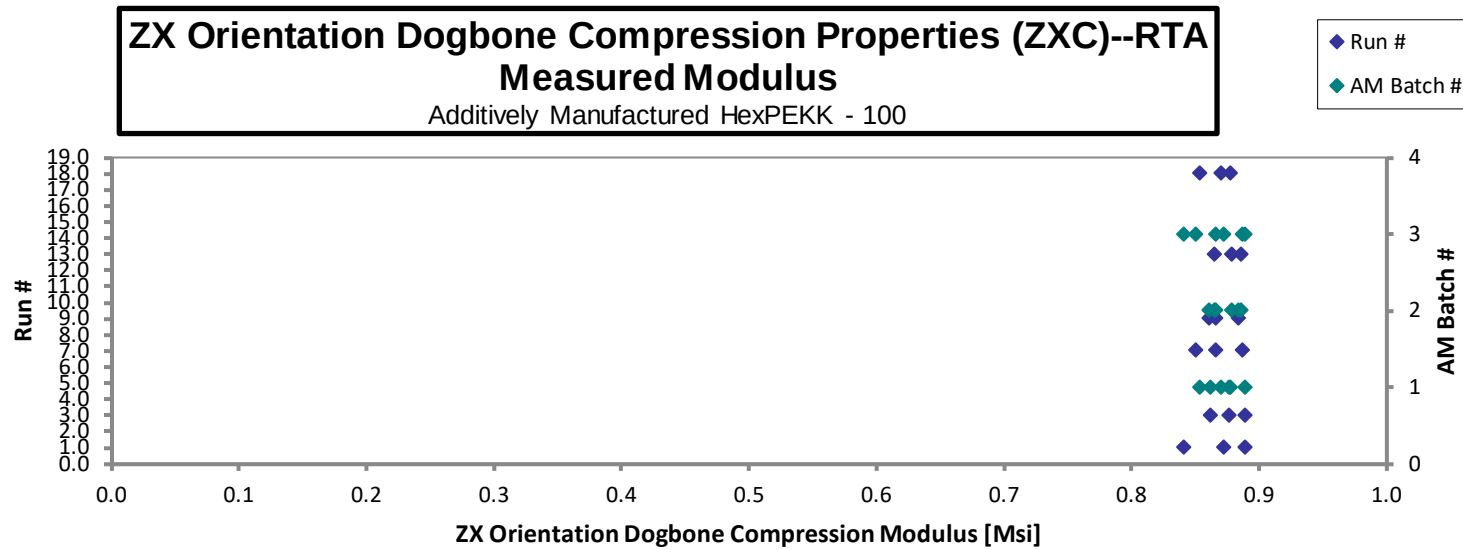
ZX Orientation Dogbone Compression Properties (ZXC)--RTA
Strength & Modulus

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-ZXC-4B-RTA-15	1	18	25.86	26.21	0.8774	3.259	0.5041	UNIFORM COMPRESSIVE FAILURE
HL-A-R18-12-ZXC-1T-RTA-17	1	18	25.04	25.15	0.8536	5.064	0.5040	UNIFORM COMPRESSIVE FAILURE
HL-A-R18-12-ZXC-2B-RTA-19	1	18	25.62	25.93	0.8701	5.793	0.5044	UNIFORM COMPRESSIVE FAILURE
HL-A-R3-14-ZXC-1T-RTA-10	1	3	25.65	26.17	0.8889	1.477	0.5042	UNIFORM COMPRESSIVE FAILURE
HL-A-R3-14-ZXC-5T-RTA-12	1	3	25.35	25.57	0.8622	0.4502	0.5036	UNIFORM COMPRESSIVE FAILURE
HL-A-R3-14-ZXC-4B-RTA-8	1	3	25.67	25.99	0.8767	4.072	0.5039	UNIFORM COMPRESSIVE FAILURE
HL-B-R13-9-ZXC-3T-RTA-10	2	13	24.94	25.04	0.8653	0.1483	0.5042	UNIFORM COMPRESSIVE FAILURE
HL-B-R13-9-ZXC-4B-RTA-12	2	13	25.13	25.25	0.8855	7.980	0.5042	UNIFORM COMPRESSIVE FAILURE
HL-B-R13-9-ZXC-2B-RTA-8	2	13	25.21	25.23	0.8786	0.2497	0.5016	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-ZXC-5T-RTA-11	2	9	25.91	26.30	0.8666	2.935	0.5022	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-ZXC-3B-RTA-7	2	9	25.84	26.23	0.8834	6.042	0.5027	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-ZXC-2T-RTA-9	2	9	25.25	25.43	0.8604	1.711	0.5022	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-ZXC-2T-RTA-10	3	1	25.78	25.85	0.8726	1.062	0.4941	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-ZXC-3T-RTA-12	3	1	26.32	26.62	0.8890	3.687	0.4938	UNIFORM COMPRESSIVE FAILURE
HL-C-R1-1-ZXC-5B-RTA-8	3	1	26.28	26.49	0.8407	5.565	0.4946	UNIFORM COMPRESSIVE FAILURE
HL-C-R7-4-ZXC-4T-RTA-12	3	7	26.12	26.54	0.8659	0.02363	0.5031	UNIFORM COMPRESSIVE FAILURE
HL-C-R7-4-ZXC-5B-RTA-7	3	7	26.26	26.47	0.8869	3.566	0.5035	UNIFORM COMPRESSIVE FAILURE
HL-C-R7-4-ZXC-1T-RTA-9	3	7	25.34	25.57	0.8505	5.959	0.5034	UNIFORM COMPRESSIVE FAILURE

Average	25.64	25.89	0.8708	3.280	0.5019
Standard Dev.	0.4401	0.5236	0.01394	2.436	
Coeff. of Var. [%]	1.716	2.022	1.601	74.25	
Min.	24.94	25.04	0.8407	0.02363	0.4938
Max.	26.32	26.62	0.8890	7.980	0.5044
Number of Spec.	18	18	18	18	18





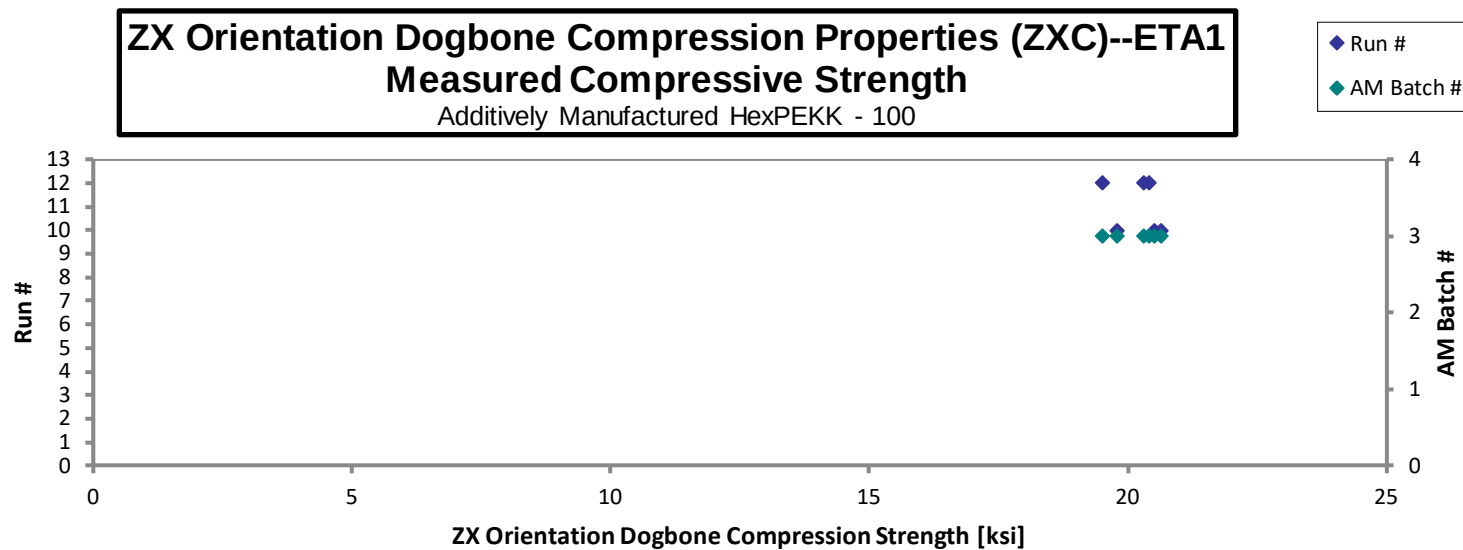
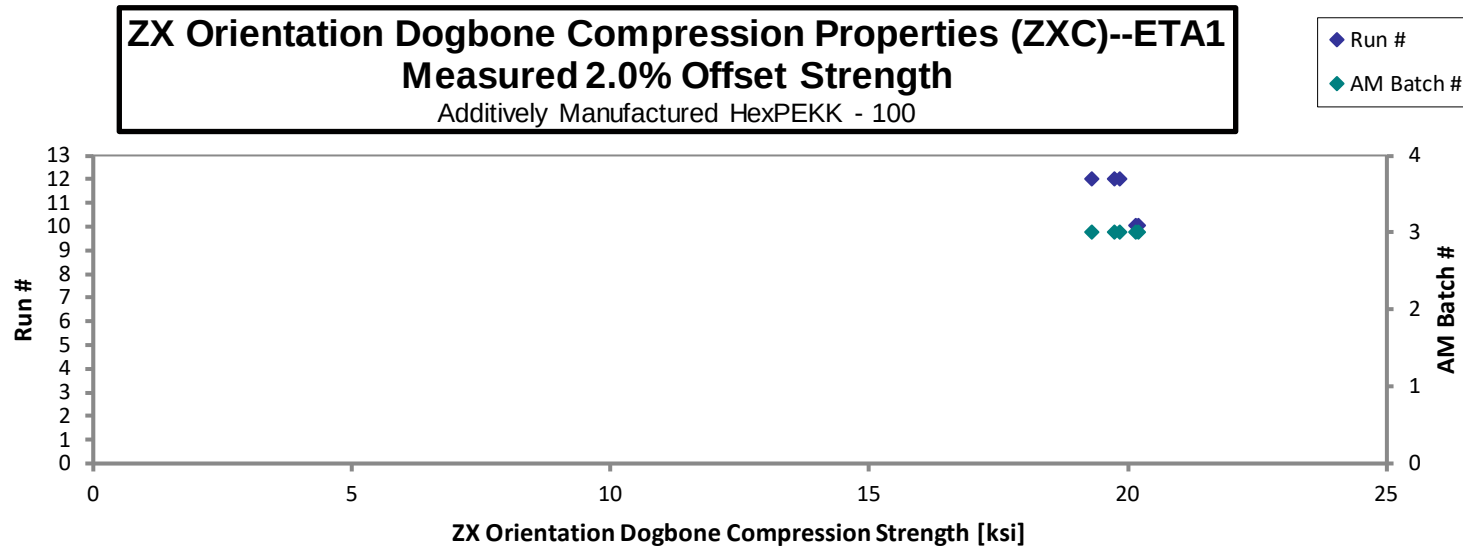
ZX Orientation Dogbone Compression Properties (ZXC)--ETA1**Strength & Modulus**

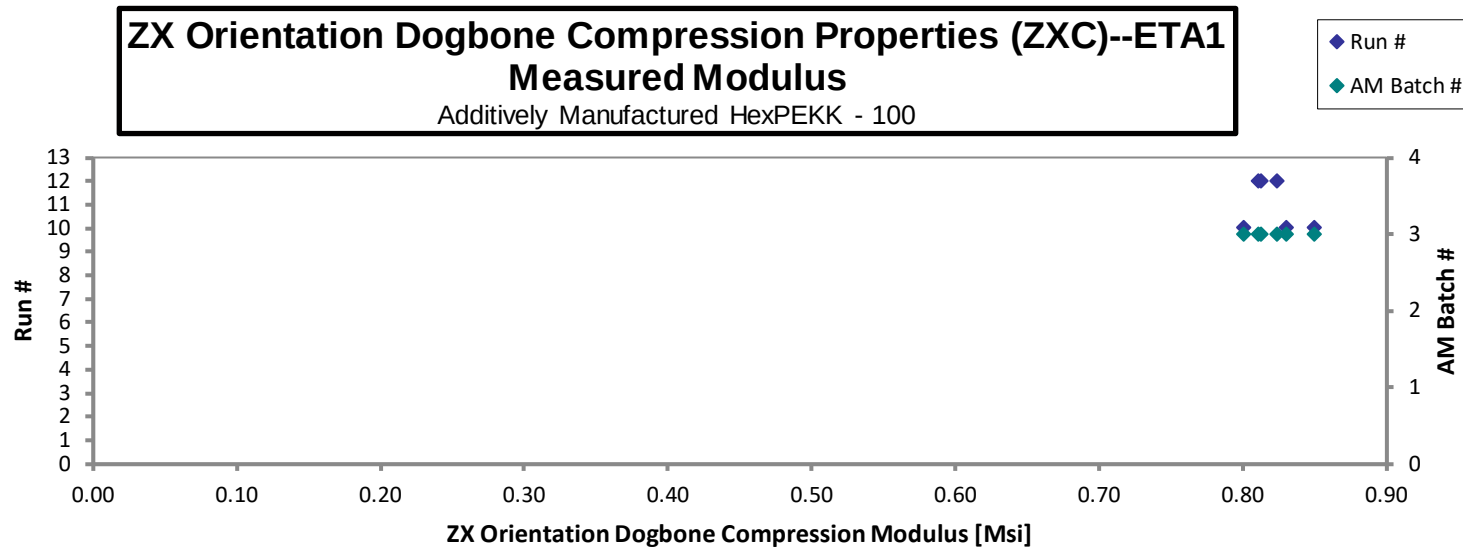
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R10-5-ZXC-4T-ETA1-12	3	10	20.16	20.51	0.8307	2.106	0.5037	UNIFORM COMPRESSIVE FAILURE
HL-C-R10-5-ZXC-5B-ETA1-7	3	10	20.20	20.63	0.8494	9.670	0.5038	UNIFORM COMPRESSIVE FAILURE
HL-C-R10-5-ZXC-1T-ETA1-9	3	10		19.79	0.8004	7.357	0.5036	UNIFORM COMPRESSIVE FAILURE
HL-C-R12-3-ZXC-2T-ETA1-10	3	12	19.31	19.51	0.8109	9.085	0.4986	UNIFORM COMPRESSIVE FAILURE
HL-C-R12-3-ZXC-3T-ETA1-12	3	12	19.74	20.41	0.8241	26.25	0.4958	UNIFORM COMPRESSIVE FAILURE
HL-C-R12-3-ZXC-5B-ETA1-8	3	12	19.84	20.31	0.8123	5.914	0.4981	UNIFORM COMPRESSIVE FAILURE

Average	19.85	20.19	0.8213	10.06	0.5006
Standard Dev.	0.3615	0.4438	0.01741	8.377	
Coeff. of Var. [%]	1.821	2.198	2.120	83.25	
Min.	19.31	19.51	0.8004	2.106	0.4958
Max.	20.20	20.63	0.8494	26.25	0.5038
Number of Spec.	5	6	6	6	6

*2% offset is not reported for one coupon as it failed prior to achieving that





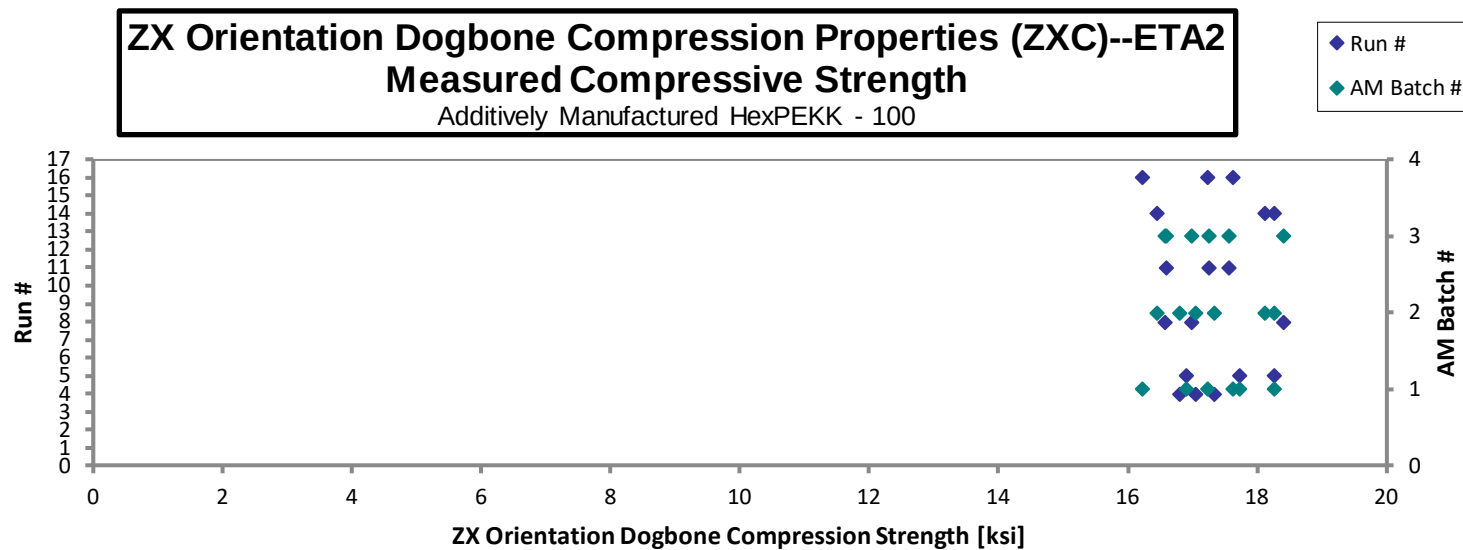
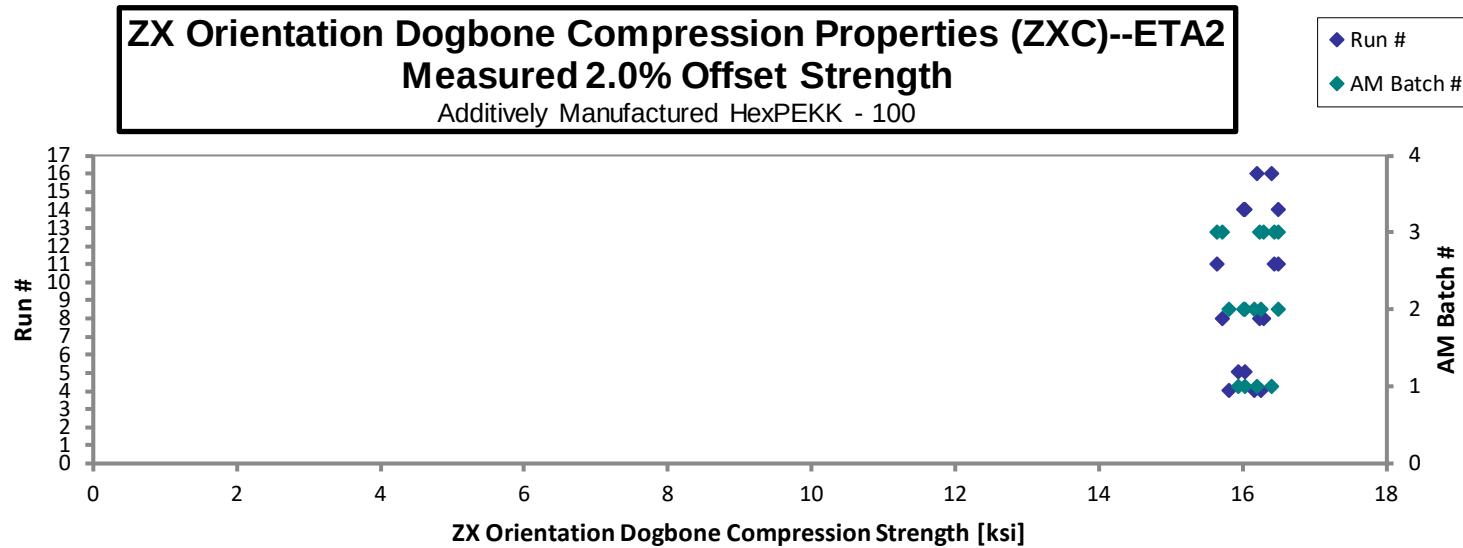
ZX Orientation Dogbone Compression Properties (ZXC)--ETA2**Strength & Modulus**

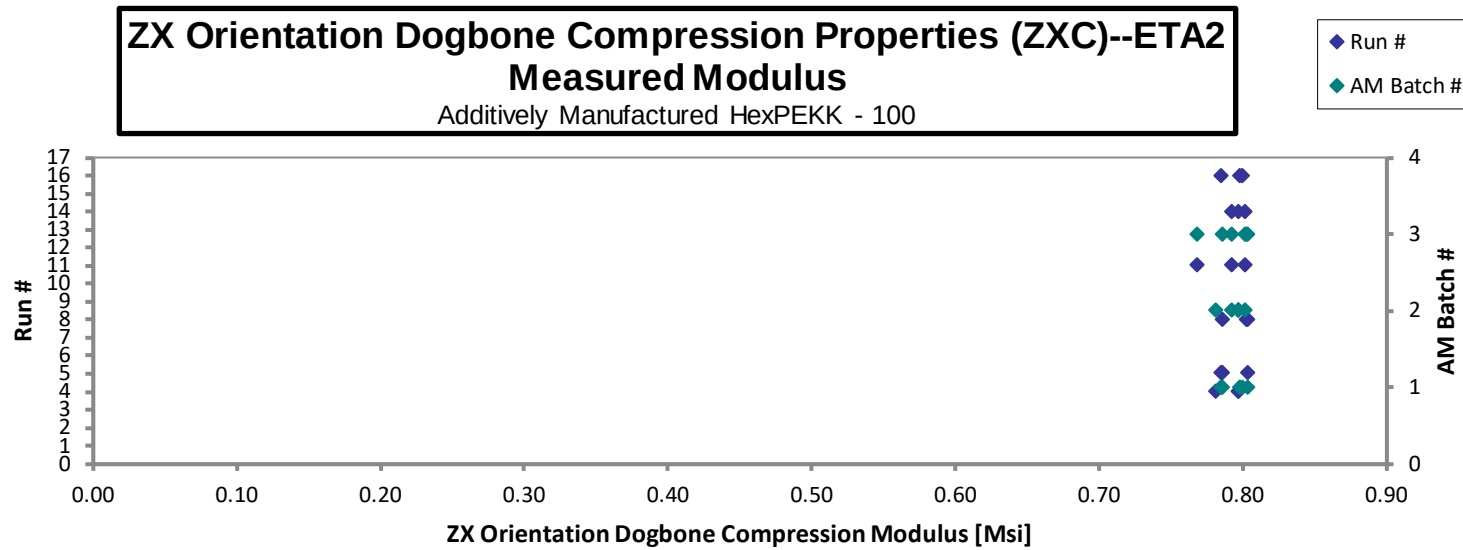
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXC-4B-ETA2-16	1	16	16.40	17.63	0.7975	1.601	0.5023	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-ZXC-1T-ETA2-18	1	16		16.23	0.7995	13.28	0.5019	UNIFORM COMPRESSIVE FAILURE
HL-A-R16-10-ZXC-2B-ETA2-20	1	16	16.21	17.24	0.7851	7.805	0.5015	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-ZXC-1T-ETA2-10	1	5	16.03	17.74	0.7855	3.141	0.5010	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-ZXC-5T-ETA2-12	1	5	15.94	16.90	0.7849	7.517	0.5008	UNIFORM COMPRESSIVE FAILURE
HL-A-R5-15-ZXC-4B-ETA2-8	1	5		18.27	0.8038	4.800	0.5005	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZXC-5T-ETA2-11	2	14	16.02	18.11	0.7920	1.766	0.5003	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZXC-3B-ETA2-7	2	14	16.49	18.26	0.7973	10.69	0.5006	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZXC-2T-ETA2-9	2	14	16.00	16.44	0.8012	10.77	0.5008	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-ZXC-3T-ETA2-10	2	4	15.80	16.80	0.7809	6.791	0.5050	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-ZXC-4B-ETA2-12	2	4	16.26	17.35	0.7970	1.863	0.5043	UNIFORM COMPRESSIVE FAILURE
HL-B-R4-7-ZXC-2B-ETA2-8	2	4	16.17	17.05	0.7971	0.04378	0.5034	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-ZXC-1T-ETA2-10	3	11	15.64	16.59	0.7685	2.608	0.5045	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-ZXC-4T-ETA2-11	3	11	16.49	17.57	0.7924	5.789	0.5046	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-ZXC-5B-ETA2-8	3	11	16.44	17.26	0.8018	7.136	0.5046	UNIFORM COMPRESSIVE FAILURE
HL-C-R8-2-ZXC-3T-ETA2-11	3	8	16.24	16.99	0.8025	3.209	0.4976	UNIFORM COMPRESSIVE FAILURE
HL-C-R8-2-ZXC-5B-ETA2-7	3	8	16.29	18.40	0.8031	9.589	0.4976	UNIFORM COMPRESSIVE FAILURE
HL-C-R8-2-ZXC-2T-ETA2-9	3	8	15.71	16.57	0.7860	5.215	0.4970	UNIFORM COMPRESSIVE FAILURE

Average	16.13	17.30	0.7931	5.757	0.5016
Standard Dev.	0.2694	0.6688	0.009540	3.730	
Coeff. of Var. [%]	1.670	3.866	1.203	64.80	
Min.	15.64	16.23	0.7685	0.04378	0.4970
Max.	16.49	18.40	0.8038	13.28	0.5050
Number of Spec.	16	18	18	18	18

*2% offset is not reported for 2 coupons as the coupon failed prior to that



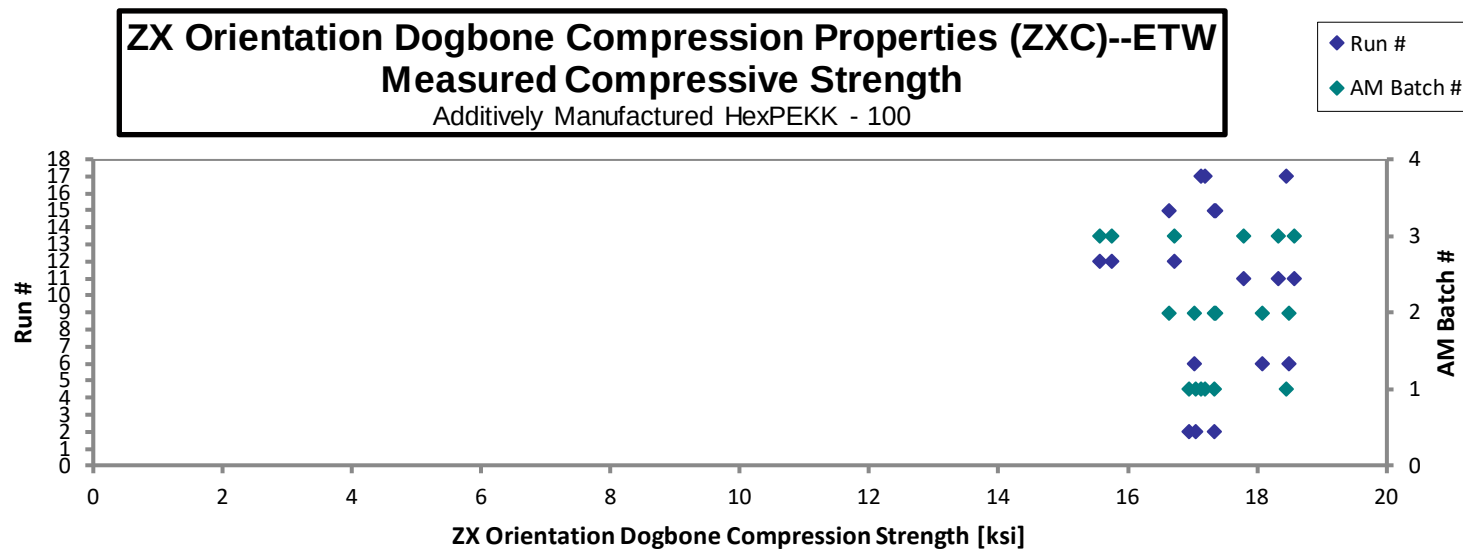
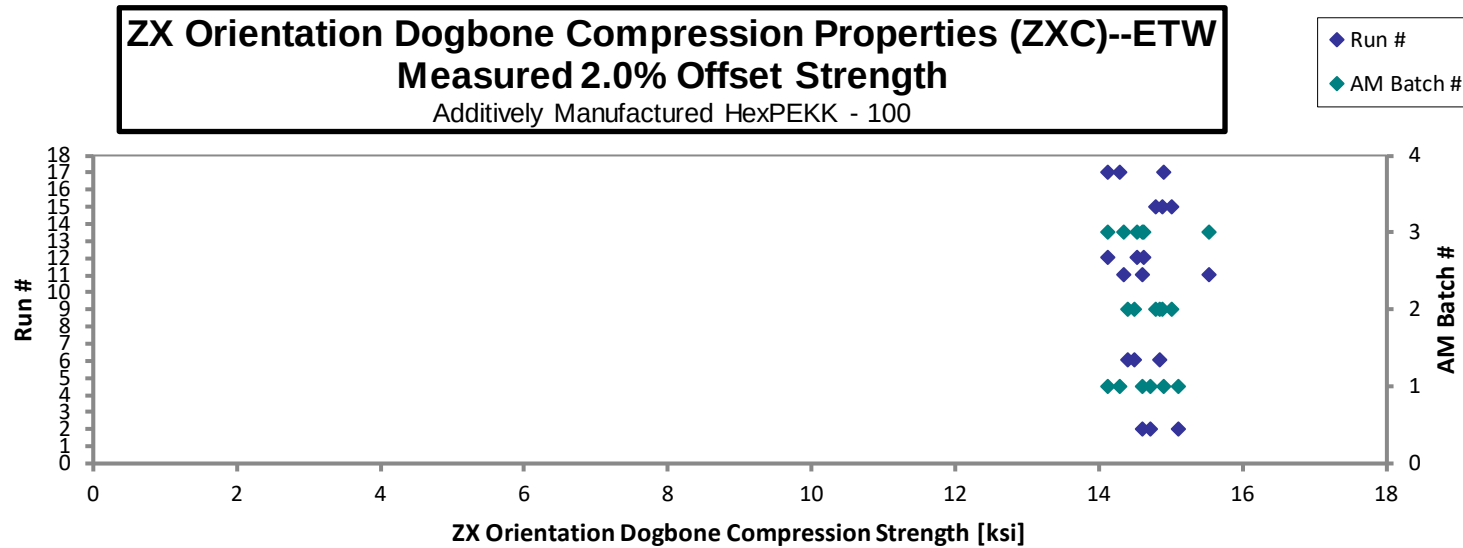


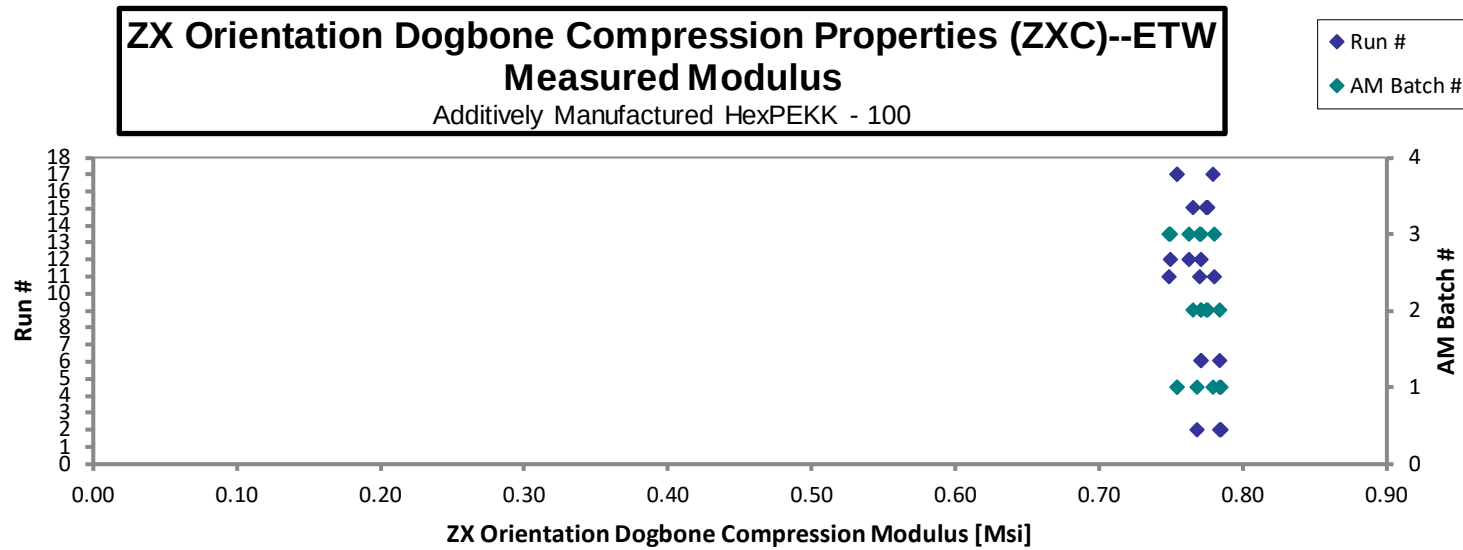
ZX Orientation Dogbone Compression Properties (ZXC)--ETW**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-ZXC-4B-ETW-16	1	17	14.89	17.13	0.7792	0.07144	0.5042	UNIFORM COMPRESSIVE FAILURE
HL-A-R17-11-ZXC-1T-ETW-17	1	17	14.13	18.46	0.7545	9.753	0.5041	UNIFORM COMPRESSIVE FAILURE
HL-A-R17-11-ZXC-1T-ETW-18	1	17	14.29	17.19	0.7547	10.03	0.5038	UNIFORM COMPRESSIVE FAILURE
HL-A-R2-13-ZXC-1T-ETW-10	1	2	14.59	17.05	0.7681	9.539	0.4845	UNIFORM COMPRESSIVE FAILURE
HL-A-R2-13-ZXC-4B-ETW-7	1	2	15.10	17.34	0.7838	19.38	0.4852	UNIFORM COMPRESSIVE FAILURE
HL-A-R2-13-ZXC-1T-ETW-9	1	2	14.72	16.95	0.7850	18.74	0.4852	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-ZXC-2T-ETW-10	2	15	14.79	16.64	0.7653	2.949	0.5010	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-ZXC-3B-ETW-7	2	15	14.88	17.33	0.7748	1.404	0.5003	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-ZXC-3B-ETW-8	2	15	15.02	17.36	0.7760	2.934	0.5011	UNIFORM COMPRESSIVE FAILURE
HL-B-R6-8-ZXC-3T-ETW-10	2	6	14.49	17.03	0.7712	0.6430	0.5010	UNIFORM COMPRESSIVE FAILURE
HL-B-R6-8-ZXC-2B-ETW-7	2	6	14.85	18.50	0.7843	13.24	0.5017	UNIFORM COMPRESSIVE FAILURE
HL-B-R6-8-ZXC-3T-ETW-9	2	6	14.40	18.08	0.7714	2.040	0.5024	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-ZXC-4T-ETW-12	3	11	14.61	18.32	0.7704	9.257	0.5044	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-ZXC-5B-ETW-7	3	11	15.54	18.59	0.7804	16.20	0.5044	UNIFORM COMPRESSIVE FAILURE
HL-C-R11-6-ZXC-1T-ETW-9	3	11	14.34	17.79	0.7484	6.565	0.5042	UNIFORM COMPRESSIVE FAILURE
HL-C-R12-3-ZXC-3T-ETW-11	3	12	14.54	15.74	0.7624	5.596	0.4955	UNIFORM COMPRESSIVE FAILURE
HL-C-R12-3-ZXC-5B-ETW-7	3	12	14.63	16.72	0.7709	12.04	0.5000	UNIFORM COMPRESSIVE FAILURE
HL-C-R12-3-ZXC-2T-ETW-9	3	12	14.12	15.58	0.7498	5.305	0.4970	UNIFORM COMPRESSIVE FAILURE

Average	14.66	17.32	0.7695	8.094	0.4989
Standard Dev.	0.3580	0.8671	0.01165	6.084	
Coeff. of Var. [%]	2.442	5.006	1.513	75.17	
Min.	14.12	15.58	0.7484	0.07144	0.4845
Max.	15.54	18.59	0.7850	19.38	0.5044
Number of Spec.	18	18	18	18	18





4.9 ZX45 Compression Properties (ZX45C)

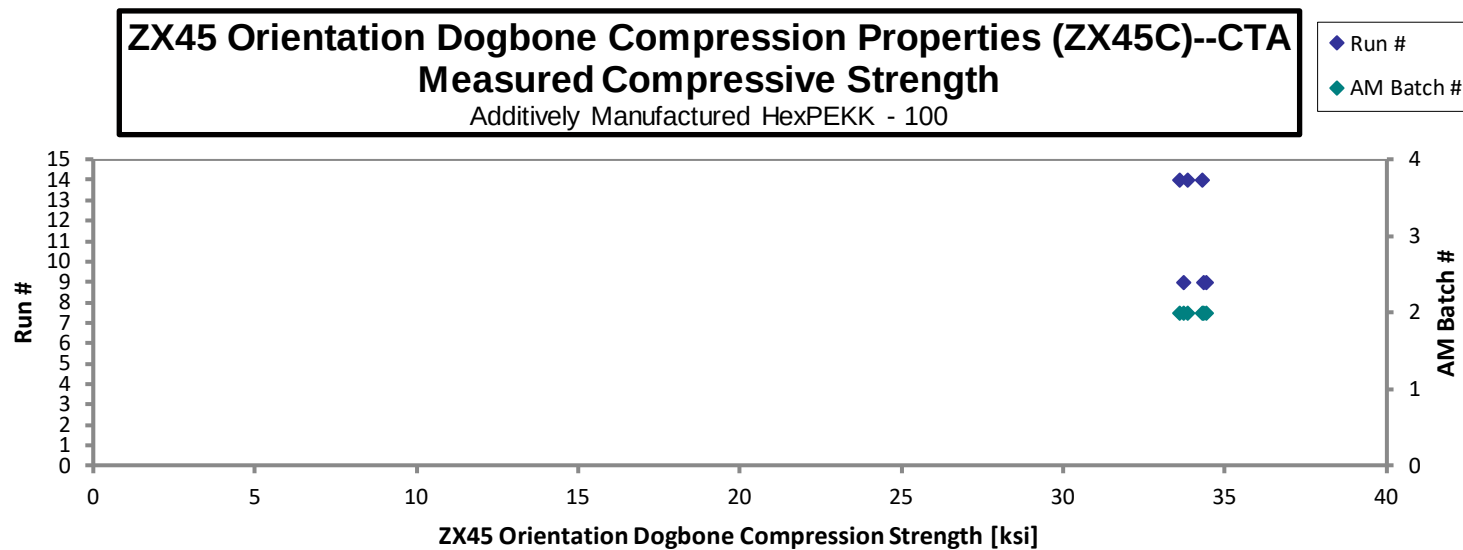
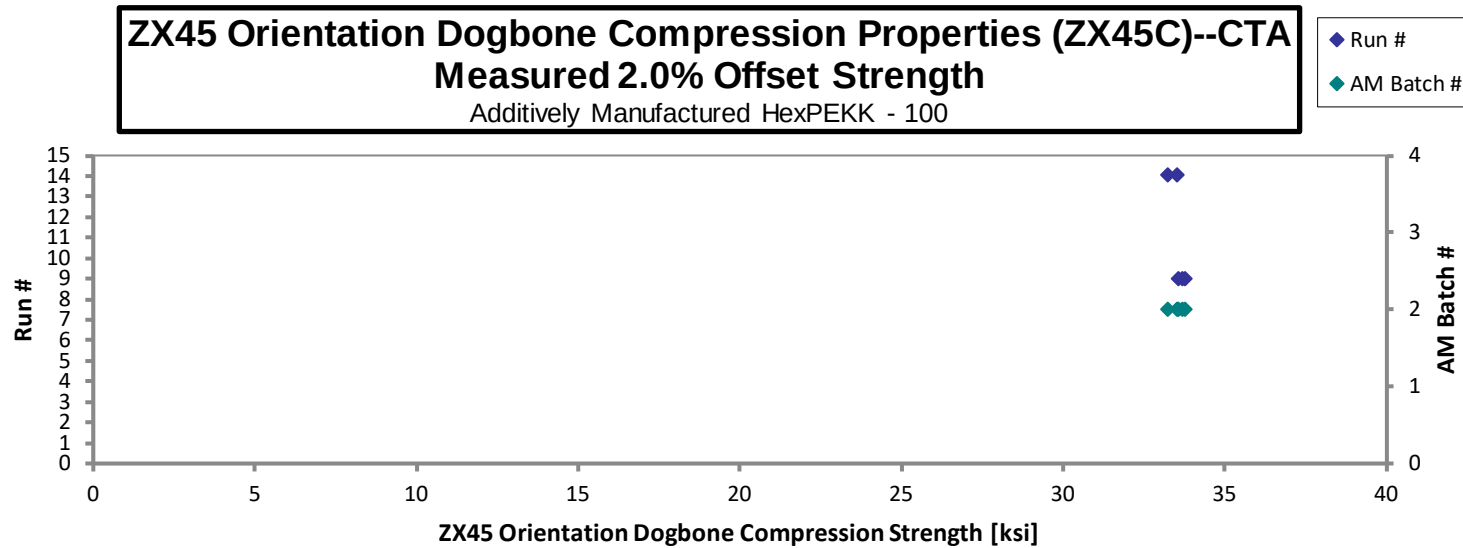
ZX45 Orientation Dogbone Compression Properties (ZX45C)--CTA Strength & Modulus

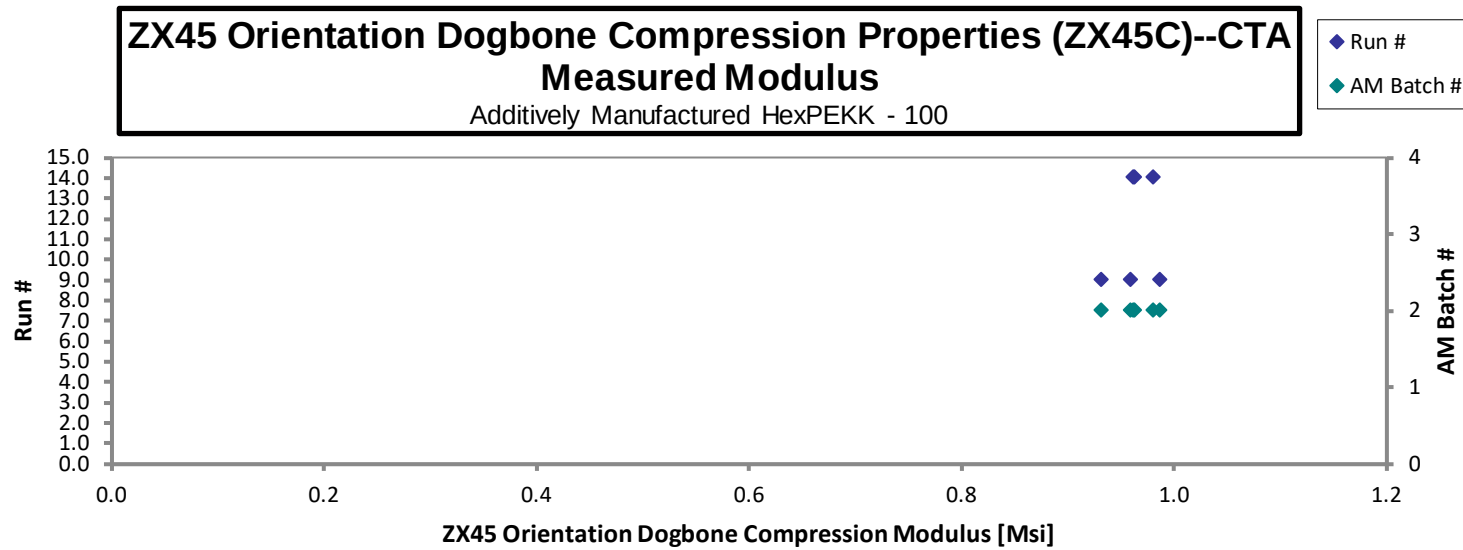
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R14-17-ZX45C-3B-CTA-16	2	14	33.52	33.85	0.9809	6.279	0.5004	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZX45C-2T-CTA-18	2	14		34.31	0.9632	1.814	0.4995	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZX45C-4T-CTA-19	2	14	33.25	33.59	0.9622	6.720	0.5010	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-ZX45C-1B-CTA-13	2	9	33.56	34.36	0.9592	1.228	0.5047	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-ZX45C-3B-CTA-15	2	9	33.69	33.74	0.9317	7.439	0.5040	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-ZX45C-2T-CTA-17	2	9	33.77	34.42	0.9863	3.040	0.5036	UNIFORM COMPRESSIVE FAILURE

Average	33.56	34.05	0.9639	4.420	0.5022
Standard Dev.	0.2014	0.3601	0.01926	2.711	
Coeff. of Var. [%]	0.6003	1.058	1.998	61.33	
Min.	33.25	33.59	0.9317	1.228	0.4995
Max.	33.77	34.42	0.9863	7.439	0.5047
Number of Spec.	5	6	6	6	6

*2% offset is not reported for CTA-18 as the coupon failed prior to that





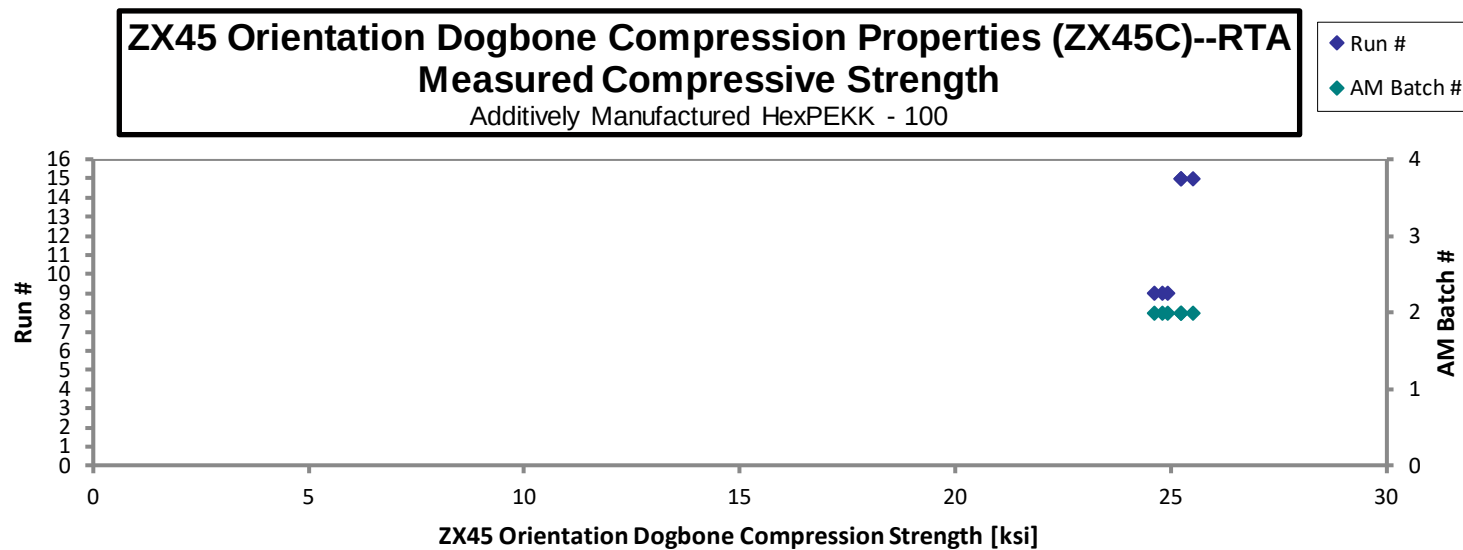
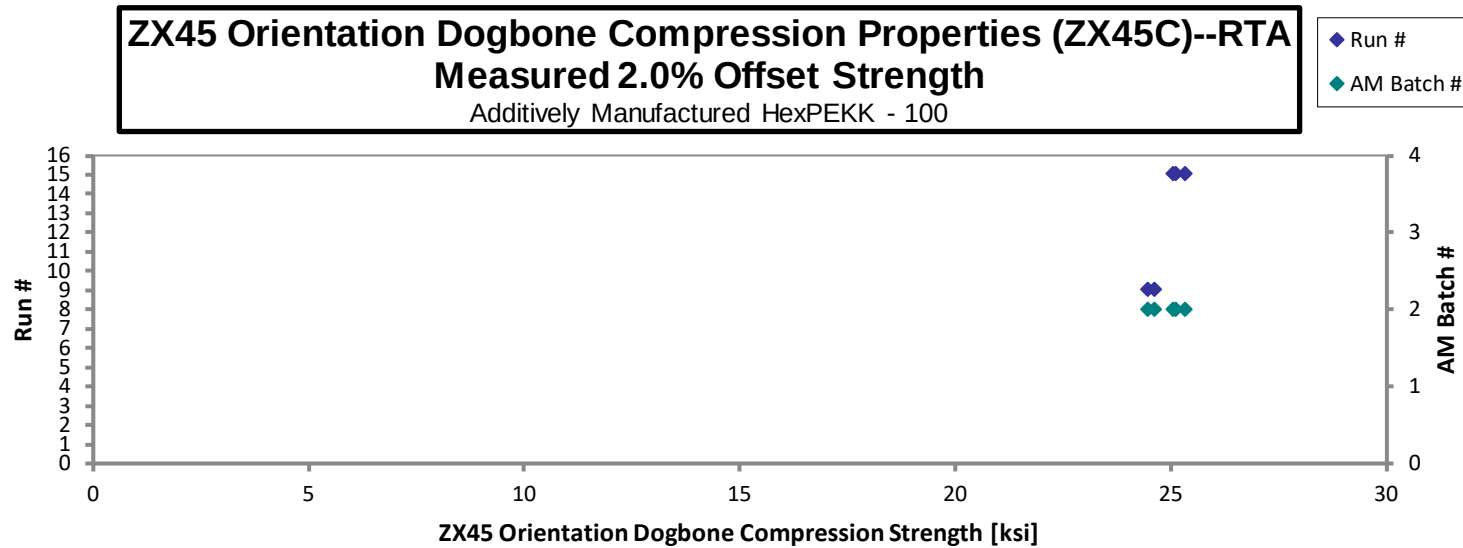
ZX45 Orientation Dogbone Compression Properties (ZX45C)--RTA□**Strength & Modulus□**

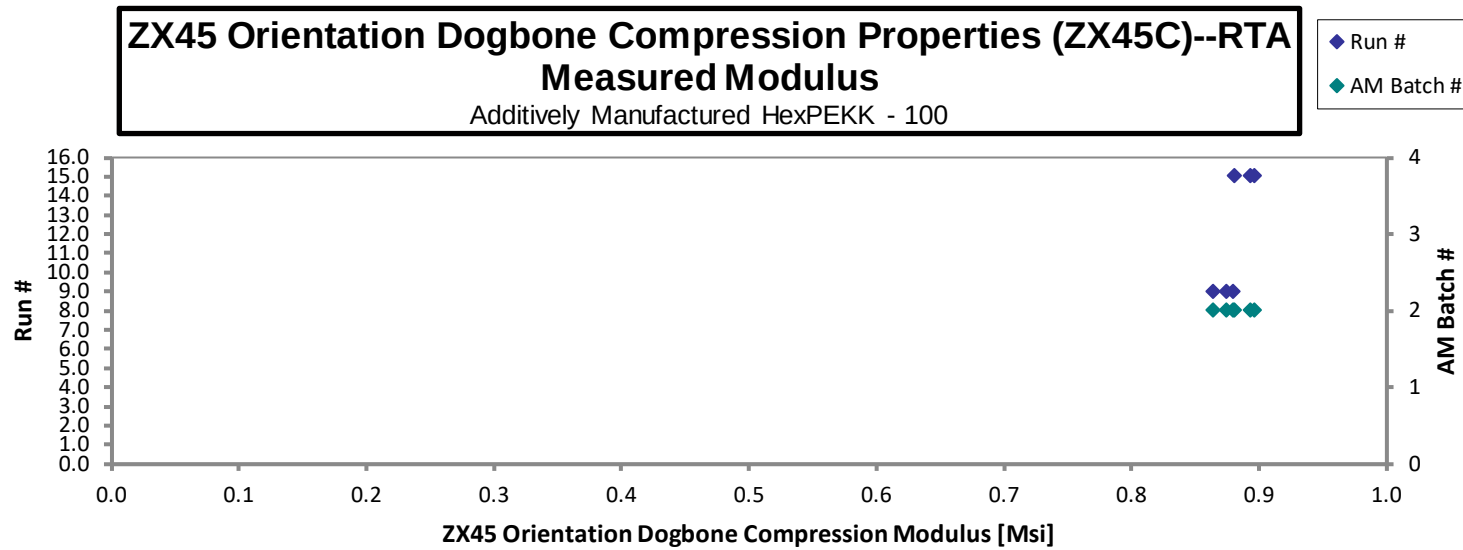
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R15-18-ZX45C-1B-RTA-13	2	15	25.05	25.23	0.8811	3.189	0.5023	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-ZX45C-3B-RTA-15	2	15	25.34	25.52	0.8935	2.125	0.5022	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-ZX45C-2T-RTA-17	2	15	25.11	25.23	0.8966	4.268	0.5013	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-ZX45C-3B-RTA-16	2	9	24.63	24.94	0.8748	3.986	0.5023	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-ZX45C-2T-RTA-18	2	9		24.80	0.8793	4.268	0.5021	UNIFORM COMPRESSIVE FAILURE
HL-B-R9-16-ZX45C-4T-RTA-19	2	9	24.47	24.63	0.8644	0.4212	0.5017	UNIFORM COMPRESSIVE FAILURE

Average	24.92	25.06	0.8816	3.043	0.5020
Standard Dev.	0.3593	0.3286	0.01193	1.525	
Coeff. of Var. [%]	1.442	1.312	1.353	50.12	
Min.	24.47	24.63	0.8644	0.4212	0.5013
Max.	25.34	25.52	0.8966	4.268	0.5023
Number of Spec.	5	6	6	6	6

*2% offset is not reported for RTA-18
as the coupon failed prior to that



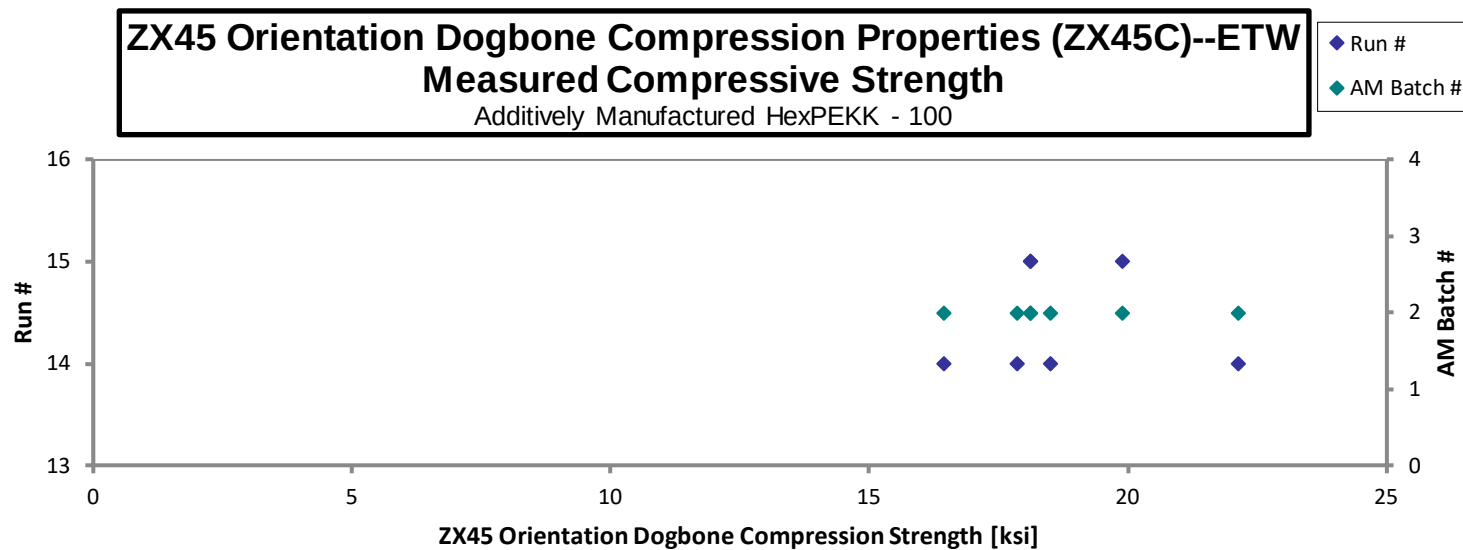
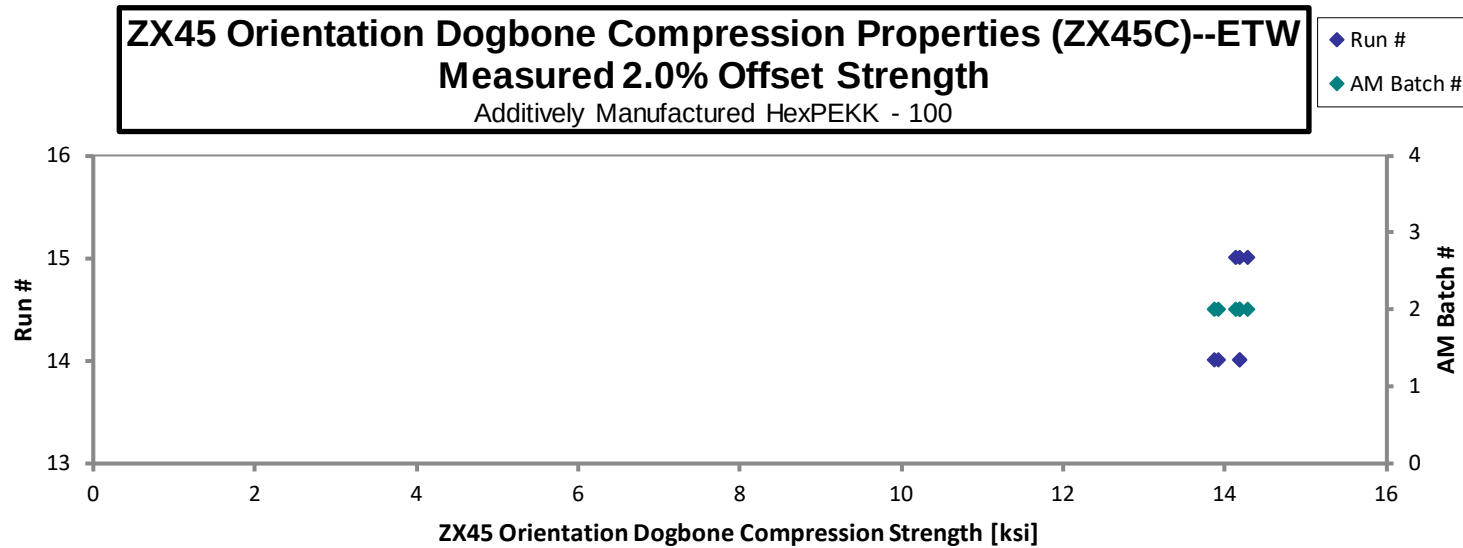


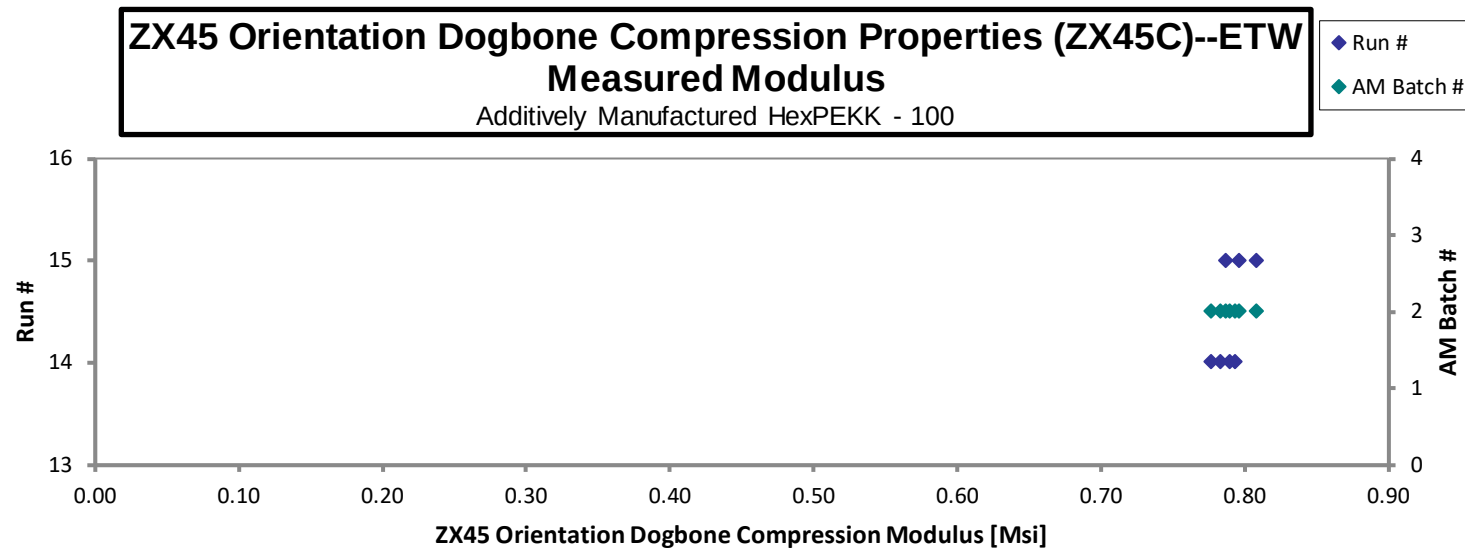
ZX45 Orientation Dogbone Compression Properties (ZX45C)--ETW**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2.0% Offset Strength [ksi]	Compressive Strength [ksi]	Modulus [Msi]	Bending Percentage [%]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R14-17-ZX45C-1B-ETW-13	2	14	14.19	18.50	0.7899	3.473	0.5004	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZX45C-3B-ETW-15	2	14	14.18	22.14	0.7831	4.577	0.5000	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZX45C-2T-ETW-17	2	14	13.92	17.87	0.7766	0.8675	0.5008	UNIFORM COMPRESSIVE FAILURE
HL-B-R14-17-ZX45C-4T-ETW-20	2	14	13.87	16.45	0.7931	11.00	0.5005	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-ZX45C-3B-ETW-16	2	15	14.28	18.12	0.8081	6.076	0.5025	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-ZX45C-2T-ETW-18	2	15	14.19	18.12	0.7963	5.858	0.5006	UNIFORM COMPRESSIVE FAILURE
HL-B-R15-18-ZX45C-4T-ETW-19	2	15	14.14	19.89	0.7863	9.206	0.5017	UNIFORM COMPRESSIVE FAILURE

Average	14.11	18.73	0.7905	5.866	0.5009
Standard Dev.	0.1522	1.813	0.01013	3.415	
Coeff. of Var. [%]	1.078	9.678	1.281	58.22	
Min.	13.87	16.45	0.7766	0.8675	0.5000
Max.	14.28	22.14	0.8081	11.00	0.5025
Number of Spec.	7	7	7	7	7





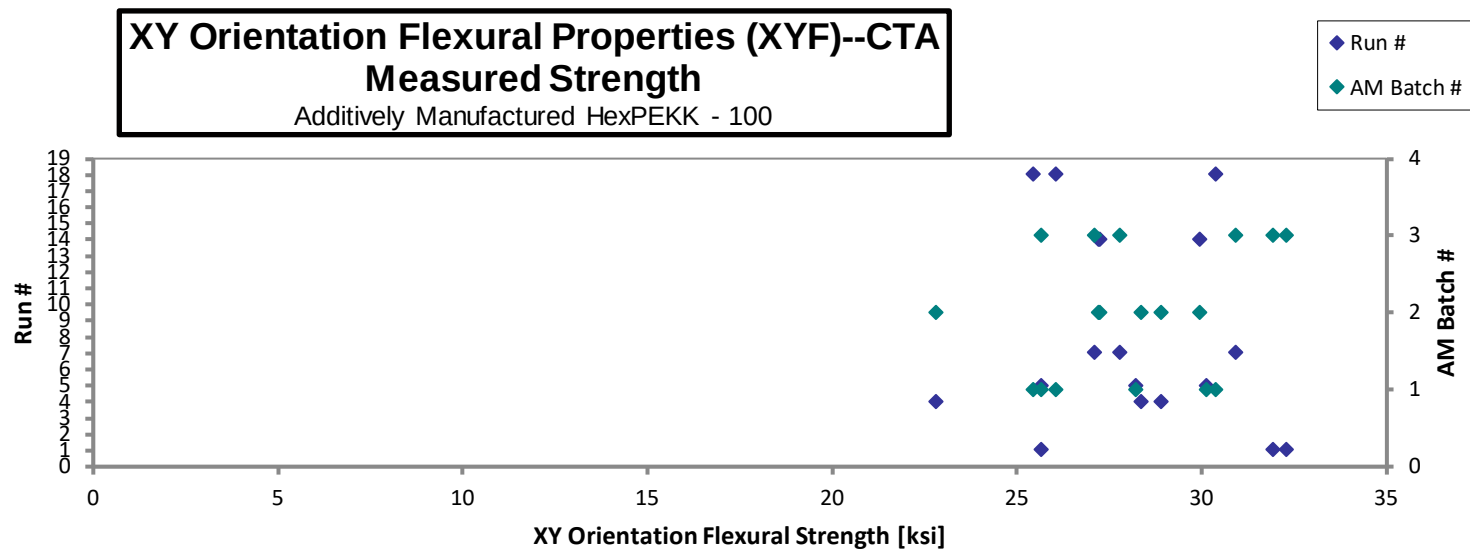
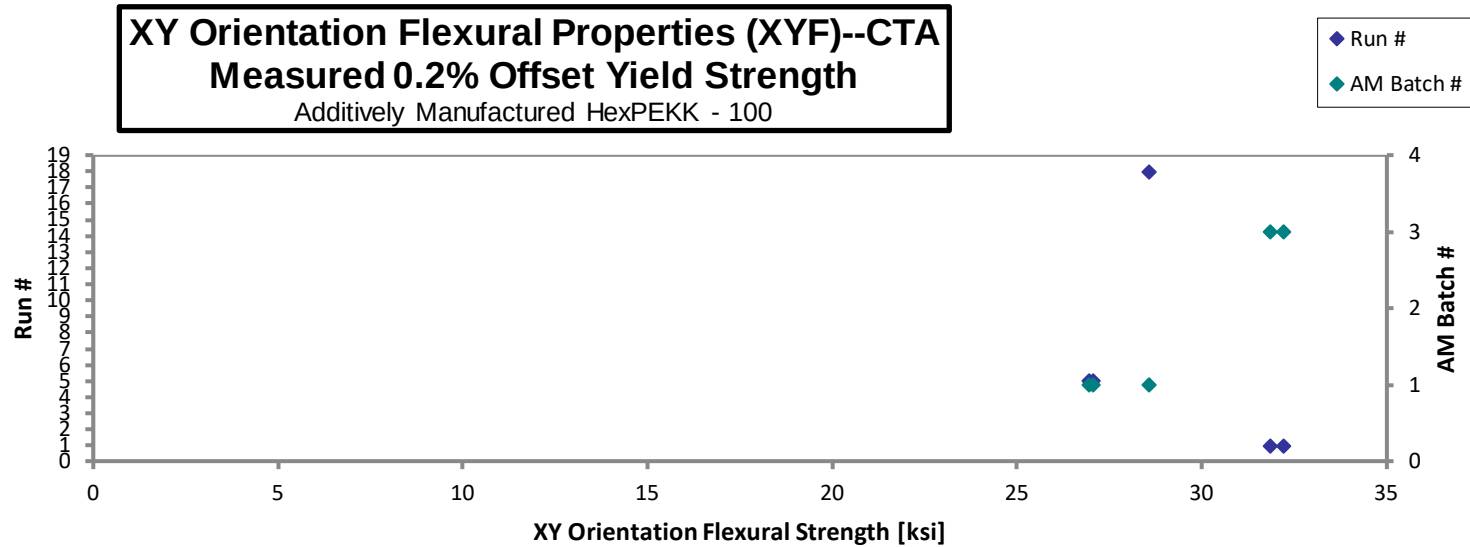
4.10 XY Flex Properties (XYF)

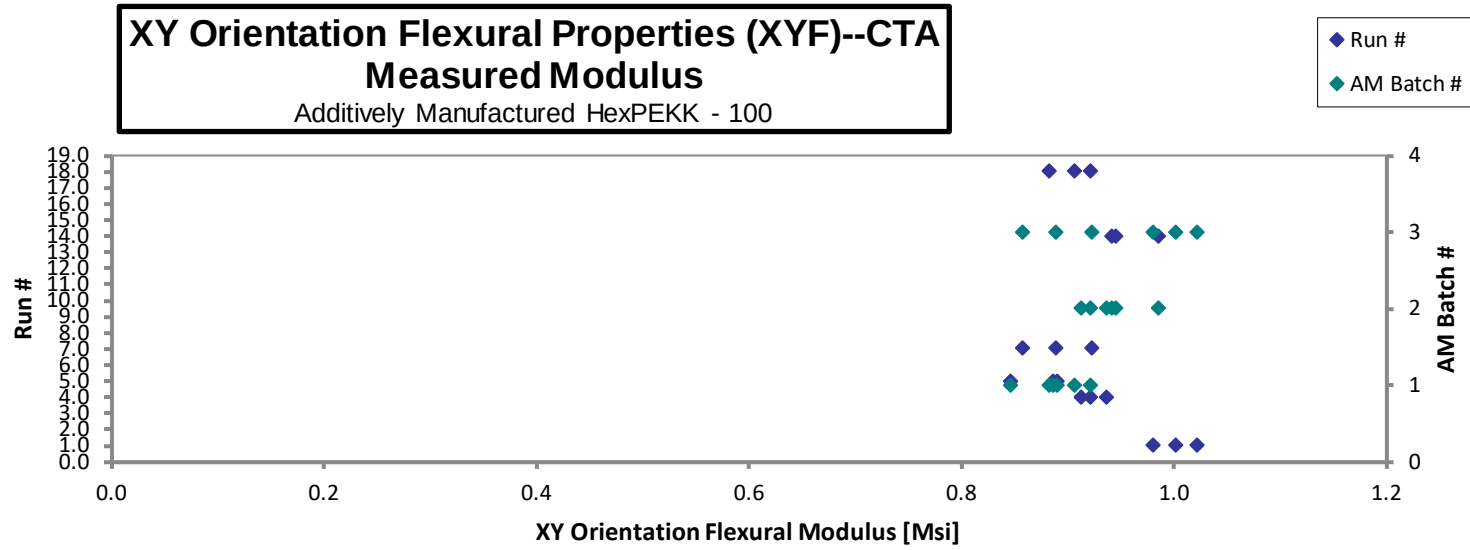
XY Orientation Flexural Properties (XYF)--CTA**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-XYF-5B-CTA-1	1	18	30.40	28.59	0.9211	0.1477	CAT, TAB
HL-A-R18-12-XYF-2T-CTA-3	1	18	25.45		0.8826	0.1533	CLT, TLB
HL-A-R18-12-XYF-5T-CTA-5	1	18	26.07		0.9064	0.1501	CAT, TAB
HL-A-R5-15-XYF-5B-CTA-2	1	5	30.14	26.94	0.8859	0.1491	CAT, TAB
HL-A-R5-15-XYF-2T-CTA-4	1	5	28.20	27.07	0.8906	0.1444	CAT, TAB / CLT, TLB
HL-A-R5-15-XYF-3T-CTA-6	1	5	25.67		0.8464	0.1481	CAT, TAB
HL-B-R14-17-XYF-4B-CTA-1	2	14	27.20		0.9854	0.1352	CAT, TAB
HL-B-R14-17-XYF-5B-CTA-3	2	14	29.94		0.9411	0.1438	CAT, TAB
HL-B-R14-17-XYF-1T-CTA-5	2	14	27.24		0.9453	0.1454	CAT, TAB
HL-B-R4-7-XYF-1B-CTA-1	2	4	28.37		0.9363	0.1416	CLT, TLB
HL-B-R4-7-XYF-4B-CTA-3	2	4	22.81		0.9125	0.1499	CAT, TAB
HL-B-R4-7-XYF-4T-CTA-5	2	4	28.92		0.9210	0.1461	CAT, TAB
HL-C-R1-1-XYF-4B-CTA-1	3	1	32.27	32.23	1.0220	0.1413	CAT, TAB / CLT, TLB
HL-C-R1-1-XYF-1T-CTA-3	3	1	25.65		0.9805	0.1411	CAT, TAB
HL-C-R1-1-XYF-4T-CTA-5	3	1	31.94	31.86	1.0023	0.1438	CAT, TAB
HL-C-R7-4-XYF-1B-CTA-1	3	7	27.11		0.9222	0.1423	CAT, T AB
HL-C-R7-4-XYF-5B-CTA-3	3	7	30.93		0.8890	0.1457	CAT, T AB
HL-C-R7-4-XYF-4T-CTA-5	3	7	27.77		0.8574	0.1493	CAT, T AB

Average	28.11	29.34	0.9249	0.1454	0.2% Offset strength was not reported for specimens that failed prior to obtaining the 0.2% offset strain
Standard Dev.	2.514	2.560	0.04851		
Coeff. of Var. [%]	8.943	8.725	5.245		
Min.	22.81	26.94	0.8464	0.1352	
Max.	32.27	32.23	1.022	0.1533	
Number of Spec.	18	5	18	18	





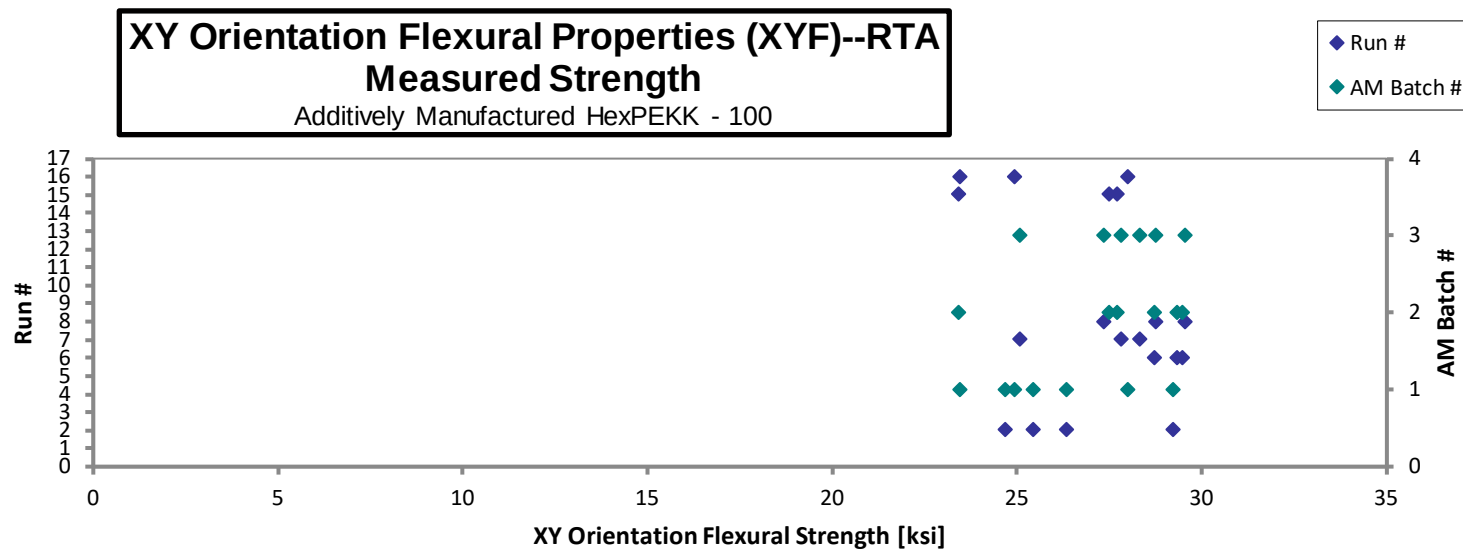
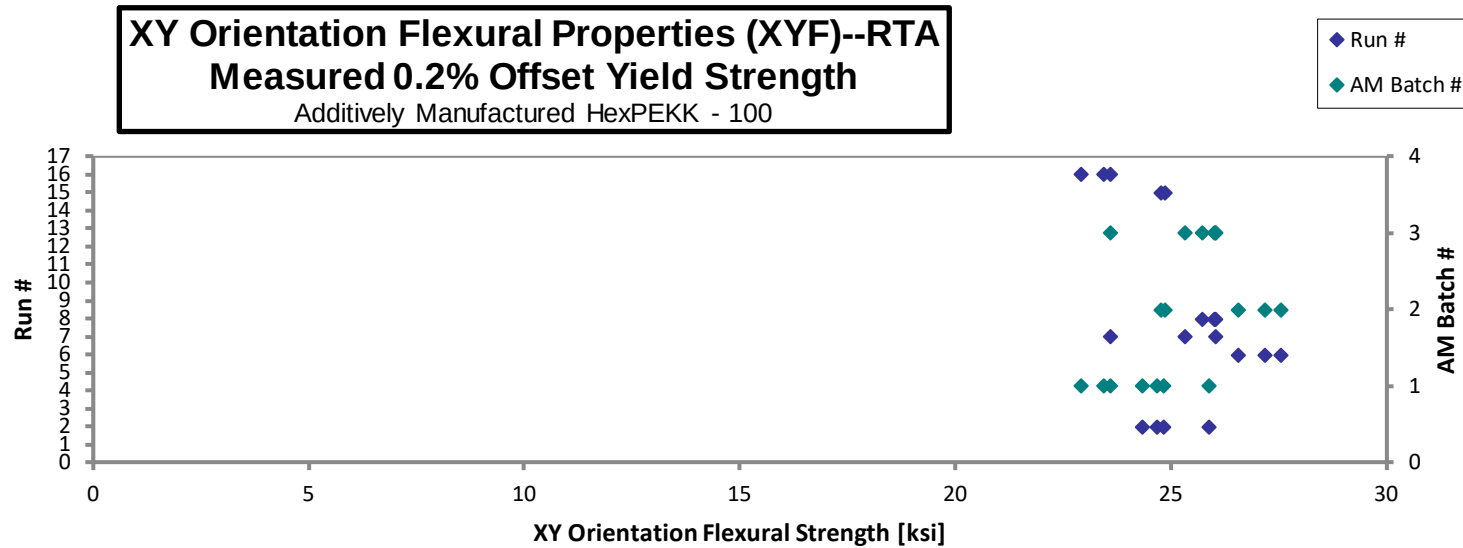
XY Orientation Flexural Properties (XYF)--RTA**Strength & Modulus**

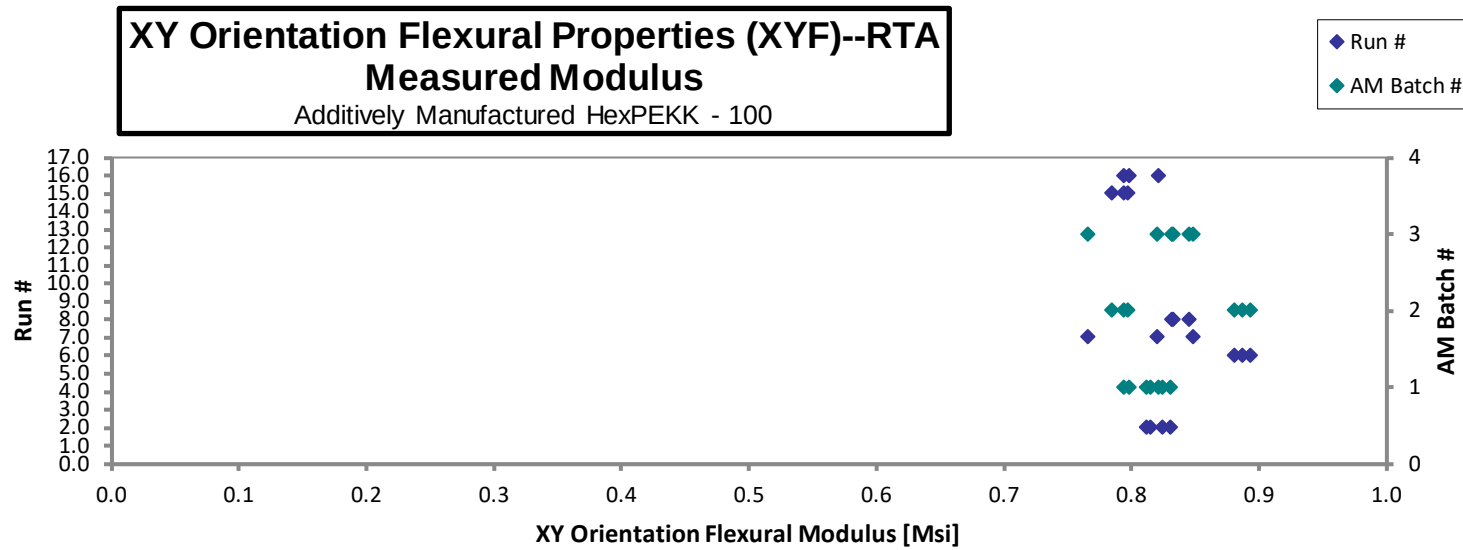
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-XYF-5B-RTA-1	1	16	28.00	23.61	0.7937	0.1518	CAT, TAB
HL-A-R16-10-XYF-2T-RTA-4	1	16	24.93	22.91	0.8212	0.1570	CAT, TAB
HL-A-R16-10-XYF-5T-RTA-5	1	16	23.46	23.46	0.7981	0.1516	CAT, TAB
HL-A-R2-13-XYF-5B-RTA-1	1	2	29.21	24.35	0.8147	0.1514	CAT, TAB
HL-A-R2-13-XYF-2T-RTA-3	1	2	24.68	24.68	0.8241	0.1466	CAT, TAB
HL-A-R2-13-XYF-3T-RTA-5	1	2	26.36	25.87	0.8301	0.1504	CAT, TAB
HL-A-R2-13-XYF-3T-RTA-6	1	2	25.45	24.85	0.8114	0.1475	CAT, TAB
HL-B-R15-18-XYF-5B-RTA-3	2	15	27.71	24.85	0.7970	0.1435	CAT, TAB
HL-B-R15-18-XYF-5B-RTA-4	2	15	27.49	24.76	0.7843	0.1460	CAT, TAB
HL-B-R15-18-XYF-1T-RTA-6	2	15	23.42		0.7945	0.1459	CAT, TAB
HL-B-R6-8-XYF-1B-RTA-2	2	6	29.35	26.57	0.8811	0.1400	CAT, TAB
HL-B-R6-8-XYF-4B-RTA-3	2	6	28.72	27.55	0.8867	0.1478	CAT, TAB
HL-B-R6-8-XYF-4B-RTA-4	2	6	29.48	27.19	0.8929	0.1495	CAT, TAB
HL-C-R7-4-XYF-1B-RTA-2	3	7	27.82	26.03	0.8488	0.1415	CLT, TLB
HL-C-R7-4-XYF-5B-RTA-4	3	7	28.32	25.32	0.8203	0.1484	CAT, TAB
HL-C-R7-4-XYF-4T-RTA-6	3	7	25.08	23.60	0.7660	0.1492	CAT, TAB
HL-C-R8-2-XYF-4B-RTA-2	3	8	29.55	26.00	0.8324	0.1463	CAT, TAB
HL-C-R8-2-XYF-1T-RTA-4	3	8	27.36	26.03	0.8448	0.1484	CAT, TAB
HL-C-R8-2-XYF-4T-RTA-6	3	8	28.77	25.73	0.8319	0.1474	CAT, TAB

	Average	27.11	25.19	0.8249	0.1479
	Standard Dev.	2.038	1.304	0.03460	
	Coeff. of Var. [%]	7.517	5.178	4.194	
	Min.	23.42	22.91	0.7660	0.1400
	Max.	29.55	27.55	0.8929	0.1570
	Number of Spec.	19	18	19	19

0.2% Offset is not reported
for one coupon as it failed
prior to achieving that



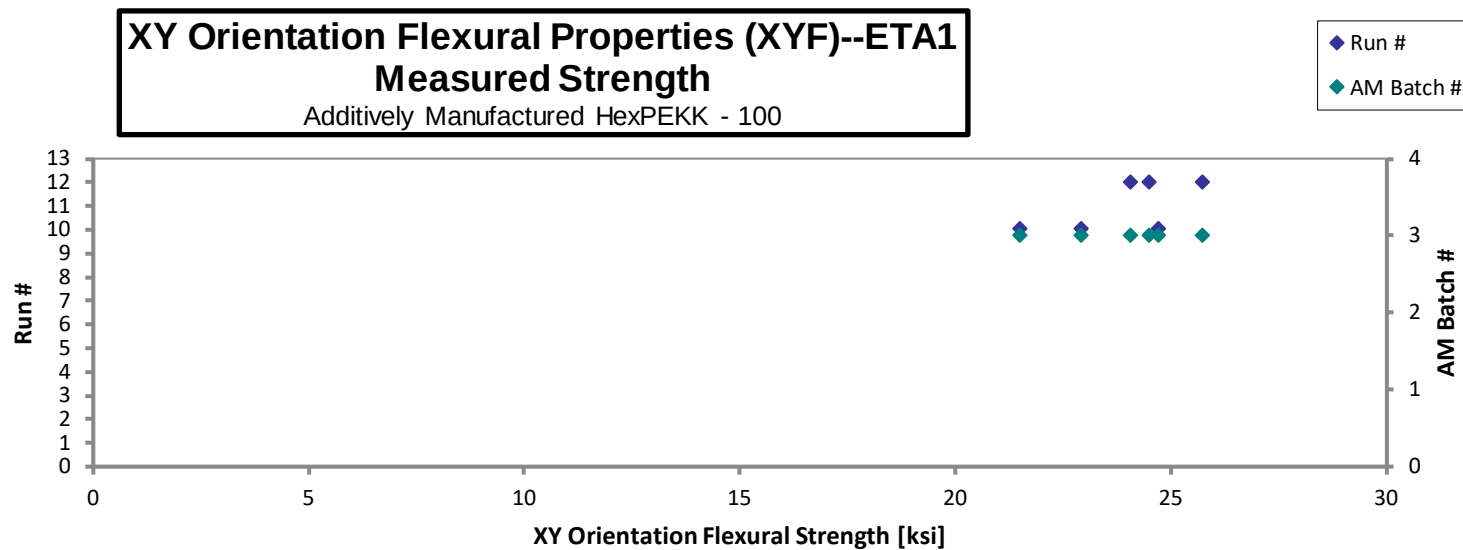
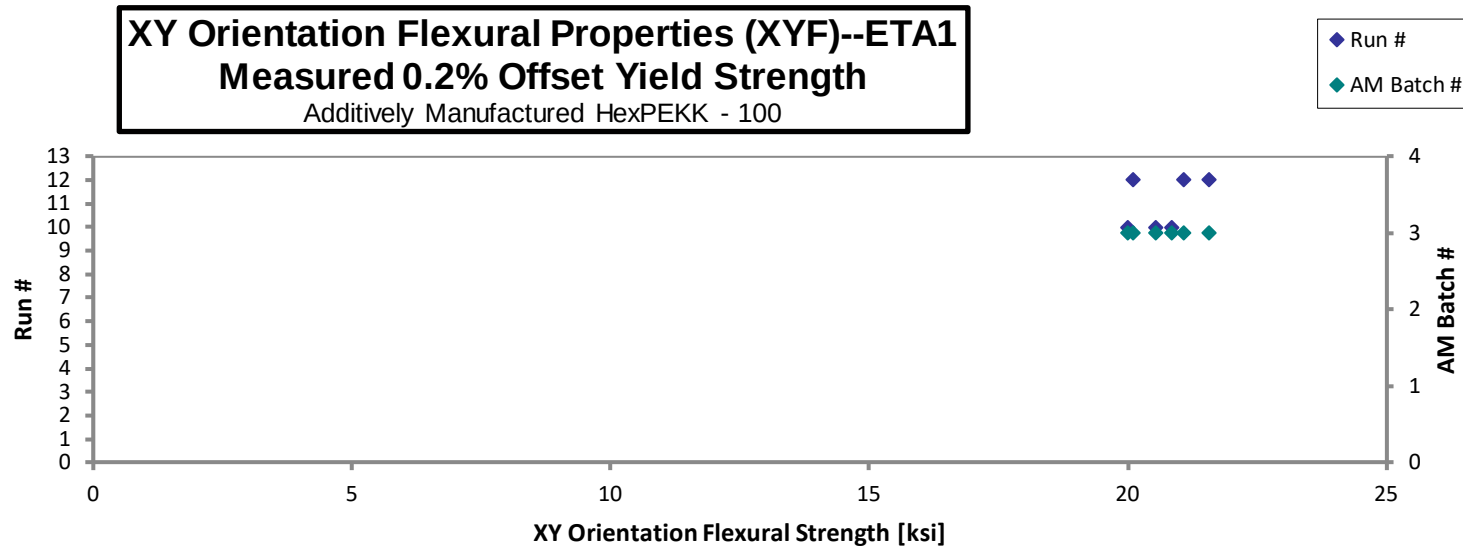


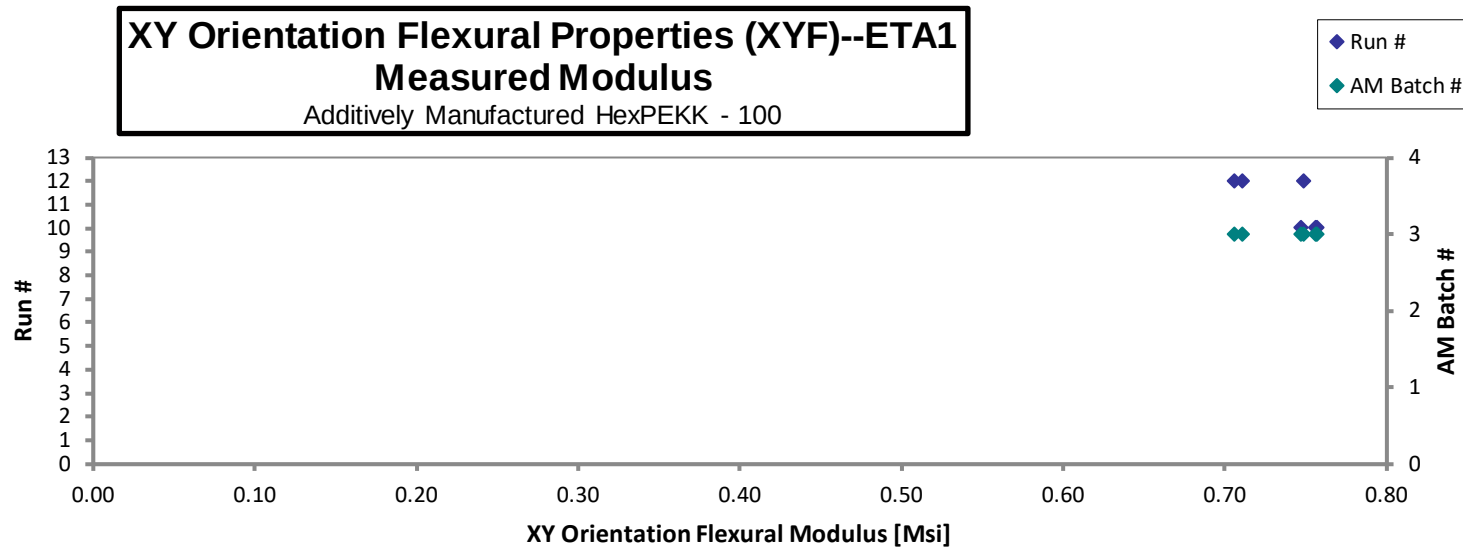
XY Orientation Flexural Properties (XYF)--ETA1**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R10-5-XYF-1B-ETA1-1	3	10	22.93	20.85	0.7572	0.1469	CAT, TAB
HL-C-R10-5-XYF-5B-ETA1-3	3	10	24.71	20.53	0.7560	0.1518	CAT, TAB
HL-C-R10-5-XYF-4T-ETA1-5	3	10	21.50	19.99	0.7469	0.1497	CAT, TAB
HL-C-R12-3-XYF-4B-ETA1-2	3	12	25.74	20.09	0.7486	0.1442	CAT, TAB
HL-C-R12-3-XYF-1T-ETA1-4	3	12	24.50	21.57	0.7058	0.1493	CAT, TAB
HL-C-R12-3-XYF-4T-ETA1-6	3	12	24.05	21.08	0.7110	0.1479	CAT, TAB

Average	23.90	20.69	0.7376	0.1483
Standard Dev.	1.490	0.6019	0.02301	
Coeff. of Var. [%]	6.235	2.910	3.119	
Min.	21.50	19.99	0.7058	0.1442
Max.	25.74	21.57	0.7572	0.1518
Number of Spec.	6	6	6	6



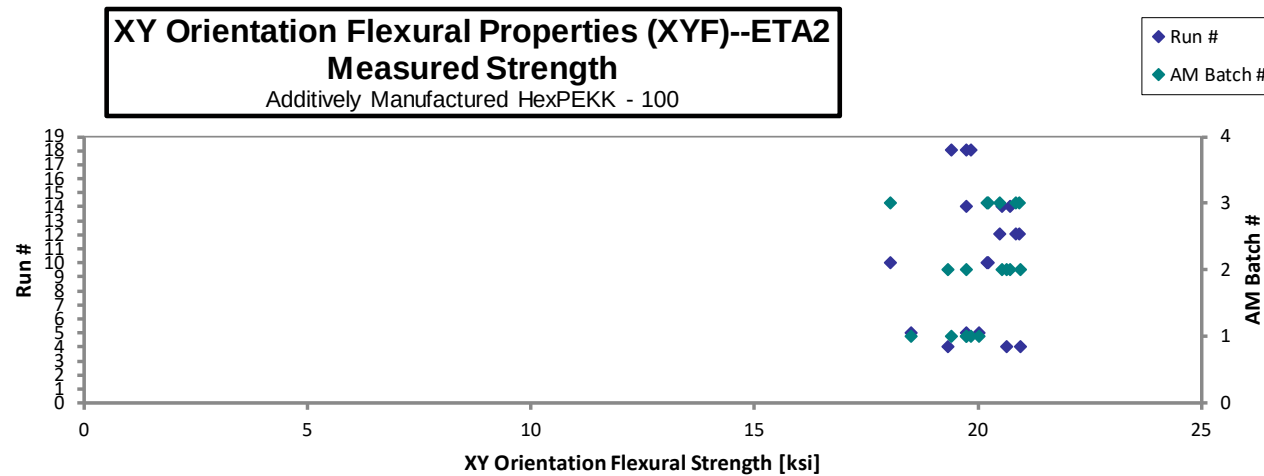
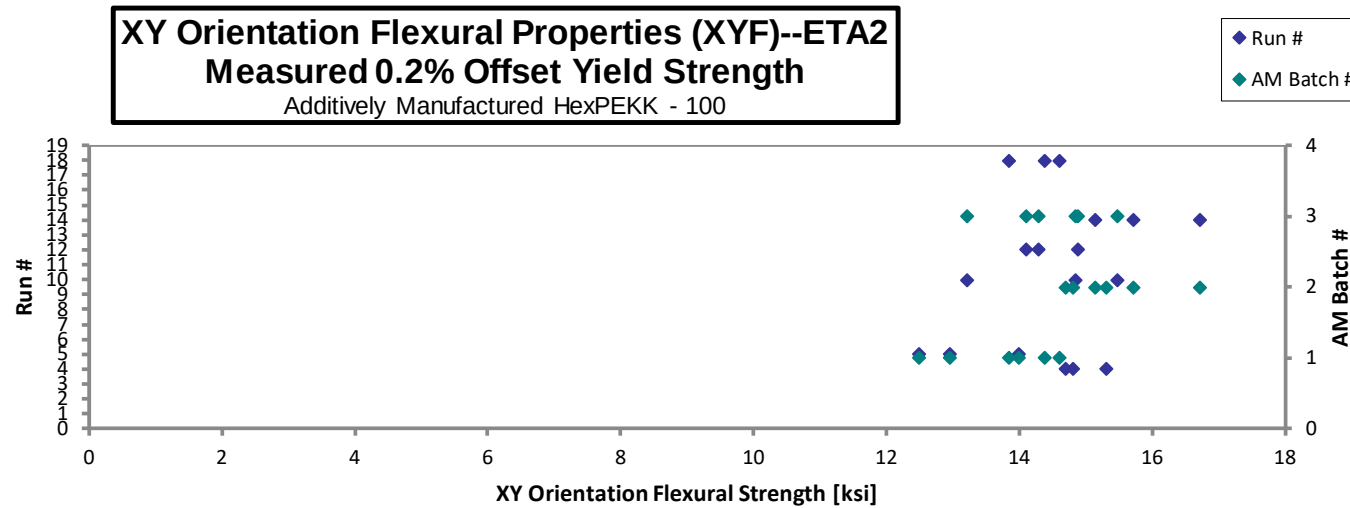


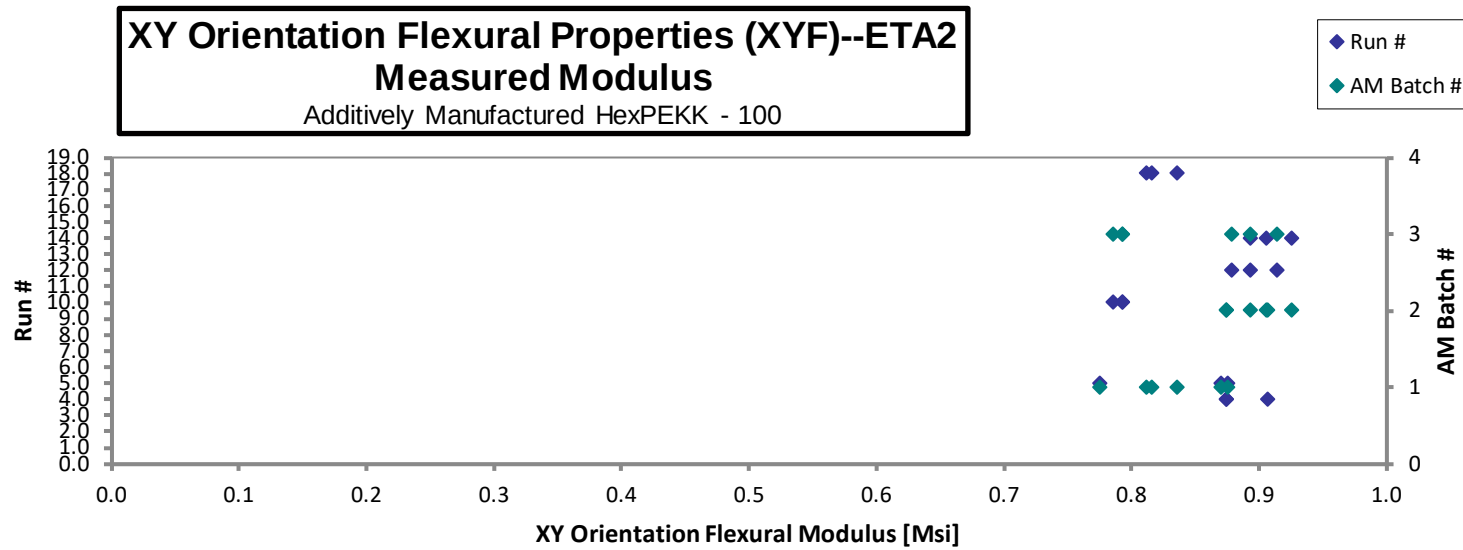
XY Orientation Flexural Properties (XYF)--ETA2
Strength & Modulus

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-XYF-5B-ETA2-2	1	18	19.83	13.84	0.8355	0.1509	CAT, TAB
HL-A-R18-12-XYF-2T-ETA2-4	1	18	19.74	14.38	0.8120	0.1496	CAT, TAB
HL-A-R18-12-XYF-5T-ETA2-6	1	18	19.41	14.60	0.8164	0.1503	CAT, TAB
HL-A-R5-15-XYF-5B-ETA2-1	1	5	20.03	12.95	0.8754	0.1493	CAT, TAB
HL-A-R5-15-XYF-2T-ETA2-3	1	5	19.73	13.99	0.8706	0.1476	CAT, TAB
HL-A-R5-15-XYF-3T-ETA2-5	1	5	18.51	12.49	0.7749	0.1499	CAT, TAB
HL-B-R14-17-XYF-4B-ETA2-2	2	14	20.72	16.72	0.9251	0.1372	CAT, TAB
HL-B-R14-17-XYF-5B-ETA2-4	2	14	20.55	15.14	0.8928	0.1467	CAT, TAB
HL-B-R14-17-XYF-1T-ETA2-6	2	14	19.74	15.71	0.9059	0.1453	CAT, TAB
HL-B-R4-7-XYF-1B-ETA2-2	2	4	20.94	15.31	0.8743	0.1420	CAT, TAB
HL-B-R4-7-XYF-4B-ETA2-4	2	4	20.63	14.70	0.9070	0.1533	CAT, TAB
HL-B-R4-7-XYF-4T-ETA2-6	2	4	19.34	14.81	0.8744	0.1438	CAT, TAB
HL-C-R10-5-XYF-1B-ETA2-2	3	10	20.21	15.47	0.7852	0.1474	CAT, TAB
HL-C-R10-5-XYF-5B-ETA2-4	3	10	20.23	14.84	0.7929	0.1453	CAT, TAB
HL-C-R10-5-XYF-4T-ETA2-6	3	10	18.06	13.22	0.7934	0.1497	CAT, TAB
HL-C-R12-3-XYF-4B-ETA2-1	3	12	20.85	14.88	0.8784	0.1461	CAT, TAB
HL-C-R12-3-XYF-1T-ETA2-3	3	12	20.50	14.29	0.8936	0.1471	CAT, TAB
HL-C-R12-3-XYF-4T-ETA2-5	3	12	20.94	14.09	0.9142	0.1474	CAT, TAB

Average	20.00	14.52	0.8568	0.1471
Standard Dev.	0.8066	1.024	0.049	
Coeff. of Var. [%]	4.033	7.052	5.746	
Min.	18.06	12.49	0.7749	0.1372
Max.	20.94	16.72	0.9251	0.1533
Number of Spec.	18	18	18	18



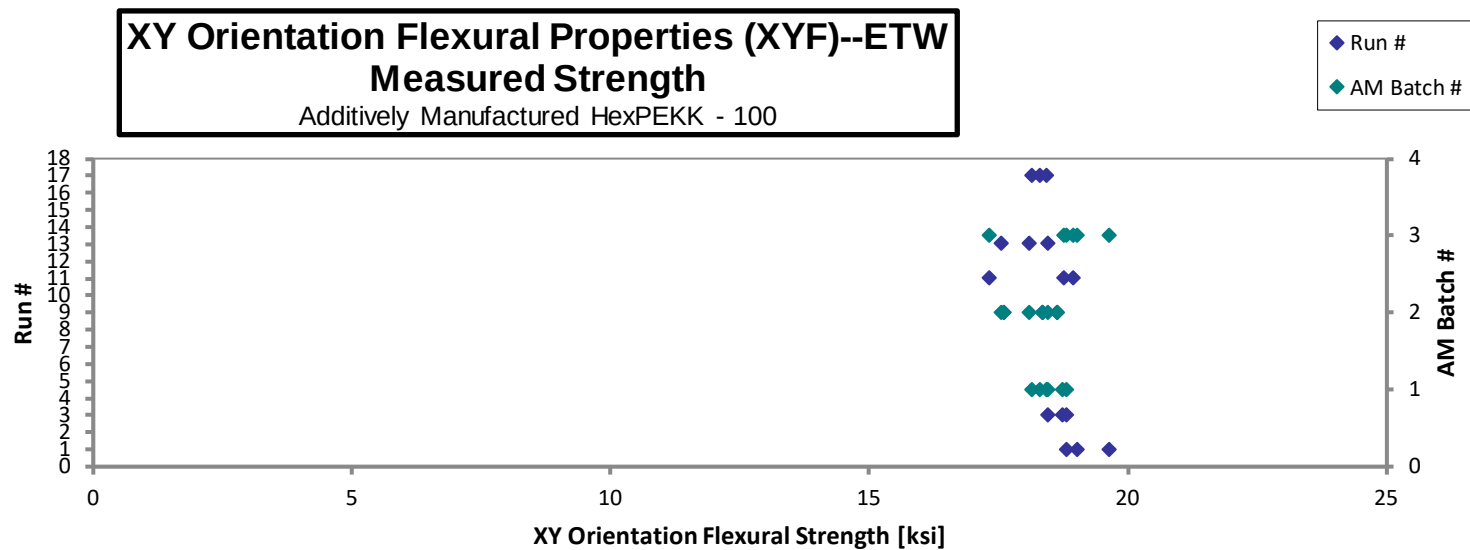
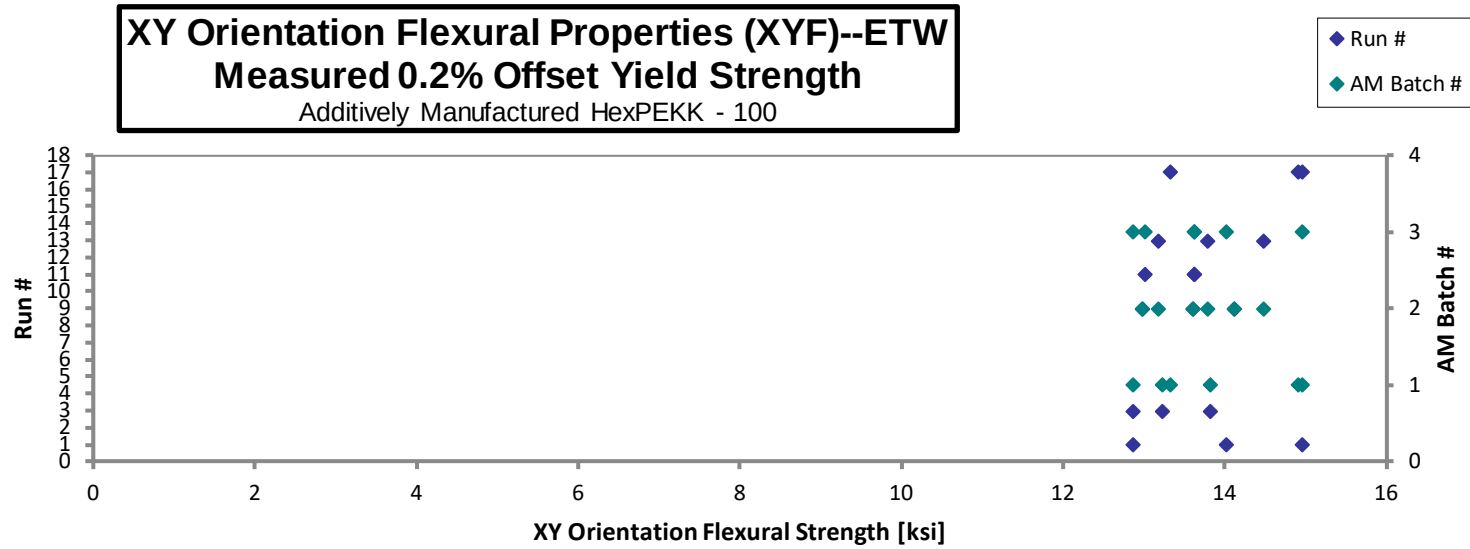


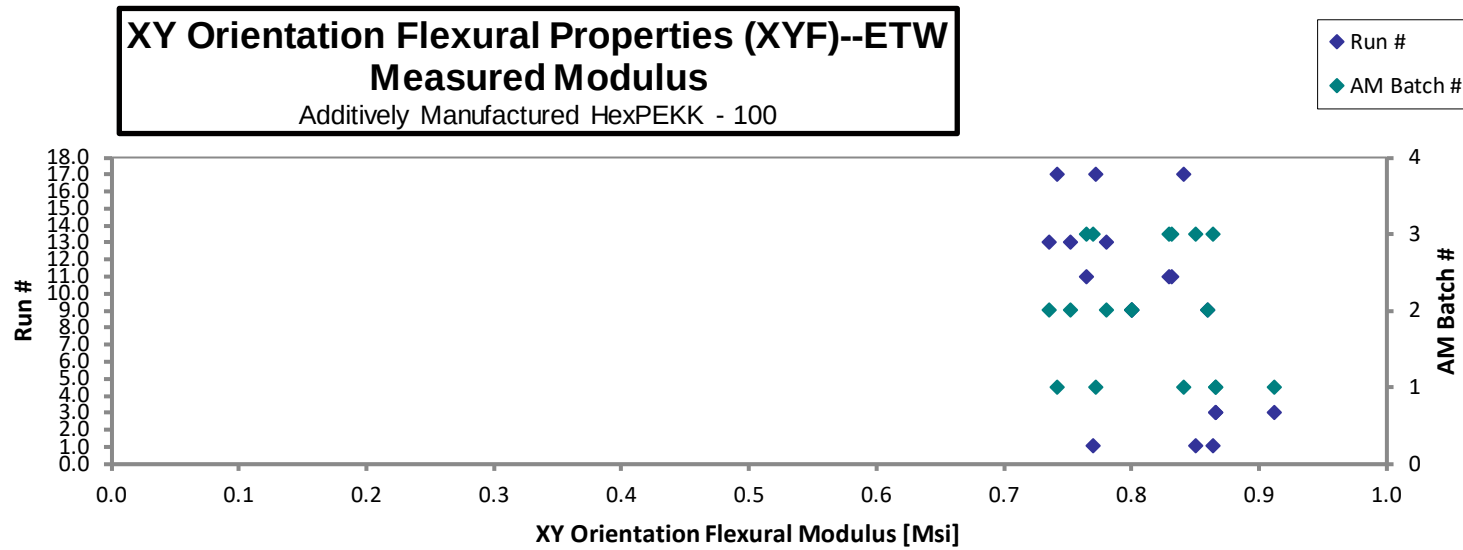
XY Orientation Flexural Properties (XYF)--ETW**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-XYF-5B-ETW-2	1	17	18.44	14.95	0.7420	0.1505	CAT, TAB
HL-A-R17-11-XYF-2T-ETW-4	1	17	18.29	13.32	0.8406	0.1545	CAT, TAB
HL-A-R17-11-XYF-5T-ETW-6	1	17	18.15	14.91	0.7725	0.1500	CAT, TAB
HL-A-R3-14-XYF-5B-ETW-2	1	3	18.81	12.87	0.8664	0.1411	CAT, TAB
HL-A-R3-14-XYF-2T-ETW-4	1	3	18.73	13.22	0.9119	0.1424	CAT, TAB
HL-A-R3-14-XYF-3T-ETW-6	1	3	18.45	13.83	0.8665	0.1415	CAT, TAB
HL-B-R13-9-XYF-4B-ETW-3	2	13	18.45	14.47	0.7355	0.1493	CAT, TAB
HL-B-R13-9-XYF-4B-ETW-4	2	13	18.10	13.18	0.7805	0.1493	CAT, TAB
HL-B-R13-9-XYF-4T-ETW-5	2	13	17.55	13.79	0.7521	0.1443	CAT, TAB
HL-B-R9-16-XYF-5B-ETW-3	2	9	18.36	13.61	0.8006	0.1501	CAT, TAB
HL-B-R9-16-XYF-5B-ETW-4	2	9	18.65	14.12	0.8005	0.1482	CAT, TAB
HL-B-R9-16-XYF-1T-ETW-5	2	9	17.60	12.98	0.8602	0.1499	CAT, TAB
HL-C-R1-1-XYF-4B-ETW-2	3	1	19.63	14.02	0.8505	0.1398	CAT, TAB
HL-C-R1-1-XYF-1T-ETW-4	3	1	18.83	14.96	0.7703	0.1400	CAT, TAB
HL-C-R1-1-XYF-4T-ETW-6	3	1	19.02	12.87	0.8642	0.1407	CAT, TAB
HL-C-R11-6-XYF-1B-ETW-1	3	11	18.93	13.63	0.8300	0.1444	CAT, TAB
HL-C-R11-6-XYF-5B-ETW-3	3	11	18.76	13.01	0.8319	0.1500	CAT, TAB
HL-C-R11-6-XYF-4T-ETW-5	3	11	17.32	13.62	0.7652	0.1465	CAT, TAB

Average	18.45	13.74	0.8134	0.1462
Standard Dev.	0.5685	0.7088	0.05147	
Coeff. of Var. [%]	3.082	5.157	6.328	
Min.	17.32	12.87	0.7355	0.1398
Max.	19.63	14.96	0.9119	0.1545
Number of Spec.	18	18	18	18





4.11 YX Flex Properties (YXF)

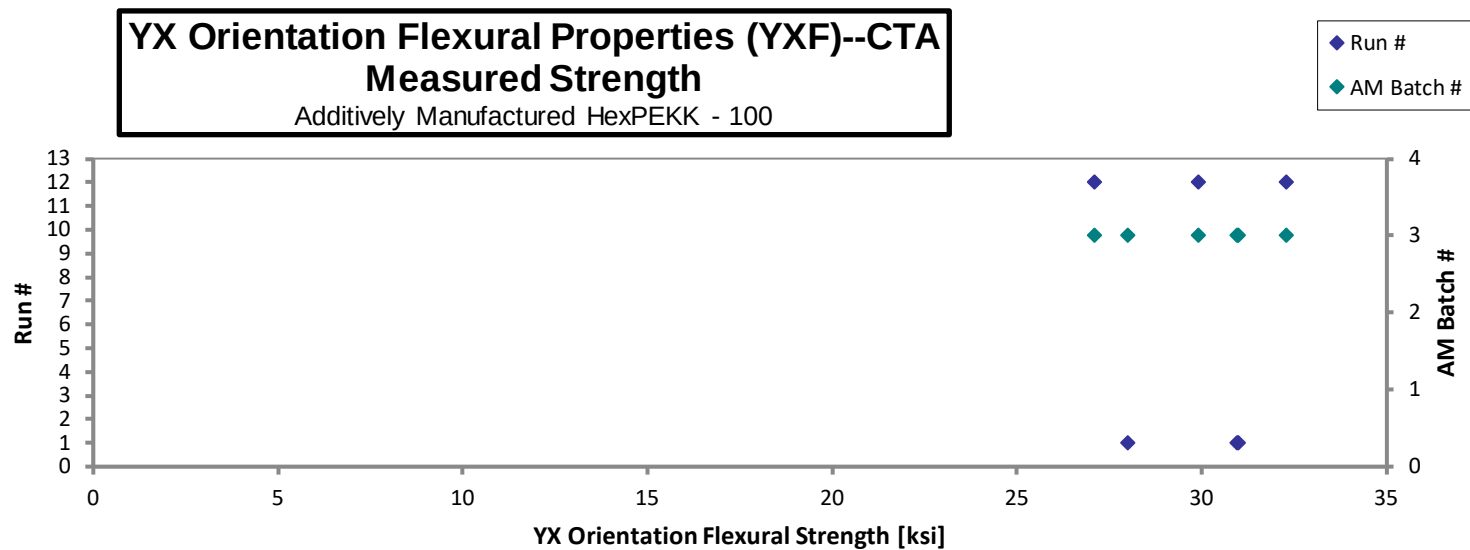
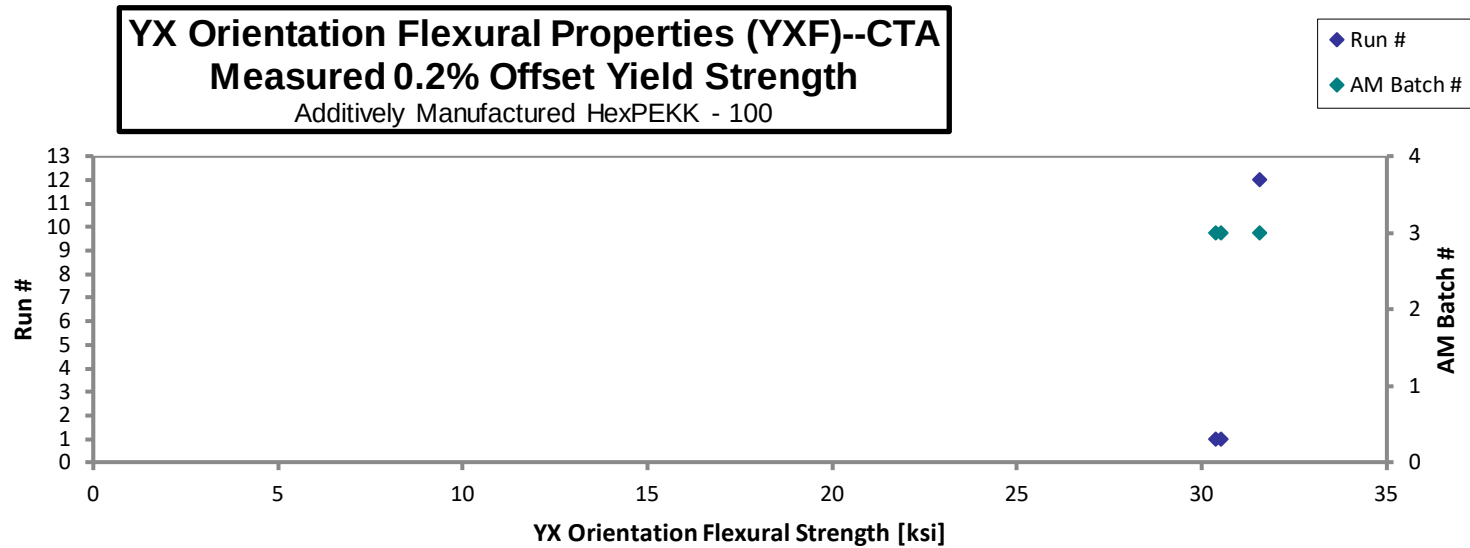
YX Orientation Flexural Properties (YXF)--CTA□
Strength & Modulus□

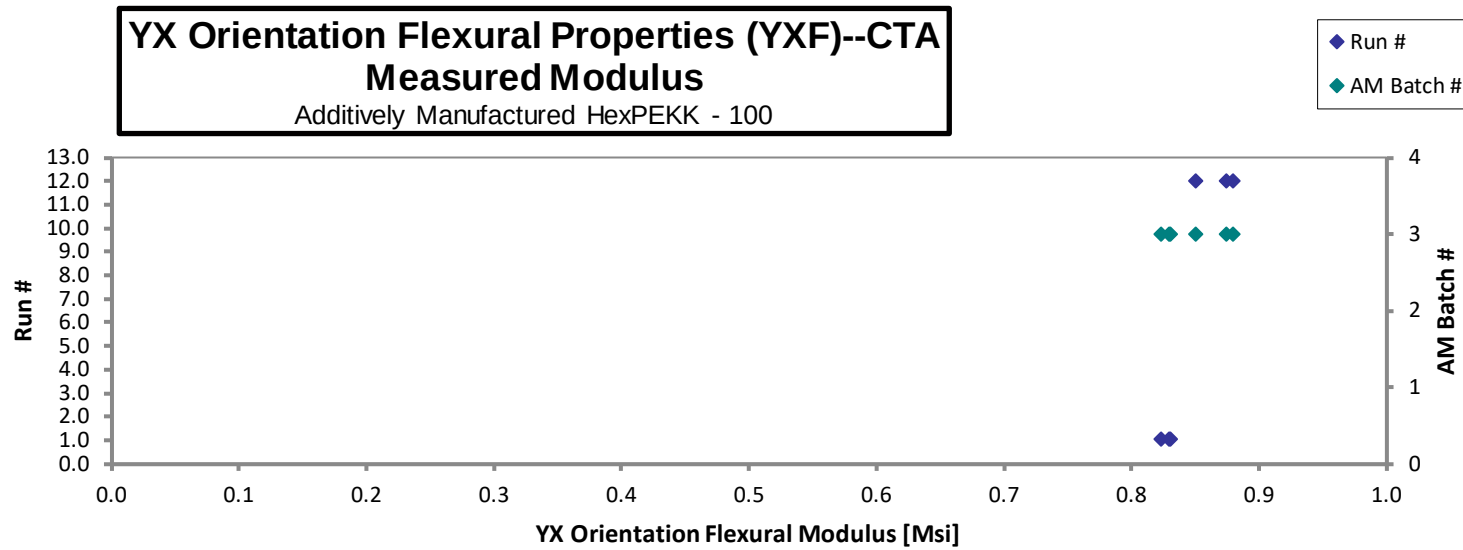
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R1-1-YXF-5B-CTA-11	3	1	27.98		0.8302	0.1402	CAT, TAB
HL-C-R1-1-YXF-1B-CTA-7	3	1	31.00	30.53	0.8300	0.1402	CAT, TAB
HL-C-R1-1-YXF-3B-CTA-9	3	1	30.95	30.37	0.8232	0.1408	CAT, TAB, CLT, TLB
HL-C-R12-3-YXF-3B-CTA-10	3	12	32.28	31.58	0.8795	0.1519	CAT, TAB
HL-C-R12-3-YXF-5T-CTA-14	3	12	29.92		0.8745	0.1406	CAT, TAB
HL-C-R12-3-YXF-2B-CTA-8	3	12	27.08		0.8501	0.1471	CAT, TAB

Average	29.87	30.83	0.8479	0.1435
Standard Dev.	1.978	0.6539	0.02430	
Coeff. of Var. [%]	6.622	2.121	2.865	
Min.	27.08	30.37	0.8232	0.1402
Max.	32.28	31.58	0.8795	0.1519
Number of Spec.	6	3	6	6

0.2% Offset strength was not reported for specimens that failed prior to obtaining the 0.2% offset strain



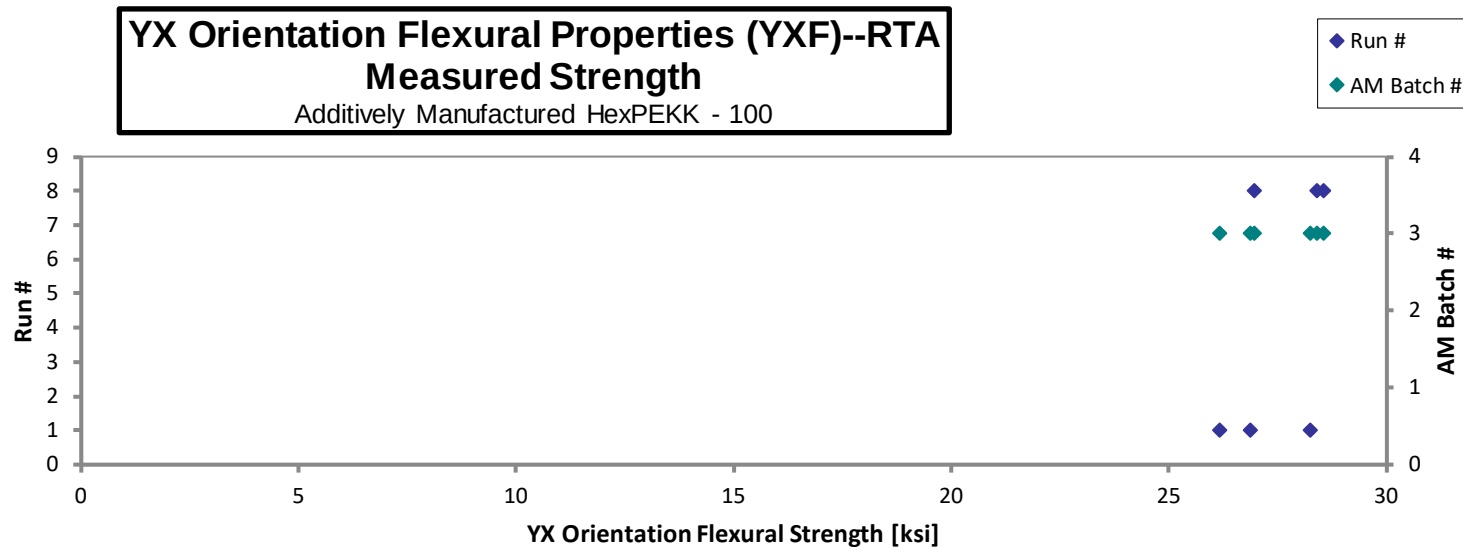
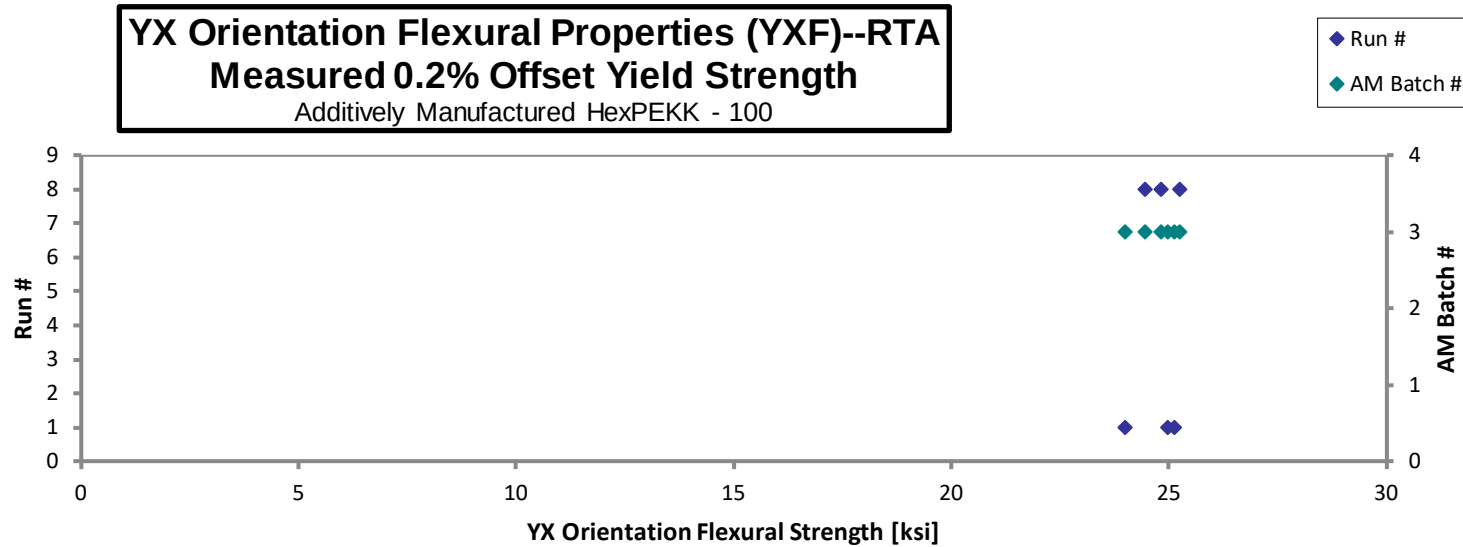


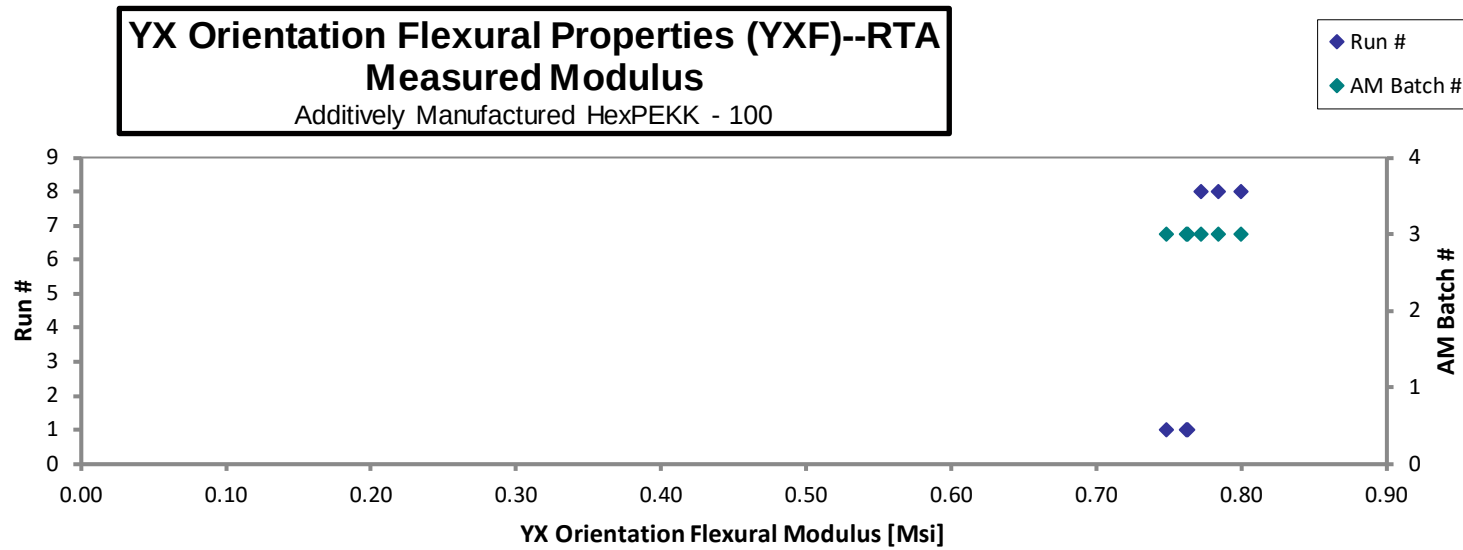
YX Orientation Flexural Properties (YXF)--RTA**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R1-1-YXF-3B-RTA-10	3	1	28.25	24.98	0.7620	0.1404	CAT, TAB
HL-C-R1-1-YXF-5T-RTA-14	3	1	26.16	23.98	0.7483	0.1381	CAT, TAB
HL-C-R1-1-YXF-2B-RTA-8	3	1	26.88	25.12	0.7633	0.1399	CAT, TAB
HL-C-R8-2-YXF-5B-RTA-11	3	8	28.56	24.45	0.7722	0.1471	CAT, TAB
HL-C-R8-2-YXF-4T-RTA-13	3	8	26.95	25.24	0.7999	0.1464	CAT, TAB
HL-C-R8-2-YXF-1B-RTA-7	3	8	28.41	24.83	0.7843	0.1465	CAT, TAB

Average	27.54	24.77	0.7717	0.1431
Standard Dev.	0.9986	0.4719	0.01825	
Coeff. of Var. [%]	3.626	1.905	2.365	
Min.	26.16	23.98	0.7483	0.1381
Max.	28.56	25.24	0.7999	0.1471
Number of Spec.	6	6	6	6



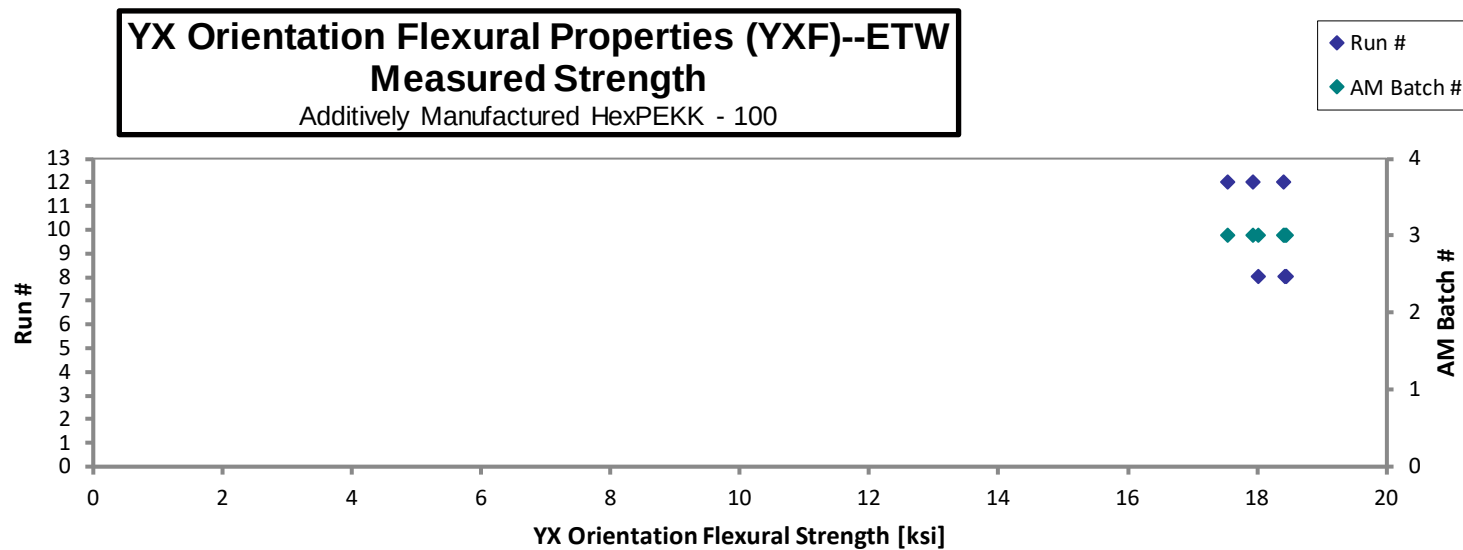
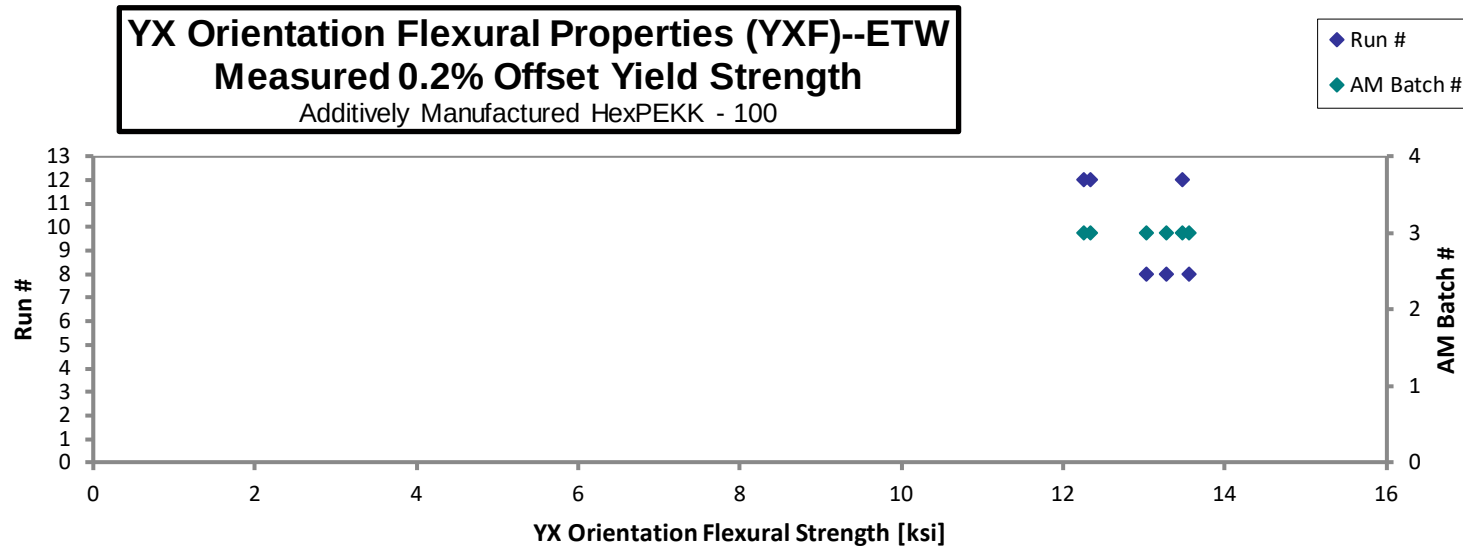


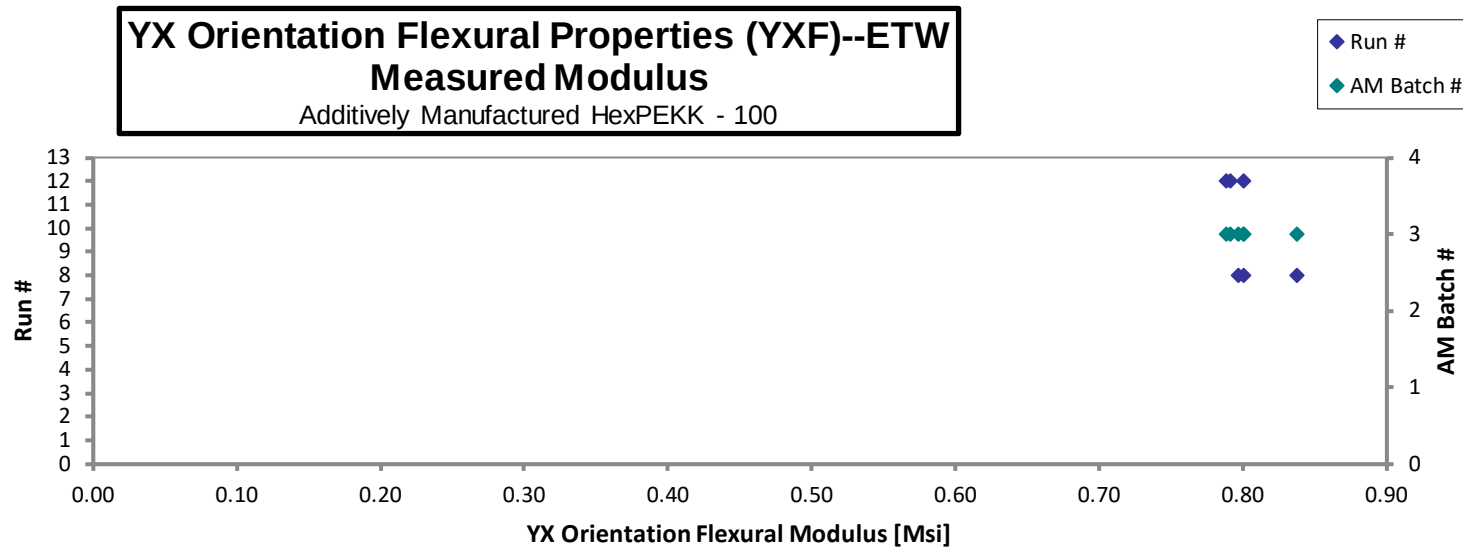
YX Orientation Flexural Properties (YXF)--ETW**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R12-3-YXF-5B-ETW-11	3	12	17.54	12.26	0.7890	0.1460	CAT, TAB
HL-C-R12-3-YXF-4T-ETW-13	3	12	18.41	13.47	0.8006	0.1465	CAT, TAB
HL-C-R12-3-YXF-1B-ETW-7	3	12	17.94	12.33	0.7912	0.1461	CAT, TAB
HL-C-R8-2-YXF-3B-ETW-10	3	8	18.45	13.28	0.7973	0.1494	CAT, TAB
HL-C-R8-2-YXF-5T-ETW-14	3	8	18.02	13.56	0.8008	0.1417	CAT, TAB
HL-C-R8-2-YXF-2B-ETW-8	3	8	18.43	13.03	0.8379	0.1426	CAT, TAB

Average	18.13	12.99	0.8028	0.1454
Standard Dev.	0.3662	0.5660	0.01785	
Coeff. of Var. [%]	2.020	4.357	2.223	
Min.	17.54	12.26	0.7890	0.1417
Max.	18.45	13.56	0.8379	0.1494
Number of Spec.	6	6	6	6





4.12 XZ Flex Properties (XZF)

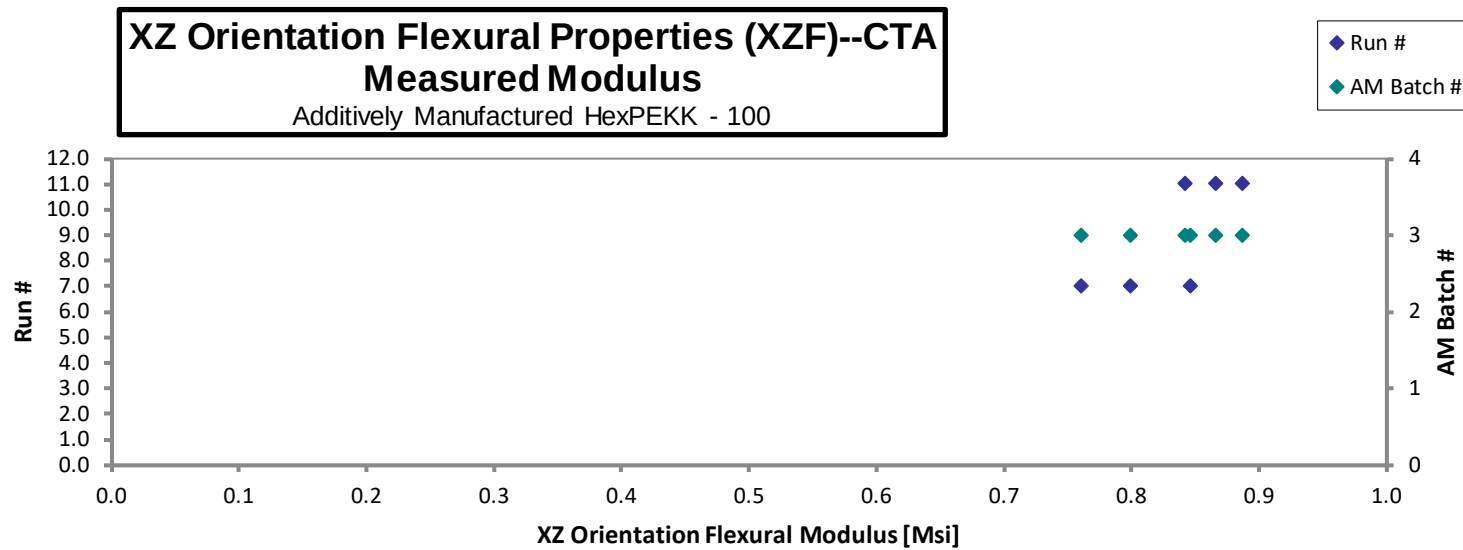
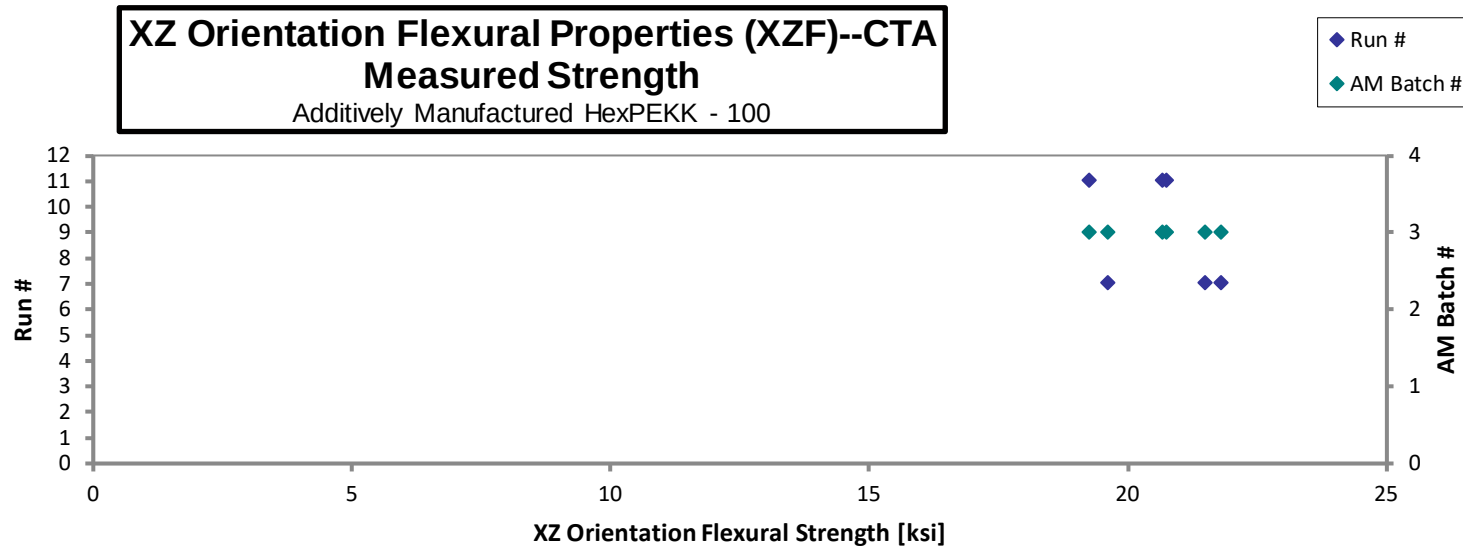
XZ Orientation Flexural Properties (XZF)--CTA
Strength & Modulus

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R11-6-XZF-4B-CTA-10	3	11	19.26		0.8656	0.1444	CAT, TAB
HL-C-R11-6-XZF-5T-CTA-13	3	11	20.68		0.8865	0.1392	CAT, TAB
HL-C-R11-6-XZF-3B-CTA-8	3	11	20.74		0.8422	0.1430	CAT, TAB
HL-C-R7-4-XZF-5B-CTA-11	3	7	19.62		0.8460	0.1358	CAT, TAB
HL-C-R7-4-XZF-3B-CTA-7	3	7	21.80		0.7609	0.1433	CAT, TAB
HL-C-R7-4-XZF-4B-CTA-9	3	7	21.49		0.7995	0.1442	CAT, TAB

0.2% Offset strength as not reported for specimens that failed prior to obtaining the 0.2% offset strain

Average	20.60		0.8335	0.1416
Standard Dev.	1.001		0.046	
Coeff. of Var. [%]	4.860		5.500	
Min.	19.26		0.7609	0.1358
Max.	21.80		0.8865	0.1444
Number of Spec.	6	0	6	6

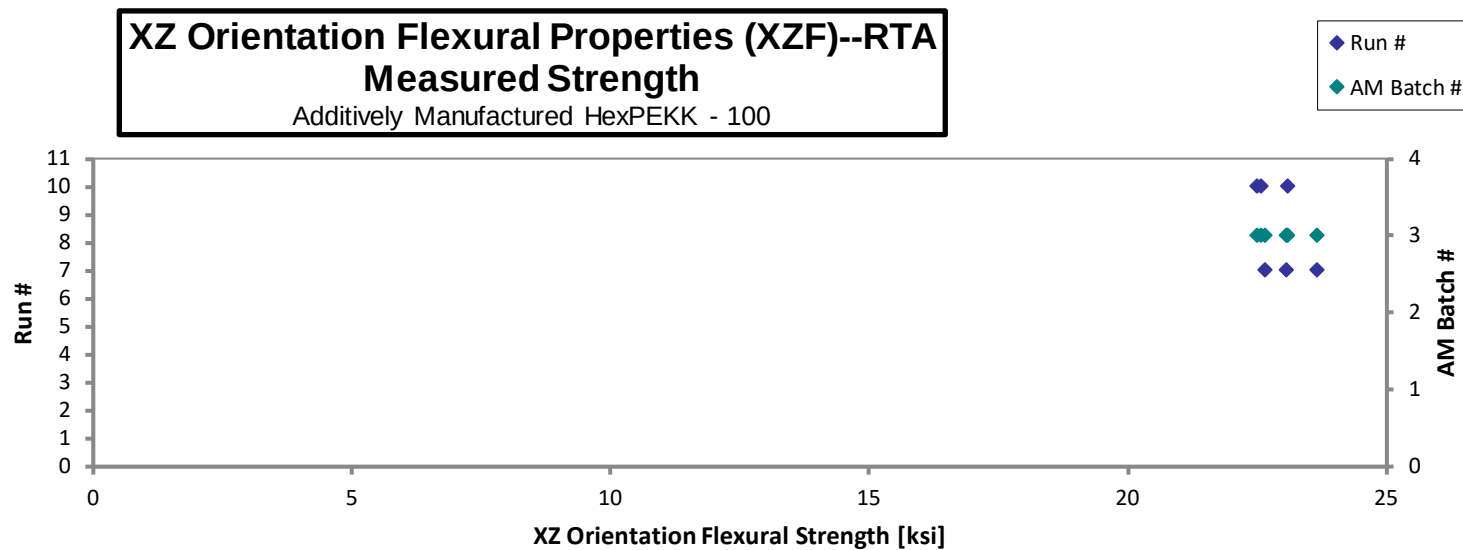
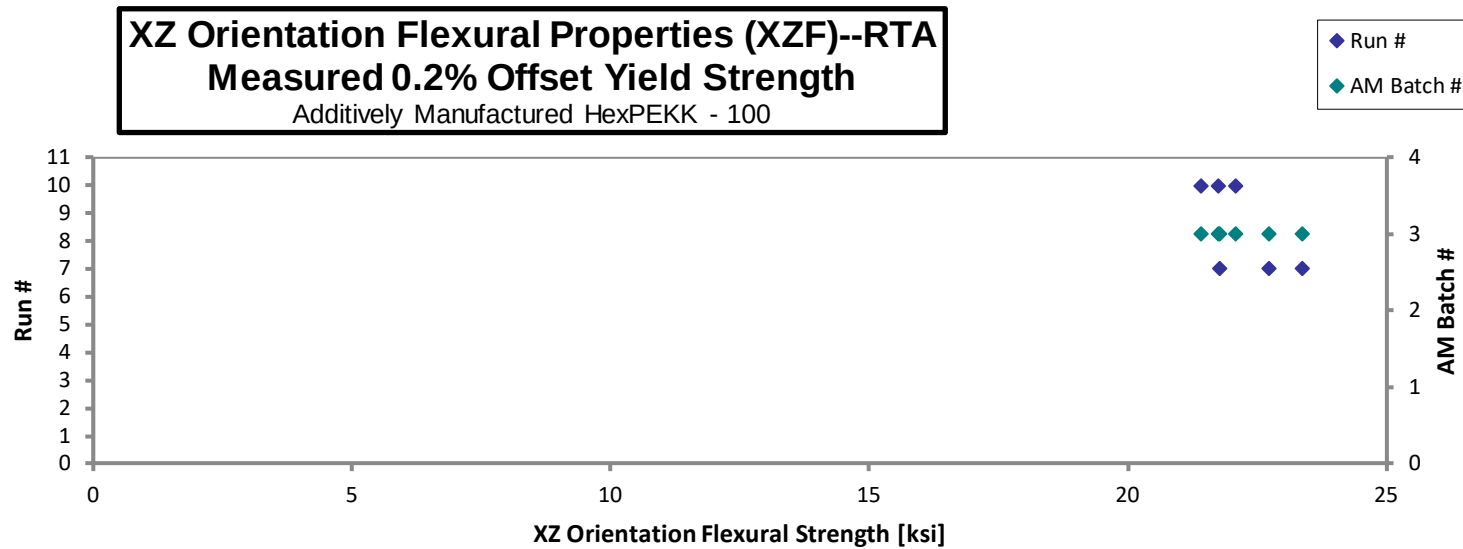


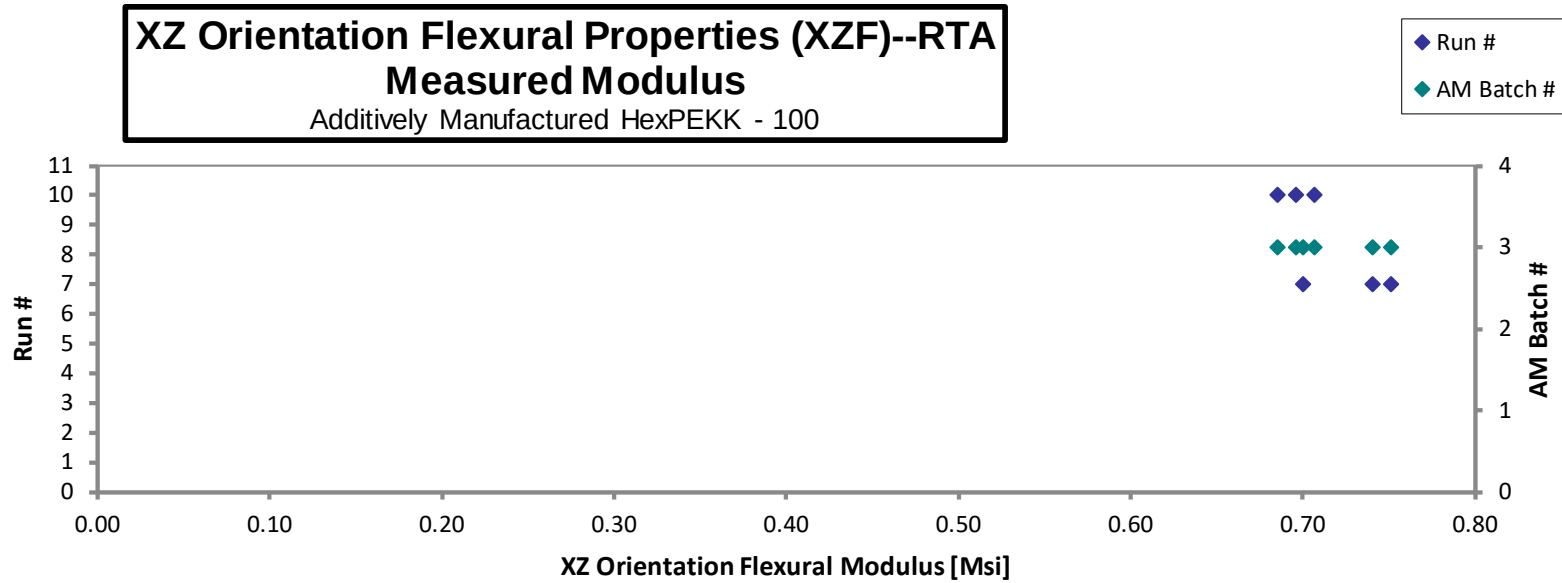
XZ Orientation Flexural Properties (XZF)--RTA**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R10-5-XZF-5B-RTA-11	3	10	23.10	21.43	0.6963	0.1464	CAT, TAB
HL-C-R10-5-XZF-5T-RTA-14	3	10	22.57	21.76	0.7070	0.1445	CAT, TAB
HL-C-R10-5-XZF-4B-RTA-9	3	10	22.50	22.09	0.6851	0.1489	CAT, TAB
HL-C-R7-4-XZF-4B-RTA-10	3	7	23.67	23.36	0.7514	0.1442	CAT, TAB
HL-C-R7-4-XZF-5T-RTA-13	3	7	23.07	22.72	0.7405	0.1425	CAT, TAB
HL-C-R7-4-XZF-3B-RTA-8	3	7	22.66	21.79	0.7005	0.1449	CAT, TAB

Average	22.93	22.19	0.7135	0.1452
Standard Dev.	0.4410	0.7207	0.02638	
Coeff. of Var. [%]	1.923	3.248	3.697	
Min.	22.50	21.43	0.6851	0.1425
Max.	23.67	23.36	0.7514	0.1489
Number of Spec.	6	6	6	6



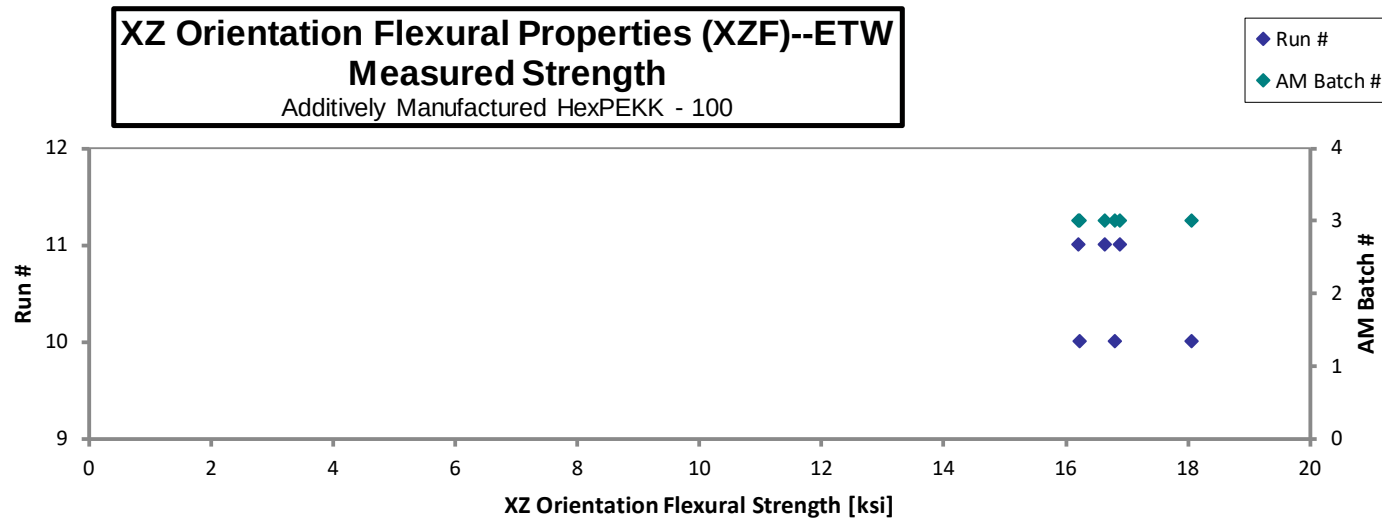
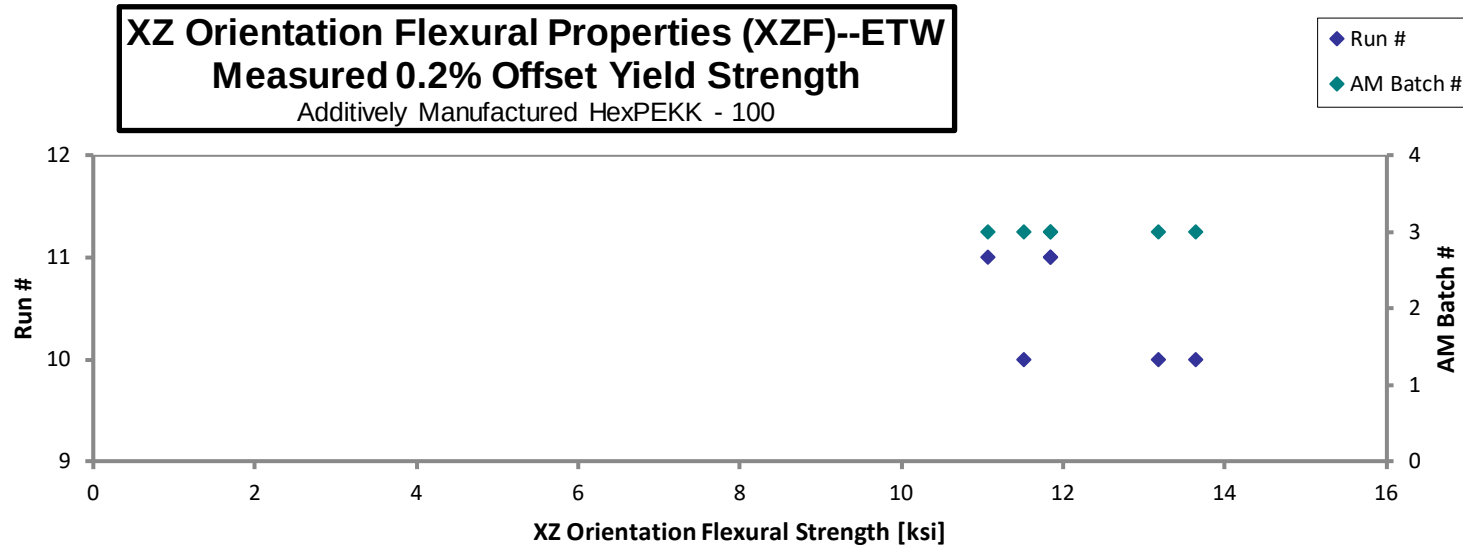


XZ Orientation Flexural Properties (XZF)--ETW**Strength & Modulus**

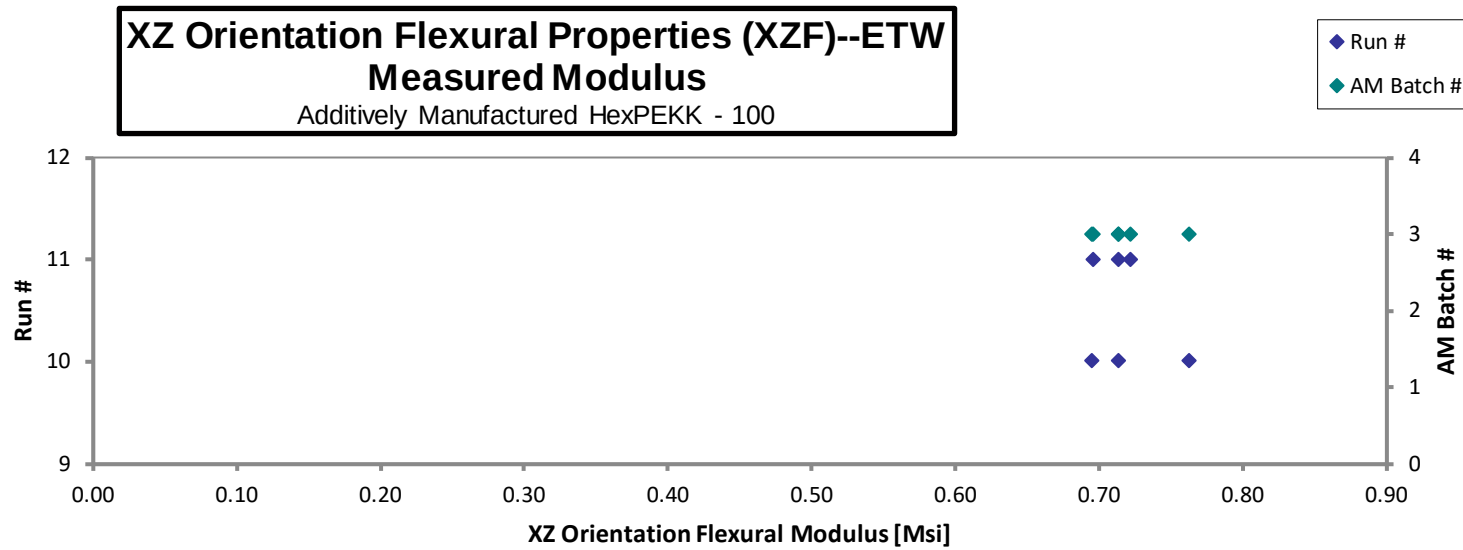
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R10-5-XZF-4B-ETW-10	3	10	16.80	13.17	0.6951	0.1494	CAT, TAB
HL-C-R10-5-XZF-5B-ETW-12	3	10	18.07	13.64	0.7630	0.1415	CAT, TAB
HL-C-R10-5-XZF-3B-ETW-8	3	10	16.23	11.51	0.7130	0.1487	CAT, TAB
HL-C-R11-6-XZF-5B-ETW-11	3	11	16.88	11.85	0.7222	0.1406	CAT, TAB
HL-C-R11-6-XZF-3B-ETW-7	3	11	16.21	11.06	0.6962	0.1440	CAT, TAB
HL-C-R11-6-XZF-4B-ETW-9	3	11	16.63	11.84	0.7138	0.1450	CAT, TAB

Average	16.80	12.18	0.7172	0.1449
Standard Dev.	0.680	1.005	0.02480	
Coeff. of Var. [%]	4.049	8.250	3.458	
Min.	16.21	11.06	0.6951	0.1406
Max.	18.07	13.64	0.7630	0.1494
Number of Spec.	6	6	6	6



f



4.13 ZX Flex Properties (ZXF)

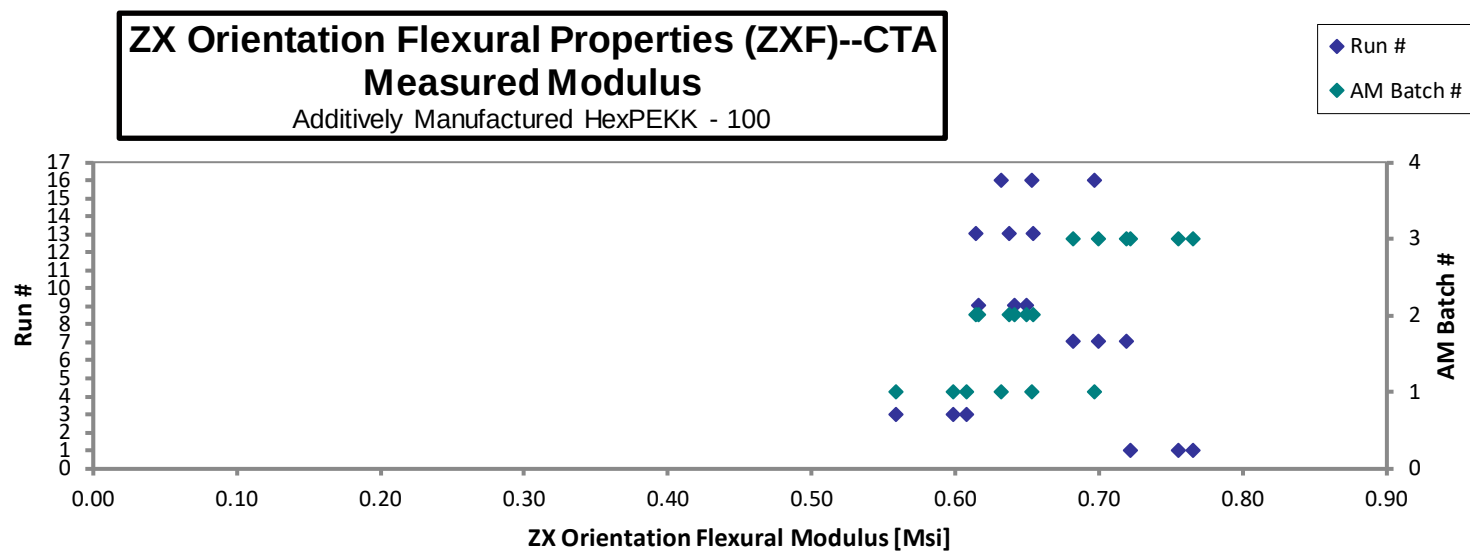
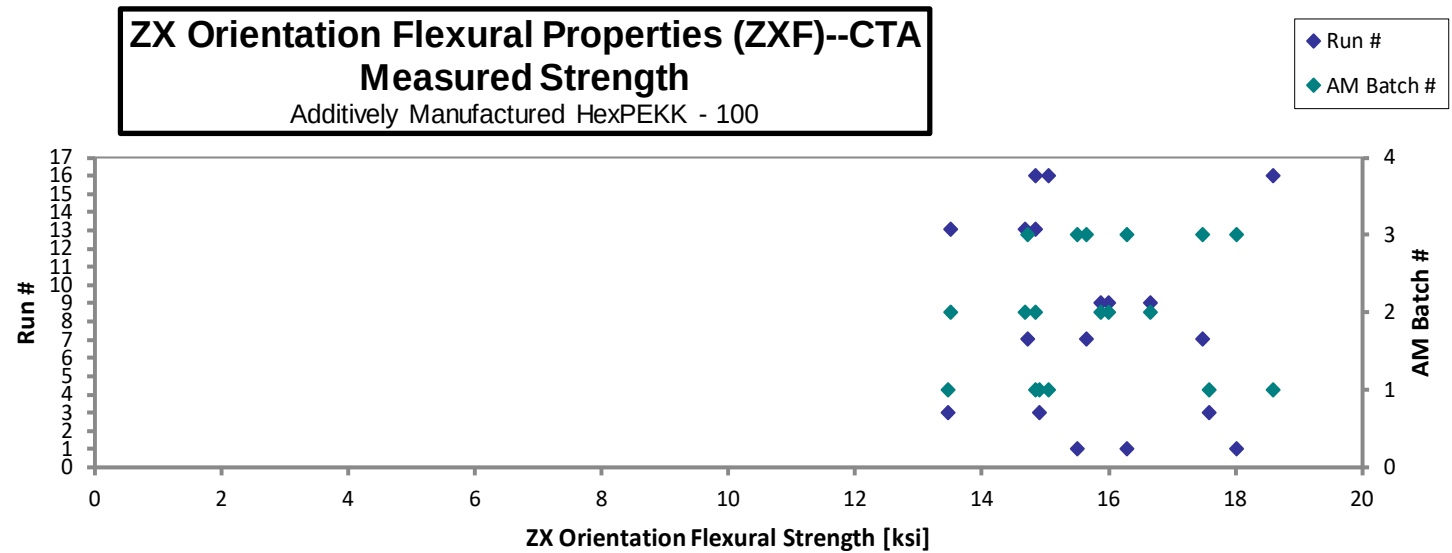
ZX Orientation Flexural Properties (ZXF)--CTA**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXF-5T-CTA-11	1	16	15.06		0.6318	0.1433	CAT, TAB
HL-A-R16-10-ZXF-1B-CTA-7	1	16	14.86		0.6966	0.1528	CAT, TAB
HL-A-R16-10-ZXF-4T-CTA-9	1	16	18.59		0.6530	0.1440	CAT, TAB, CLT, TLB
HL-A-R3-14-ZXF-2T-CTA-11	1	3	17.59		0.5986	0.1472	CLT, TLB
HL-A-R3-14-ZXF-4B-CTA-7	1	3	13.46		0.6079	0.1438	CLT, TLB
HL-A-R3-14-ZXF-1T-CTA-9	1	3	14.91		0.5585	0.1531	CLT, TLB
HL-B-R13-9-ZXF-3B-CTA-10	2	13	14.67		0.6539	0.1494	CAT, TAB
HL-B-R13-9-ZXF-5T-CTA-12	2	13	13.50		0.6140	0.1475	CAT, TAB
HL-B-R13-9-ZXF-2B-CTA-8	2	13	14.85		0.6376	0.1494	CAT, TAB
HL-B-R9-16-ZXF-2T-CTA-11	2	9	16.67		0.6157	0.1423	CLT, TLB
HL-B-R9-16-ZXF-1B-CTA-7	2	9	15.87		0.6408	0.1419	CLT, TLB
HL-B-R9-16-ZXF-3B-CTA-9	2	9	16.00		0.6492	0.1392	CLT, TLB
HL-C-R1-1-ZXF-2T-CTA-15	3	1	15.51		0.7654	0.1353	CAT, TAB
HL-C-R1-1-ZXF-3B-CTA-17	3	1	16.29		0.7553	0.1409	CAT, TAB
HL-C-R1-1-ZXF-5T-CTA-19	3	1	18.03		0.7222	0.1357	CLT, TLB
HL-C-R7-4-ZXF-5B-CTA-15	3	7	17.48		0.7191	0.1422	CLT, TLB
HL-C-R7-4-ZXF-1T-CTA-17	3	7	14.73		0.6818	0.1424	CAT, TAB
HL-C-R7-4-ZXF-4T-CTA-19	3	7	15.64		0.6999	0.1443	CAT, TAB

0.2% Offset strength as not reported for specimens that failed prior to obtaining the 0.2% offset strain

Average	15.76		0.6612	0.1441
Standard Dev.	1.460		0.05618	
Coeff. of Var. [%]	9.266		8.498	
Min.	13.46		0.5585	0.1353
Max.	18.59		0.7654	0.1531
Number of Spec.	18	0	18	18



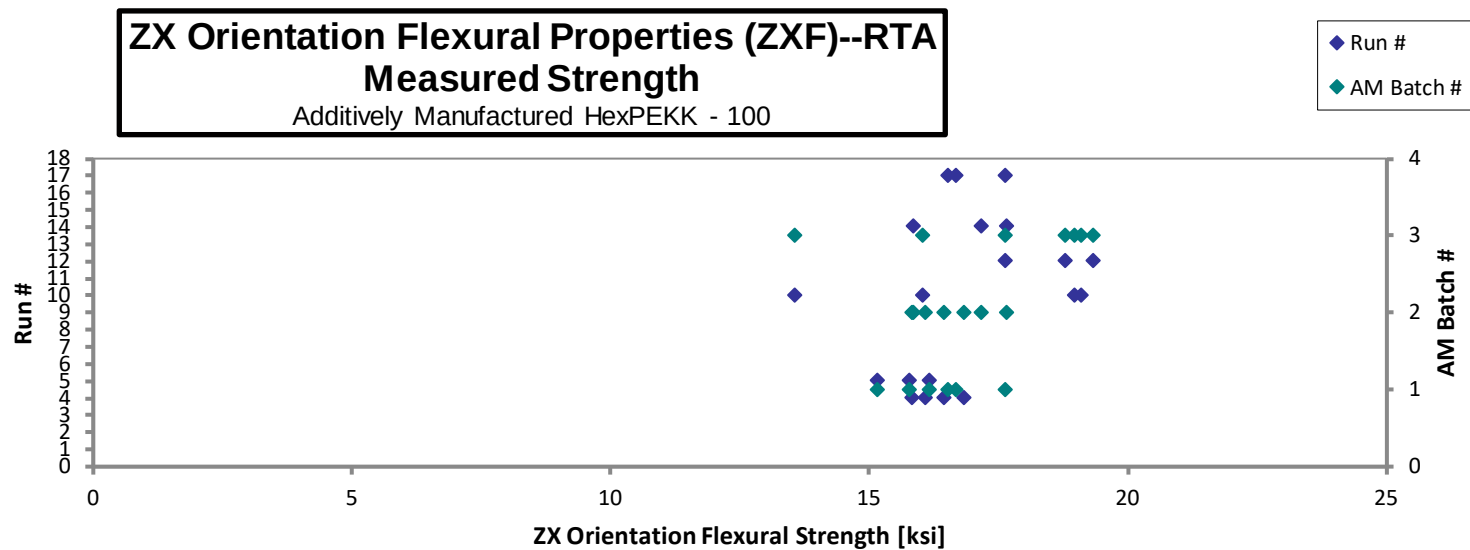
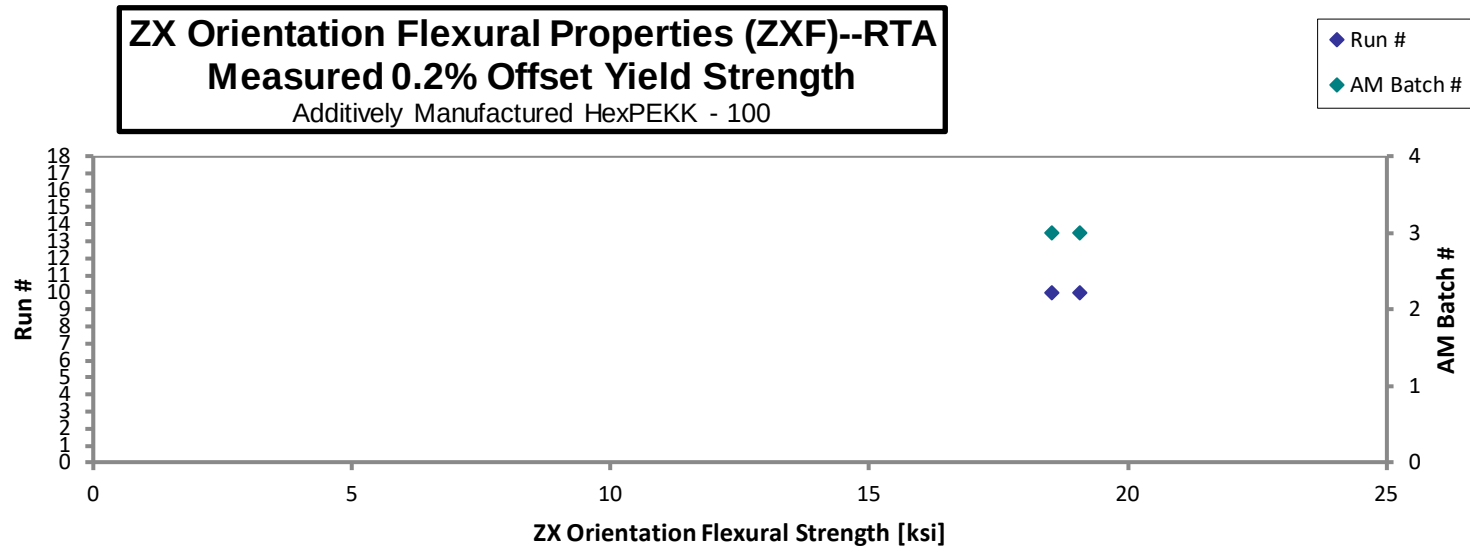
ZX Orientation Flexural Properties (ZXF)--RTA**Strength & Modulus**

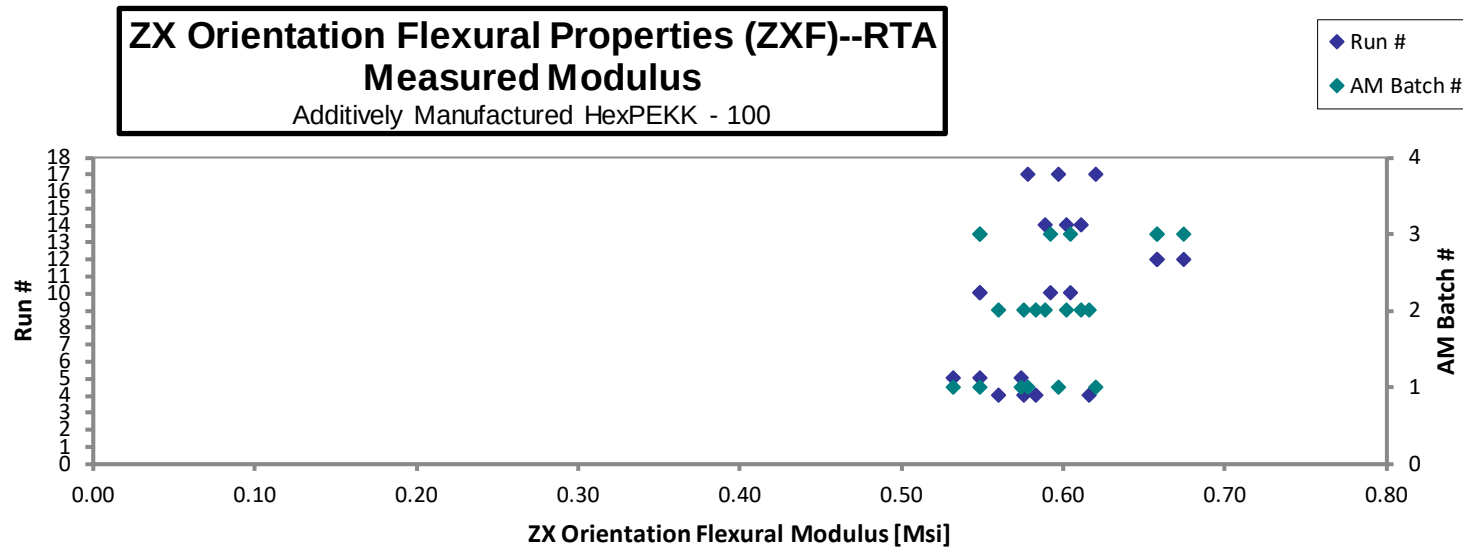
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-ZXF-4T-RTA-10	1	17	17.62		0.5970	0.1442	CAT, TAB
HL-A-R17-11-ZXF-5T-RTA-11	1	17	16.53		0.5782	0.1452	CAT, TAB
HL-A-R17-11-ZXF-4T-RTA-9	1	17	16.67		0.6201	0.1415	CAT, TAB
HL-A-R5-15-ZXF-1T-RTA-10	1	5	15.16		0.5324	0.1461	CAT, TAB
HL-A-R5-15-ZXF-2T-RTA-12	1	5	16.16		0.5482	0.1471	CAT, TAB
HL-A-R5-15-ZXF-4B-RTA-8	1	5	15.77		0.5740	0.1434	CAT, TAB
HL-B-R14-17-ZXF-3B-RTA-10	2	14	17.65		0.6019	0.1372	CAT, TAB
HL-B-R14-17-ZXF-2T-RTA-12	2	14	15.84		0.5889	0.1403	CAT, TAB
HL-B-R14-17-ZXF-1B-RTA-8	2	14	17.16		0.6115	0.1381	CAT, TAB
HL-B-R4-7-ZXF-3B-RTA-10	2	4	16.09		0.5599	0.1450	CAT, TAB
HL-B-R4-7-ZXF-5T-RTA-11	2	4	16.44		0.5834	0.1448	CAT, TAB
HL-B-R4-7-ZXF-2B-RTA-7	2	4	15.82		0.6162	0.1390	CAT, TAB
HL-B-R4-7-ZXF-3B-RTA-9	2	4	16.83		0.5760	0.1437	CAT, TAB
HL-C-R10-5-ZXF-5B-RTA-15	3	10	18.97	18.54	0.5922	0.1445	CAT, TAB
HL-C-R10-5-ZXF-5B-RTA-16	3	10	16.02		0.5489	0.1467	CAT, TAB
HL-C-R10-5-ZXF-1T-RTA-17	3	10	19.11	19.08	0.6045	0.1442	CAT, TAB
HL-C-R10-5-ZXF-4T-RTA-19	3	10	13.57		0.5488	0.1478	CAT, TAB
HL-C-R12-3-ZXF-2T-RTA-16	3	12	18.80		0.6579	0.1375	CAT, TAB
HL-C-R12-3-ZXF-3B-RTA-18	3	12	19.34		0.6745	0.1382	CAT, TAB
HL-C-R12-3-ZXF-5T-RTA-20	3	12	17.63		0.6584	0.1376	CAT, TAB

0.2% Offset strength as not reported for specimens that failed prior to obtaining the 0.2% offset strain

Average	16.86	18.81	0.5937	0.1426
Standard Dev.	1.459	0.3828	0.03880	
Coeff. of Var. [%]	8.656	2.035	6.537	
Min.	13.57	18.54	0.5324	0.1372
Max.	19.34	19.08	0.6745	0.1478
Number of Spec.	20	2	20	20





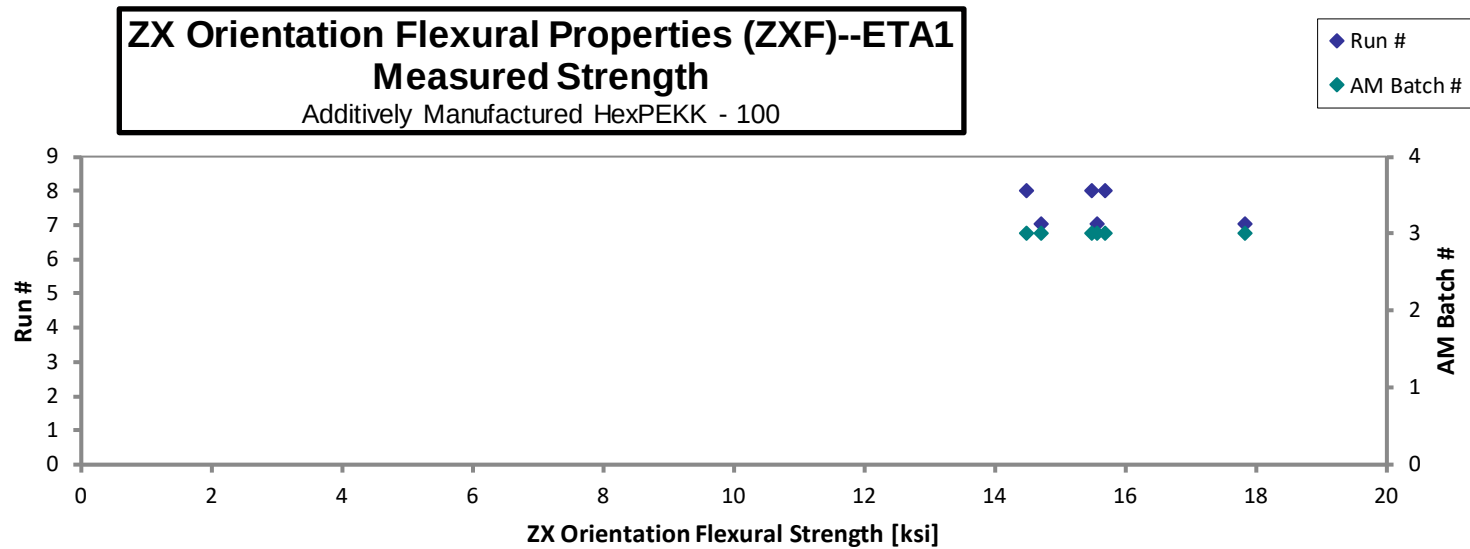
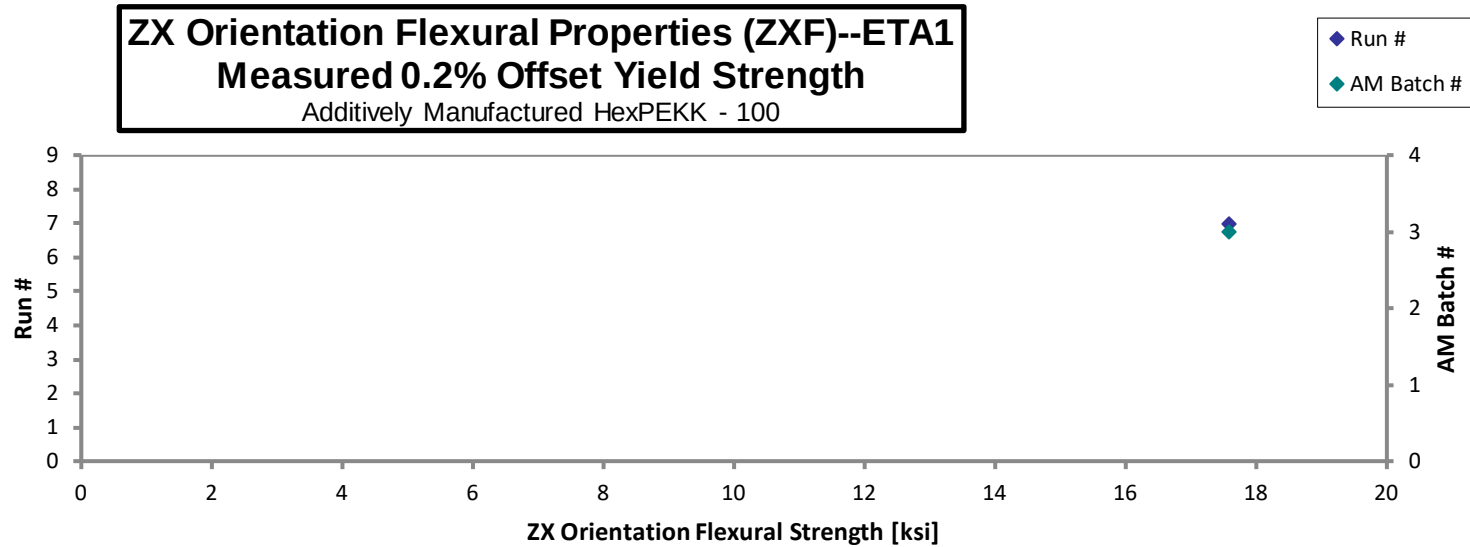
ZX Orientation Flexural Properties (ZXF)--ETA1**Strength & Modulus**

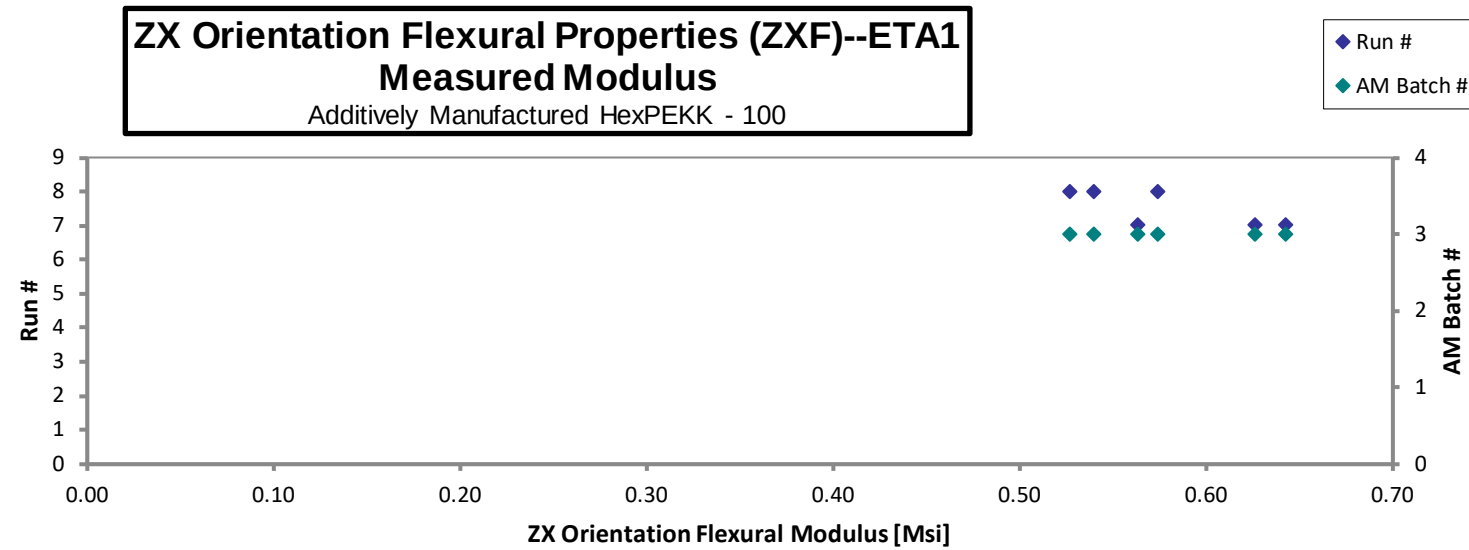
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R7-4-ZXF-5B-ETA1-16	3	7	17.83	17.59	0.6424	0.1398	CAT, TAB / CLT, TLB
HL-C-R7-4-ZXF-1T-ETA1-18	3	7	15.57		0.6266	0.1405	CAT, TAB
HL-C-R7-4-ZXF-4T-ETA1-20	3	7	14.70		0.5636	0.1459	CAT, TAB
HL-C-R8-2-ZXF-2T-ETA1-16	3	8	15.69		0.5741	0.1424	CAT, TAB
HL-C-R8-2-ZXF-3B-ETA1-18	3	8	15.50		0.5395	0.1480	CAT, TAB
HL-C-R8-2-ZXF-5T-ETA1-20	3	8	14.48		0.5272	0.1471	CAT, TAB

0.2% Offset strength as not reported for specimens that failed prior to obtaining the 0.2% offset strain

Average	15.63	17.59	0.5789	0.1440
Standard Dev.	1.187		0.04644	
Coeff. of Var. [%]	7.593		8.022	
Min.	14.48		0.5272	0.1398
Max.	17.83		0.6424	0.1480
Number of Spec.	6	1	6	6



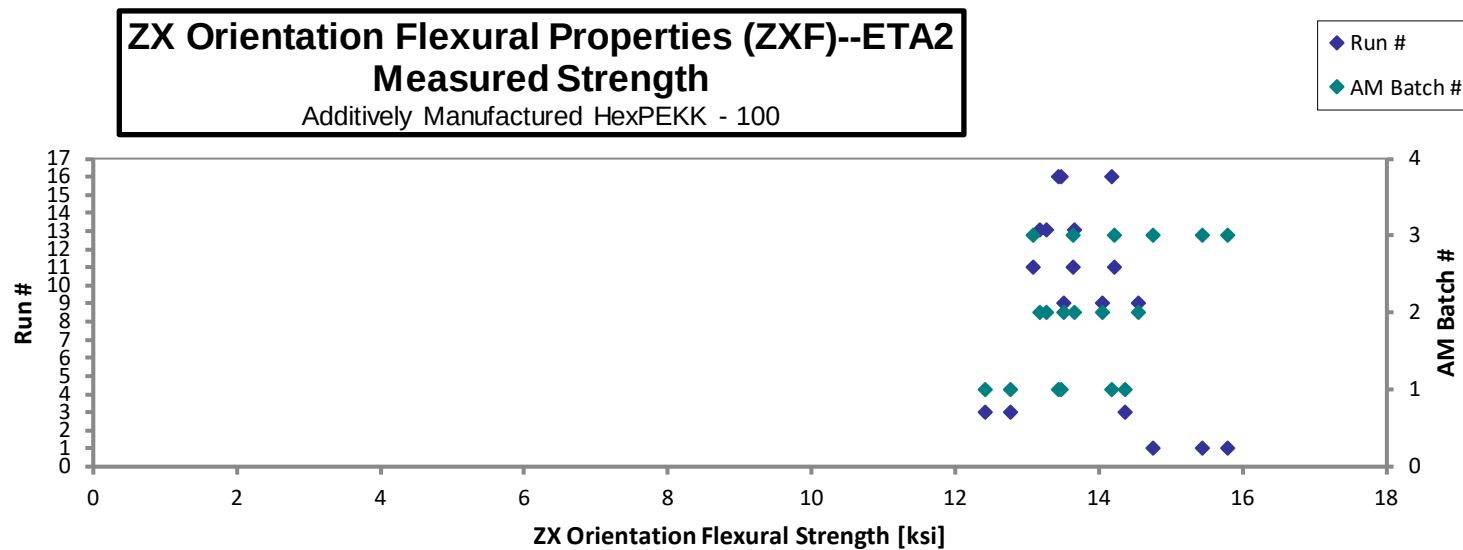
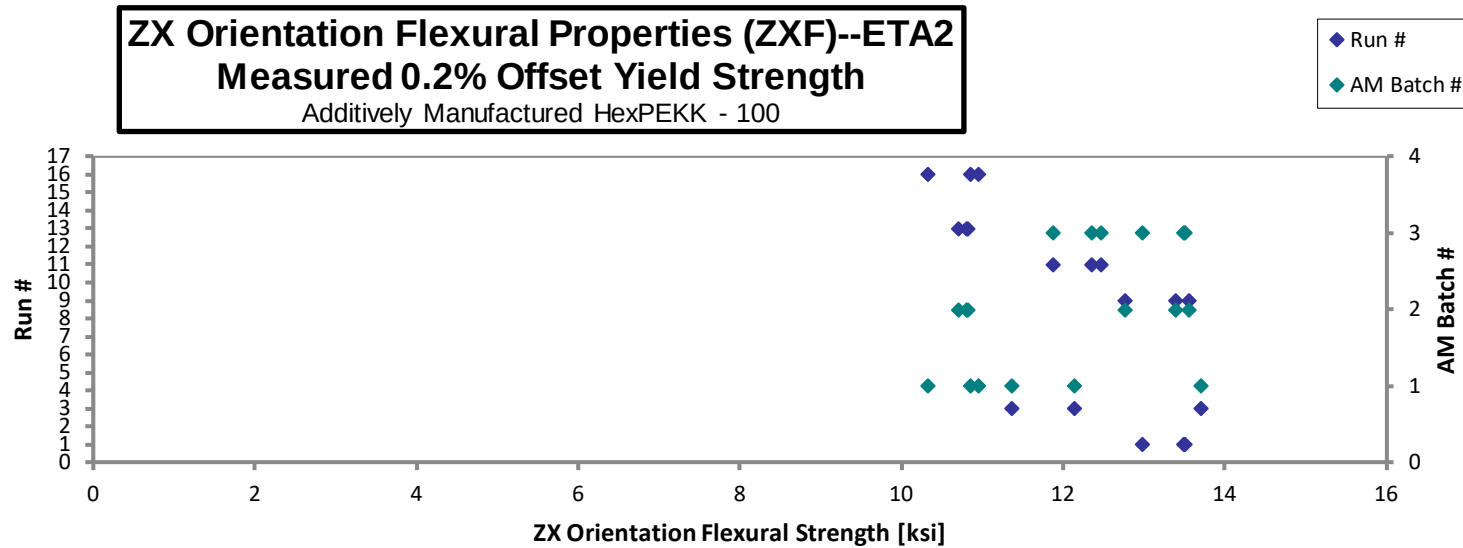


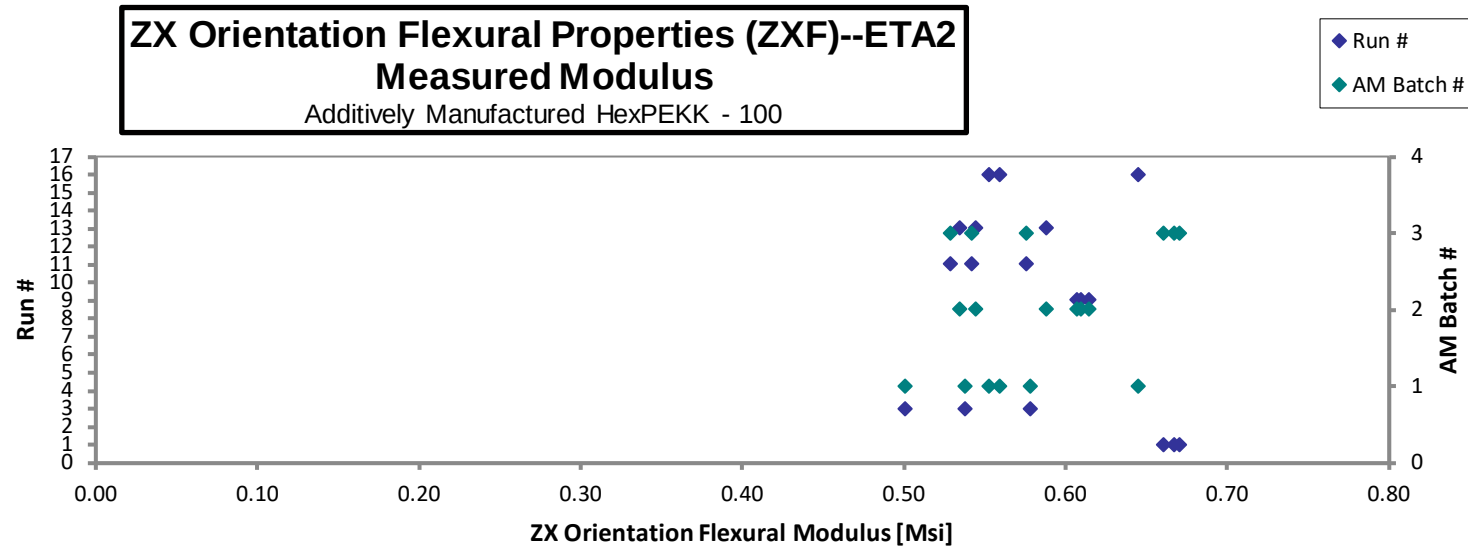
ZX Orientation Flexural Properties (ZXF)--ETA2□ Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXF-4T-ETA2-10	1	16	13.44	10.96	0.5589	0.1465	CAT, TAB
HL-A-R16-10-ZXF-5T-ETA2-12	1	16	13.48	10.85	0.5527	0.1458	CAT, TAB
HL-A-R16-10-ZXF-1B-ETA2-8	1	16	14.18	10.32	0.6449	0.1532	CAT, TAB
HL-A-R3-14-ZXF-1T-ETA2-10	1	3	12.42	11.36	0.5011	0.1508	CAT, TAB
HL-A-R3-14-ZXF-2T-ETA2-12	1	3	12.77	12.14	0.5376	0.1475	CAT, TAB
HL-A-R3-14-ZXF-4B-ETA2-8	1	3	14.36	13.71	0.5782	0.1407	CLT, TLB
HL-B-R13-9-ZXF-5T-ETA2-11	2	13	13.26	10.83	0.5440	0.1471	CAT, TAB
HL-B-R13-9-ZXF-2B-ETA2-7	2	13	13.66	10.71	0.5879	0.1483	CAT, TAB
HL-B-R13-9-ZXF-3B-ETA2-9	2	13	13.17	10.81	0.5342	0.1512	CAT, TAB
HL-B-R9-16-ZXF-3B-ETA2-10	2	9	14.54	13.39	0.6097	0.1393	CLT, TLB
HL-B-R9-16-ZXF-2T-ETA2-12	2	9	13.51	12.77	0.6148	0.1426	CAT, TAB
HL-B-R9-16-ZXF-1B-ETA2-8	2	9	14.06	13.56	0.6074	0.1407	CAT, TAB
HL-C-R1-1-ZXF-2T-ETA2-16	3	1	15.43	12.98	0.6608	0.1359	CAT, TAB
HL-C-R1-1-ZXF-3B-ETA2-18	3	1	15.80	13.51	0.6708	0.1409	CAT, TAB
HL-C-R1-1-ZXF-5T-ETA2-20	3	1	14.75	13.50	0.6670	0.1350	CAT, TAB
HL-C-R11-6-ZXF-5B-ETA2-16	3	11	14.21	12.47	0.5284	0.1450	CAT, TAB
HL-C-R11-6-ZXF-1T-ETA2-18	3	11	13.08	11.87	0.5760	0.1435	CAT, TAB
HL-C-R11-6-ZXF-4T-ETA2-20	3	11	13.65	12.36	0.5422	0.1440	CAT, TAB

Average	13.88	12.12	0.5843	0.1443
Standard Dev.	0.8828	1.178	0.05194	
Coeff. of Var. [%]	6.362	9.724	8.889	
Min.	12.42	10.32	0.5011	0.1350
Max.	15.80	13.71	0.6708	0.1532
Number of Spec.	18	18	18	18



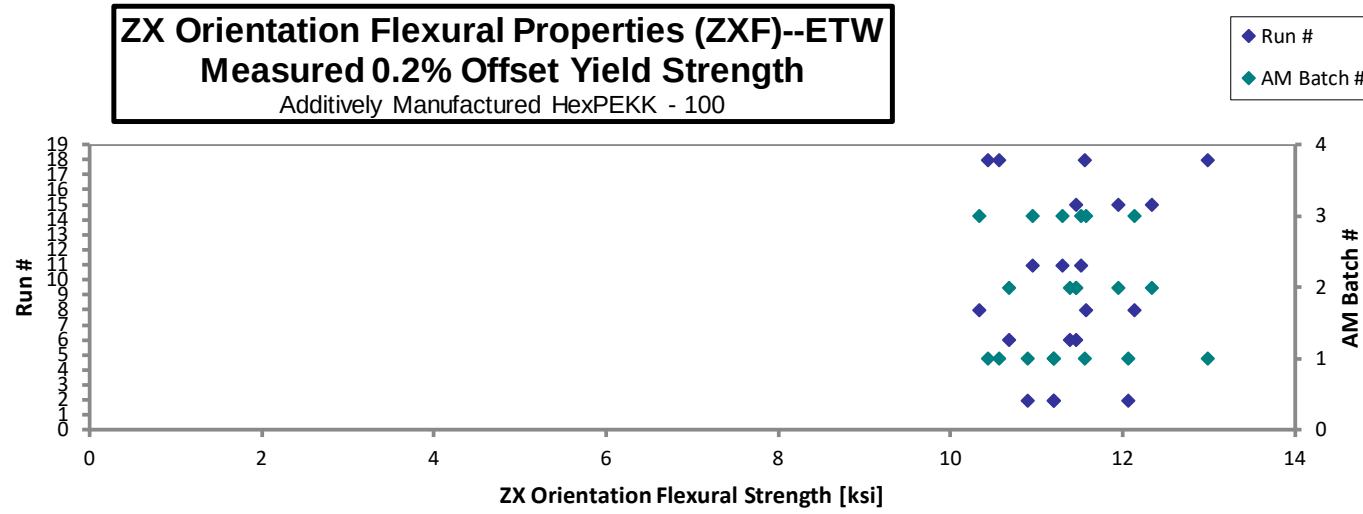


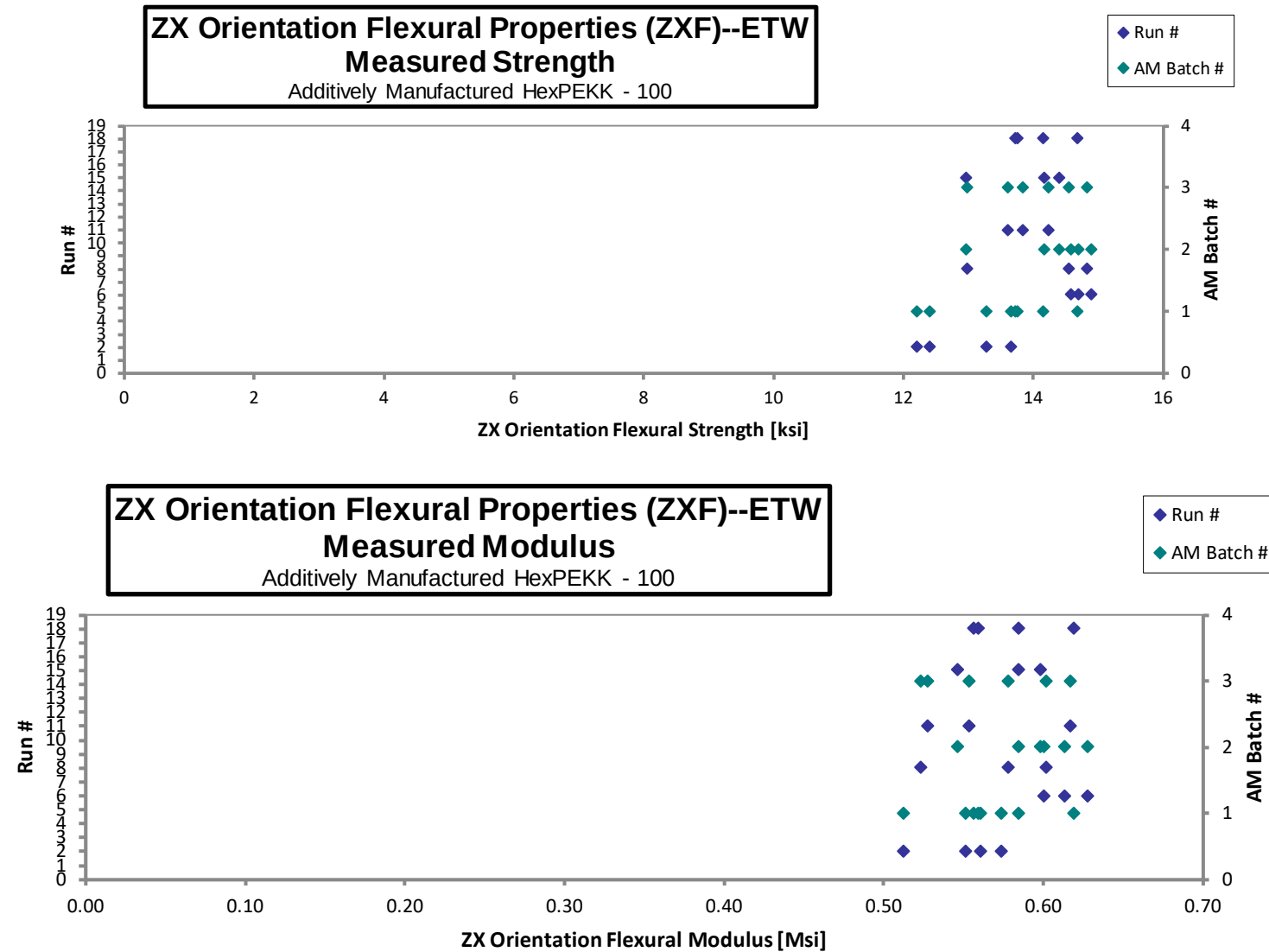
ZX Orientation Flexural Properties (ZXF)--ETW**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-ZXF-4T-ETW-10	1	18	14.15	11.57	0.5566	0.1434	CAT, TAB
HL-A-R18-12-ZXF-5T-ETW-12	1	18	13.76	10.56	0.5847	0.1445	CAT, TAB
HL-A-R18-12-ZXF-1B-ETW-8	1	18	14.68	12.99	0.5590	0.1525	CAT, TAB
HL-A-R18-12-ZXF-4T-ETW-9	1	18	13.72	10.44	0.6194	0.1414	CAT, TAB
HL-A-R2-13-ZXF-1T-ETW-10	1	2	12.21	10.90	0.5608	0.1445	CAT, TAB
HL-A-R2-13-ZXF-2T-ETW-11	1	2	13.28	11.20	0.5737	0.1429	CAT, TAB
HL-A-R2-13-ZXF-4B-ETW-7	1	2	13.66	12.07	0.5512	0.1432	CLT, TLB
HL-A-R2-13-ZXF-1T-ETW-9	1	2	12.40	11.20	0.5122	0.1440	CAT, TAB
HL-B-R15-18-ZXF-2T-ETW-11	2	15	12.96	11.45	0.5460	0.1404	CAT, TAB
HL-B-R15-18-ZXF-1B-ETW-7	2	15	14.17	12.34	0.5844	0.1367	CAT, TAB
HL-B-R15-18-ZXF-3B-ETW-9	2	15	14.40	11.94	0.5985	0.1369	CAT, TAB
HL-B-R6-8-ZXF-3B-ETW-10	2	6	14.58	10.68	0.6280	0.1409	CAT, TAB
HL-B-R6-8-ZXF-5T-ETW-12	2	6	14.70	11.39	0.6007	0.1391	CAT, TAB
HL-B-R6-8-ZXF-2B-ETW-8	2	6	14.89	11.46	0.6130	0.1378	CAT, TAB
HL-C-R11-6-ZXF-5B-ETW-15	3	11	14.23	11.51	0.5275	0.1450	CAT, TAB
HL-C-R11-6-ZXF-1T-ETW-17	3	11	13.84	10.95	0.6166	0.1417	CAT, TAB
HL-C-R11-6-ZXF-4T-ETW-19	3	11	13.61	11.30	0.5538	0.1436	CAT, TAB
HL-C-R8-2-ZXF-2T-ETW-15	3	8	14.54	12.14	0.5779	0.1399	CAT, TAB
HL-C-R8-2-ZXF-3B-ETW-17	3	8	14.82	11.58	0.6017	0.1439	CAT, TAB
HL-C-R8-2-ZXF-5T-ETW-19	3	8	12.99	10.33	0.5236	0.1467	CAT, TAB

Average	13.88	11.40	0.5745	0.1425
Standard Dev.	0.7885	0.6731	0.03368	
Coeff. of Var. [%]	5.681	5.904	5.864	
Min.	12.21	10.33	0.5122	0.1367
Max.	14.89	12.99	0.6280	0.1525
Number of Spec.	20	20	20	20





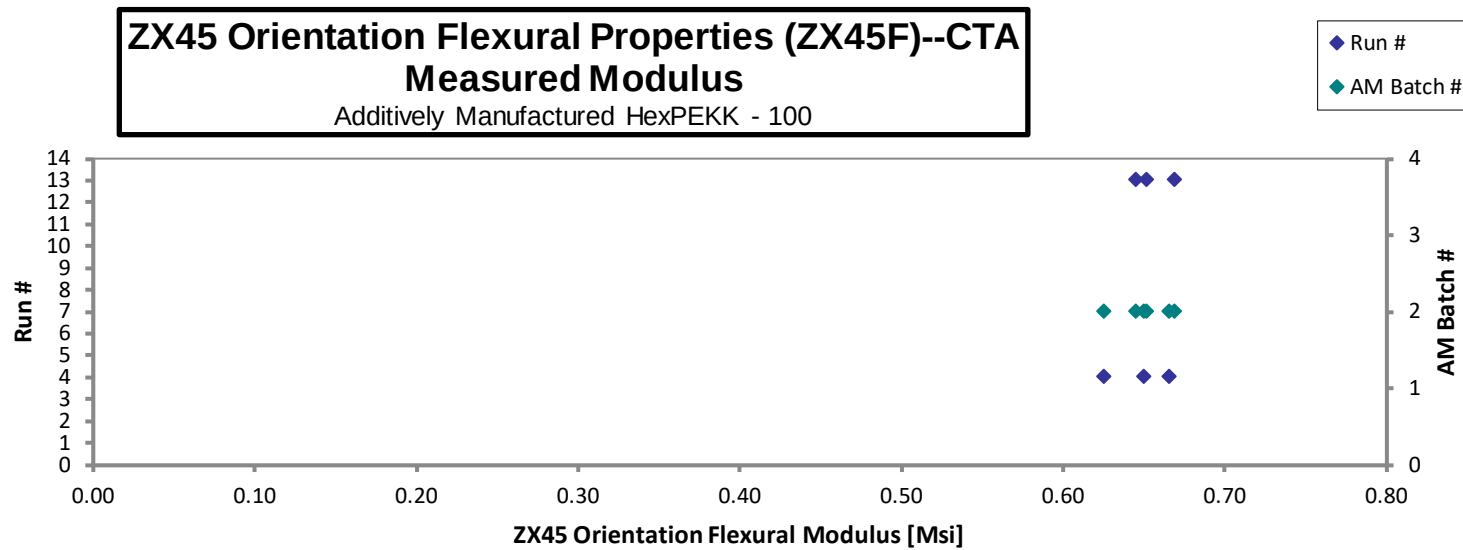
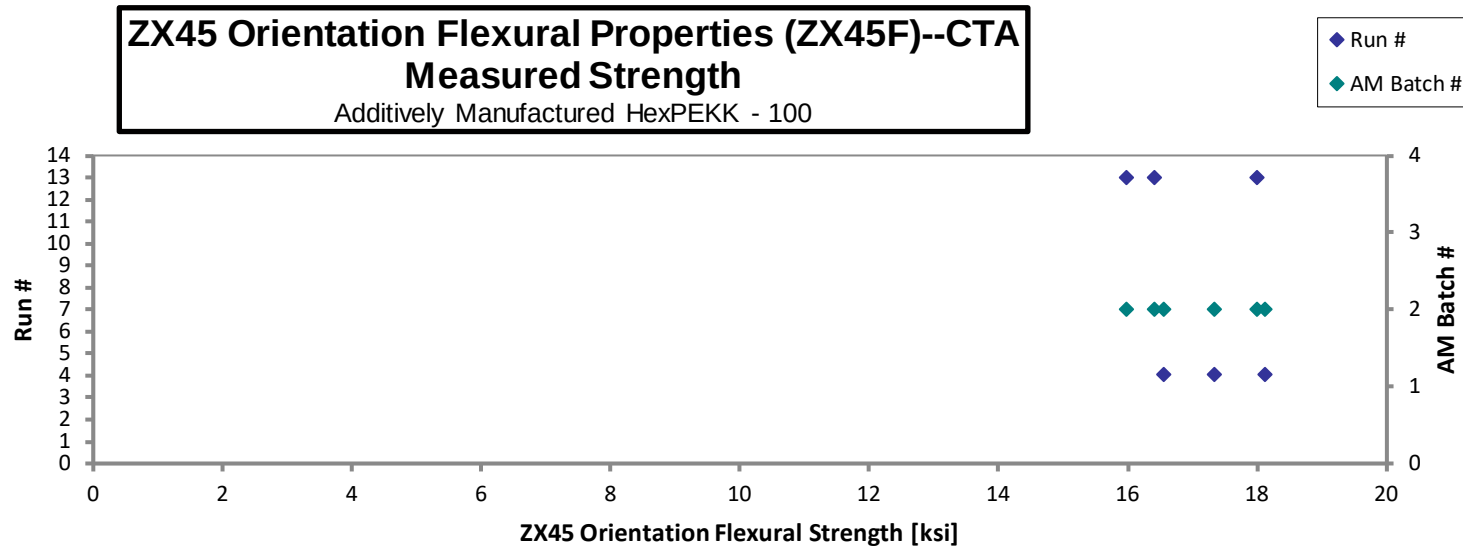
4.14 X45 Flex Properties (ZX45F)

ZX45 Orientation Flexural Properties (ZX45F)--CTA
Strength & Modulus

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R13-9-ZX45F-2B-CTA-16	2	13	18.01		0.6514	0.1500	CAT, TAB
HL-B-R13-9-ZX45F-3B-CTA-18	2	13	16.41		0.6692	0.1556	CAT, TAB
HL-B-R13-9-ZX45F-4T-CTA-19	2	13	15.97		0.6449	0.1443	CAT, TAB
HL-B-R4-7-ZX45F-1B-CTA-13	2	4	16.55		0.6657	0.1414	CAT, TAB
HL-B-R4-7-ZX45F-2B-CTA-15	2	4	17.34		0.6496	0.1438	CAT, TAB
HL-B-R4-7-ZX45F-3B-CTA-17	2	4	18.11		0.6254	0.1494	CAT, TAB

	Average	17.07		0.6511	0.1474
	Standard Dev.	0.89		0.0158	
0.2% Offset strength as not reported for specimens that failed prior to obtaining the 0.2% offset strain	Coeff. of Var. [%]	5.21		2.4201	
	Min.	15.97		0.6254	0.1414
	Max.	18.11		0.6692	0.1556
	Number of Spec.	6	0	6	6

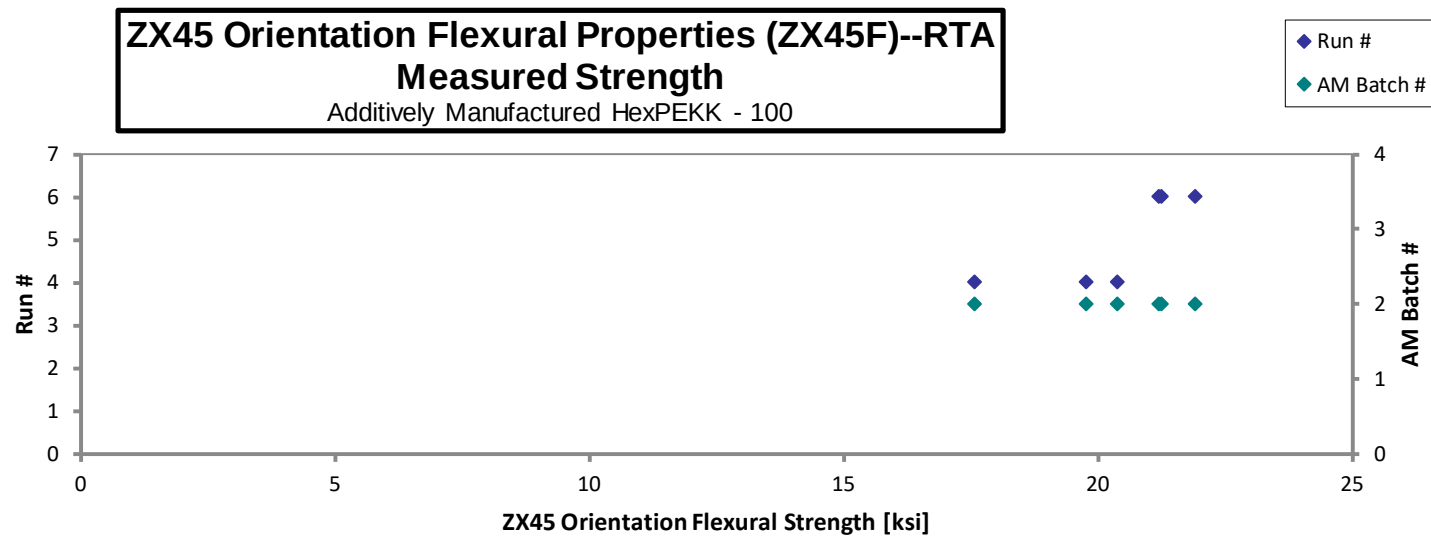
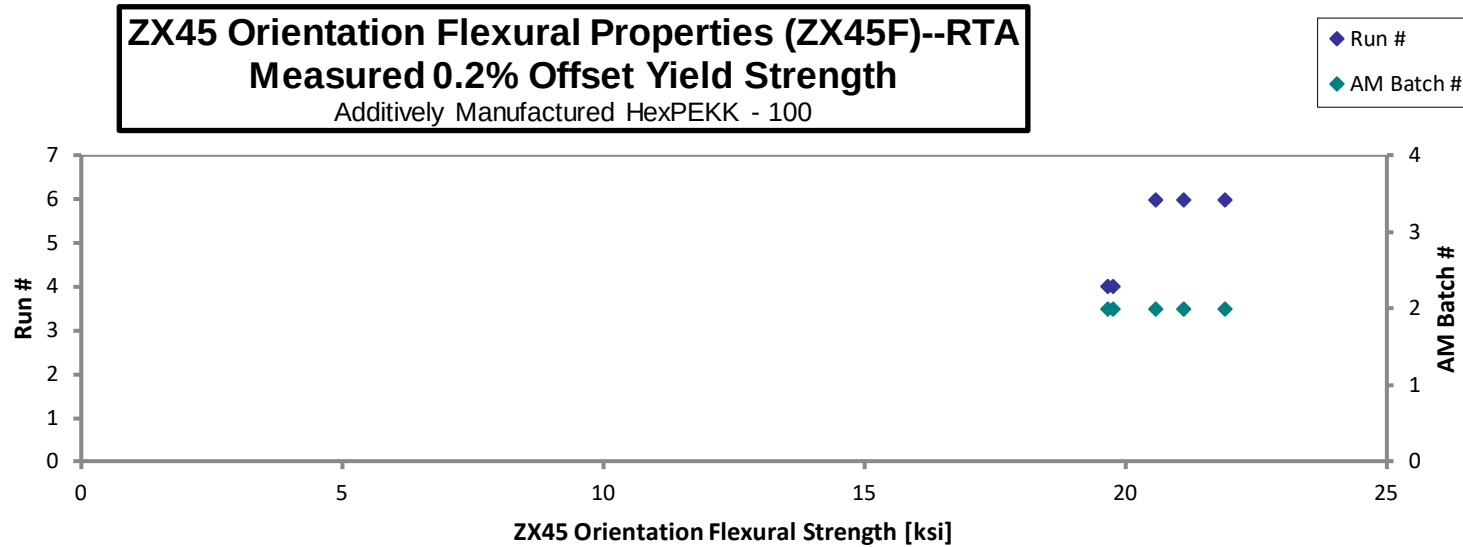


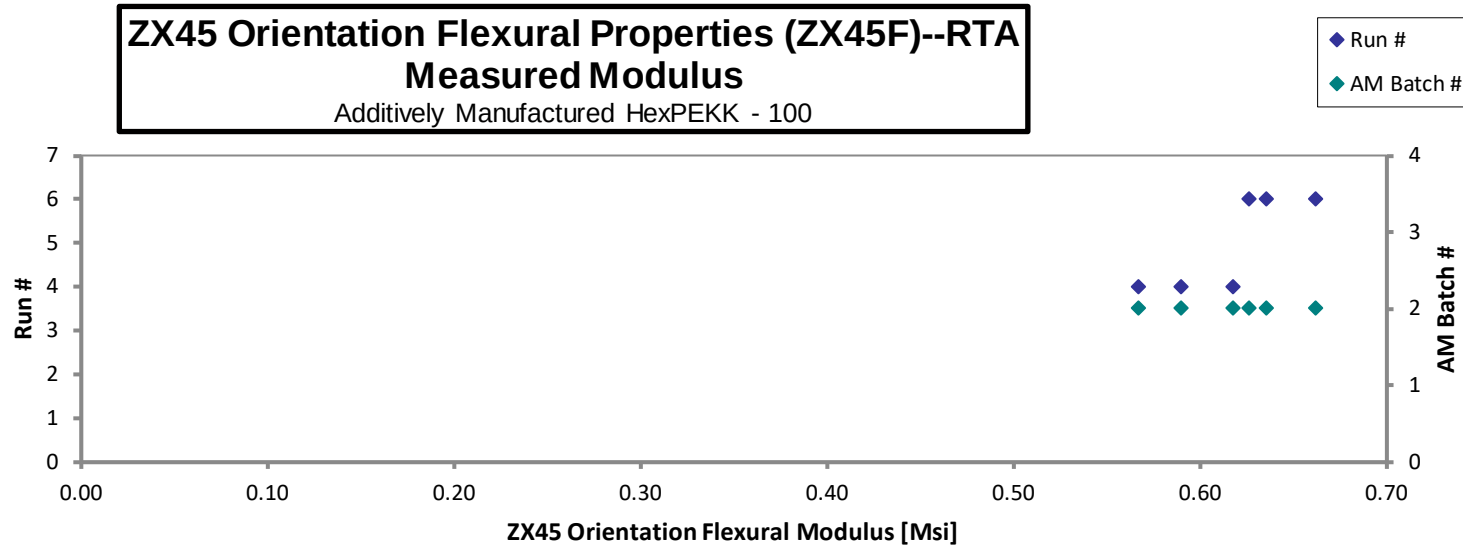
ZX45 Orientation Flexural Properties (ZX45F)--RTA**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R4-7-ZX45F-1B-RTA-14	2	4	20.37	19.65	0.6174	0.1417	CAT, TAB / CLT, TLB
HL-B-R4-7-ZX45F-2B-RTA-16	2	4	19.75	19.75	0.5896	0.1432	
HL-B-R4-7-ZX45F-4T-RTA-19	2	4	17.58		0.5673	0.1453	
HL-B-R6-8-ZX45F-1B-RTA-13	2	6	21.19	20.58	0.6358	0.1398	CAT, TAB
HL-B-R6-8-ZX45F-2B-RTA-15	2	6	21.90	21.90	0.6617	0.1384	CAT, TAB
HL-B-R6-8-ZX45F-3B-RTA-17	2	6	21.24	21.13	0.6263	0.1438	CAT, TAB

0.2% Offset strength as not reported for specimens that failed prior to obtaining the 0.2% offset strain	Average	20.34	20.60	0.6163	0.1420
	Standard Dev.	1.54	0.95	0.0336	
	Coeff. of Var. [%]	7.59	4.59	5.4589	
	Min.	17.58	19.65	0.5673	0.1384
	Max.	21.90	21.90	0.6617	0.1453
	Number of Spec.	6	5	6	6



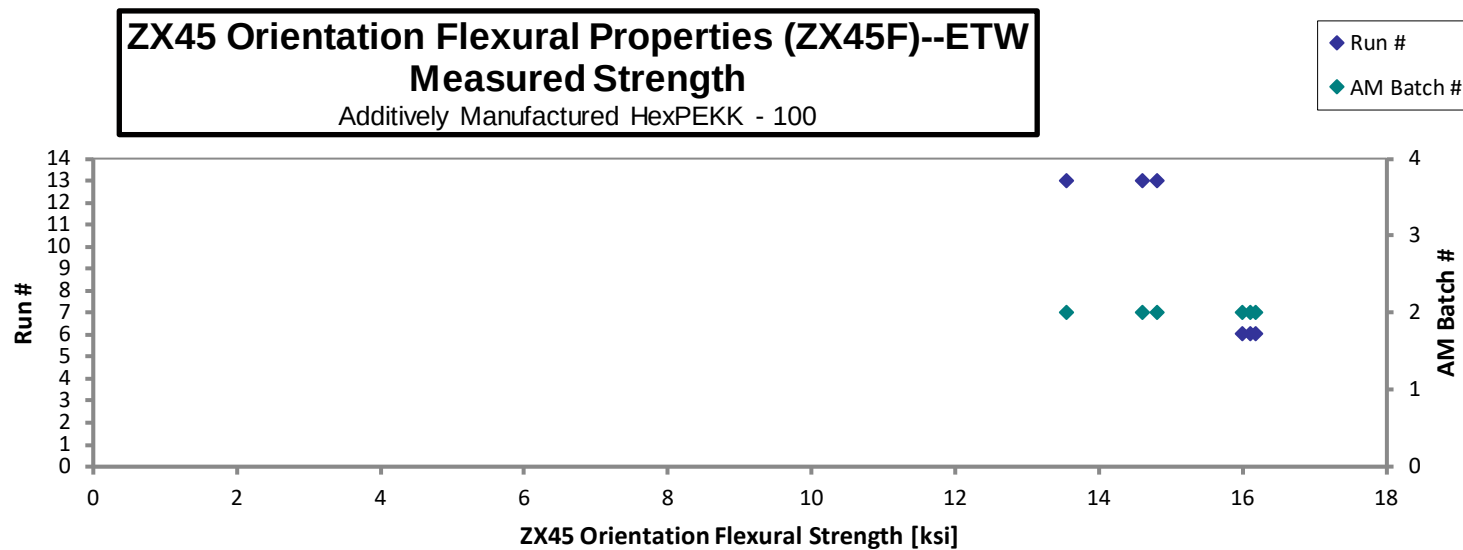
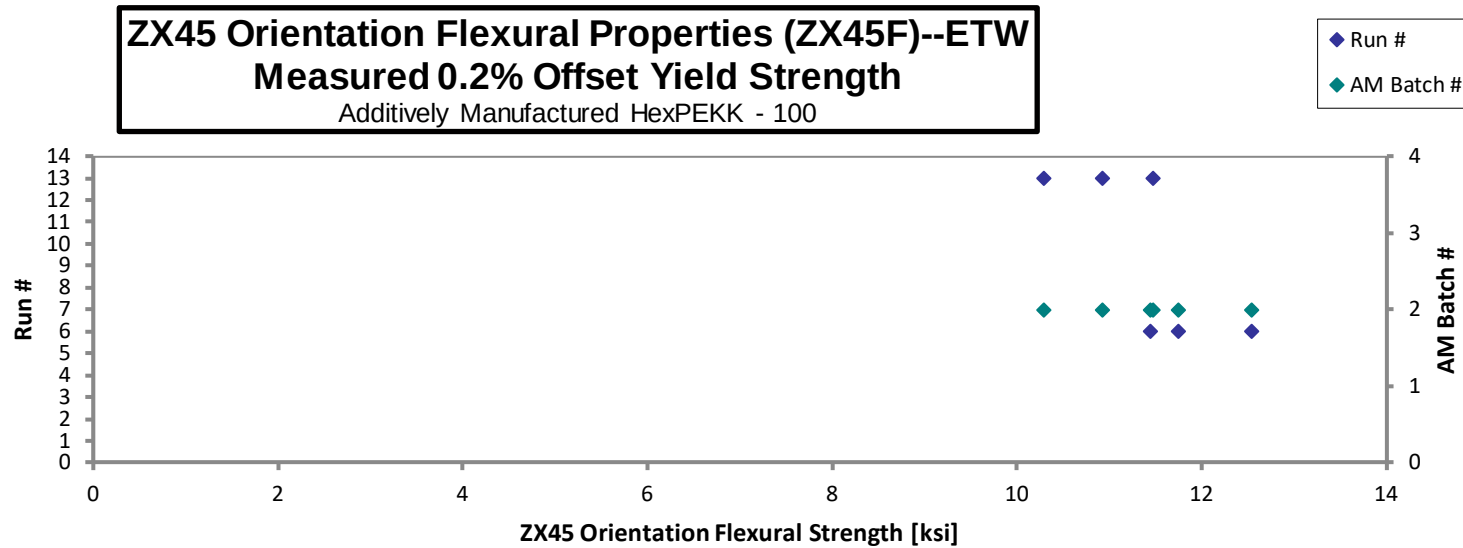


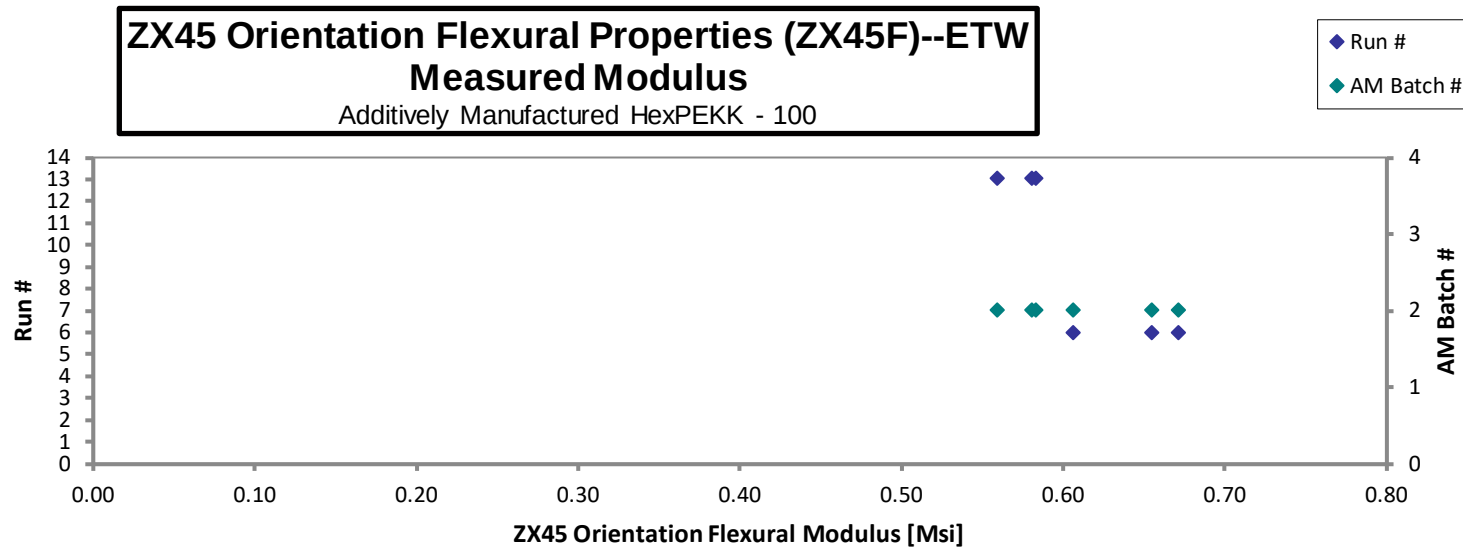
ZX45 Orientation Flexural Properties (ZX45F)--ETW**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	0.2% Offset Yield Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R13-9-ZX45F-2B-ETW-15	2	13	14.60	10.92	0.5828	0.1513	CAT, TAB
HL-B-R13-9-ZX45F-3B-ETW-17	2	13	14.82	11.48	0.5594	0.1555	CAT, TAB
HL-B-R13-9-ZX45F-4T-ETW-20	2	13	13.54	10.29	0.5804	0.1437	CAT, TAB
HL-B-R6-8-ZX45F-1B-ETW-14	2	6	16.10	12.55	0.6061	0.1395	CAT, TAB
HL-B-R6-8-ZX45F-2B-ETW-16	2	6	16.17	11.45	0.6710	0.1398	CAT, TAB
HL-B-R6-8-ZX45F-3B-ETW-18	2	6	16.00	11.75	0.6548	0.1443	CAT, TAB

Average	15.21	11.41	0.6091	0.1457
Standard Dev.	1.06	0.76	0.0445	
Coeff. of Var. [%]	6.98	6.68	7.3086	
Min.	13.54	10.29	0.5594	0.1395
Max.	16.17	12.55	0.6710	0.1555
Number of Spec.	6	6	6	6





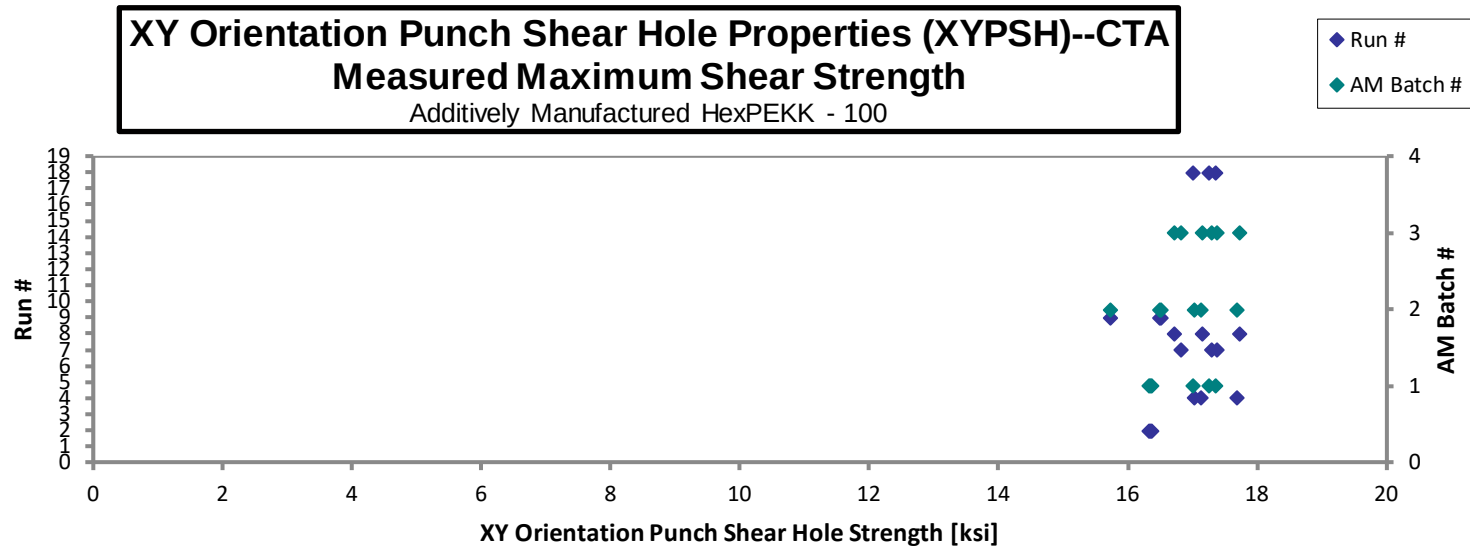
4.15 XY Punch Shear Properties (XYPSH)

XY Orientation Punch Shear Hole Properties (XYPSH)--CTA□
Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-XYPSH-2B-CTA-1	1	18	17.36	0.1466	SHEAR FAILURE
HL-A-R18-12-XYPSH-5B-CTA-3	1	18	17.25	0.1515	SHEAR FAILURE
HL-A-R18-12-XYPSH-3T-CTA-5	1	18	17.00	0.1540	SHEAR FAILURE
HL-A-R2-13-XYPSH-3B-CTA-1	1	2	16.34	0.1461	SHEAR FAILURE
HL-A-R2-13-XYPSH-1T-CTA-3	1	2	16.35	0.1460	SHEAR FAILURE
HL-A-R2-13-XYPSH-2T-CTA-5	1	2	16.37	0.1433	SHEAR FAILURE
HL-B-R4-7-XYPSH-1B-CTA-1	2	4	17.70	0.1337	SHEAR FAILURE
HL-B-R4-7-XYPSH-4T-CTA-3	2	4	17.03	0.1420	SHEAR FAILURE
HL-B-R4-7-XYPSH-5T-CTA-5	2	4	17.13	0.1451	SHEAR FAILURE
HL-B-R9-16-XYPSH-2B-CTA-1	2	9	16.49	0.1430	SHEAR FAILURE
HL-B-R9-16-XYPSH-1T-CTA-2	2	9	15.73	0.1515	SHEAR FAILURE
HL-B-R9-16-XYPSH-4T-CTA-5	2	9	16.52	0.1412	SHEAR FAILURE
HL-C-R7-4-XYPSH-2B-CTA-1	3	7	17.39	0.1238	SHEAR FAILURE
HL-C-R7-4-XYPSH-5B-CTA-3	3	7	17.30	0.1427	SHEAR FAILURE
HL-C-R7-4-XYPSH-3T-CTA-5	3	7	16.83	0.1399	SHEAR FAILURE
HL-C-R8-2-XYPSH-1B-CTA-1	3	8	17.15	0.1398	SHEAR FAILURE
HL-C-R8-2-XYPSH-4T-CTA-3	3	8	16.71	0.1477	SHEAR FAILURE
HL-C-R8-2-XYPSH-5T-CTA-5	3	8	17.72	0.1400	SHEAR FAILURE

Average	16.91	0.1432
Standard Dev.	0.5314	
Coeff. of Var. [%]	3.143	
Min.	15.73	0.1238
Max.	17.72	0.1540
Number of Spec.	18	18

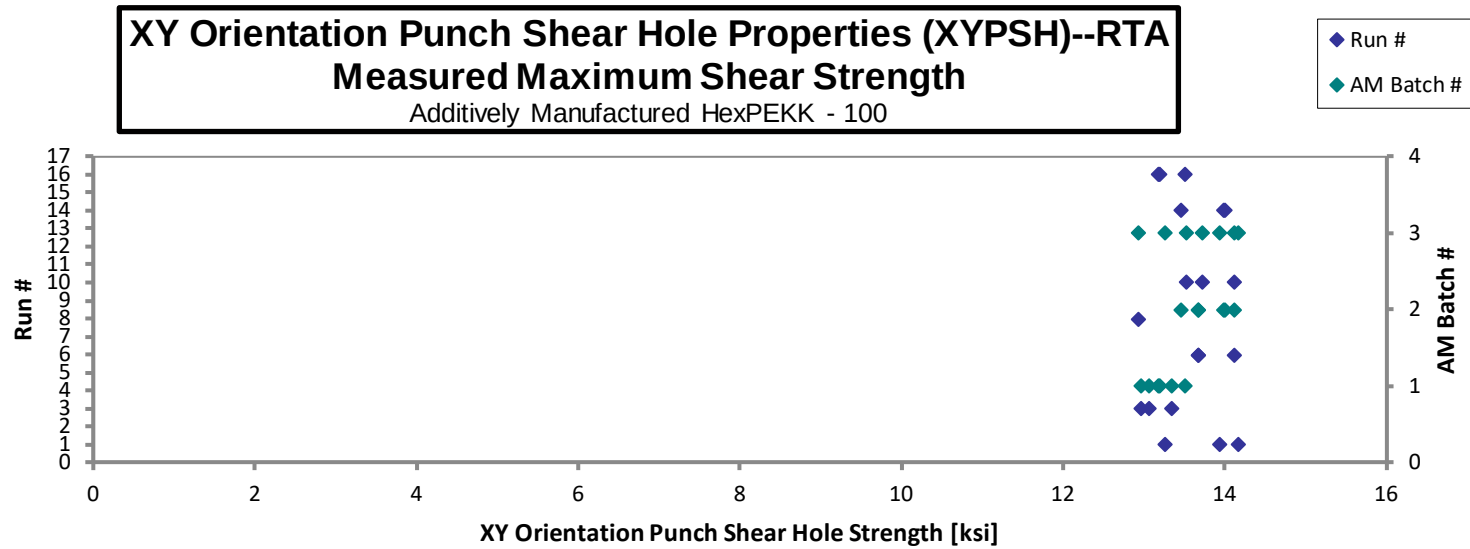


XY Orientation Punch Shear Hole Properties (XYP SH)--RTA□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-XYP SH-2B-RTA-1	1	16	13.50	0.1561	SHEAR FAILURE
HL-A-R16-10-XYP SH-3T-RTA-5	1	16	13.18	0.1555	SHEAR FAILURE
HL-A-R16-10-XYP SH-3T-RTA-6	1	16	13.20	0.1561	SHEAR FAILURE
HL-A-R3-14-XYP SH-3B-RTA-1	1	3	13.35	0.1428	SHEAR FAILURE
HL-A-R3-14-XYP SH-1T-RTA-3	1	3	13.07	0.1437	SHEAR FAILURE
HL-A-R3-14-XYP SH-2T-RTA-5	1	3	12.97	0.1419	SHEAR FAILURE
HL-B-R14-17-XYP SH-2B-RTA-1	2	14	13.99	0.1407	SHEAR FAILURE
HL-B-R14-17-XYP SH-1T-RTA-3	2	14	13.47	0.1458	SHEAR FAILURE
HL-B-R14-17-XYP SH-4T-RTA-5	2	14	14.00	0.1370	SHEAR FAILURE
HL-B-R6-8-XYP SH-1B-RTA-1	2	6	14.12	0.1316	SHEAR FAILURE
HL-B-R6-8-XYP SH-4T-RTA-3	2	6	13.68	0.1418	SHEAR FAILURE
HL-B-R6-8-XYP SH-5T-RTA-5	2	6	13.67	0.1434	SHEAR FAILURE
HL-C-R1-1-XYP SH-1B-RTA-2	3	1	14.17	0.1333	SHEAR FAILURE
HL-C-R1-1-XYP SH-4T-RTA-4	3	1	13.27	0.1472	SHEAR FAILURE
HL-C-R1-1-XYP SH-5T-RTA-6	3	1	13.94	0.1375	SHEAR FAILURE
HL-C-R10-5-XYP SH-2B-RTA-2	3	10	13.72	0.1443	SHEAR FAILURE
HL-C-R10-5-XYP SH-5B-RTA-3	3	10	14.11	0.1446	SHEAR FAILURE
HL-C-R10-5-XYP SH-3T-RTA-6	3	10	13.52	0.1452	SHEAR FAILURE
HL-C-R8-2-XYP SH-4T-RTA-4	3	8	12.93	0.1462	SHEAR FAILURE

Average	13.57	0.1439
Standard Dev.	0.4075	
Coeff. of Var. [%]	3.003	
Min.	12.93	0.1316
Max.	14.17	0.1561
Number of Spec.	19	19



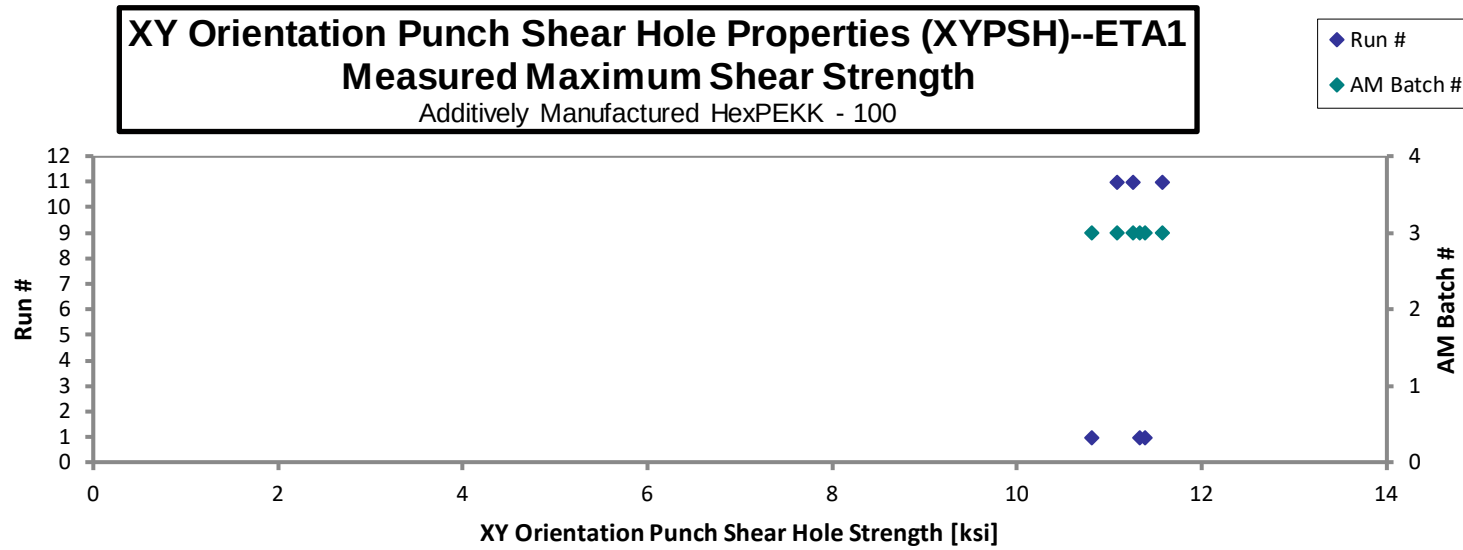
XY Orientation Punch Shear Hole Properties (XYP SH)--ETA1 ☐

Strength ☐

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R1-1-XYP SH-1B-ETA1-1	3	1	11.33	0.1338	SHEAR FAILURE
HL-C-R1-1-XYP SH-4T-ETA1-3	3	1	10.81	0.1449	SHEAR FAILURE
HL-C-R1-1-XYP SH-5T-ETA1-5	3	1	11.39	0.1371	SHEAR FAILURE
HL-C-R11-6-XYP SH-2B-ETA1-2	3	11	11.57	0.1413	SHEAR FAILURE
HL-C-R11-6-XYP SH-5T-ETA1-4	3	11	11.26	0.1395	SHEAR FAILURE
HL-C-R11-6-XYP SH-3T-ETA1-6	3	11	11.09	0.1402	SHEAR FAILURE

Average	11.24	0.1395
Standard Dev.	0.2643	
Coeff. of Var. [%]	2.352	
Min.	10.81	0.1338
Max.	11.57	0.1449
Number of Spec.	6	6



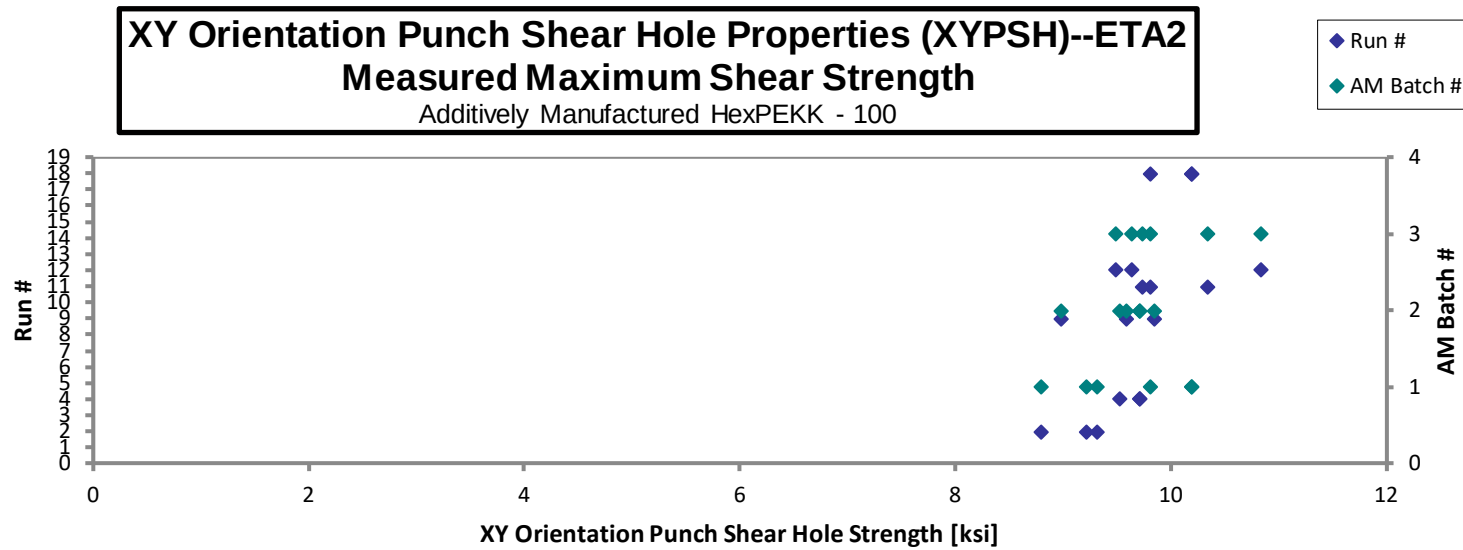
XY Orientation Punch Shear Hole Properties (XYP SH)--ETA2 ☐

Strength ☐

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-XYP SH-2B-ETA2-2	1	18	10.19	0.1568	SHEAR FAILURE
HL-A-R18-12-XYP SH-5B-ETA2-4	1	18	10.19	0.1499	SHEAR FAILURE
HL-A-R18-12-XYP SH-3T-ETA2-6	1	18	9.815	0.1518	SHEAR FAILURE
HL-A-R2-13-XYP SH-3B-ETA2-2	1	2	9.218	0.1453	SHEAR FAILURE
HL-A-R2-13-XYP SH-1T-ETA2-4	1	2	8.790	0.1514	SHEAR FAILURE
HL-A-R2-13-XYP SH-2T-ETA2-6	1	2	9.317	0.1447	SHEAR FAILURE
HL-B-R4-7-XYP SH-1B-ETA2-2	2	4	9.707	0.1300	SHEAR FAILURE
HL-B-R4-7-XYP SH-4T-ETA2-4	2	4	9.532	0.1410	SHEAR FAILURE
HL-B-R4-7-XYP SH-5T-ETA2-6	2	4	9.713	0.1488	SHEAR FAILURE
HL-B-R9-16-XYP SH-1T-ETA2-3	2	9	8.978	0.1507	SHEAR FAILURE
HL-B-R9-16-XYP SH-2T-ETA2-4	2	9	9.847	0.1394	SHEAR FAILURE
HL-B-R9-16-XYP SH-4T-ETA2-6	2	9	9.584	0.1395	SHEAR FAILURE
HL-C-R11-6-XYP SH-2B-ETA2-1	3	11	10.34	0.1302	SHEAR FAILURE
HL-C-R11-6-XYP SH-5B-ETA2-3	3	11	9.805	0.1448	SHEAR FAILURE
HL-C-R11-6-XYP SH-3T-ETA2-5	3	11	9.733	0.1422	SHEAR FAILURE
HL-C-R12-3-XYP SH-1B-ETA2-2	3	12	10.83	0.1360	SHEAR FAILURE
HL-C-R12-3-XYP SH-4T-ETA2-4	3	12	9.490	0.1443	SHEAR FAILURE
HL-C-R12-3-XYP SH-5T-ETA2-6	3	12	9.639	0.1418	SHEAR FAILURE

Average	9.707	0.1438
Standard Dev.	0.4878	
Coeff. of Var. [%]	5.026	
Min.	8.790	0.1300
Max.	10.83	0.1568
Number of Spec.	18	18

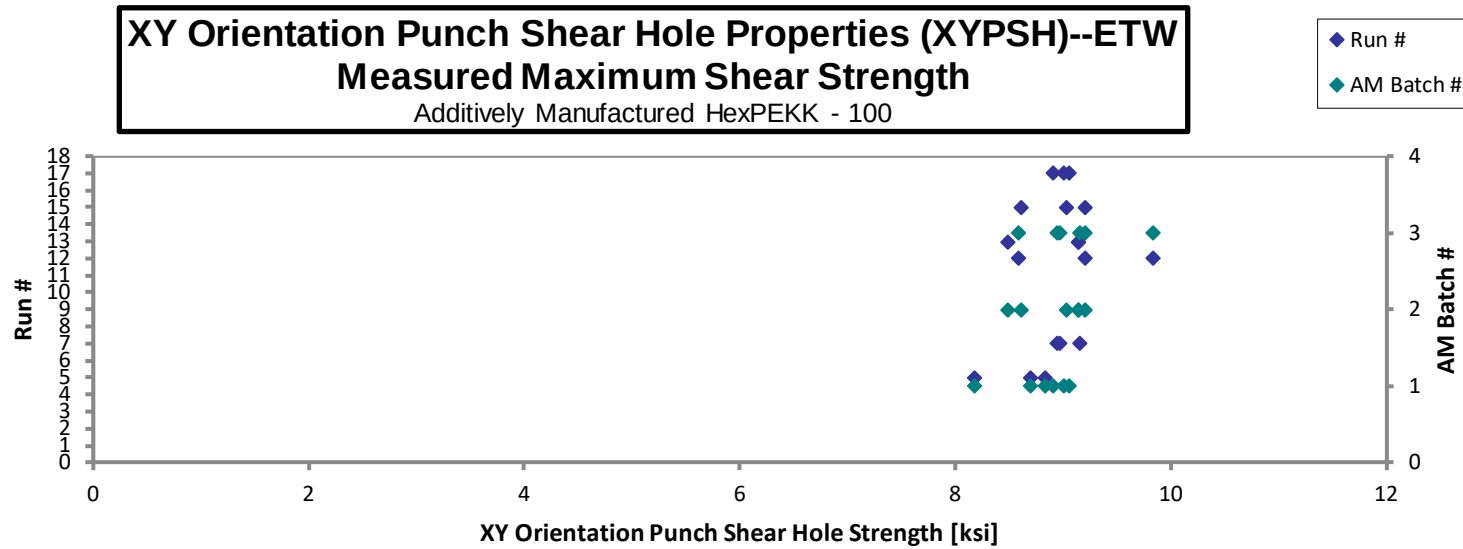


XY Orientation Punch Shear Hole Properties (XYP SH)--ETW **Strength**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-XYP SH-2B-ETW-2	1	17	9.053	0.1515	SHEAR FAILURE
HL-A-R17-11-XYP SH-5B-ETW-4	1	17	9.009	0.1523	SHEAR FAILURE
HL-A-R17-11-XYP SH-3T-ETW-6	1	17	8.913	0.1562	SHEAR FAILURE
HL-A-R5-15-XYP SH-3B-ETW-2	1	5	8.829	0.1411	SHEAR FAILURE
HL-A-R5-15-XYP SH-1T-ETW-4	1	5	8.179	0.1458	SHEAR FAILURE
HL-A-R5-15-XYP SH-2T-ETW-6	1	5	8.700	0.1420	SHEAR FAILURE
HL-B-R13-9-XYP SH-1B-ETW-2	2	13	9.143	0.1514	SHEAR FAILURE
HL-B-R13-9-XYP SH-4T-ETW-4	2	13	9.143	0.1447	SHEAR FAILURE
HL-B-R13-9-XYP SH-5T-ETW-6	2	13	8.493	0.1509	SHEAR FAILURE
HL-B-R15-18-XYP SH-1T-ETW-3	2	15	8.608	0.1464	SHEAR FAILURE
HL-B-R15-18-XYP SH-2T-ETW-4	2	15	9.206	0.1388	SHEAR FAILURE
HL-B-R15-18-XYP SH-4T-ETW-6	2	15	9.026	0.1359	SHEAR FAILURE
HL-C-R12-3-XYP SH-1B-ETW-1	3	12	9.838	0.1367	SHEAR FAILURE
HL-C-R12-3-XYP SH-4T-ETW-3	3	12	8.581	0.1451	SHEAR FAILURE
HL-C-R12-3-XYP SH-5T-ETW-5	3	12	9.200	0.1419	SHEAR FAILURE
HL-C-R7-4-XYP SH-2B-ETW-2	3	7	9.154	0.1383	SHEAR FAILURE
HL-C-R7-4-XYP SH-5T-ETW-4	3	7	8.972	0.1393	SHEAR FAILURE
HL-C-R7-4-XYP SH-3T-ETW-6	3	7	8.948	0.1384	SHEAR FAILURE

Average	8.944	0.1443
Standard Dev.	0.3587	
Coeff. of Var. [%]	4.011	
Min.	8.179	0.1359
Max.	9.838	0.1562
Number of Spec.	18	18



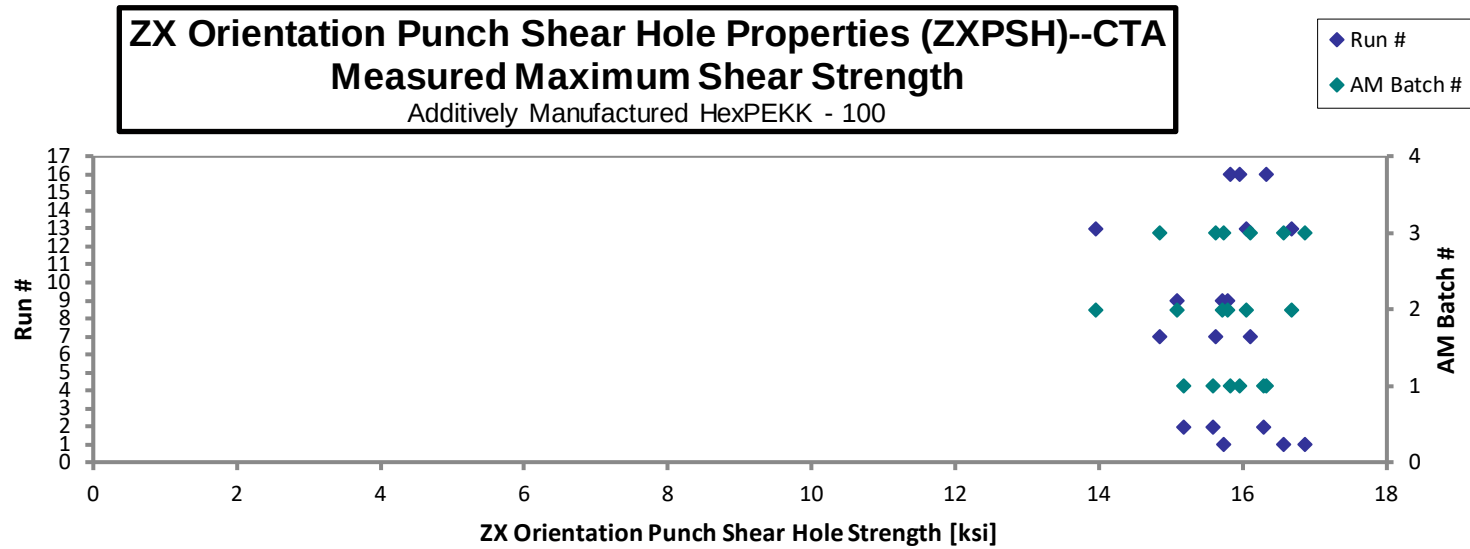
4.16 ZX Punch Shear Properties (ZXPSH)

ZX Orientation Punch Shear Hole Properties (ZXPSH)--CTA□
Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXPSH-4T-CTA-11	1	16	16.33	0.1361	SHEAR FAILURE
HL-A-R16-10-ZXPSH-1B-CTA-7	1	16	15.83	0.1503	SHEAR FAILURE, FRACTURE
HL-A-R16-10-ZXPSH-1T-CTA-9	1	16	15.95	0.1448	SHEAR FAILURE
HL-A-R2-13-ZXPSH-4T-CTA-11	1	2	15.58	0.1328	SHEAR FAILURE
HL-A-R2-13-ZXPSH-1B-CTA-7	1	2	15.17	0.1401	SHEAR FAILURE
HL-A-R2-13-ZXPSH-2B-CTA-9	1	2	16.29	0.1394	SHEAR FAILURE
HL-B-R13-9-ZXPSH-5T-CTA-11	2	13	16.05	0.1491	SHEAR FAILURE
HL-B-R13-9-ZXPSH-2B-CTA-7	2	13	13.96	0.1468	SHEAR FAILURE, FRACTURE
HL-B-R13-9-ZXPSH-3B-CTA-9	2	13	16.68	0.1373	SHEAR FAILURE, FRACTURE
HL-B-R9-16-ZXPSH-5T-CTA-11	2	9	15.09	0.1417	SHEAR FAILURE, FRACTURE
HL-B-R9-16-ZXPSH-3B-CTA-7	2	9	15.72	0.1399	SHEAR FAILURE
HL-B-R9-16-ZXPSH-2T-CTA-9	2	9	15.80	0.1366	SHEAR FAILURE
HL-C-R1-1-ZXPSH-5T-CTA-11	3	1	16.86	0.1315	SHEAR FAILURE
HL-C-R1-1-ZXPSH-5B-CTA-7	3	1	16.58	0.1299	SHEAR FAILURE
HL-C-R1-1-ZXPSH-2T-CTA-9	3	1	15.74	0.1310	SHEAR FAILURE
HL-C-R7-4-ZXPSH-5T-CTA-11	3	7	14.85	0.1356	SHEAR FAILURE
HL-C-R7-4-ZXPSH-1B-CTA-7	3	7	16.10	0.1332	SHEAR FAILURE
HL-C-R7-4-ZXPSH-4T-CTA-9	3	7	15.63	0.1356	SHEAR FAILURE

Average	15.79	0.1384
Standard Dev.	0.7052	
Coeff. of Var. [%]	4.466	
Min.	13.96	0.1299
Max.	16.86	0.1503
Number of Spec.	18	18

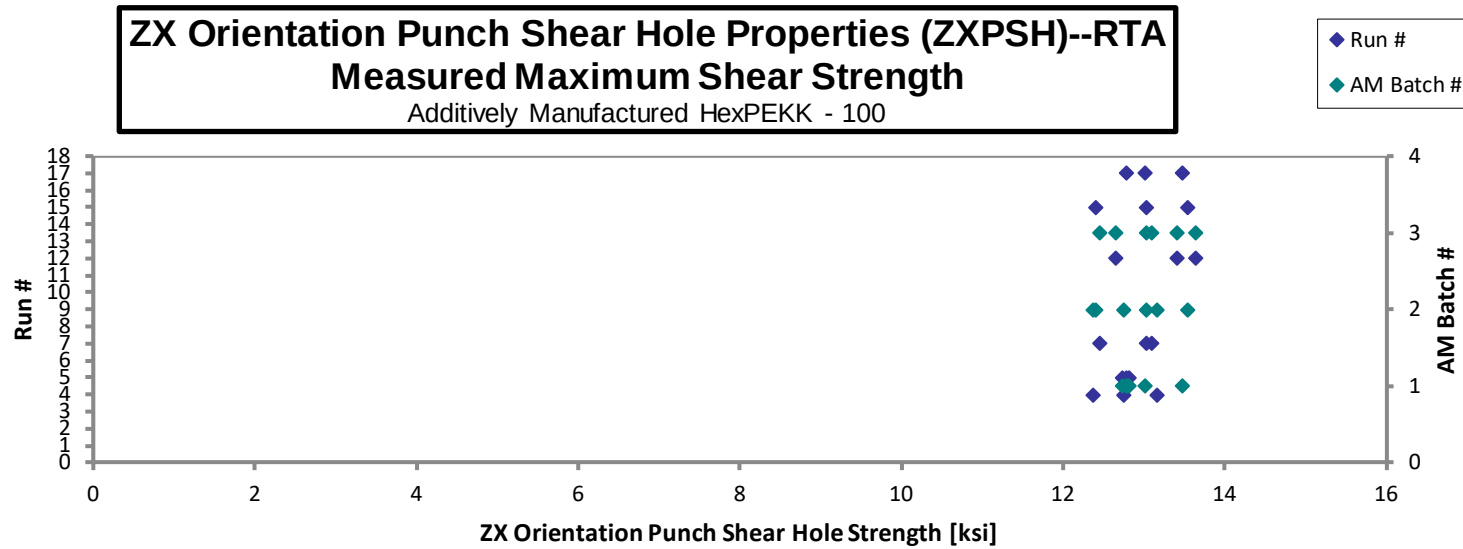


ZX Orientation Punch Shear Hole Properties (ZXPSH)--RTA□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-ZXPSH-4T-RTA-11	1	17	13.01	0.1362	SHEAR FAILURE
HL-A-R17-11-ZXPSH-1B-RTA-7	1	17	13.47	0.1502	SHEAR FAILURE
HL-A-R17-11-ZXPSH-1T-RTA-9	1	17	12.79	0.1442	SHEAR FAILURE
HL-A-R5-15-ZXPSH-4T-RTA-11	1	5	12.82	0.1348	SHEAR FAILURE
HL-A-R5-15-ZXPSH-1B-RTA-8	1	5	12.73	0.1412	SHEAR FAILURE
HL-A-R5-15-ZXPSH-2B-RTA-9	1	5	12.78	0.1387	SHEAR FAILURE
HL-B-R15-18-ZXPSH-5T-RTA-11	2	15	13.04	0.1383	SHEAR FAILURE
HL-B-R15-18-ZXPSH-3B-RTA-7	2	15	13.54	0.1313	SHEAR FAILURE
HL-B-R15-18-ZXPSH-2T-RTA-9	2	15	12.40	0.1348	SHEAR FAILURE
HL-B-R4-7-ZXPSH-5T-RTA-11	2	4	12.76	0.1343	SHEAR FAILURE
HL-B-R4-7-ZXPSH-2B-RTA-7	2	4	13.17	0.1331	SHEAR FAILURE
HL-B-R4-7-ZXPSH-3B-RTA-9	2	4	12.38	0.1353	SHEAR FAILURE
HL-C-R12-3-ZXPSH-5T-RTA-11	3	12	13.63	0.1349	SHEAR FAILURE
HL-C-R12-3-ZXPSH-5B-RTA-7	3	12	13.40	0.1369	SHEAR FAILURE
HL-C-R12-3-ZXPSH-2T-RTA-9	3	12	12.65	0.1303	SHEAR FAILURE
HL-C-R7-4-ZXPSH-4T-RTA-10	3	7	13.03	0.1361	SHEAR FAILURE
HL-C-R7-4-ZXPSH-5T-RTA-12	3	7	12.45	0.1377	SHEAR FAILURE
HL-C-R7-4-ZXPSH-1B-RTA-8	3	7	13.09	0.1328	SHEAR FAILURE

Average	12.95	0.1367
Standard Dev.	0.3838	
Coeff. of Var. [%]	2.963	
Min.	12.38	0.1303
Max.	13.63	0.1502
Number of Spec.	18	18



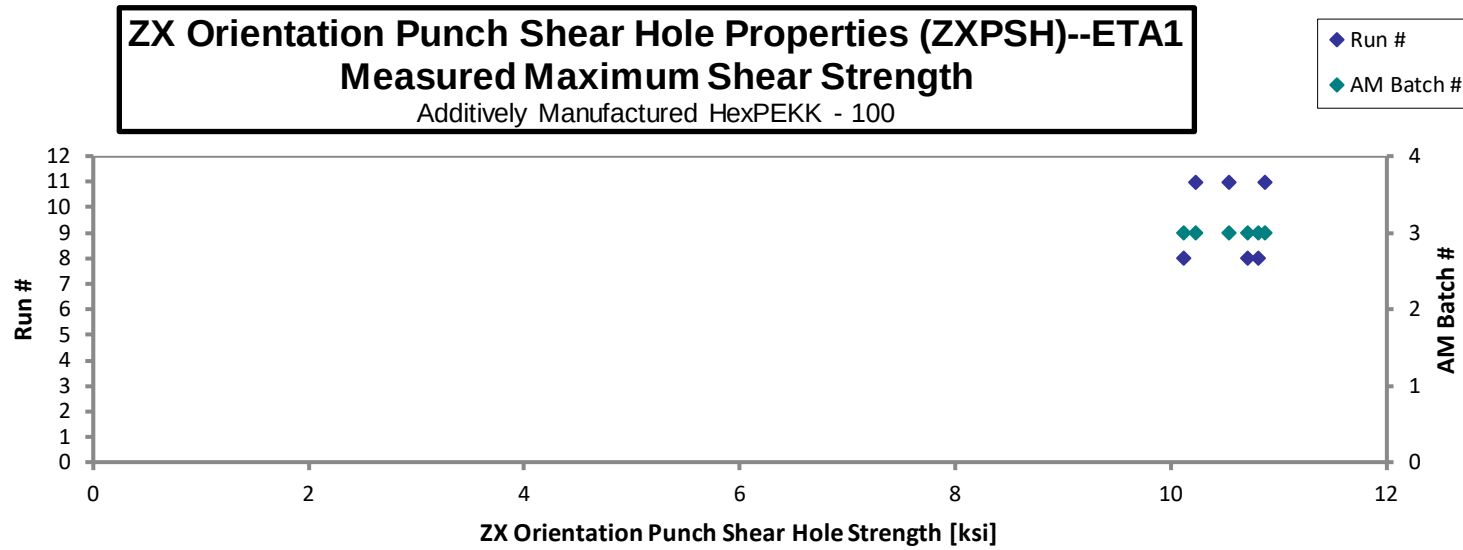
ZX Orientation Punch Shear Hole Properties (ZXPSH)--ETA1 ☐

Strength ☐

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R11-6-ZXPSH-5T-ETA1-11	3	11	10.23	0.1417	SHEAR FAILURE
HL-C-R11-6-ZXPSH-1B-ETA1-7	3	11	10.54	0.1382	SHEAR FAILURE
HL-C-R11-6-ZXPSH-4T-ETA1-9	3	11	10.88	0.1332	SHEAR FAILURE
HL-C-R8-2-ZXPSH-2T-ETA1-10	3	8	10.12	0.1374	SHEAR FAILURE
HL-C-R8-2-ZXPSH-5T-ETA1-12	3	8	10.71	0.1407	SHEAR FAILURE
HL-C-R8-2-ZXPSH-5B-ETA1-8	3	8	10.81	0.1364	SHEAR FAILURE

Average	10.55	0.1379
Standard Dev.	0.3144	
Coeff. of Var. [%]	2.980	
Min.	10.12	0.1332
Max.	10.88	0.1417
Number of Spec.	6	6



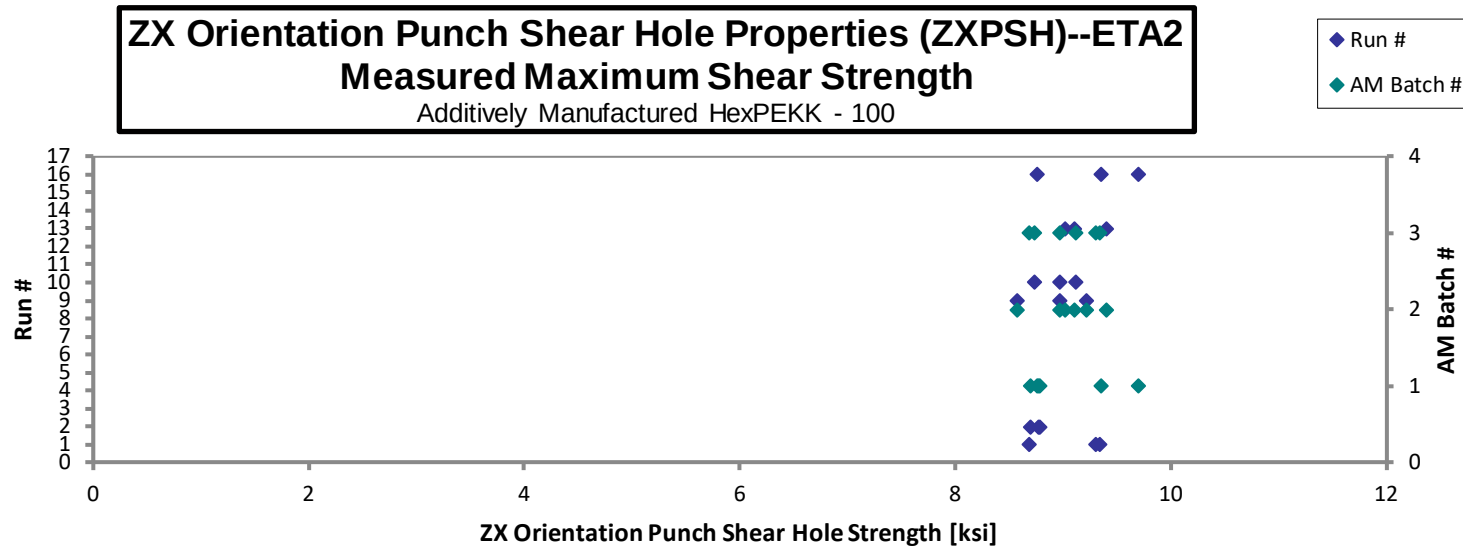
ZX Orientation Punch Shear Hole Properties (ZXPSH)--ETA2 ☐

Strength ☐

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXPSH-2T-ETA2-10	1	16	8.755	0.1460	SHEAR FAILURE
HL-A-R16-10-ZXPSH-4T-ETA2-12	1	16	9.350	0.1381	SHEAR FAILURE
HL-A-R16-10-ZXPSH-1B-ETA2-8	1	16	9.699	0.1492	SHEAR FAILURE
HL-A-R2-13-ZXPSH-2B-ETA2-10	1	2	8.692	0.1384	SHEAR FAILURE
HL-A-R2-13-ZXPSH-4T-ETA2-12	1	2	8.766	0.1330	SHEAR FAILURE
HL-A-R2-13-ZXPSH-1B-ETA2-8	1	2	8.779	0.1398	SHEAR FAILURE
HL-B-R13-9-ZXPSH-3B-ETA2-10	2	13	9.109	0.1448	SHEAR FAILURE
HL-B-R13-9-ZXPSH-5T-ETA2-12	2	13	9.021	0.1460	SHEAR FAILURE
HL-B-R13-9-ZXPSH-2B-ETA2-8	2	13	9.403	0.1478	SHEAR FAILURE
HL-B-R9-16-ZXPSH-2T-ETA2-10	2	9	8.568	0.1383	SHEAR FAILURE
HL-B-R9-16-ZXPSH-5T-ETA2-12	2	9	8.973	0.1387	SHEAR FAILURE
HL-B-R9-16-ZXPSH-3B-ETA2-8	2	9	9.219	0.1339	SHEAR FAILURE
HL-C-R1-1-ZXPSH-2T-ETA2-10	3	1	8.681	0.1325	SHEAR FAILURE
HL-C-R1-1-ZXPSH-5T-ETA2-12	3	1	9.301	0.1338	SHEAR FAILURE
HL-C-R1-1-ZXPSH-5B-ETA2-8	3	1	9.344	0.1291	SHEAR FAILURE
HL-C-R10-5-ZXPSH-5T-ETA2-11	3	10	8.737	0.1414	SHEAR FAILURE
HL-C-R10-5-ZXPSH-1B-ETA2-7	3	10	9.121	0.1373	SHEAR FAILURE
HL-C-R10-5-ZXPSH-4T-ETA2-9	3	10	8.968	0.1386	SHEAR FAILURE

Average	9.027	0.1392
Standard Dev.	0.3126	
Coeff. of Var. [%]	3.463	
Min.	8.568	0.1291
Max.	9.699	0.1492
Number of Spec.	18	18

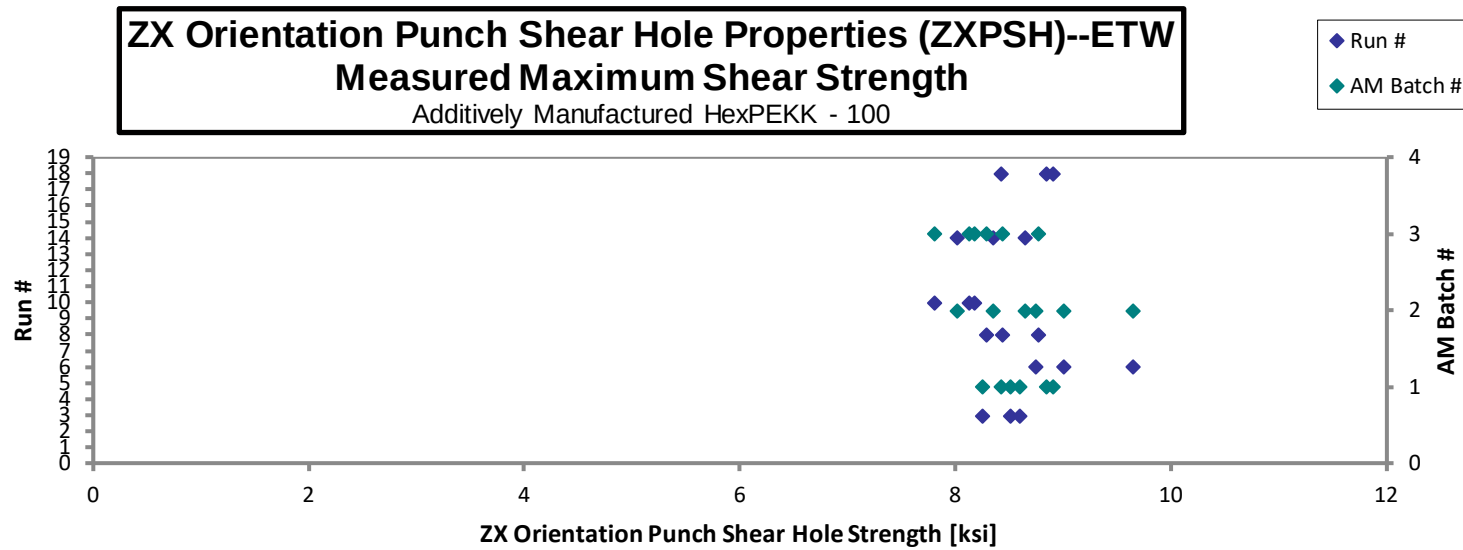


ZX Orientation Punch Shear Hole Properties (ZXPSH)--ETW□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-ZXPSH-2T-ETW-10	1	18	8.430	0.1430	SHEAR FAILURE
HL-A-R18-12-ZXPSH-4T-ETW-12	1	18	8.851	0.1354	SHEAR FAILURE
HL-A-R18-12-ZXPSH-1B-ETW-8	1	18	8.908	0.1491	SHEAR FAILURE
HL-A-R3-14-ZXPSH-2B-ETW-10	1	3	8.512	0.1418	SHEAR FAILURE
HL-A-R3-14-ZXPSH-4T-ETW-12	1	3	8.249	0.1360	SHEAR FAILURE
HL-A-R3-14-ZXPSH-1B-ETW-8	1	3	8.596	0.1398	SHEAR FAILURE
HL-B-R14-17-ZXPSH-2T-ETW-10	2	14	8.017	0.1382	SHEAR FAILURE
HL-B-R14-17-ZXPSH-5T-ETW-12	2	14	8.353	0.1360	SHEAR FAILURE
HL-B-R14-17-ZXPSH-3B-ETW-8	2	14	8.651	0.1327	SHEAR FAILURE
HL-B-R6-8-ZXPSH-3B-ETW-10	2	6	8.748	0.1374	SHEAR FAILURE
HL-B-R6-8-ZXPSH-5T-ETW-12	2	6	9.003	0.1292	SHEAR FAILURE
HL-B-R6-8-ZXPSH-2B-ETW-8	2	6	9.650	0.1326	SHEAR FAILURE
HL-C-R10-5-ZXPSH-4T-ETW-10	3	10	8.181	0.1408	SHEAR FAILURE
HL-C-R10-5-ZXPSH-5T-ETW-12	3	10	7.802	0.1426	SHEAR FAILURE
HL-C-R10-5-ZXPSH-1B-ETW-8	3	10	8.133	0.1399	SHEAR FAILURE
HL-C-R8-2-ZXPSH-5T-ETW-11	3	8	8.766	0.1387	SHEAR FAILURE
HL-C-R8-2-ZXPSH-5B-ETW-7	3	8	8.436	0.1353	SHEAR FAILURE
HL-C-R8-2-ZXPSH-2T-ETW-9	3	8	8.287	0.1331	SHEAR FAILURE

Average	8.532	0.1379
Standard Dev.	0.4276	
Coeff. of Var. [%]	5.011	
Min.	7.802	0.1292
Max.	9.650	0.1491
Number of Spec.	18	18



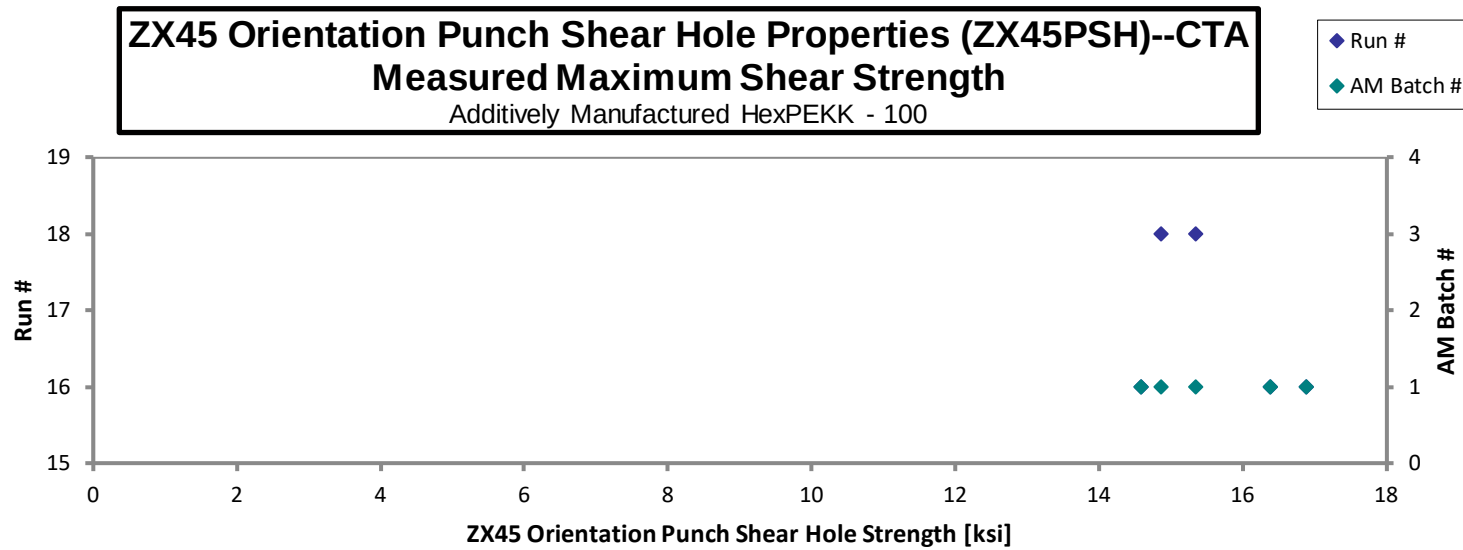
4.17 ZX45 Punch Shear Properties (ZX45PSH)

**ZX45 Orientation Punch Shear Hole Properties (ZX45PSH)--CTA□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZX45PSH-1B-CTA-13	1	16	14.58	0.1494	SHEAR FAILURE, FRACTURE
HL-A-R16-10-ZX45PSH-3B-CTA-15	1	16	16.88	0.1447	SHEAR FAILURE
HL-A-R16-10-ZX45PSH-2T-CTA-17	1	16	16.39	0.1436	SHEAR FAILURE
HL-A-R18-12-ZX45PSH-1B-CTA-14	1	18	15.34	0.1516	SHEAR FAILURE
HL-A-R18-12-ZX45PSH-3B-CTA-16	1	18	14.87	0.1477	SHEAR FAILURE, FAILURE

Average	15.61	0.1474
Standard Dev.	0.9874	
Coeff. of Var. [%]	6.325	
Min.	14.58	0.1436
Max.	16.88	0.1516
Number of Spec.	5	5



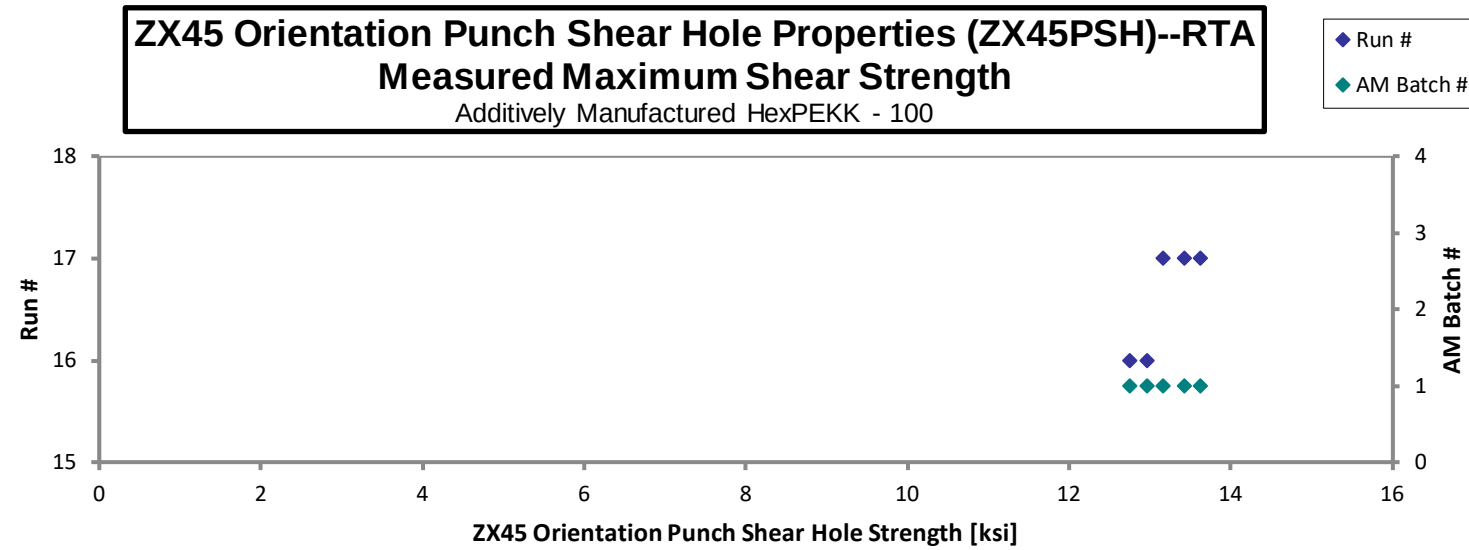
ZX45 Orientation Punch Shear Hole Properties (ZX45PSH)--RTA ☐

Strength ☐

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZX45PSH-1B-RTA-14	1	16	12.97	0.1521	SHEAR FAILURE
HL-A-R16-10-ZX45PSH-3B-RTA-16	1	16	12.74	0.1497	SHEAR FAILURE
HL-A-R17-11-ZX45PSH-1B-RTA-13	1	17	13.43	0.1477	SHEAR FAILURE
HL-A-R17-11-ZX45PSH-3B-RTA-15	1	17	13.62	0.1445	SHEAR FAILURE
HL-A-R17-11-ZX45PSH-2T-RTA-17	1	17	13.16	0.1433	SHEAR FAILURE

Average	13.19	0.1474
Standard Dev.	0.3515	
Coeff. of Var. [%]	2.666	
Min.	12.74	0.1433
Max.	13.62	0.1521
Number of Spec.	5	5



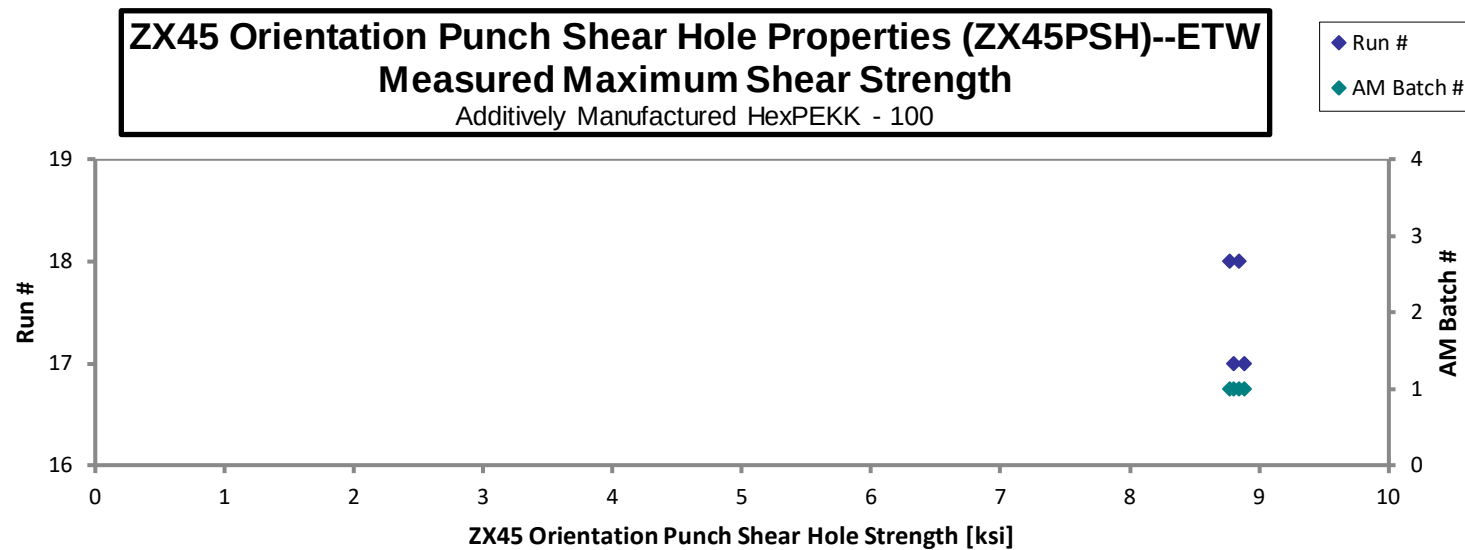
ZX45 Orientation Punch Shear Hole Properties (ZX45PSH)--ETW

Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Maximum Shear Strength [Ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-ZX45PSH-1B-ETW-14	1	17	8.883	0.1501	SHEAR FAILURE
HL-A-R17-11-ZX45PSH-3B-ETW-16	1	17	8.806	0.1479	SHEAR FAILURE
HL-A-R18-12-ZX45PSH-3B-ETW-15	1	18	8.775	0.1440	SHEAR FAILURE
HL-A-R18-12-ZX45PSH-2T-ETW-17	1	18	8.843	0.1409	SHEAR FAILURE

Average	8.827	0.1457
Standard Dev.	0.04679	
Coeff. of Var. [%]	0.5301	
Min.	8.775	0.1409
Max.	8.883	0.1501
Number of Spec.	4	4



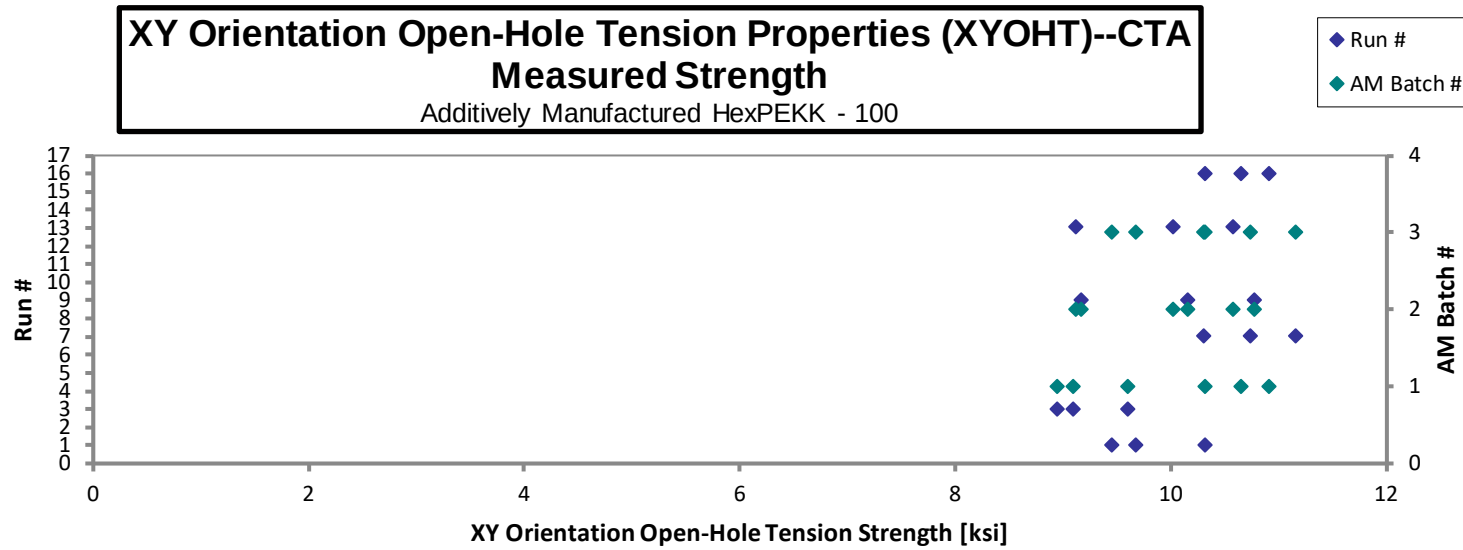
4.18 XY Open-Hole Tension Properties (XYOHT)

**XY Orientation Open-Hole Tension Properties (XYOHT)--CTA□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-XYOHT-2B-CTA-1	1	16	10.91	0.1475	M(A,L)GM
HL-A-R16-10-XYOHT-3B-CTA-3	1	16	10.65	0.1454	AGM
HL-A-R16-10-XYOHT-3T-CTA-5	1	16	10.31	0.1453	AGM
HL-A-R3-14-XYOHT-2B-CTA-2	1	3	9.604	0.1462	AGM
HL-A-R3-14-XYOHT-2T-CTA-4	1	3	8.950	0.1418	AGM
HL-A-R3-14-XYOHT-3T-CTA-6	1	3	9.099	0.1418	AGM
HL-B-R13-9-XYOHT-4B-CTA-1	2	13	10.58	0.1407	AGM
HL-B-R13-9-XYOHT-5B-CTA-3	2	13	9.117	0.1504	AGM
HL-B-R13-9-XYOHT-2T-CTA-5	2	13	10.02	0.1214	AGM
HL-B-R9-16-XYOHT-4B-CTA-1	2	9	10.78	0.1335	AGM
HL-B-R9-16-XYOHT-1T-CTA-3	2	9	9.169	0.1438	M(A,L)GM
HL-B-R9-16-XYOHT-3T-CTA-5	2	9	10.15	0.1372	AGM
HL-C-R1-1-XYOHT-1T-CTA-1	3	1	9.457	0.1352	M(A,L)GM
HL-C-R1-1-XYOHT-4T-CTA-3	3	1	9.673	0.1400	M(A,L)GM
HL-C-R1-1-XYOHT-5T-CTA-5	3	1	10.32	0.1396	M(A,L)GM
HL-C-R7-4-XYOHT-3B-CTA-1	3	7	11.16	0.1332	AGM
HL-C-R7-4-XYOHT-3B-CTA-2	3	7	10.31	0.1327	M(A,L)GM
HL-C-R7-4-XYOHT-2T-CTA-4	3	7	10.74	0.1306	M(A,L)GM

Average	10.06	0.1392
Standard Dev.	0.6981	
Coeff. of Var. [%]	6.943	
Min.	8.950	0.1214
Max.	11.16	0.1504
Number of Spec.	18	18

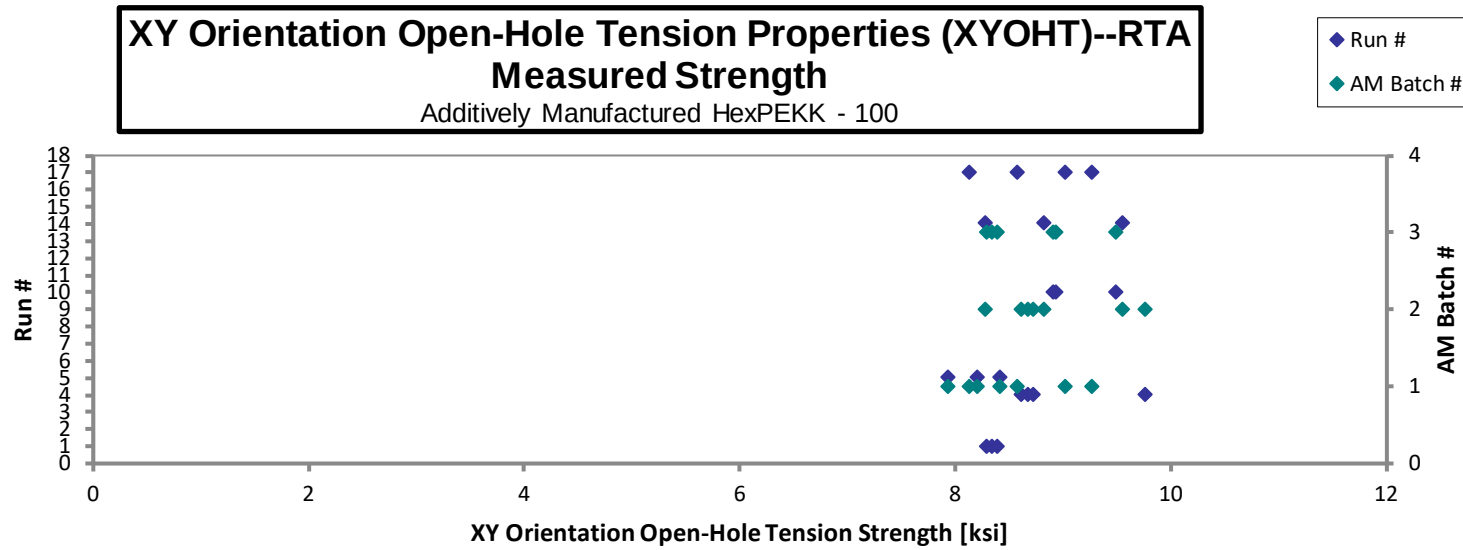


**XY Orientation Open-Hole Tension Properties (XYOHT)--RTA□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-XYOHT-2B-RTA-1	1	17	9.014	0.1430	M(A,L)GM
HL-A-R17-11-XYOHT-3B-RTA-3	1	17	8.574	0.1459	M(A,L)GM
HL-A-R17-11-XYOHT-3T-RTA-4	1	17	9.260	0.1436	AGM
HL-A-R17-11-XYOHT-3T-RTA-5	1	17	8.126	0.1446	M(A,L)GM
HL-A-R5-15-XYOHT-2B-RTA-2	1	5	8.414	0.1442	AGM
HL-A-R5-15-XYOHT-2T-RTA-4	1	5	8.197	0.1435	AGM
HL-A-R5-15-XYOHT-3T-RTA-6	1	5	7.928	0.1441	M(A,L)GM
HL-B-R14-17-XYOHT-4B-RTA-1	2	14	9.547	0.1304	AGM
HL-B-R14-17-XYOHT-1T-RTA-3	2	14	8.817	0.1400	M(A,L)GM
HL-B-R14-17-XYOHT-3T-RTA-5	2	14	8.275	0.1365	M(A,L)GM
HL-B-R4-7-XYOHT-4B-RTA-1	2	4	9.757	0.1431	AGM
HL-B-R4-7-XYOHT-5B-RTA-3	2	4	8.667	0.1375	M(A,L)GM
HL-B-R4-7-XYOHT-5B-RTA-4	2	4	8.614	0.1380	M(A,L)GM
HL-B-R4-7-XYOHT-1T-RTA-6	2	4	8.722	0.1370	AGM
HL-C-R1-1-XYOHT-1T-RTA-2	3	1	8.285	0.1336	AGM
HL-C-R1-1-XYOHT-4T-RTA-4	3	1	8.339	0.1381	M(A,L)GM
HL-C-R1-1-XYOHT-5T-RTA-6	3	1	8.392	0.1406	M(A,L)GM
HL-C-R10-5-XYOHT-3B-RTA-3	3	10	9.486	0.1420	AGM
HL-C-R10-5-XYOHT-2T-RTA-5	3	10	8.904	0.1398	AGM
HL-C-R10-5-XYOHT-2T-RTA-6	3	10	8.929	0.1358	AGM

Average	8.712	0.1401
Standard Dev.	0.5043	
Coeff. of Var. [%]	5.788	
Min.	7.928	0.1304
Max.	9.757	0.1459
Number of Spec.	20	20

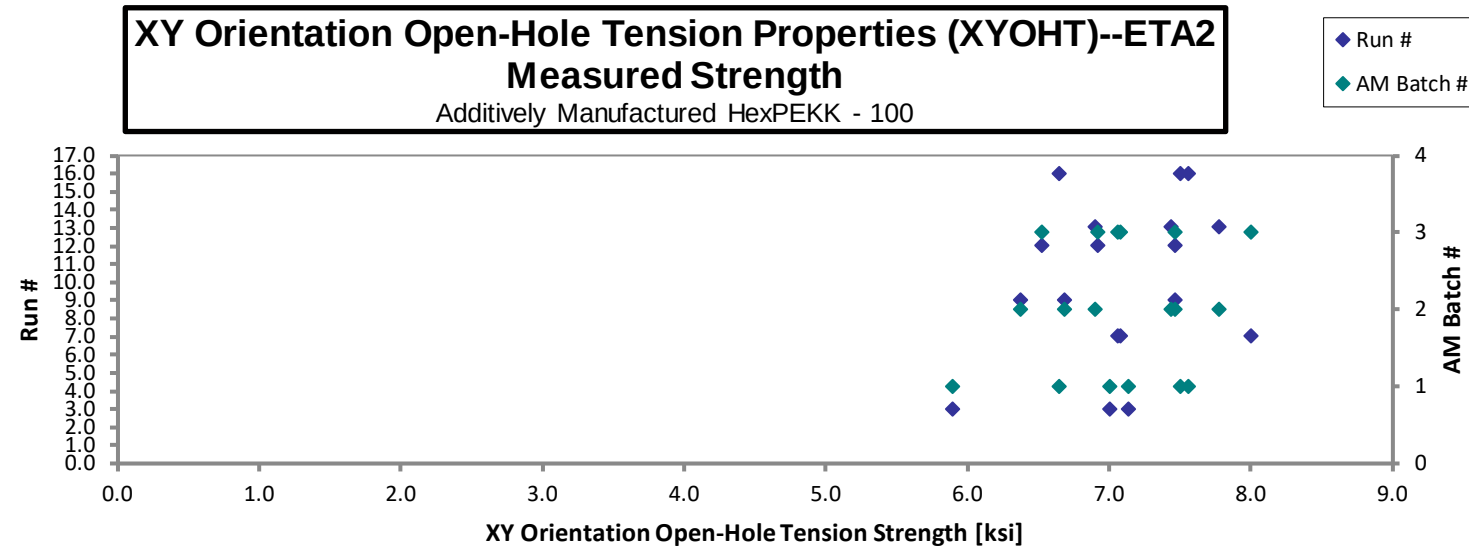


XY Orientation Open-Hole Tension Properties (XYOHT)--ETA2 Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-XYOHT-2B-ETA2-2	1	16	7.557	0.1481	M(A,L)GM
HL-A-R16-10-XYOHT-3T-ETA2-4	1	16	7.505	0.1488	M(A,L)GM
HL-A-R16-10-XYOHT-3T-ETA2-6	1	16	6.650	0.1418	M(A,L)GM
HL-A-R3-14-XYOHT-2B-ETA2-1	1	3	7.001	0.1444	M(A,L)GM
HL-A-R3-14-XYOHT-2T-ETA2-3	1	3	7.133	0.1434	M(A,L)GM
HL-A-R3-14-XYOHT-3T-ETA2-5	1	3	5.894	0.1437	M(A,L)GM
HL-B-R13-9-XYOHT-4B-ETA2-2	2	13	7.772	0.1390	M(A,L)GM
HL-B-R13-9-XYOHT-5B-ETA2-4	2	13	7.440	0.1507	M(A,L)GM
HL-B-R13-9-XYOHT-1T-ETA2-6	2	13	6.904	0.1595	AGM
HL-B-R9-16-XYOHT-4B-ETA2-2	2	9	7.464	0.1322	M(A,L)GM
HL-B-R9-16-XYOHT-1T-ETA2-4	2	9	6.687	0.1432	M(A,L)GM
HL-B-R9-16-XYOHT-3T-ETA2-6	2	9	6.373	0.1371	LGM
HL-C-R12-3-XYOHT-1T-ETA2-2	3	12	6.521	0.1378	M(A,L)GM
HL-C-R12-3-XYOHT-4T-ETA2-4	3	12	6.916	0.1398	M(A,L)GM
HL-C-R12-3-XYOHT-5T-ETA2-6	3	12	7.466	0.1431	M(A,L)GM
HL-C-R7-4-XYOHT-3B-ETA2-3	3	7	8.003	0.1352	AGM
HL-C-R7-4-XYOHT-2T-ETA2-5	3	7	7.062	0.1400	M(A,L)GM
HL-C-R7-4-XYOHT-2T-ETA2-6	3	7	7.078	0.1307	LGM

Average	7.079	0.1421
Standard Dev.	0.5308	
Coeff. of Var. [%]	7.498	
Min.	5.894	0.1307
Max.	8.003	0.1595
Number of Spec.	18	18

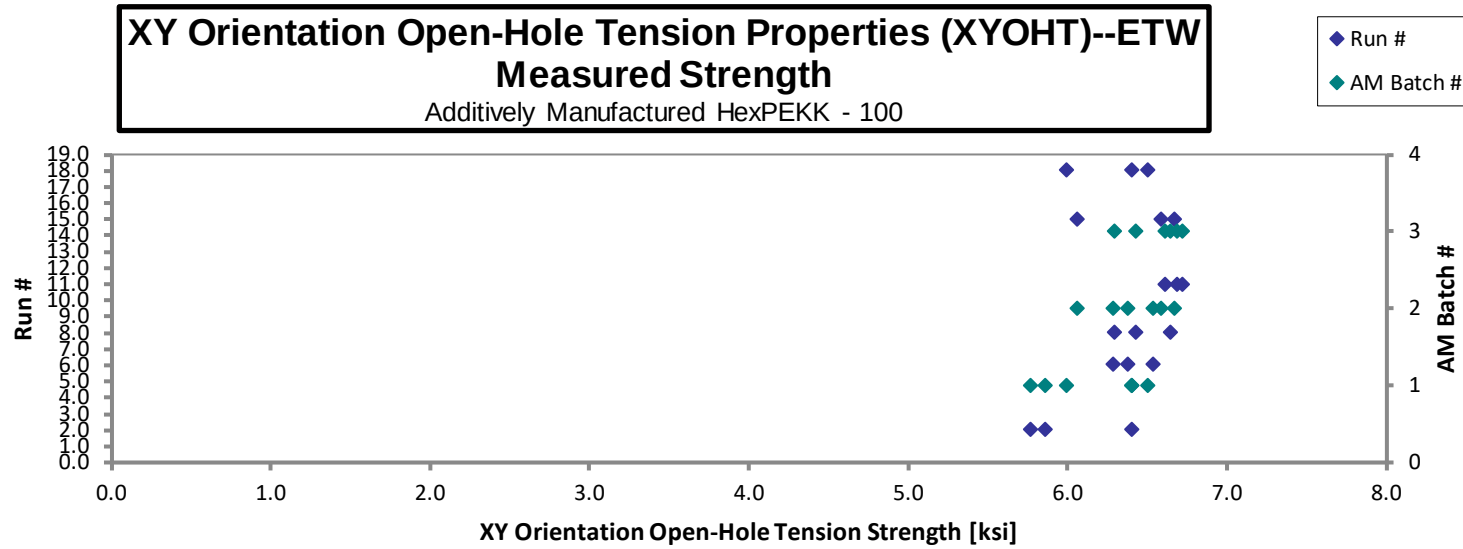


XY Orientation Open-Hole Tension Properties (XYOHT)--ETW
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-XYOHT-2B-ETW-2	1	18	6.504	0.1434	LGM
HL-A-R18-12-XYOHT-3T-ETW-5	1	18	6.400	0.1400	LGM
HL-A-R18-12-XYOHT-3T-ETW-6	1	18	5.997	0.1445	LGM
HL-A-R2-13-XYOHT-2B-ETW-1	1	2	6.401	0.1469	LGM
HL-A-R2-13-XYOHT-2T-ETW-3	1	2	5.766	0.1444	LGM
HL-A-R2-13-XYOHT-3T-ETW-5	1	2	5.859	0.1437	LGM
HL-B-R15-18-XYOHT-4B-ETW-2	2	15	6.670	0.1290	M(A,L)GM
HL-B-R15-18-XYOHT-1T-ETW-4	2	15	6.587	0.1401	M(A,L)GM
HL-B-R15-18-XYOHT-3T-ETW-6	2	15	6.061	0.1356	LGM
HL-B-R6-8-XYOHT-4B-ETW-2	2	6	6.532	0.1389	LGM
HL-B-R6-8-XYOHT-5B-ETW-4	2	6	6.288	0.1384	M(A,L)GM
HL-B-R6-8-XYOHT-1T-ETW-6	2	6	6.375	0.1374	LGM
HL-C-R11-6-XYOHT-3B-ETW-1	3	11	6.717	0.1382	LGM
HL-C-R11-6-XYOHT-3B-ETW-2	3	11	6.685	0.1348	LGM
HL-C-R11-6-XYOHT-2T-ETW-4	3	11	6.609	0.1342	LGM
HL-C-R8-2-XYOHT-1T-ETW-1	3	8	6.293	0.1375	M(A,L)GM
HL-C-R8-2-XYOHT-4T-ETW-3	3	8	6.425	0.1413	M(A,L)GM
HL-C-R8-2-XYOHT-5T-ETW-5	3	8	6.645	0.1429	M(A,L)GM

Average	6.379	0.1395
Standard Dev.	0.2880	
Coeff. of Var. [%]	4.515	
Min.	5.766	0.1290
Max.	6.717	0.1469
Number of Spec.	18	18



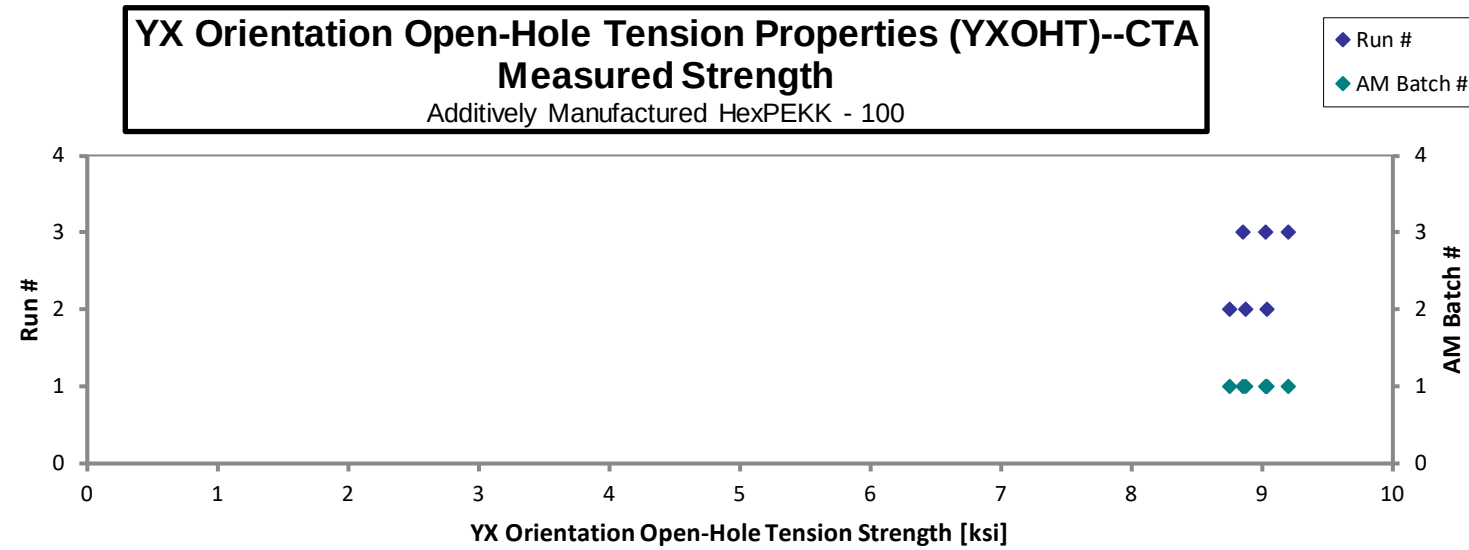
4.19 YX Open-Hole Tension Properties (YXOHT)

**YX Orientation Open-Hole Tension Properties (YXOHT)--CTA□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R2-13-YXOHT-1T-CTA-11	1	2	8.879	0.1466	M(A,L)GM
HL-A-R2-13-YXOHT-4B-CTA-7	1	2	8.752	0.1404	M(A,L)GM
HL-A-R2-13-YXOHT-5B-CTA-9	1	2	9.038	0.1402	M(A,L)GM
HL-A-R3-14-YXOHT-5B-CTA-10	1	3	9.027	0.1392	AGM
HL-A-R3-14-YXOHT-1T-CTA-12	1	3	8.858	0.1472	AGM
HL-A-R3-14-YXOHT-4B-CTA-8	1	3	9.200	0.1405	M(A,L)GM

Average	8.959	0.1423
Standard Dev.	0.1602	
Coeff. of Var. [%]	1.788	
Min.	8.752	0.1392
Max.	9.200	0.1472
Number of Spec.	6	6

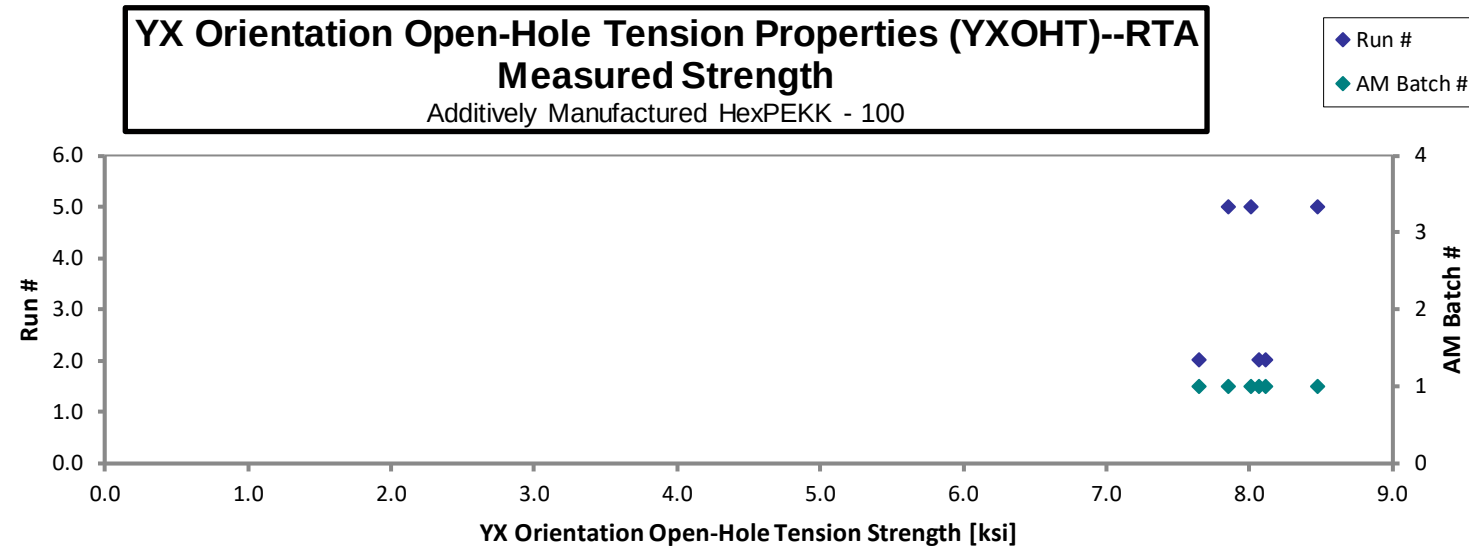


YX Orientation Open-Hole Tension Properties (YXOHT)--RTA□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R2-13-YXOHT-5B-RTA-10	1	2	8.118	0.1409	M(A,L)GM
HL-A-R2-13-YXOHT-3T-RTA-13	1	2	7.646	0.1425	M(A,L)GM
HL-A-R2-13-YXOHT-4B-RTA-8	1	2	8.068	0.1425	M(A,L)GM
HL-A-R5-15-YXOHT-1T-RTA-11	1	5	7.851	0.1479	M(A,L)GM
HL-A-R5-15-YXOHT-3T-RTA-14	1	5	8.010	0.1413	AGM
HL-A-R5-15-YXOHT-5B-RTA-9	1	5	8.474	0.1366	M(A,L)GM

Average	8.028	0.1419
Standard Dev.	0.2779	
Coeff. of Var. [%]	3.461	
Min.	7.646	0.1366
Max.	8.474	0.1479
Number of Spec.	6	6



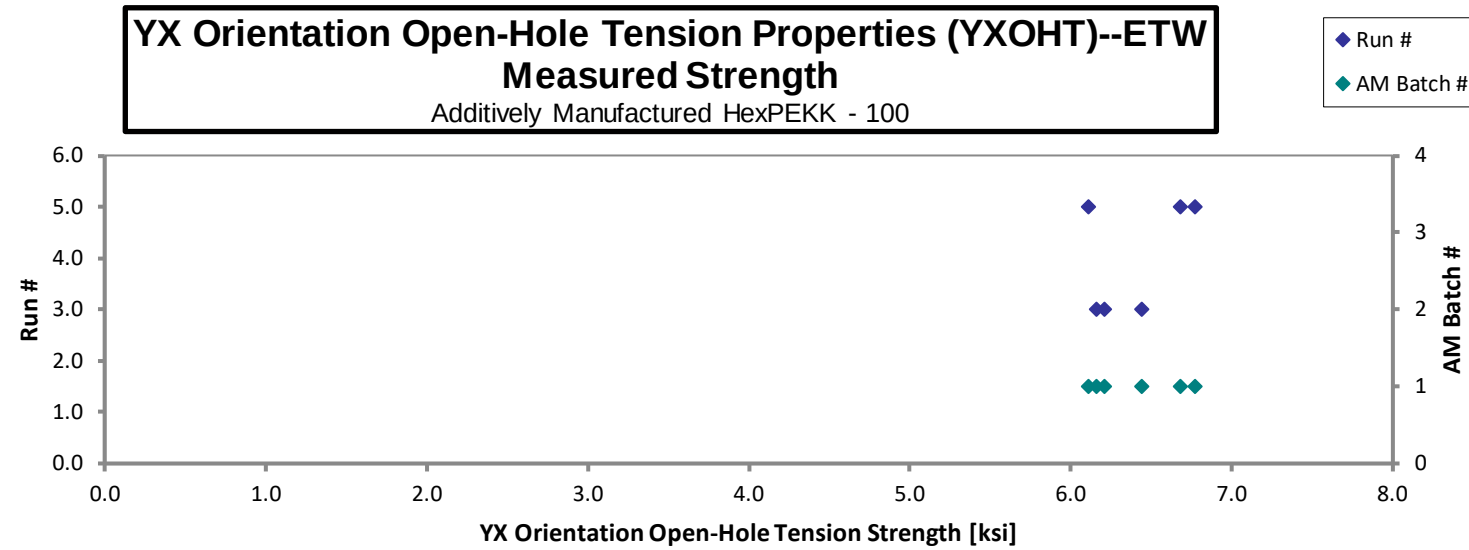
YX Orientation Open-Hole Tension Properties (YXOHT)--ETW

Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R3-14-YXOHT-1T-ETW-11	1	3	6.163	0.1476	LGM
HL-A-R3-14-YXOHT-3T-ETW-14	1	3	6.211	0.1445	LGM
HL-A-R3-14-YXOHT-5B-ETW-9	1	3	6.442	0.1401	M(A,L)GM
HL-A-R5-15-YXOHT-5B-ETW-10	1	5	6.773	0.1362	M(A,L)GM
HL-A-R5-15-YXOHT-1T-ETW-12	1	5	6.115	0.1456	M(A,L)GM
HL-A-R5-15-YXOHT-4B-ETW-8	1	5	6.678	0.1405	M(A,L)GM

Average	6.397	0.1424
Standard Dev.	0.2799	
Coeff. of Var. [%]	4.376	
Min.	6.115	0.1362
Max.	6.773	0.1476
Number of Spec.	6	6



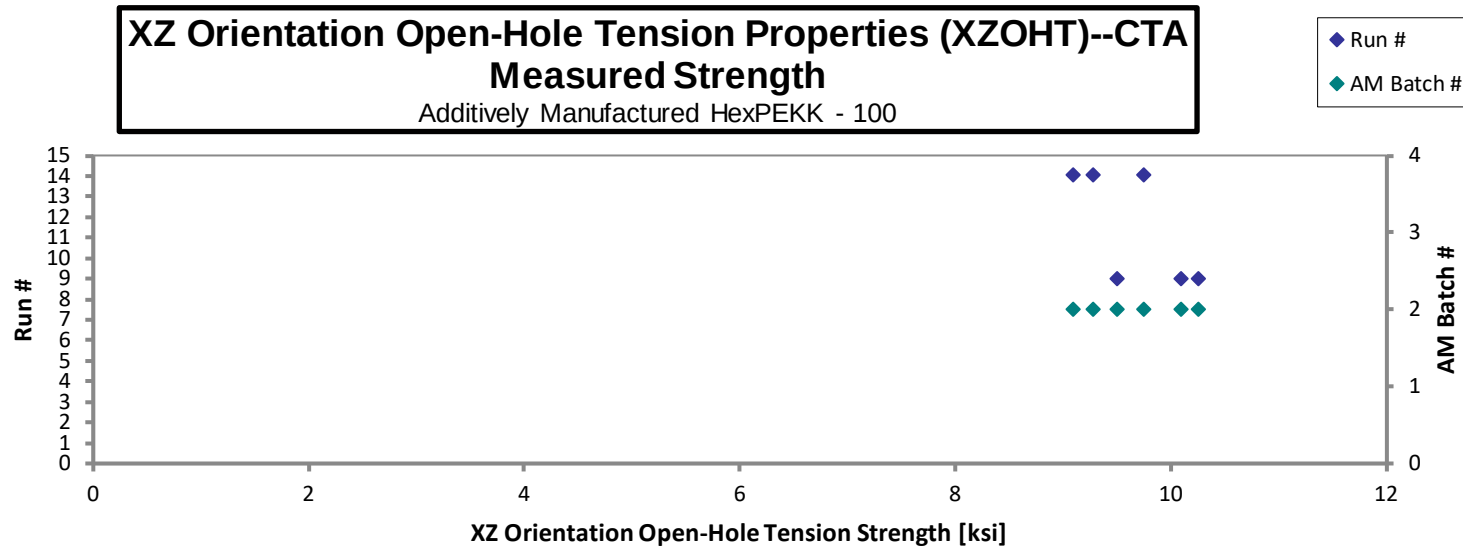
4.20 XZ Open-Hole Tension Properties (XZOHT)

**XZ Orientation Open-Hole Tension Properties (XZOHT)--CTA□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R14-17-XZOHT-1T-CTA-10	2	14	9.273	0.1316	AGM
HL-B-R14-17-XZOHT-3T-CTA-12	2	14	9.094	0.1302	M(A,L)GM
HL-B-R14-17-XZOHT-4B-CTA-8	2	14	9.744	0.1274	M(A,L)GM
HL-B-R9-16-XZOHT-3T-CTA-11	2	9	9.499	0.1325	AGM
HL-B-R9-16-XZOHT-2B-CTA-7	2	9	10.26	0.1328	AGM
HL-B-R9-16-XZOHT-4B-CTA-8	2	9	10.09	0.1275	AGM

Average	9.660	0.1303
Standard Dev.	0.4575	
Coeff. of Var. [%]	4.736	
Min.	9.094	0.1274
Max.	10.26	0.1328
Number of Spec.	6	6

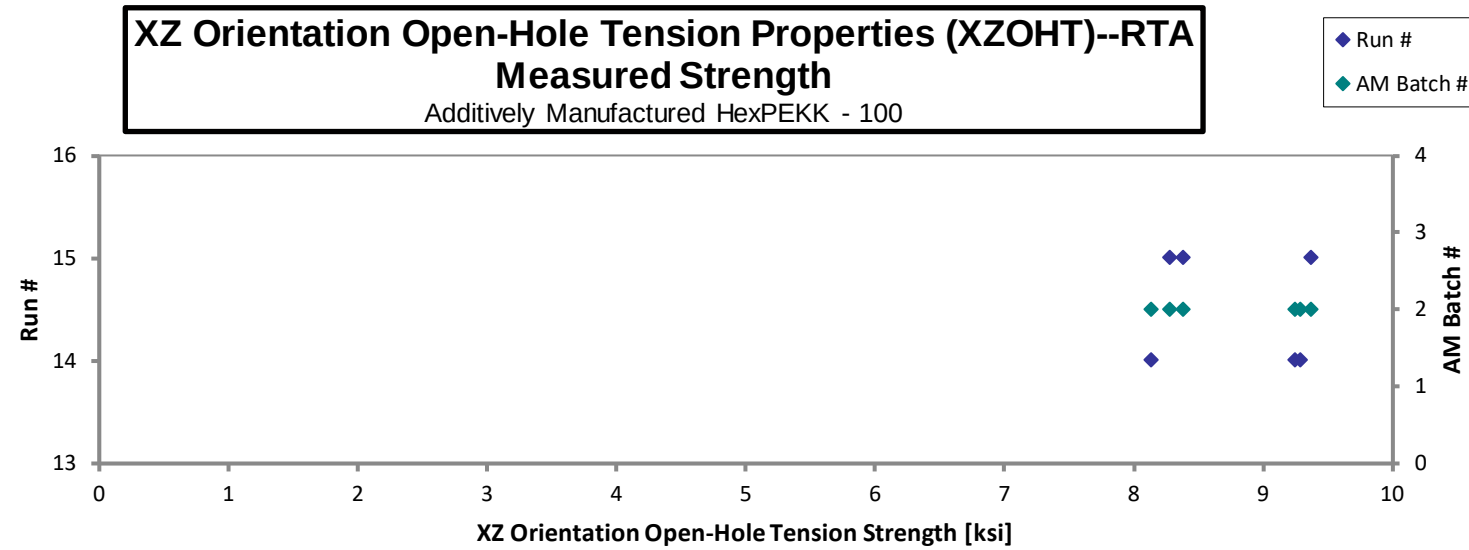


XZ Orientation Open-Hole Tension Properties (XZOHT)--RTA□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R14-17-XZOHT-3T-RTA-11	2	14	8.129	0.1317	M(A,L)GM
HL-B-R14-17-XZOHT-2B-RTA-7	2	14	9.290	0.1295	M(A,L)GM
HL-B-R14-17-XZOHT-4B-RTA-9	2	14	9.248	0.1265	AGM
HL-B-R15-18-XZOHT-1T-RTA-10	2	15	8.377	0.1310	M(A,L)GM
HL-B-R15-18-XZOHT-3T-RTA-12	2	15	8.278	0.1297	AGM
HL-B-R15-18-XZOHT-4B-RTA-9	2	15	9.375	0.1270	AGM

Average	8.783	0.1292
Standard Dev.	0.5779	
Coeff. of Var. [%]	6.580	
Min.	8.129	0.1265
Max.	9.375	0.1317
Number of Spec.	6	6



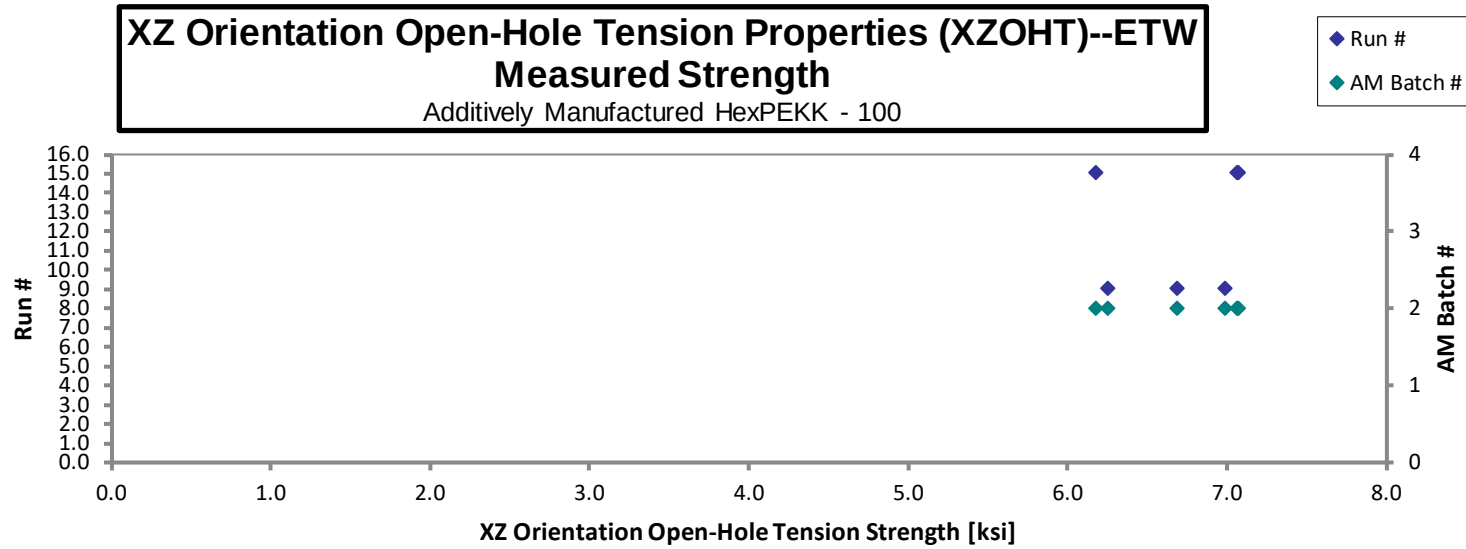
XZ Orientation Open-Hole Tension Properties (XZOHT)--ETW ☐

Strength ☐

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R15-18-XZOHT-3T-ETW-11	2	15	6.178	0.1305	M(A,L)GM
HL-B-R15-18-XZOHT-2B-ETW-7	2	15	7.067	0.1294	M(A,L)GM
HL-B-R15-18-XZOHT-4B-ETW-8	2	15	7.060	0.1274	M(A,L)GM
HL-B-R9-16-XZOHT-1T-ETW-10	2	9	6.684	0.1331	M(A,L)GM
HL-B-R9-16-XZOHT-3T-ETW-12	2	9	6.248	0.1313	M(A,L)GM
HL-B-R9-16-XZOHT-4B-ETW-9	2	9	6.985	0.1264	M(A,L)GM

Average	6.704	0.1297
Standard Dev.	0.4055	
Coeff. of Var. [%]	6.049	
Min.	6.178	0.1264
Max.	7.067	0.1331
Number of Spec.	6	6



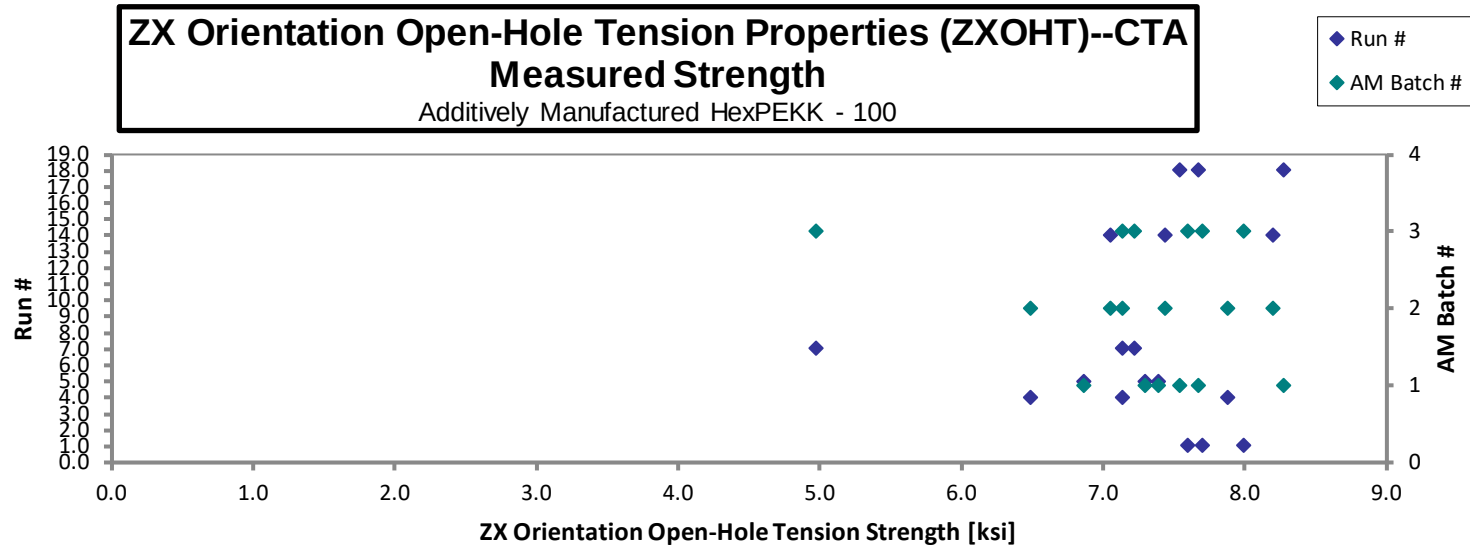
4.21 ZX Open-Hole Tension Properties (ZXOHT)

**ZX Orientation Open-Hole Tension Properties (ZXOHT)--CTA□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-ZXOHT-4T-CTA-11	1	18	7.538	0.1327	M(A,L)GM
HL-A-R18-12-ZXOHT-1B-CTA-7	1	18	7.676	0.1502	AGM
HL-A-R18-12-ZXOHT-5B-CTA-9	1	18	8.273	0.1413	AGM
HL-A-R5-15-ZXOHT-1B-CTA-16	1	5	6.865	0.1377	M(A,L)GM
HL-A-R5-15-ZXOHT-5B-CTA-18	1	5	7.387	0.1324	M(A,L)GM
HL-A-R5-15-ZXOHT-4T-CTA-20	1	5	7.299	0.1361	M(A,L)GM
HL-B-R14-17-ZXOHT-5B-CTA-13	2	14	7.435	0.1342	AGM
HL-B-R14-17-ZXOHT-5B-CTA-15	2	14	8.198	0.1297	AGM
HL-B-R14-17-ZXOHT-5T-CTA-17	2	14	7.051	0.1314	M(A,L)GM
HL-B-R4-7-ZXOHT-2T-CTA-11	2	4	7.141	0.1352	AGM
HL-B-R4-7-ZXOHT-3B-CTA-7	2	4	7.877	0.1391	AGM
HL-B-R4-7-ZXOHT-5B-CTA-9	2	4	6.485	0.1326	M(A,L)GM
HL-C-R1-1-ZXOHT-5T-CTA-11	3	1	7.593	0.1347	AGM
HL-C-R1-1-ZXOHT-2B-CTA-7	3	1	7.994	0.1350	AGM
HL-C-R1-1-ZXOHT-5B-CTA-9	3	1	7.703	0.1338	M(A,L)GM
HL-C-R7-4-ZXOHT-4T-CTA-11	3	7	7.217	0.1371	M(A,L)GM
HL-C-R7-4-ZXOHT-1B-CTA-7	3	7	7.133	0.1371	AGM
HL-C-R7-4-ZXOHT-1T-CTA-9	3	7	4.973	0.1394	LGM

Average	7.324	0.1361
Standard Dev.	0.7445	
Coeff. of Var. [%]	10.16	
Min.	4.973	0.1297
Max.	8.273	0.1502
Number of Spec.	18	18

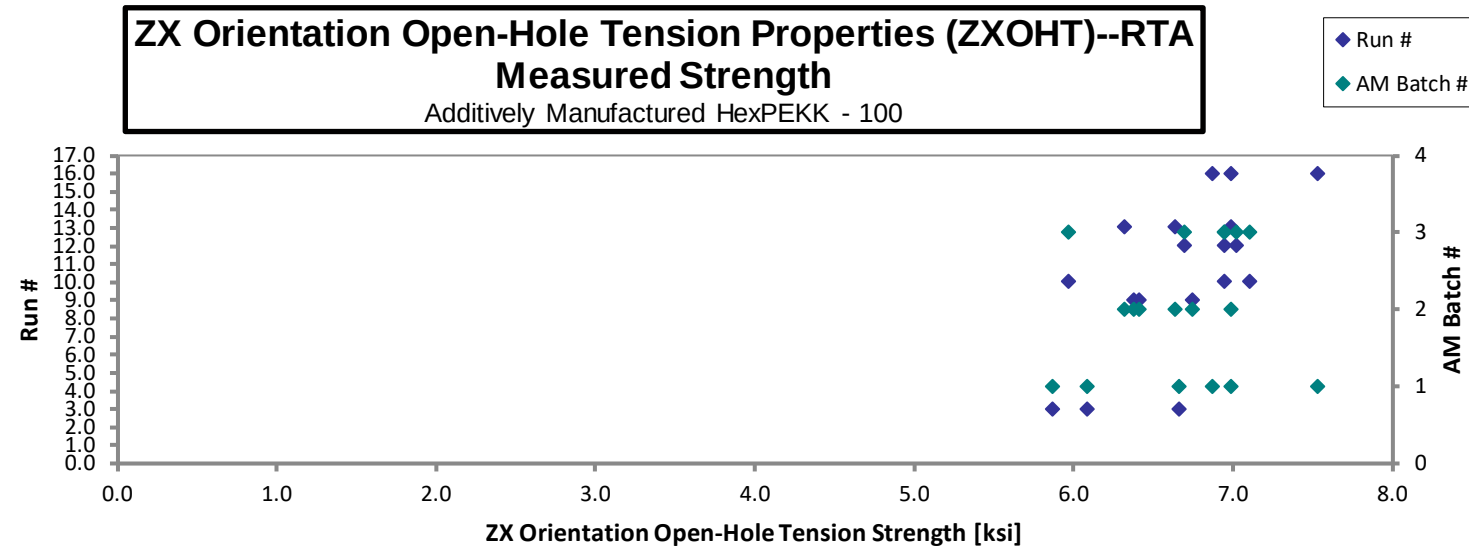


ZX Orientation Open-Hole Tension Properties (ZXOHT)--RTA□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXOHT-4T-RTA-11	1	16	6.867	0.1323	AGM
HL-A-R16-10-ZXOHT-1B-RTA-7	1	16	6.983	0.1516	AGM
HL-A-R16-10-ZXOHT-5B-RTA-9	1	16	7.529	0.1409	M(A,L)GM
HL-A-R3-14-ZXOHT-1B-RTA-16	1	3	6.084	0.1447	M(A,L)GM
HL-A-R3-14-ZXOHT-5B-RTA-18	1	3	6.665	0.1369	M(A,L)GM
HL-A-R3-14-ZXOHT-4T-RTA-20	1	3	5.870	0.1367	M(A,L)GM
HL-B-R13-9-ZXOHT-2T-RTA-11	2	13	6.321	0.1463	M(A,L)GM
HL-B-R13-9-ZXOHT-3B-RTA-7	2	13	6.990	0.1463	AGM
HL-B-R13-9-ZXOHT-5B-RTA-9	2	13	6.639	0.1461	M(A,L)GM
HL-B-R9-16-ZXOHT-5B-RTA-13	2	9	6.746	0.1354	M(A,L)GM
HL-B-R9-16-ZXOHT-5B-RTA-14	2	9	6.410	0.1376	M(A,L)GM
HL-B-R9-16-ZXOHT-5T-RTA-17	2	9	6.375	0.1333	M(A,L)GM
HL-C-R10-5-ZXOHT-1T-RTA-10	3	10	7.107	0.1439	AGM
HL-C-R10-5-ZXOHT-4T-RTA-12	3	10	5.966	0.1402	M(A,L)GM
HL-C-R10-5-ZXOHT-1B-RTA-8	3	10	6.945	0.1409	AGM
HL-C-R12-3-ZXOHT-5B-RTA-10	3	12	6.697	0.1384	M(A,L)GM
HL-C-R12-3-ZXOHT-5T-RTA-12	3	12	6.949	0.1380	AGM
HL-C-R12-3-ZXOHT-2B-RTA-8	3	12	7.019	0.1393	M(A,L)GM

Average	6.676	0.1405
Standard Dev.	0.4341	
Coeff. of Var. [%]	6.503	
Min.	5.870	0.1323
Max.	7.529	0.1516
Number of Spec.	18	18



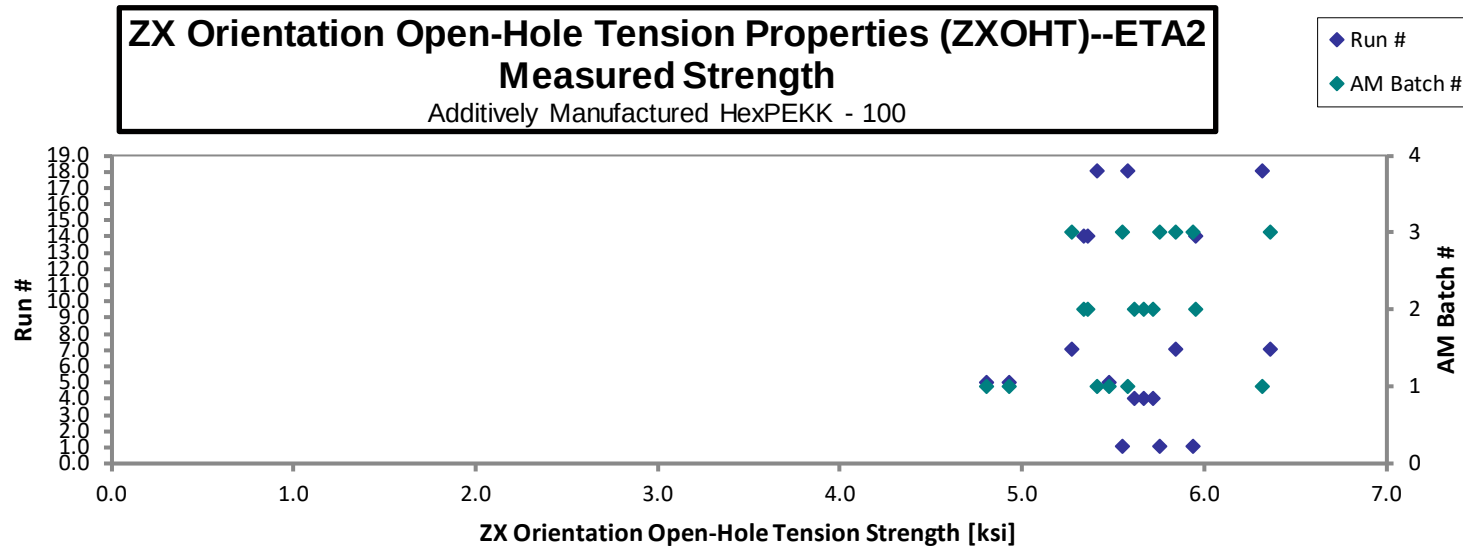
ZX Orientation Open-Hole Tension Properties (ZXOHT)--ETA2 ☐

Strength ☐

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-ZXOHT-5B-ETA2-10	1	18	6.319	0.1400	AGM
HL-A-R18-12-ZXOHT-4T-ETA2-12	1	18	5.414	0.1376	M(A,L)GM
HL-A-R18-12-ZXOHT-1B-ETA2-8	1	18	5.581	0.1461	AGM
HL-A-R5-15-ZXOHT-1B-ETA2-15	1	5	4.808	0.1344	M(A,L)GM
HL-A-R5-15-ZXOHT-5B-ETA2-17	1	5	5.479	0.1333	M(A,L)GM
HL-A-R5-15-ZXOHT-4T-ETA2-19	1	5	4.926	0.1321	M(A,L)GM
HL-B-R14-17-ZXOHT-5B-ETA2-14	2	14	5.363	0.1359	M(A,L)GM
HL-B-R14-17-ZXOHT-5B-ETA2-16	2	14	5.953	0.1296	M(A,L)GM
HL-B-R14-17-ZXOHT-5T-ETA2-18	2	14	5.340	0.1351	M(A,L)GM
HL-B-R4-7-ZXOHT-5B-ETA2-10	2	4	5.720	0.1321	M(A,L)GM
HL-B-R4-7-ZXOHT-2T-ETA2-12	2	4	5.614	0.1344	AGM
HL-B-R4-7-ZXOHT-3B-ETA2-8	2	4	5.669	0.1457	AGM
HL-C-R1-1-ZXOHT-5B-ETA2-10	3	1	5.549	0.1331	M(A,L)GM
HL-C-R1-1-ZXOHT-5T-ETA2-12	3	1	5.938	0.1317	AGM
HL-C-R1-1-ZXOHT-2B-ETA2-8	3	1	5.756	0.1347	M(A,L)GM
HL-C-R7-4-ZXOHT-1T-ETA2-10	3	7	6.359	0.1368	AGM
HL-C-R7-4-ZXOHT-4T-ETA2-12	3	7	5.276	0.1373	M(A,L)GM
HL-C-R7-4-ZXOHT-1B-ETA2-8	3	7	5.841	0.1330	M(A,L)GM

Average	5.606	0.1357
Standard Dev.	0.4055	
Coeff. of Var. [%]	7.233	
Min.	4.808	0.1296
Max.	6.359	0.1461
Number of Spec.	18	18

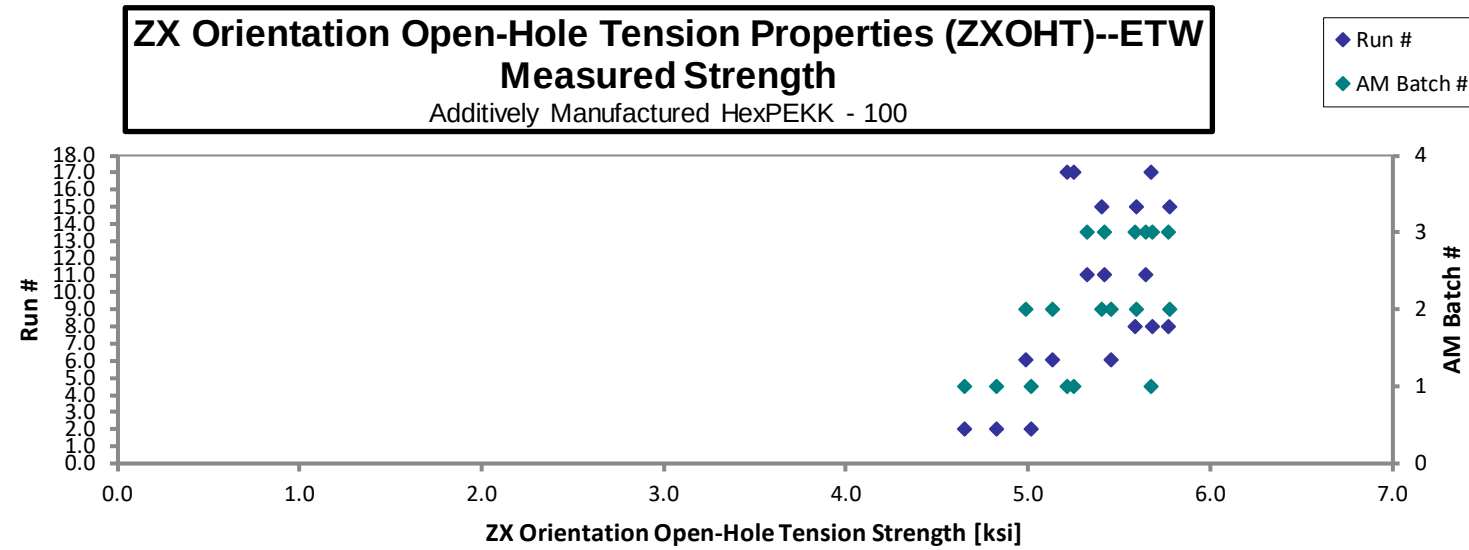


ZX Orientation Open-Hole Tension Properties (ZXOHT)--ETW
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-ZXOHT-5B-ETW-10	1	17	5.677	0.1399	LGM
HL-A-R17-11-ZXOHT-4T-ETW-12	1	17	5.216	0.1399	LGM
HL-A-R17-11-ZXOHT-1B-ETW-8	1	17	5.253	0.1450	M(A,L)GM
HL-A-R2-13-ZXOHT-1B-ETW-15	1	2	4.654	0.1395	M(A,L)GM
HL-A-R2-13-ZXOHT-5B-ETW-17	1	2	5.015	0.1326	LGM
HL-A-R2-13-ZXOHT-4T-ETW-19	1	2	4.827	0.1328	M(A,L)GM
HL-B-R15-18-ZXOHT-5B-ETW-15	2	15	5.591	0.1290	M(A,L)GM
HL-B-R15-18-ZXOHT-5B-ETW-16	2	15	5.777	0.1295	LGM
HL-B-R15-18-ZXOHT-5T-ETW-18	2	15	5.403	0.1354	LGM
HL-B-R6-8-ZXOHT-5B-ETW-10	2	6	5.136	0.1310	M(A,L)GM
HL-B-R6-8-ZXOHT-3B-ETW-7	2	6	4.985	0.1409	LGM
HL-B-R6-8-ZXOHT-3B-ETW-8	2	6	5.458	0.1431	M(A,L)GM
HL-C-R11-6-ZXOHT-4T-ETW-11	3	11	5.320	0.1367	LGM
HL-C-R11-6-ZXOHT-1B-ETW-7	3	11	5.418	0.1375	M(A,L)GM
HL-C-R11-6-ZXOHT-1T-ETW-9	3	11	5.644	0.1367	LGM
HL-C-R8-2-ZXOHT-5T-ETW-11	3	8	5.680	0.1433	M(A,L)GM
HL-C-R8-2-ZXOHT-2B-ETW-7	3	8	5.767	0.1381	M(A,L)GM
HL-C-R8-2-ZXOHT-5B-ETW-9	3	8	5.587	0.1421	M(A,L)GM

Average	5.356	0.1374
Standard Dev.	0.3315	
Coeff. of Var. [%]	6.190	
Min.	4.654	0.1290
Max.	5.777	0.1450
Number of Spec.	18	18



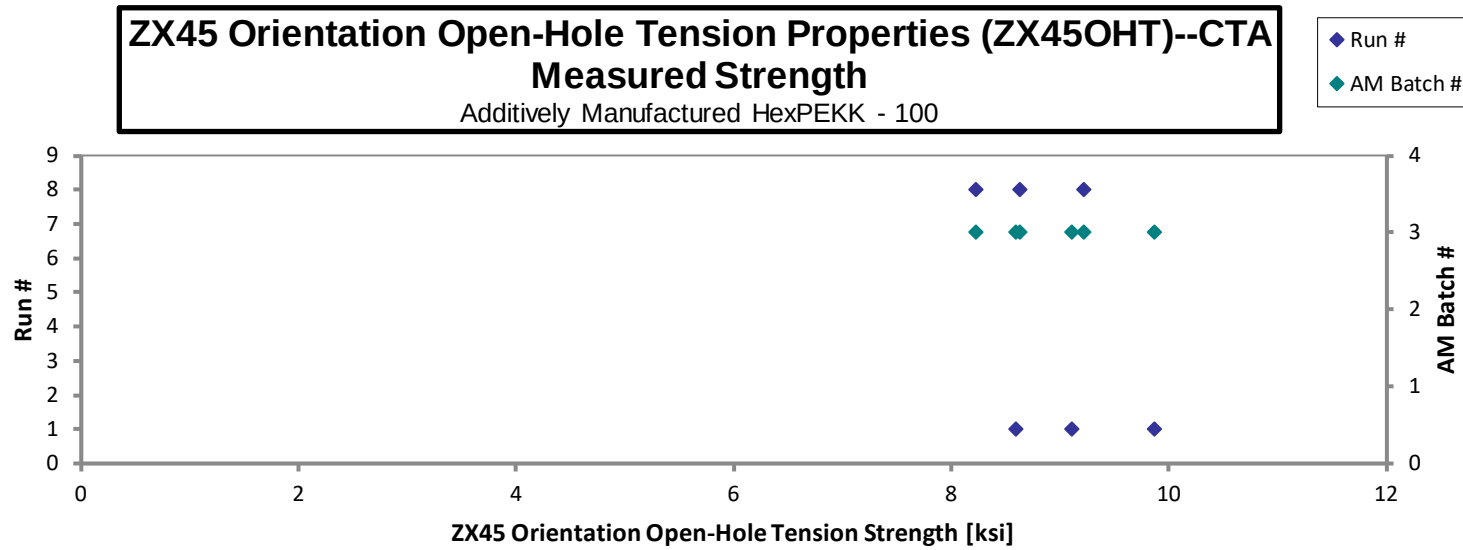
4.22 ZX45 Open-Hole Tension Properties (ZX45OHT)

ZX45 Orientation Open-Hole Tension Properties (ZX45OHT)--CTA ☐ Strength ☐

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R1-1-ZX45OHT-1B-CTA-13	3	1	8.589	0.1356	M(A,L)GM
HL-C-R1-1-ZX45OHT-3B-CTA-15	3	1	9.867	0.1342	M(A,L)GM
HL-C-R1-1-ZX45OHT-4B-CTA-16	3	1	9.112	0.1358	M(A,L)GM
HL-C-R8-2-ZX45OHT-1B-CTA-14	3	8	8.225	0.1378	AGM
HL-C-R8-2-ZX45OHT-4B-CTA-17	3	8	9.223	0.1374	AGM, LGT
HL-C-R8-2-ZX45OHT-2T-CTA-18	3	8	8.636	0.1388	M(A,L)GM

Average	8.942	0.1366
Standard Dev.	0.5824	
Coeff. of Var. [%]	6.513	
Min.	8.225	0.1342
Max.	9.867	0.1388
Number of Spec.	6	6

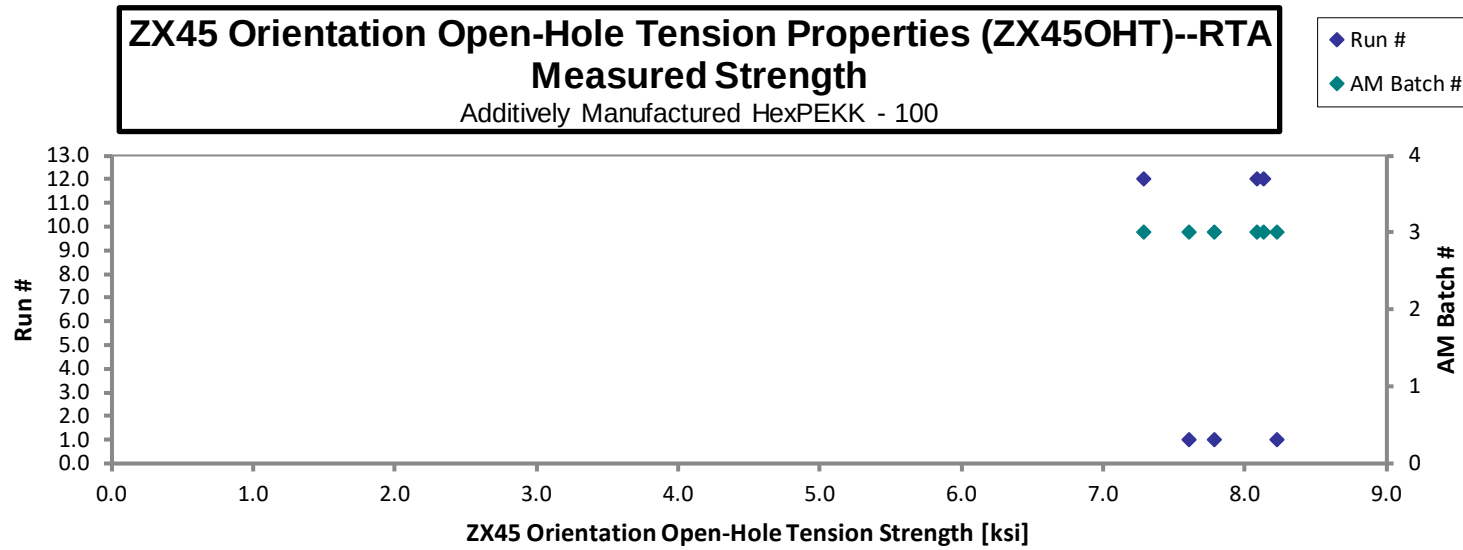


ZX45 Orientation Open-Hole Tension Properties (ZX45OHT)--RTA□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R1-1-ZX45OHT-1B-RTA-14	3	1	7.602	0.1331	M(A,L)GM
HL-C-R1-1-ZX45OHT-4B-RTA-17	3	1	8.231	0.1338	AGM
HL-C-R1-1-ZX45OHT-2T-RTA-18	3	1	7.782	0.1339	M(A,L)GM
HL-C-R12-3-ZX45OHT-1B-RTA-13	3	12	8.086	0.1356	AGM
HL-C-R12-3-ZX45OHT-4B-RTA-16	3	12	8.134	0.1403	AGM
HL-C-R12-3-ZX45OHT-3T-RTA-20	3	12	7.291	0.1358	M(A,L)GM

Average	7.854	0.1354
Standard Dev.	0.3631	
Coeff. of Var. [%]	4.623	
Min.	7.291	0.1331
Max.	8.231	0.1403
Number of Spec.	6	6

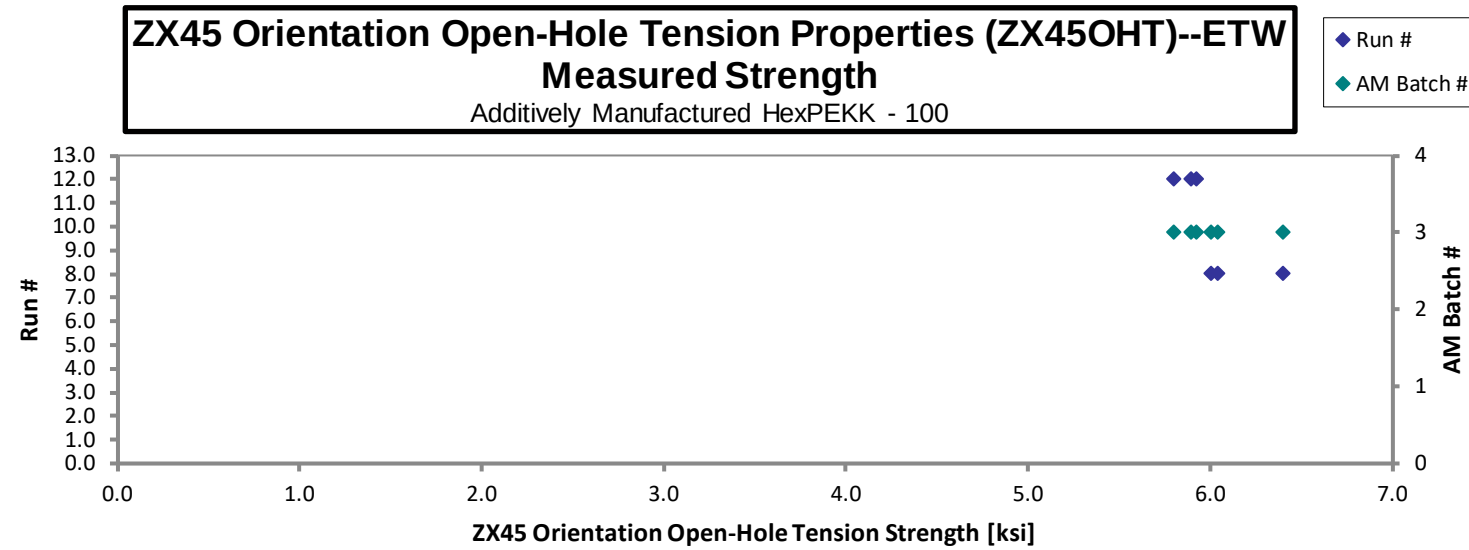


ZX45 Orientation Open-Hole Tension Properties (ZX45OHT)--ETW□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R12-3-ZX45OHT-1B-ETW-14	3	12	5.923	0.1383	M(A,L)GM
HL-C-R12-3-ZX45OHT-4B-ETW-17	3	12	5.895	0.1372	M(A,L)GM
HL-C-R12-3-ZX45OHT-2T-ETW-18	3	12	5.800	0.1371	M(A,L)GM
HL-C-R8-2-ZX45OHT-1B-ETW-13	3	8	6.007	0.1428	M(A,L)GM
HL-C-R8-2-ZX45OHT-3B-ETW-15	3	8	6.402	0.1383	M(A,L)GM
HL-C-R8-2-ZX45OHT-4B-ETW-16	3	8	6.040	0.1458	M(A,L)GM

Average	6.011	0.1399
Standard Dev.	0.2096	
Coeff. of Var. [%]	3.486	
Min.	5.800	0.1371
Max.	6.402	0.1458
Number of Spec.	6	6



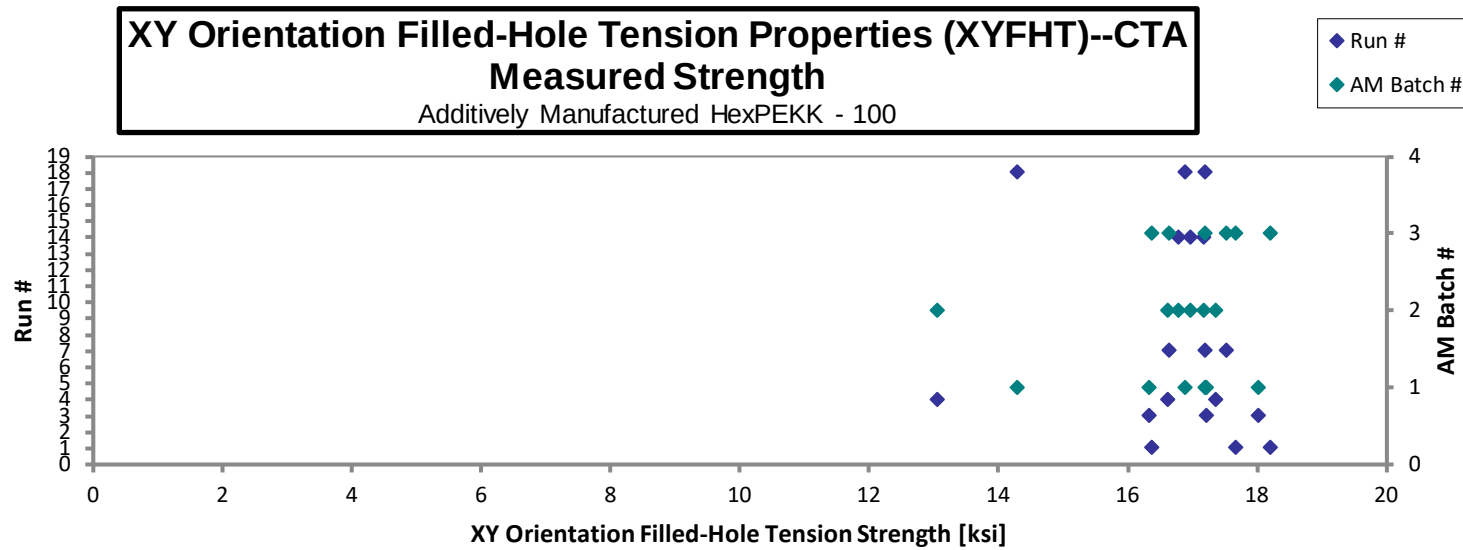
4.23 XY Filled-Hole Tension Properties (XYFHT)

XY Orientation Filled-Hole Tension Properties (XYFHT)--CTA□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-XYFHT-2B-CTA-1	1	18	16.88	0.1210	AGM, AGB
HL-A-R18-12-XYFHT-4B-CTA-3	1	18	17.19	0.1148	AGM
HL-A-R18-12-XYFHT-1T-CTA-5	1	18	14.28	0.1348	M(A,L)GM
HL-A-R3-14-XYFHT-3B-CTA-1	1	3	17.22	0.1128	AGM
HL-A-R3-14-XYFHT-4B-CTA-3	1	3	16.34	0.1221	XGM
HL-A-R3-14-XYFHT-1T-CTA-5	1	3	18.03	0.1169	AGM
HL-B-R14-17-XYFHT-1B-CTA-2	2	14	17.17	0.1112	AGF, M(L,S)WB, M(A,S)WT
HL-B-R14-17-XYFHT-2B-CTA-4	2	14	16.78	0.1110	AGM, LGB, AWT
HL-B-R14-17-XYFHT-3T-CTA-6	2	14	16.98	0.1113	AGM, AWT
HL-B-R4-7-XYFHT-3B-CTA-1	2	4	16.61	0.1218	AGM
HL-B-R4-7-XYFHT-5B-CTA-3	2	4	13.06	0.1101	M(A,L)GM
HL-B-R4-7-XYFHT-2T-CTA-5	2	4	17.36	0.1111	AGM
HL-C-R1-1-XYFHT-2B-CTA-1	3	1	17.67	0.1101	AGM, M(L,S)GB, M(A,L)WT
HL-C-R1-1-XYFHT-5B-CTA-3	3	1	16.36	0.1121	M(A,L)GM, M(A,S)GB, LAB
HL-C-R1-1-XYFHT-3T-CTA-4	3	1	18.21	0.1185	AGM, AGT, M(A,L)GB, LAT
HL-C-R7-4-XYFHT-4B-CTA-1	3	7	16.64	0.1109	AGM
HL-C-R7-4-XYFHT-4B-CTA-2	3	7	17.20	0.1181	AGM, M(A,L)AT, M(A,S)WB
HL-C-R7-4-XYFHT-1T-CTA-4	3	7	17.52	0.1115	AGM, AGB

Average	16.75	0.1156
Standard Dev.	1.248	
Coeff. of Var. [%]	7.450	
Min.	13.06	0.1101
Max.	18.21	0.1348
Number of Spec.	18	18

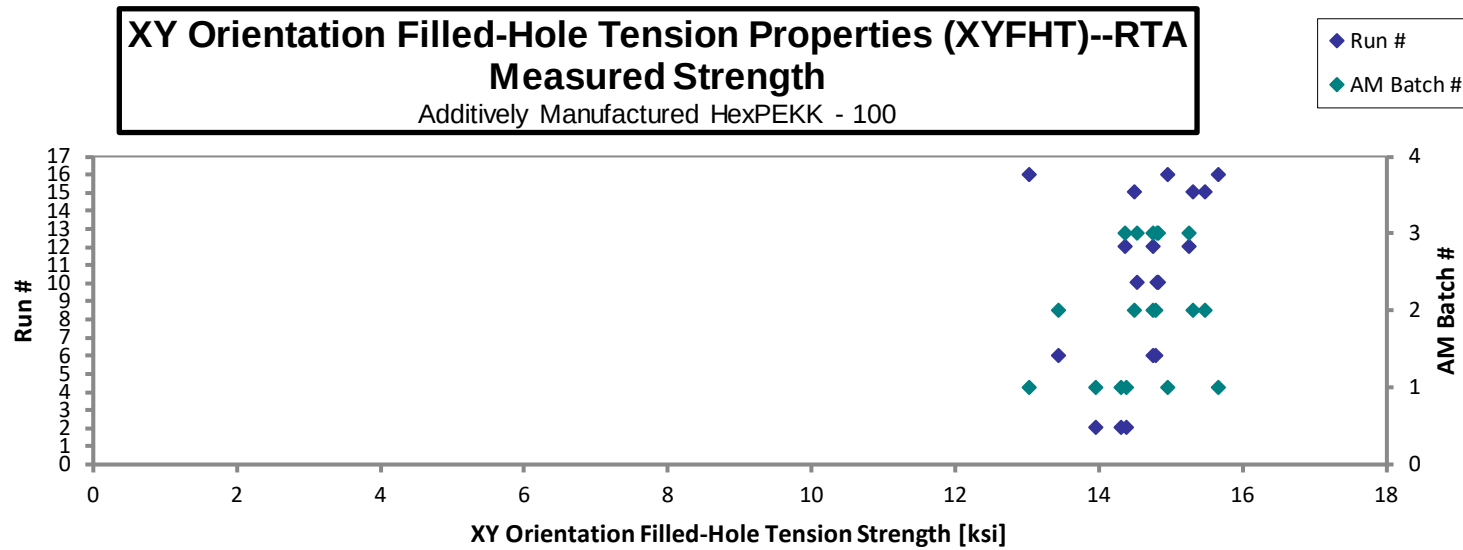


**XY Orientation Filled-Hole Tension Properties (XYFHT)--RTA□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-XYFHT-2B-RTA-1	1	16	13.02	0.1263	LGM, M(A,L)WT
HL-A-R16-10-XYFHT-4B-RTA-3	1	16	15.67	0.1124	M(A,L)GM
HL-A-R16-10-XYFHT-1T-RTA-5	1	16	14.95	0.1336	M(A,L)GM
HL-A-R2-13-XYFHT-3B-RTA-1	1	2	14.39	0.1159	M(A,L)GM
HL-A-R2-13-XYFHT-4B-RTA-3	1	2	14.31	0.1139	M(A,L)GM
HL-A-R2-13-XYFHT-1T-RTA-5	1	2	13.95	0.1221	M(A,L)GF
HL-B-R15-18-XYFHT-1B-RTA-2	2	15	15.31	0.1100	M(A,L)GM
HL-B-R15-18-XYFHT-2B-RTA-4	2	15	15.48	0.1109	M(A,L)GM
HL-B-R15-18-XYFHT-3T-RTA-6	2	15	14.50	0.1110	M(A,L)GM
HL-B-R6-8-XYFHT-3B-RTA-1	2	6	14.76	0.1227	M(A,L)GF
HL-B-R6-8-XYFHT-5B-RTA-3	2	6	13.43	0.1161	M(A,L)GM
HL-B-R6-8-XYFHT-2T-RTA-5	2	6	14.78	0.1119	AGM, AAB
HL-C-R10-5-XYFHT-4B-RTA-3	3	10	14.83	0.1195	M(A,L)GM
HL-C-R10-5-XYFHT-1T-RTA-5	3	10	14.52	0.1192	M(A,L)GM
HL-C-R10-5-XYFHT-1T-RTA-6	3	10	14.82	0.1192	M(A,L)GM
HL-C-R12-3-XYFHT-2B-RTA-2	3	12	15.26	0.1073	M(A,L)GM
HL-C-R12-3-XYFHT-3T-RTA-5	3	12	14.75	0.1164	M(A,L)GM
HL-C-R12-3-XYFHT-5T-RTA-6	3	12	14.36	0.1203	M(A,L)GM

Average	14.62	0.1172
Standard Dev.	0.6700	
Coeff. of Var. [%]	4.584	
Min.	13.02	0.1073
Max.	15.67	0.1336
Number of Spec.	18	18

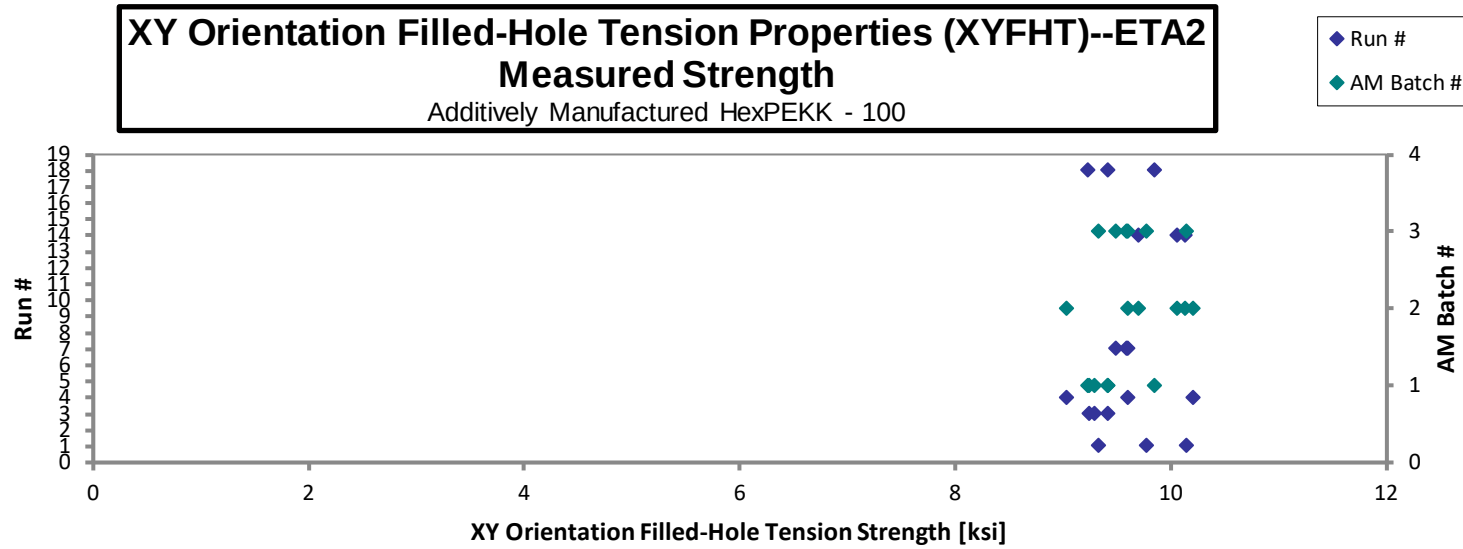


XY Orientation Filled-Hole Tension Properties (XYFHT)--ETA2
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-XYFHT-2B-ETA2-2	1	18	9.410	0.1218	M(A,L)GM
HL-A-R18-12-XYFHT-4B-ETA2-4	1	18	9.848	0.1096	M(A,L)GM
HL-A-R18-12-XYFHT-1T-ETA2-6	1	18	9.234	0.1335	M(A,L)GM
HL-A-R3-14-XYFHT-3B-ETA2-2	1	3	9.236	0.1158	M(A,L)GM
HL-A-R3-14-XYFHT-4B-ETA2-4	1	3	9.409	0.1170	M(A,L)GM
HL-A-R3-14-XYFHT-1T-ETA2-6	1	3	9.294	0.1165	M(A,L)GM
HL-B-R14-17-XYFHT-1B-ETA2-1	2	14	10.13	0.1119	M(A,L)GM
HL-B-R14-17-XYFHT-2B-ETA2-3	2	14	10.06	0.1108	M(A,L)GM
HL-B-R14-17-XYFHT-3T-ETA2-5	2	14	9.694	0.1108	M(A,L)GM
HL-B-R4-7-XYFHT-3B-ETA2-2	2	4	10.21	0.1117	M(A,L)GM
HL-B-R4-7-XYFHT-5B-ETA2-4	2	4	9.037	0.1155	M(A,L)GM
HL-B-R4-7-XYFHT-2T-ETA2-6	2	4	9.595	0.1114	M(A,L)GM
HL-C-R1-1-XYFHT-2B-ETA2-2	3	1	10.15	0.1038	M(A,L)GM
HL-C-R1-1-XYFHT-3T-ETA2-5	3	1	9.769	0.1139	M(A,L)GM
HL-C-R1-1-XYFHT-5T-ETA2-6	3	1	9.327	0.1158	M(A,L)GM
HL-C-R7-4-XYFHT-4B-ETA2-3	3	7	9.483	0.1140	M(A,L)GM
HL-C-R7-4-XYFHT-1T-ETA2-5	3	7	9.589	0.1071	M(A,L)GM
HL-C-R7-4-XYFHT-1T-ETA2-6	3	7	9.596	0.1120	M(A,L)GM

Average	9.615	0.1140
Standard Dev.	0.3511	
Coeff. of Var. [%]	3.652	
Min.	9.037	0.1038
Max.	10.21	0.1335
Number of Spec.	18	18

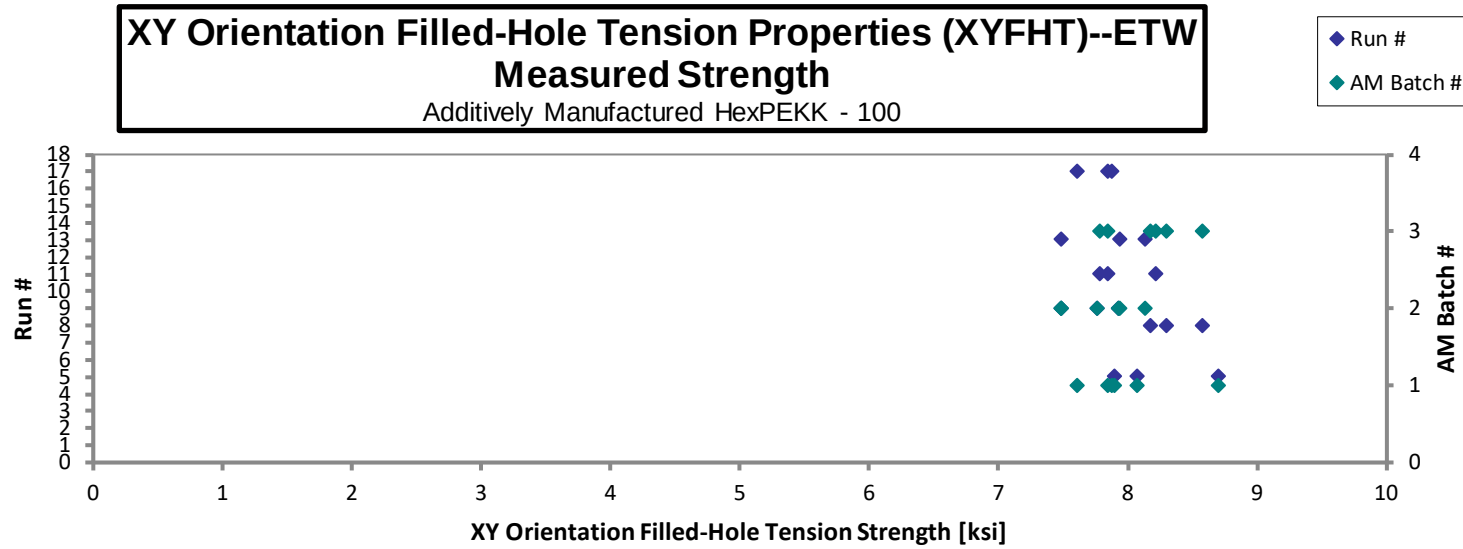


**XY Orientation Filled-Hole Tension Properties (XYFHT)--ETW□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-XYFHT-2B-ETW-2	1	17	7.874	0.1236	M(A,L)GM
HL-A-R17-11-XYFHT-4B-ETW-4	1	17	7.848	0.1160	M(A,L)GM
HL-A-R17-11-XYFHT-1T-ETW-6	1	17	7.611	0.1278	M(A,L)GM
HL-A-R5-15-XYFHT-3B-ETW-2	1	5	8.701	0.1105	M(A,L)GM
HL-A-R5-15-XYFHT-4B-ETW-4	1	5	8.073	0.1135	M(A,L)GM
HL-A-R5-15-XYFHT-1T-ETW-6	1	5	7.894	0.1159	M(A,L)GM
HL-B-R13-9-XYFHT-3B-ETW-2	2	13	8.134	0.1165	LGM
HL-B-R13-9-XYFHT-5B-ETW-4	2	13	7.485	0.1193	M(A,L)GM
HL-B-R13-9-XYFHT-2T-ETW-6	2	13	7.938	0.1192	M(A,L)GM
HL-B-R9-16-XYFHT-1B-ETW-1	2	9	7.929	0.1154	M(A,L)GM
HL-B-R9-16-XYFHT-2B-ETW-3	2	9	7.764	0.1141	LGM
HL-B-R9-16-XYFHT-3T-ETW-5	2	9	7.489	0.1143	LGM
HL-C-R11-6-XYFHT-4B-ETW-1	3	11	8.218	0.1100	LGM
HL-C-R11-6-XYFHT-4B-ETW-2	3	11	7.783	0.1188	M(A,L)GM
HL-C-R11-6-XYFHT-1T-ETW-4	3	11	7.849	0.1181	M(A,L)GM
HL-C-R8-2-XYFHT-2B-ETW-1	3	8	8.580	0.1122	LGM
HL-C-R8-2-XYFHT-5B-ETW-3	3	8	8.173	0.1156	M(A,L)GM
HL-C-R8-2-XYFHT-3T-ETW-4	3	8	8.296	0.1187	M(A,L)GM

Average	7.980	0.1166
Standard Dev.	0.3318	
Coeff. of Var. [%]	4.158	
Min.	7.485	0.1100
Max.	8.701	0.1278
Number of Spec.	18	18



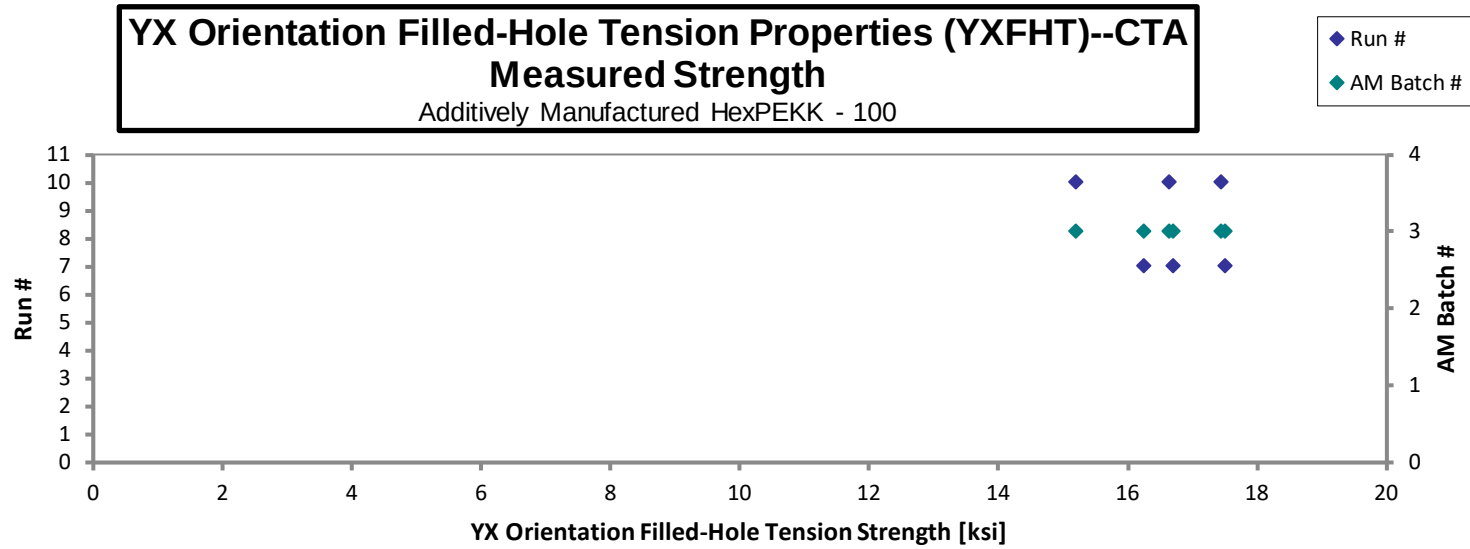
4.24 YX Filled-Hole Tension Properties (YXFHT)

YX Orientation Filled-Hole Tension Properties (YXFHT)--CTA
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R10-5-YXFHT-3B-CTA-10	3	10	16.63	0.1233	M(A,L)GM, M(A,S)WT, M(A,S)WB
HL-C-R10-5-YXFHT-4T-CTA-13	3	10	17.45	0.1176	AGM, LGF, M(A,S)WB, M(A,S,L)WT, M(A,L)AT
HL-C-R10-5-YXFHT-2B-CTA-8	3	10	15.19	0.1191	M(A,L)GM, AWT
HL-C-R7-4-YXFHT-5B-CTA-11	3	7	16.24	0.1075	AGF, M(A,S)WB
HL-C-R7-4-YXFHT-2B-CTA-7	3	7	17.50	0.1126	AGM, SGT, LAB
HL-C-R7-4-YXFHT-3B-CTA-9	3	7	16.70	0.1140	M(A,L)GM, M(A,S)WB

Average	16.62	0.1157
Standard Dev.	0.8544	
Coeff. of Var. [%]	5.142	
Min.	15.19	0.1075
Max.	17.50	0.1233
Number of Spec.	6	6

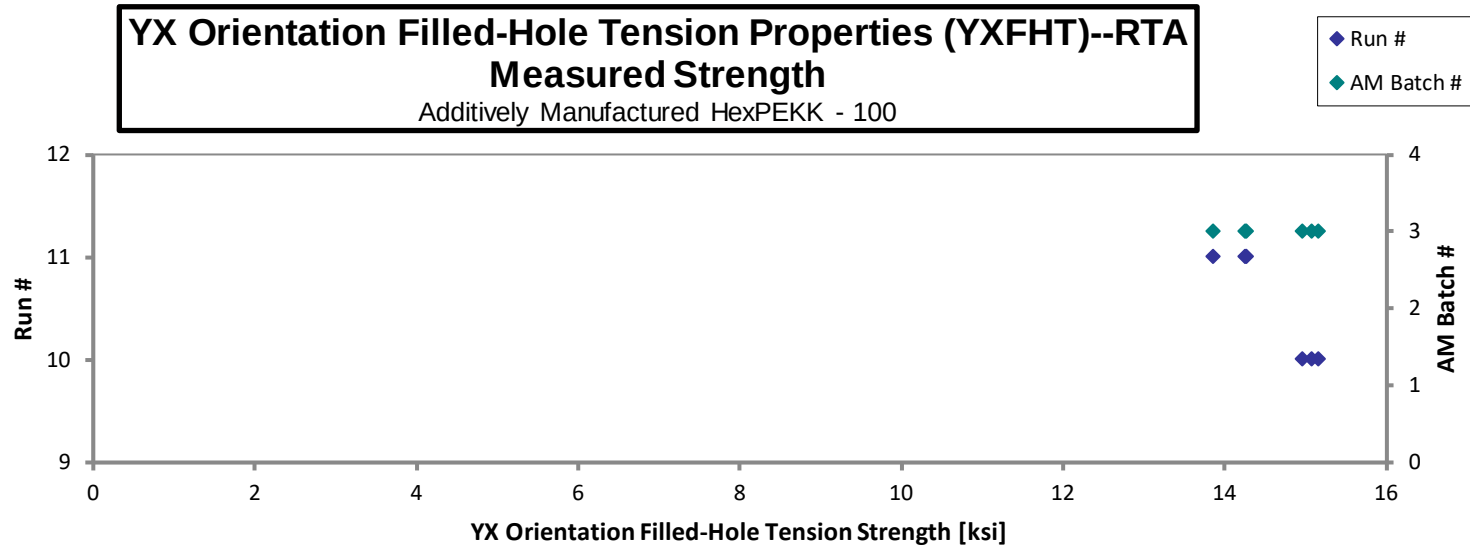


YX Orientation Filled-Hole Tension Properties (YXFHT)--RTA Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R10-5-YXFHT-5B-RTA-11	3	10	15.08	0.1132	AGF
HL-C-R10-5-YXFHT-2B-RTA-7	3	10	15.16	0.1144	M(A,L)GM
HL-C-R10-5-YXFHT-3B-RTA-9	3	10	14.96	0.1160	M(A,L)GM
HL-C-R11-6-YXFHT-3B-RTA-10	3	11	13.86	0.1190	M(A,L)GM
HL-C-R11-6-YXFHT-4T-RTA-13	3	11	14.25	0.1147	M(A,L)GM, M(A,L)GB
HL-C-R11-6-YXFHT-2B-RTA-8	3	11	14.27	0.1166	M(A,L)GM

Average	14.60	0.1156
Standard Dev.	0.5383	
Coeff. of Var. [%]	3.688	
Min.	13.86	0.1132
Max.	15.16	0.1190
Number of Spec.	6	6

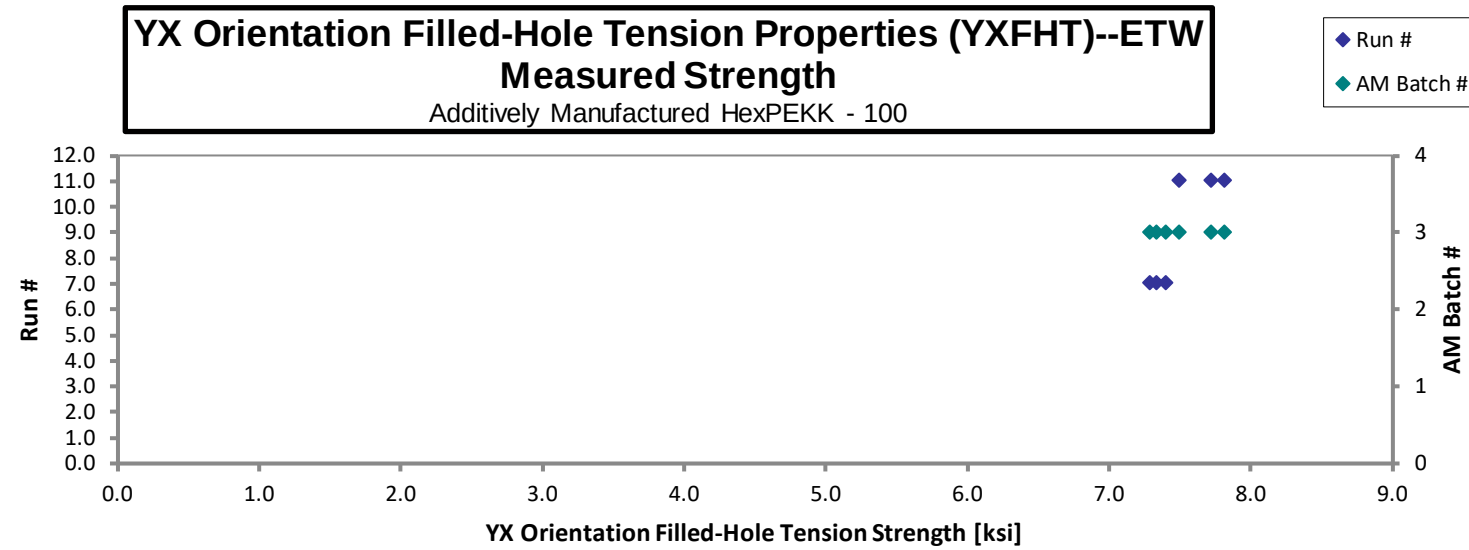


YX Orientation Filled-Hole Tension Properties (YXFHT)--ETW□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R11-6-YXFHT-5B-ETW-11	3	11	7.716	0.1094	M(A,L)GM
HL-C-R11-6-YXFHT-2B-ETW-7	3	11	7.494	0.1134	M(A,L)GM
HL-C-R11-6-YXFHT-3B-ETW-9	3	11	7.818	0.1121	LGM
HL-C-R7-4-YXFHT-3B-ETW-10	3	7	7.288	0.1178	LGM
HL-C-R7-4-YXFHT-4T-ETW-13	3	7	7.403	0.1146	M(A,L)GM
HL-C-R7-4-YXFHT-2B-ETW-8	3	7	7.336	0.1156	M(A,L)GM

Average	7.509	0.1138
Standard Dev.	0.2139	
Coeff. of Var. [%]	2.849	
Min.	7.288	0.1094
Max.	7.818	0.1178
Number of Spec.	6	6



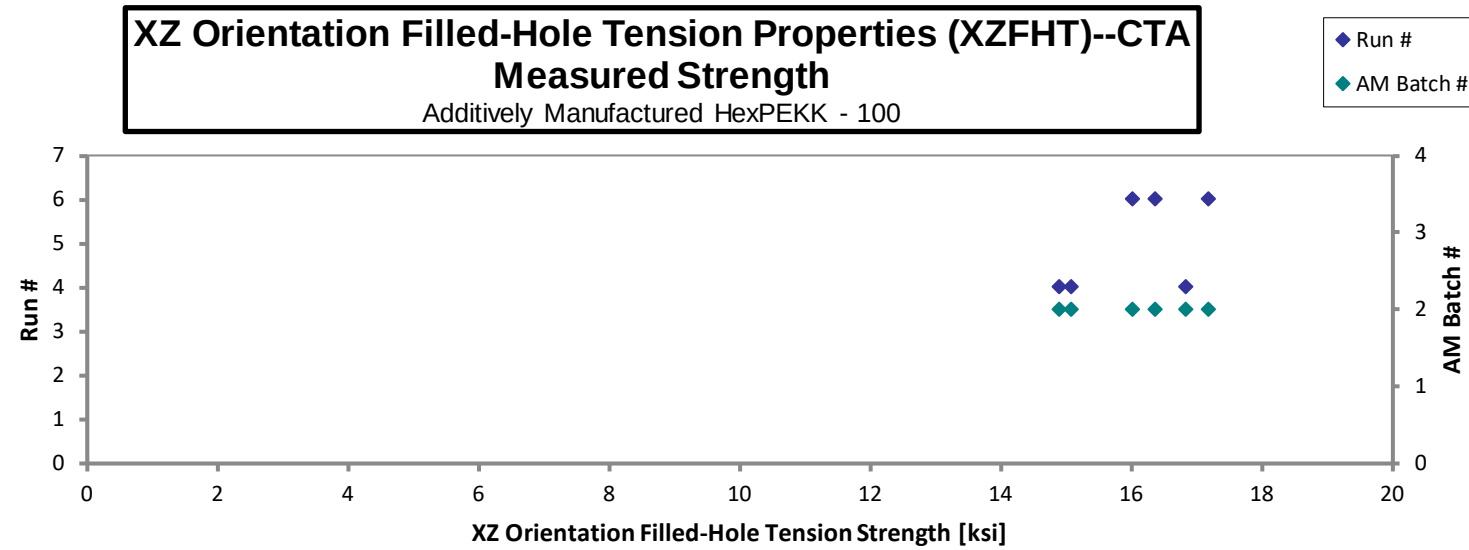
4.25 XZ Filled-Hole Tension Properties (XZFHT)

**XZ Orientation Filled-Hole Tension Properties (XZFHT)--CTA□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R4-7-XZFHT-3T-CTA-11	2	4	15.09	0.1086	M(A,L)GM, AWB, AWT
HL-B-R4-7-XZFHT-1B-CTA-7	2	4	16.82	0.1031	M(A,L)GM, AWB
HL-B-R4-7-XZFHT-2B-CTA-9	2	4	14.89	0.1047	AGF, AWB
HL-B-R6-8-XZFHT-2B-CTA-10	2	6	16.36	0.1018	AGF, AWB, AWT
HL-B-R6-8-XZFHT-3T-CTA-12	2	6	16.02	0.1061	M(A,L)GM, AWB, AWT
HL-B-R6-8-XZFHT-4T-CTA-13	2	6	17.18	0.1047	M(A,L)GF, AWB, AWT

Average	16.06	0.1048
Standard Dev.	0.9211	
Coeff. of Var. [%]	5.736	
Min.	14.89	0.1018
Max.	17.18	0.1086
Number of Spec.	6	6

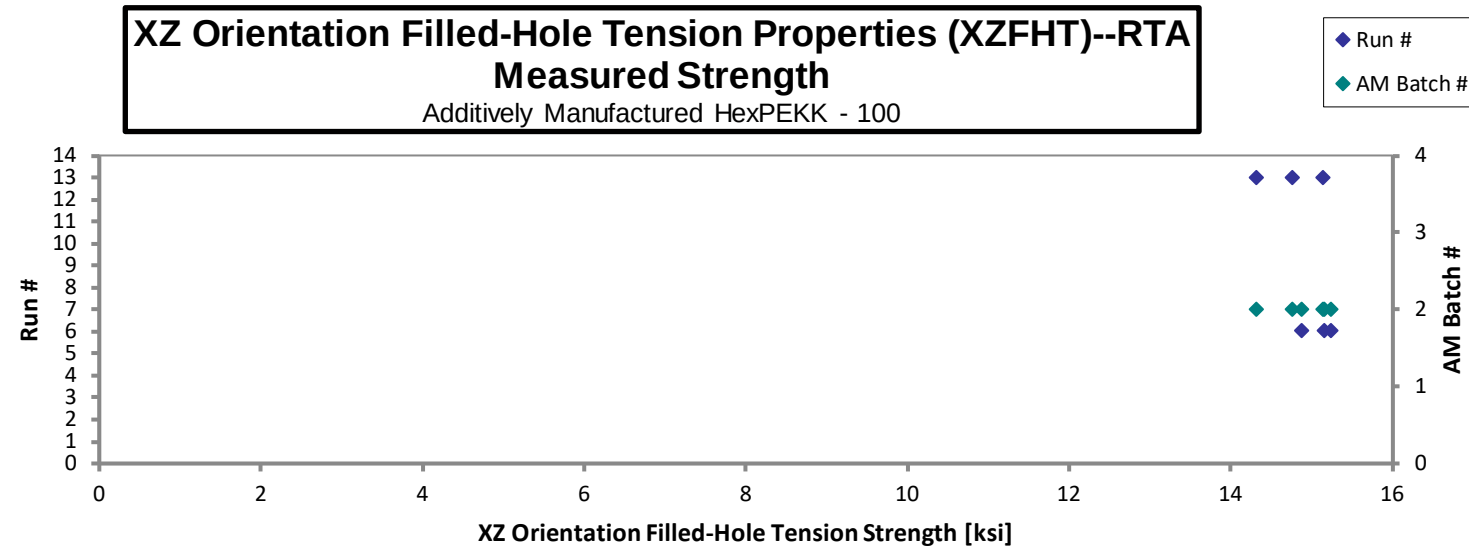


XZ Orientation Filled-Hole Tension Properties (XZFHT)--RTA□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R13-9-XZFHT-2B-RTA-10	2	13	15.14	0.1135	M(A,L)GF
HL-B-R13-9-XZFHT-3T-RTA-12	2	13	14.77	0.1128	M(A,L)GF
HL-B-R13-9-XZFHT-4T-RTA-13	2	13	14.32	0.1039	AGF, M(A,L)GT
HL-B-R6-8-XZFHT-3T-RTA-11	2	6	14.88	0.1075	M(A,L)GF, M(A,S)GB
HL-B-R6-8-XZFHT-1B-RTA-7	2	6	15.16	0.1045	M(A,L)GM, M(LS,)GT
HL-B-R6-8-XZFHT-2B-RTA-9	2	6	15.23	0.1030	M(A,L)GM

Average	14.92	0.1075
Standard Dev.	0.3436	
Coeff. of Var. [%]	2.303	
Min.	14.32	0.1030
Max.	15.23	0.1135
Number of Spec.	6	6



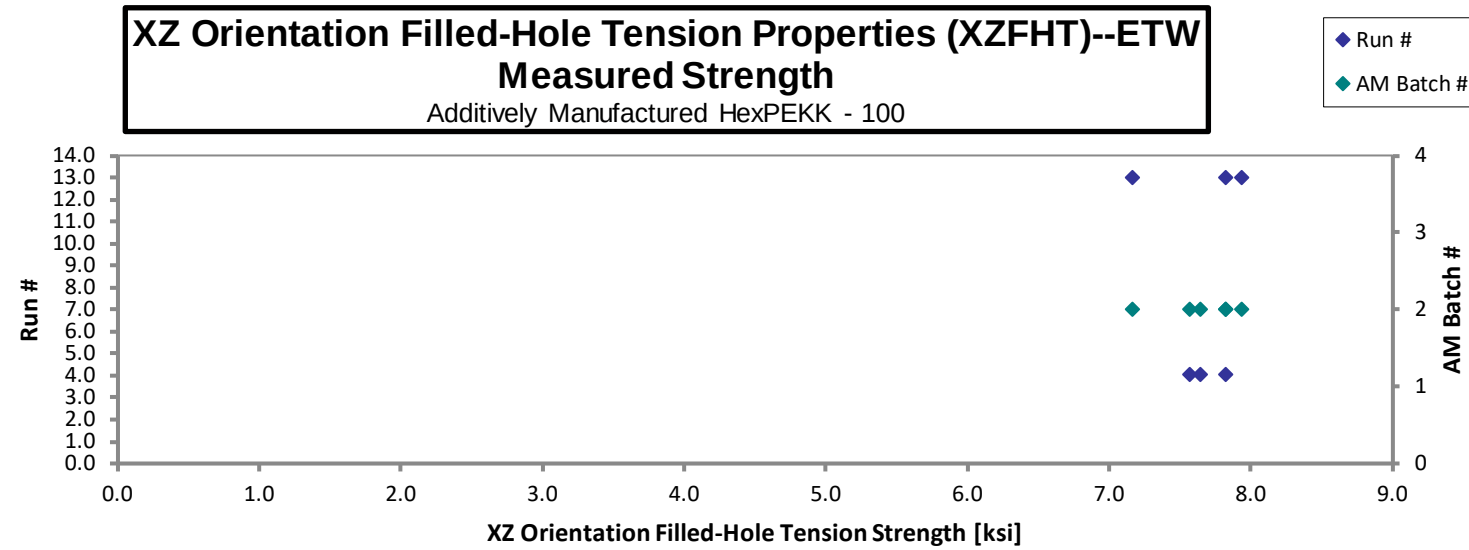
XZ Orientation Filled-Hole Tension Properties (XZFHT)--ETW

Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R13-9-XZFHT-3T-ETW-11	2	13	7.936	0.1114	M(A,L)GM
HL-B-R13-9-XZFHT-1B-ETW-7	2	13	7.163	0.1232	M(A,L)GM
HL-B-R13-9-XZFHT-2B-ETW-9	2	13	7.823	0.1155	M(A,L)GM
HL-B-R4-7-XZFHT-2B-ETW-10	2	4	7.826	0.1036	M(A,L)GM
HL-B-R4-7-XZFHT-3T-ETW-12	2	4	7.641	0.1090	M(A,L)GM
HL-B-R4-7-XZFHT-4T-ETW-13	2	4	7.568	0.1059	M(A,L)GM

Average	7.660	0.1114
Standard Dev.	0.2779	
Coeff. of Var. [%]	3.629	
Min.	7.163	0.1036
Max.	7.936	0.1232
Number of Spec.	6	6



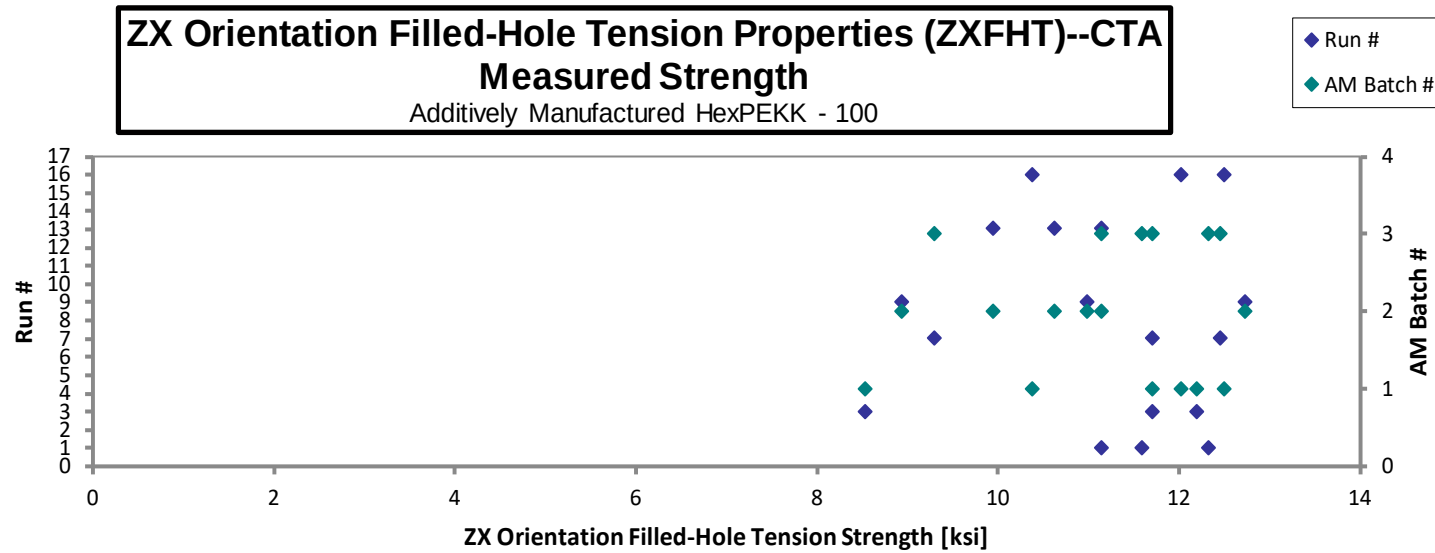
4.26 ZX Filled-Hole Tension Properties (ZXFHT)

ZX Orientation Filled-Hole Tension Properties (ZXFHT)--CTA
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXFHT-2T-CTA-11	1	16	10.38	0.1151	M(A,L)GM
HL-A-R16-10-ZXFHT-3B-CTA-7	1	16	12.02	0.1145	M(A,L)GF
HL-A-R16-10-ZXFHT-5B-CTA-9	1	16	12.50	0.1169	M(A,L)GM, M(A,S)WB, M(A,S)WT
HL-A-R3-14-ZXFHT-5B-CTA-10	1	3	12.20	0.1087	M(A,L)GF, SGB, M(A,S)GT
HL-A-R3-14-ZXFHT-2T-CTA-12	1	3	11.71	0.1106	AGF
HL-A-R3-14-ZXFHT-3B-CTA-8	1	3	8.529	0.1149	LGF
HL-B-R13-9-ZXFHT-1B-CTA-15	2	13	9.942	0.1241	M(A,L)GF, AWB
HL-B-R13-9-ZXFHT-5B-CTA-17	2	13	11.14	0.1179	M(A,L)GF
HL-B-R13-9-ZXFHT-4T-CTA-19	2	13	10.62	0.1151	M(A,L)GF, LWB, M(A,L)WT
HL-B-R9-16-ZXFHT-5T-CTA-11	2	9	10.99	0.0998	M(A,L)GM, AGB
HL-B-R9-16-ZXFHT-1B-CTA-7	2	9	12.73	0.1070	M(A,L)GF, M(A,L)WB, M(A,L)WT
HL-B-R9-16-ZXFHT-5B-CTA-9	2	9	8.939	0.1085	AGF, M(A,L)AB
HL-C-R1-1-ZXFHT-4T-CTA-11	3	1	11.58	0.1075	M(A,L)GF, AWB, M(A,L)AT
HL-C-R1-1-ZXFHT-1B-CTA-7	3	1	12.32	0.1071	AGF
HL-C-R1-1-ZXFHT-1T-CTA-9	3	1	11.15	0.1081	M(A,L)GF, M(A,L)GB, M(A,L)WT
HL-C-R7-4-ZXFHT-3B-CTA-15	3	7	9.293	0.1050	M(A,L)GM, AGT
HL-C-R7-4-ZXFHT-2T-CTA-17	3	7	11.71	0.1080	AGF
HL-C-R7-4-ZXFHT-5T-CTA-19	3	7	12.45	0.1084	M(A,L)GF, LAB

Average	11.12	0.1109
Standard Dev.	1.275	
Coeff. of Var. [%]	11.46	
Min.	8.529	0.09977
Max.	12.73	0.1241
Number of Spec.	18	18

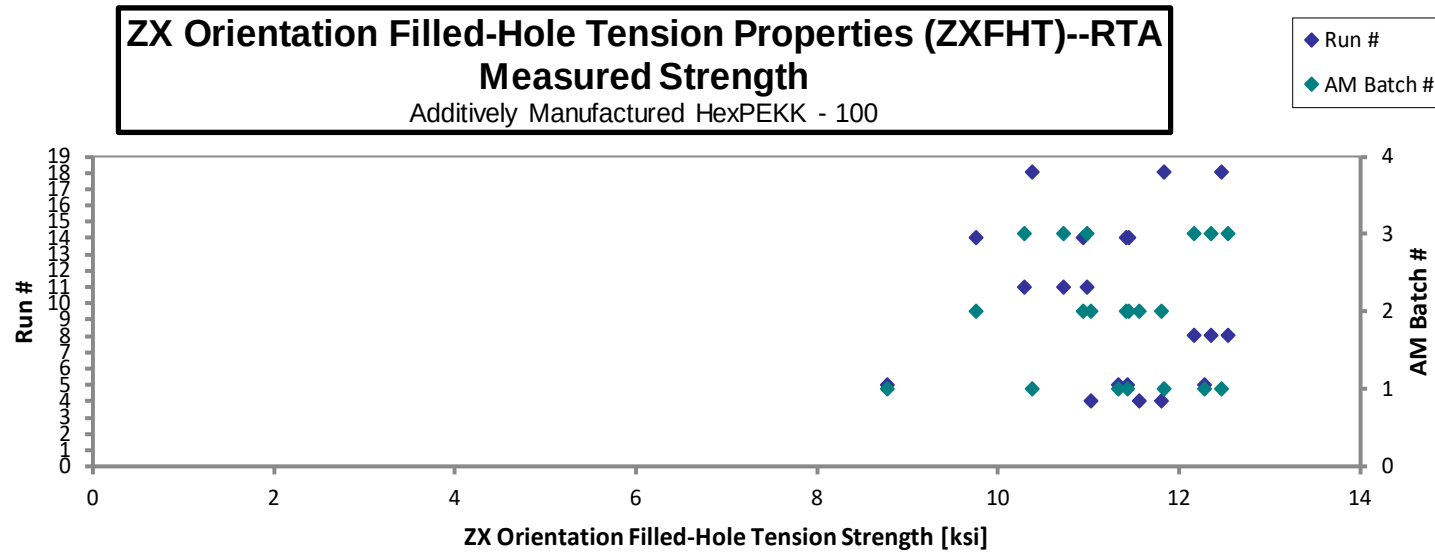


ZX Orientation Filled-Hole Tension Properties (ZXFHT)--RTA□**Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-ZXFHT-2T-RTA-11	1	18	10.38	0.1174	M(A,L)GM
HL-A-R18-12-ZXFHT-3B-RTA-7	1	18	11.83	0.1143	M(A,L)GM, M(A,L)WB
HL-A-R18-12-ZXFHT-5B-RTA-9	1	18	12.47	0.1172	M(A,L)GF
HL-A-R5-15-ZXFHT-5B-RTA-10	1	5	12.28	0.1035	M(A,L)GF
HL-A-R5-15-ZXFHT-2T-RTA-12	1	5	11.43	0.1094	M(A,L)GF, M(A,L)GT, M(A,L)GB
HL-A-R5-15-ZXFHT-3B-RTA-8	1	5	8.781	0.1100	M(A,L)GM, AGT
HL-A-R5-15-ZXFHT-5B-RTA-9	1	5	11.32	0.1050	M(A,L)GF
HL-B-R14-17-ZXFHT-5B-RTA-10	2	14	11.41	0.1042	M(A,L)GF, M(A,S)WT, M(L,S)WB
HL-B-R14-17-ZXFHT-5T-RTA-11	2	14	9.752	0.1000	M(A,L)GF, M(A,L)WT
HL-B-R14-17-ZXFHT-1B-RTA-7	2	14	11.45	0.1048	AGF
HL-B-R14-17-ZXFHT-5B-RTA-9	2	14	10.94	0.1063	M(A,L)GM, M(A,L)WT
HL-B-R4-7-ZXFHT-1B-RTA-15	2	4	11.56	0.1067	M(A,L)GF
HL-B-R4-7-ZXFHT-5B-RTA-17	2	4	11.80	0.1134	M(A,L)GF
HL-B-R4-7-ZXFHT-4T-RTA-19	2	4	11.03	0.1147	M(A,L)GF
HL-C-R11-6-ZXFHT-3B-RTA-16	3	11	10.30	0.1127	M(A,L)GF
HL-C-R11-6-ZXFHT-2T-RTA-18	3	11	10.73	0.1089	M(A,L)GF
HL-C-R11-6-ZXFHT-5T-RTA-20	3	11	10.98	0.1056	M(A,L)GF
HL-C-R8-2-ZXFHT-1T-RTA-10	3	8	12.36	0.1089	M(A,L)GF
HL-C-R8-2-ZXFHT-4T-RTA-12	3	8	12.16	0.1062	M(A,L)GF
HL-C-R8-2-ZXFHT-1B-RTA-8	3	8	12.54	0.1153	M(S,A,L)GM

Average	11.28	0.1092
Standard Dev.	0.9621	
Coeff. of Var. [%]	8.533	
Min.	8.781	0.1000
Max.	12.54	0.1174
Number of Spec.	20	20



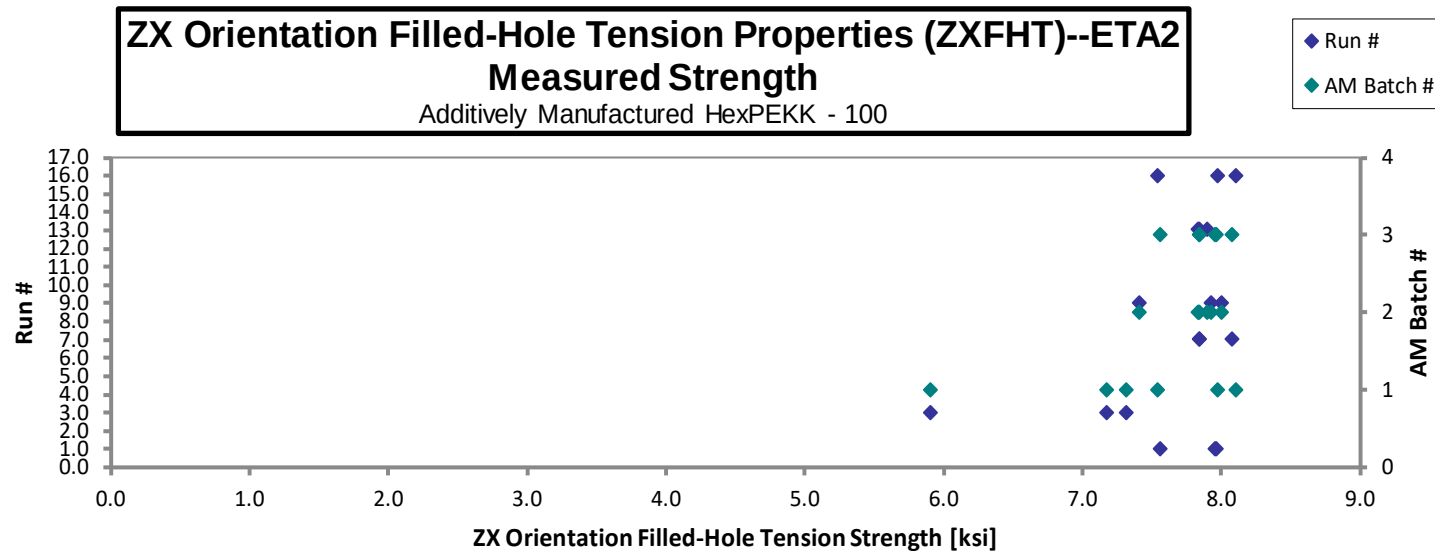
ZX Orientation Filled-Hole Tension Properties (ZXFHT)--ETA2 ☐

Strength ☐

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXFHT-5B-ETA2-10	1	16	7.978	0.1186	M(A,L)GM
HL-A-R16-10-ZXFHT-2T-ETA2-12	1	16	7.541	0.1139	M(A,L)GM
HL-A-R16-10-ZXFHT-3B-ETA2-8	1	16	8.108	0.1175	M(A,L)GM
HL-A-R3-14-ZXFHT-2T-ETA2-11	1	3	7.315	0.1158	M(A,L)GM
HL-A-R3-14-ZXFHT-3B-ETA2-7	1	3	5.901	0.1124	M(A,L)GB
HL-A-R3-14-ZXFHT-5B-ETA2-9	1	3	7.175	0.1103	M(A,L)GO
HL-B-R13-9-ZXFHT-1B-ETA2-16	2	13	7.895	0.1244	AGM
HL-B-R13-9-ZXFHT-5B-ETA2-18	2	13	7.831	0.1178	M(A,L)GM
HL-B-R13-9-ZXFHT-4T-ETA2-20	2	13	7.839	0.1151	M(A,L)GM
HL-B-R9-16-ZXFHT-5B-ETA2-10	2	9	8.003	0.1056	M(A,L)GM
HL-B-R9-16-ZXFHT-5T-ETA2-12	2	9	7.409	0.1027	M(A,L)GM
HL-B-R9-16-ZXFHT-1B-ETA2-8	2	9	7.926	0.1064	M(A,L)GM
HL-C-R1-1-ZXFHT-1T-ETA2-10	3	1	7.558	0.1049	AGM
HL-C-R1-1-ZXFHT-4T-ETA2-12	3	1	7.952	0.1057	AGM
HL-C-R1-1-ZXFHT-1B-ETA2-8	3	1	7.966	0.1110	M(A,L)GM
HL-C-R7-4-ZXFHT-3B-ETA2-16	3	7	7.839	0.1079	AGM
HL-C-R7-4-ZXFHT-2T-ETA2-18	3	7	7.841	0.1110	M(A,L)GM
HL-C-R7-4-ZXFHT-5T-ETA2-20	3	7	8.079	0.1062	AGM

Average	7.675	0.1115
Standard Dev.	0.5178	
Coeff. of Var. [%]	6.746	
Min.	5.901	0.1027
Max.	8.108	0.1244
Number of Spec.	18	18

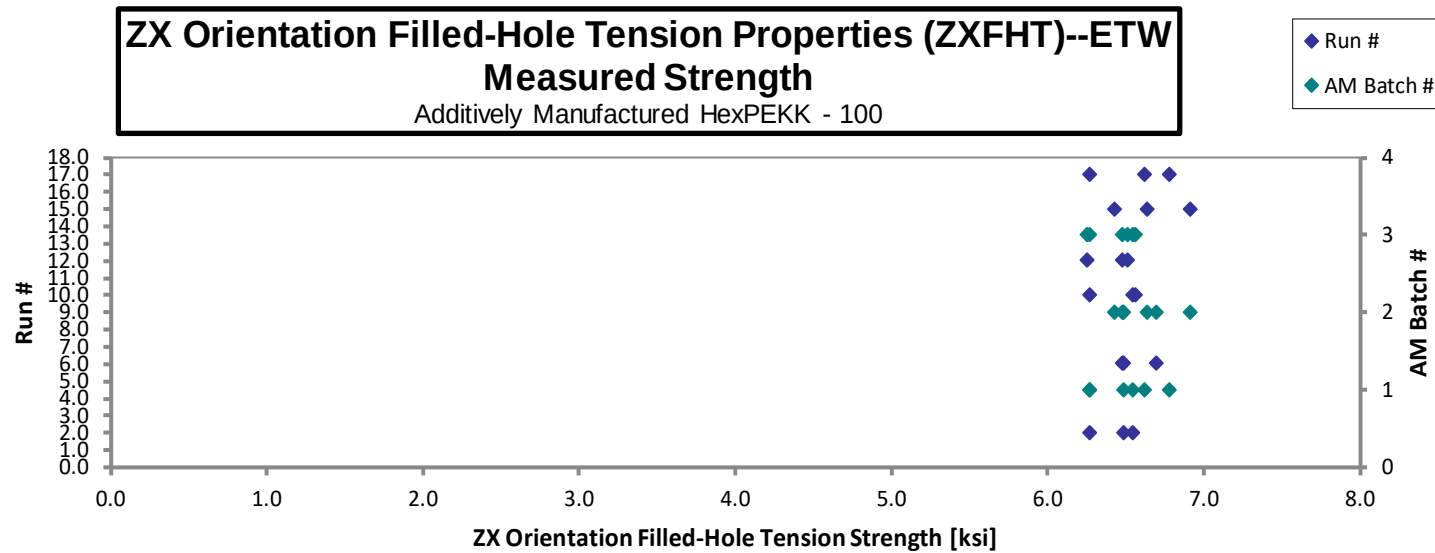


ZX Orientation Filled-Hole Tension Properties (ZXFHT)--ETW**Strength**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-ZXFHT-5B-ETW-10	1	17	6.617	0.1181	M(A,L)GM
HL-A-R17-11-ZXFHT-2T-ETW-12	1	17	6.264	0.1158	LGM
HL-A-R17-11-ZXFHT-3B-ETW-8	1	17	6.778	0.1177	M(A,L)GM
HL-A-R2-13-ZXFHT-2T-ETW-11	1	2	6.547	0.1083	M(A,L)GM, LGF
HL-A-R2-13-ZXFHT-3B-ETW-7	1	2	6.485	0.1089	M(A,L)GT
HL-A-R2-13-ZXFHT-5B-ETW-9	1	2	6.265	0.1074	M(A,L)GM, LGF
HL-B-R15-18-ZXFHT-5B-ETW-10	2	15	6.639	0.1029	M(A,L)GB
HL-B-R15-18-ZXFHT-5T-ETW-12	2	15	6.908	0.1014	M(A,L)GB
HL-B-R15-18-ZXFHT-1B-ETW-8	2	15	6.426	0.1052	M(A,L)GB
HL-B-R6-8-ZXFHT-1B-ETW-16	2	6	6.691	0.1078	M(A,L)GM
HL-B-R6-8-ZXFHT-5B-ETW-18	2	6	6.482	0.1099	LGM
HL-B-R6-8-ZXFHT-4T-ETW-20	2	6	6.473	0.1129	M(A,L)GM
HL-C-R10-5-ZXFHT-3B-ETW-15	3	10	6.265	0.1143	LGM
HL-C-R10-5-ZXFHT-2T-ETW-17	3	10	6.559	0.1136	LGM
HL-C-R10-5-ZXFHT-5T-ETW-19	3	10	6.546	0.1145	M(A,L)GM
HL-C-R12-3-ZXFHT-4T-ETW-11	3	12	6.513	0.1097	M(A,L)GM, M(A,L)GF
HL-C-R12-3-ZXFHT-1B-ETW-7	3	12	6.255	0.1104	LGM
HL-C-R12-3-ZXFHT-1T-ETW-9	3	12	6.480	0.1124	M(A,L)GM

Average	6.511	0.1106
Standard Dev.	0.1803	
Coeff. of Var. [%]	2.770	
Min.	6.255	0.1014
Max.	6.908	0.1181
Number of Spec.	18	18



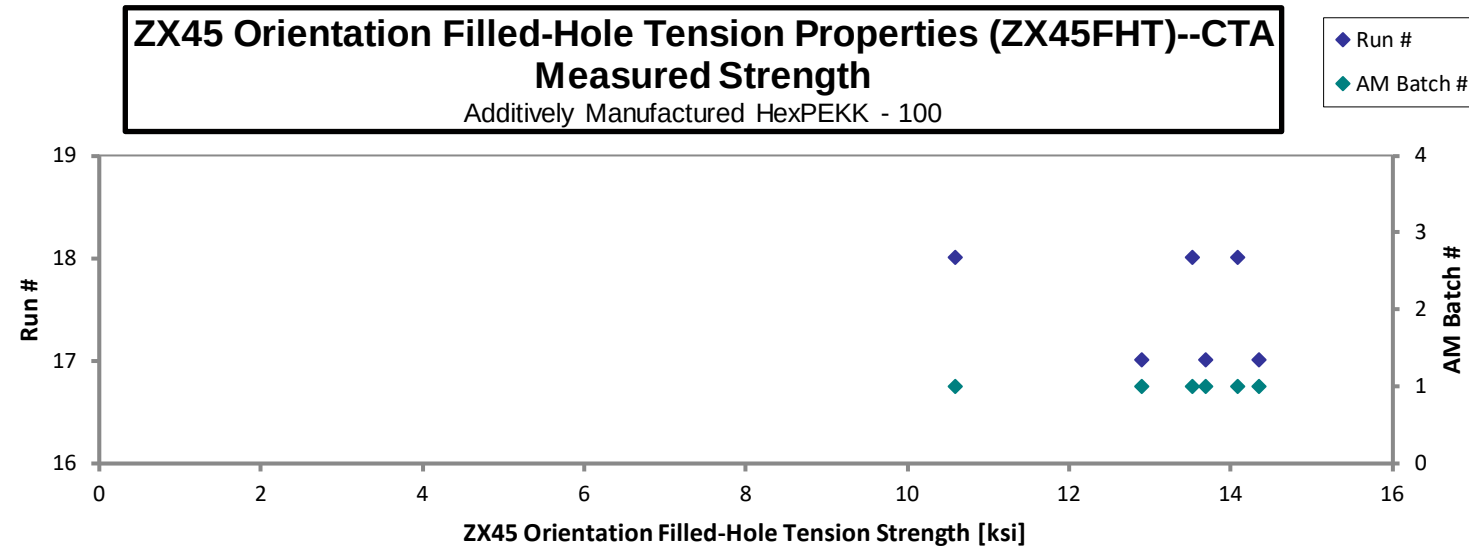
4.27 ZX45 Filled-Hole Tension Properties (ZX45FHT)

**ZX45 Orientation Filled-Hole Tension Properties (ZX45FHT)--CTA□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-ZX45FHT-2B-CTA-13	1	17	14.35	0.1155	AGM, M(A,L)GB
HL-A-R17-11-ZX45FHT-4B-CTA-15	1	17	12.89	0.1095	AGM, M(A,S,L)GT, SGB
HL-A-R17-11-ZX45FHT-1T-CTA-18	1	17	13.69	0.1261	M(A,L)GM, AGB, AWT
HL-A-R18-12-ZX45FHT-4B-CTA-16	1	18	10.59	0.1133	M(A,L)GM
HL-A-R18-12-ZX45FHT-1T-CTA-17	1	18	14.09	0.1203	XGM
HL-A-R18-12-ZX45FHT-3T-CTA-19	1	18	13.52	0.1141	AGM, SGB, AGT

Average	13.19	0.1165
Standard Dev.	1.369	
Coeff. of Var. [%]	10.38	
Min.	10.59	0.1095
Max.	14.35	0.1261
Number of Spec.	6	6

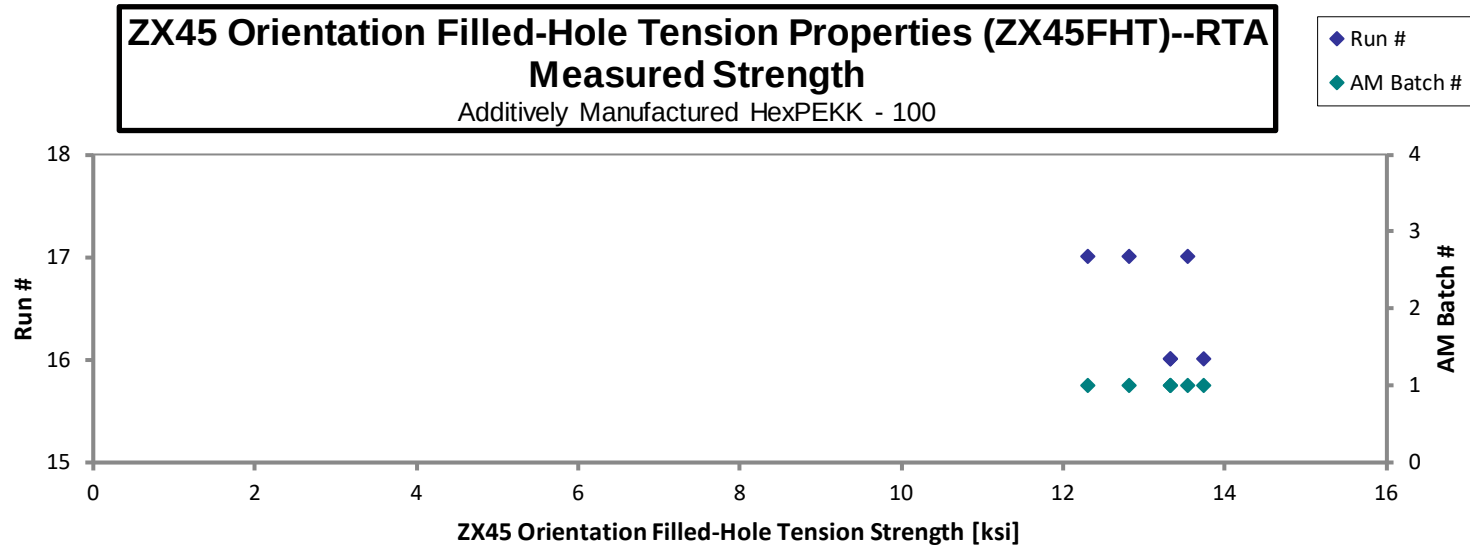


ZX45 Orientation Filled-Hole Tension Properties (ZX45FHT)--RTA□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZX45FHT-4B-RTA-15	1	16	13.75	0.1092	M(A,L)GF
HL-A-R16-10-ZX45FHT-1T-RTA-18	1	16	13.32	0.1225	M(A,L)GF
HL-A-R16-10-ZX45FHT-3T-RTA-20	1	16	13.33	0.1196	M(A,L)GM
HL-A-R17-11-ZX45FHT-2B-RTA-14	1	17	12.81	0.1144	M(A,L)GM, M(A,L)GF
HL-A-R17-11-ZX45FHT-4B-RTA-16	1	17	12.31	0.1139	M(A,L)GM, M(A,L)GF, M(L,S)WB
HL-A-R17-11-ZX45FHT-1T-RTA-17	1	17	13.54	0.1195	M(A,L)GF

Average	13.17	0.1165
Standard Dev.	0.5267	
Coeff. of Var. [%]	3.998	
Min.	12.31	0.1092
Max.	13.75	0.1225
Number of Spec.	6	6



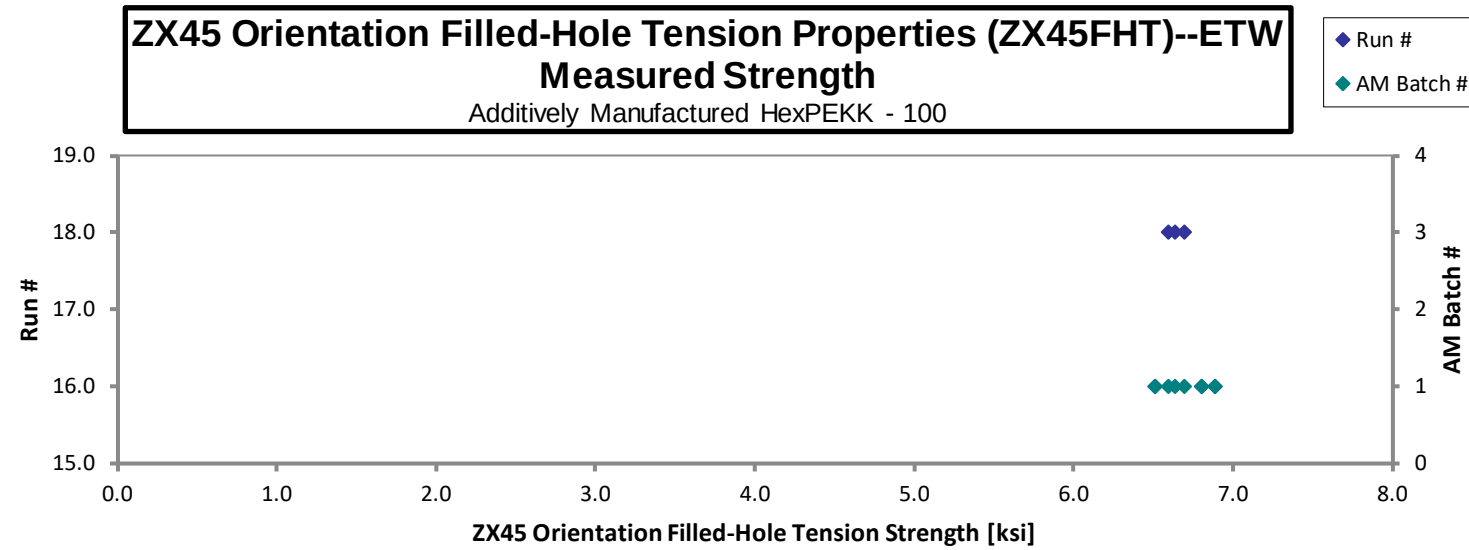
ZX45 Orientation Filled-Hole Tension Properties (ZX45FHT)--ETW

Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZX45FHT-2B-ETW-13	1	16	6.888	0.1154	M(A,L)GM
HL-A-R16-10-ZX45FHT-1T-ETW-17	1	16	6.514	0.1225	M(A,L)GM
HL-A-R16-10-ZX45FHT-3T-ETW-19	1	16	6.801	0.1150	LGM
HL-A-R18-12-ZX45FHT-2B-ETW-13	1	18	6.632	0.1164	M(A,L)GM
HL-A-R18-12-ZX45FHT-4B-ETW-15	1	18	6.595	0.1114	M(A,L)GM
HL-A-R18-12-ZX45FHT-1T-ETW-18	1	18	6.692	0.1236	M(A,L)GM

Average	6.687	0.1174
Standard Dev.	0.1379	
Coeff. of Var. [%]	2.062	
Min.	6.514	0.1114
Max.	6.888	0.1236
Number of Spec.	6	6



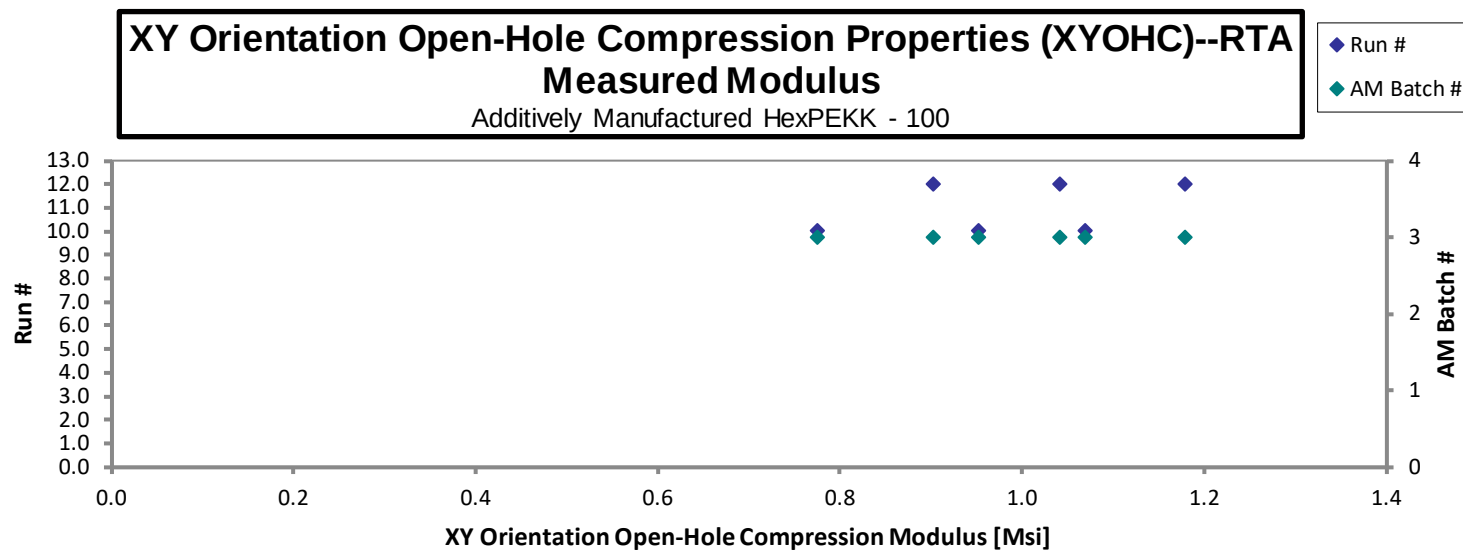
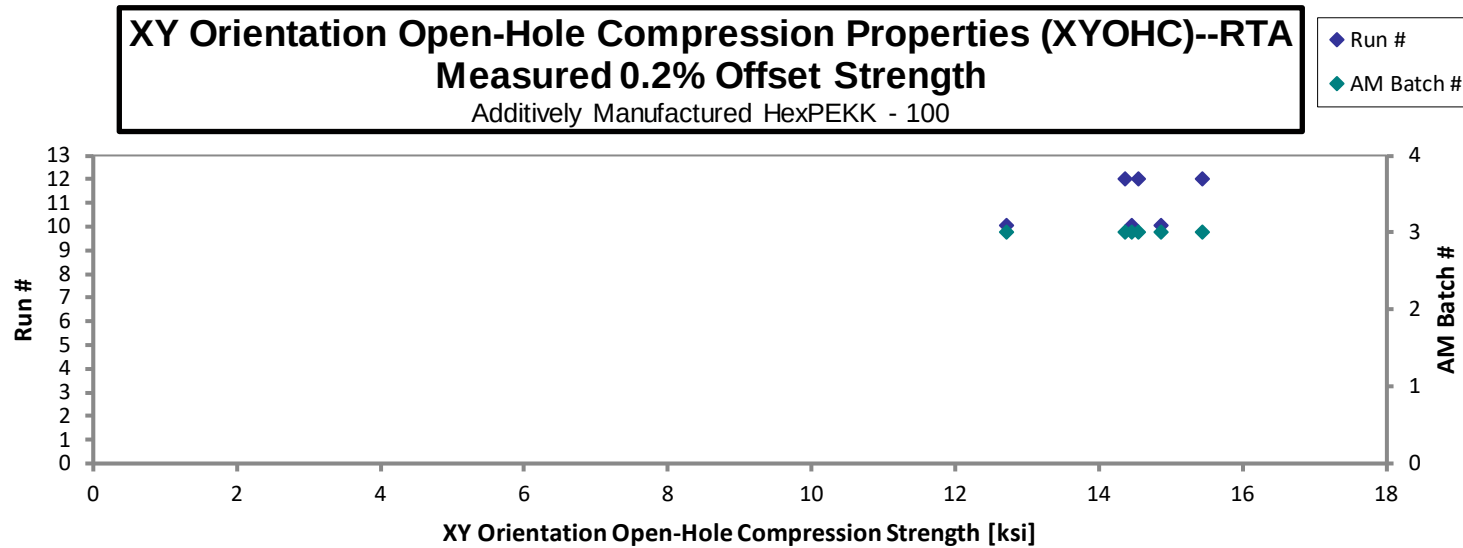
4.28 XY Open-Hole Compression Properties (XYOHC)

XY Orientation Open-Hole Compression Properties (XYOHC)--RTA**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R10-5-XYOHC-4B-RTA-1(RB04)	3	10	12.72	0.7749	0.1810	SGM, AGM
HL-C-R10-5-XYOHC-4B-RTA-2(RB04)	3	10	14.87	1.069	0.1852	SGM, AGM
HL-C-R10-5-XYOHC-1T-RTA-3(RB04)	3	10	14.46	0.9522	0.1823	SGM, AGM
HL-C-R12-3-XYOHC-4B-RTA-1(RB02)	3	12	14.56	1.179	0.1746	SGM, AGM
HL-C-R12-3-XYOHC-5B-RTA-2(RB02)	3	12	15.44	1.041	0.1720	SGM, M(A,L)GM
HL-C-R12-3-XYOHC-1T-RTA-3(RB02)	3	12	14.36	0.9028	0.1742	SGM, M(A,L)GM

Average	14.40	0.9865	0.1782
Standard Dev.	0.9120	0.1413	
Coeff. of Var. [%]	6.334	14.33	
Min.	12.72	0.7749	0.1720
Max.	15.44	1.179	0.1852
Number of Spec.	6	6	6



XY Orientation Open-Hole Compression Properties (XYOHC)--ETW□

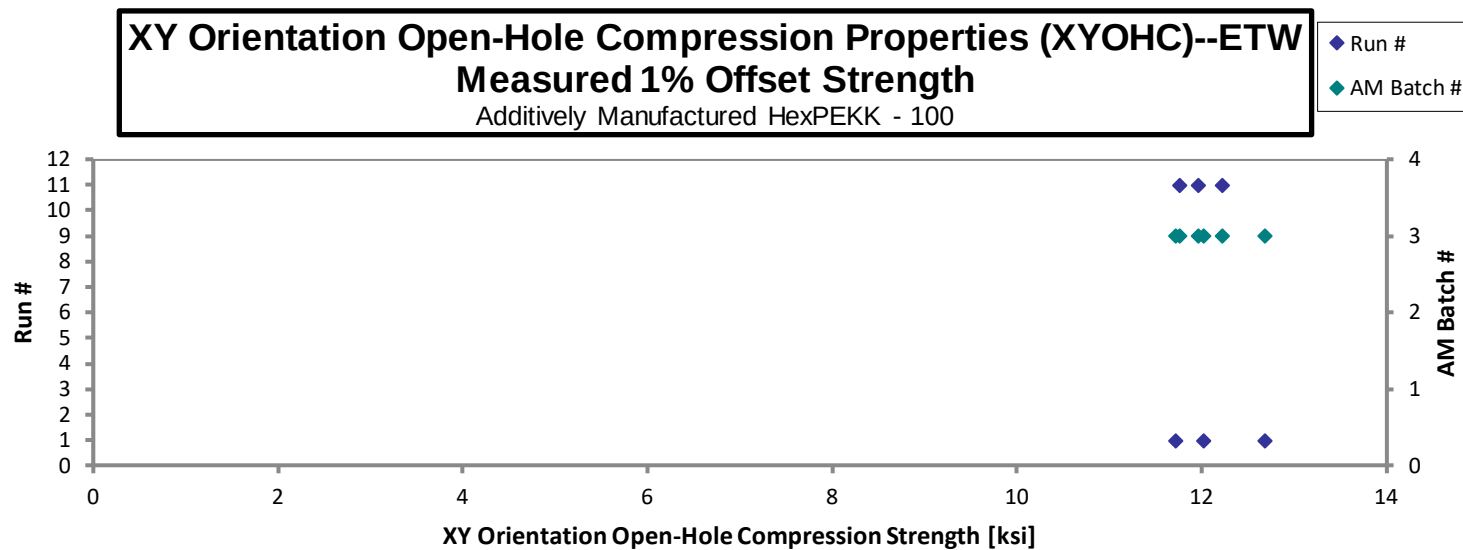
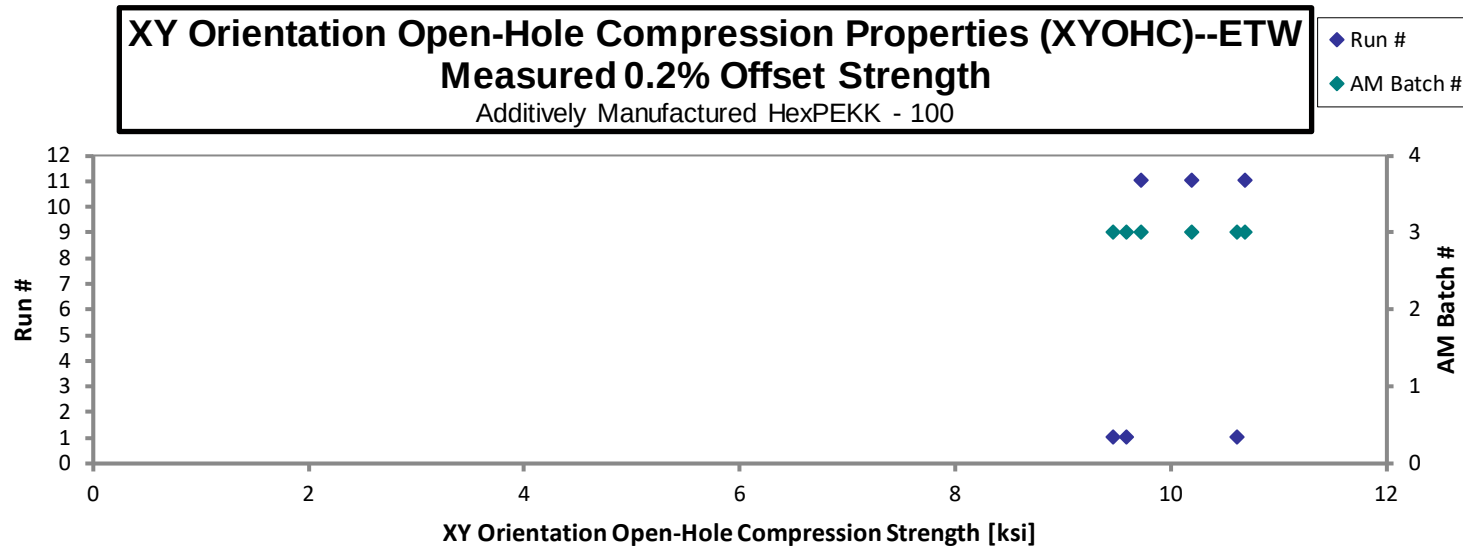
Strength & Modulus□

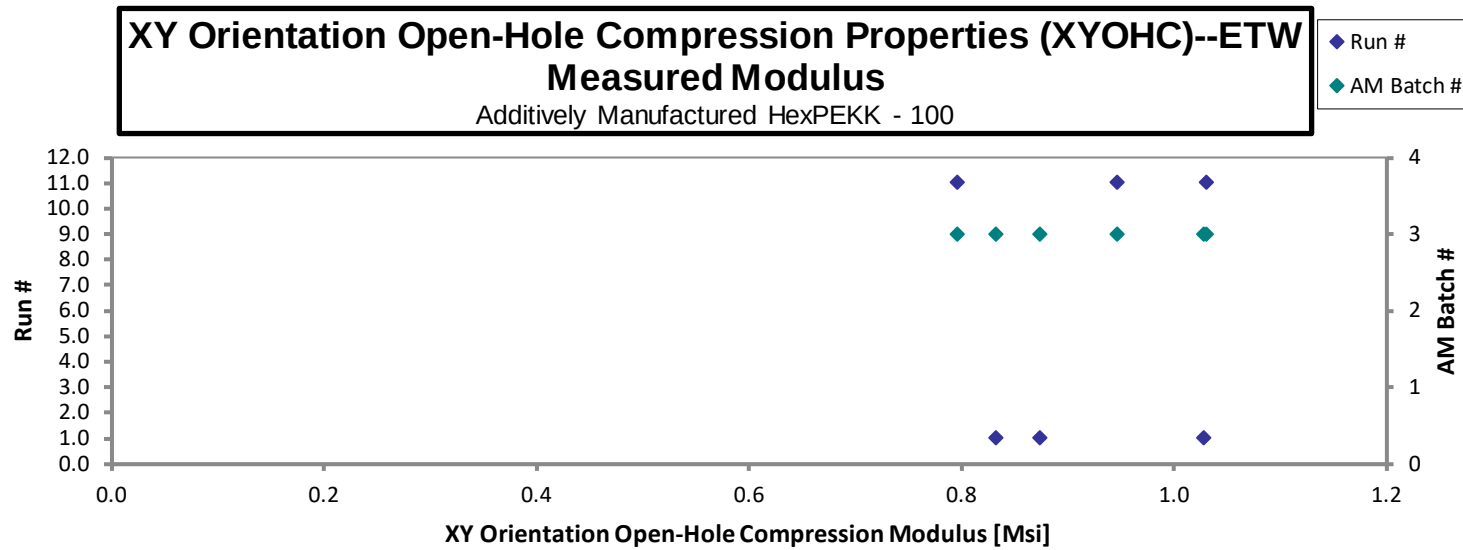
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Strength [ksi]	1% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]
HL-C-R1-1-XYOHC-4B-ETW-1	3	1	10.61	12.68	1.028	0.1717
HL-C-R1-1-XYOHC-5B-ETW-2	3	1	9.463	12.03	0.8325	0.1691
HL-C-R1-1-XYOHC-1T-ETW-3	3	1	9.584	11.72	0.8739	0.1694
HL-C-R11-6-XYOHC-4B-ETW-1	3	11	10.68	12.22	1.031	0.1771
HL-C-R11-6-XYOHC-4B-ETW-2	3	11	10.19	11.96	0.9469	0.1806
HL-C-R11-6-XYOHC-1T-ETW-3	3	11	9.720	11.76	0.7955	0.1796

****Failure mode was not recorded as coupons failed outside the failure mode defined by ASTM**

Average	10.04	12.06	0.9179	0.1746
Standard Dev.	0.5291	0.3548	0.09986	
Coeff. of Var. [%]	5.269	2.942	10.88	
Min.	9.463	11.72	0.7955	0.1691
Max.	10.68	12.68	1.031	0.1806
Number of Spec.	6	6	6	6





4.29 YX Open-Hole Compression Properties (YXOHC)

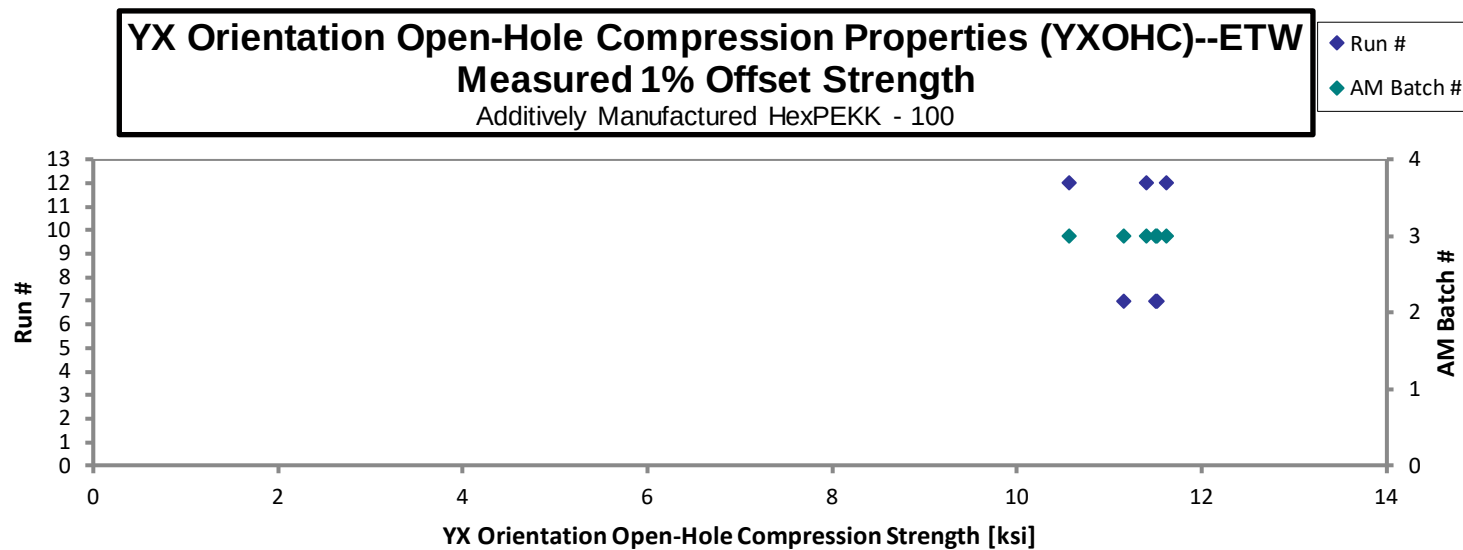
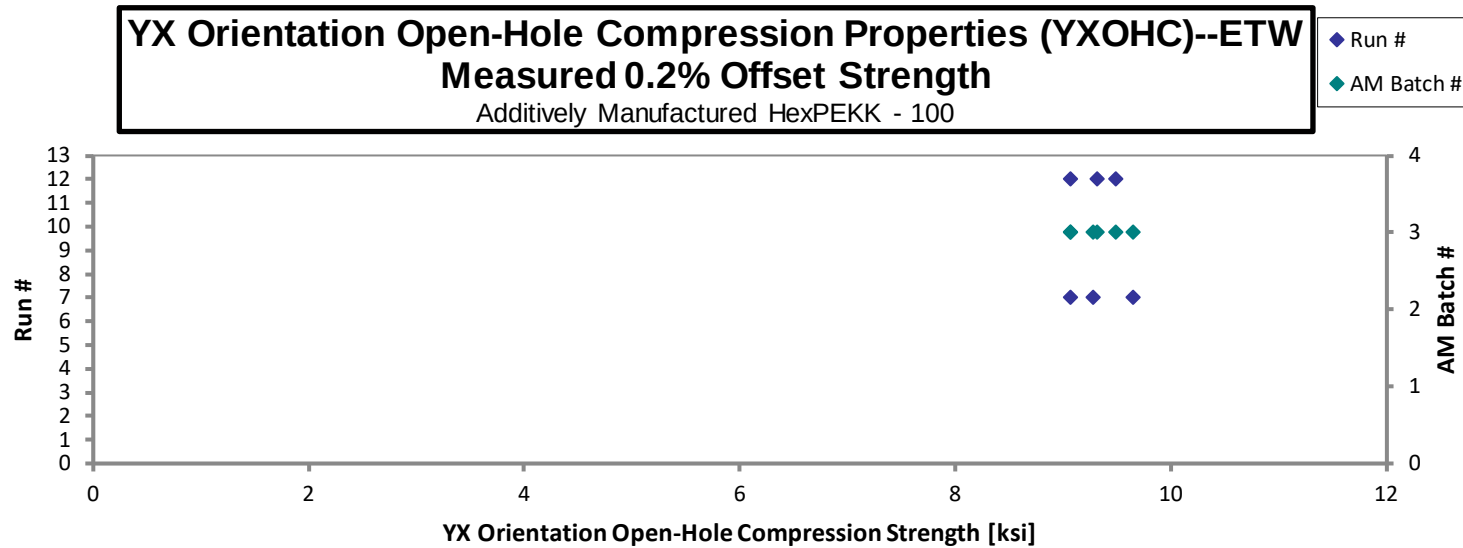
YX Orientation Open-Hole Compression Properties (YXOHC)--ETW
Strength & Modulus

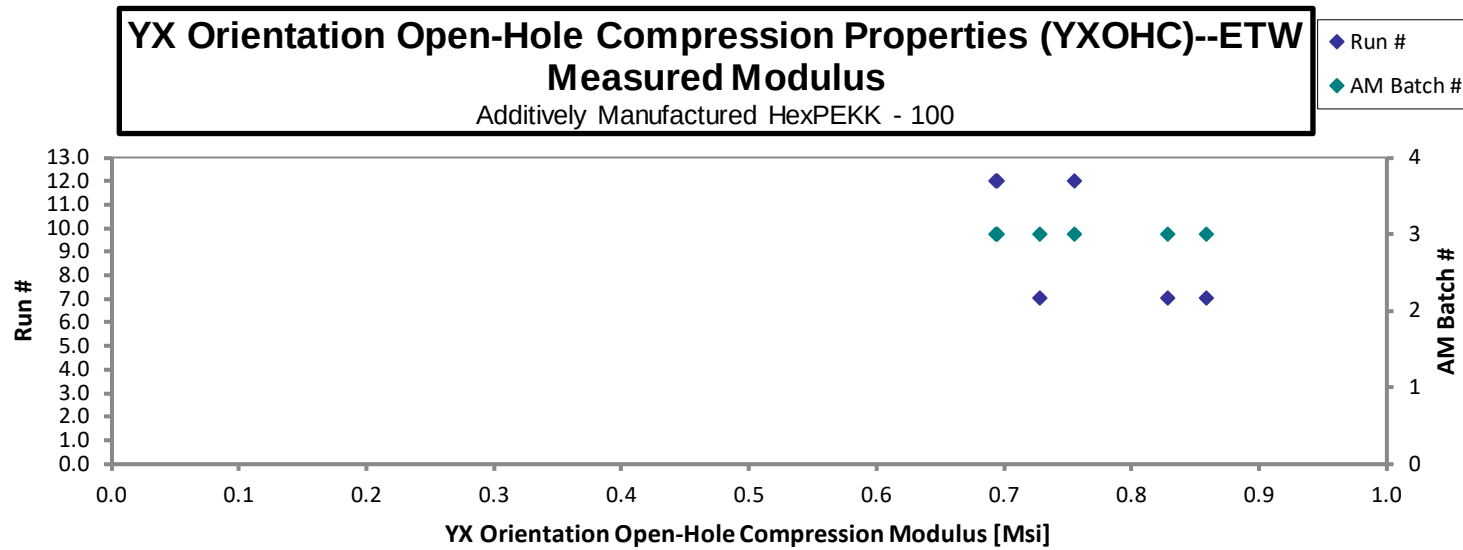
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Strength [ksi]	1% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]
HL-C-R12-3-YXOHC-5B-ETW-4	3	12	9.483	11.41	0.6945	0.1693
HL-C-R12-3-YXOHC-2T-ETW-5	3	12	9.066	10.57	0.7559	0.1708
HL-C-R12-3-YXOHC-5T-ETW-6	3	12	9.312	11.62	0.6941	0.1723
HL-C-R7-4-YXOHC-2B-ETW-4	3	7	9.071	11.15	0.7284	0.1675
HL-C-R7-4-YXOHC-5B-ETW-5	3	7	9.274	11.51	0.8288	0.1672
HL-C-R7-4-YXOHC-3T-ETW-6	3	7	9.644	11.52	0.8586	0.1724

****Failure mode was not recorded as coupons failed outside the failure mode defined by ASTM**

Average	9.308	11.30	0.7601	0.1699
Standard Dev.	0.2276	0.3912	0.06943	
Coeff. of Var. [%]	2.446	3.463	9.134	
Min.	9.066	10.57	0.6941	0.1672
Max.	9.644	11.62	0.8586	0.1724
Number of Spec.	6	6	6	6





4.30 XZ Open-Hole Compression Properties (XZOHC)

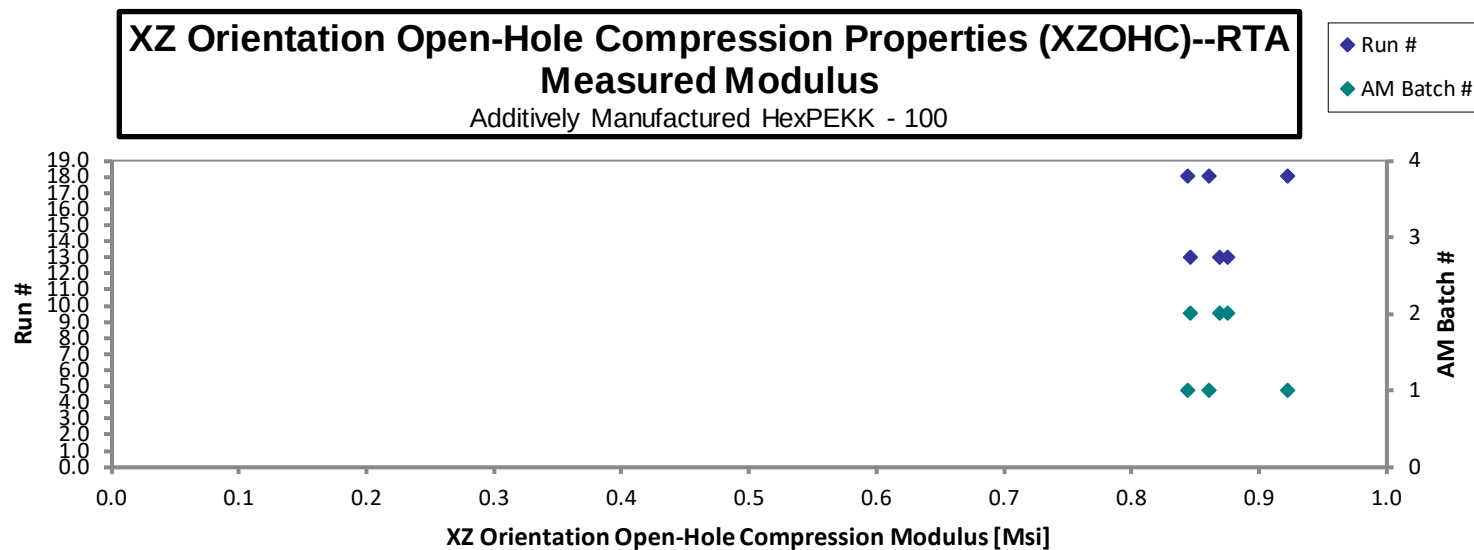
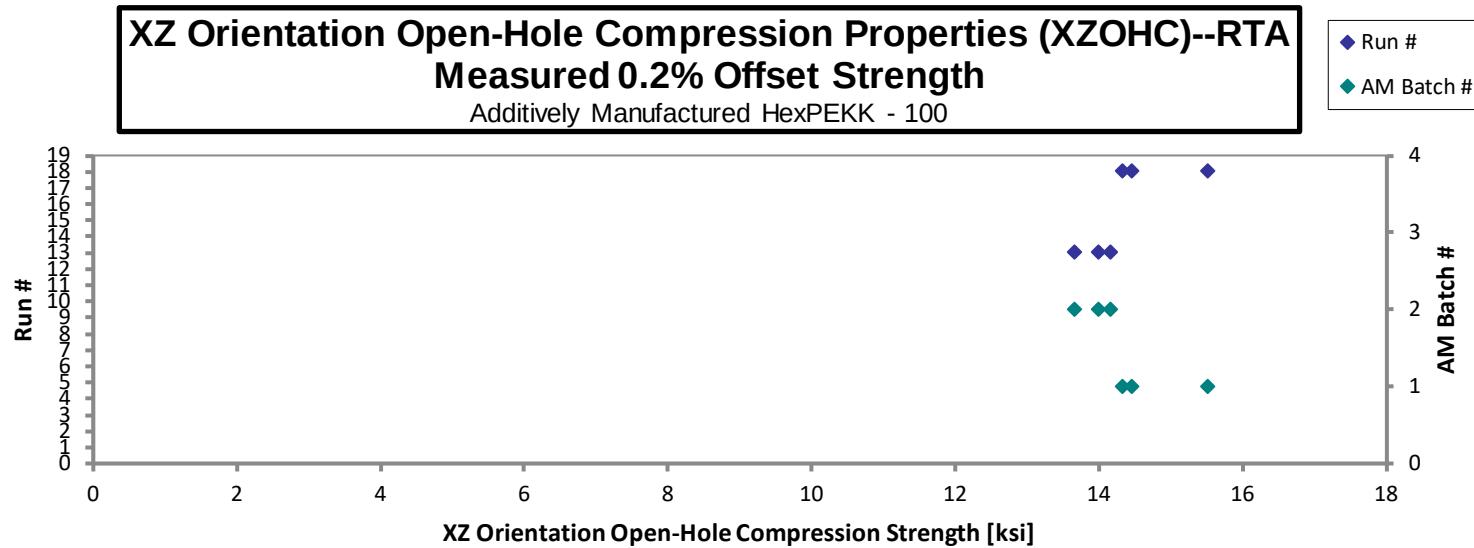
XZ Orientation Open-Hole Compression Properties (XZOHC)--RTA
Strength & Modulus

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Strength [ksi]	1% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]
HL-A-R18-12-XZOHC-1B-RTA-1(RB08)	1	18	15.51		0.8445	0.1726
HL-A-R18-12-XZOHC-2T-RTA-2(RB08)	1	18	14.32		0.9221	0.1710
HL-A-R18-12-XZOHC-4T-RTA-3(RB08)	1	18	14.46		0.8614	0.1620
HL-B-R13-9-XZOHC-1B-RTA-1(RB07)	2	13	14.16		0.8695	0.1758
HL-B-R13-9-XZOHC-5B-RTA-2(RB07)	2	13	13.99		0.8757	0.1755
HL-B-R13-9-XZOHC-4T-RTA-3(RB07)	2	13	13.65		0.8463	0.1632

*Coupons fail prior to reaching the 1% offset strength **Failure mode was not recorded as coupons failed outside the failure mode defined by ASTM

Average	14.35		0.8699	0.1700
Standard Dev.	0.6334		0.02842	
Coeff. of Var. [%]	4.415		3.267	
Min.	13.65		0.8445	0.1620
Max.	15.51		0.9221	0.1758
Number of Spec.	6	0	6	6



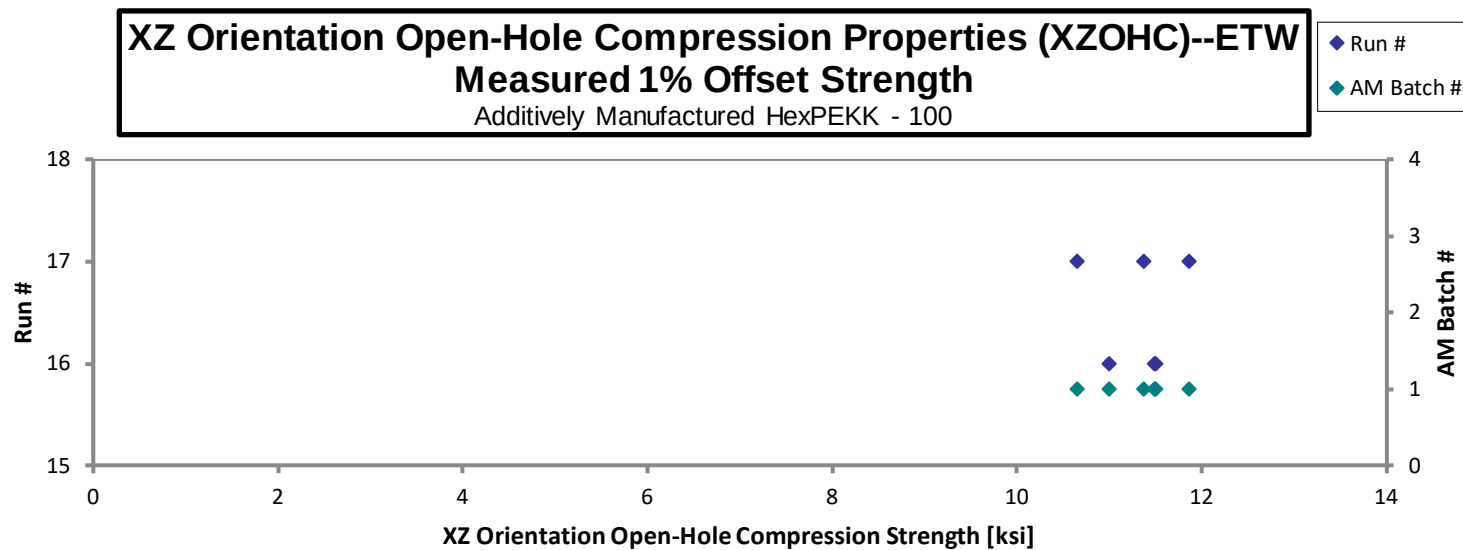
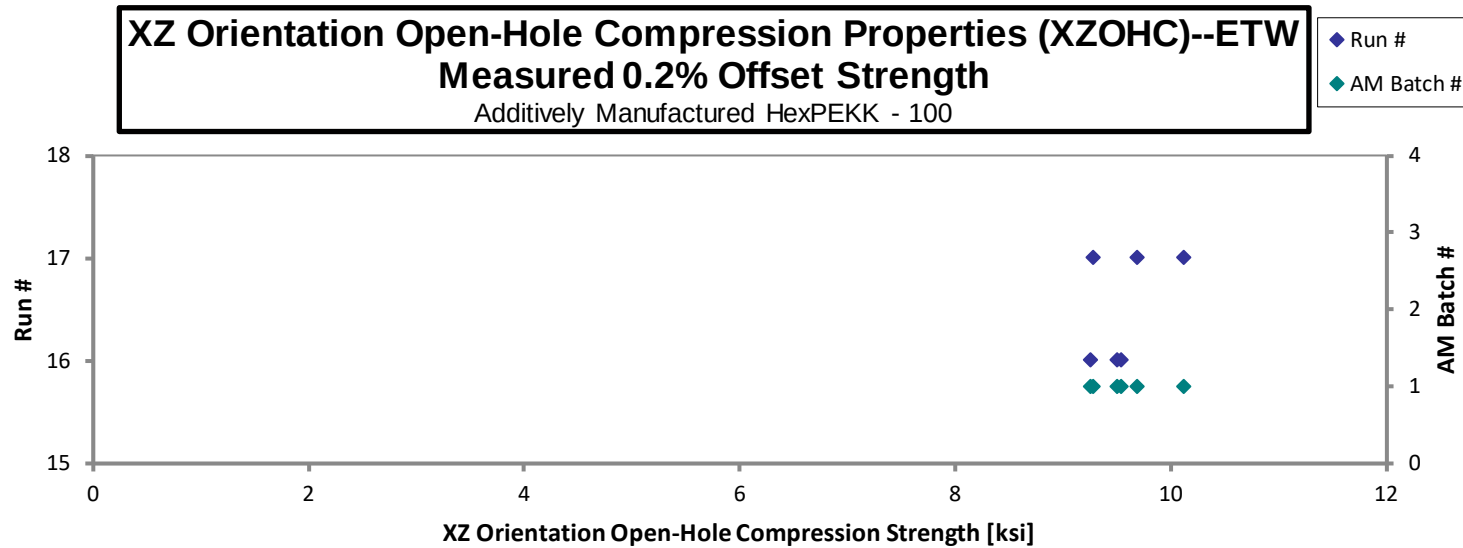
XZ Orientation Open-Hole Compression Properties (XZOHC)--ETW**Strength & Modulus**

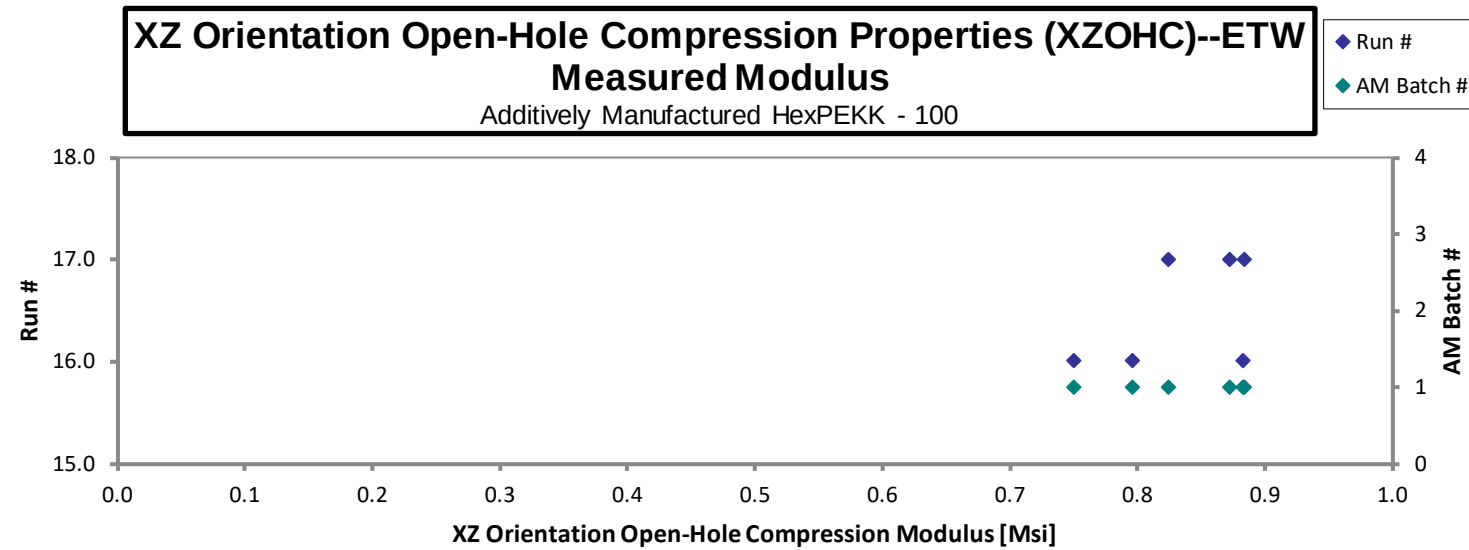
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Strength [ksi]	1% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]
HL-A-R16-10-XZOHC-1B-ETW-1	1	16	9.251	11.49	0.7502	0.1713
HL-A-R16-10-XZOHC-2T-ETW-2	1	16	9.504	10.99	0.8825	0.1698
HL-A-R16-10-XZOHC-4T-ETW-3	1	16	9.533	11.50	0.7962	0.1611
HL-A-R17-11-XZOHC-1B-ETW-1	1	17	10.12	11.86	0.8239	0.1731
HL-A-R17-11-XZOHC-2T-ETW-2	1	17	9.278	10.65	0.8719	0.1705
HL-A-R17-11-XZOHC-4T-ETW-3	1	17	9.690	11.38	0.8836	0.1611

**Failure mode was not recorded
as coupons failed outside the
failure mode defined by ASTM

Average	9.562	11.31	0.8347	0.1678
Standard Dev.	0.3186	0.427	0.054	
Coeff. of Var. [%]	3.331	3.772	6.518	
Min.	9.251	10.65	0.7502	0.1611
Max.	10.12	11.86	0.8836	0.1731
Number of Spec.	6	6	6	6





4.31 ZX Open-Hole Compression Properties (ZXOHC)

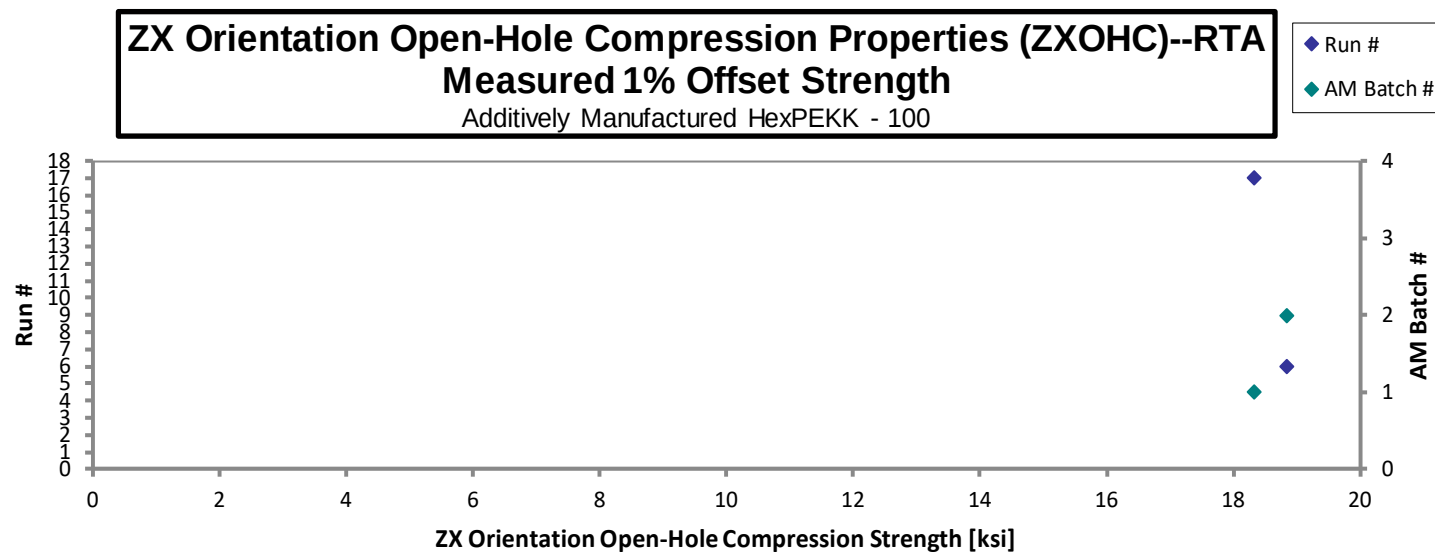
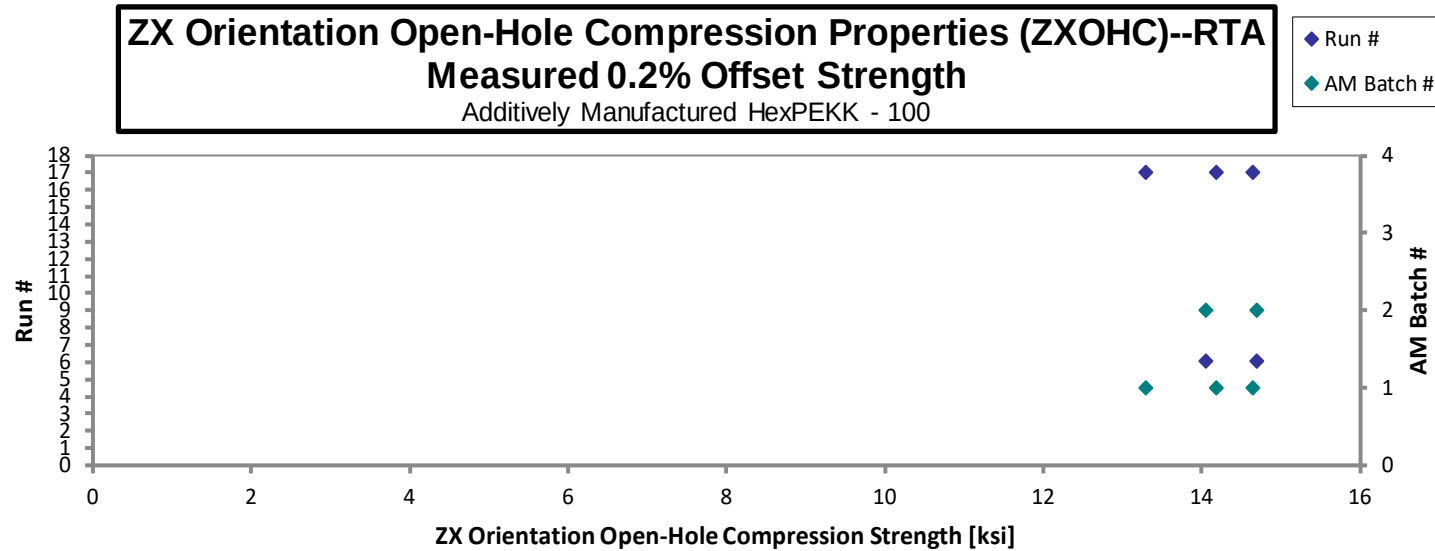
ZX Orientation Open-Hole Compression Properties (ZXOHC)--RTA□ Strength & Modulus□

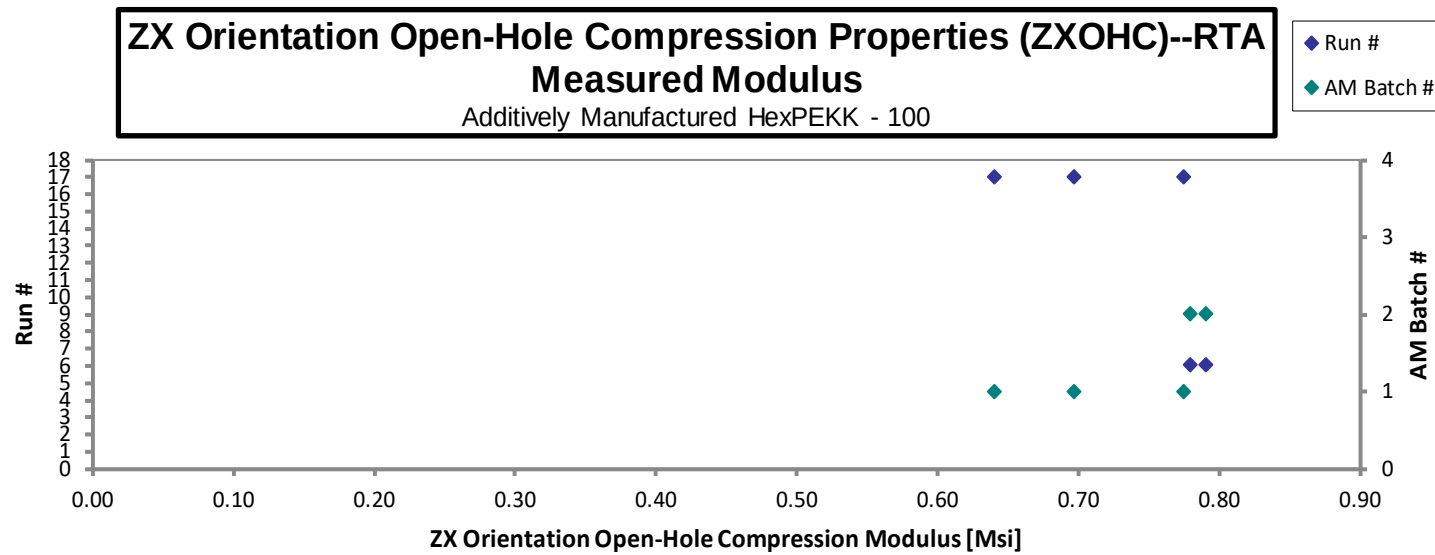
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Strength [ksi]	1% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]
HL-A-R17-11-ZXOHC-3B-RTA-4(RB10)	1	17	14.65		0.6966	0.1767
HL-A-R17-11-ZXOHC-5B-RTA-5(RB10)	1	17	14.18		0.7746	0.1796
HL-A-R17-11-ZXOHC-4T-RTA-6(RB10)	1	17	13.30	18.34	0.6406	0.1815
HL-B-R6-8-ZXOHC-2B-RTA-4(RB12)	2	6	14.70		0.7903	0.1693
HL-B-R6-8-ZXOHC-5T-RTA-6(RB12)	2	6	14.06	18.83	0.7790	0.1711

**Coupons RTA-4 & 5 fail prior to reaching the 1% offset strength. Failure mode was not recorded as it was outside the failure mode defined by ASTM

Average	14.18	18.58	0.7362	0.1756
Standard Dev.	0.5663	0.3524	0.06510	
Coeff. of Var. [%]	3.994	1.896	8.842	
Min.	13.30	18.34	0.6406	0.1693
Max.	14.70	18.83	0.7903	0.1815
Number of Spec.	5	2	5	5





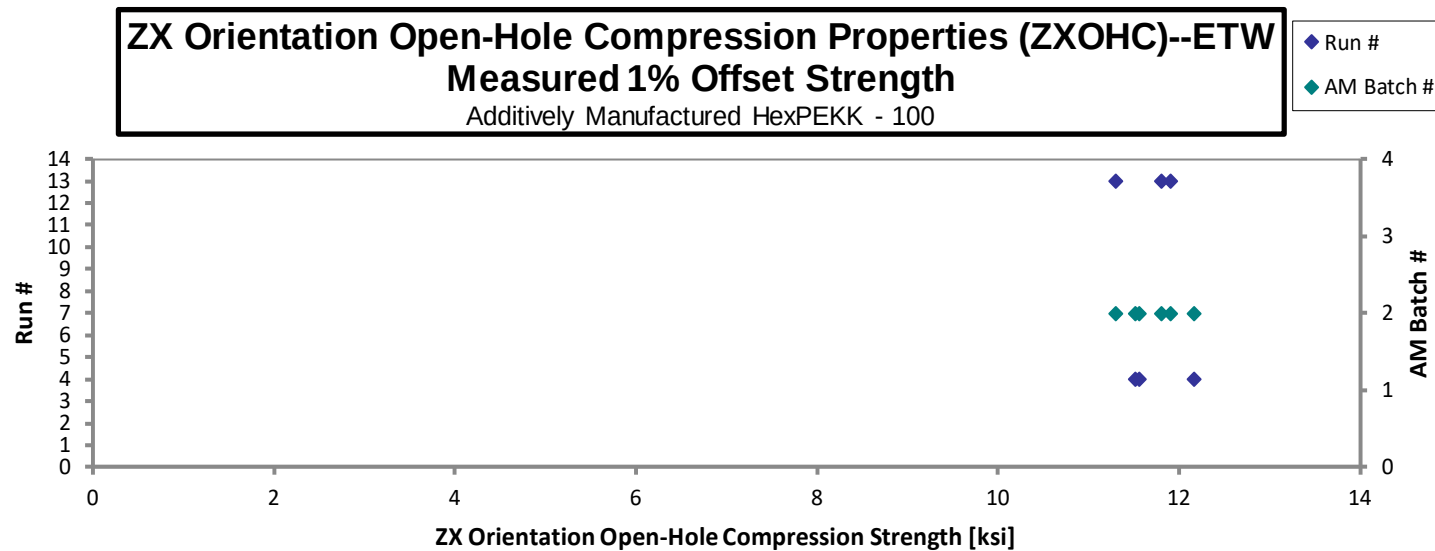
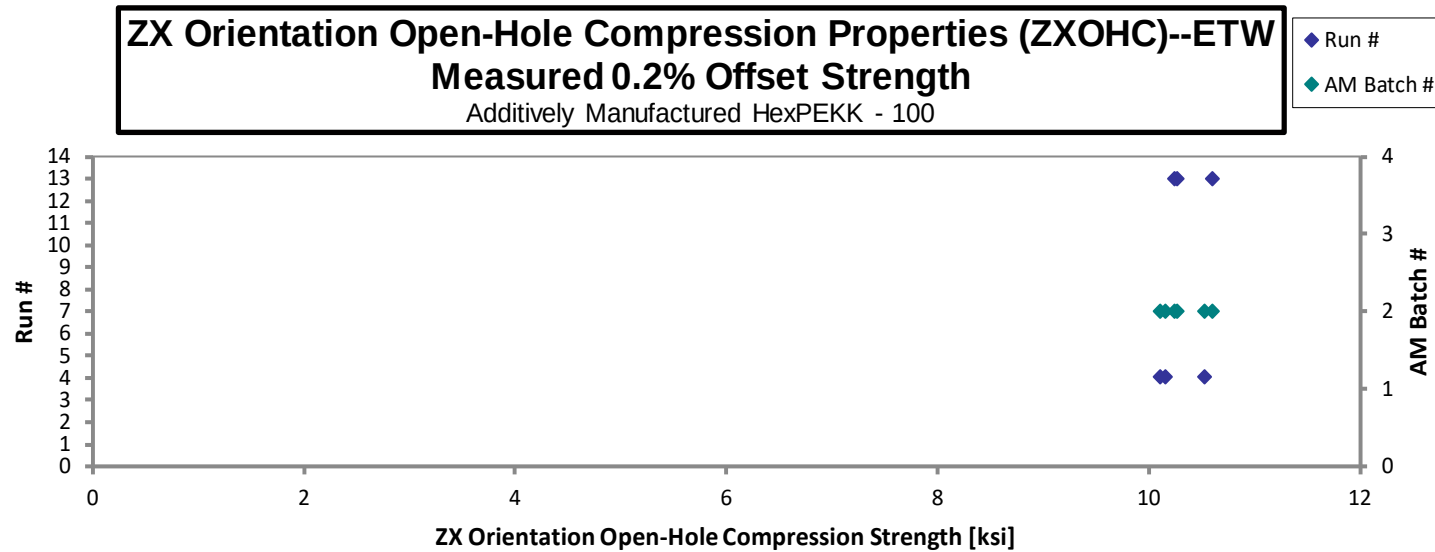
ZX Orientation Open-Hole Compression Properties (ZXOHC)--ETW**Strength & Modulus**

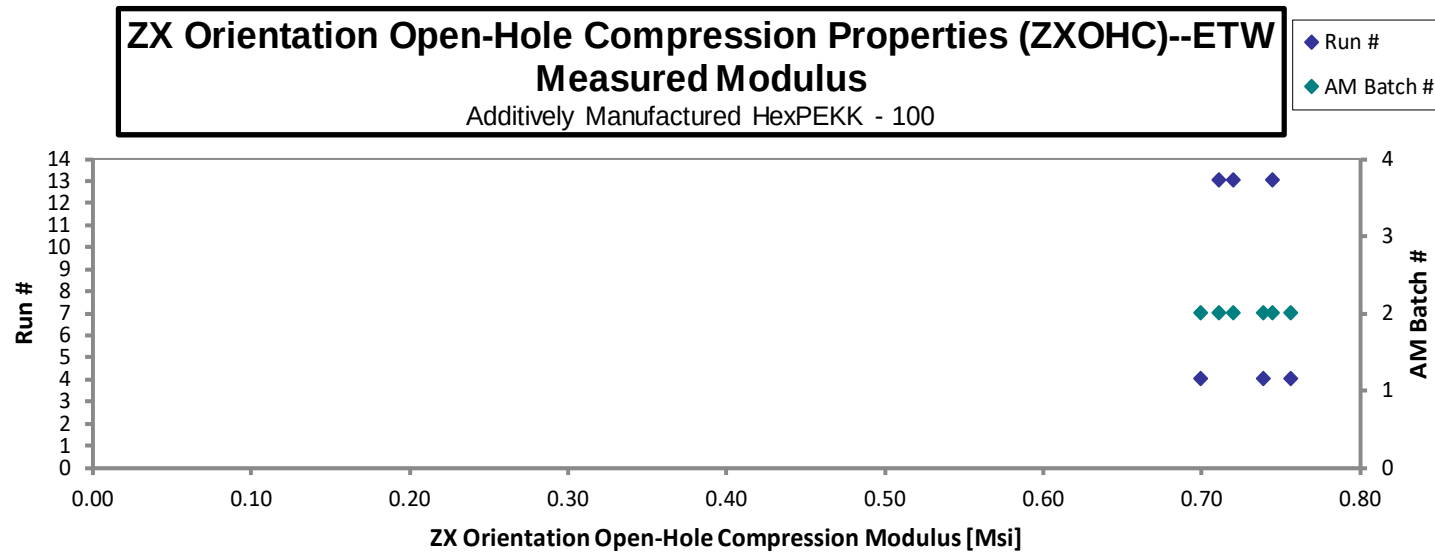
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Strength [ksi]	1% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]
HL-B-R13-9-ZXOHC-2B-ETW-4	2	13	10.60	11.90	0.7449	0.1800
HL-B-R13-9-ZXOHC-3B-ETW-5	2	13	10.25	11.29	0.7107	0.1728
HL-B-R13-9-ZXOHC-5T-ETW-6	2	13	10.27	11.80	0.7202	0.1825
HL-B-R4-7-ZXOHC-2B-ETW-4	2	4	10.16	11.52	0.7562	0.1644
HL-B-R4-7-ZXOHC-3B-ETW-5	2	4	10.53	12.17	0.7392	0.1684
HL-B-R4-7-ZXOHC-5T-ETW-6	2	4	10.10	11.56	0.6994	0.1670

****Failure mode was not recorded as coupons failed outside the failure mode defined by ASTM**

Average	10.32	11.71	0.7284	0.1725
Standard Dev.	0.2014	0.3114	0.02182	
Coeff. of Var. [%]	1.952	2.660	2.995	
Min.	10.10	11.29	0.6994	0.1644
Max.	10.60	12.17	0.7562	0.1825
Number of Spec.	6	6	6	6





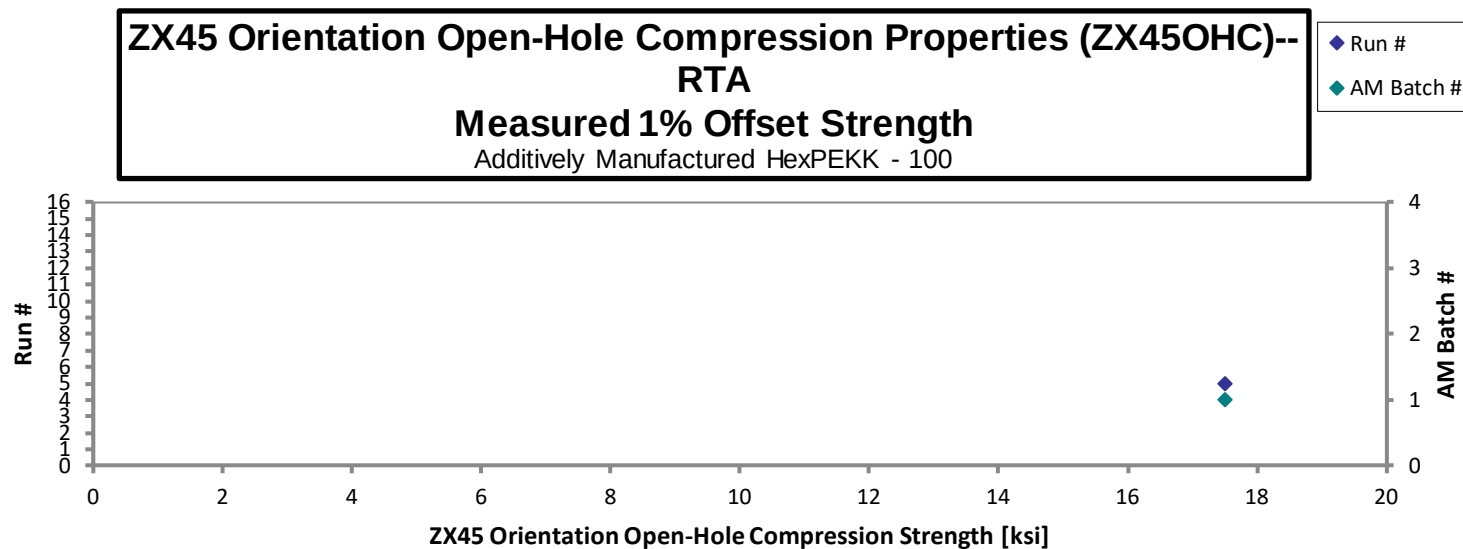
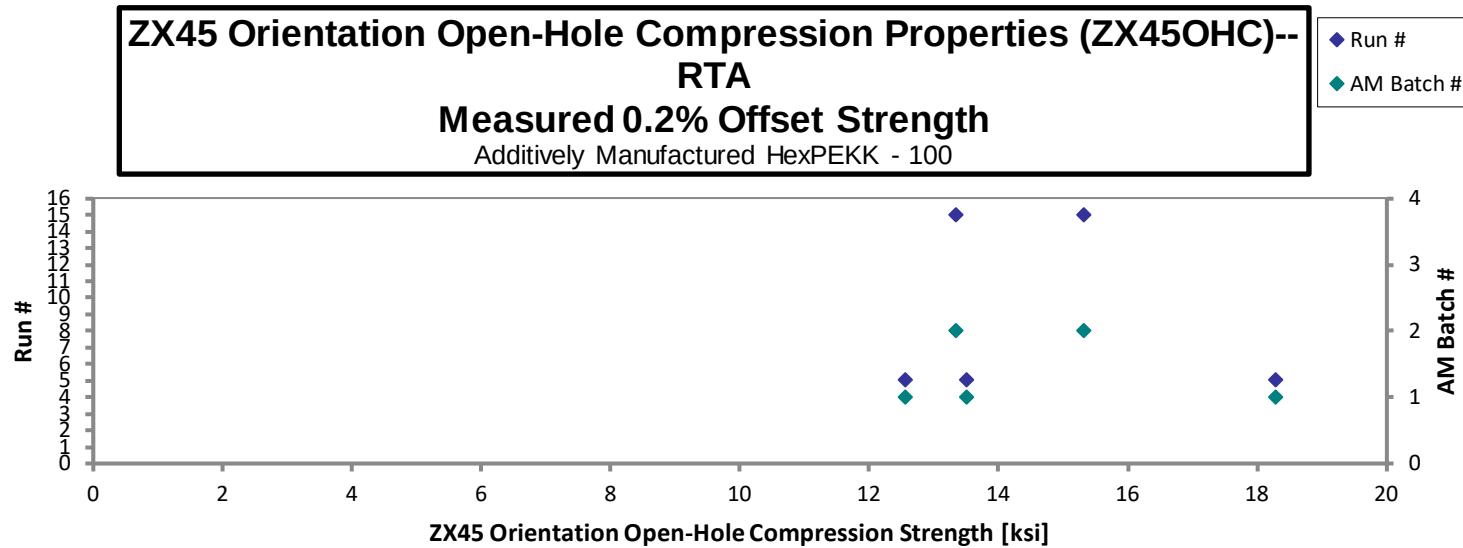
4.32 ZX45 Open-Hole Compression Properties (ZX45OHC)

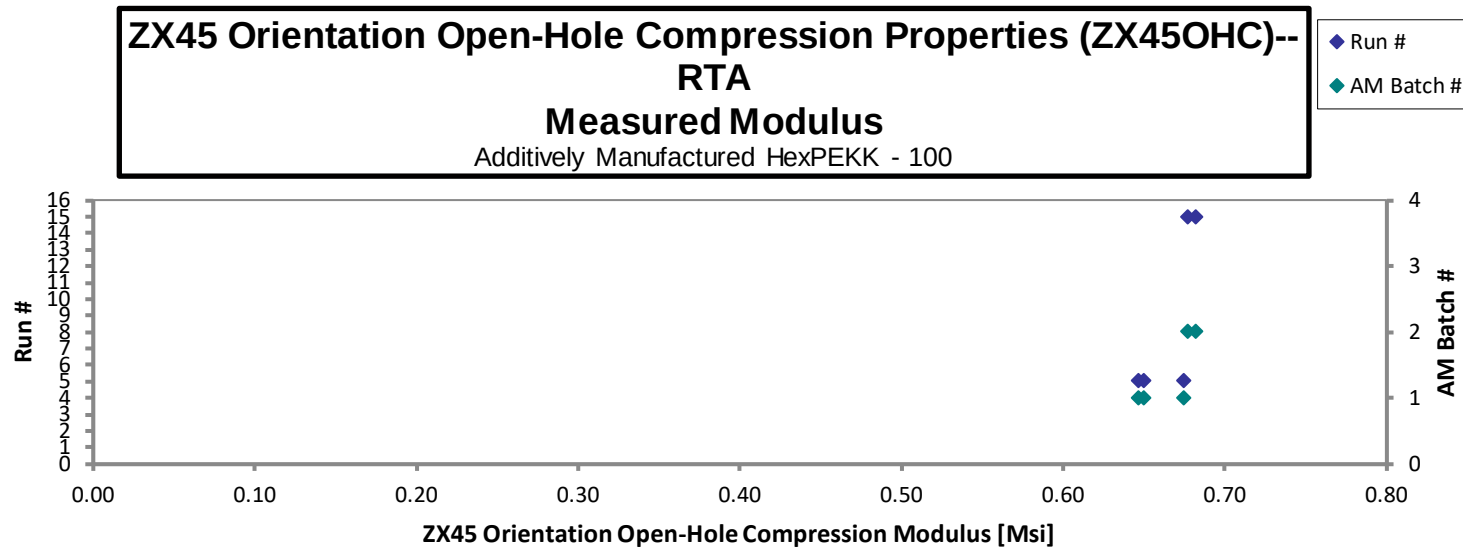
ZX45 Orientation Open-Hole Compression Properties (ZX45OHC)--RTA
Strength & Modulus
 Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Strength [ksi]	1% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]
HL-A-R5-15-ZX45OHC-1B-RTA-1(RB13)	1	5	12.57	17.50	0.6470	0.1820
HL-A-R5-15-ZX45OHC-3B-RTA-2(RB13)	1	5	13.50		0.6748	0.1759
HL-A-R5-15-ZX45OHC-2T-RTA-3(RB13)	1	5	18.28		0.6495	0.1784
HL-B-R15-18-ZX45OHC-3B-RTA-1(RB14)	2	15	13.34		0.6822	0.1692
HL-B-R15-18-ZX45OHC-1T-RTA-2(RB14)	2	15	15.33		0.6772	0.1701

****Some coupons fail prior to reaching the 1% offset strength. Failure mode was not recorded as coupons failed outside the failure mode defined by ASTM**

Average	14.60	17.50	0.6661	0.1751
Standard Dev.	2.292		0.01657	
Coeff. of Var. [%]	15.70		2.487	
Min.	12.57		0.6470	0.1692
Max.	18.28		0.6822	0.1820
Number of Spec.	5	1	5	5



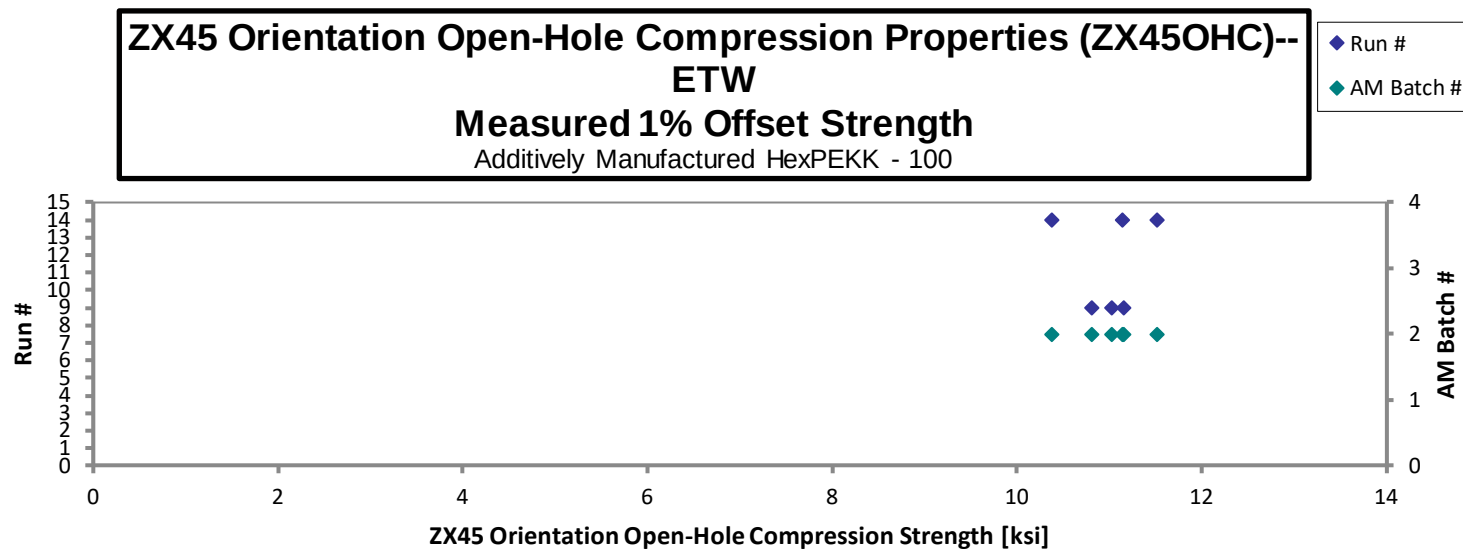
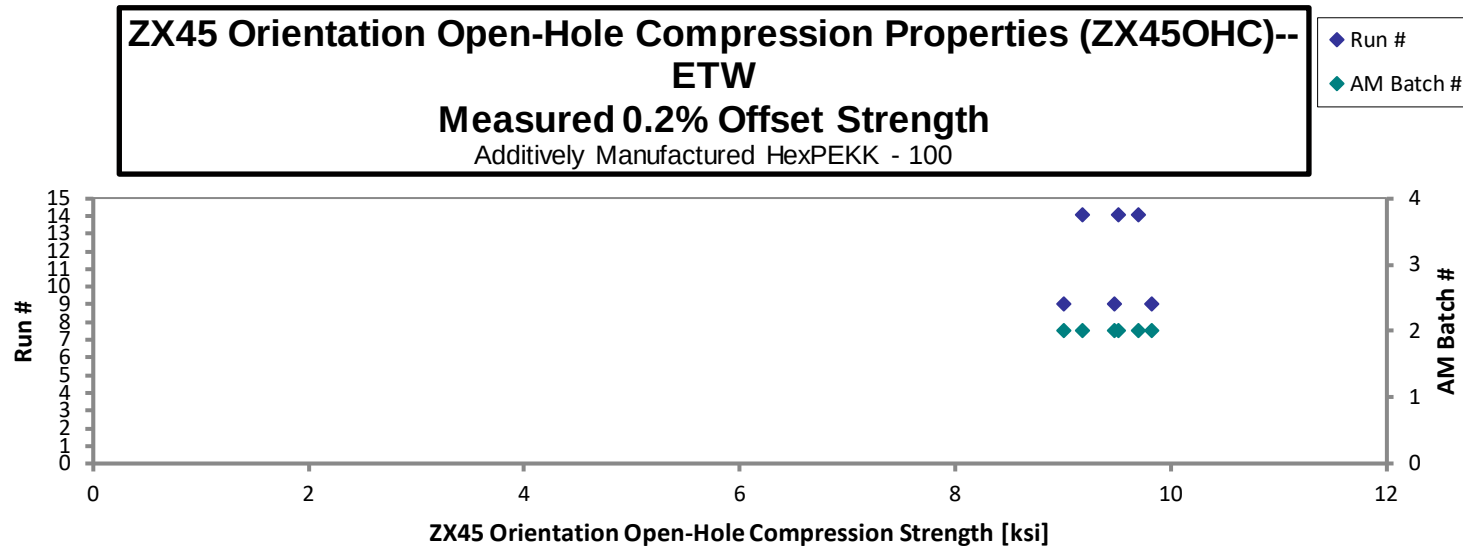


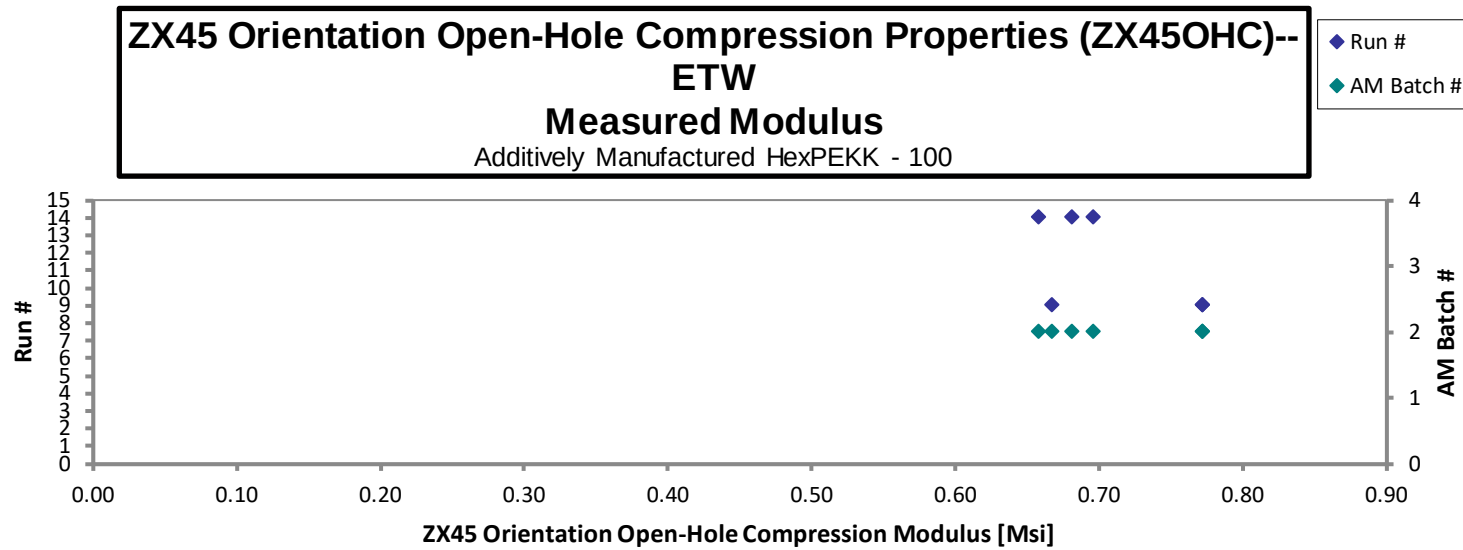
ZX45 Orientation Open-Hole Compression Properties (ZX45OHC)--ETW**Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Strength [ksi]	1% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]
HL-B-R14-17-ZX45OHC-3B-ETW-1	2	14	9.703	11.14	0.6575	0.1715
HL-B-R14-17-ZX45OHC-1T-ETW-2	2	14	9.181	10.37	0.6963	0.1705
HL-B-R14-17-ZX45OHC-2T-ETW-3	2	14	9.509	11.52	0.6813	0.1701
HL-B-R9-16-ZX45OHC-3B-ETW-1	2	9	9.472	11.16	0.7715	0.1706
HL-B-R9-16-ZX45OHC-1T-ETW-2	2	9	9.002	10.81	0.6673	0.1728
HL-B-R9-16-ZX45OHC-2T-ETW-3	2	9	9.820	11.03	0.7721	0.1753

**Failure mode was not recorded as coupons failed outside the failure mode defined by ASTM	Average	9.448	11.01	0.7077	0.1718
	Standard Dev.	0.3090	0.3871	0.05135	
	Coeff. of Var. [%]	3.270	3.517	7.256	
	Min.	9.002	10.37	0.6575	0.1701
	Max.	9.820	11.52	0.7721	0.1753
	Number of Spec.	6	6	6	6





4.33 XY Filled-Hole Compression Properties (XYFHC)

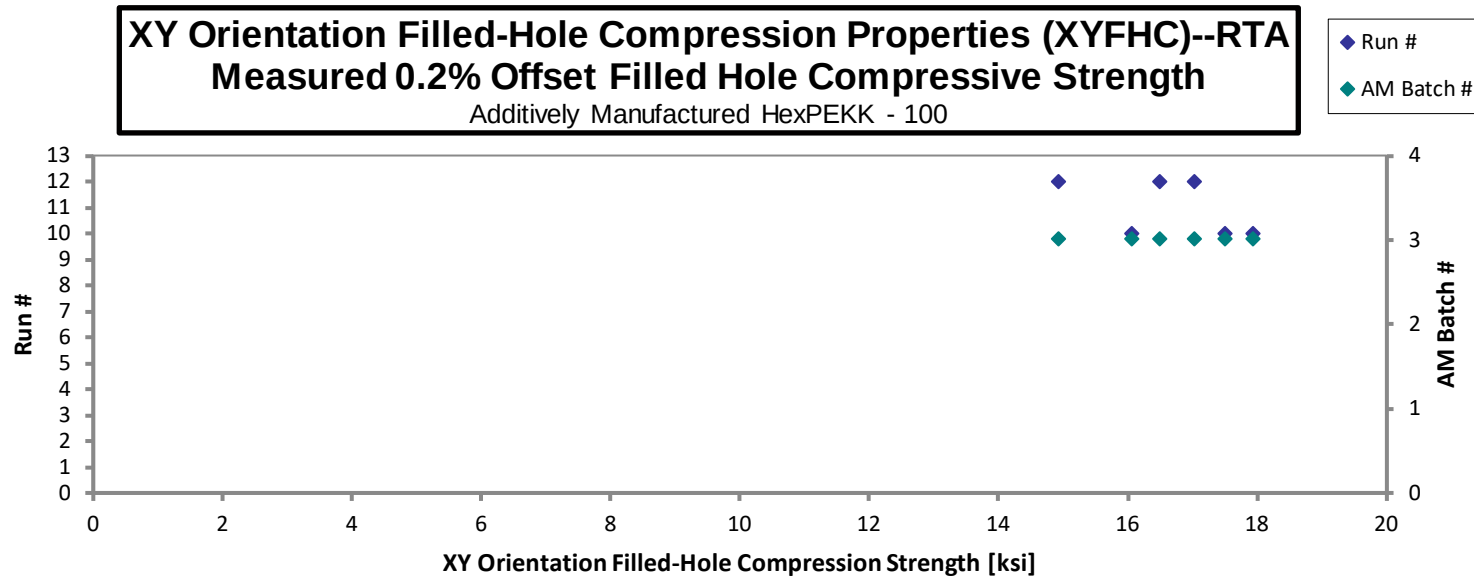
XY Orientation Filled-Hole Compression Properties (XYFHC)--RTA□

Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Filled Hole Compressive Strength [ksi]	Avg. Specimen Thickness [in]
HL-C-R10-5-XYFHC-1T-RTA-1(RB06)	3	10	17.51	0.1811
HL-C-R10-5-XYFHC-4T-RTA-2(RB06)	3	10	17.94	0.1845
HL-C-R10-5-XYFHC-4T-RTA-3(RB06)	3	10	16.07	0.1798
HL-C-R12-3-XYFHC-2B-RTA-1(RB01)	3	12	17.03	0.1623
HL-C-R12-3-XYFHC-2B-RTA-2(RB01)	3	12	16.50	0.1629
HL-C-R12-3-XYFHC-3T-RTA-3(RB01)	3	12	14.92	0.1718

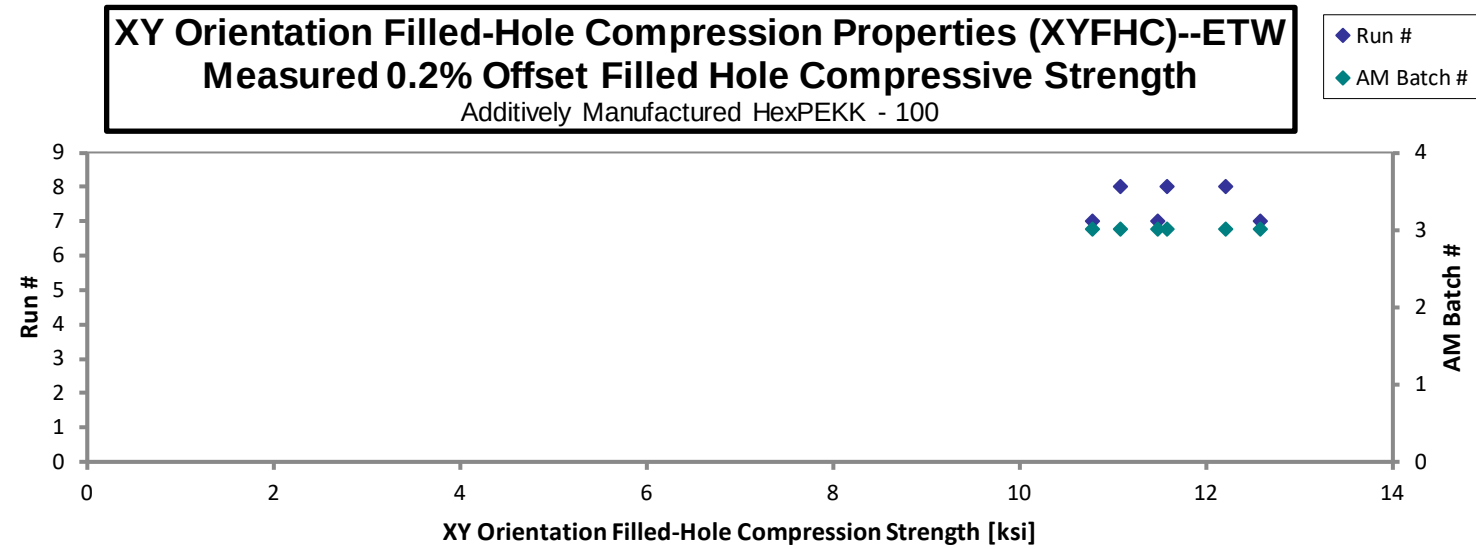
**Failure mode was not reported as coupons were not tested only to obtain 0.2% offset and not to failure	Average	16.66	0.1737
	Standard Dev.	1.087	
	Coeff. of Var. [%]	6.523	
	Min.	14.92	0.1623
	Max.	17.94	0.1845
	Number of Spec.	6	6



XY Orientation Filled-Hole Compression Properties
(XYFHC)--ETW
Strength & Modulus
Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Filled Hole Compressive Strength [ksi]	Avg. Specimen Thickness [in]
HL-C-R7-4-XYFHC-1T-ETW-1	3	7	10.78	0.1789
HL-C-R7-4-XYFHC-4T-ETW-2	3	7	12.58	0.1796
HL-C-R7-4-XYFHC-4T-ETW-3	3	7	11.48	0.1736
HL-C-R8-2-XYFHC-2B-ETW-1	3	8	11.09	0.1655
HL-C-R8-2-XYFHC-2B-ETW-2	3	8	11.58	0.1642
HL-C-R8-2-XYFHC-3T-ETW-3	3	8	12.21	0.1736

**Failure mode was not reported as coupons were not tested only to obtain 0.2% offset and not to failure	Average	11.62	0.1726
	Standard Dev.	0.6743	
	Coeff. of Var. [%]	5.802	
	Min.	10.78	0.1642
	Max.	12.58	0.1796
	Number of Spec.	6	6



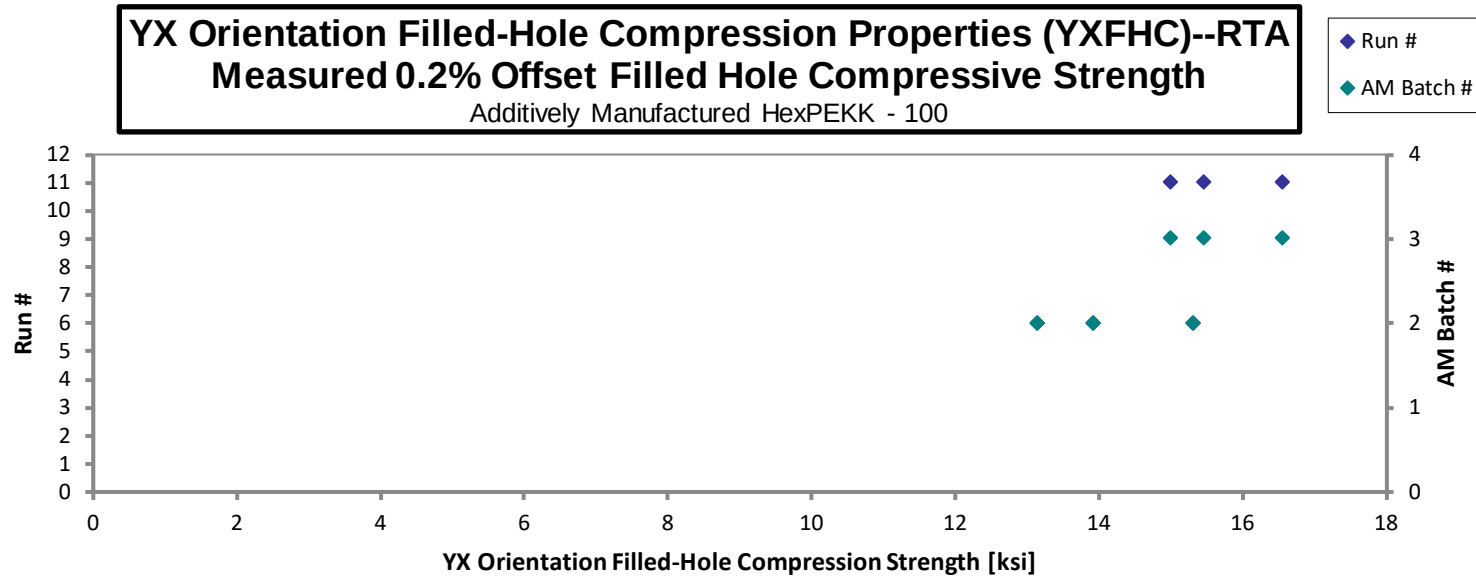
4.34 YX Filled-Hole Compression Properties (YXFHC)

**YX Orientation Filled-Hole Compression Properties
(YXFHC)--RTA□
Strength & Modulus□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Filled Hole Compressive Strength [ksi]	Avg. Specimen Thickness [in]
HL-B-R6-8-YXFHC-4B-RTA-1(RB07)	2	6	13.92	0.1820
HL-B-R6-8-YXFHC-1T-RTA-2(RB07)	2	6	15.31	0.1690
HL-B-R6-8-YXFHC-4T-RTA-3(RB07)	2	6	13.14	0.1726
HL-C-R11-6-YXFHC-5B-RTA-4(RB09)	3	11	16.56	0.1671
HL-C-R11-6-YXFHC-5B-RTA-5(RB09)	3	11	14.99	0.1711
HL-C-R11-6-YXFHC-3T-RTA-6(RB09)	3	11	15.45	0.1726

**Failure mode was not reported as coupons were not tested only to obtain 0.2% offset and not to failure	Average	14.90	0.1724
	Standard Dev.	1.206	
	Coeff. of Var. [%]	8.094	
	Min.	13.14	0.1671
	Max.	16.56	0.1820
	Number of Spec.	6	6



4.35 XZ Filled-Hole Compression Properties (XZFHC)

XZ Orientation Filled-Hole Compression Properties (XZFHC)--RTA□

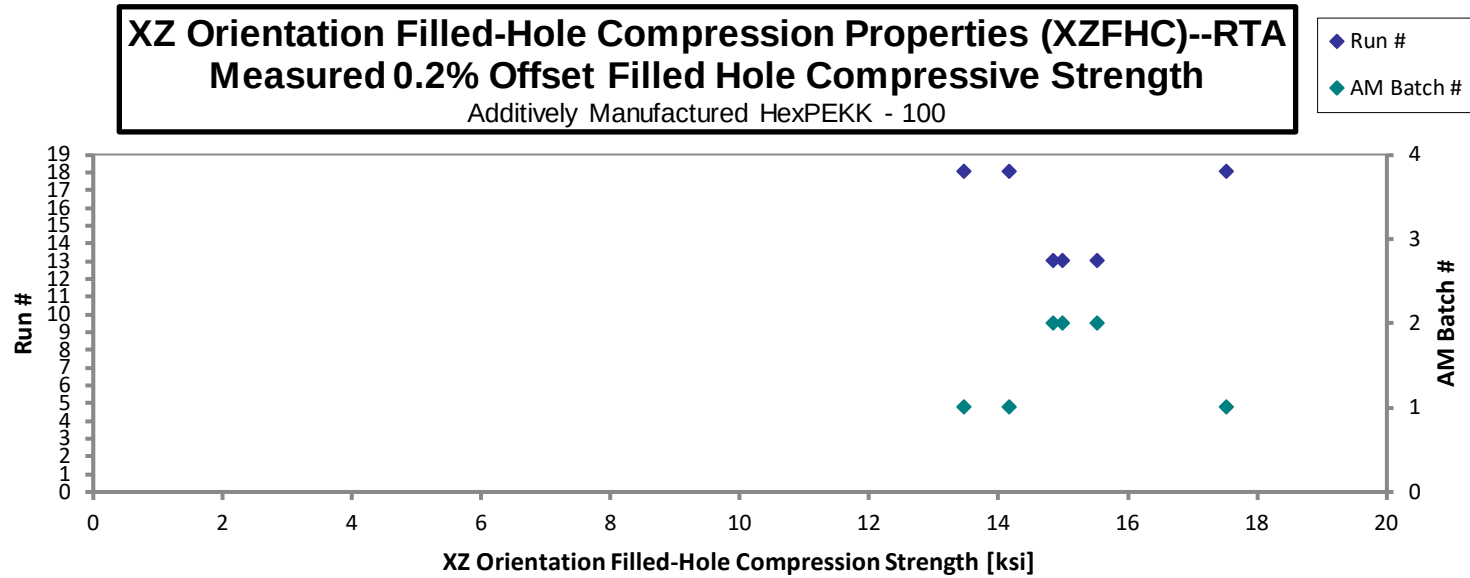
Strength & Modulus□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Filled Hole Compressive Strength [ksi]	Avg. Specimen Thickness [in]
HL-A-R18-12-XZFHC-1B-RTA-1(RB10)	1	18	13.46	0.1740
HL-A-R18-12-XZFHC-1B-RTA-2(RB10)	1	18	17.52	0.1727
HL-A-R18-12-XZFHC-4T-RTA-3(RB10)	1	18	14.17	0.1631
HL-B-R13-9-XZFHC-3B-RTA-4(RB11)	2	13	15.00	0.1747
HL-B-R13-9-XZFHC-2T-RTA-5(RB11)	2	13	15.53	0.1692
HL-B-R13-9-XZFHC-2T-RTA-6(RB11)	2	13	14.85	0.1717

	Average	15.09	0.1709
	Standard Dev.	1.390	
	Coeff. of Var. [%]	9.210	
	Min.	13.46	0.1631
	Max.	17.52	0.1747
	Number of Spec.	6	6

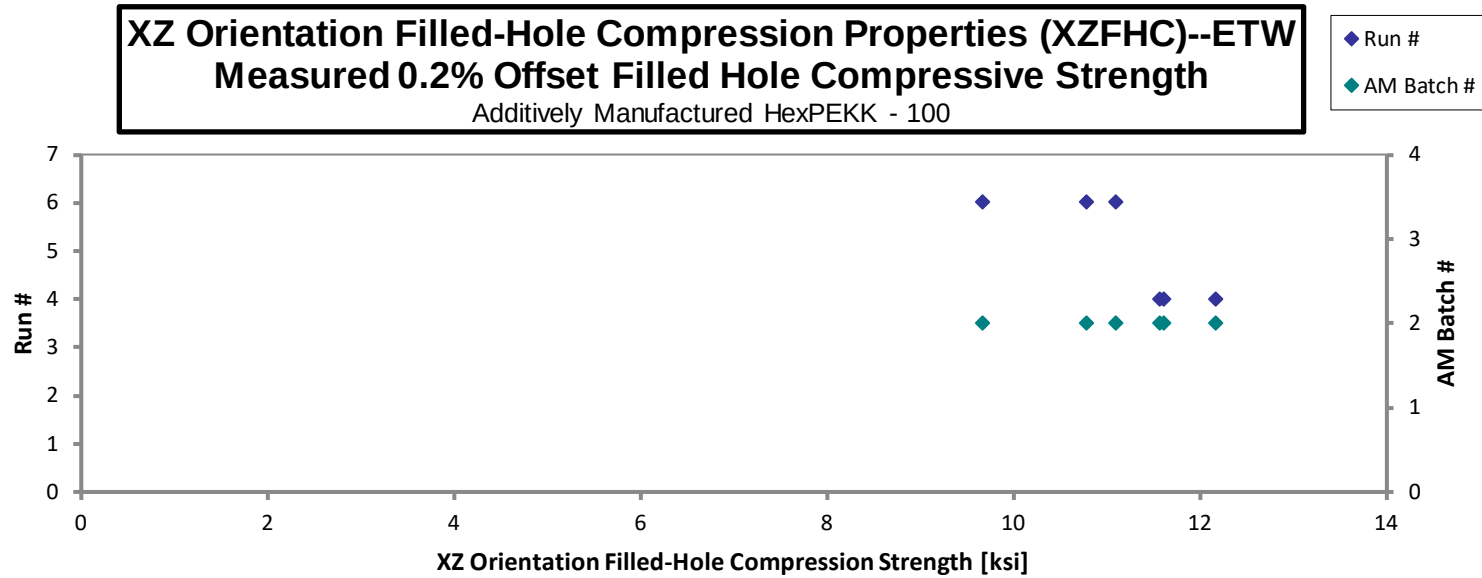
****Failure mode was not reported as coupons were not tested only to obtain 0.2% offset and not to failure**



XZ Orientation Filled-Hole Compression Properties
(XZFHC)--ETW
Strength & Modulus
 Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Filled Hole Compressive Strength [ksi]	Avg. Specimen Thickness [in]
HL-B-R4-7-XZFHC-3B-ETW-4	2	4	12.18	0.1670
HL-B-R4-7-XZFHC-2T-ETW-5	2	4	11.56	0.1602
HL-B-R4-7-XZFHC-2T-ETW-6	2	4	11.62	0.1600
HL-B-R6-8-XZFHC-3B-ETW-4	2	6	11.10	0.1654
HL-B-R6-8-XZFHC-2T-ETW-5	2	6	9.670	0.1617
HL-B-R6-8-XZFHC-2T-ETW-6	2	6	10.79	0.1604

**Failure mode was not reported as coupons were not tested only to obtain 0.2% offset and not to failure	Average	11.15	0.1625
	Standard Dev.	0.8674	
	Coeff. of Var. [%]	7.778	
	Min.	9.670	0.1600
	Max.	12.18	0.1670
	Number of Spec.	6	6

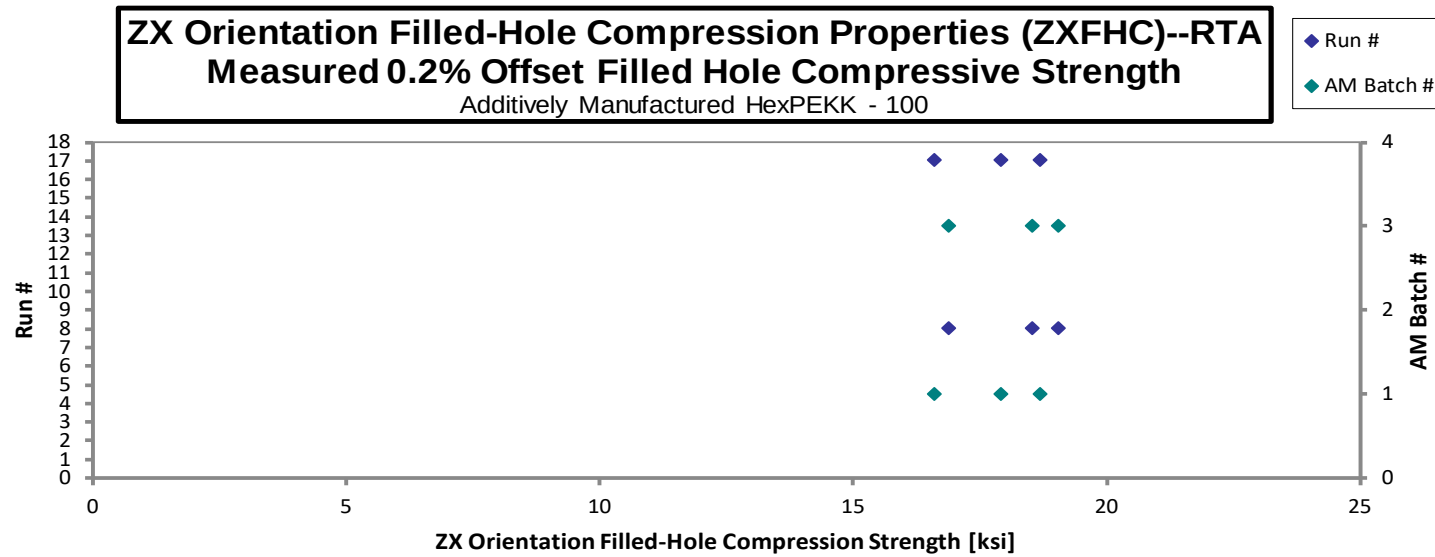


4.36 ZX Filled-Hole Compression Properties (ZXFHC)

ZX Orientation Filled-Hole Compression Properties (ZXFHC)--RTA□ Strength & Modulus□ Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Filled Hole Compressive Strength [ksi]	Avg. Specimen Thickness [in]
HL-A-R17-11-ZXFHC-3B-RTA-4(RB03)	1	17	18.68	0.1790
HL-A-R17-11-ZXFHC-3B-RTA-5(RB03)	1	17	16.59	0.1782
HL-A-R17-11-ZXFHC-5T-RTA-6(RB03)	1	17	17.92	0.1770
HL-C-R8-2-ZXFHC-1B-RTA-4(RB01)	3	8	16.89	0.1720
HL-C-R8-2-ZXFHC-4T-RTA-5(RB01)	3	8	18.53	0.1748
HL-C-R8-2-ZXFHC-4T-RTA-6(RB01)	3	8	19.05	0.1708

**Failure mode was not reported as coupons were not tested only to obtain 0.2% offset and not to failure	Average	17.94	0.1753
	Standard Dev.	1.003	
	Coeff. of Var. [%]	5.590	
	Min.	16.59	0.1708
	Max.	19.05	0.1790
	Number of Spec.	6	6



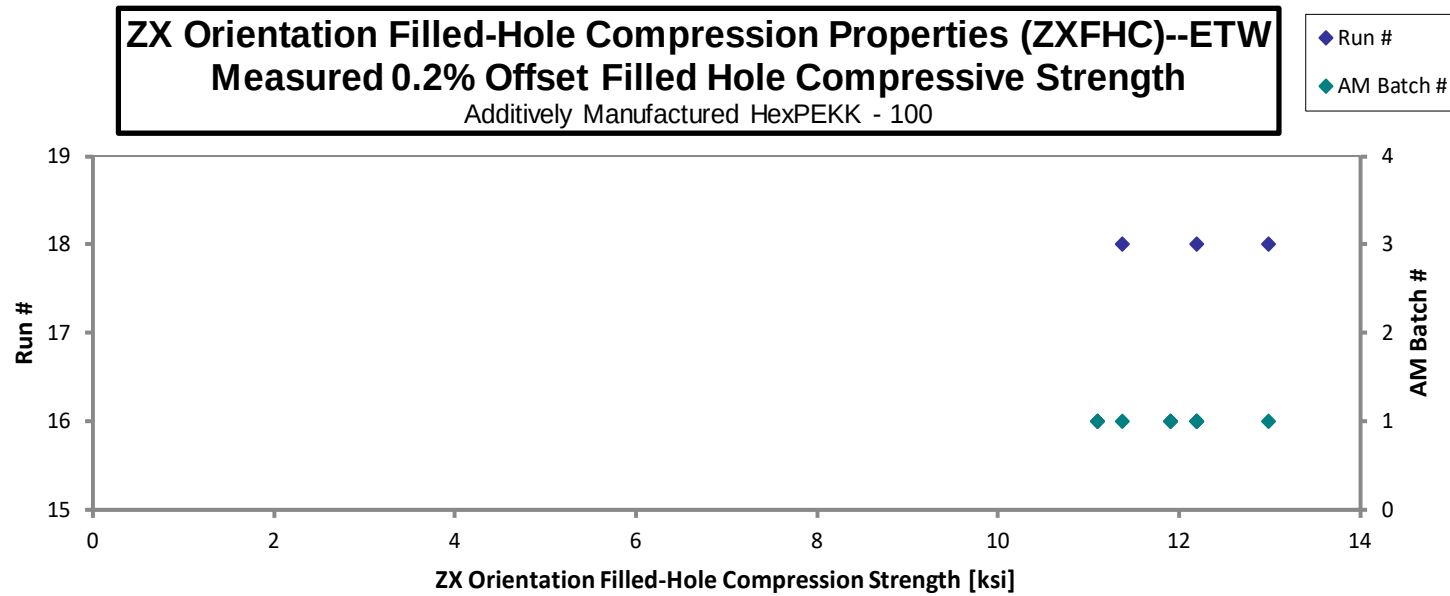
ZX Orientation Filled-Hole Compression Properties**(ZXFHC)--ETW****Strength & Modulus**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Filled Hole Compressive Strength [ksi]	Avg. Specimen Thickness [in]
HL-A-R16-10-ZXFHC-3B-ETW-4	1	16	11.90	0.1801
HL-A-R16-10-ZXFHC-3B-ETW-5	1	16	12.20	0.1793
HL-A-R16-10-ZXFHC-5T-ETW-6	1	16	11.09	0.1793
HL-A-R18-12-ZXFHC-3B-ETW-4	1	18	11.38	0.1743
HL-A-R18-12-ZXFHC-3B-ETW-5	1	18	12.99	0.1739
HL-A-R18-12-ZXFHC-5T-ETW-6	1	18	12.20	0.1751

****Failure mode was not reported
as coupons were not tested
only to obtain 0.2% offset and
not to failure**

Average	11.96	0.1770
Standard Dev.	0.6721	
Coeff. of Var. [%]	5.620	
Min.	11.09	0.1739
Max.	12.99	0.1801
Number of Spec.	6	6

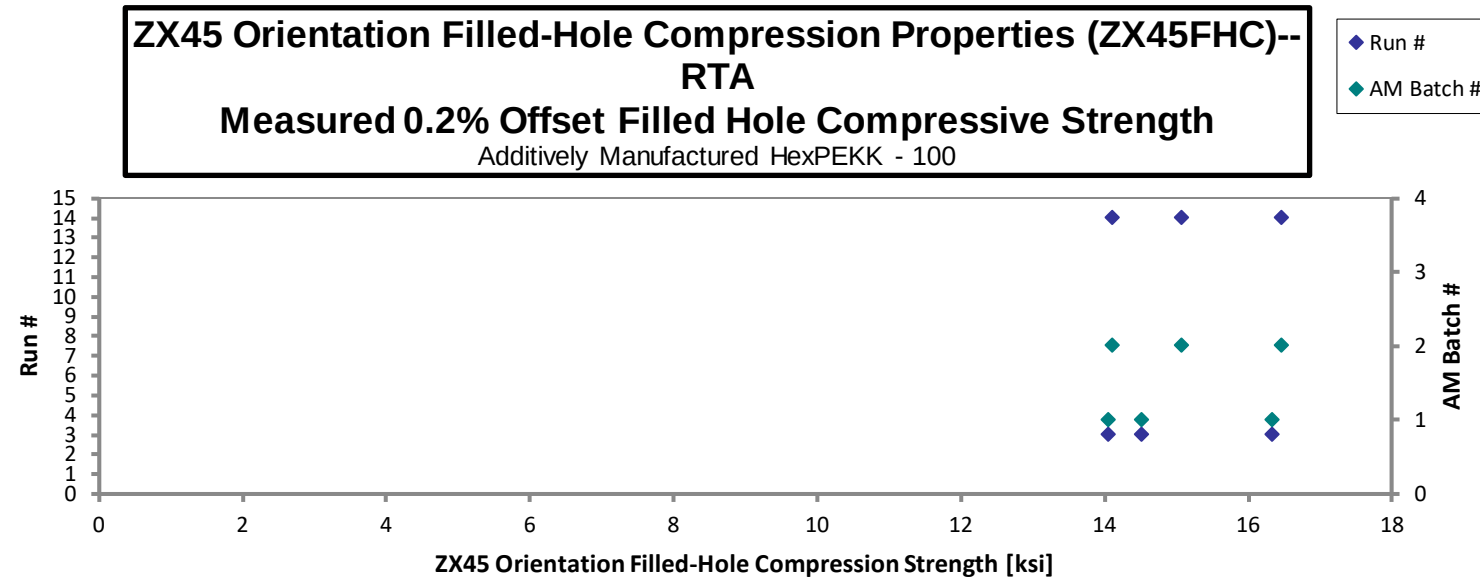


4.37 ZX45 Filled-Hole Compression Properties (ZX45FHC)**ZX45 Orientation Filled-Hole Compression Properties****(ZX45FHC)--RTA□****Strength & Modulus□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	0.2% Offset Filled Hole Compressive Strength [ksi]	Avg. Specimen Thickness [in]
HL-A-R3-14-ZX45FHC-4B-RTA-1(RB13)	1	3	16.34	0.1711
HL-A-R3-14-ZX45FHC-1T-RTA-2(RB13)	1	3	14.04	0.1799
HL-A-R3-14-ZX45FHC-1T-RTA-3(RB13)	1	3	14.52	0.1815
HL-B-R14-17-ZX45FHC-3B-RTA-1(RB15)	2	14	16.46	0.1691
HL-B-R14-17-ZX45FHC-3B-RTA-2(RB15)	2	14	15.07	0.1718
HL-B-R14-17-ZX45FHC-2T-RTA-3(RB15)	2	14	14.12	0.1706

**Failure mode was not reported as coupons were not tested only to obtain 0.2% offset and not to failure	Average	15.09	0.1740
	Standard Dev.	1.076	
	Coeff. of Var. [%]	7.133	
	Min.	14.04	0.1691
	Max.	16.46	0.1815
	Number of Spec.	6	6



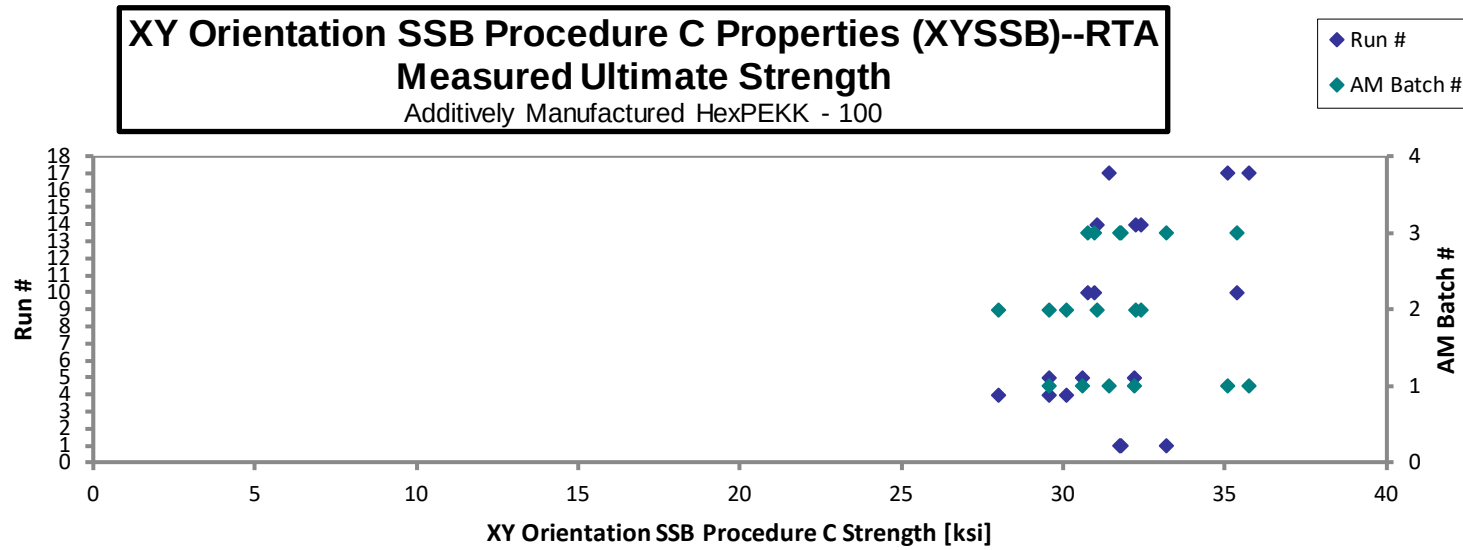
4.38 XY Single-Shear Bearing Properties (XYSSB)

XY Orientation SSB Procedure C Properties (XYSSB)--RTA
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-XYSSB-4B-RTA-1	1	17	35.08	0.1676	L1I
HL-A-R17-11-XYSSB-5B-RTA-3	1	17	31.43	0.1767	L1I
HL-A-R17-11-XYSSB-4T-RTA-5	1	17	35.74	0.1692	L1I
HL-A-R5-15-XYSSB-1B-RTA-2	1	5	32.20	0.1699	L1I
HL-A-R5-15-XYSSB-3T-RTA-4	1	5	29.59	0.1711	L1I
HL-A-R5-15-XYSSB-5T-RTA-6	1	5	30.60	0.1639	L1I
HL-B-R14-17-XYSSB-2B-RTA-1	2	14	31.05	0.1634	L1I
HL-B-R14-17-XYSSB-1T-RTA-3	2	14	32.42	0.1674	L1I
HL-B-R14-17-XYSSB-3T-RTA-5	2	14	32.24	0.1571	L1I
HL-B-R4-7-XYSSB-5B-RTA-1	2	4	27.99	0.1623	L1I
HL-B-R4-7-XYSSB-3T-RTA-3	2	4	30.08	0.1636	L1I
HL-B-R4-7-XYSSB-5T-RTA-5	2	4	29.57	0.1676	L1I
HL-C-R1-1-XYSSB-3B-RTA-1	3	1	31.81	0.1633	L1I
HL-C-R1-1-XYSSB-5B-RTA-3	3	1	33.20	0.1647	L1I
HL-C-R1-1-XYSSB-2T-RTA-4	3	1	31.77	0.1566	L1I
HL-C-R10-5-XYSSB-1B-RTA-1	3	10	35.39	0.1679	L1I
HL-C-R10-5-XYSSB-3B-RTA-3	3	10	30.75	0.1646	L1I
HL-C-R10-5-XYSSB-5B-RTA-5	3	10	30.97	0.1671	L1I

2% Offset bearing strength was not reported as it occurred after obtaining the max load	Average	31.77	0.1658
	Standard Dev.	2.074	
	Coeff. of Var. [%]	6.528	
	Min.	27.99	0.1566
	Max.	35.74	0.1767
	Number of Spec.	18	18



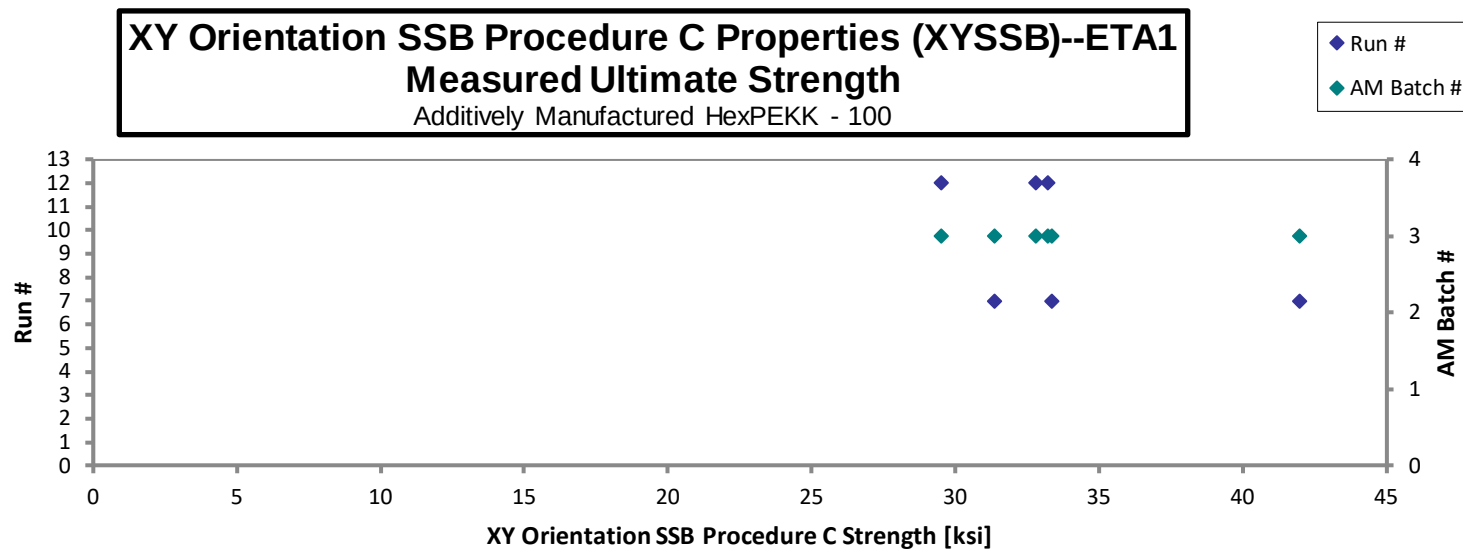
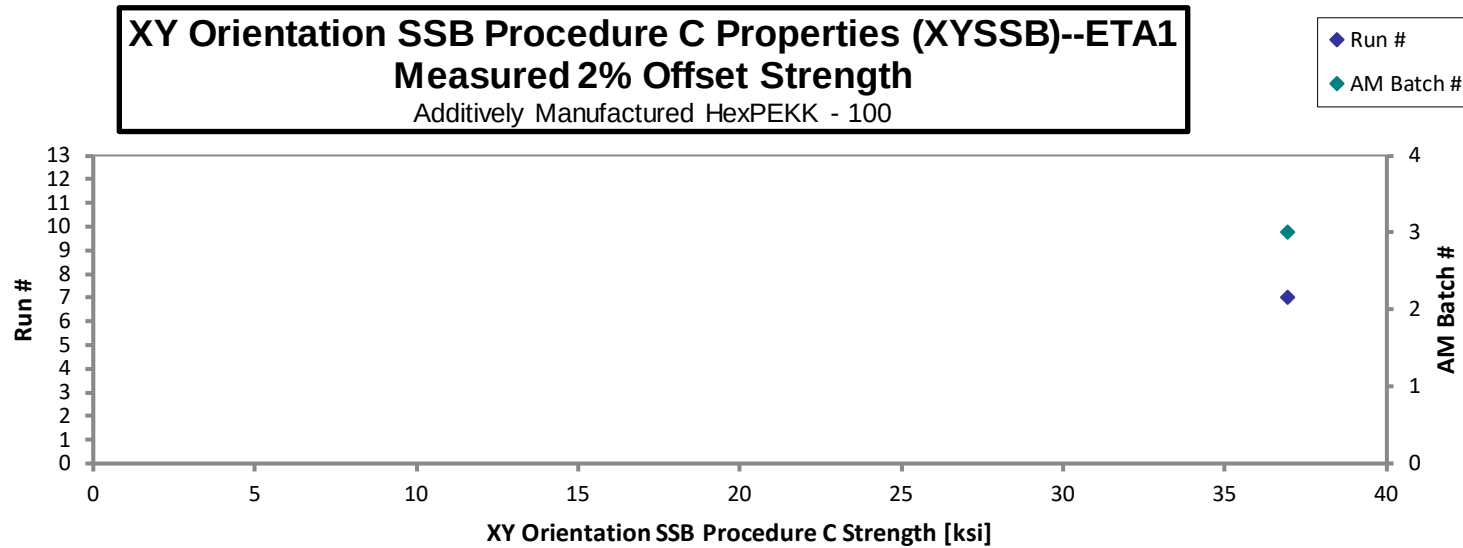
XY Orientation SSB Procedure C Properties (XYSSB)--ETA1□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R12-3-XYSSB-3B-ETA1-2	3	12		33.23	0.1694	L1I
HL-C-R12-3-XYSSB-2T-ETA1-5	3	12		32.79	0.1668	L1I
HL-C-R12-3-XYSSB-5T-ETA1-6	3	12		29.50	0.1638	L1I
HL-C-R7-4-XYSSB-3B-ETA1-2	3	7		33.34	0.1592	L1I
HL-C-R7-4-XYSSB-5B-ETA1-4	3	7		31.35	0.1585	L1I
HL-C-R7-4-XYSSB-1T-ETA1-6	3	7	36.93	41.99	0.1630	L1I

2% Offset bearing strength was not reported as it occurred after obtaining the max load

Average	36.93	33.70	0.1635
Standard Dev.		4.313	
Coeff. of Var. [%]		12.80	
Min.		29.50	0.1585
Max.		41.99	0.1694
Number of Spec.	1	6	6

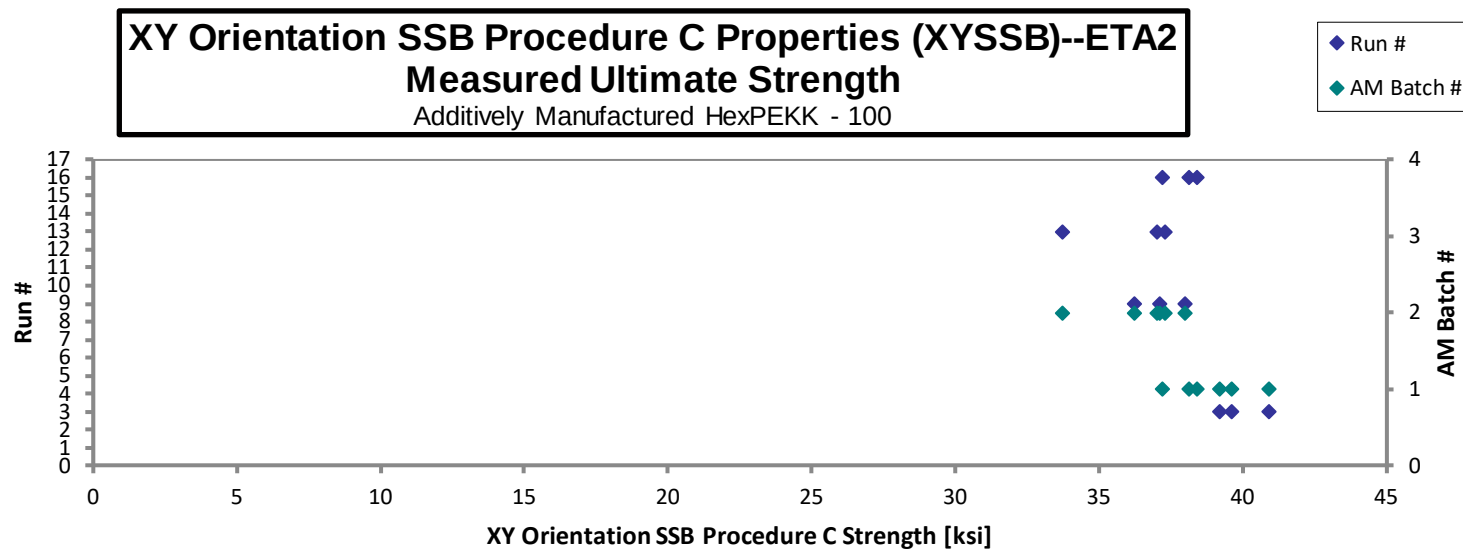
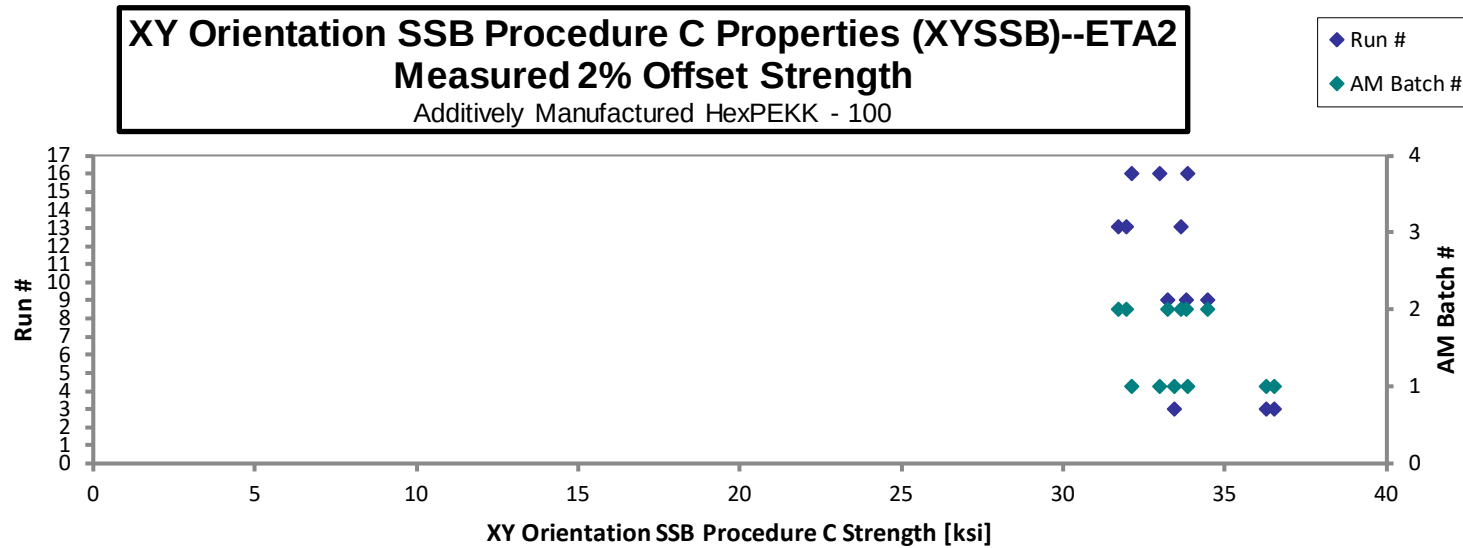


XY Orientation SSB Procedure C Properties (XYSSB)--ETA2 Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-XYSSB-4B-ETA2-1	1	16	33.87	38.39	0.1680	M(C,L)1I
HL-A-R16-10-XYSSB-5B-ETA2-3	1	16	33.01	38.13	0.1785	L1I
HL-A-R16-10-XYSSB-4T-ETA2-5	1	16	32.13	37.21	0.1704	L1I
HL-A-R3-14-XYSSB-1B-ETA2-2	1	3	33.46	39.19	0.1645	L1I
HL-A-R3-14-XYSSB-3T-ETA2-4	1	3	36.51	40.90	0.1640	M(T,C,L)1I
HL-A-R3-14-XYSSB-5T-ETA2-6	1	3	36.28	39.61	0.1635	M(C,L)1I
HL-B-R13-9-XYSSB-5B-ETA2-1	2	13	33.64	37.29	0.1726	L1I
HL-B-R13-9-XYSSB-3T-ETA2-3	2	13	31.71	33.72	0.1659	L1I
HL-B-R13-9-XYSSB-5T-ETA2-5	2	13	31.95	37.03	0.1641	M(C,L)1I
HL-B-R9-16-XYSSB-2B-ETA2-1	2	9	34.47	38.01	0.1659	M(T,C,L)1I
HL-B-R9-16-XYSSB-1T-ETA2-3	2	9	33.23	36.22	0.1739	L1I
HL-B-R9-16-XYSSB-3T-ETA2-5	2	9	33.80	37.10	0.1663	M(T,C,L)1I

Average	33.67	37.73	0.1681
Standard Dev.	1.520	1.813	
Coeff. of Var. [%]	4.514	4.804	
Min.	31.71	33.72	0.1635
Max.	36.51	40.90	0.1785
Number of Spec.	12	12	12

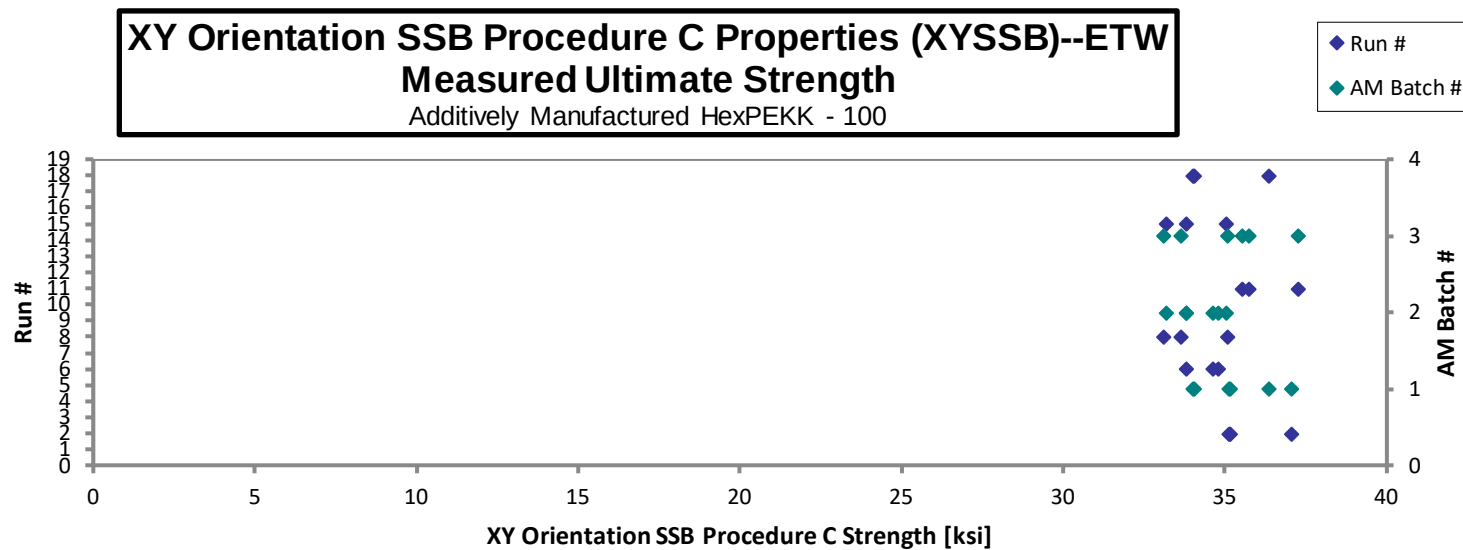
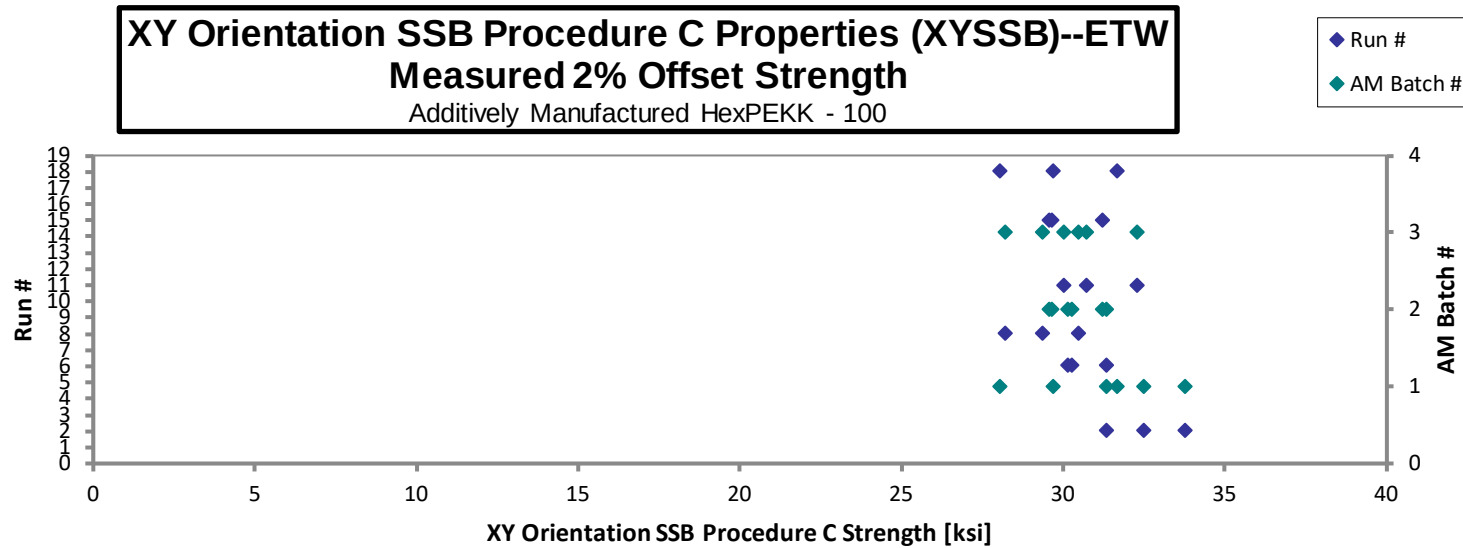


XY Orientation SSB Procedure C Properties (XYSSB)--ETW
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-XYSSB-4B-ETW-2	1	18	31.66	36.39	0.1632	M(C,L)1I
HL-A-R18-12-XYSSB-5B-ETW-4	1	18	29.68	34.06	0.1765	L1I
HL-A-R18-12-XYSSB-4T-ETW-6	1	18	28.04	34.01	0.1696	M(C,L)1I
HL-A-R2-13-XYSSB-1B-ETW-1	1	2	31.33	35.17	0.1674	L1I
HL-A-R2-13-XYSSB-3T-ETW-3	1	2	32.51	35.13	0.1643	L1I
HL-A-R2-13-XYSSB-5T-ETW-5	1	2	33.78	37.08	0.1636	L1I
HL-B-R15-18-XYSSB-2B-ETW-2	2	15	31.22	35.06	0.1672	L1I
HL-B-R15-18-XYSSB-1T-ETW-4	2	15	29.58	33.81	0.1663	L1I
HL-B-R15-18-XYSSB-3T-ETW-6	2	15	29.64	33.19	0.1619	L1I
HL-B-R6-8-XYSSB-5B-ETW-2	2	6	31.33	34.80	0.1607	L1I
HL-B-R6-8-XYSSB-3T-ETW-4	2	6	30.26	33.82	0.1648	M(C,L)1I
HL-B-R6-8-XYSSB-5T-ETW-6	2	6	30.17	34.64	0.1684	M(C,L)1I
HL-C-R11-6-XYSSB-3B-ETW-2	3	11	32.30	37.26	0.1616	M(C,L)1I
HL-C-R11-6-XYSSB-5B-ETW-4	3	11	30.73	35.75	0.1638	L1I
HL-C-R11-6-XYSSB-1T-ETW-6	3	11	30.03	35.54	0.1650	M(C,L)1I
HL-C-R8-2-XYSSB-3B-ETW-1	3	8	29.36	35.09	0.1657	L1I
HL-C-R8-2-XYSSB-5B-ETW-3	3	8	30.46	33.63	0.1622	L1I
HL-C-R8-2-XYSSB-2T-ETW-4	3	8	28.21	33.12	0.1648	L1I

Average	30.57	34.86	0.1654
Standard Dev.	1.465	1.224	
Coeff. of Var. [%]	4.792	3.512	
Min.	28.04	33.12	0.1607
Max.	33.78	37.26	0.1765
Number of Spec.	18	18	18



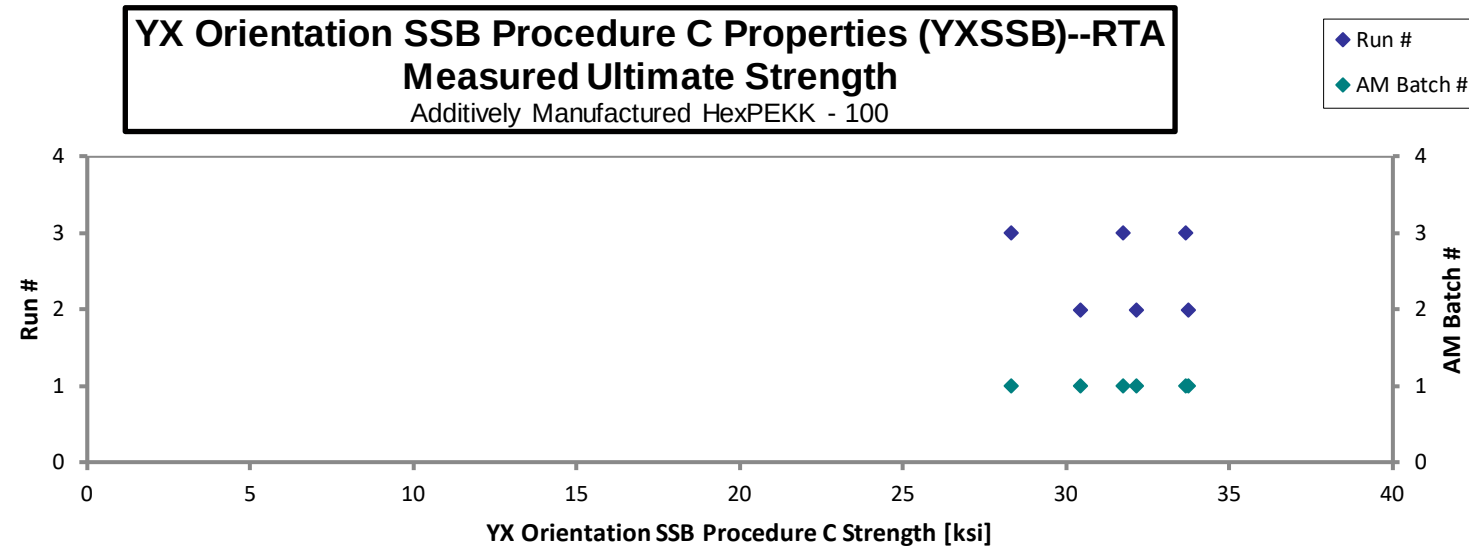
4.39 YX Single-Shear Bearing Properties (YXSSB)

YX Orientation SSB Procedure C Properties (YXSSB)--RTA
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R2-13-YXSSB-2T-RTA-10	1	2		32.16	0.1584	L1I
HL-A-R2-13-YXSSB-4T-RTA-12	1	2		30.43	0.1640	L1I
HL-A-R2-13-YXSSB-5B-RTA-8	1	2		33.73	0.1640	L1I
HL-A-R3-14-YXSSB-4T-RTA-11	1	3		31.73	0.1615	L1I
HL-A-R3-14-YXSSB-3B-RTA-7	1	3		28.34	0.1664	L1I
HL-A-R3-14-YXSSB-2T-RTA-9	1	3		33.65	0.1669	L1I

2% Offset bearing strength was not reported as it occurred after obtaining the max load	Average		31.67	0.1635
	Standard Dev.		2.053	
	Coeff. of Var. [%]		6.482	
	Min.		28.34	0.1584
	Max.		33.73	0.1669
	Number of Spec.	0	6	6

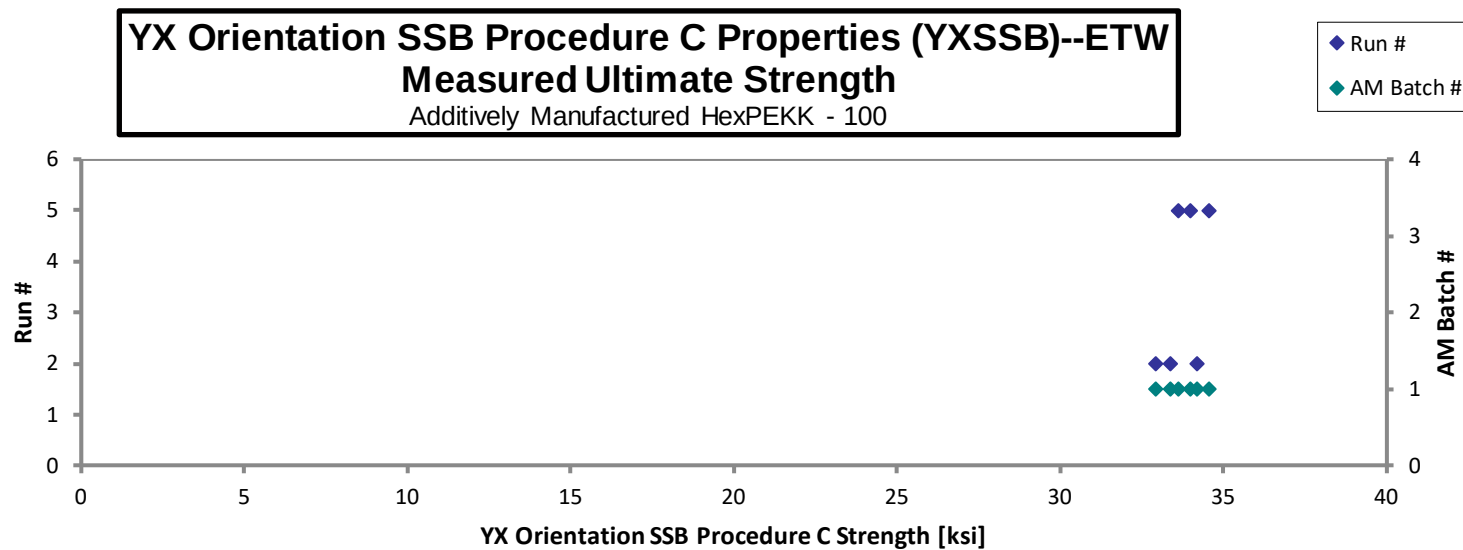
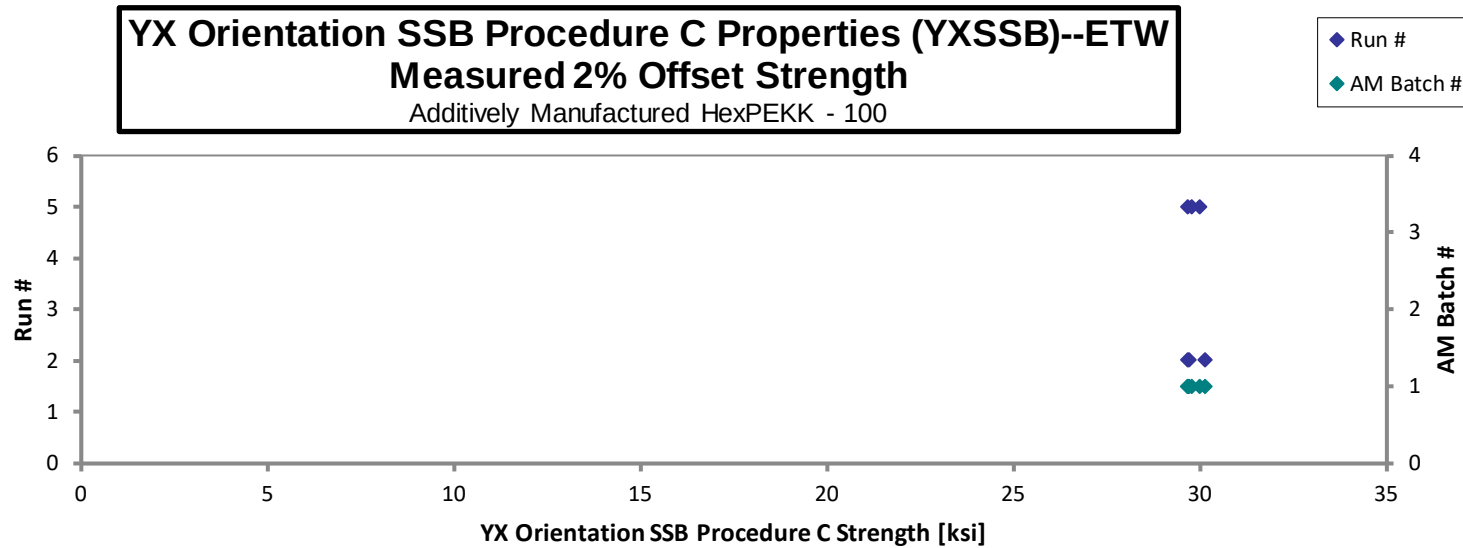


YX Orientation SSB Procedure C Properties (YXSSB)--ETW□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R2-13-YXSSB-4T-ETW-11	1	2	29.69	33.36	0.1626	L1I
HL-A-R2-13-YXSSB-3B-ETW-7	1	2	30.14	32.94	0.1619	L1I
HL-A-R2-13-YXSSB-2T-ETW-9	1	2	29.69	34.21	0.1580	L1I
HL-A-R5-15-YXSSB-2T-ETW-10	1	5	30.00	33.97	0.1658	L1I
HL-A-R5-15-YXSSB-4T-ETW-12	1	5	29.66	33.63	0.1614	L1I
HL-A-R5-15-YXSSB-5B-ETW-8	1	5	29.76	34.58	0.1692	L1I

Average	29.82	33.78	0.1632
Standard Dev.	0.1967	0.5956	
Coeff. of Var. [%]	0.6595	1.763	
Min.	29.66	32.94	0.1580
Max.	30.14	34.58	0.1692
Number of Spec.	6	6	6



4.40 XZ Single-Shear Bearing Properties (XZSSB)

**XZ Orientation SSB Procedure C Properties (XZSSB)--RTA□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R14-17-XZSSB-4T-RTA-10	2	14		29.87	0.1559	L1I
HL-B-R14-17-XZSSB-1B-RTA-7	2	14		32.63	0.1617	L1I
HL-B-R14-17-XZSSB-3B-RTA-9	2	14		33.13	0.1481	L1I
HL-B-R15-18-XZSSB-4T-RTA-11	2	15		28.38	0.1468	L1I
HL-B-R15-18-XZSSB-5T-RTA-12	2	15		30.68	0.1482	L1I
HL-B-R15-18-XZSSB-2B-RTA-8	2	15		34.14	0.1540	L1I

2% Offset bearing strength was not reported as it occurred after obtaining the max load

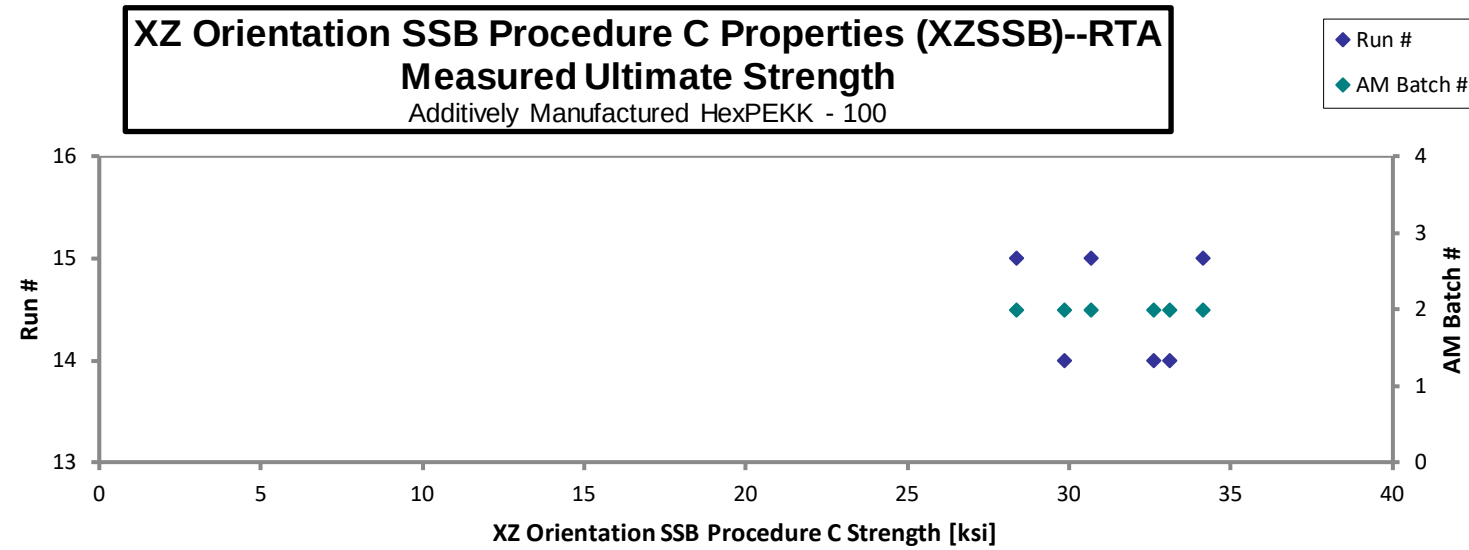
Average
Standard Dev.
Coeff. of Var. [%]
Min.
Max.
Number of Spec.

0

31.47
2.189
6.956
28.38
34.14
6

0.1525

0.1468
0.1617
6

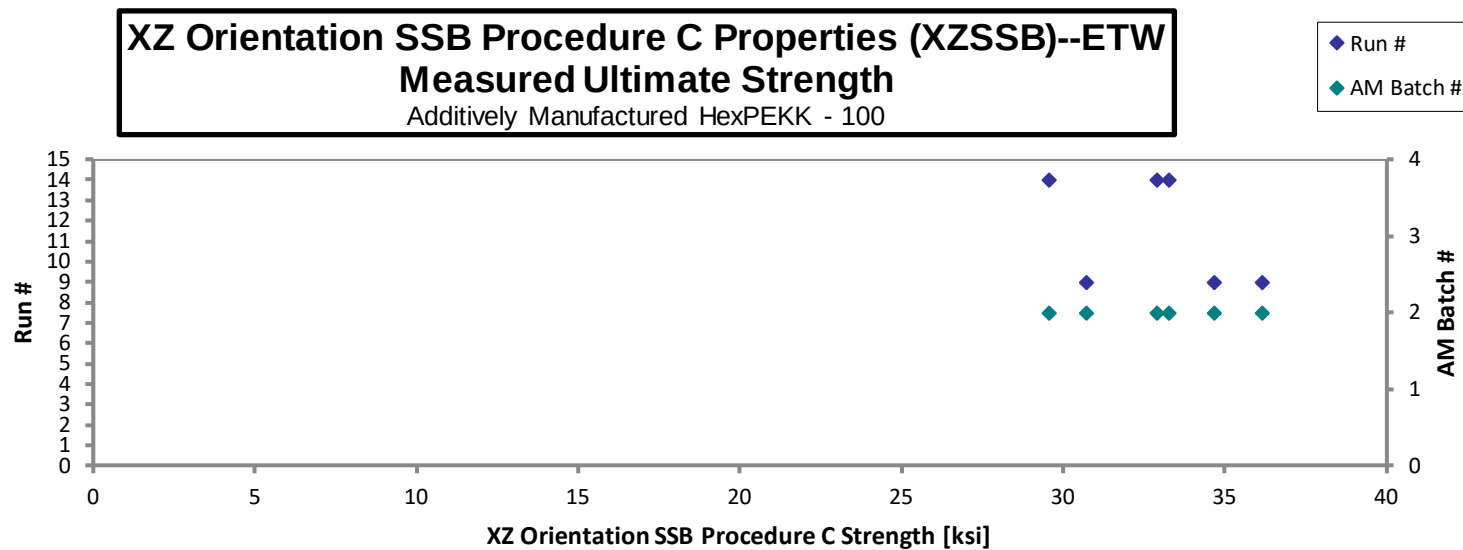
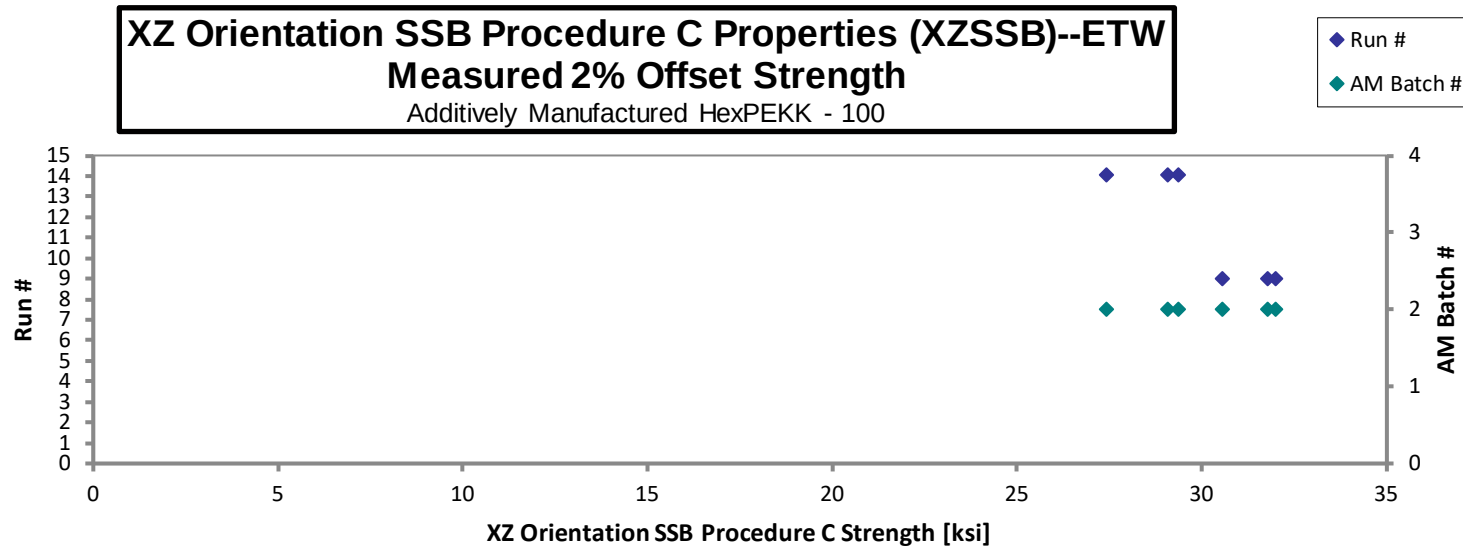


XZ Orientation SSB Procedure C Properties (XZSSB)--ETW□ Strength□

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-B-R14-17-XZSSB-4T-ETW-11	2	14	27.43	29.56	0.1490	M(C,L)1I
HL-B-R14-17-XZSSB-5T-ETW-12	2	14	29.39	33.27	0.1563	M(C,L)1I
HL-B-R14-17-XZSSB-2B-ETW-8	2	14	29.07	32.92	0.1568	M(C,L)1I
HL-B-R9-16-XZSSB-4T-ETW-10	2	9	30.56	30.74	0.1486	L1I
HL-B-R9-16-XZSSB-1B-ETW-7	2	9	32.00	36.16	0.1633	L1I
HL-B-R9-16-XZSSB-3B-ETW-9	2	9	31.78	34.67	0.1586	M(C,L)1I

Average	30.04	32.88	0.1554
Standard Dev.	1.751	2.439	
Coeff. of Var. [%]	5.830	7.416	
Min.	27.43	29.56	0.1486
Max.	32.00	36.16	0.1633
Number of Spec.	6	6	6



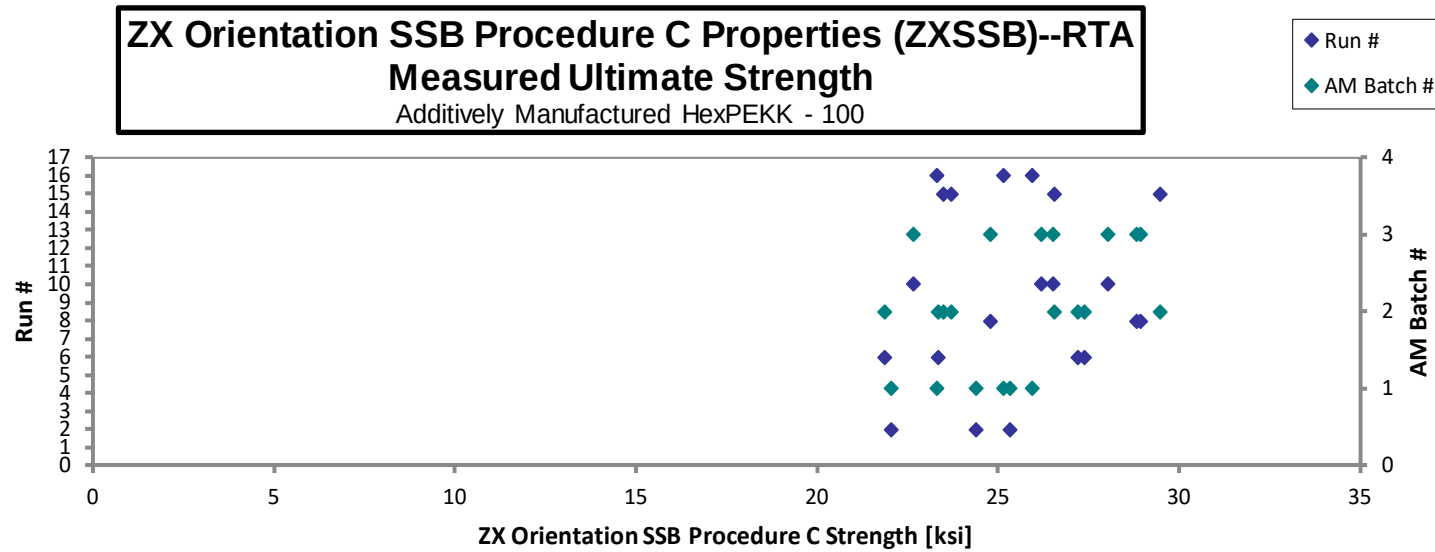
4.41 ZX Single-Shear Bearing Properties (ZXSSB)

ZX Orientation SSB Procedure C Properties (ZXSSB)--RTA Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R16-10-ZXSSB-5T-RTA-11	1	16		25.96	0.1607	L1I
HL-A-R16-10-ZXSSB-3B-RTA-7	1	16		23.30	0.1686	L1I
HL-A-R16-10-ZXSSB-1T-RTA-9	1	16		25.17	0.1783	L1I
HL-A-R2-13-ZXSSB-2B-RTA-14	1	2		22.04	0.1721	L1I
HL-A-R2-13-ZXSSB-5B-RTA-15	1	2		25.33	0.1613	L1I
HL-A-R2-13-ZXSSB-5T-RTA-17	1	2		24.38	0.1619	L1I
HL-B-R15-18-ZXSSB-1B-RTA-13	2	15		23.48	0.1626	L1I
HL-B-R15-18-ZXSSB-3T-RTA-15	2	15		29.46	0.1544	L1I
HL-B-R15-18-ZXSSB-4T-RTA-16	2	15		26.56	0.1569	L1I
HL-B-R15-18-ZXSSB-4T-RTA-17	2	15		23.70	0.1564	L1I
HL-B-R6-8-ZXSSB-1T-RTA-10	2	6		27.19	0.1581	L1I
HL-B-R6-8-ZXSSB-4T-RTA-11	2	6		27.37	0.1634	L1I
HL-B-R6-8-ZXSSB-4B-RTA-7	2	6		21.86	0.1636	L1I
HL-B-R6-8-ZXSSB-1T-RTA-9	2	6		23.34	0.1647	L1I
HL-C-R10-5-ZXSSB-4T-RTA-10	3	10		26.51	0.1627	L1I
HL-C-R10-5-ZXSSB-5T-RTA-11	3	10		22.67	0.1618	L1I
HL-C-R10-5-ZXSSB-2B-RTA-7	3	10		28.05	0.1626	L1I
HL-C-R10-5-ZXSSB-3T-RTA-9	3	10		26.21	0.1619	L1I
HL-C-R8-2-ZXSSB-5T-RTA-11	3	8		24.78	0.1627	L1I
HL-C-R8-2-ZXSSB-1B-RTA-7	3	8		28.84	0.1651	L1I
HL-C-R8-2-ZXSSB-4B-RTA-8	3	8		28.93	0.1646	L1I

2% Offset bearing strength was not reported as it occurred after obtaining the max load	Average	25.48	0.1631
	Standard Dev.	2.304	
	Coeff. of Var. [%]	9.043	
	Min.	21.86	0.1544
	Max.	29.46	0.1783
	Number of Spec.	0	21



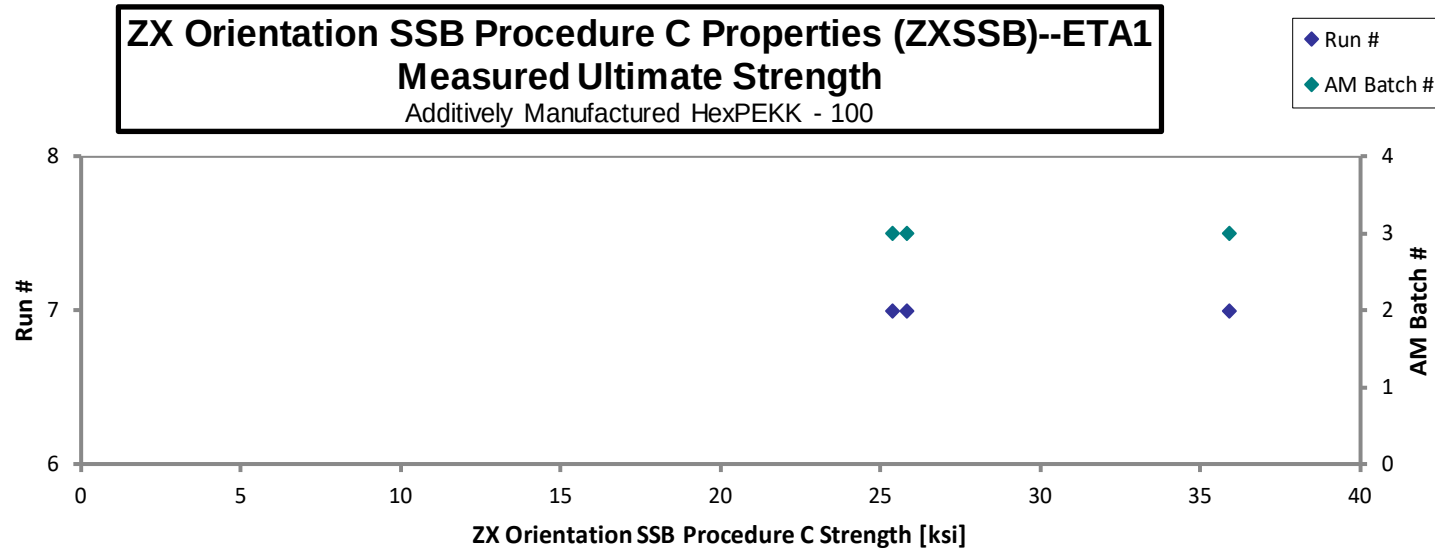
ZX Orientation SSB Procedure C Properties (ZXSSB)--ETA1 ☐

Strength ☐

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R7-4-ZXSSB-5T-ETA1-11	3	7		25.83	0.1618	L1I
HL-C-R7-4-ZXSSB-2B-ETA1-7	3	7		35.90	0.1540	L1I
HL-C-R7-4-ZXSSB-3T-ETA1-9	3	7		25.36	0.1625	L1I

2% Offset bearing strength was not reported as it occurred after obtaining the max load	Average		29.03	0.1594
	Standard Dev.		5.953	
	Coeff. of Var. [%]		20.51	
	Min.		25.36	0.1540
	Max.		35.90	0.1625
	Number of Spec.	0	3	3

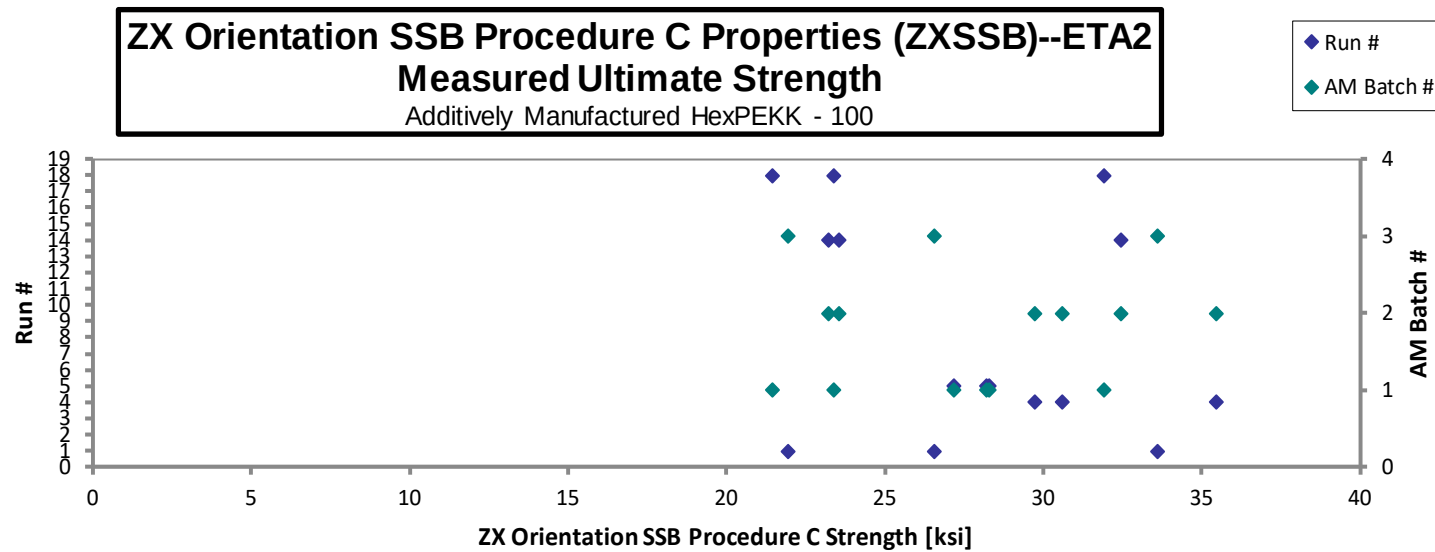
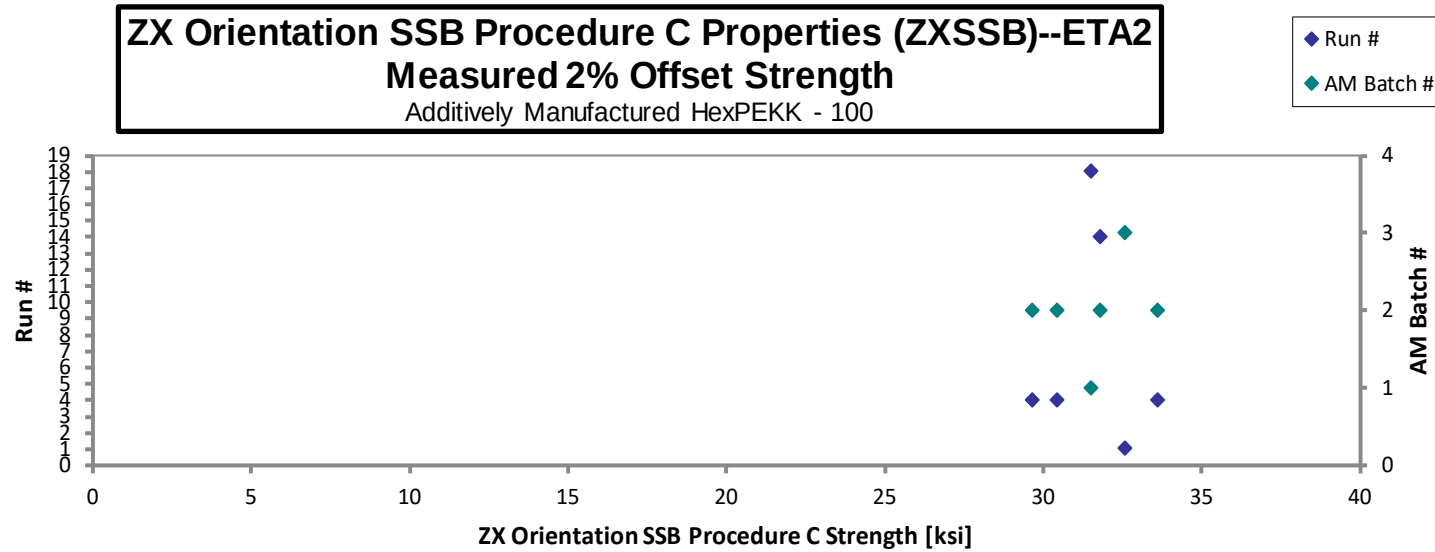


ZX Orientation SSB Procedure C Properties (ZXSSB)--ETA2
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R18-12-ZXSSB-5T-ETA2-11	1	18		23.38	0.1619	L1I
HL-A-R18-12-ZXSSB-3B-ETA2-7	1	18	31.51	31.94	0.1692	L1I
HL-A-R18-12-ZXSSB-1T-ETA2-9	1	18		21.43	0.1782	L1I
HL-A-R5-15-ZXSSB-2B-ETA2-14	1	5		28.31	0.1693	L1I
HL-A-R5-15-ZXSSB-5B-ETA2-15	1	5		28.23	0.1596	L1I
HL-A-R5-15-ZXSSB-5T-ETA2-17	1	5		27.20	0.1608	L1I
HL-B-R14-17-ZXSSB-1B-ETA2-14	2	14	31.80	32.47	0.1652	L1I
HL-B-R14-17-ZXSSB-4T-ETA2-16	2	14		23.23	0.1614	L1I
HL-B-R14-17-ZXSSB-4T-ETA2-18	2	14		23.57	0.1564	L1I
HL-B-R4-7-ZXSSB-4T-ETA2-11	2	4	30.43	30.60	0.1680	L1I
HL-B-R4-7-ZXSSB-4B-ETA2-7	2	4	33.60	35.46	0.1632	L1I
HL-B-R4-7-ZXSSB-1T-ETA2-9	2	4	29.67	29.75	0.1577	L1I
HL-C-R1-1-ZXSSB-5T-ETA2-11	3	1	32.56	33.60	0.1562	L1I
HL-C-R1-1-ZXSSB-1B-ETA2-7	3	1		26.54	0.1589	L1I
HL-C-R1-1-ZXSSB-4B-ETA2-8	3	1		21.96	0.1660	L1I

2% Offset bearing strength was not reported as it occurred after obtaining the max load	Average	31.60	27.84	0.1635
	Standard Dev.	1.418	4.457	
	Coeff. of Var. [%]	4.489	16.01	
	Min.	29.67	21.43	0.1562
	Max.	33.60	35.46	0.1782
	Number of Spec.	6	15	15

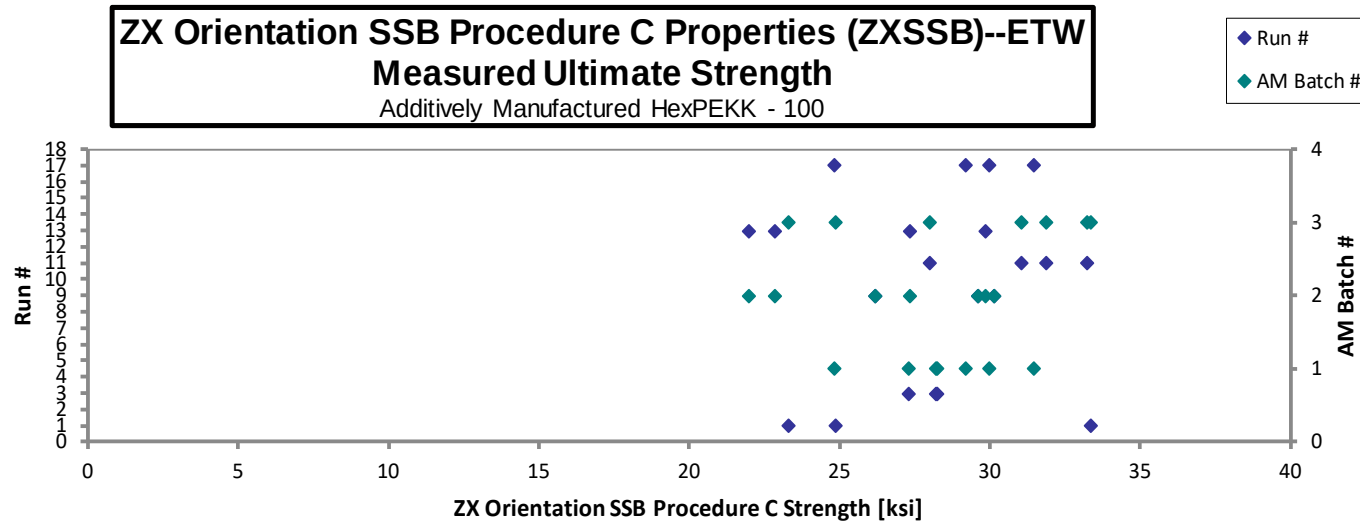
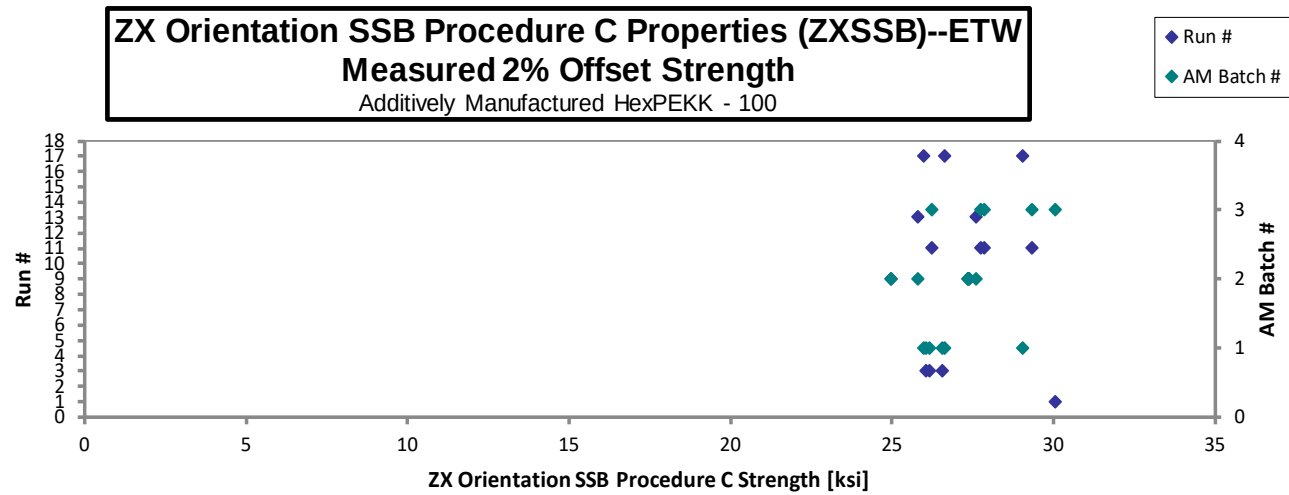


**ZX Orientation SSB Procedure C Properties (ZXSSB)--ETW□
Strength□**

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-A-R17-11-ZXSSB-1T-ETW-10	1	17	26.62	29.98	0.1755	L1I
HL-A-R17-11-ZXSSB-5T-ETW-12	1	17		24.84	0.1638	L1I
HL-A-R17-11-ZXSSB-3B-ETW-8	1	17	25.98	31.47	0.1686	L1I
HL-A-R17-11-ZXSSB-1T-ETW-9	1	17	29.06	29.21	0.1779	L1I
HL-A-R3-14-ZXSSB-1B-ETW-13	1	3	26.06	28.26	0.1728	L1I
HL-A-R3-14-ZXSSB-5B-ETW-16	1	3	26.17	28.20	0.1617	L1I
HL-A-R3-14-ZXSSB-5T-ETW-18	1	3	26.55	27.29	0.1658	L1I
HL-B-R13-9-ZXSSB-1T-ETW-10	2	13		22.84	0.1812	L1I
HL-B-R13-9-ZXSSB-4T-ETW-12	2	13		22.00	0.1676	L1I
HL-B-R13-9-ZXSSB-4B-ETW-8	2	13	27.59	29.87	0.1654	L1I
HL-B-R13-9-ZXSSB-1T-ETW-9	2	13	25.80	27.35	0.1711	L1I
HL-B-R9-16-ZXSSB-1B-ETW-13	2	9	24.96	26.21	0.1663	L1I
HL-B-R9-16-ZXSSB-3T-ETW-15	2	9	27.34	29.61	0.1580	L1I
HL-B-R9-16-ZXSSB-4T-ETW-17	2	9	27.39	30.17	0.1554	L1I
HL-C-R1-1-ZXSSB-1T-ETW-10	3	1	30.05	33.36	0.1573	L1I
HL-C-R1-1-ZXSSB-5T-ETW-12	3	1		24.86	0.1547	L1I
HL-C-R1-1-ZXSSB-4B-ETW-9	3	1		23.32	0.1561	L1I
HL-C-R11-6-ZXSSB-4T-ETW-10	3	11	27.73	31.87	0.1659	M(C,L)I
HL-C-R11-6-ZXSSB-5T-ETW-12	3	11	26.23	28.02	0.1565	L1I
HL-C-R11-6-ZXSSB-2B-ETW-8	3	11	29.32	33.24	0.1624	M(C,L)I
HL-C-R11-6-ZXSSB-3T-ETW-9	3	11	27.85	31.07	0.1605	L1I

2% Offset bearing strength was not reported as it occurred after obtaining the max load	Average	27.17	28.24	0.1650
	Standard Dev.	1.402	3.288	
	Coeff. of Var. [%]	5.159	11.64	
	Min.	24.96	22.00	0.1547
	Max.	30.05	33.36	0.1812
	Number of Spec.	16	21	21



4.42 ZX45 Single-Shear Bearing Properties (ZX45SSB)

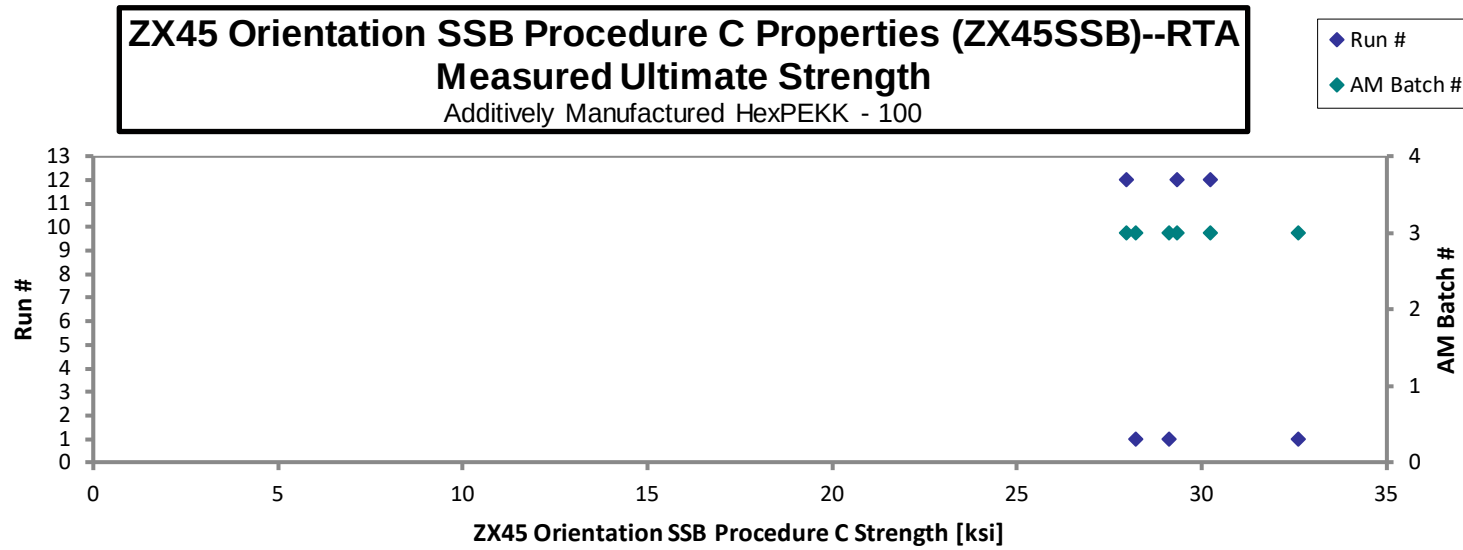
ZX45 Orientation SSB Procedure C Properties (ZX45SSB)--RTA
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R1-1-ZX45SSB-1B-RTA-13	3	1		29.11	0.1569	L1I
HL-C-R1-1-ZX45SSB-3B-RTA-15	3	1		32.60	0.1606	L1I
HL-C-R1-1-ZX45SSB-5T-RTA-18	3	1		28.20	0.1571	L1I
HL-C-R12-3-ZX45SSB-3B-RTA-15	3	12		30.24	0.1581	L1I
HL-C-R12-3-ZX45SSB-4B-RTA-16	3	12		27.98	0.1649	L1I
HL-C-R12-3-ZX45SSB-5T-RTA-17	3	12		29.35	0.1614	L1I

2% Offset bearing strength was not reported as it occurred after obtaining the max load

Average	29.58	0.1598
Standard Dev.	1.690	
Coeff. of Var. [%]	5.714	
Min.	27.98	0.1569
Max.	32.60	0.1649
Number of Spec.	0	6



ZX45 Orientation SSB Procedure C Properties (ZX45SSB)--ETW

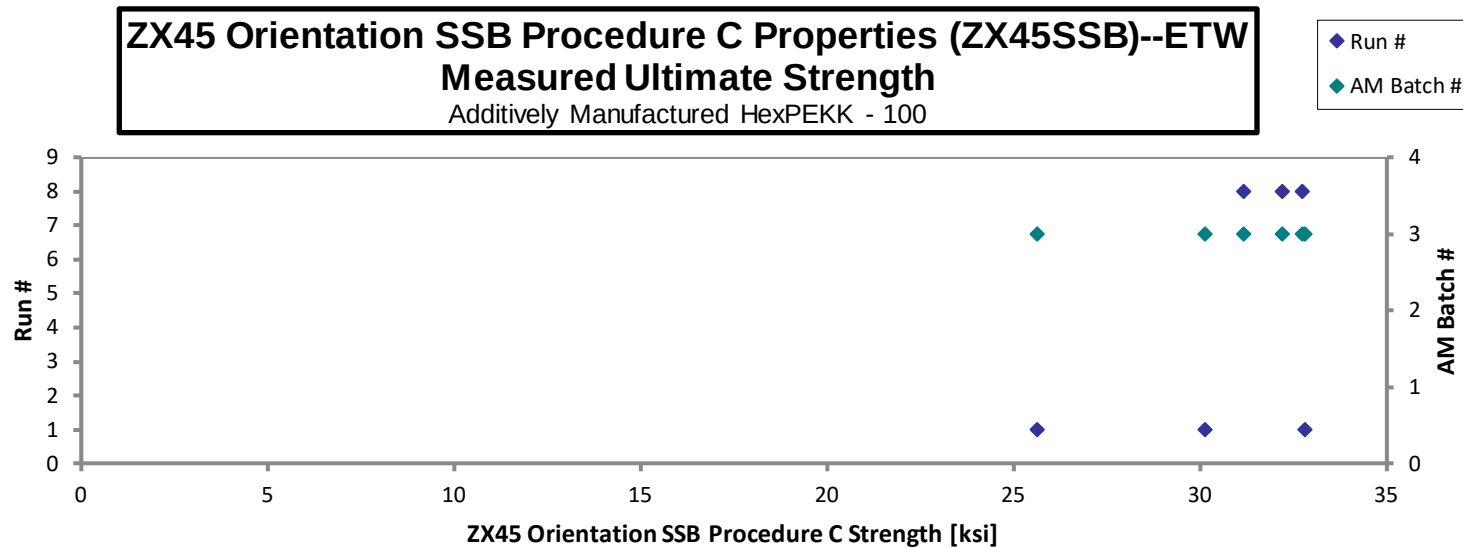
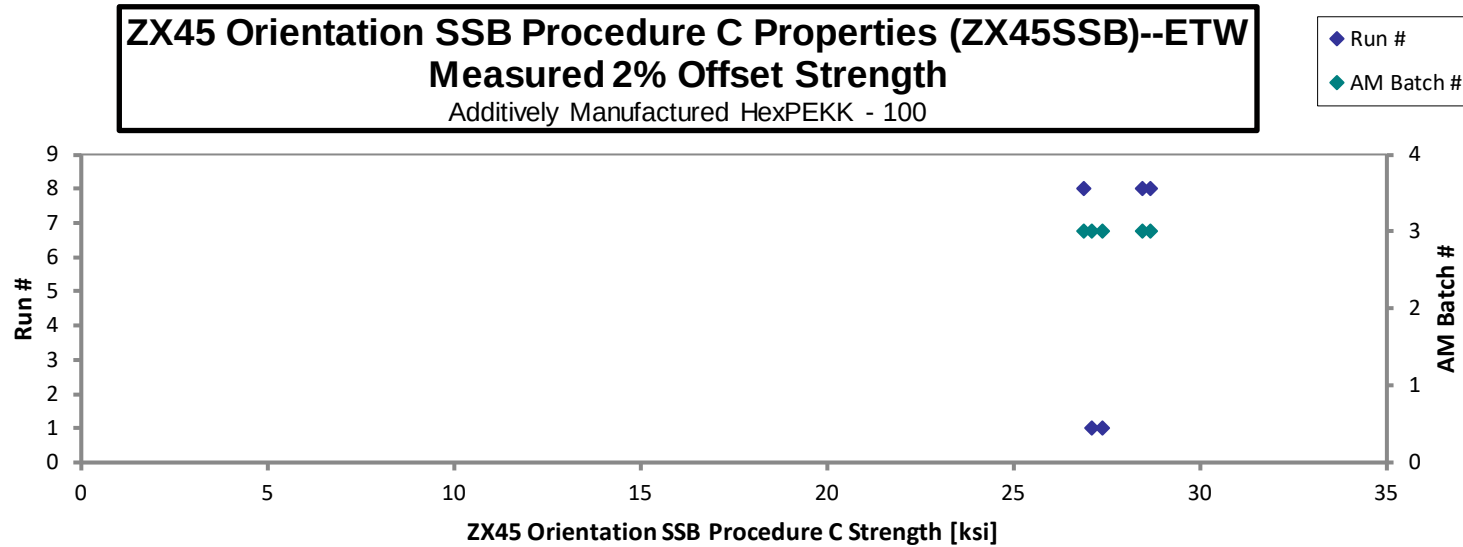
Strength

Additively Manufactured HexPEKK - 100

Specimen Number	AM Batch #	Machine Run #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode
HL-C-R1-1-ZX45SSB-3B-ETW-14	3	1		25.64	0.1571	M(C,L)1I
HL-C-R1-1-ZX45SSB-4B-ETW-16	3	1	27.37	32.80	0.1624	M(C,L)1I
HL-C-R1-1-ZX45SSB-5T-ETW-17	3	1	27.10	30.14	0.1574	L1I
HL-C-R8-2-ZX45SSB-1B-ETW-13	3	8	28.48	32.22	0.1668	L1I
HL-C-R8-2-ZX45SSB-3B-ETW-14	3	8	28.67	32.74	0.1660	L1I
HL-C-R8-2-ZX45SSB-5T-ETW-18	3	8	26.87	31.18	0.1650	M(C,L)1I

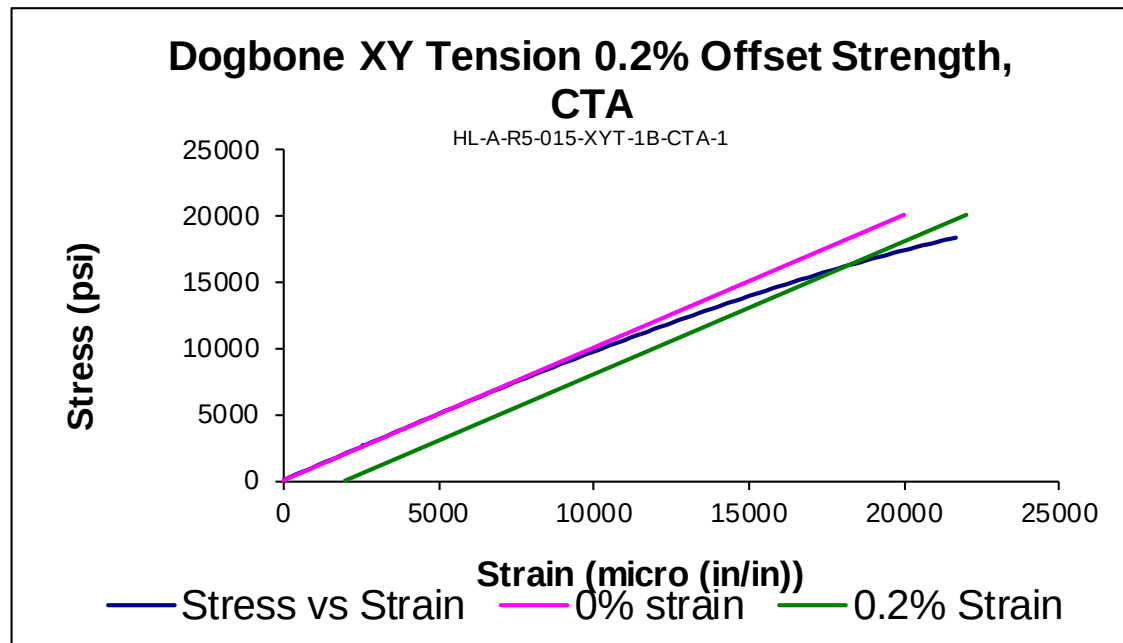
2% Offset bearing strength was not reported as it occurred after obtaining the max load

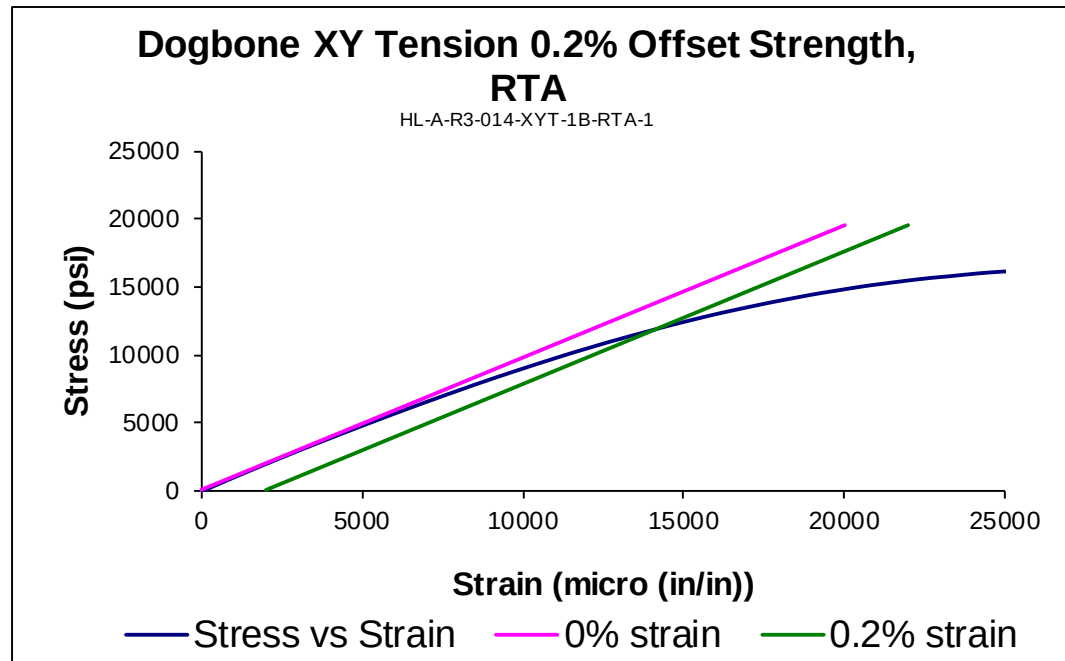
Average	27.70	30.79	0.1625
Standard Dev.	0.8214	2.720	
Coeff. of Var. [%]	2.965	8.834	
Min.	26.87	25.64	0.1571
Max.	28.67	32.80	0.1668
Number of Spec.	5	6	6

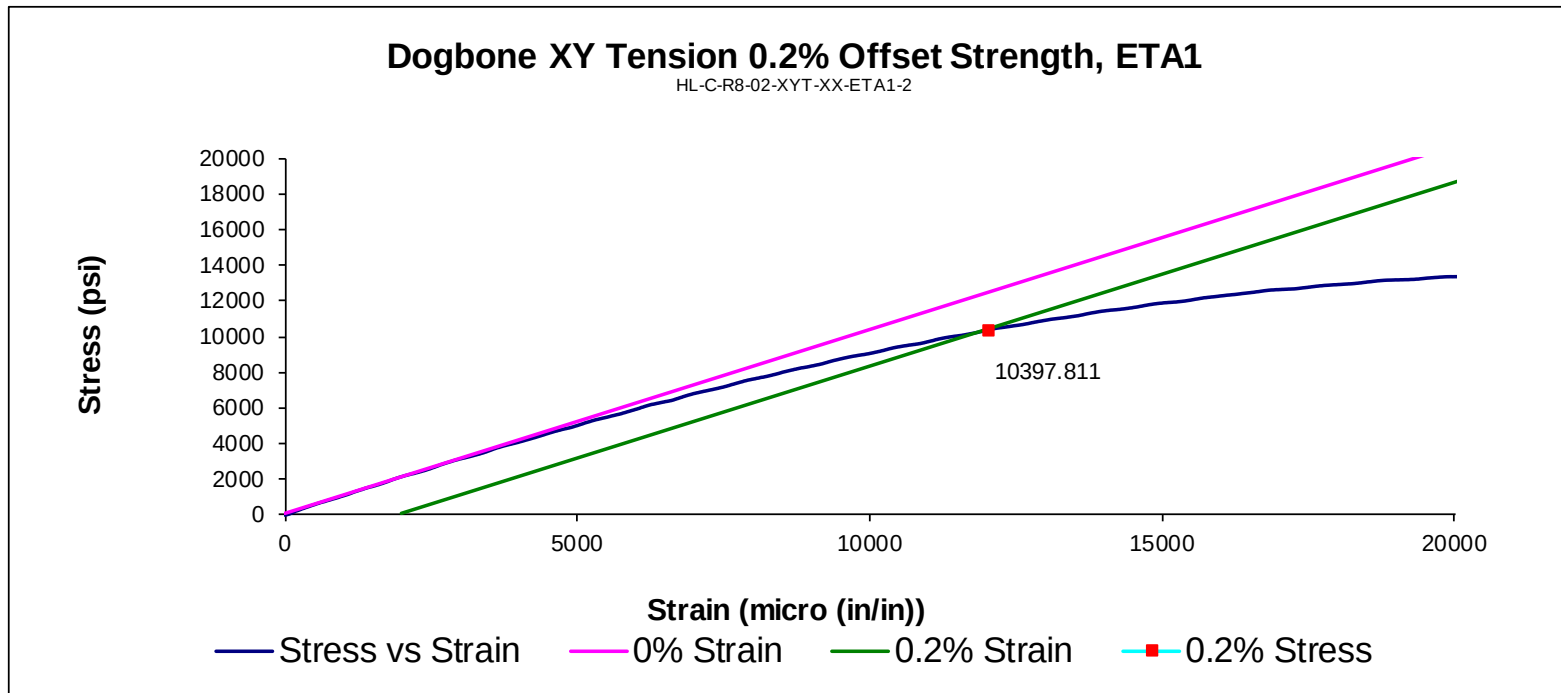


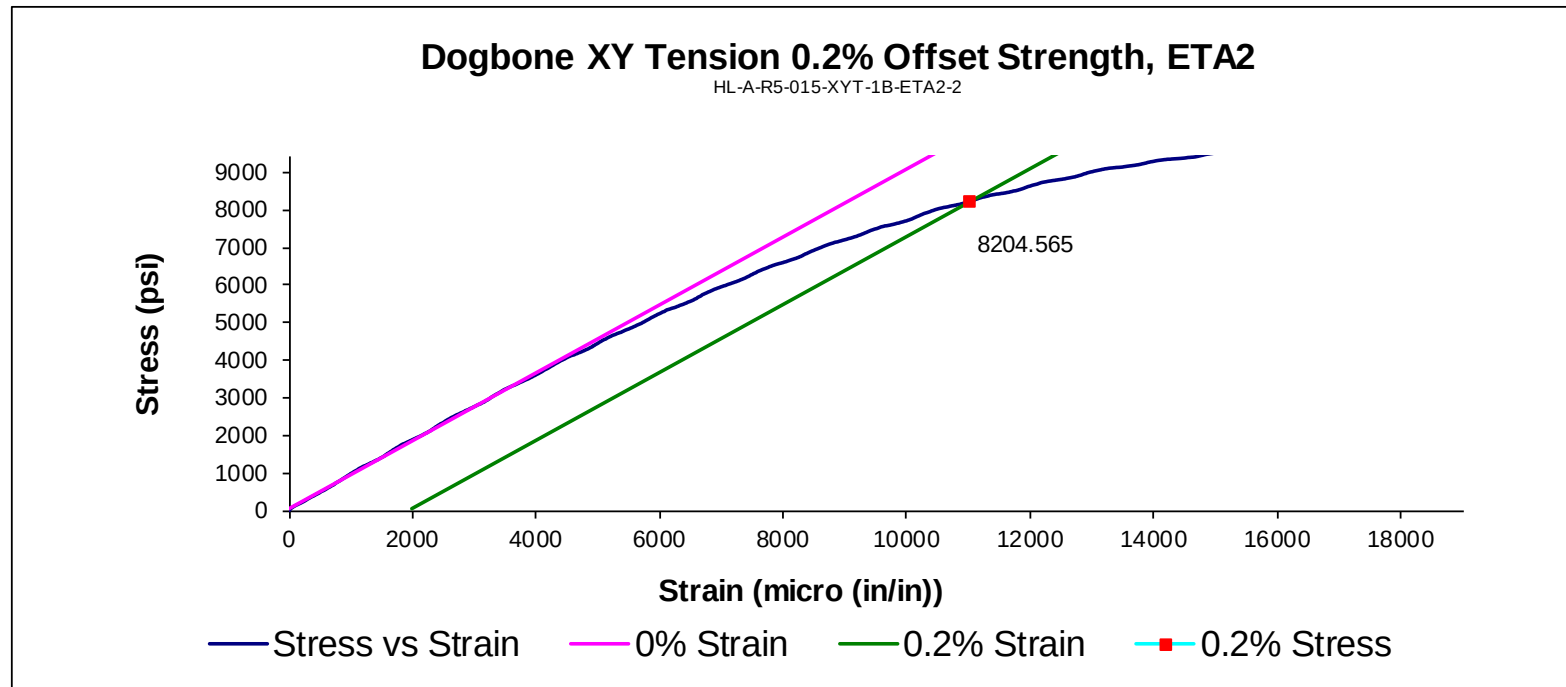
5. Full Stress vs. Strain Curve

5.1 Dogbone XY-Tension Properties (XYT)

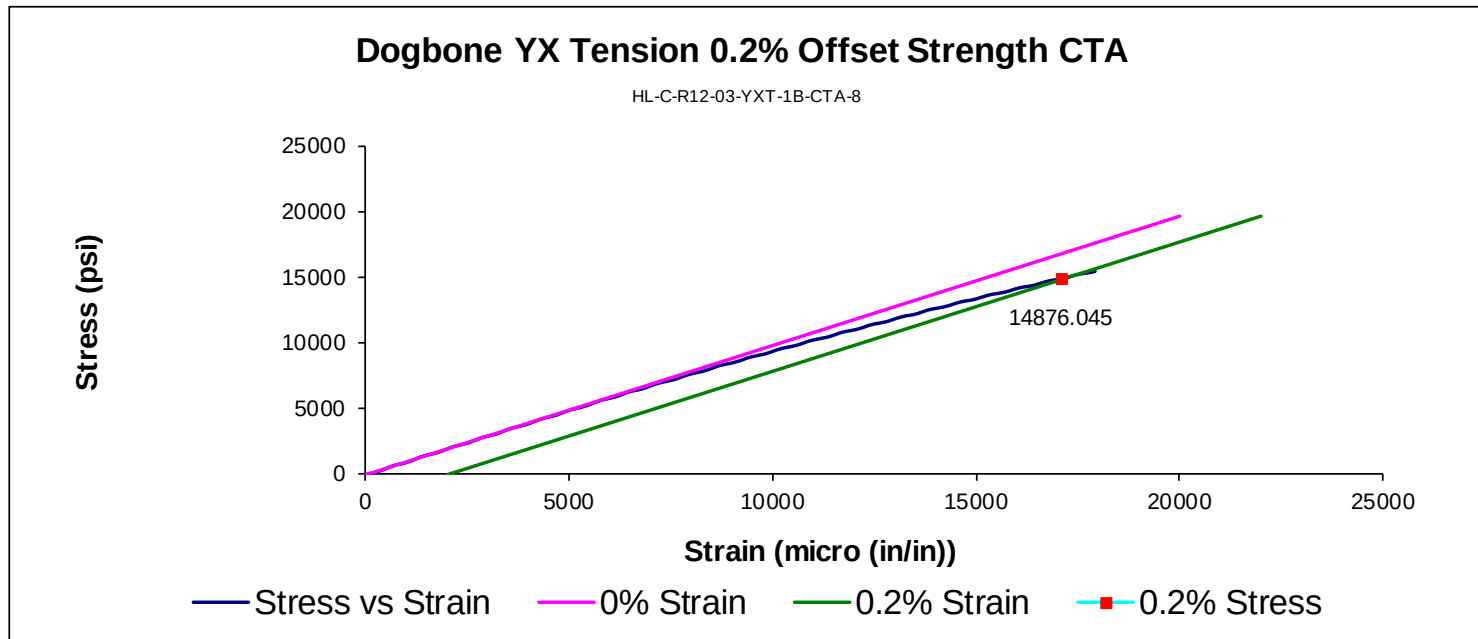


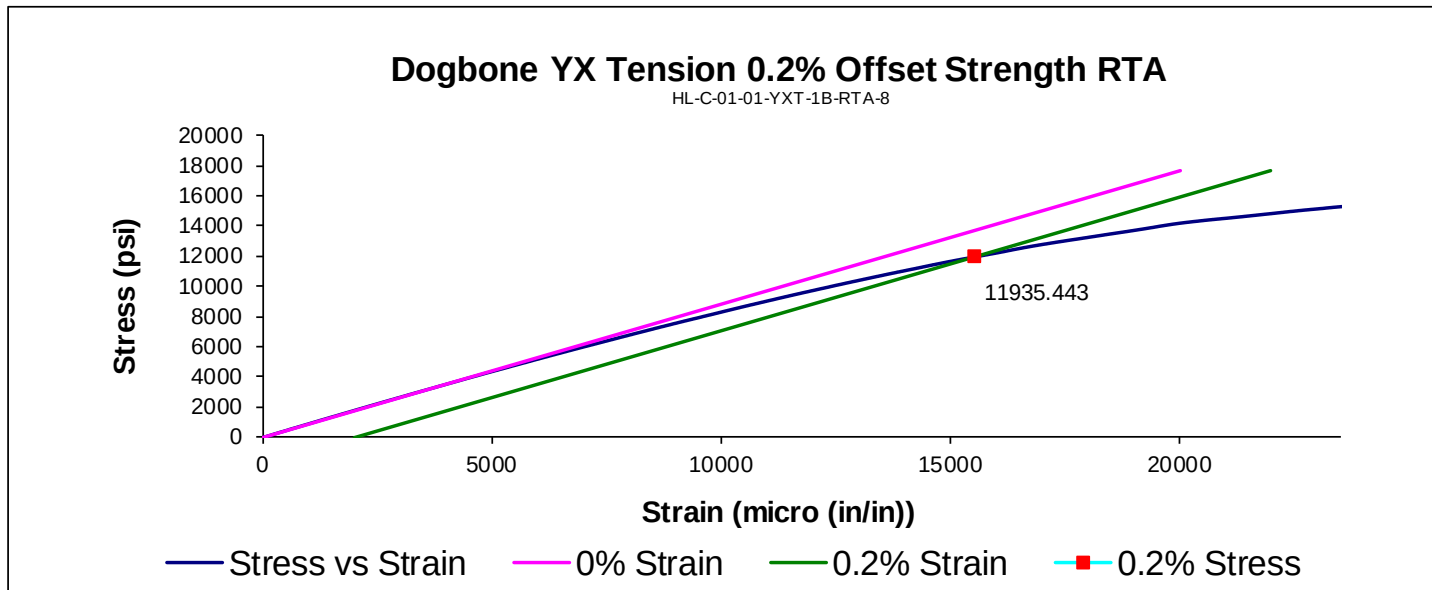




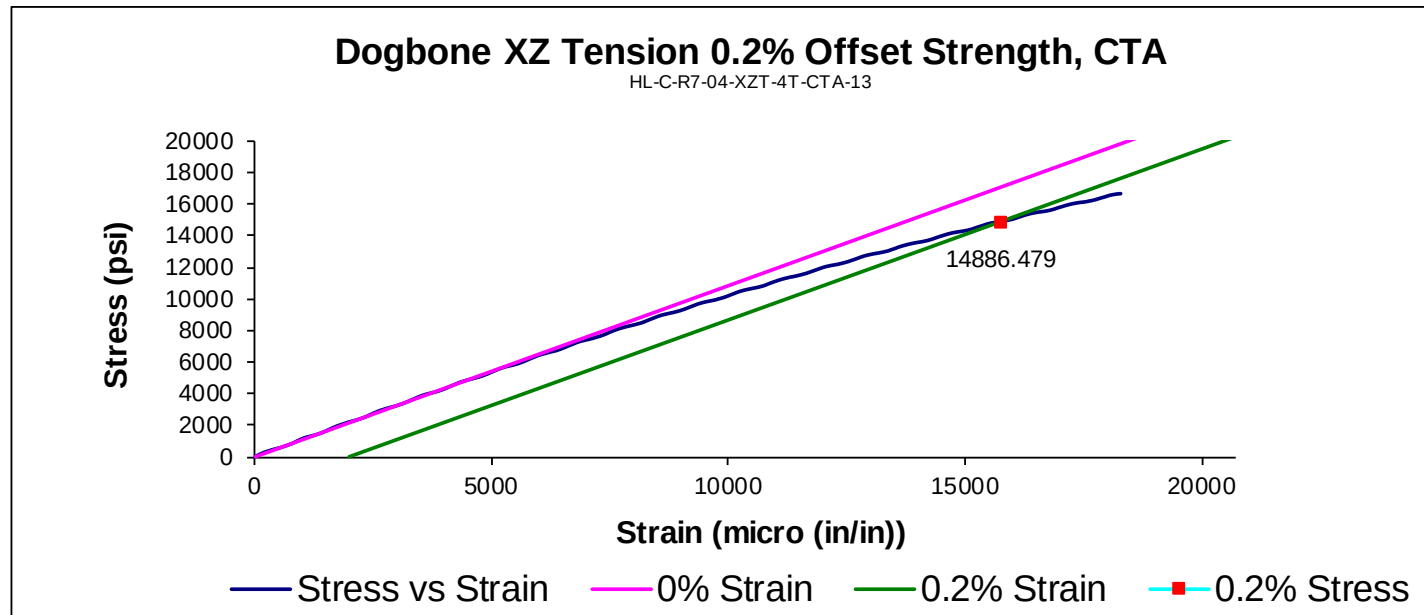


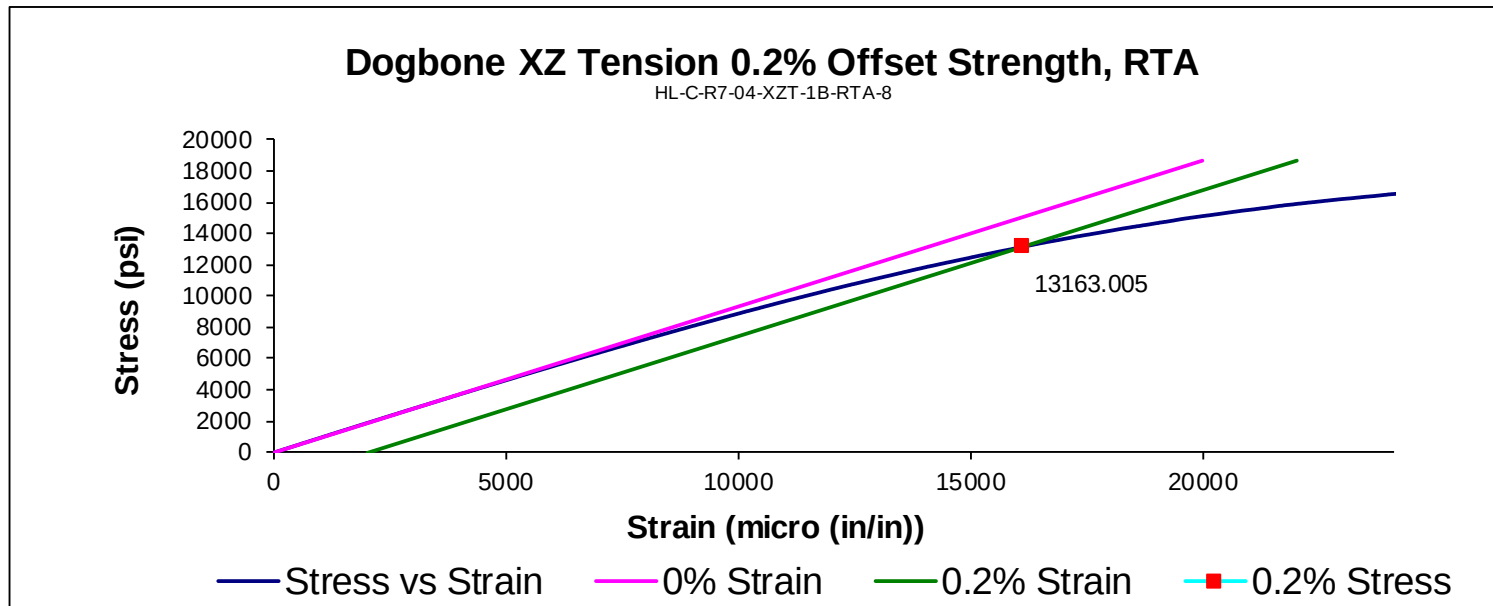
5.2 Dogbone YX-Tension Properties (YXT)



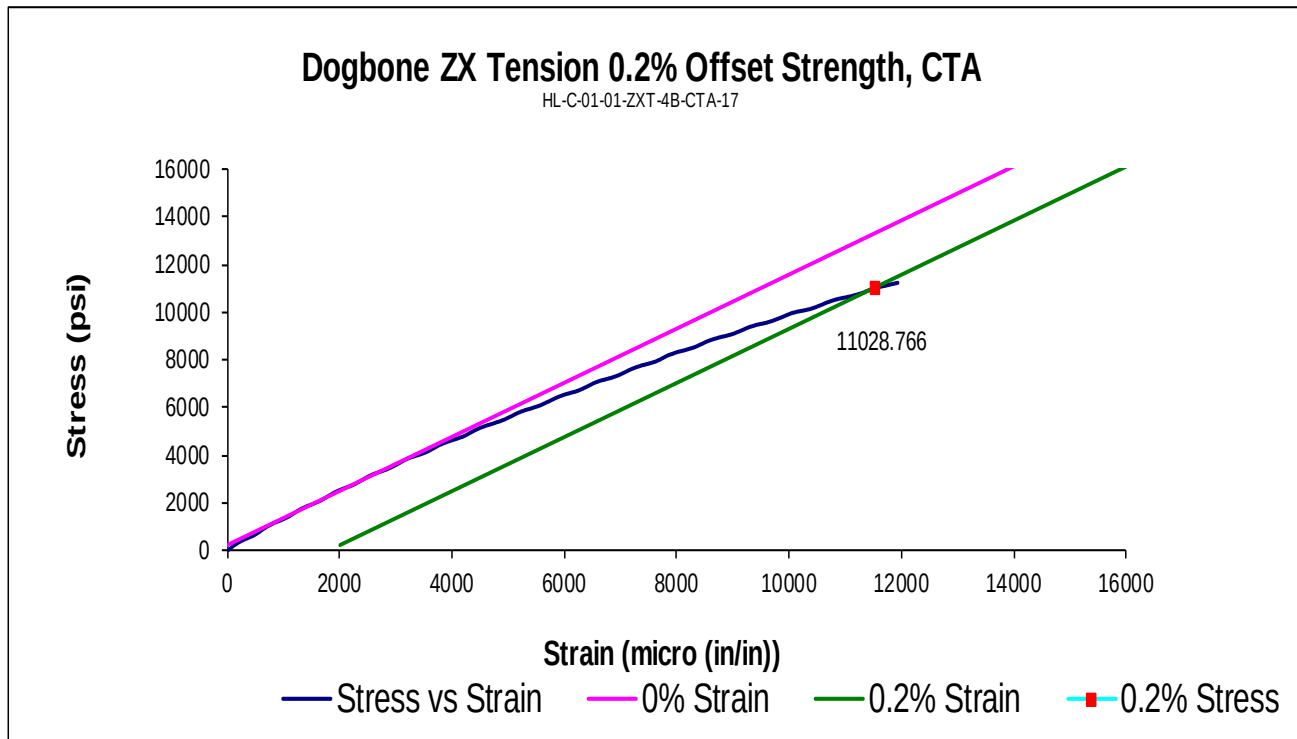


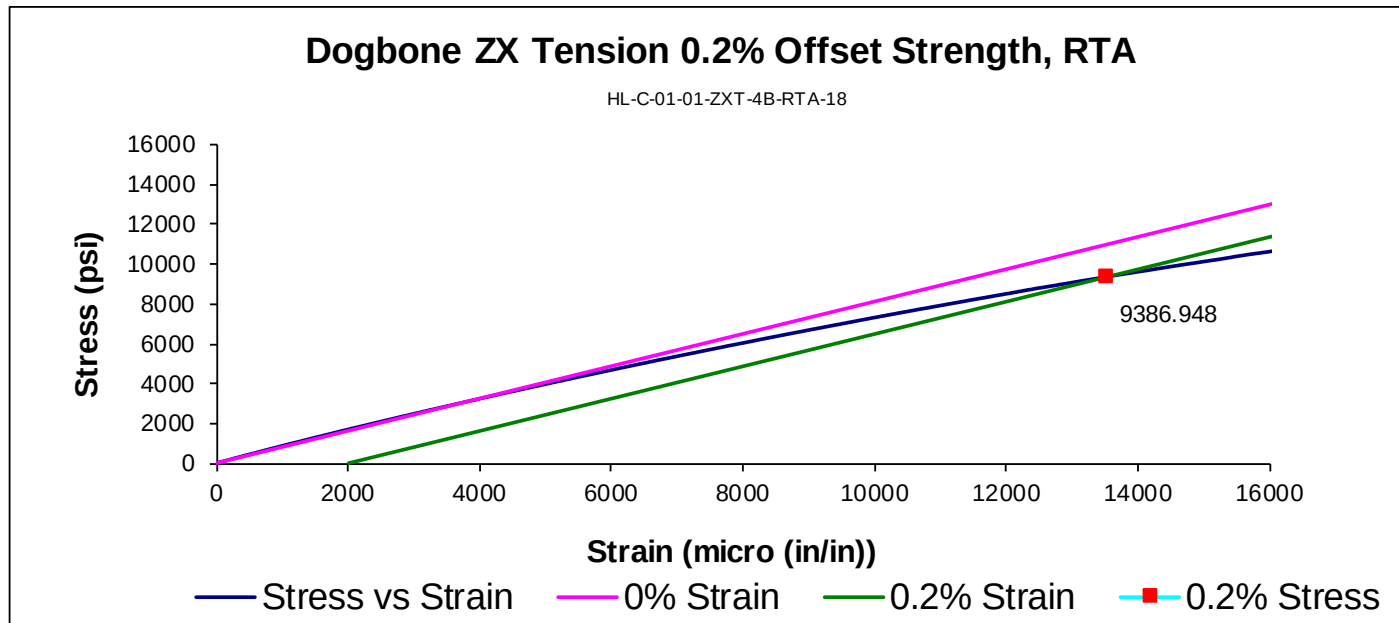
5.3 Dogbone XZ-Tension Properties (XZT)

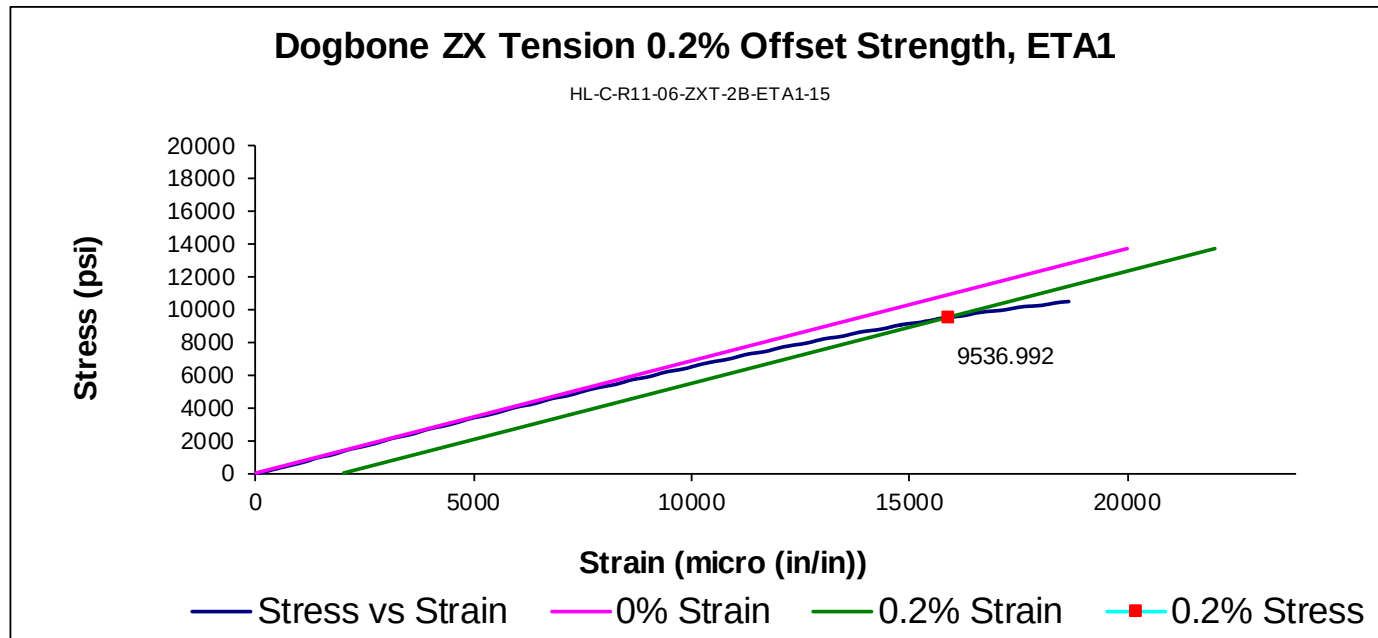


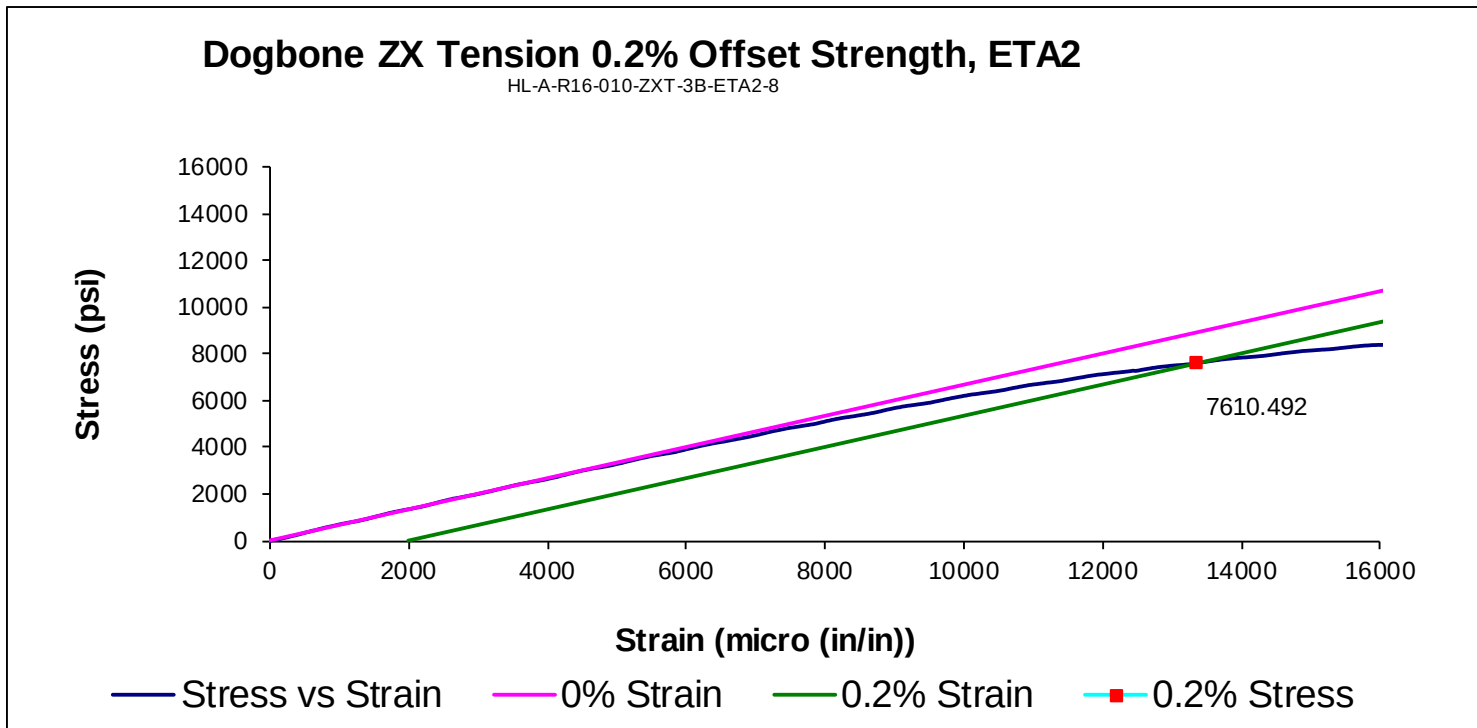


5.4 Dogbone ZX-Tension Properties (ZXT)

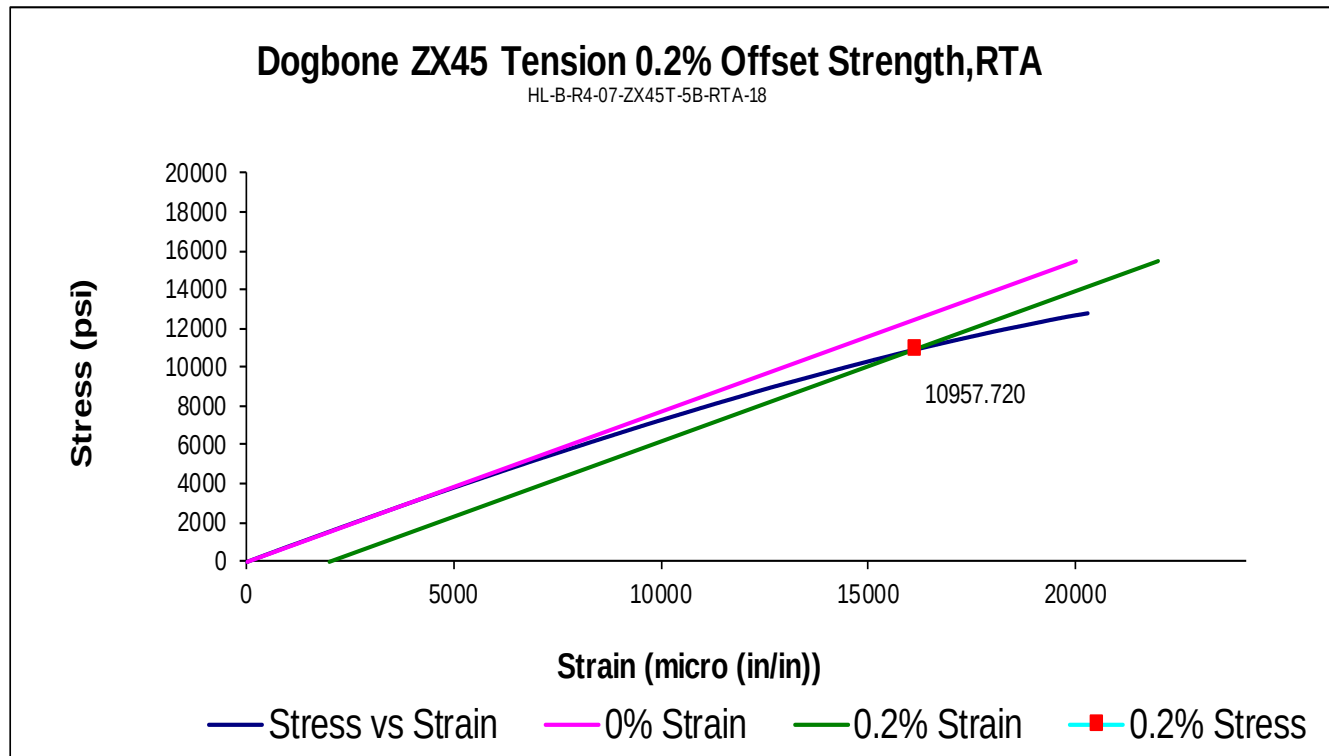




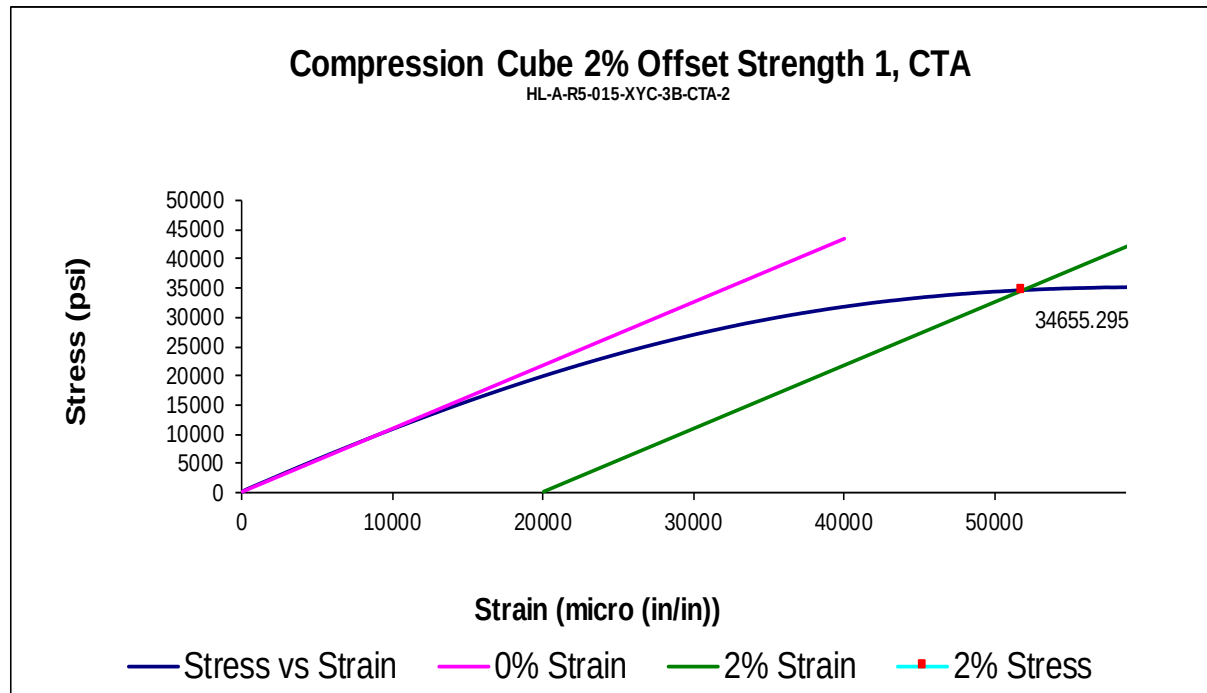


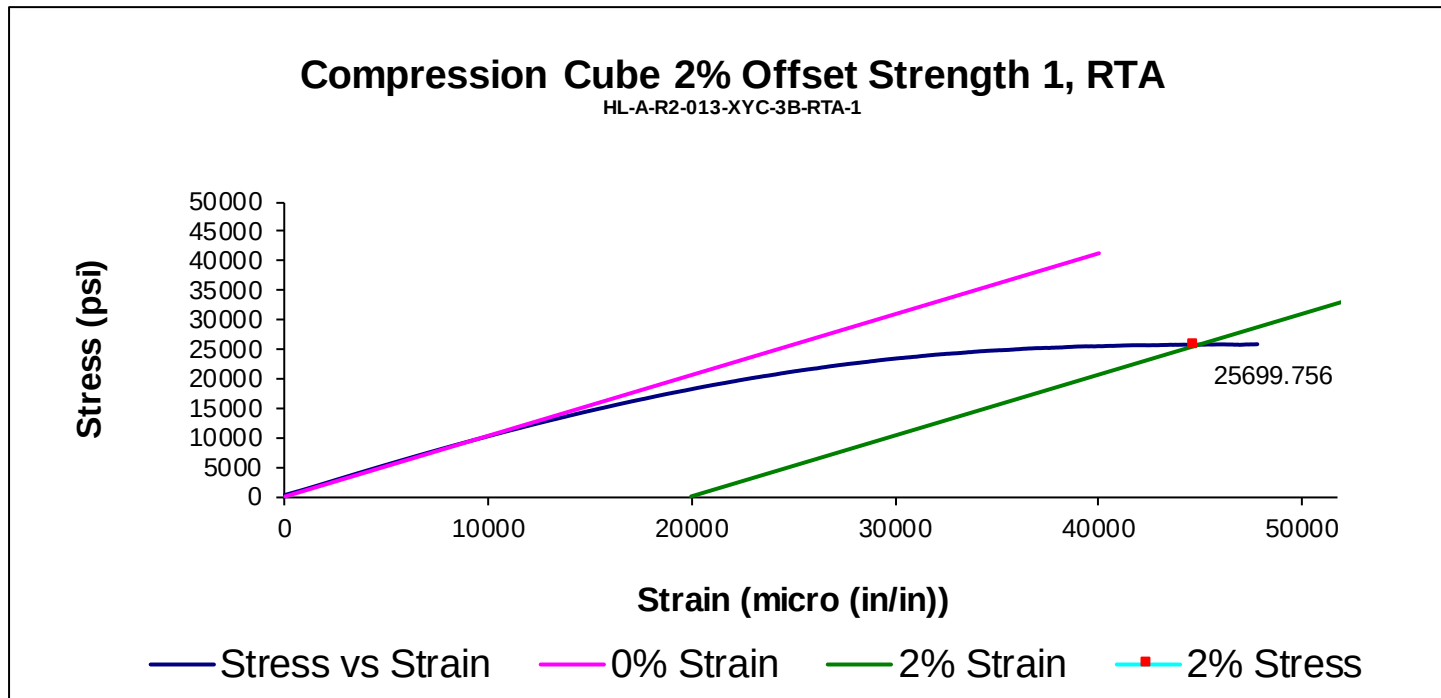


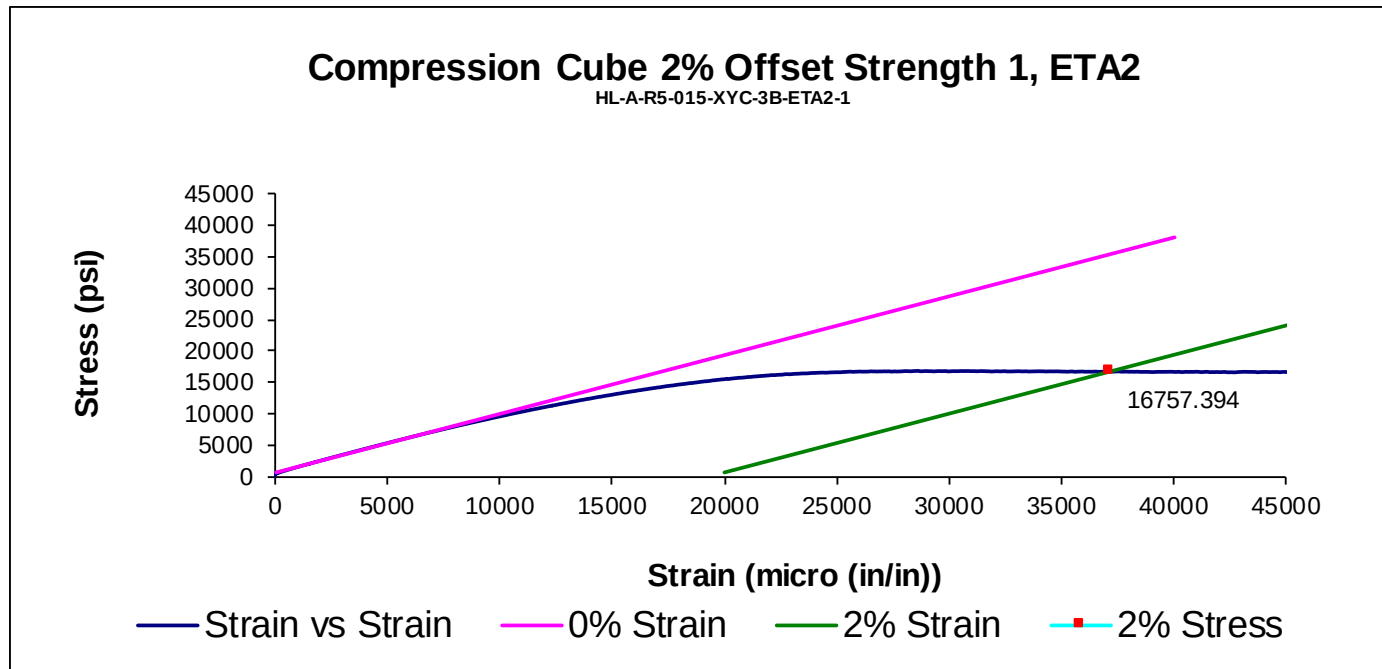
5.5 Dogbone Z45-Tension Properties (ZX45T)



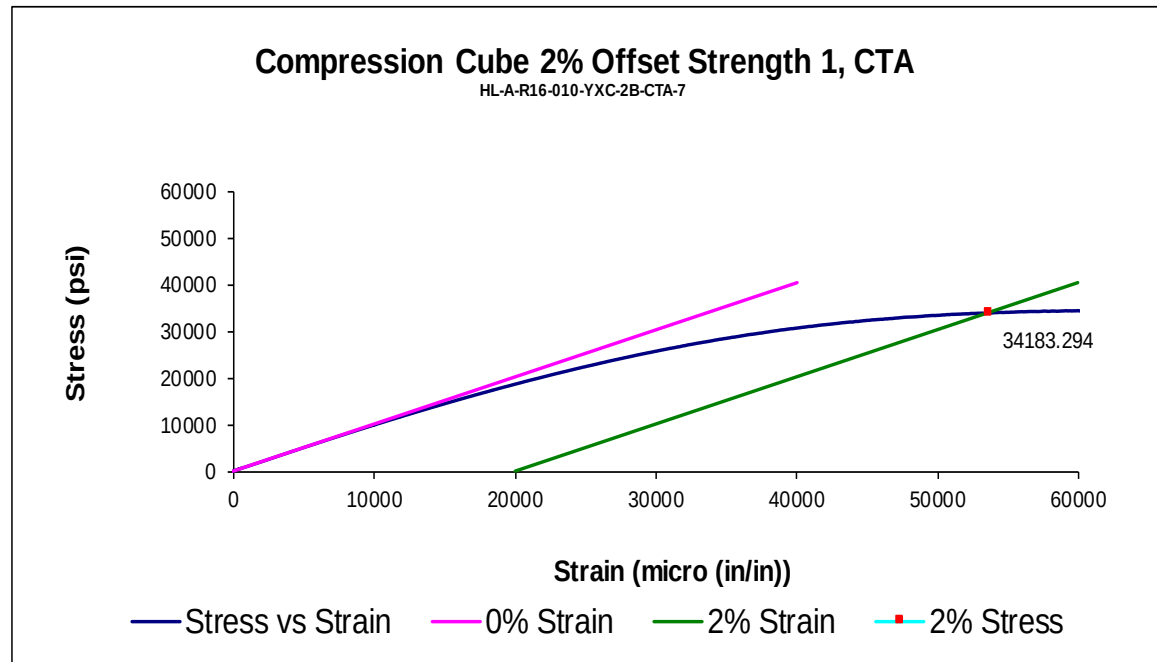
5.6 Cube XY Compression Properties (XYC)

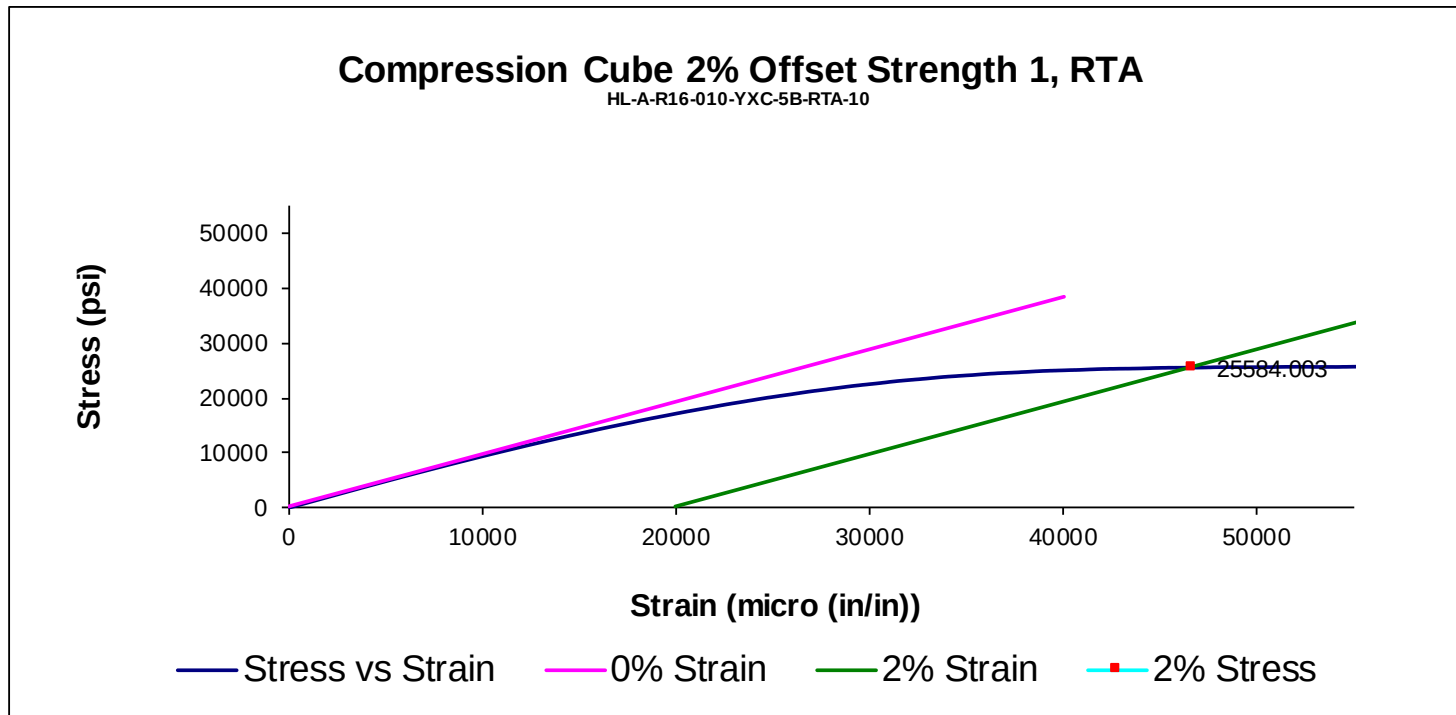


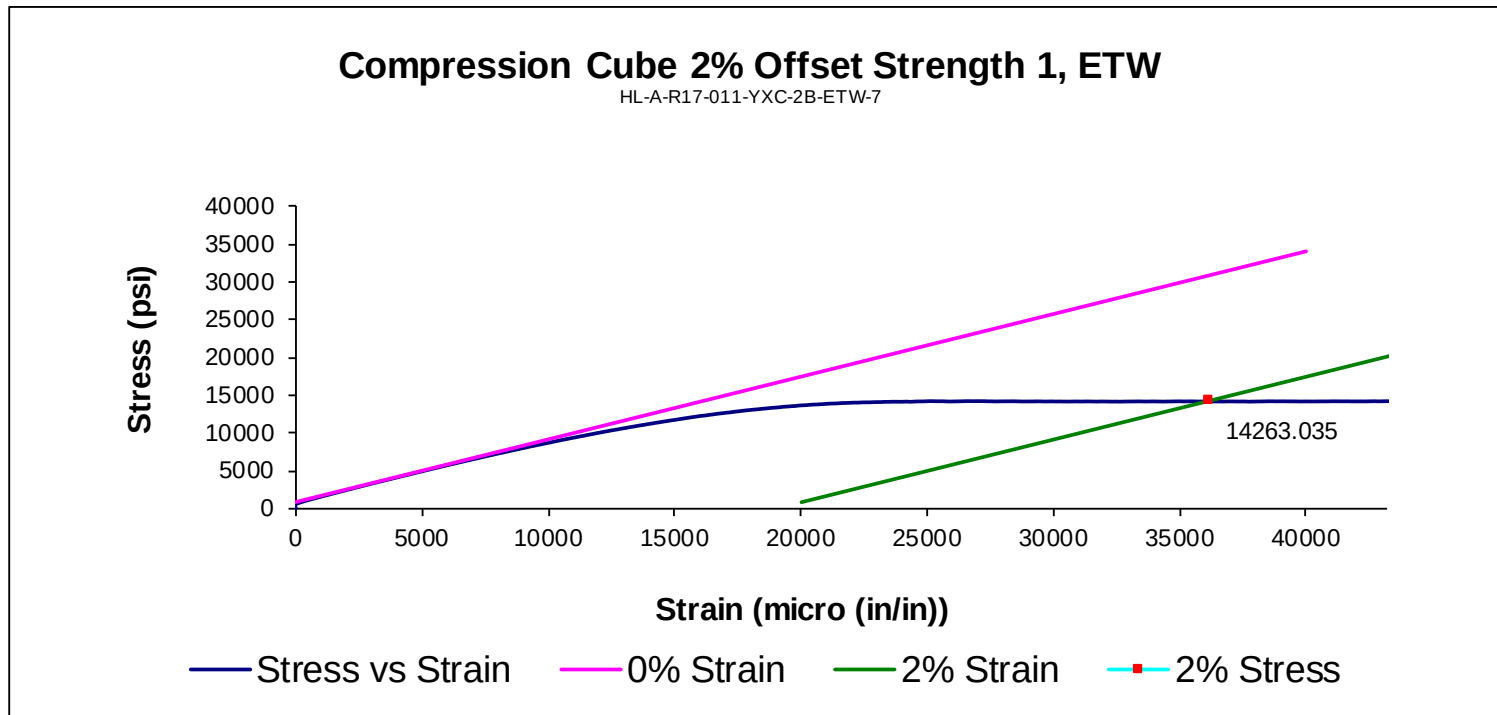




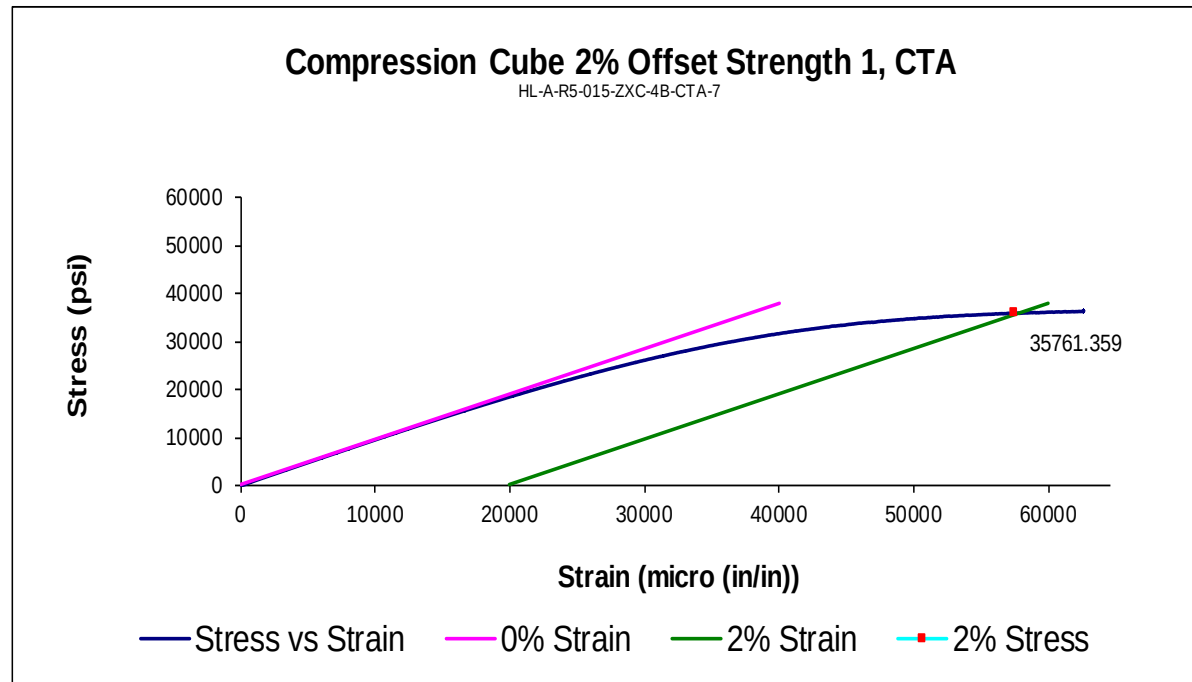
5.7 Cube YX Compression Properties (YXC)

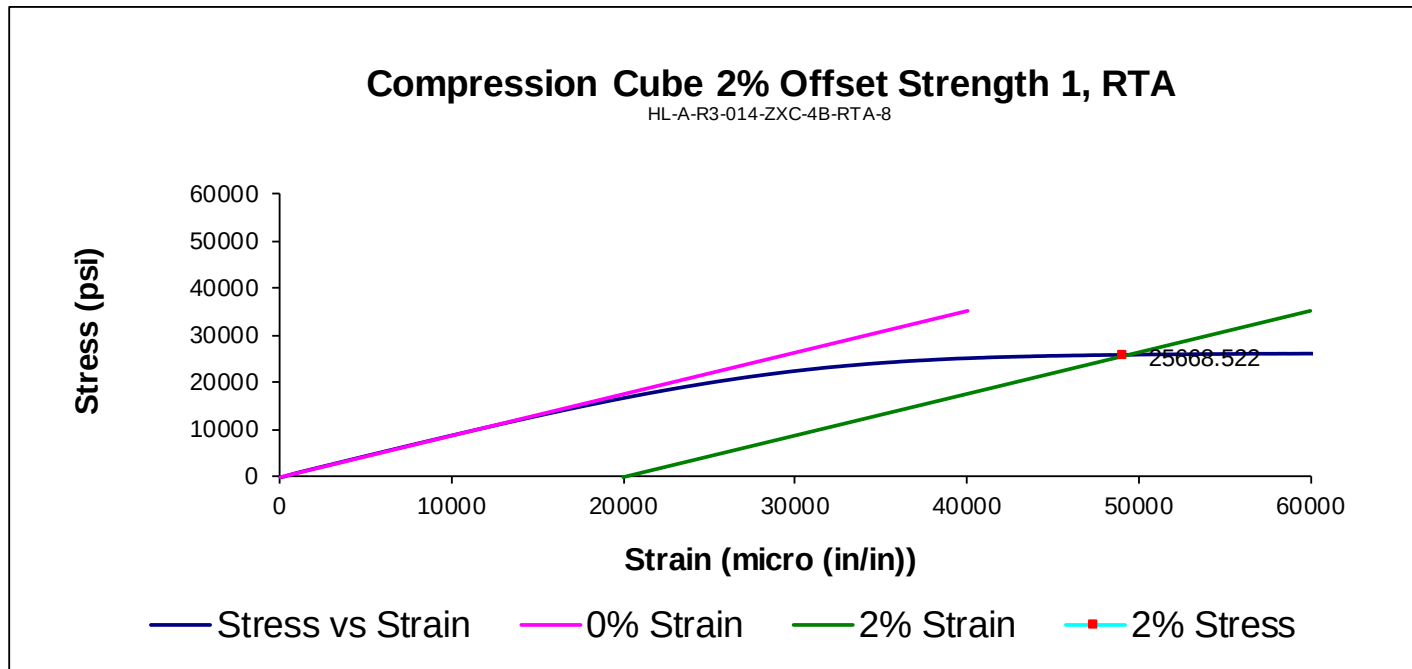


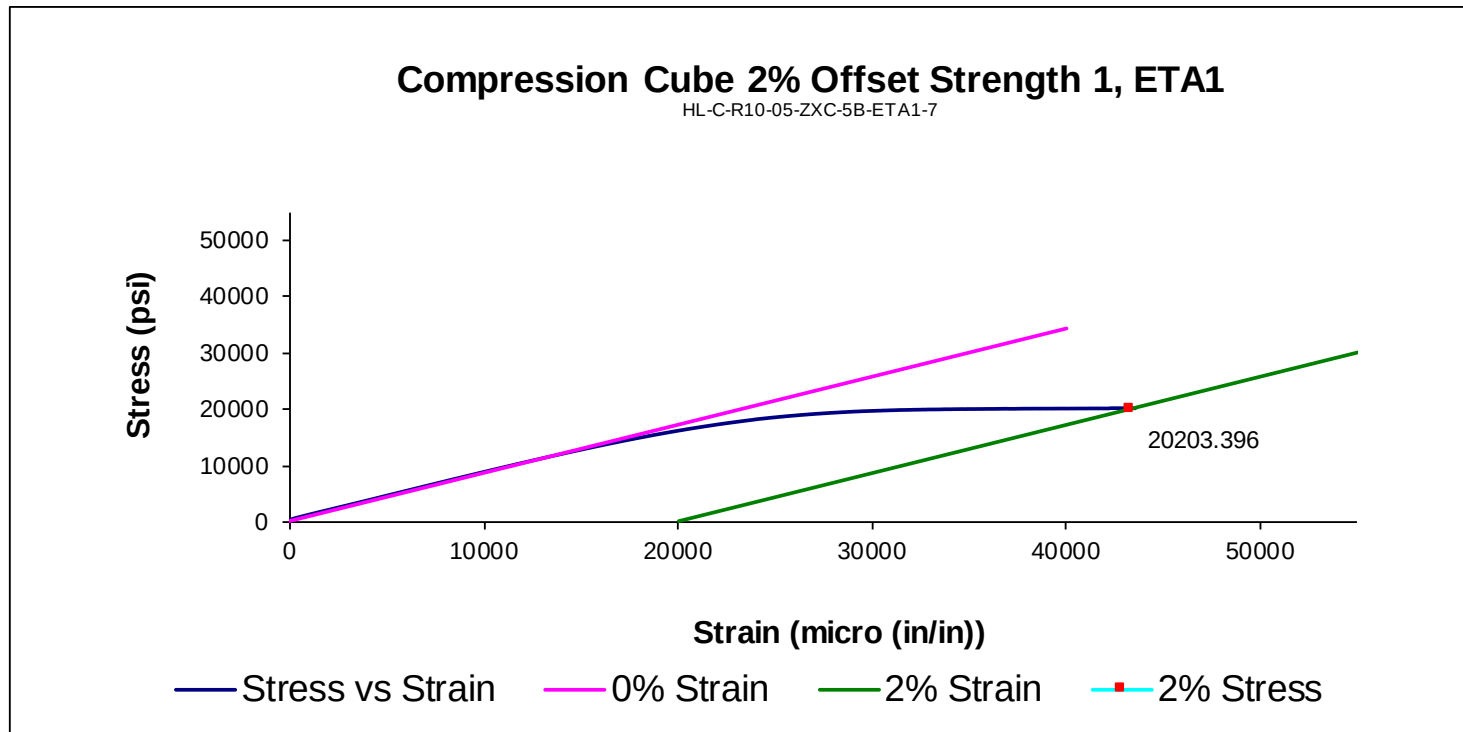


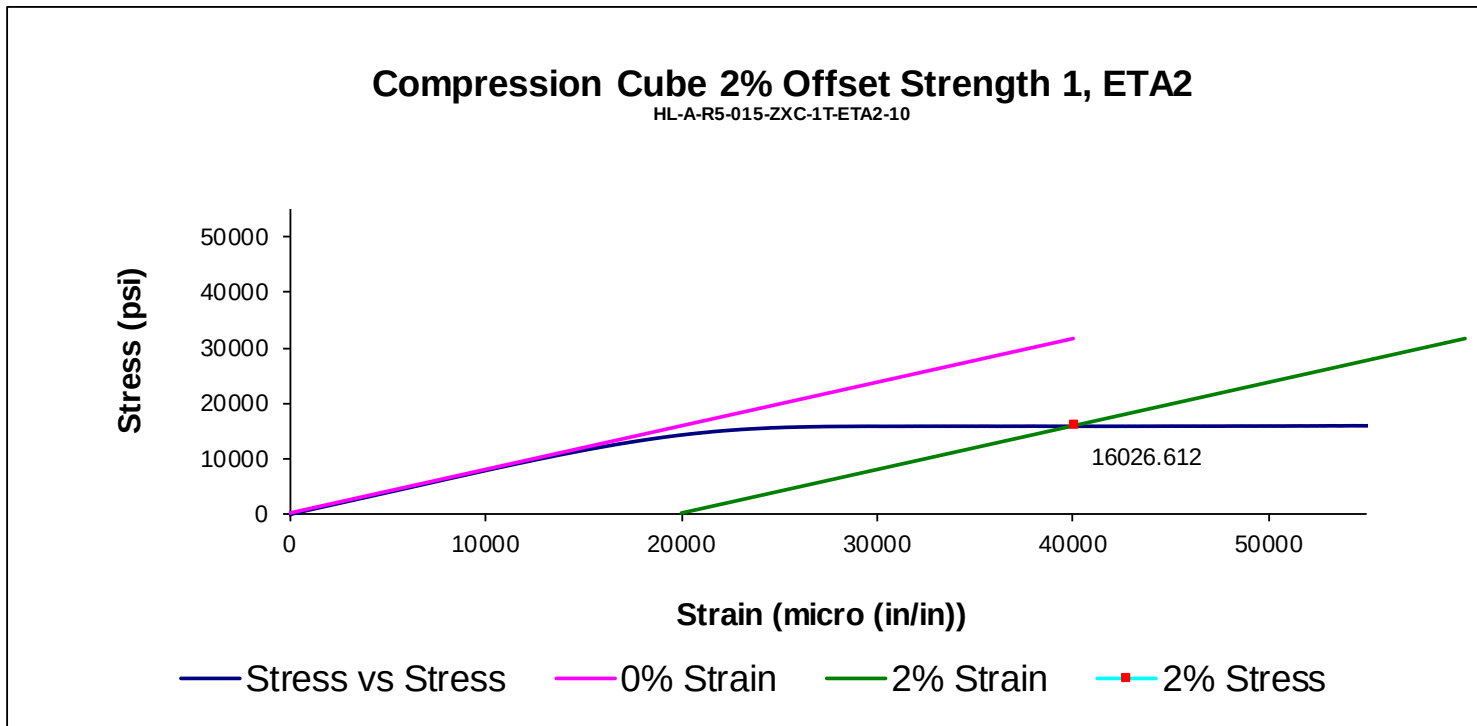


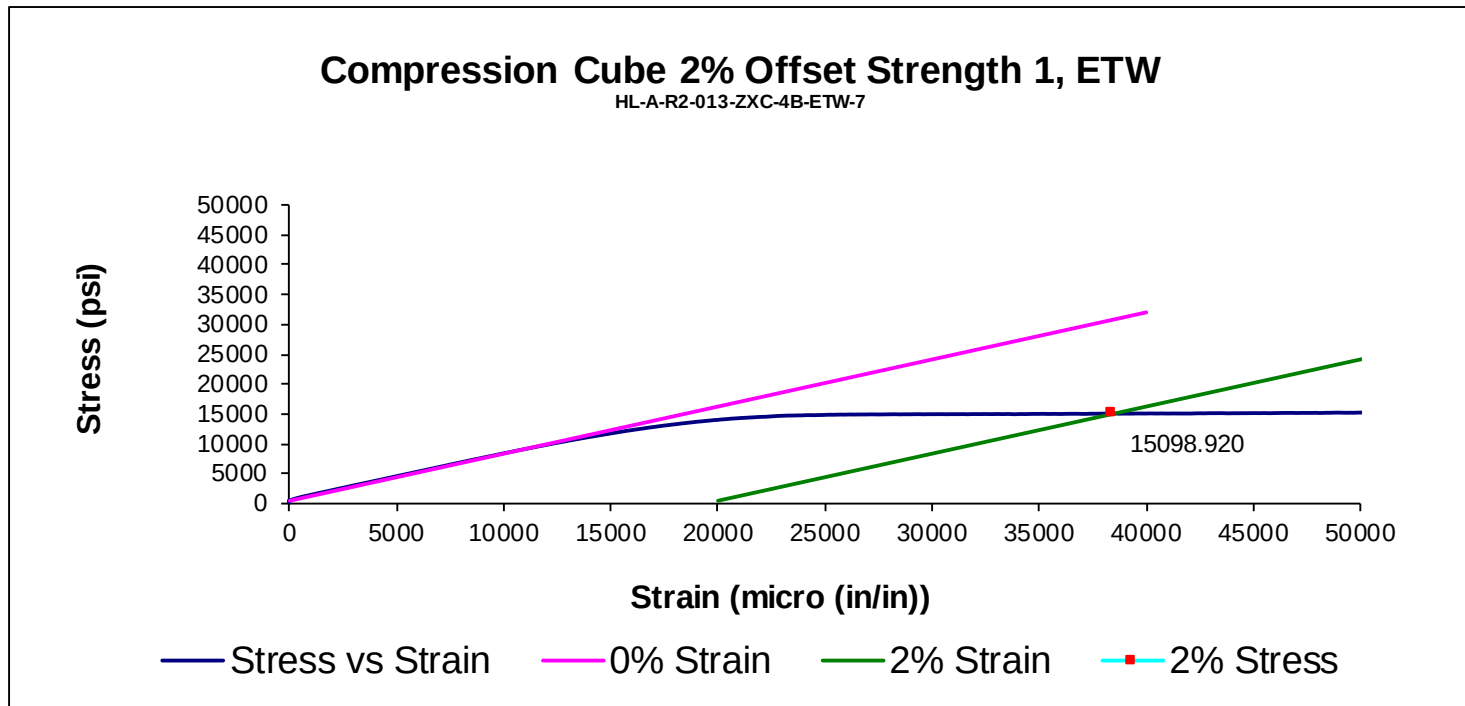
5.8 Cube ZX Compression Properties



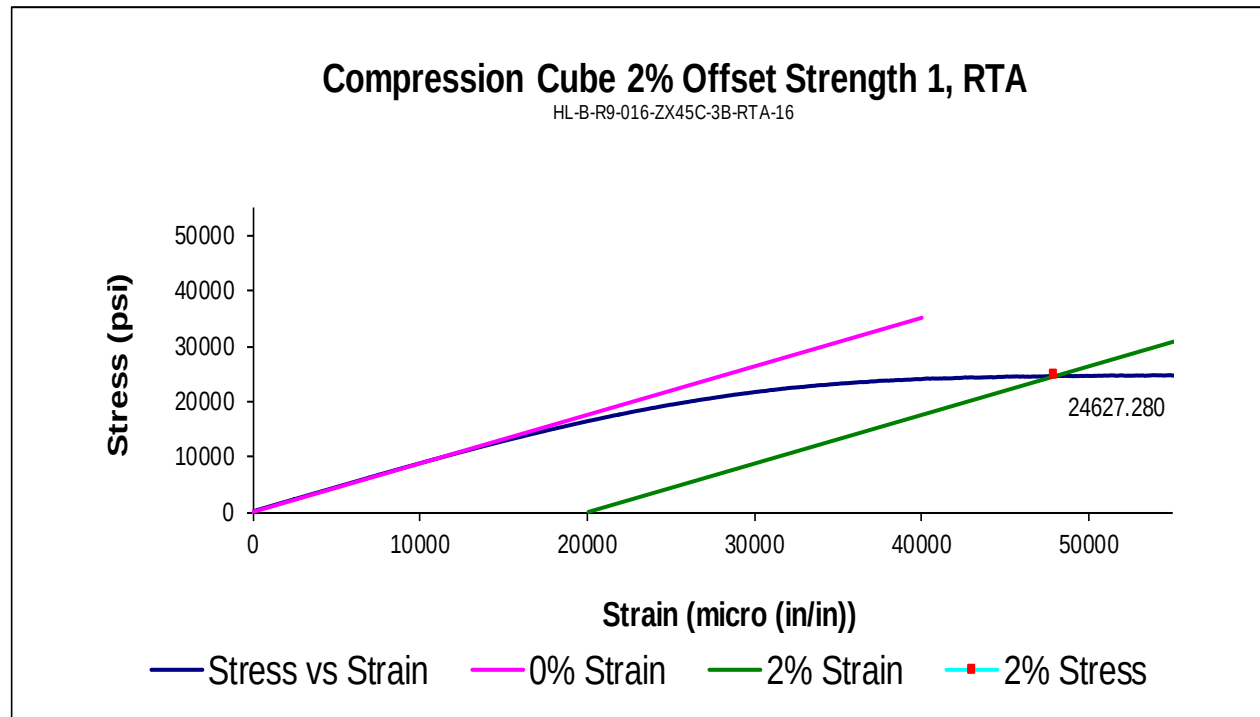


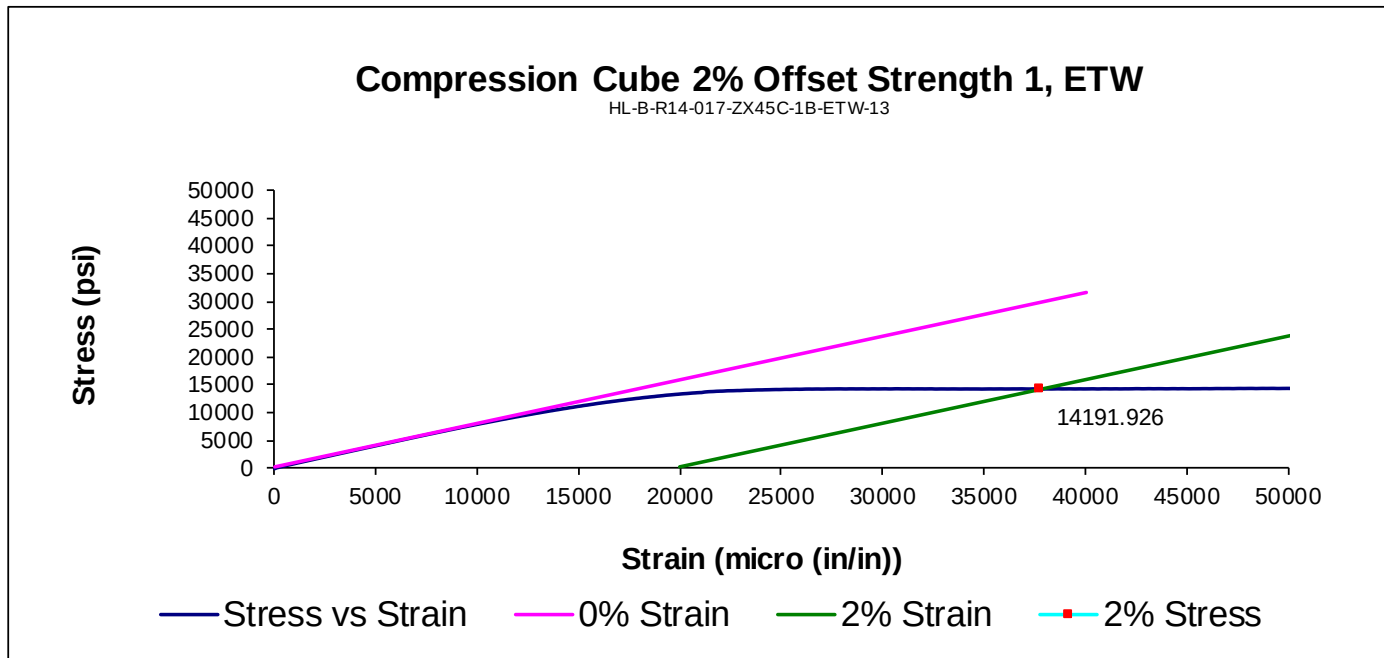






5.9 Cube ZX45 Compression Properties





6. Fluid Sensitivity Comparison

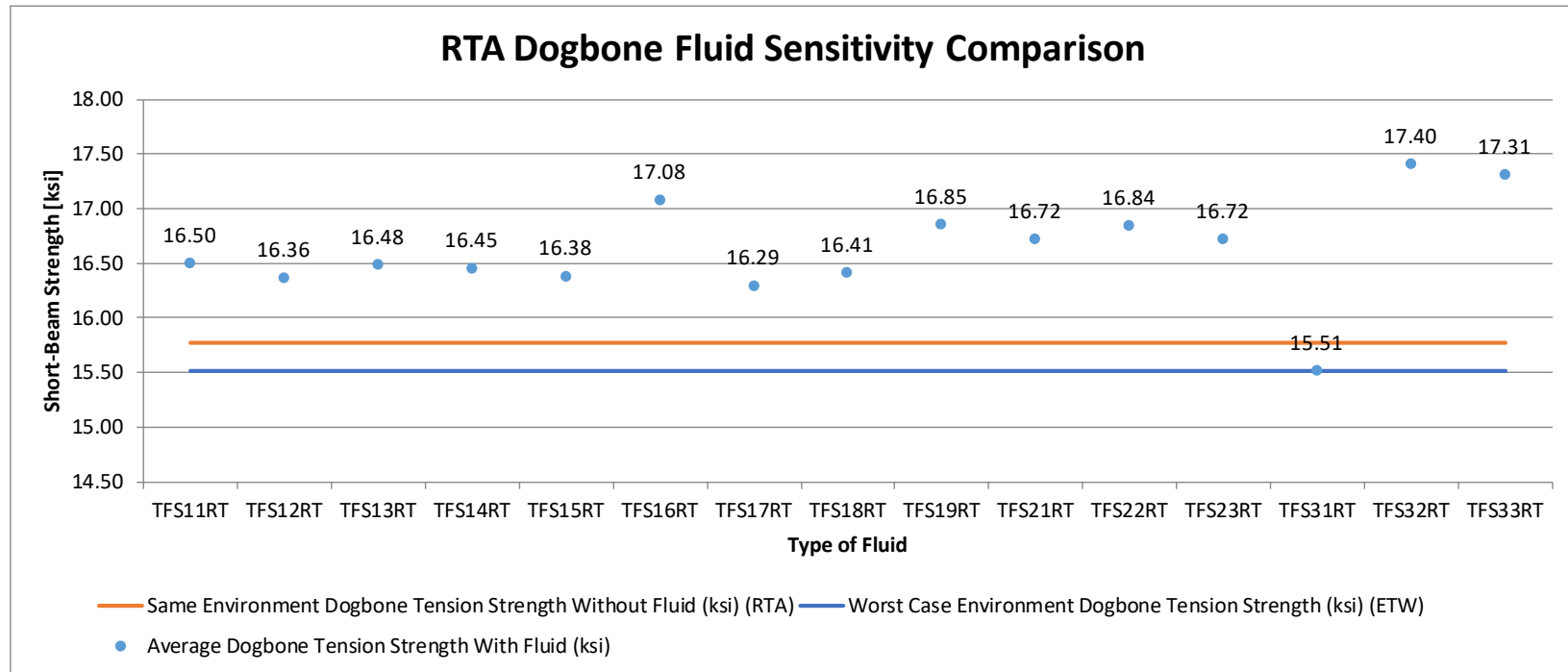
6.1 Room Temperature Test Data

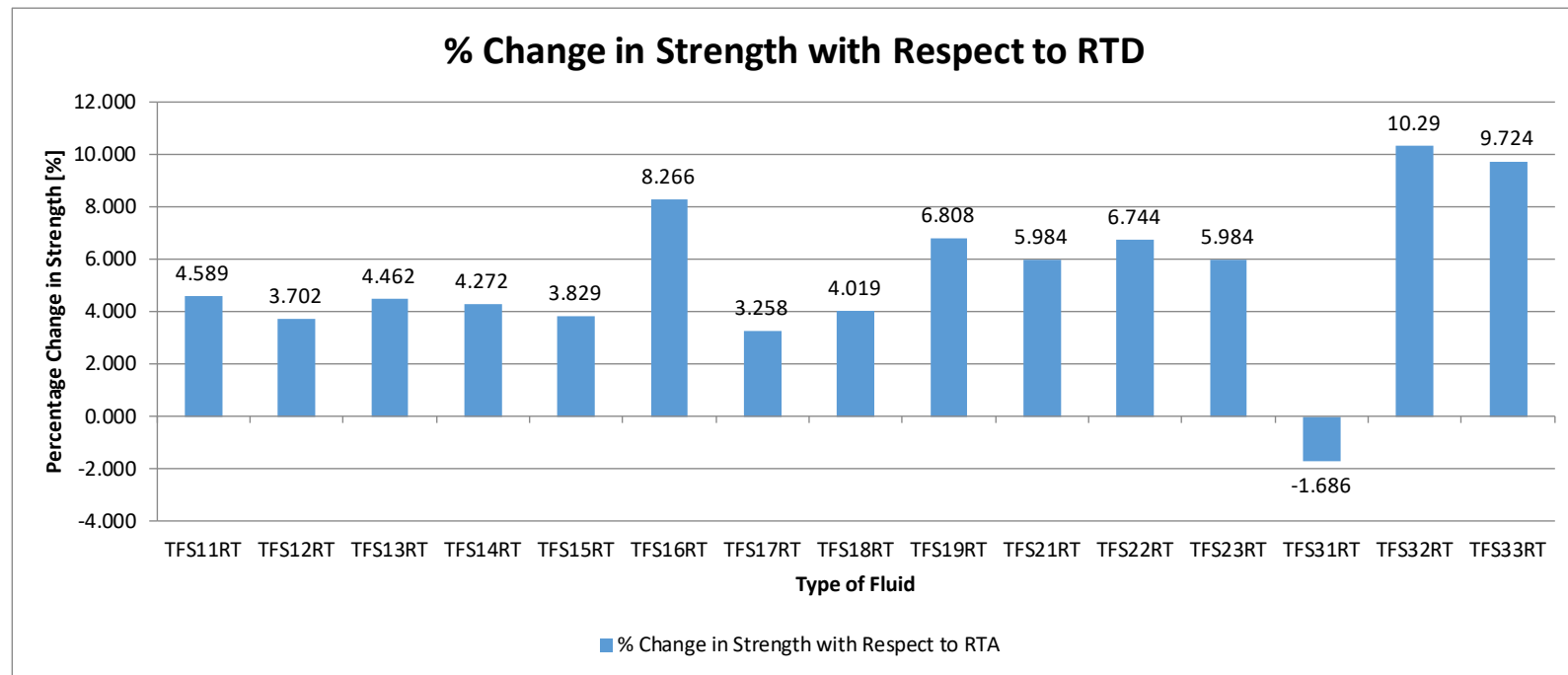
<u>Extended Contact:</u>	Exposure	Test Condition	Code
100 Low Lead Aviation Fuel (ASTM D910)	90 days min. @ 70°F±10°F	70°F	TFS11RT
ASTM D1655 Jet A Fuel (other jet fuel may be used but its type must be reported)			TFS12RT
MIL-PRF-5606 Hydraulic Oil			TFS13RT
MIL-PRF-83282 Hydraulic Oil			TFS14RT
MIL-PRF-7808 Engine Oil			TFS15RT
MIL-PRF-23699, Class STD Engine Oil			TFS16RT
Sea Water (ASTM D1141 or equiv.)			TFS17RT
Skydrol LD-4 (SAE AS1241, Type IV, Class 1)			TFS18RT
50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)			TFS19RT
<u>Short Duration Contact:</u>			
MEK washing fluid. ASTM D740	90 minutes min. @ 70°F±10°F	70°F	TFS21RT

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Polypropylene Glycol Deicer (Type I) SAE AMS 1424			TFS22RT
Isopropyl Alcohol Deicing Agent (TT-I-735)	48±4 hours @70°F±10°F		TFS23RT
<u>Control Tests:</u>			
Distilled Water	90 days min. at 70°F±10°F		TFS31RT
Ambient	90 days min. at 70°F±10°F	70°F	TFS32RT
85% Relative Humidity	Per section 7.1		TFS33RT





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Fluid Sensitivity Screening Dogbone Tension Properties (TFS)-- RT Strength Hexcel Hexpekk 100
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Fluid Code	Specimen Number	AM Batch #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode	Average
TFS11RT	HL-C-01-01-TFS11RT-1	1	16.65	0.1435	FAILURE AT GAGE SECTION	16.50
	HL-C-01-01-TFS11RT-2	1	16.93	0.1412	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS11RT-3	1	17.01	0.1398	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS11RT-4	1	16.24	0.1414	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS11RT-5	1	15.71	0.1503	FAILURE AT GAGE SECTION	
TFS12RT	HL-C-01-01-TFS12RT-1	1	16.78	0.1437	FAILURE AT GAGE SECTION	16.36
	HL-C-01-01-TFS12RT-2	1	16.81	0.1462	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS12RT-3	1	16.69	0.1419	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS12RT-4	1	15.98	0.1493	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS12RT-5	1	15.54	0.1499	FAILURE AT GAGE SECTION	
TFS13RT	HL-C-01-01-TFS13RT-1	1	15.71	0.1499	FAILURE AT GAGE SECTION	16.48
	HL-C-01-01-TFS13RT-2	1	17.13	0.1403	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS13RT-3	1	16.31	0.1480	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS13RT-4	1	16.46	0.1419	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS13RT-5	1	16.80	0.1418	FAILURE AT GAGE SECTION	
TFS14RT	HL-C-01-01-TFS14RT-1	1	16.79	0.1406	FAILURE AT GAGE SECTION	16.45
	HL-C-01-01-TFS14RT-2	1	16.62	0.1403	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS14RT-3	1	16.63	0.1525	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS14RT-4	1	16.59	0.1423	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS14RT-5	1	15.61	0.1402	FAILURE AT GAGE SECTION	
TFS15RT	HL-C-01-01-TFS15RT-1	1	15.71	0.1404	FAILURE AT GAGE SECTION	16.38
	HL-C-01-01-TFS15RT-2	1	16.87	0.1382	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS15RT-3	1	16.88	0.1429	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS15RT-4	1	16.42	0.1473	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS15RT-5	1	16.01	0.1421	FAILURE AT GAGE SECTION	
TFS16RT	HL-C-R8-02-TFS16RT-1	2	17.02	0.1460	FAILURE AT GAGE SECTION	17.08
	HL-C-R8-02-TFS16RT-2	2	17.28	0.1468	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS16RT-3	2	17.47	0.1420	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS16RT-4	2	16.52	0.1457	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS16RT-5	2	17.12	0.1473	FAILURE AT GAGE SECTION	
TFS17RT	HL-C-R8-02-TFS17RT-1	2	16.03	0.1422	FAILURE AT GAGE SECTION	16.29
	HL-C-R8-02-TFS17RT-2	2	16.81	0.1390	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS17RT-3	2	15.99	0.1449	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS17RT-4	2	15.68	0.1441	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS17RT-5	2	16.93	0.1407	FAILURE AT GAGE SECTION	
TFS18RT	HL-C-R8-02-TFS18RT-1	2	16.73	0.1424	FAILURE AT GAGE SECTION	16.41
	HL-C-R8-02-TFS18RT-2	2	16.52	0.1479	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS18RT-3	2	16.19	0.1448	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS18RT-4	2	15.59	0.1506	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS18RT-5	2	17.02	0.1462	FAILURE AT GAGE SECTION	

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TFS19RT	HL-C-R8-02-TFS19RT-1	2	17.13	0.1415	FAILURE AT GAGE SECTION	16.85
	HL-C-R8-02-TFS19RT-2	2	16.32	0.1516	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS19RT-3	2	17.14	0.1408	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS19RT-4	2	16.82	0.1434	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS19RT-5	2	16.84	0.1404	FAILURE AT GAGE SECTION	
TFS21RT	HL-C-R8-02-TFS21RT-1	2	17.37	0.1439	FAILURE AT GAGE SECTION	16.72
	HL-C-R8-02-TFS21RT-2	2	16.43	0.1459	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS21RT-3	2	16.36	0.1456	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS21RT-4	2	17.06	0.1464	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS21RT-5	2	16.39	0.1507	FAILURE AT GAGE SECTION	
TFS22RT	HL-C-R12-03-TFS22RT-1	3	16.56	0.1460	FAILURE AT GAGE SECTION	16.85
	HL-C-R12-03-TFS22RT-2	3	16.86	0.1421	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS22RT-3	3	17.10	0.1425	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS22RT-4	3	16.67	0.1421	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS22RT-5	3	17.04	0.1480	FAILURE AT GAGE SECTION	
TFS23RT	HL-C-R12-03-TFS23RT-1	3	16.20	0.1398	FAILURE AT GAGE SECTION	16.72
	HL-C-R12-03-TFS23RT-2	3	17.25	0.1450	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS23RT-3	3	16.87	0.1433	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS23RT-4	3	17.20	0.1387	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS23RT-5	3	16.07	0.1443	FAILURE AT GAGE SECTION	
TFS31RT	HL-C-R12-03-TFS31RT-1	3	14.98	0.1518	FAILURE AT GAGE SECTION	15.51
	HL-C-R12-03-TFS31RT-2	3	15.41	0.1503	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS31RT-3	3	16.63	0.1457	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS31RT-4	3	15.26	0.1484	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS31RT-5	3	15.29	0.1479	FAILURE AT GAGE SECTION	
TFS32RT	HL-C-R12-03-TFS32RT-1	3	17.61	0.1431	FAILURE AT GAGE SECTION	17.40
	HL-C-R12-03-TFS32RT-2	3	17.37	0.1462	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS32RT-3	3	17.34	0.1456	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS32RT-4	3	16.73	0.1439	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS32RT-5	3	17.95	0.1378	FAILURE AT GAGE SECTION	
TFS33RT	HL-C-R12-03-TFS33RT-1	3	17.73	0.1396	FAILURE AT GAGE SECTION	17.31
	HL-C-R12-03-TFS33RT-2	3	17.04	0.1395	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS33RT-3	3	17.64	0.1389	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS33RT-4	3	17.40	0.1393	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS33RT-5	3	16.76	0.1391	FAILURE AT GAGE SECTION	

Average 0.1441
 Standard Dev. 0.003767
 Coeff. of Var. [%] 2.615
 Min. 0.1378
 Max. 0.1525
 Number of Spec. 75

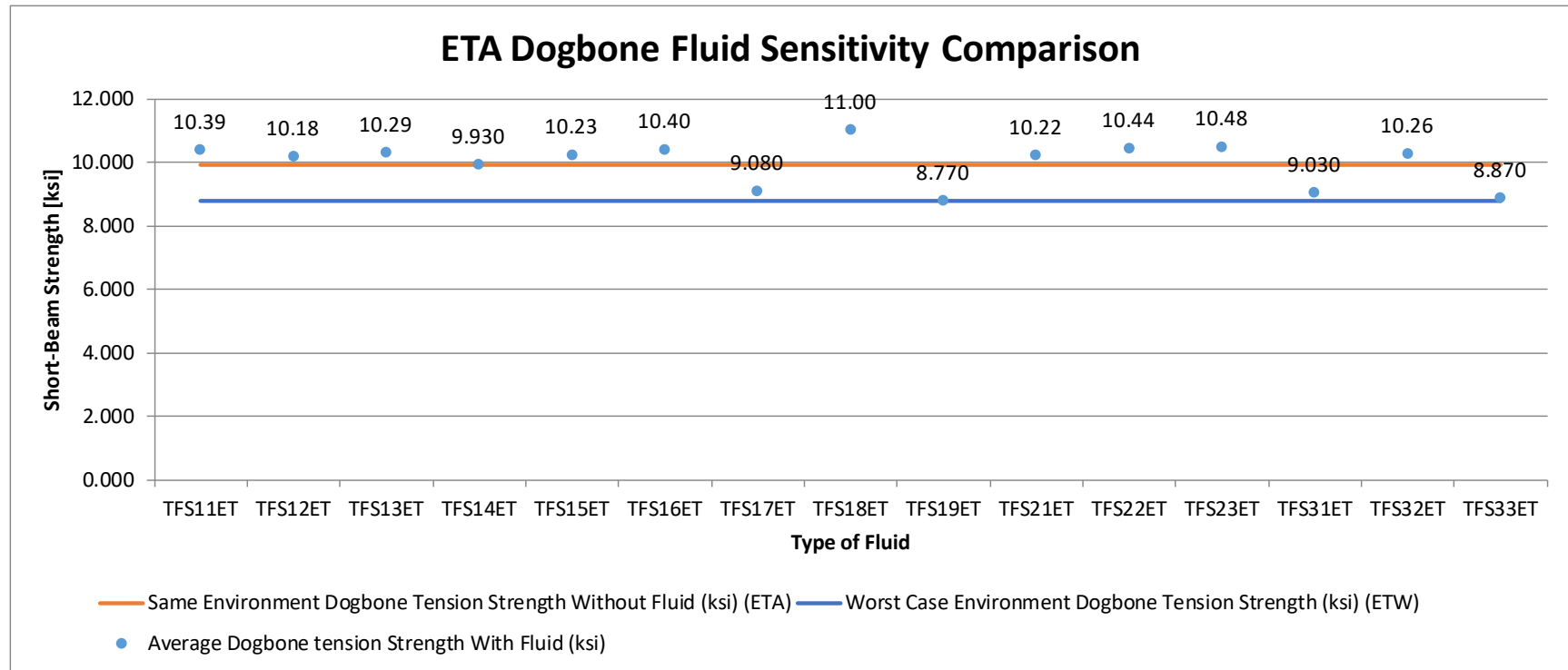
6.2 Elevated Temperature Test Data

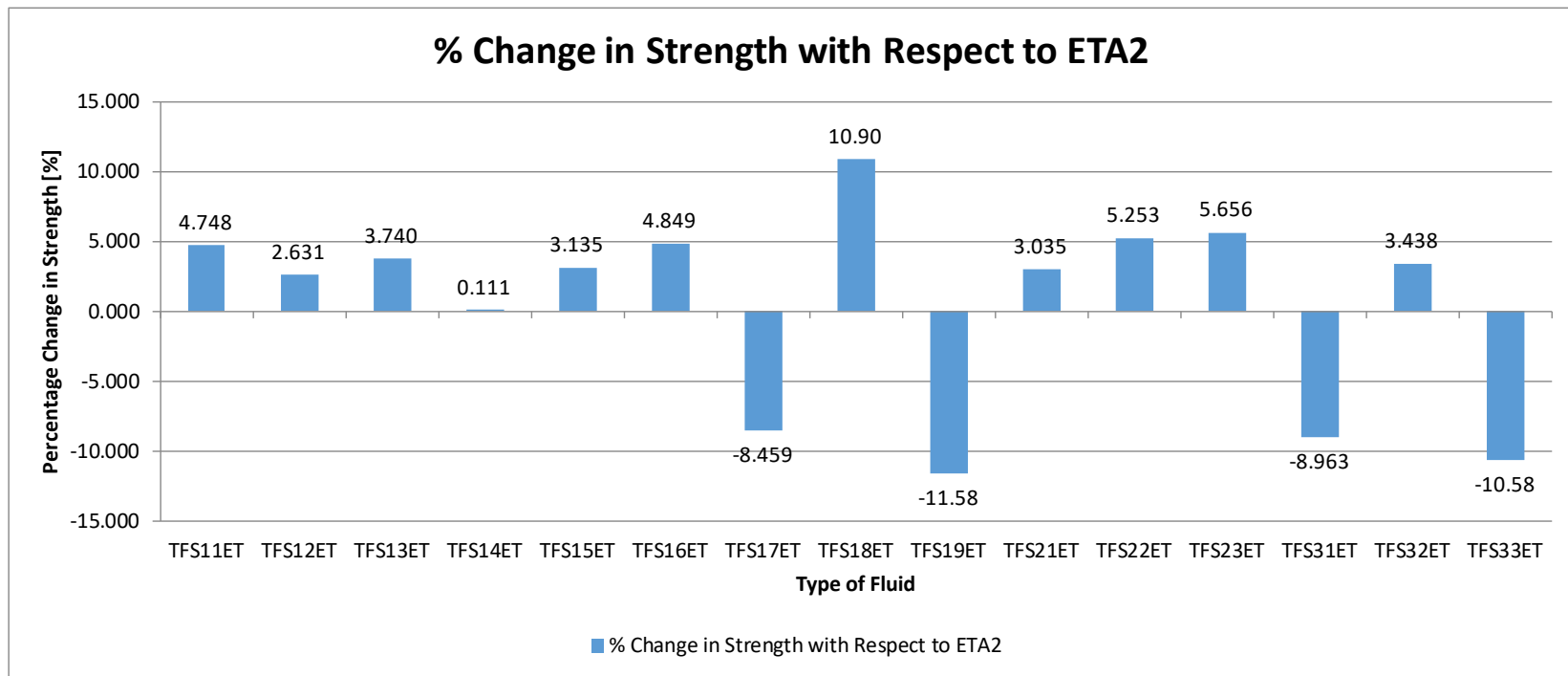
<u>Extended Contact:</u>	Exposure	Test Condition	Code
100 Low Lead Aviation Fuel (ASTM D910)	90 days min. @ 70°F±10°F	250°F	TFS11ET
ASTM D1655 Jet A Fuel (other jet fuel may be used but its type must be reported)			TFS12ET
MIL-PRF-5606 Hydraulic Oil			TFS13ET
MIL-PRF-83282 Hydraulic Oil			TFS14ET
MIL-PRF-7808 Engine Oil			TFS15ET
MIL-PRF-23699, Class STD Engine Oil			TFS16ET
Sea Water (ASTM D1141 or equiv.)			TFS17ET
Skydrol LD-4 (SAE AS1241, Type IV, Class 1)			TFS18ET
50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)			TFS19ET
<u>Short Duration Contact:</u>			
MEK washing fluid. ASTM D740	90 minutes min. @ 70°F±10°F	250°F	TFS21ET
Polypropylene Glycol Deicer (Type I) SAE AMS 1424			TFS22ET

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Isopropyl Alcohol Deicing Agent (TT-I-735)	48±4 hours @70°F±10°F		TFS23ET
<u>Control Tests:</u>			
Distilled Water	90 days min. at 70°F±10°F	250°F	TFS31ET
Ambient	Ambient per section 7.1		TFS32ET
85% Relative Humidity	Per section 7.1		TFS33ET





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**Fluid Sensitivity Screening Dogbone Tension Properties (TFS)-
ET Strength**
Hexcel Hexpekk 100

Fluid Code	Specimen Number	AM Batch #	Strength [ksi]	Avg. Specimen Thickness [in]	Failure Mode	Average
TFS11ET	HL-C-01-01-TFS11ET-1	1	10.38	0.1401	FAILURE AT GAGE SECTION	10.39
	HL-C-01-01-TFS11ET-2	1	10.47	0.1463	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS11ET-3	1	10.32	0.1422	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS11ET-4	1	10.24	0.1538	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS11ET-5	1	10.55	0.1388	FAILURE AT GAGE SECTION	
TFS12ET	HL-C-01-01-TFS12ET-1	1	10.06	0.1493	FAILURE AT GAGE SECTION	10.18
	HL-C-01-01-TFS12ET-2	1	10.39	0.1453	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS12ET-3	1	10.33	0.1430	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS12ET-4	1	9.788	0.1428	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS12ET-5	1	10.32	0.1445	FAILURE AT GAGE SECTION	
TFS13ET	HL-C-01-01-TFS13ET-1	1	10.50	0.1393	FAILURE AT GAGE SECTION	10.29
	HL-C-01-01-TFS13ET-2	1	10.28	0.1467	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS13ET-3	1	10.45	0.1386	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS13ET-4	1	10.27	0.1409	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS13ET-5	1	9.933	0.1427	FAILURE AT GAGE SECTION	
TFS14ET	HL-C-01-01-TFS14ET-1	1	9.519	0.1414	FAILURE AT GAGE SECTION	9.934
	HL-C-01-01-TFS14ET-2	1	9.997	0.1397	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS14ET-3	1	10.01	0.1383	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS14ET-4	1	10.18	0.1458	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS14ET-5	1	9.963	0.1412	FAILURE AT GAGE SECTION	
TFS15ET	HL-C-01-01-TFS15ET-1	1	9.993	0.1477	FAILURE AT GAGE SECTION	10.23
	HL-C-01-01-TFS15ET-2	1	10.21	0.1404	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS15ET-3	1	10.40	0.1466	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS15ET-4	1	10.20	0.1400	FAILURE AT GAGE SECTION	
	HL-C-01-01-TFS15ET-5	1	10.11	0.1405	FAILURE AT GAGE SECTION	
TFS16ET	HL-C-R8-02-TFS16ET-1	2	10.48	0.1482	FAILURE AT GAGE SECTION	10.40
	HL-C-R8-02-TFS16ET-2	2	10.31	0.1488	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS16ET-3	2	10.25	0.1430	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS16ET-4	2	10.45	0.1461	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS16ET-5	2	10.49	0.1470	FAILURE AT GAGE SECTION	
TFS17ET	HL-C-R8-02-TFS17ET-1	2	8.996	0.1459	FAILURE AT GAGE SECTION	9.079
	HL-C-R8-02-TFS17ET-2	2	9.027	0.1424	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS17ET-3	2	9.433	0.1454	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS17ET-4	2	9.195	0.1460	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS17ET-5	2	8.743	0.1503	FAILURE AT GAGE SECTION	
TFS18ET	HL-C-R8-02-TFS18ET-1	2	10.96	0.1420	FAILURE AT GAGE SECTION	11.00
	HL-C-R8-02-TFS18ET-2	2	10.83	0.1408	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS18ET-3	2	11.05	0.1437	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS18ET-4	2	10.96	0.1445	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS18ET-5	2	11.17	0.1516	FAILURE AT GAGE SECTION	

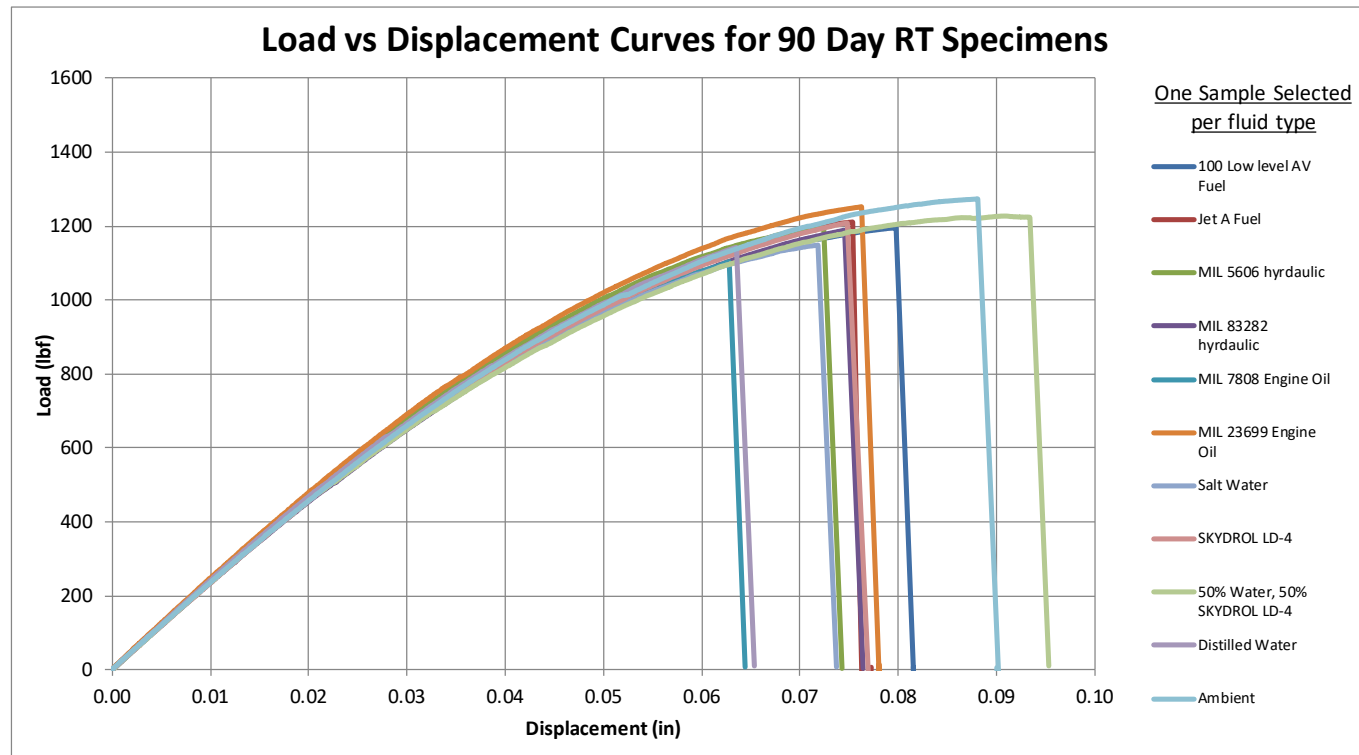
January 22nd, 2025

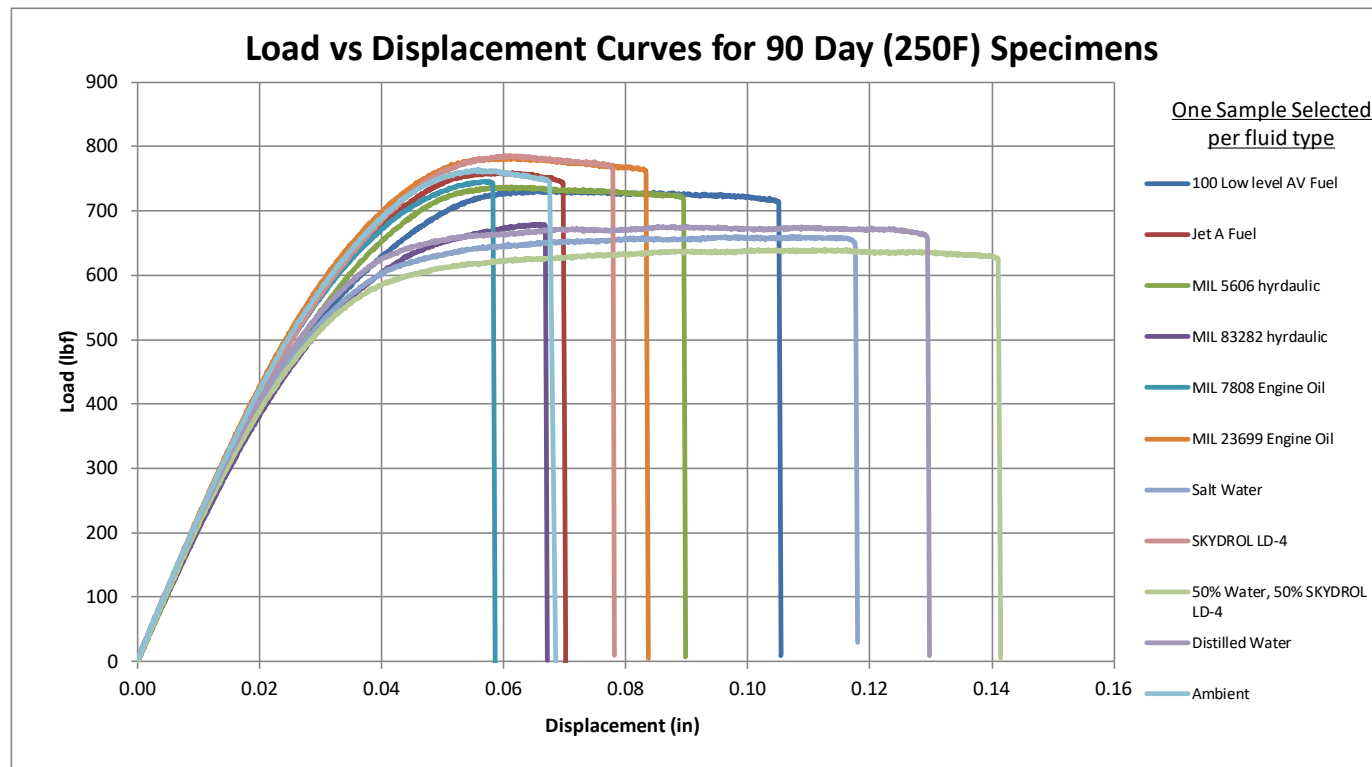
CAM-RP-2023-007 Rev N/C

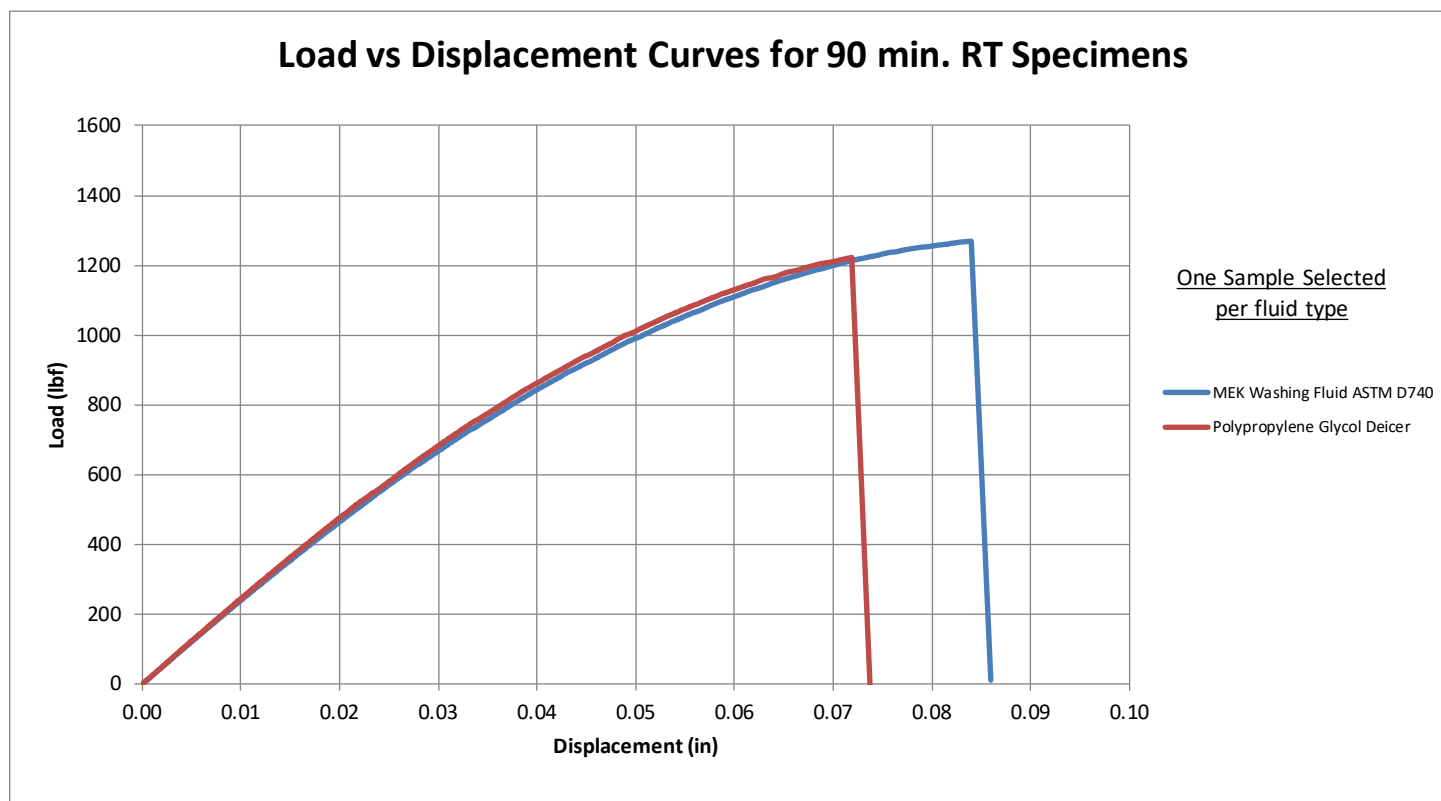
TFS19ET	HL-C-R8-02-TFS19ET-1	2	8.812	0.1446	FAILURE AT GAGE SECTION	8.769
	HL-C-R8-02-TFS19ET-2	2	8.707	0.1439	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS19ET-3	2	8.771	0.1416	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS19ET-4	2	8.798	0.1413	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS19ET-5	2	8.758	0.1498	FAILURE AT GAGE SECTION	
TFS21ET	HL-C-R8-02-TFS21ET-1	2	9.770	0.1508	FAILURE AT GAGE SECTION	10.22
	HL-C-R8-02-TFS21ET-2	2	10.41	0.1430	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS21ET-3	2	10.27	0.1515	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS21ET-4	2	10.32	0.1504	FAILURE AT GAGE SECTION	
	HL-C-R8-02-TFS21ET-5	2	10.52	0.1469	FAILURE AT GAGE SECTION	
TFS22ET	HL-C-R12-03-TFS22ET-1	3	10.52	0.1418	FAILURE AT GAGE SECTION	10.44
	HL-C-R12-03-TFS22ET-2	3	10.81	0.1428	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS22ET-3	3	10.22	0.1397	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS22ET-4	3	10.35	0.1413	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS22ET-5	3	10.30	0.1428	FAILURE AT GAGE SECTION	
TFS23ET	HL-C-R12-03-TFS23ET-1	3	10.84	0.1395	FAILURE AT GAGE SECTION	10.49
	HL-C-R12-03-TFS23ET-2	3	10.11	0.1471	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS23ET-3	3	10.17	0.1476	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS23ET-4	3	10.67	0.1438	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS23ET-5	3	10.65	0.1409	FAILURE AT GAGE SECTION	
TFS31ET	HL-C-R12-03-TFS31ET-1	3	8.897	0.1512	FAILURE AT GAGE SECTION	9.026
	HL-C-R12-03-TFS31ET-2	3	9.176	0.1446	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS31ET-3	3	8.866	0.1395	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS31ET-4	3	9.278	0.1399	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS31ET-5	3	8.913	0.1433	FAILURE AT GAGE SECTION	
TFS32ET	HL-C-R12-03-TFS32ET-1	3	10.44	0.1453	FAILURE AT GAGE SECTION	10.26
	HL-C-R12-03-TFS32ET-2	3	10.16	0.1437	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS32ET-3	3	10.29	0.1469	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS32ET-4	3	10.06	0.1513	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS32ET-5	3	10.34	0.1446	FAILURE AT GAGE SECTION	
TFS33ET	HL-C-R12-03-TFS33ET-1	3	8.950	0.1441	FAILURE AT GAGE SECTION	8.873
	HL-C-R12-03-TFS33ET-2	3	8.831	0.1391	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS33ET-3	3	8.713	0.1474	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS33ET-4	3	8.771	0.1468	FAILURE AT GAGE SECTION	
	HL-C-R12-03-TFS33ET-5	3	9.101	0.1394	FAILURE AT GAGE SECTION	

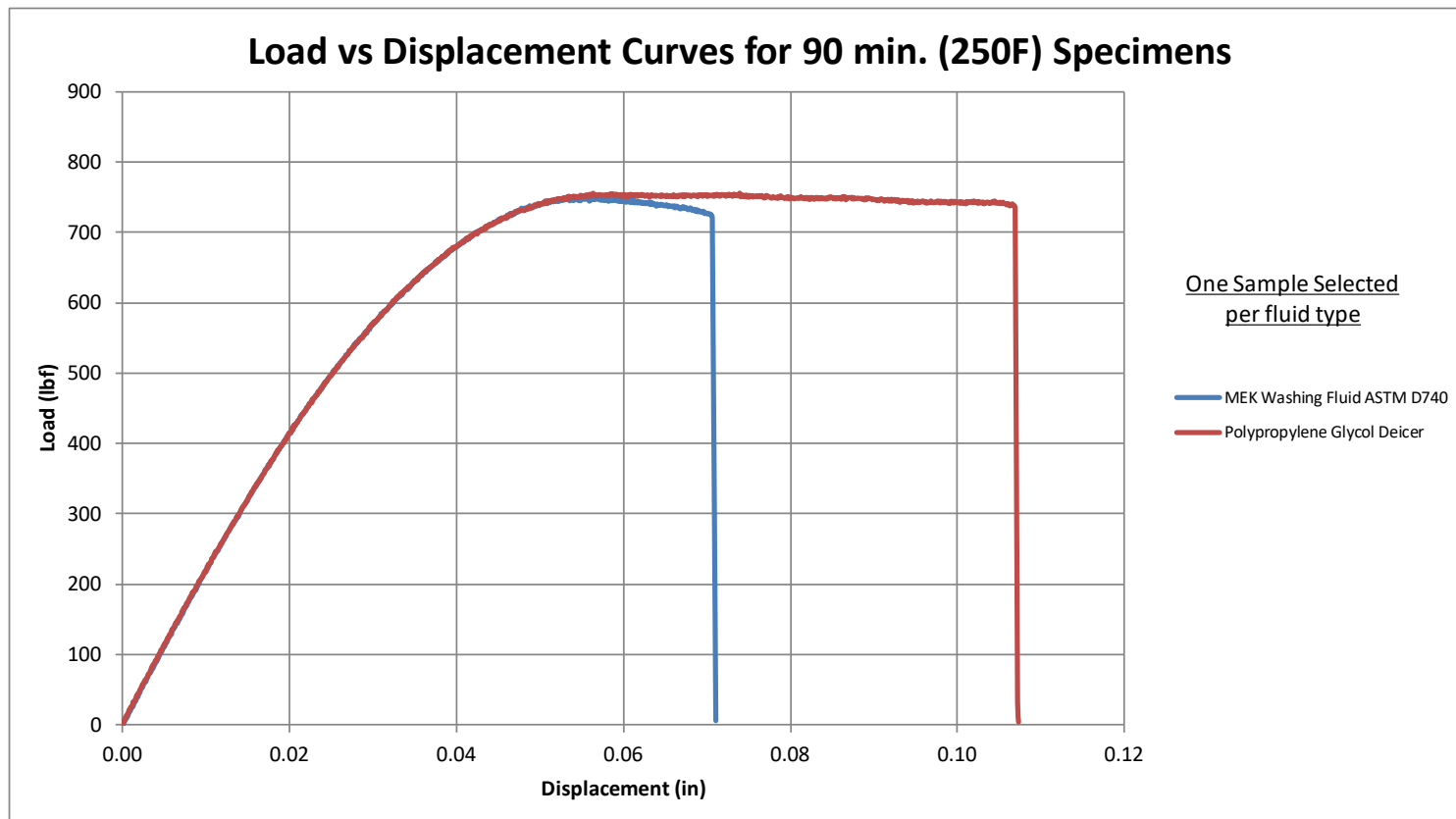
Average 0.1443
 Standard Dev. 0.003775
 Coeff. of Var. [%] 2.617
 Min. 0.1383
 Max. 0.1538
 Number of Spec. 75

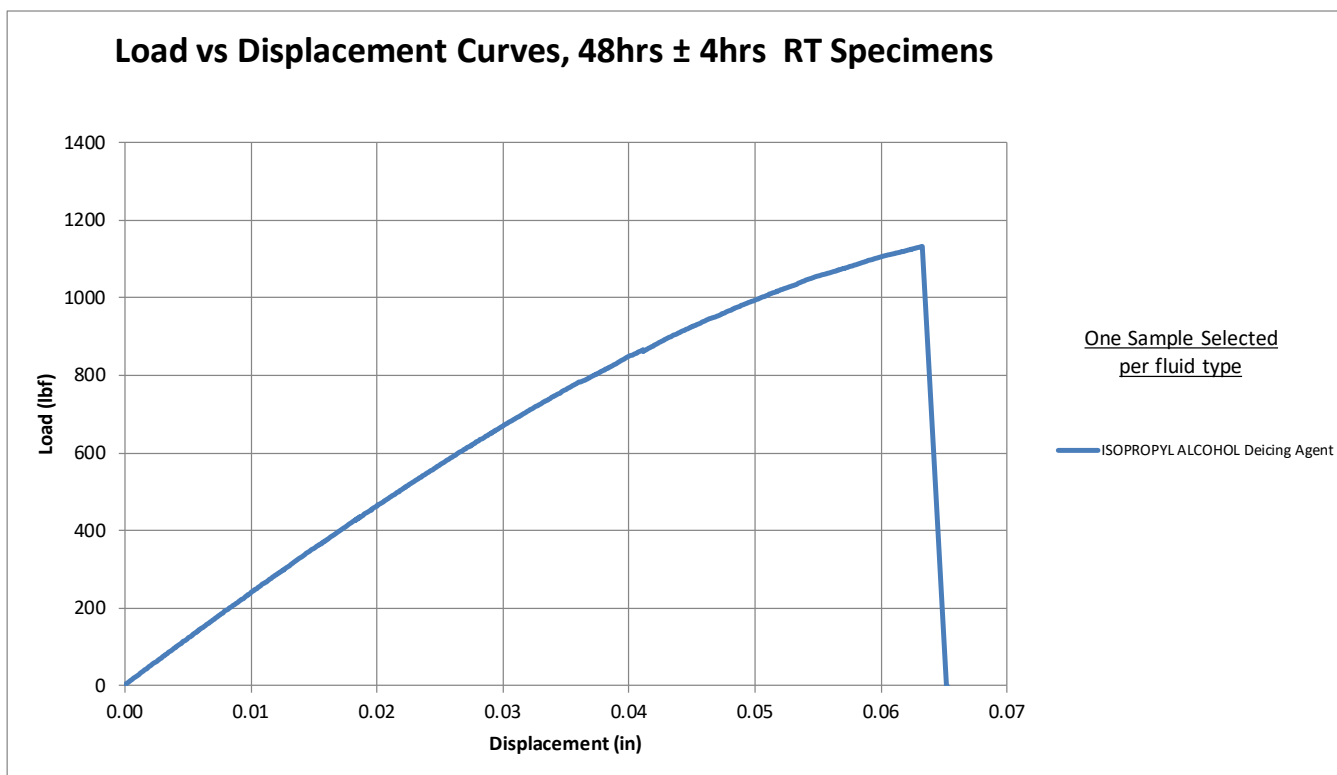
6.3 Load Displacement Curves

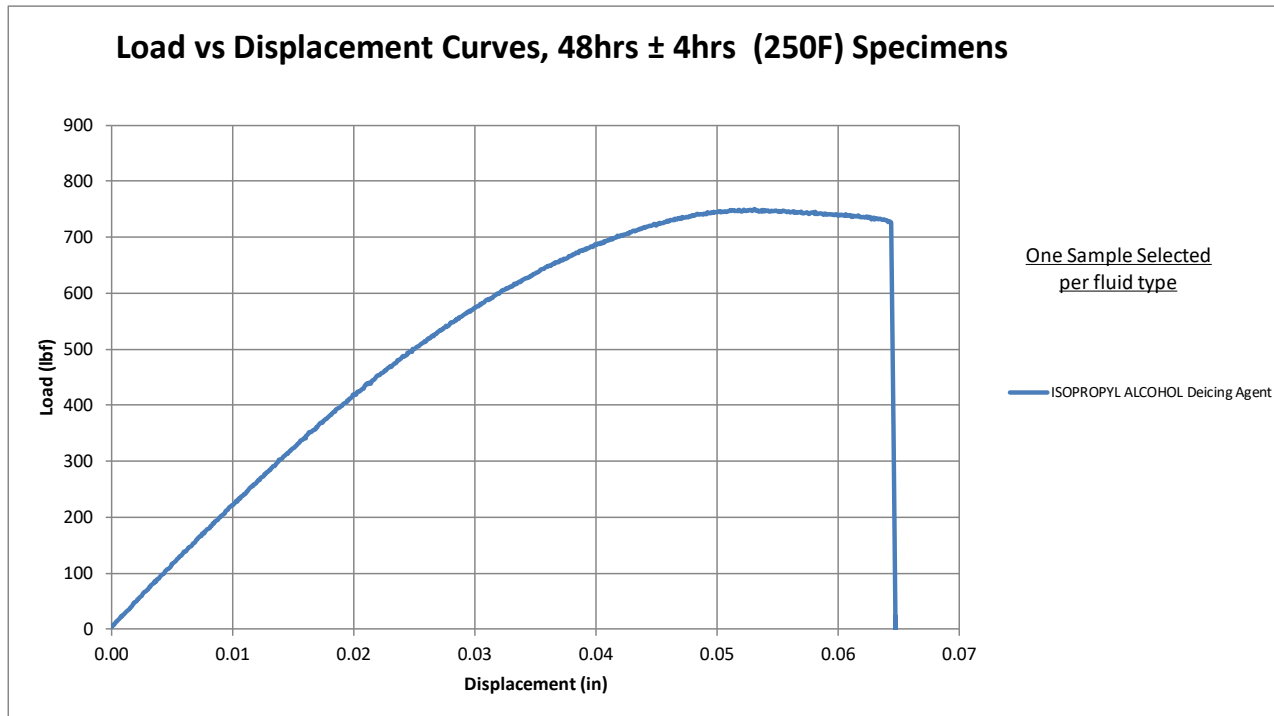


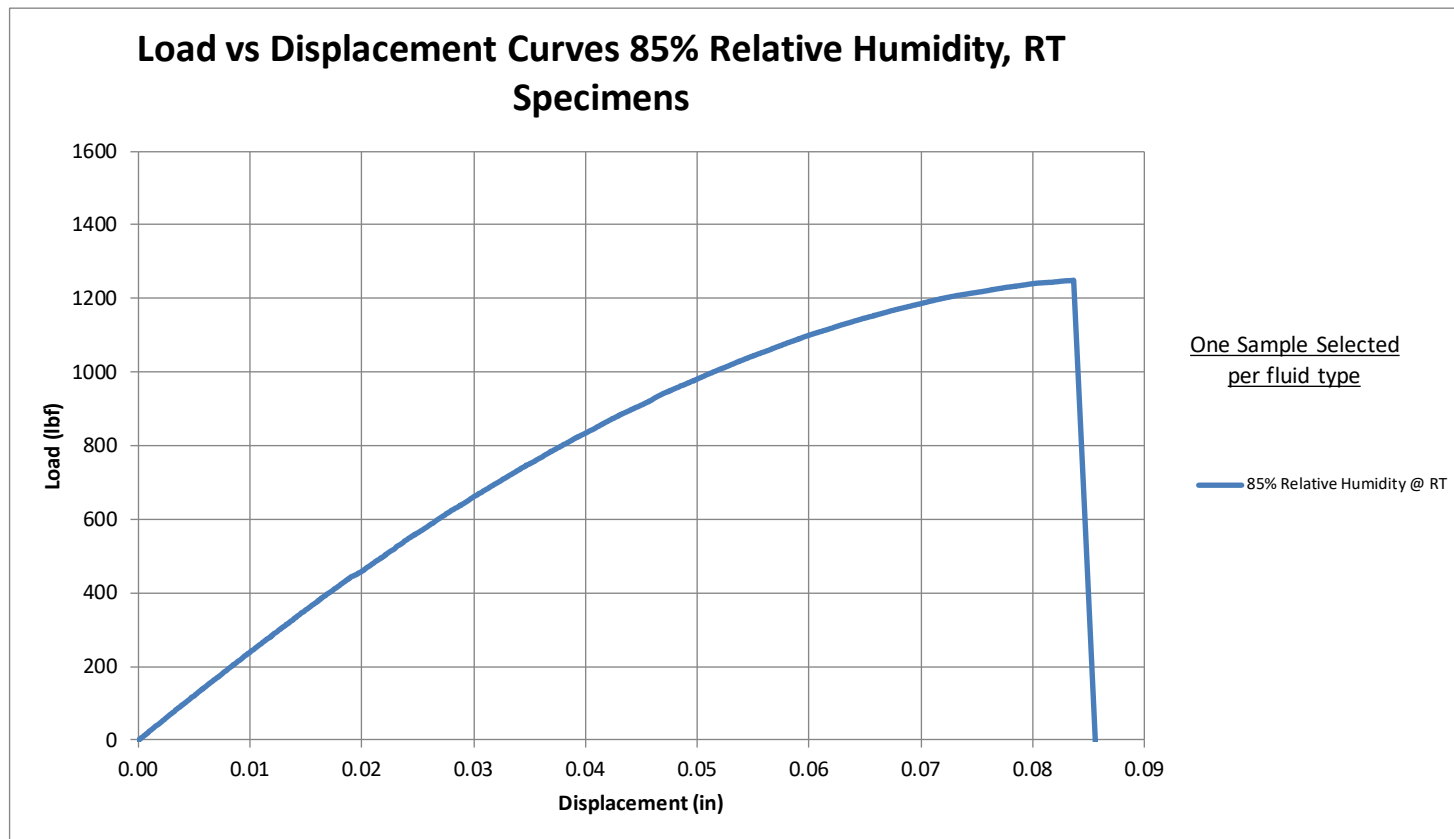


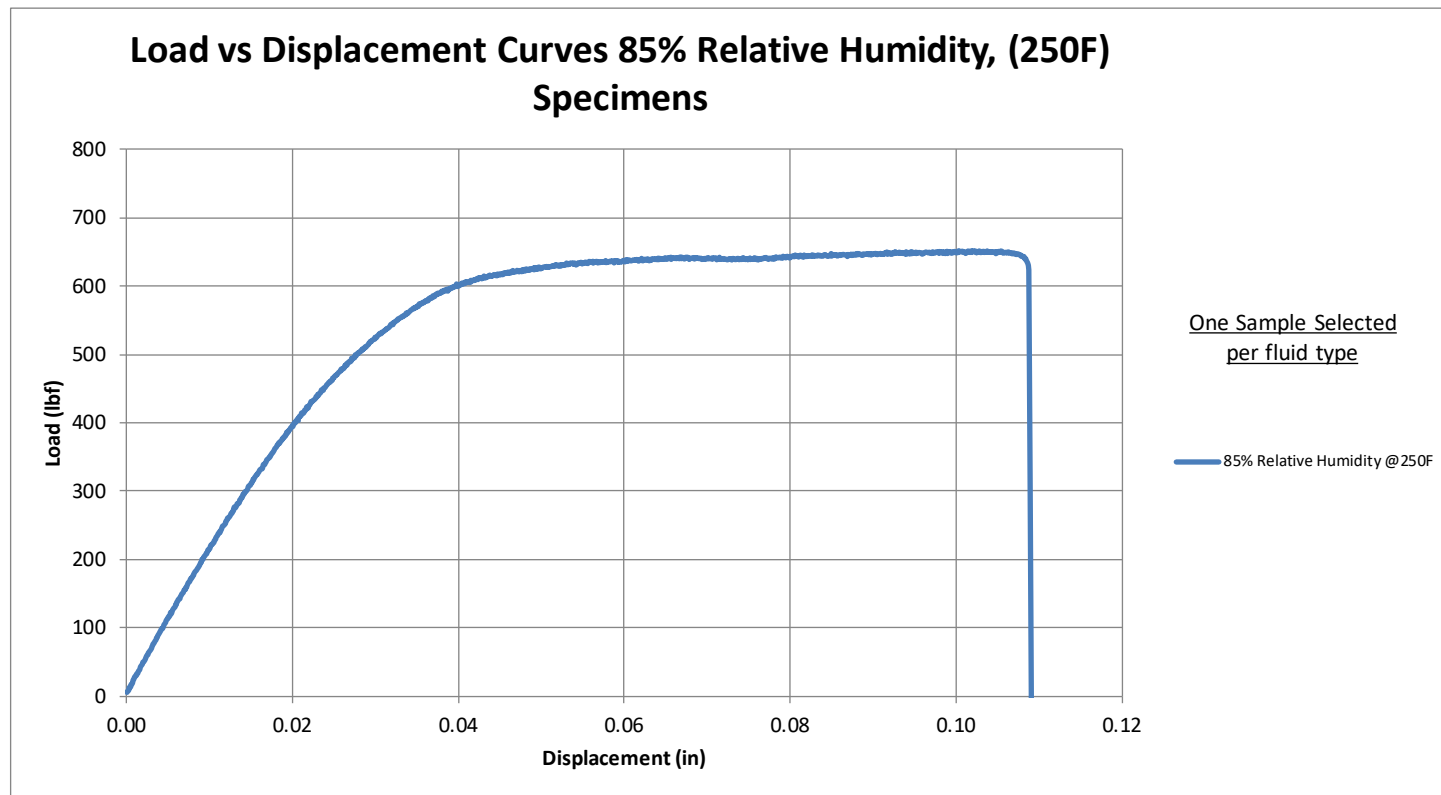






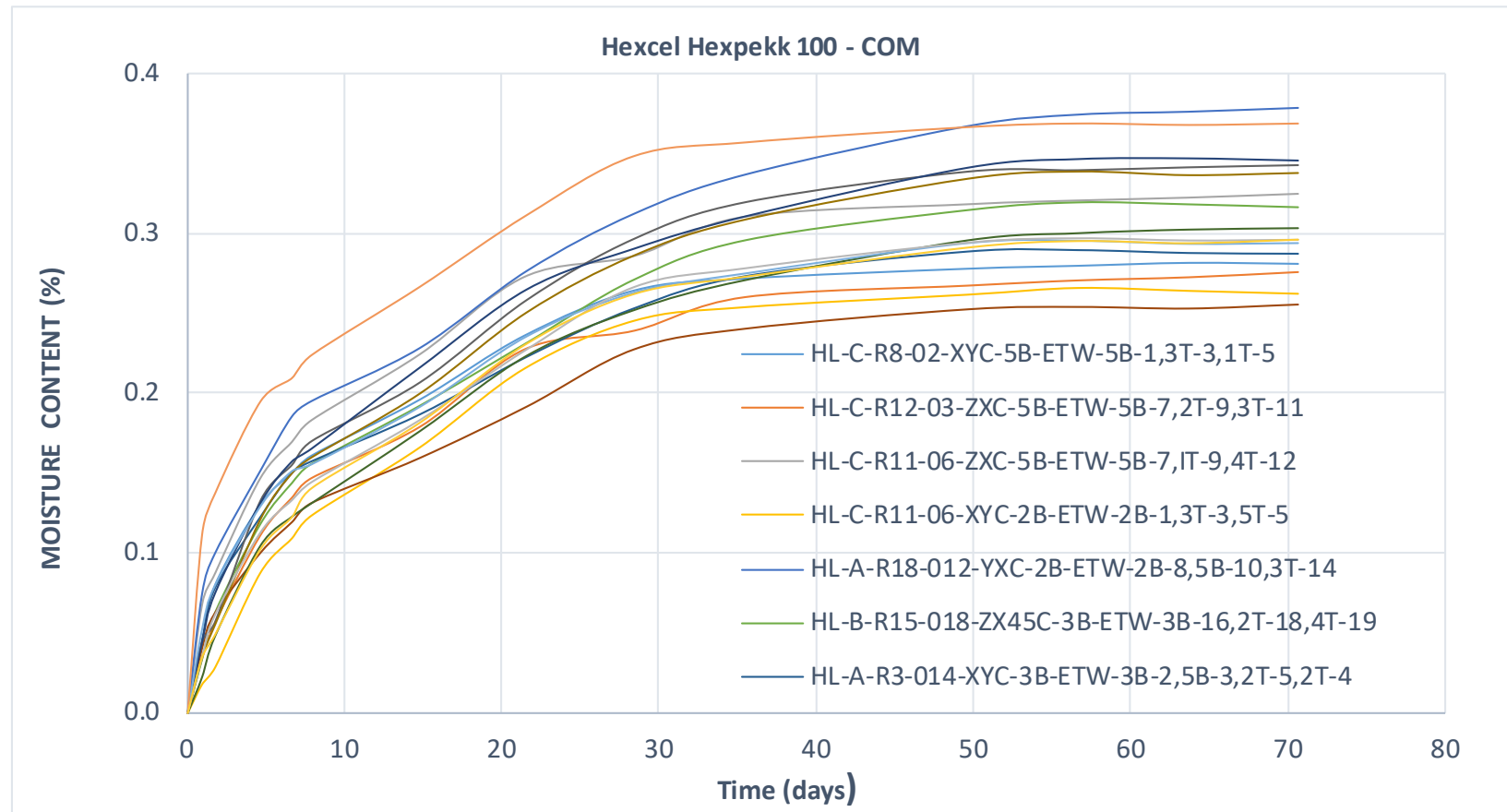


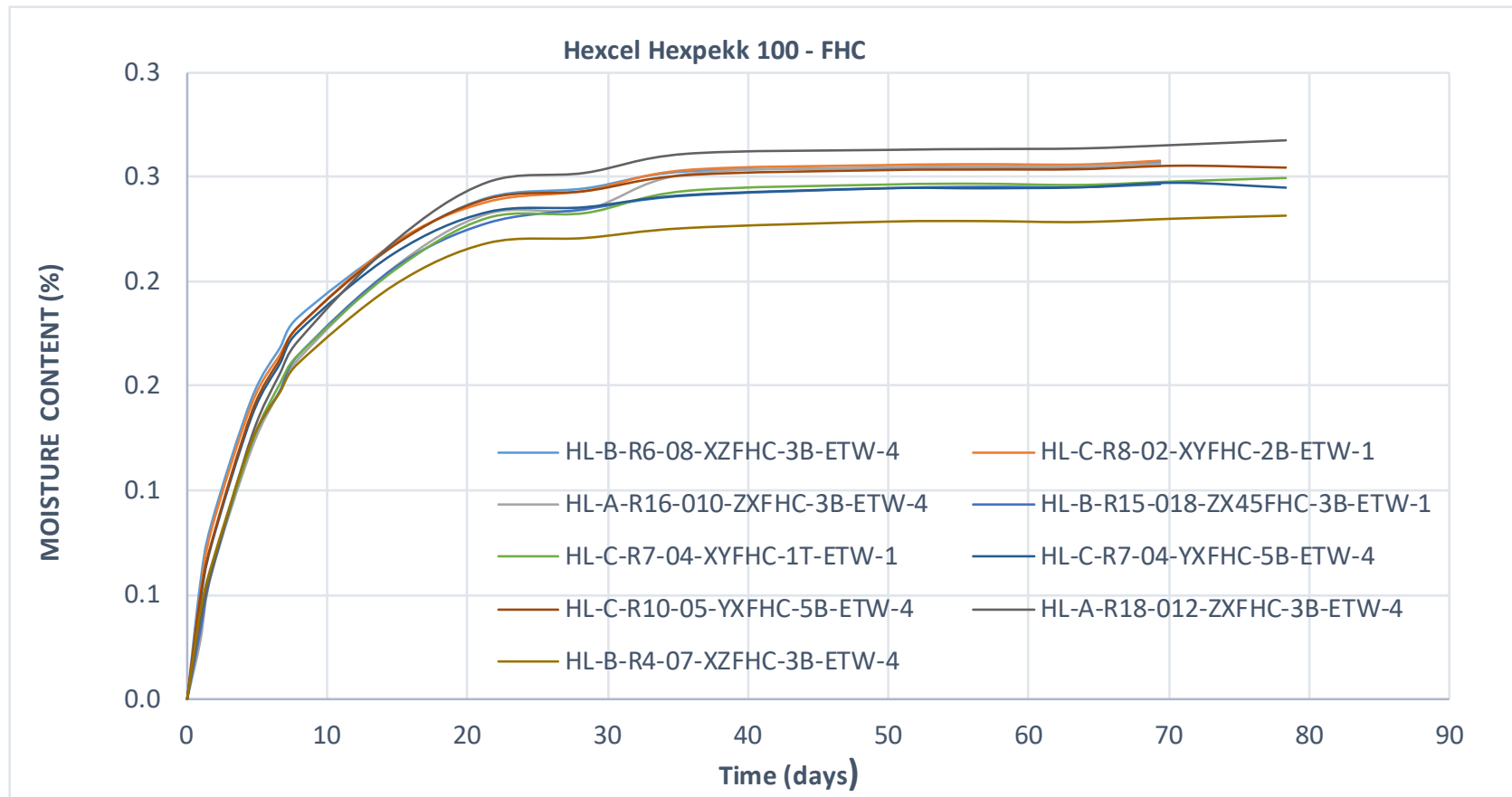




6.4 Moisture Conditioning Charts

6.4.1 Smallest Sample – Compression Cubes (1" x 1")



6.4.2 Largest Sample – FHC (12” x 1.5”)

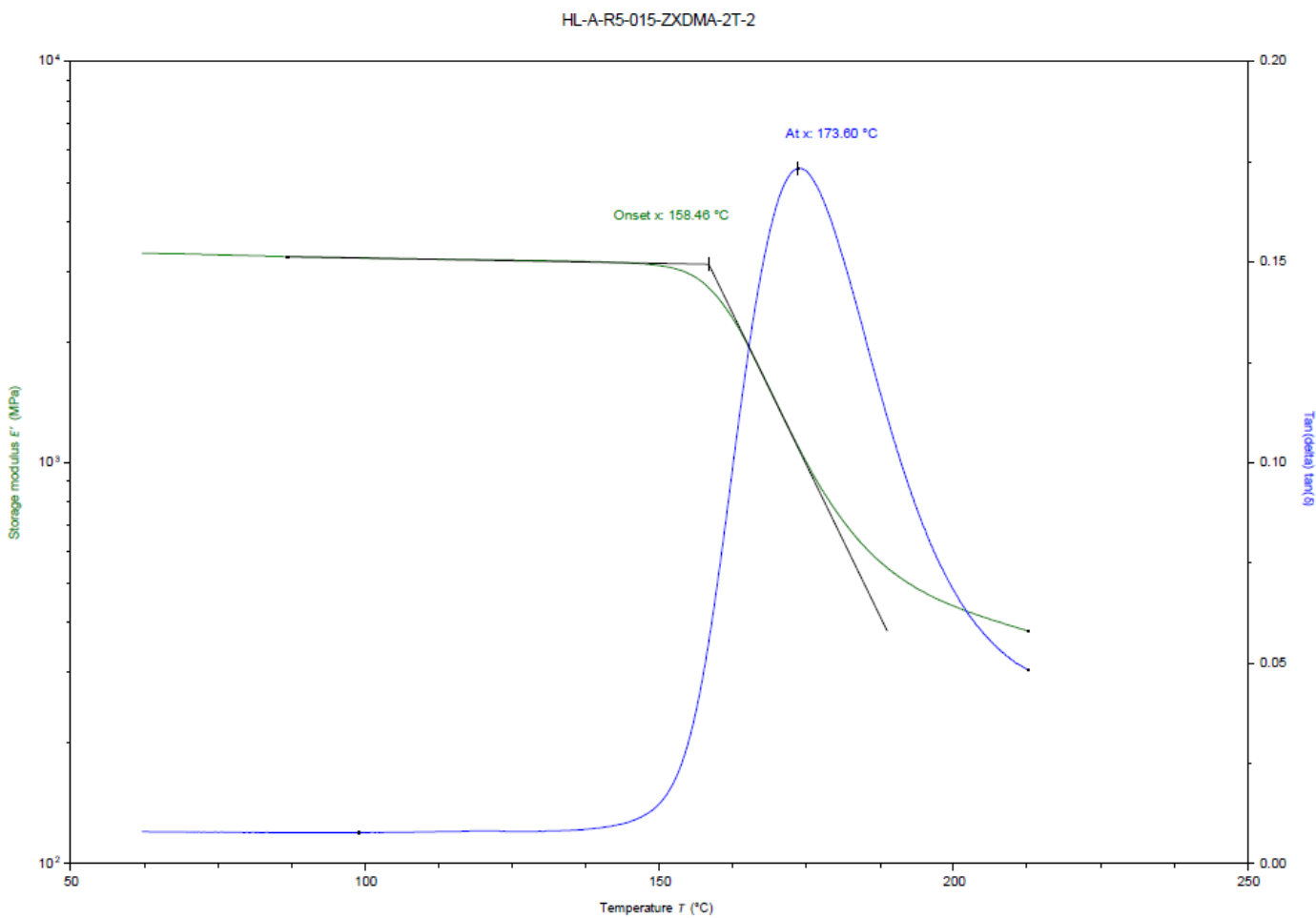
7. Physical Testing

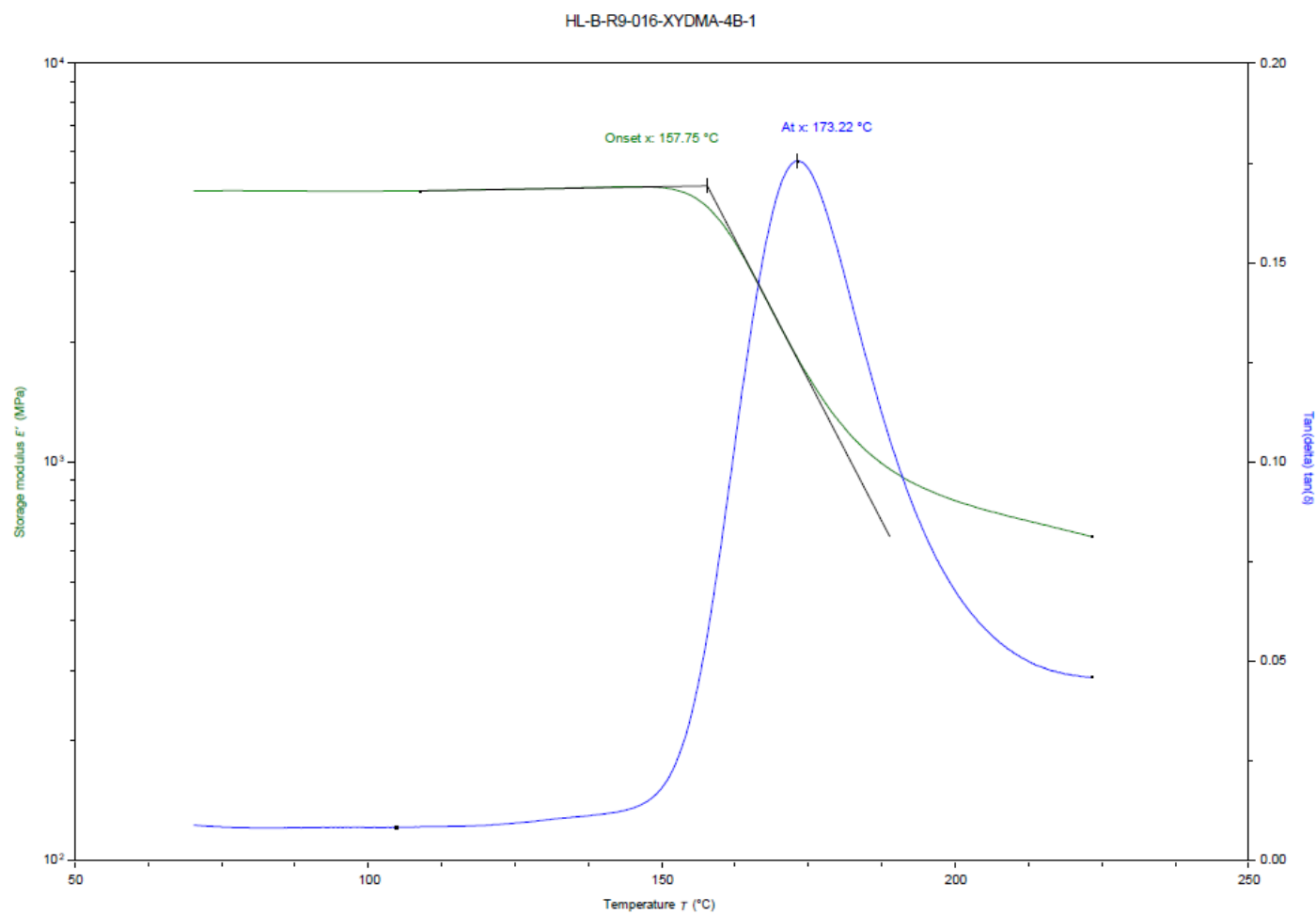
7.1 DMA Results

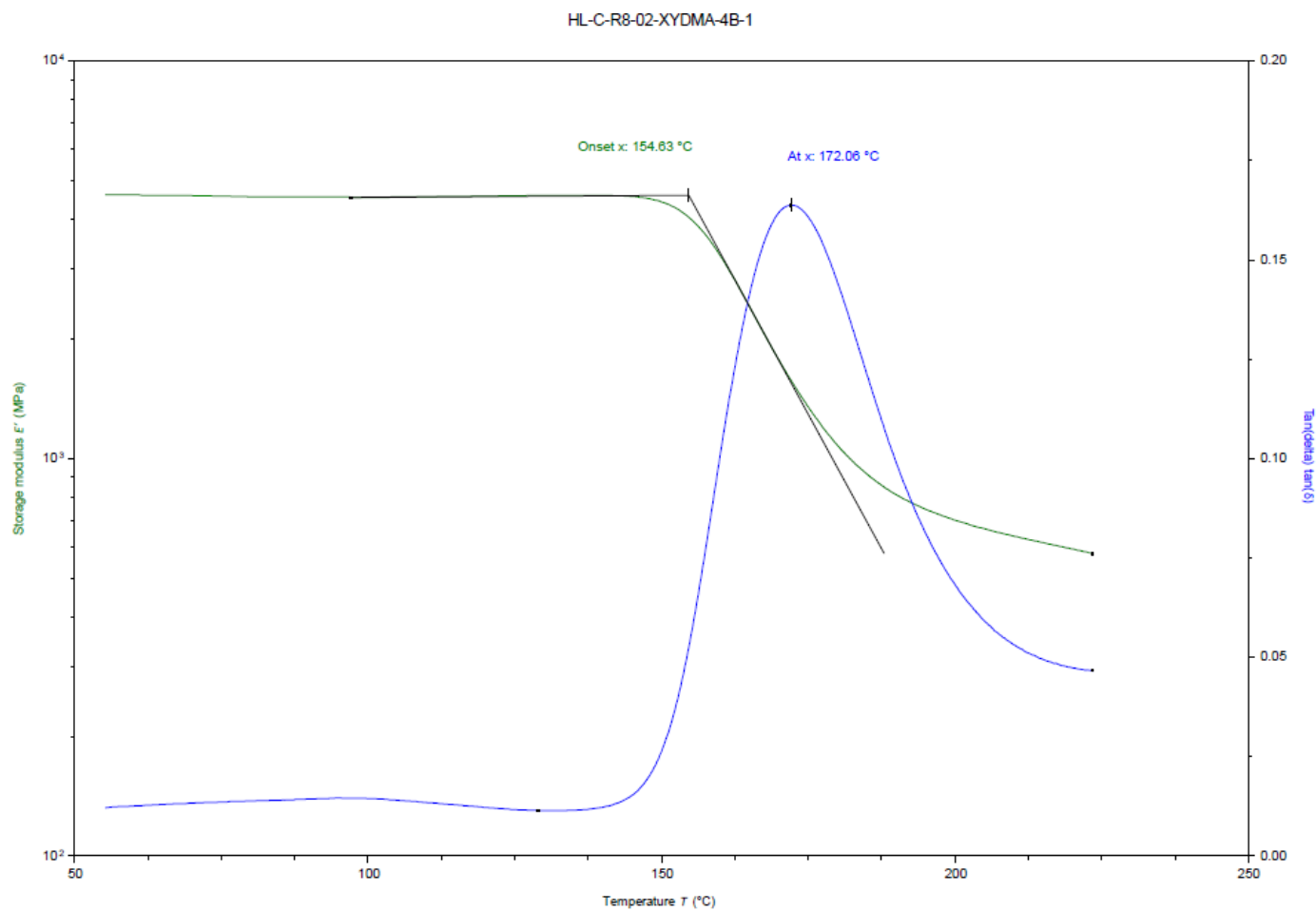
DMA Results Summary Hexcel Hexpekk 100 DMA Dry				
Sample ID	Onset Storage Modulus		Peak of Tangent Delta	
	T _g [°C]	T _g [°F]	T _g [°C]	T _g [°F]
HL-A-R5-015-ZXDMA-5T-1	158.3	316.9	173.9	345.0
HL-A-R5-015-ZXDMA-2T-2	158.5	317.2	173.6	344.5
HL-A-R5-015-ZXDMA-4B-3	157.7	315.8	173.4	344.1
HL-A-R16-010-XYDMA-2T-5	158.9	317.9	174.4	345.9
HL-A-R16-010-ZXDMA-4B-1	157.5	315.5	173.7	344.6
HL-A-R17-011-XYDMA-2T-5	160.2	320.3	174.2	345.6
HL-A-R17-011-ZXDMA-4B-1	158.9	318.1	174.0	345.2
HL-A-R18-012-XYDMA-2T-5	160.1	320.1	174.9	346.8
HL-A-R18-012-ZXDMA-4B-1	159.0	318.2	174.3	345.7
HL-B-R9-016-XYDMA-4B-1	157.8	316.0	173.2	343.8
HL-B-R9-016-ZXDMA-2T-5	157.6	315.7	173.4	344.1
HL-B-R13-09-XYDMA-4B-4	157.9	316.3	173.7	344.6
HL-B-R13-09-ZXDMA-4B-1	157.2	314.9	173.0	343.4
HL-B-R13-09-ZXDMA-5T-3	159.3	318.7	173.4	344.1
HL-B-R14-017-XYDMA-4B-1	158.9	317.9	174.2	345.5
HL-B-R14-017-ZXDMA-4B-4	158.6	317.4	173.3	344.0
HL-B-R15-018-XYDMA-4B-1	157.3	315.1	175.2	347.4
HL-B-R15-018-ZXDMA-2T-5	157.9	316.1	173.4	344.2
HL-C-R7-04-ZXDMA-4B-1	157.3	315.2	173.0	343.5
HL-C-R8-02-XYDMA-4B-1	154.6	310.3	172.1	341.7
HL-C-R8-02-XYDMA-5T-3	155.4	311.7	174.6	346.2
HL-C-R8-02-ZXDMA-4B-4	153.4	308.2	170.5	338.8
HL-C-R11-06-XYDMA-4B-4	157.8	316.0	174.0	345.2
HL-C-R11-06-ZXDMA-4B-1	157.1	314.8	172.8	343.0
HL-C-R11-06-ZXDMA-5T-3	157.6	315.6	172.8	343.0
HL-C-R10-05-XYDMA-4B-4	157.9	316.2	173.6	344.4
HL-C-R10-05-ZXDMA-4B-1	157.5	315.6	173.4	344.2
HL-C-R10-05-ZXDMA-5T-3	158.7	317.6	173.3	343.9
HL-C-R12-03-XYDMA-4B-1	156.7	314.1	172.8	343.0
HL-C-R12-03-XYDMA-5T-3	157.8	316.1	172.8	343.0
HL-C-R12-03-ZXDMA-4B-4	155.6	312.1	172.6	342.6
Average	157.7	315.9	173.5	344.2
Standard Deviation	1.440	2.590	0.8900	1.610

DMA Results Summary Hexcel Hexpekk 100 DMA Wet				
Sample ID	Onset Storage Modulus		Peak of Tangent Delta	
	T _g [°C]	T _g [°F]	T _g [°C]	T _g [°F]
HL-A-R16-010-XYDMA-4B-W-4	145.1	293.1	166.0	330.7
HL-A-R16-010-ZXDMA-2T-W-2	146.1	295.0	166.5	331.6
HL-A-R17-011-XYDMA-4B-W-4	146.1	294.9	167.5	333.6
HL-A-R17-011-ZXDMA-2T-W-2	146.5	295.7	167.2	333.0
HL-A-R18-012-XYDMA-4B-W-4	145.6	294.1	166.4	331.6
HL-A-R18-012-ZXDMA-2T-W-2	147.3	297.1	167.1	332.7
HL-B-R6-08-ZXDMA-2T-W-2	146.8	296.3	167.4	333.2
HL-B-R6-08-ZXDMA-4B-W-1	147.0	296.6	166.7	332.1
HL-B-R6-08-ZXDMA-5T-W-3	147.7	297.9	167.7	333.8
HL-B-R9-016-XYDMA-2T-W-2	146.4	295.6	167.4	333.3
HL-B-R9-016-ZXDMA-4B-W-4	146.5	295.7	167.0	332.6
HL-B-R13-09-XYDMA-2T-W-5	146.6	295.8	167.7	333.9
HL-B-R13-09-XYDMA-5T-W-6	147.8	298.0	167.1	332.8
HL-B-R13-09-ZXDMA-2T-W-2	147.3	297.2	167.9	334.3
HL-B-R14-017-XYDMA-2T-W-2	145.8	294.4	166.5	331.7
HL-B-R14-017-ZXDMA-2T-W-5	146.9	296.4	166.9	332.4
HL-B-R15-018-XYDMA-2T-W-2	145.4	293.8	166.4	331.5
HL-B-R15-018-ZXDMA-4B-W-4	146.2	295.2	166.4	331.4
HL-C-R7-04-ZXDMA-2T-W-2	147.1	296.7	167.6	333.7
HL-C-R8-02-XYDMA-2T-W-2	146.7	296.0	167.2	333.0
HL-C-R8-02-ZXDMA-2T-W-5	147.2	297.0	166.9	332.4
HL-C-R8-02-ZXDMA-5T-W-6	148.4	299.2	167.3	333.2
HL-C-R10-05-XYDMA-2T-W-5	146.8	296.3	169.5	337.2
HL-C-R10-05-XYDMA-5T-W-6	148.0	298.4	167.4	333.3
HL-C-R10-05-ZXDMA-2T-W-2	147.5	297.5	167.2	333.0
HL-C-R11-06-XYDMA-2T-W-5	147.1	296.9	167.1	332.8
HL-C-R11-06-XYDMA-5T-W-6	147.5	297.5	168.8	335.8
HL-C-R11-06-ZXDMA-2T-W-2	147.3	297.1	167.1	332.8
HL-C-R12-03-XYDMA-2T-W-2	147.2	296.9	167.0	332.6
HL-C-R12-03-ZXDMA-2T-W-5	147.5	297.5	166.7	332.0
HL-C-R12-03-ZXDMA-5T-W-6	148.3	298.9	167.4	333.3
Average	146.9	296.4	167.2	333.0
Standard Deviation	0.8100	1.450	0.7000	1.270

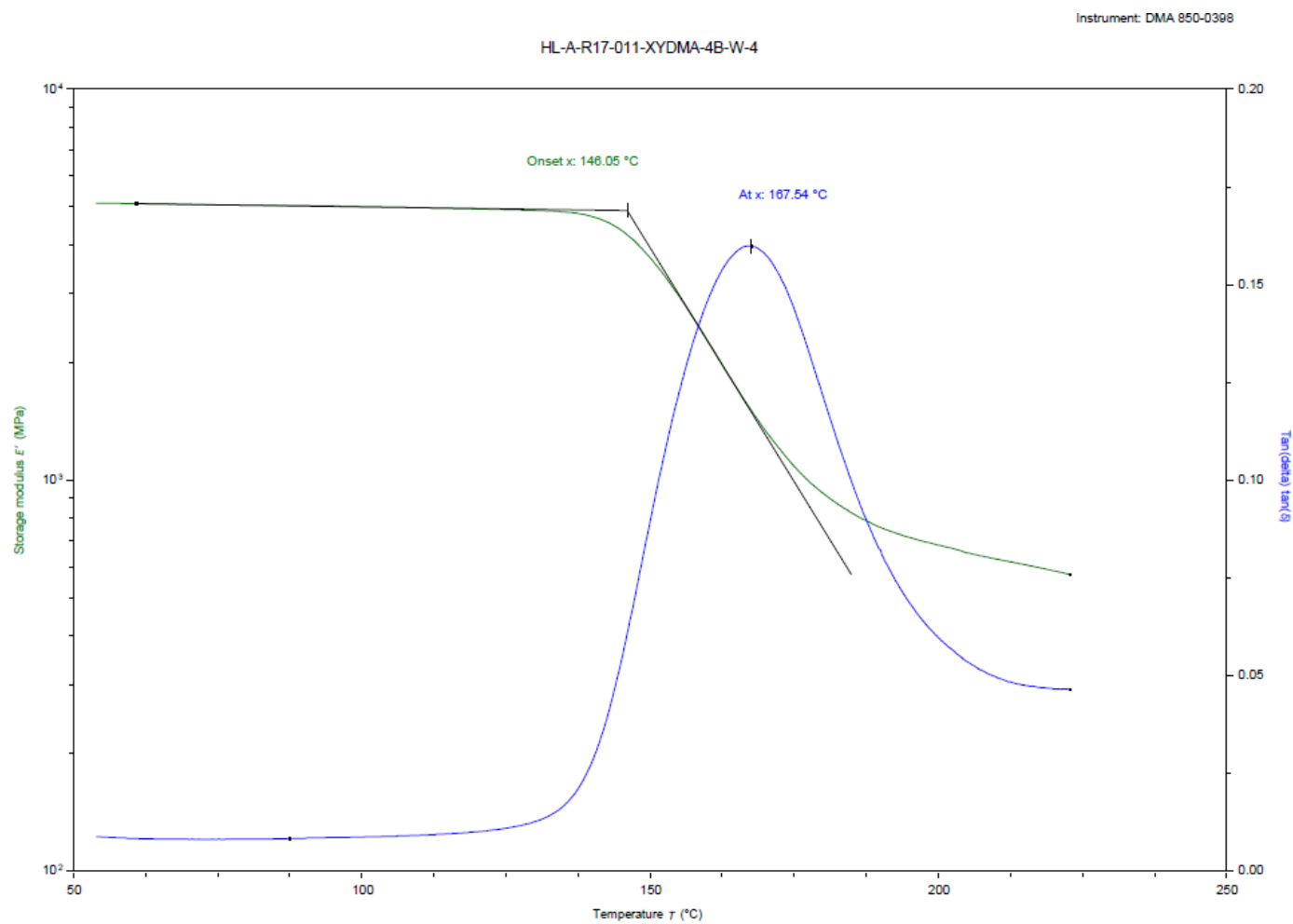
7.2 DMA Dry Batch A, B and C

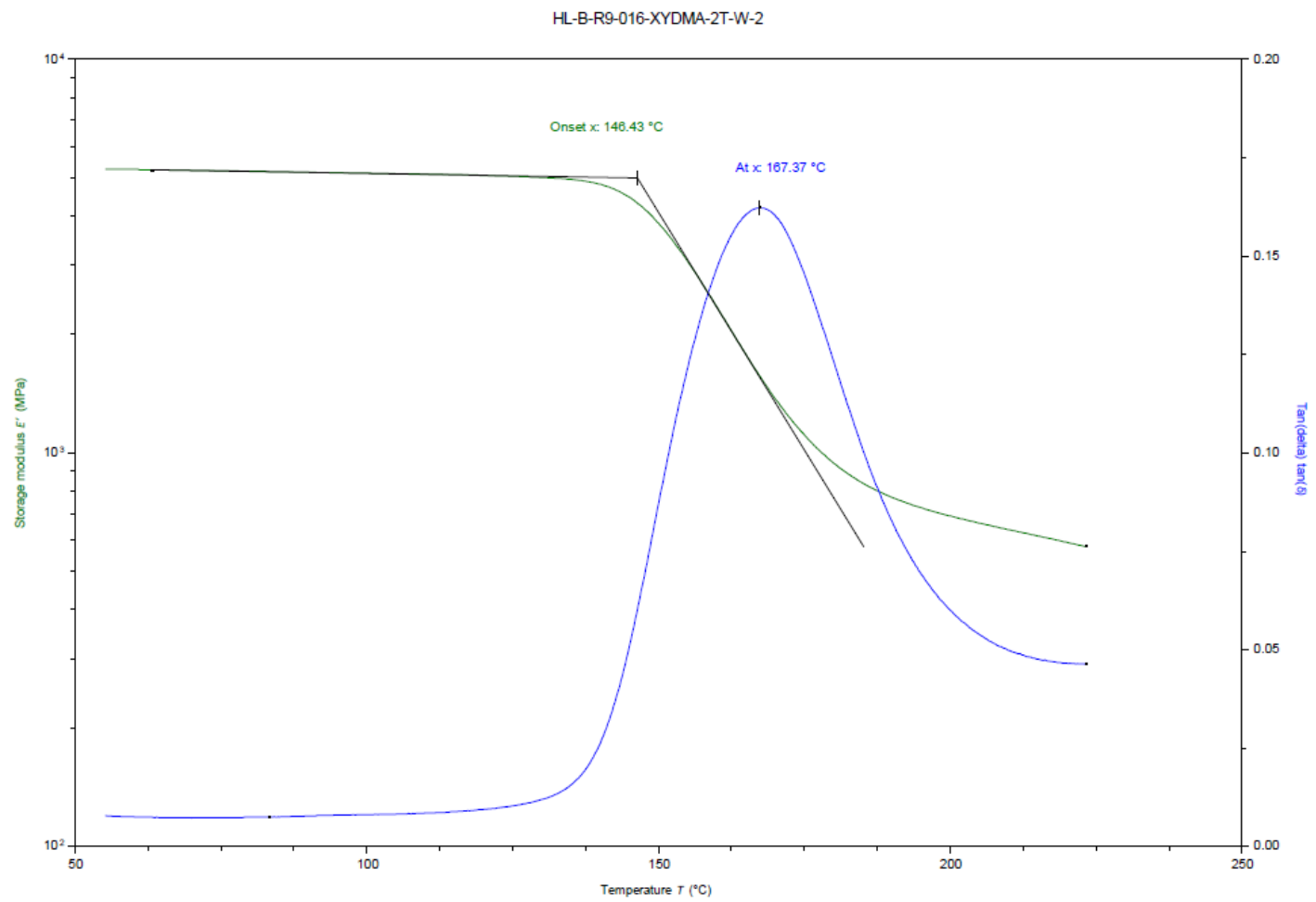


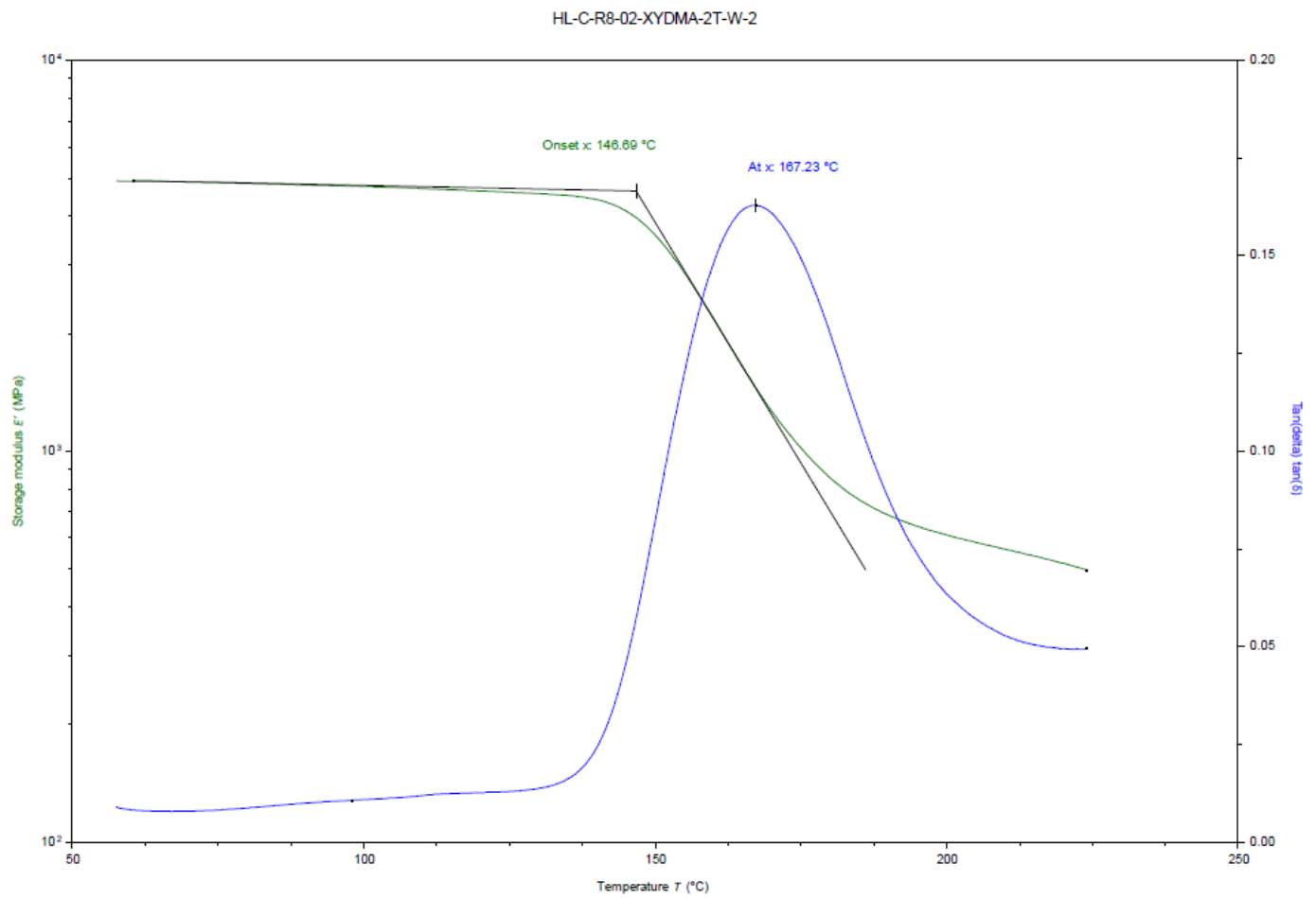




7.3 DMA Wet Batch A, B and C

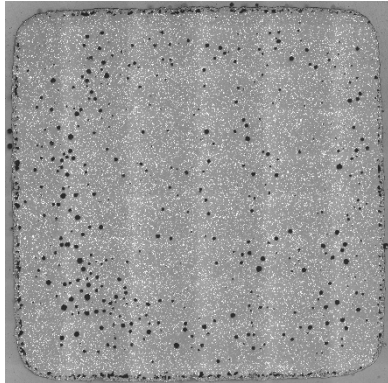




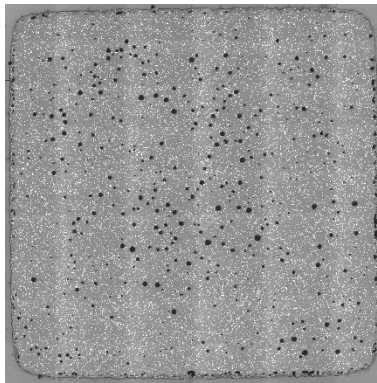


7.4 Photomicrograph, Void Content Analysis

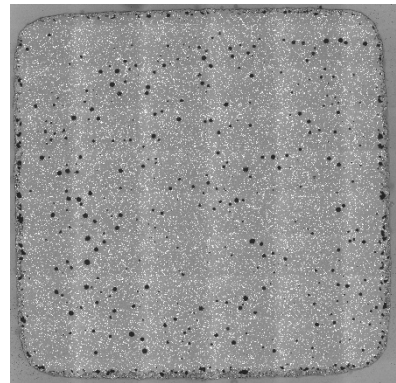
VOID/POROSITY CONTENT BY IMAGE ANALYSIS		
PICTURE	VOID/POROSITY CONTENT (%)	COMMENTS
HL-B-R13-09-PM-T-1	2.002	Threshold 62
HL-B-R13-09-PM-T-2	1.959	Threshold 61
HL-B-R13-09-PM-T-3	1.540	Threshold 61
HL-C-R11-06-PM-T-1	2.115	Threshold 64
HL-C-R11-06-PM-T-2	2.000	Threshold 60
HL-C-R11-06-PM-T-3	1.388	Threshold 62



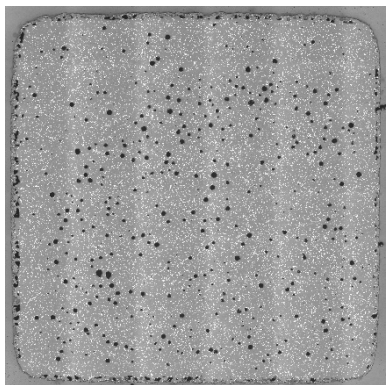
HL-B-R13-09-PM-T-1



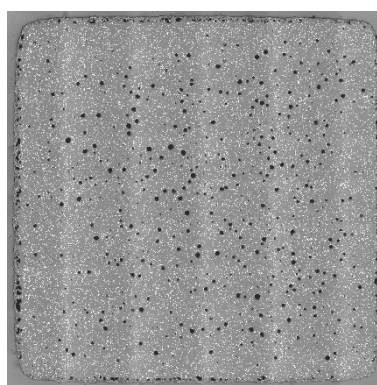
HL-B-R13-09-PM-T-2



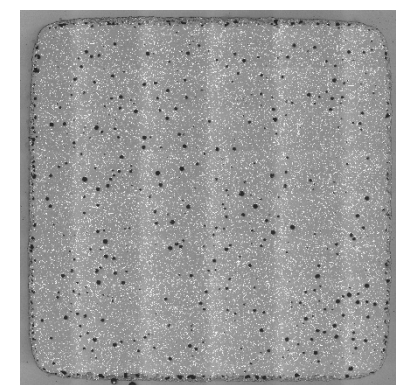
HL-B-R13-09-PM-T-3



HL-C-R11-06-PM-T-1

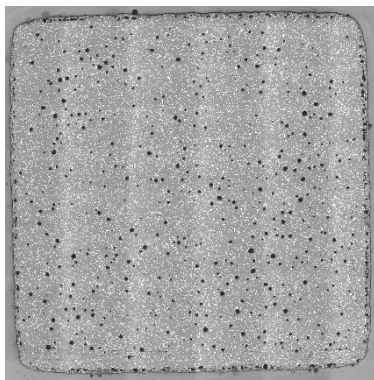


HL-C-R11-06-PM-T-2

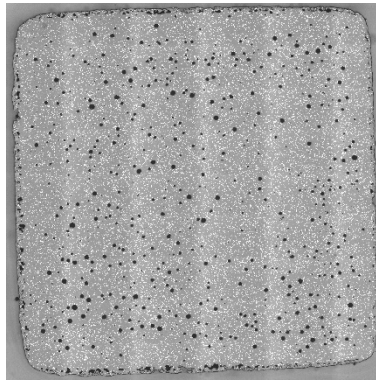


HL-C-R11-06-PM-T-3

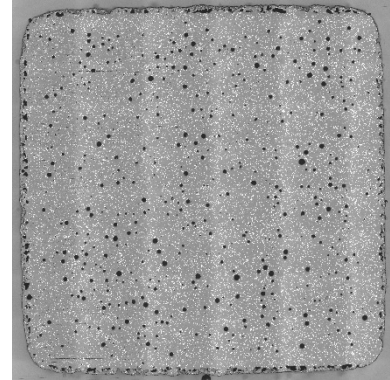
VOID/POROSITY CONTENT BY IMAGE ANALYSIS		
PICTURE	VOID/POROSITY CONTENT (%)	COMMENTS
HL-C-R7-04-PM-T-1	2.024	Threshold 67
HL-C-R7-04-PM-T-2	2.400	Threshold 67
HL-C-R7-04-PM-T-3	2.298	Threshold 64
HL-C-R10-05-PM-T-1	1.699	Threshold 68
HL-C-R10-05-PM-T-2	2.070	Threshold 65
HL-C-R10-05-PM-T-3	2.465	Threshold 66
HL-C-R12-03-PM-T-1	2.258	Threshold 67
HL-C-R12-03-PM-T-2	2.382	Threshold 67
HL-C-R12-03-PM-T-3	1.836	Threshold 66



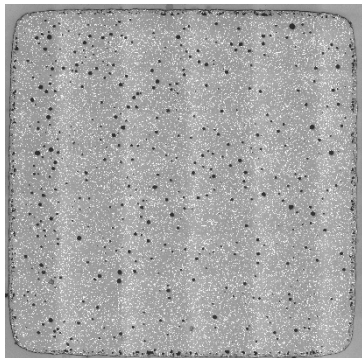
HL-C-R7-04-PM-T-1



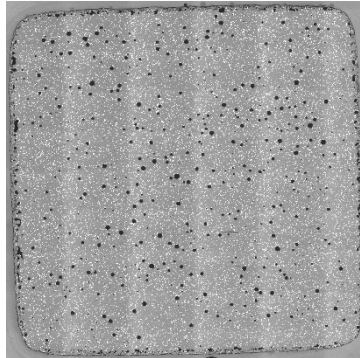
HL-C-R7-04-PM-T-2



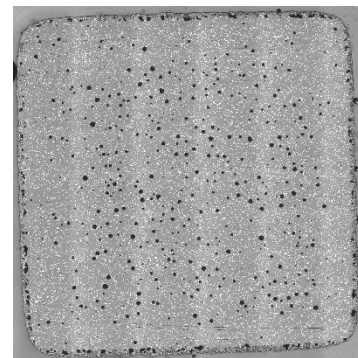
HL-C-R7-04-PM-T-3



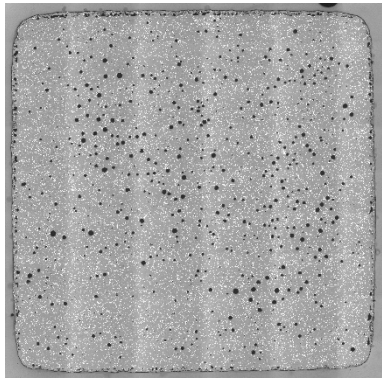
HL-C-R10-05-PM-T-1



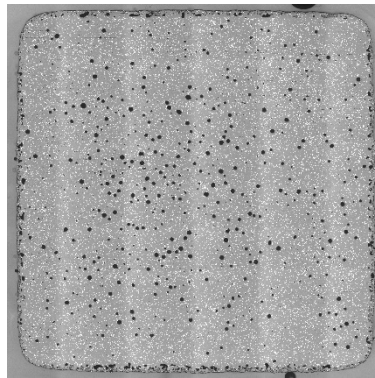
HL-C-R10-05-PM-T-2



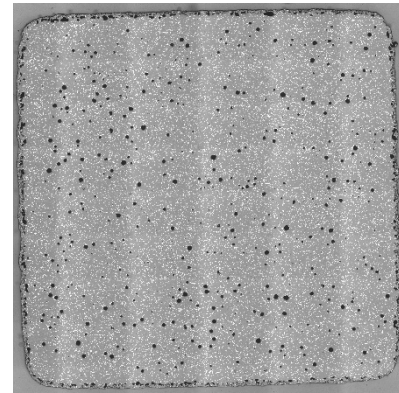
HL-C-R10-05-PM-T-3



HL-C-R12-03-PM-T-1



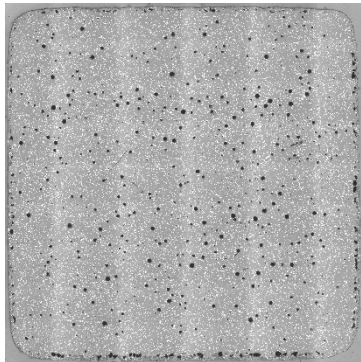
HL-C-R12-03-PM-T-2



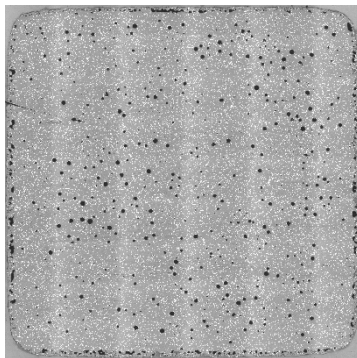
HL-C-R12-03-PM-T-3

VOID/POROSITY CONTENT BY IMAGE ANALYSIS

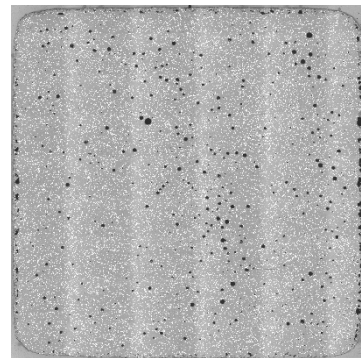
PICTURE	VOID/POROSITY CONTENT (%)	COMMENTS
HL-C-R8-02-PM-T-1	1.794	Threshold 70
HL-C-R8-02-PM-T-2	1.829	Threshold 69
HL-C-R8-02-PM-T-3	1.240	Threshold 72



HL-C-R8-02-PM-T-1

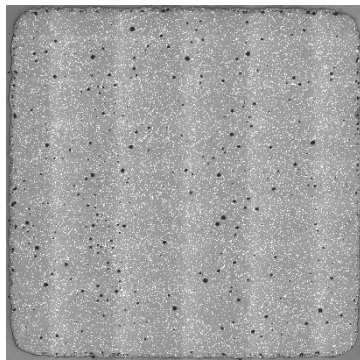


HL-C-R8-02-PM-T-2

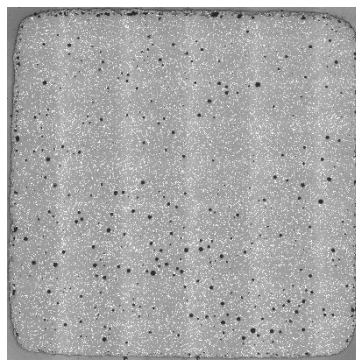


HL-C-R8-02-PM-T-3

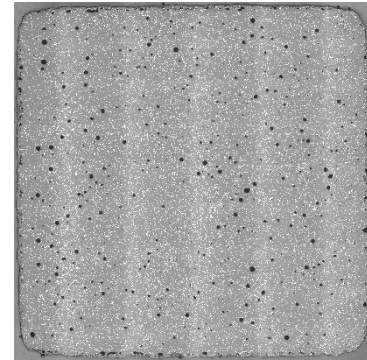
VOID/POROSITY CONTENT BY IMAGE ANALYSIS		
PICTURE	VOID/POROSITY CONTENT (%)	COMMENTS
HL-B-R6-08-PM-T-1	1.160	Threshold
HL-B-R6-08-PM-T-2	1.130	Threshold
HL-B-R6-08-PM-T-3	1.350	Threshold



HL-B-R6-08-PM-T-1

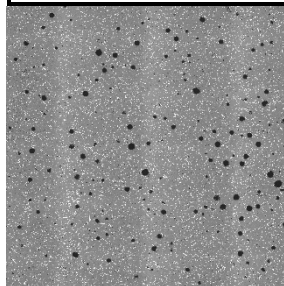


HL-B-R6-08-PM-T-2

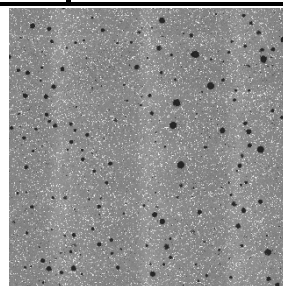


HL-B-R6-08-PM-T-3

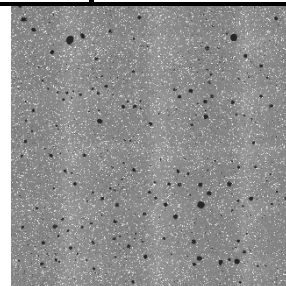
VOID/POROSITY CONTENT BY IMAGE ANALYSIS		
PICTURE	VOID/POROSITY CONTENT (%)	COMMENTS
HL-B-R4-07-PM-1	2.135	Threshold 57
HL-B-R4-07-PM-2	1.913	Threshold 57
HL-B-R4-07-PM-3	1.379	Threshold 57



HL-B-R4-07-PM-1

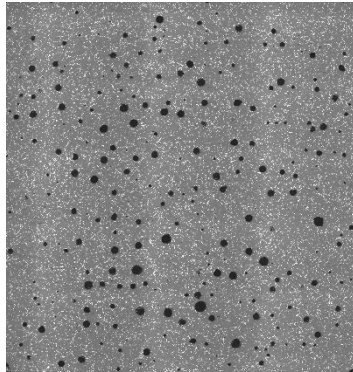


HL-B-R4-07-PM-2

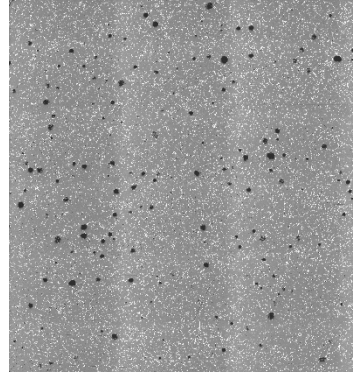


HL-B-R4-07-PM-3

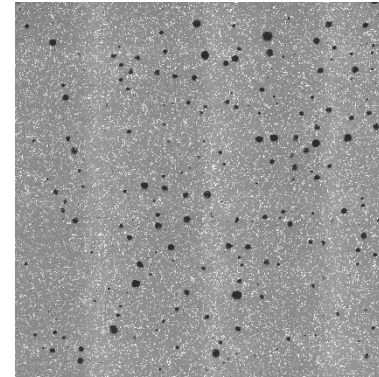
VOID/POROSITY CONTENT BY IMAGE ANALYSIS		
PICTURE	VOID/POROSITY CONTENT (%)	COMMENTS
HL-C-R1-01-DEN-1-PM	3.017	Threshold 53
HL-C-R1-01-DEN-2-PM	0.951	Threshold 61
HL-C-R1-01-DEN-3-PM	1.500	Threshold 61
HL-A-R2-013-DEN-1-PM	2.123	Threshold 51
HL-A-R2-013-DEN-2-PM	1.575	Threshold 59
HL-A-R2-013-DEN-3-PM	1.939	Threshold 60
HL-A-R3-014-DEN-1-PM	2.204	Threshold 63
HL-A-R3-014-DEN-2-PM	2.307	Threshold 61
HL-A-R3-014-DEN-3-PM	2.066	Threshold 62



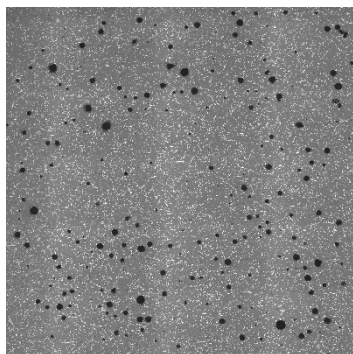
HL-C-R1-01-DEN-1-PM



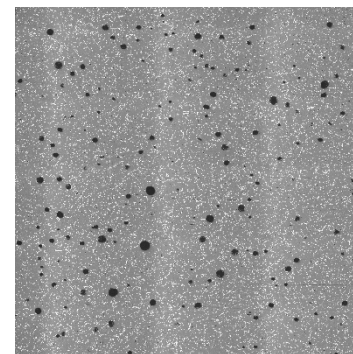
HL-C-R1-01-DEN-2-PM



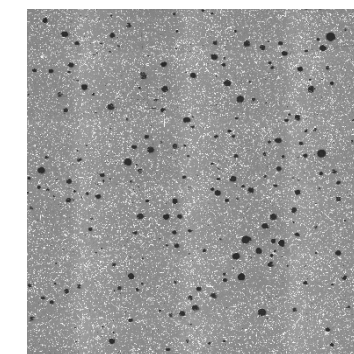
HL-C-R1-01-DEN-3-PM



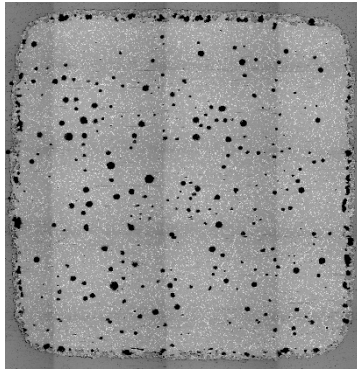
HL-A-R2-013-DEN-1-PM



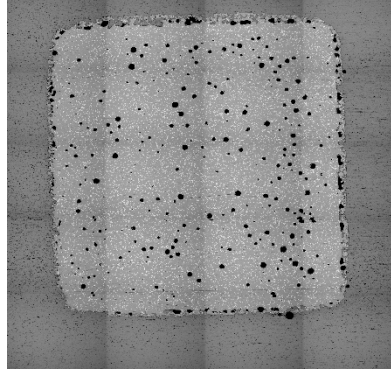
HL-A-R2-013-DEN-2-PM



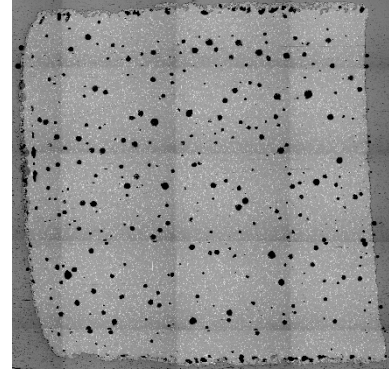
HL-A-R2-013-DEN-3-PM



HL-A-R3-014-DEN-1-PM



HL-A-R3-014-DEN-2-PM



HL-A-R3-014-DEN-3-PM

VOID/POROSITY CONTENT BY IMAGE ANALYSIS

Image	VOID/POROSITY CONTENT (%)	Threshold
HL-A-R17-011-PM-T-1	2.150	56
HL-A-R17-011-PM-T-2	1.867	58
HL-A-R17-011-PM-T-3	1.698	57
HL-B-R9-016-PM-T-1	2.289	58
HL-B-R9-016-PM-T-2	1.996	57
HL-B-R9-016-PM-T-3	2.096	56
HL-A-R16-010-PM-T-1	1.724	60
HL-A-R16-010-PM-T-2	2.021	56
HL-A-R16-010-PM-T-3	1.532	57
HL-B-R14-017-PM-T-1	2.356	63
HL-B-R14-017-PM-T-2	2.435	52
HL-B-R14-017-PM-T-3	2.092	63
HL-B-R15-018-PM-T-1	1.917	56
HL-B-R15-018-PM-T-2	1.907	64
HL-B-R15-018-PM-T-3	2.605	59
HL-A-R18-012-PM-T-1	2.230	62
HL-A-R18-012-PM-T-2	1.961	56
HL-A-R18-012-PM-T-3	1.841	65

7.5 TMA Dry Batch A

TMA Results		
Hexcel Hexpekk 100 TMA		
Sample ID	Coefficient of Thermal Expansion in z-direction	
	α [$\mu\text{m}/(\text{m}\cdot^{\circ}\text{C})$]	α [$\mu\text{in}/(\text{in}\cdot^{\circ}\text{F})$]
HL-B-R4-07-CTE-5T-1	54.87	30.48
HL-B-R6-08-CTE-5T-1	52.91	29.39
HL-B-R13-09-CTE-5T-1	53.62	29.79
HL-B-R14-017-CTE-5T-1	54.73	30.41
HL-C-R7-04-CTE-5T-1	55.88	31.04
HL-C-R10-05-CTE-5T-1	54.72	30.40
HL-C-R11-06-CTE-5T-1	54.76	30.42

Test Parameters:

Instrument: TA Instruments Discovery TMA 450

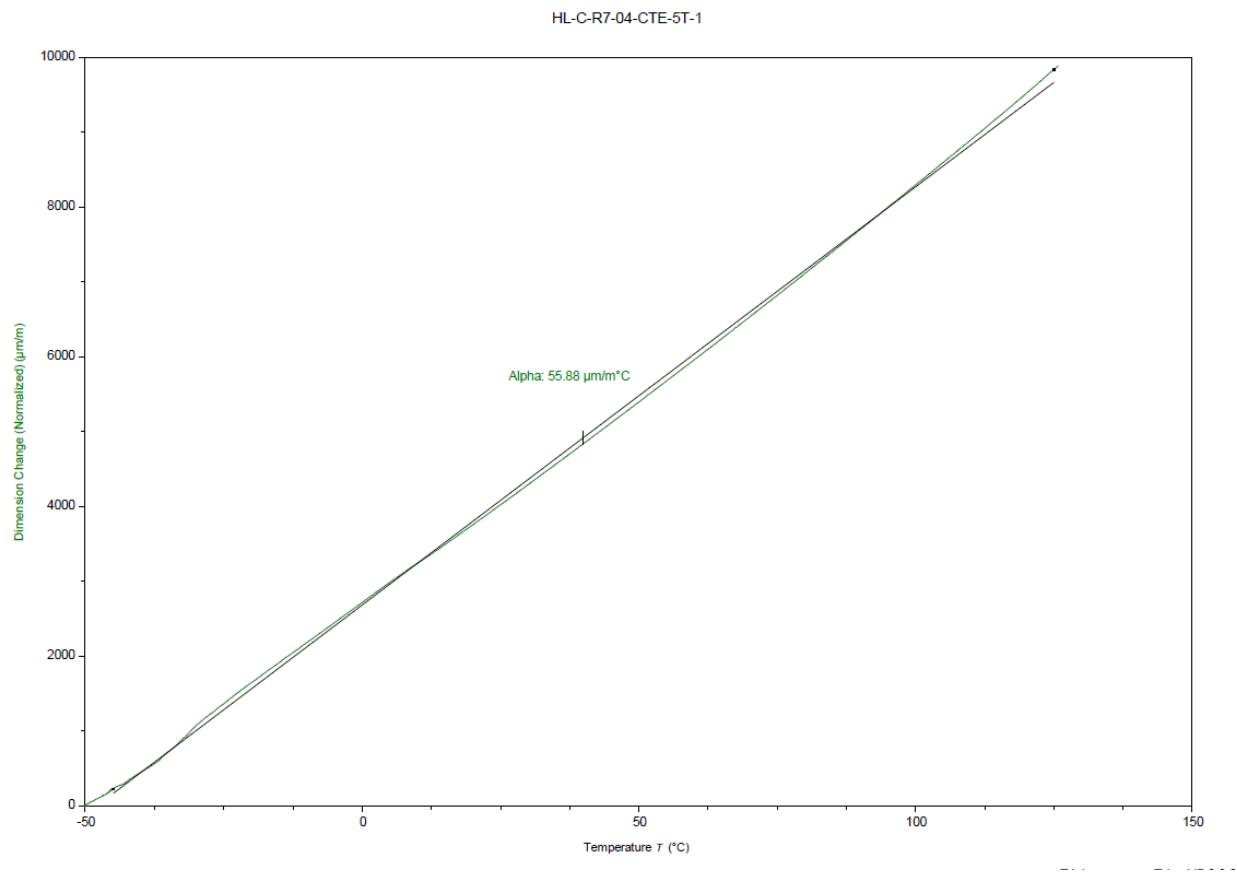
Test Fixture: Expansion Probe

Test Method: ASTM E831

Controlled Force: 0.05 N

Ramp Rate: 5°C/min

Temperature Range: -40°C to 130°C



7.6 Flammability Results

7.6.1 Vertical Burn Flammability Test

**FAR 25.853 (a) Appendix F, Part I, (a) 1, (i): 60 sec,
Vertical Burn Flammability Test**

Hexcel Hexpekk 100

Specimen ID	Burning Time (sec)	Burning Length (in)	Longest Burning Particle (sec)	Pass/Fail
HL-C-R7-04-XYFLM-2T-1	0	1.3	None	Pass
HL-C-R11-06-XYFLM-2T-1	0	1.6	None	Pass
HL-C-R10-05-XYFLM-2T-1	0	1.8	None	Pass
HL-B-R6-08-ZXFLM-4B-2	0	1.4	None	Pass
HL-B-R4-07-ZXFLM-4B-2	0	1.4	None	Pass
HL-B-R13-09-ZXFLM-4B-2	0	1.4	None	Pass

Passing Criteria:

Maximum Burn Time: 15 sec

Maximum Burn Length: 6 in

Maximum Longest Burning: 3 sec

7.6.2 Smoke Density Test

**FAR 25.853 (d) Appendix F, Part V,
Smoke Density Test**

Hexcel Hexpekk 100

Specimen ID	Ds @ 1.5m	Ds @ 4.0m	Ds Max	Pass/Fail	Dmax time
HL-B-R9-016-ZXNBS-1T-2	2	2	3	Pass	220
HL-B-R15-018-ZXNBS-1T-2	1	0	2	Pass	195
HL-B-R14-017-ZXNBS-1T-2	2	6	8	Pass	150
HL-B-R14-017-XYNBS-4B-1	0	0	1	Pass	110
HL-B-R9-016-XYNBS-4B-1	8	6	8	Pass	90
HL-B-R15-018-XYNBS-4B-1	6	0	8	Pass	235

Passing Criteria:

Ds Max <200

7.6.3 Heat Release Test

**FAR 25.853 (d) Appendix F, Part IV,
Heat Release Test**
Hexcel Hexpekk 100

Specimen ID	Total HR at 2 min (kWmin/m ²)	Peak HR (kW/m ²)	Peak Time (sec)	Melting (Yes/No)	Sagging (Yes/No)	Dripping (Yes/No)	Pass/Fail
HL-B-R4-07-XYOSU-HRP-5B-1	1.0	72.3	273	Yes	Yes	Yes	Pass
HL-A-R2-013-ZXOSU-HRP-2B-1	0.1	51.0	176	Yes	Yes	Yes	Pass
HL-B-R6-08-XYOSU-HRP-5B-1	1.0	63.2	241	Yes	Yes	Yes	Pass
HL-B-R13-09-XYOSU-HRP-5B-1	0.0	62.8	300	Yes	Yes	Yes	Pass
HL-A-R5-015-ZXOSU-HRP-2B-1	0.0	63.0	247	Yes	Yes	Yes	Pass
HL-A-R3-014-ZXOSU-HRP-2B-1	0.1	62.2	250	Yes	Yes	Yes	Pass

Passing Criteria:
FAR 25.853 (d). Amdt. 25-116, 65/65

7.7 Relative Density

D792-13 Specific Gravity (Relative Density)							
Sample Name	W1 [g]	W2 [g]	Water Temp. [°C]	Water Density at Temp. [g/cc]	Specific Gravity	Specimen Density [g/cc]	Specimen Density [lbm/in3]
HL-A-R18-012-PM-T-1	5.171	1.260	22.90	0.9976	1.322	1.319	0.04765
HL-A-R18-012-PM-T-2	5.077	1.243	22.90	0.9976	1.324	1.321	0.04773
HL-A-R18-012-PM-T-3	4.860	1.192	22.90	0.9976	1.325	1.322	0.04776
HL-A-R17-011-PM-T-1	5.182	1.264	22.90	0.9976	1.323	1.319	0.04767
HL-A-R17-011-PM-T-2	4.862	1.192	22.90	0.9976	1.325	1.322	0.04775
HL-A-R17-011-PM-T-3	5.091	1.246	22.90	0.9976	1.324	1.321	0.04772
HL-A-R16-010-PM-T-1	5.087	1.243	22.90	0.9976	1.323	1.320	0.04769
HL-A-R16-010-PM-T-2	5.179	1.261	22.90	0.9976	1.322	1.319	0.04764
HL-A-R16-010-PM-T-3	4.835	1.198	22.90	0.9976	1.329	1.326	0.04791
HL-B-R14-017-PM-T-1	4.743	1.160	22.90	0.9976	1.324	1.320	0.04770
HL-B-R14-017-PM-T-2	4.891	1.200	22.90	0.9976	1.325	1.322	0.04776
HL-B-R14-017-PM-T-3	5.002	1.211	22.90	0.9976	1.319	1.316	0.04755
HL-B-R15-018-PM-T-1	4.997	1.213	22.80	0.9976	1.321	1.317	0.04760
HL-B-R15-018-PM-T-2	4.904	1.201	22.80	0.9976	1.324	1.321	0.04773
HL-B-R15-018-PM-T-3	4.770	1.172	22.80	0.9976	1.326	1.323	0.04778
HL-B-R9-016-DENSITY-T-1	5.033	1.223	22.80	0.9976	1.321	1.318	0.04761
HL-B-R9-016-DENSITY-T-2	4.784	1.175	22.80	0.9976	1.326	1.322	0.04778
HL-B-R9-016-DENSITY-T-3	4.964	1.216	22.80	0.9976	1.324	1.321	0.04773
HL-A-R2-013-DEN-1	1.413	0.3279	21.70	0.9978	1.302	1.299	0.04695
HL-A-R2-013-DEN-2	1.387	0.3202	21.70	0.9978	1.300	1.297	0.04687
HL-A-R2-013-DEN-3	1.369	0.3209	21.70	0.9978	1.306	1.303	0.04709
HL-C-R1-01-DEN-1	1.406	0.3248	21.70	0.9978	1.300	1.298	0.04688
HL-C-R1-01-DEN-2	1.345	0.3163	21.70	0.9978	1.307	1.305	0.04713
HL-C-R1-01-DEN-3	1.327	0.3147	21.70	0.9978	1.311	1.308	0.04726
HL-A-R3-014-DEN-1	1.384	0.3086	21.70	0.9978	1.287	1.284	0.04639
HL-A-R3-014-DEN-2	1.393	0.3091	21.70	0.9978	1.285	1.283	0.04633
HL-A-R3-014-DEN-3	1.418	0.3093	21.70	0.9978	1.279	1.276	0.04610
HL-B-R4-07-DEN-1	1.368	0.3222	22.70	0.9976	1.308	1.305	0.04714
HL-B-R4-07-DEN-2	1.438	0.3438	22.70	0.9976	1.314	1.311	0.04737
HL-B-R4-07-DEN-3	1.323	0.3178	22.70	0.9976	1.316	1.313	0.04744
HL-A-R5-015-DENSITY-T-1	4.788	1.137	22.20	0.9977	1.311	1.308	0.04727
HL-A-R5-015-DENSITY-T-2	5.010	1.183	22.20	0.9977	1.309	1.306	0.04719
HL-A-R5-015-DENSITY-T-3	4.998	1.180	22.20	0.9977	1.309	1.306	0.04719
HL-B-R6-08-DENSITY-T-1	4.858	1.181	22.60	0.9976	1.321	1.318	0.04761
HL-B-R6-08-DENSITY-T-2	4.994	1.206	22.60	0.9976	1.318	1.315	0.04752
HL-B-R6-08-DENSITY-T-3	4.903	1.184	22.60	0.9976	1.318	1.315	0.04752
HL-C-R08-02-DENSITY-T-1	4.937	1.194	22.20	0.9977	1.319	1.316	0.04754
HL-C-R08-02-DENSITY-T-2	4.966	1.196	22.20	0.9977	1.317	1.314	0.04748
HL-C-R08-02-DENSITY-T-3	4.965	1.200	22.20	0.9977	1.319	1.316	0.04753
HL-C-R10-05-DENSITY-T-1	4.926	1.205	22.40	0.9977	1.324	1.321	0.04772
HL-C-R10-05-DENSITY-T-2	5.002	1.216	22.40	0.9977	1.321	1.318	0.04762
HL-C-R10-05-DENSITY-T-3	4.972	1.205	22.40	0.9977	1.320	1.317	0.04757
HL-C-R7-04-DENSITY-T-1	4.934	1.209	22.60	0.9976	1.325	1.321	0.04774
HL-C-R7-04-DENSITY-T-2	4.923	1.205	22.60	0.9976	1.324	1.321	0.04772
HL-C-R7-04-DENSITY-T-3	4.955	1.206	22.60	0.9976	1.321	1.318	0.04763
HL-C-R12-03-DENSITY-T-1	4.929	1.205	22.60	0.9976	1.323	1.320	0.04770
HL-C-R12-03-DENSITY-T-2	4.897	1.191	22.60	0.9976	1.321	1.318	0.04762
HL-C-R12-03-DENSITY-T-3	4.905	1.192	22.60	0.9976	1.321	1.318	0.04761
HL-B-R13-09-PM-T-1	5.215	1.254	24.10	0.9973	1.317	1.313	0.04743
HL-B-R13-09-PM-T-2	4.901	1.185	24.10	0.9973	1.319	1.315	0.04752
HL-B-R13-09-PM-T-3	5.144	1.233	24.10	0.9973	1.315	1.312	0.04739
HL-C-R11-06-PM-T-1	4.914	1.187	24.10	0.9973	1.318	1.315	0.04750
HL-C-R11-06-PM-T-2	4.888	1.191	24.10	0.9973	1.322	1.318	0.04763
HL-C-R11-06-PM-T-3	4.944	1.197	24.10	0.9973	1.319	1.316	0.04754
AVERAGE (composite)					1.317	1.314	0.04745
STANDARD DEVIATION					0.01053	0.01040	0.0003756
COEFF. OF VARIATION					0.7998	0.7915	0.7915
Minimum					1.279	1.276	0.04610
Maximum					1.329	1.326	0.04791
Number of Specimens					54	54	54

8. Deviations/Program Test Notes

- a. Holes on coupons were machined at NIAR for OHT, OHC, FHT, FHC, SSB, and Punch Hole Shear coupons.
- b. OHC and FHC coupons for the RTA conditions were retested with extra coupons to obtain the offset strength values.