

# Physical Mechanical Lab: Tensile, Flex, Compression

## Principle

A universal testing machine (UTM) can be used to test various material mechanical properties.

Tensile tests measure the force required to break a material in tension and can measure the amount of elongation the specimen can withstand before yield or the breaking point.

Flexural tests measure the force required to bend a beam under three point loading conditions.

Compression tests measure the material's ability to withstand compressive loads before fracturing.

## Capabilities


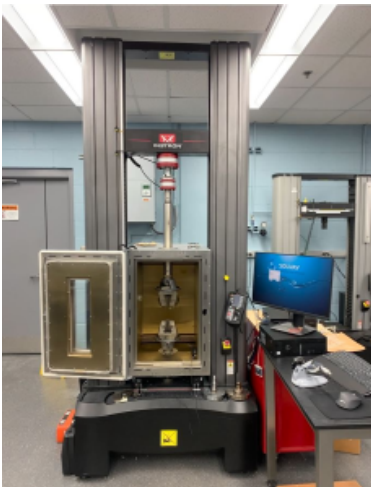
### Tensile, Flex, Compression


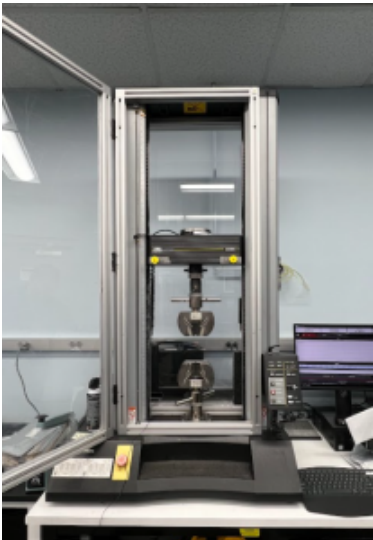
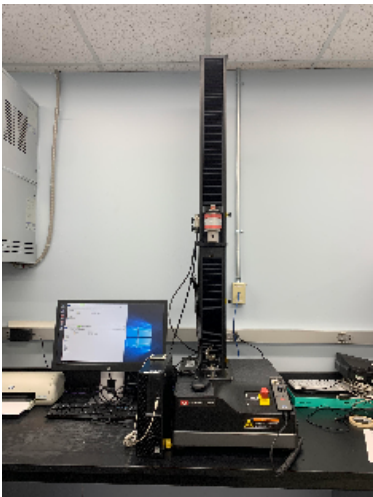
- Tensile - ASTM D638, ISO 527, ASTM D1708 (microtensile), ASTM D882 (film tensile)
- Flexural - ASTM D790, ISO 178
- Compression - ASTM D695
- Testing temperatures (-40°C to 250°C)

### Specimen/Sample Types

- ISO - Type IA
- ASTM - Type I, IV, V, 1BA, microtensile, film

## Equipment

	Equipment Type	Information
	Tensile/Flex Zwick Automation System	<ul style="list-style-type: none"> <li>• Kuka robotic arm</li> <li>• 1 UTM for tensile</li> <li>• 1 UTM for flex</li> <li>• 1 CMU (cross-sectional measurement unit)</li> <li>• Routine ASTM and ISO testing at room temperature</li> </ul>
	Instron 5982 Universal Testing Machine	<ul style="list-style-type: none"> <li>• 100 kN load capacity</li> <li>• Environmental chamber (-40°C to 250°C)</li> <li>• Primarily used for non-ambient tensile, flex and compression testing</li> </ul>

	<p>Instron 68TM50 Universal Testing Machine</p>	<ul style="list-style-type: none"> <li>• 50 kN load capacity</li> <li>• Environmental chamber (-40°C to 250°C)</li> <li>• Primarily used for non-ambient tensile, flex and compression testing</li> </ul>
	<p>Instron 5569 Universal Testing Machine</p>	<ul style="list-style-type: none"> <li>• 50 kN load capacity</li> </ul>
	<p>Instron 68SC Universal Testing Machine</p>	<ul style="list-style-type: none"> <li>• 5 kN load capacity</li> <li>• Extended height</li> <li>• Small part, film, specialty testing</li> </ul>

Test Codes

- AP-RD-MECH-TENSILE
- AP-RD-MECH-FLEX
- AP-RD-MECH-COMPRESSION