

PhD Activity Presentation

- Name: Ana Paula Pagnoncelli
- Title of Activity: Brittle Materials
- Fellowship: DIMEAS - POLITO - Brittle Materials
- Supervisors: Lorenzo Peroni and Davide S. Paolino
- Year of Activity: 1st

Military



Medical



Electronic

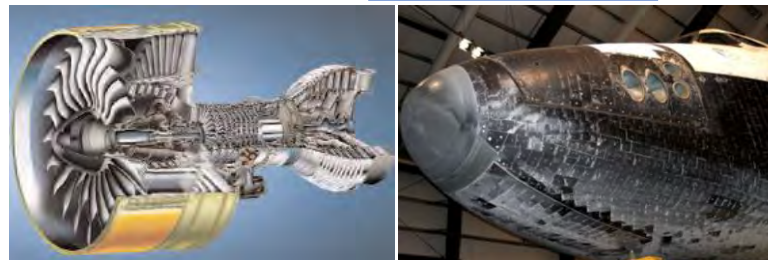


Machinery



Applications

Aerospace



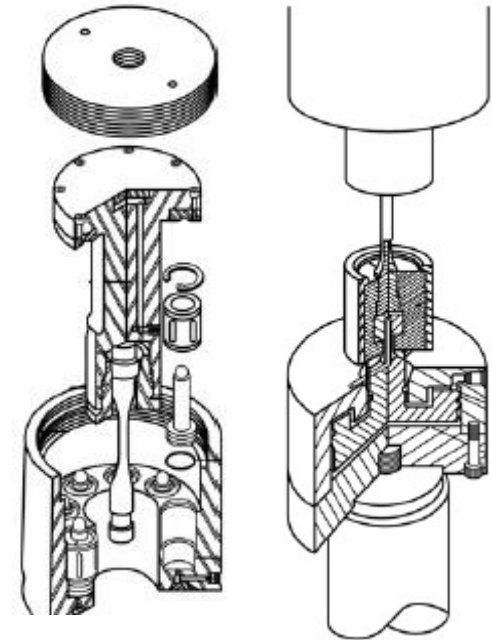
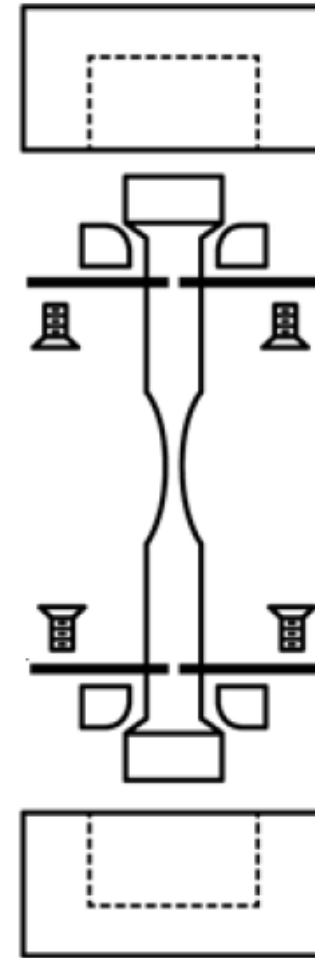
Automotive



State of the Art

Difficult assessment of mechanical properties:

- Fracture governed by initial defects
 - Tensile tests → gripping interface and alignment
 - Bending tests → surface cracks
- Very high mechanical resistance
 - Maximum specimen size in tensile tests



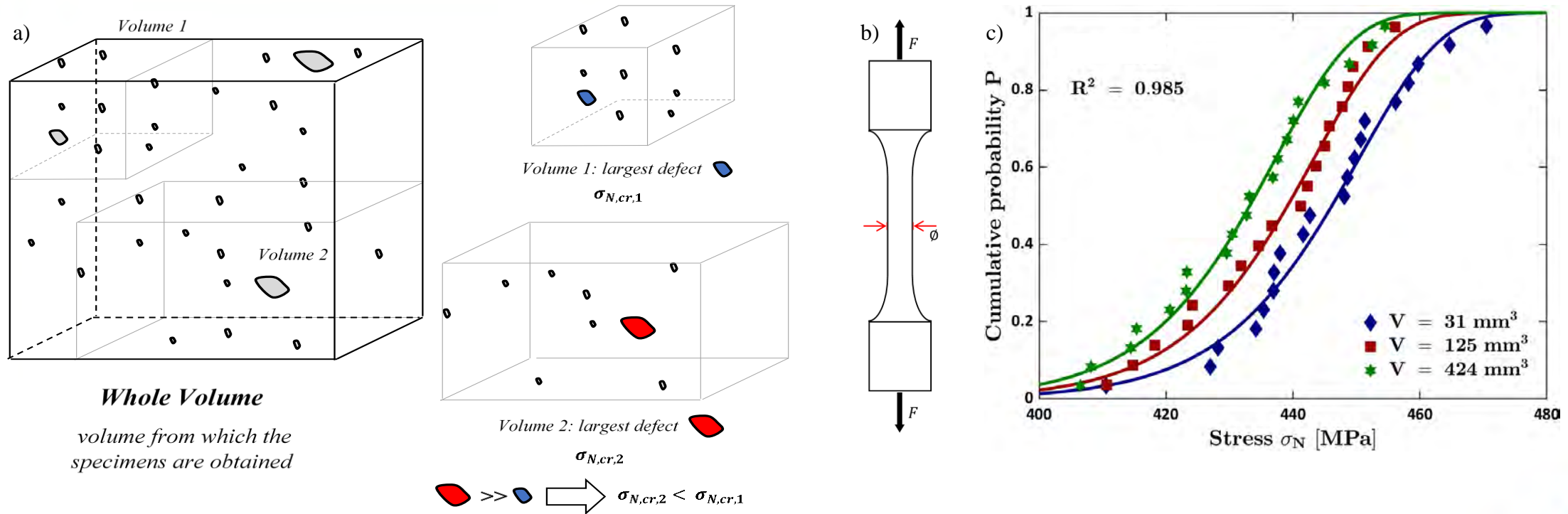
Foreseen Approach

- New protocol for tensile testing → Gripping interface and alignment
- Fatigue tensile tests at ultrasonic frequencies → Required machine strength
- Statistical analysis of size effects → Estimation of fracture behavior



Early Results

New model for estimating specimen's size effects on fracture strength of brittle materials



- Size effects on fracture strength.
- Tensile test on gamma titanium aluminide alloy (Ti-48Al-2Cr-2Nb).
- Experimental data and fitting curve for gamma titanium aluminide alloy.

Pagnoncelli A.P., Tridello A., Paolino D.S., Modelling size effects for static strength of brittle materials. *Materials and Design*, 195 (2020) 109052.

Work Plan

Experimental preparation:

- Gripping interface
- Materials
- Specimens

Experiment execution:

- Fatigue tensile tests at ultrasound frequency

Data collection:

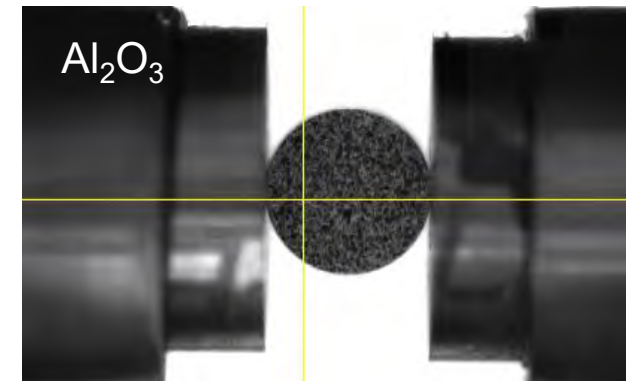
- Fracture strength

Improvements:

- Testing protocol
- Statistical model

Statistical analysis:

- Size effects model





DIMEAS

Dipartimento di Ingegneria
Meccanica e Aerospaziale

Thank you for your attention!