## DAMAGE EVALUATION AND CORRELATION TO TENSILE STRENGTH AS A FUNCTION OF CONSOLIDATION PRESSURE FOR UHMWPE

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#### Introduction

UHMWPE, also known as Ultra-High-Molecular-Weight Polyethylene, is both strong and lightweight. It's durable and offers protection, which makes it perfect for high impact uses

- Protective Uses: Widely used in protective gear like helmets, vests, and vehicle armor due to its ability to absorb and distribute energy.
- Versatile: Used in various industries light-weight needing robust, materials.





#### **Objective**

**Evaluation of the influence of** processing parameters (applied pressure) on tensile strength of HB210 Composites

#### **Specimen Fabrication Tensile Testing**

	<b>Applied Pressure</b>	Temperature
Batch 1	0 ksi	RT (unprocessed)
Batch 2	3 ksi	125 C
Batch 3	6.5 ksi	125 C
Batch 4	8.25 ksi	125 C
Batch 5	10 ksi	125 C





MPa ŋgtŀ





#### **Balancing Pressure for Optimal** Strength

-0-ksi,	3-ksi	6.5-ksi	8.25-ksi	<b>10-ksi</b>
trength,	Strength,	Strength,	Strength,	Strength,
MPa	MPa	MPa	MPa	MPa
943±45	1169±78	1228±54	1223±52	1179±63



#### 0 ksi (No Pressure)

Image shows unconsolidated fibers with minimal damage



We investigated the influence of applied UHMWPE composite on pressure strength. Two competing mechanisms – compaction and damage due to pressure.

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#### **3 ksi**: Increasing strength due to compaction (removes air).



**10 ksi**: High pressure compacts more, but introduces more damage, which affects overall strength.

10 ksi compacted TM4000 0001 5kV 10.0mm X1.00k Mix L 07/16/2024 15:55 50.0μm

#### Conclusions

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