Fatigue Technology Inc:

Static and Fatigue Testing of Two Aluminum Specimens

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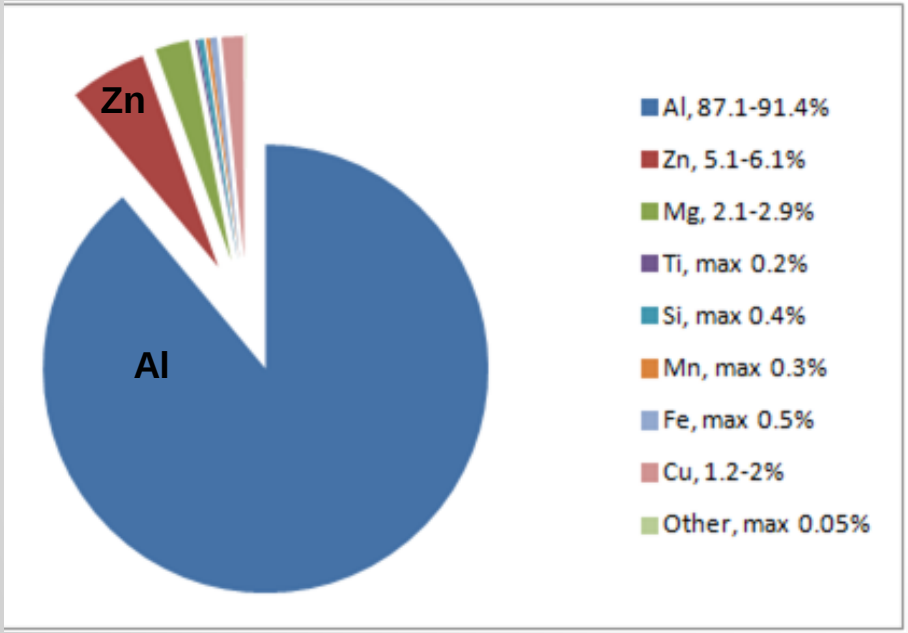
What is FTI?

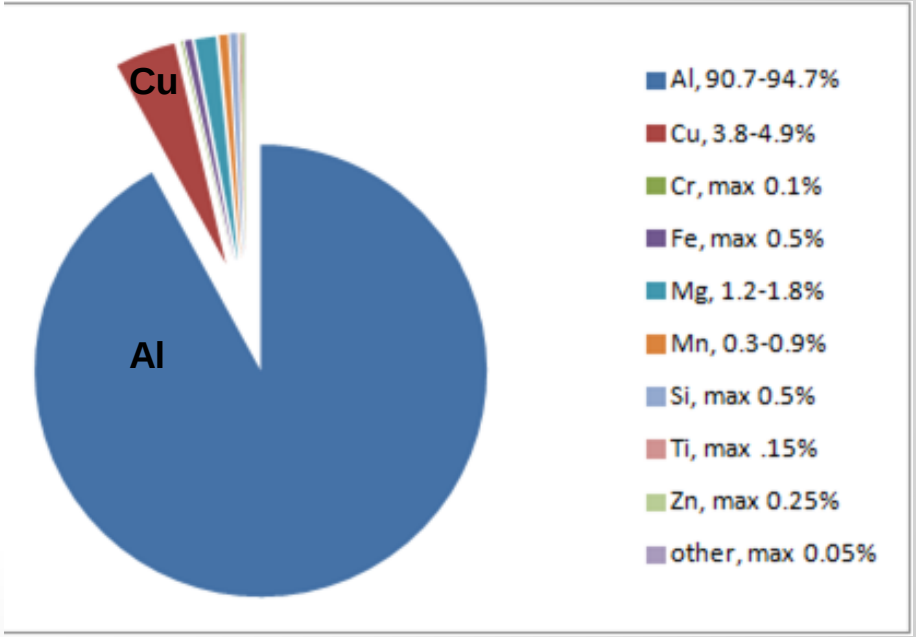
- Seattle-based company that tests and improves the fatigue life of materials used in aircrafts
- Conducts fatigue and static testing
- Measures crack growth under constant-amplitude or spectrum loading

Material Properties

7075-T651. Aluminium Zinc Alloy



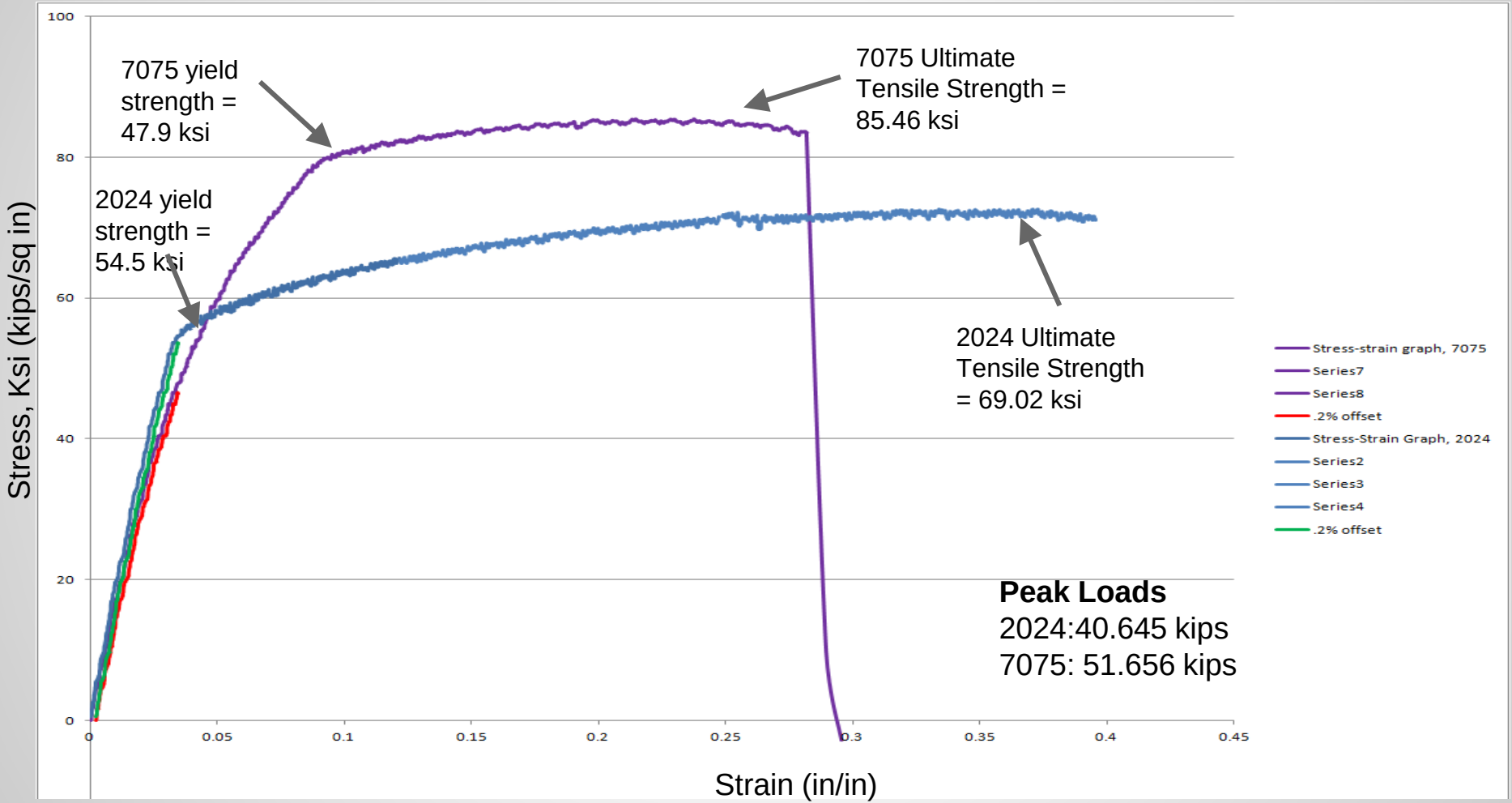
2024- T351 Aluminum Copper Alloy



Static Testing

- Material is stretched until it breaks
  - Pressure is added gradually
- Malleable materials perform well

Static Test: Stress Strain Curves



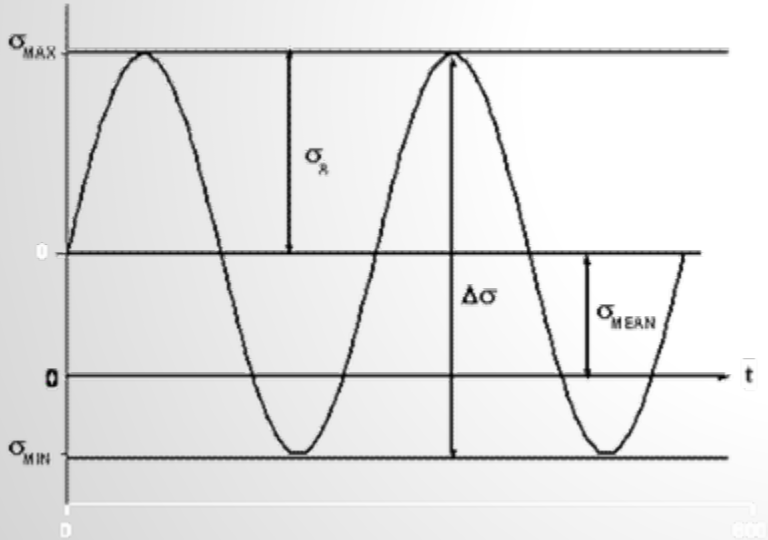
Fatigue Testing

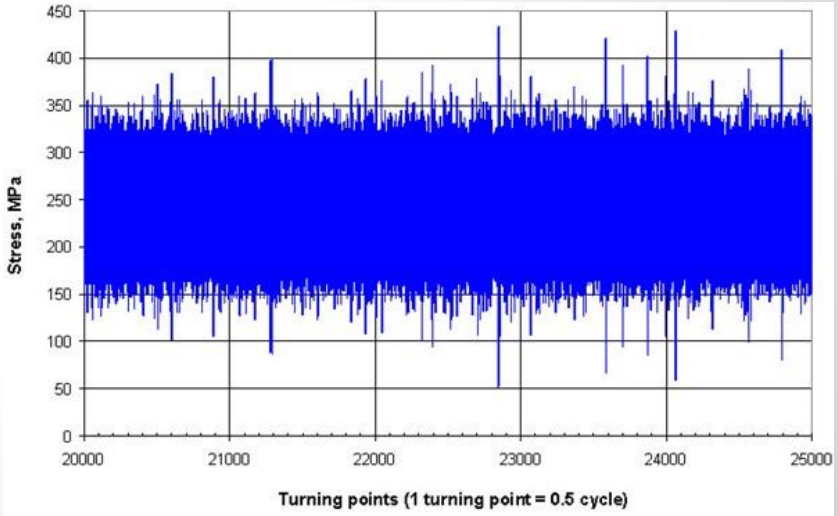
- Material is stretched and relaxed several times each second
- Up to 1,000 times less pressure applied than in static testing
- Stress concentrates in hole, simulating real scenario

Fatigue Test Data

	Fatigue Specimens				
Specimen	Width (inch)	Thickness (inch)	Hole Diameter (inch)	Test Stress (ksi)	Cycles to Failure
UW15-2024-Fatg	2.3509	0.2566	0.2498	25	86,486
UW15-7075-Fatg	2.3612	0.2484	0.2498	25	56,886

Constant Amplitude v. Spectrum Testing





Which metal would be the ideal material for a plane wing?

- 7075:

Withstands more force due to its high ultimate strength, but is more brittle than 2024

- 2024:

Endures more fatigue cycles because it has a higher yield strength and therefore greater ductility

Final Decision:

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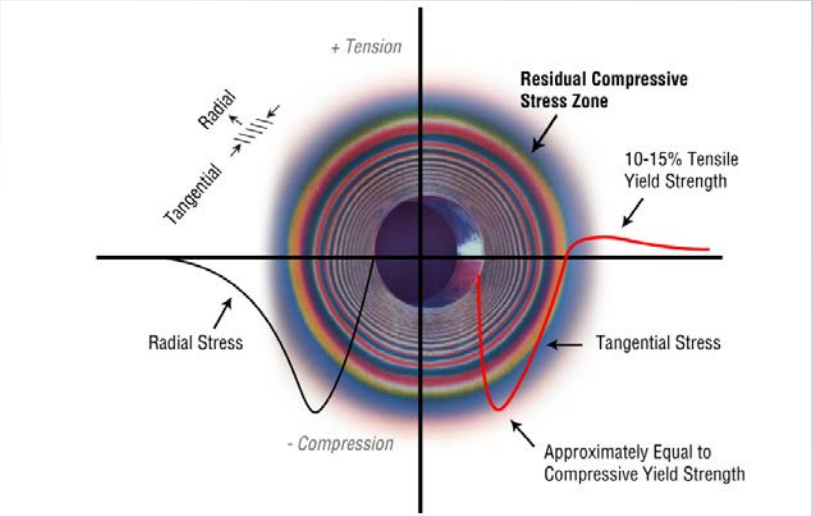
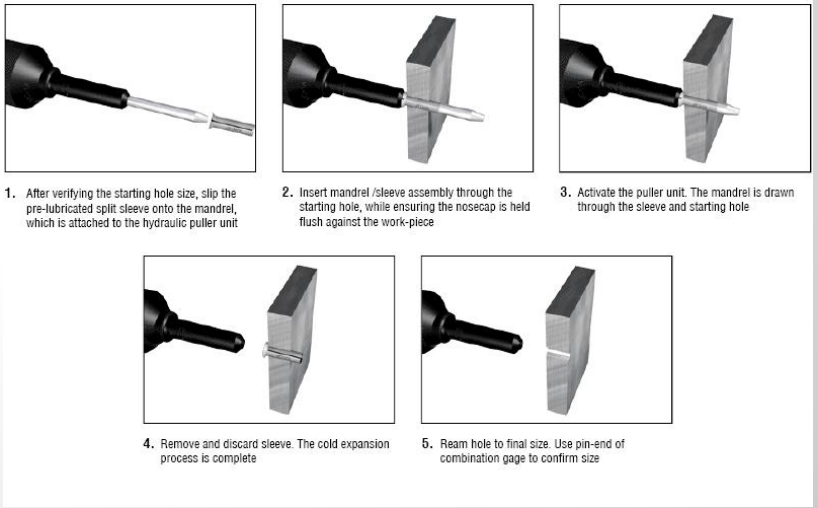
Final Decision: 2024

Improving Fatigue Life: Cold Working

- Creates compression stresses to counteract harmful tensile stress
- Uses the processes of plastic and elastic deformation





Questions?