

# AUTOMATED, FEA-ASSISTED FATIGUE LIFETIME ASSESSMENT FOR CONTINUOUS FIBER REINFORCED PLASTIC COMPONENTS



WITHIN THE SCOPE OF RUNNING PROJECT 2023-1.1.1-PIACI\_FÓKUSZ-2024-00002

## TRANSFORM DEVELOPMENTS WITH VIRTUAL PROTOTYPES

### LOWER COSTS

Development, testing, certification, warranty & call-back

### DESIGN OPTIMIZATION

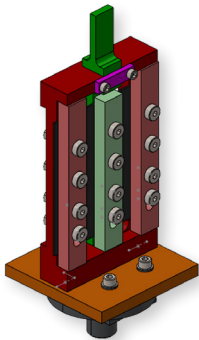
Reduction of labour, material requirements & weight

### DEVELOPMENT EFFICIENCY

Shorter go-to-market time

### INNOVATIVE SOLUTION

Rapid Multiphysics prototyping across any industries and work areas



### FATIGUE EXPERIMENTS

Ever-growing CFRP material data-base with fatigue data

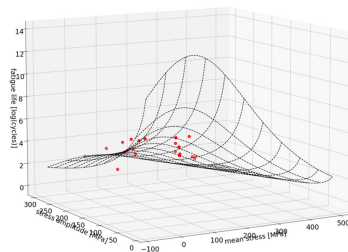
Static and fatigue testing services

Tension, compression, shear and flexural fixtures

Capability for shear fatigue experiment

Capability for  $R < 0$  fatigue testing on plates

Servo hydraulic testing frame up to 10 Hz frequency



### FATIGUE CHARACTERIZATION

SN curve fitting services with inherent UQ

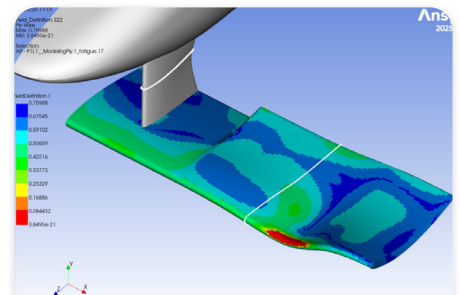
In-house validated combined fatigue model (residual stiffness with mean stress correction)

Loading direction dependent Haigh-diagram fitting

Stress level dependent modulus degradation models

All in-plane loads considered (fiber, transverse and shear)

Material card generation for fatigue assessment in FEA (ANSYS)



### FEA-BASED LIFETIME PREDICTION

Automated fatigue evaluation plug-in for ANSYS use

Mechanistic model incorporating mean-stress dependent property degradation

FEA-based stress redistribution assessment (spatial and through plies)

Predefined material cards available from in-house experimental campaigns

Validated both for thermoset and thermoplastic matrices

Both loading block and stochastic load input (history) handled