RESEARCH METHODOLOGIES

Dynamic crashing behavior of new extrudable multi-cell tubes with a functionally graded thickness

- Finite Element Analysis (FEA)
- Parametric Study ; Thickness Gradient, Cell Number and Arrangement, Material Properties
- Comparative Analysis; Uniform Thickness Tubes, Different Geometrical Configurations
- Analytical and Empirical Validation; Energy Absorption Formula, Crushing Force Models
- Design Optimization; response surface methodology (RSM)
- Experimental Data for Validation (if applicable)
- Quantitative Metrics for Performance Evaluation; Specific Energy Absorption (SEA), Peak Crushing Force (Fmax), Crushing Force Efficiency (CFE)
- Sensitivity Analysis

On design of multi-cell tubes under axial and oblique impact loads

- complex proportional assessment (COPRAS) method
- multi-criteria decision-making (MCDM) problem
- Kriging model and optimization algorithm
- separate load case (SLC)
- multiple load cases (MLC)

Energy Absorption of a Novel Lattice Structure-Filled Multicell Thin-Walled Tubes Under Axial and Oblique Loadings

- Effect of Single and Multicell Tubes on Structural Crashworthiness
- Interaction of Lattice Structure with Tube

Dynamical bending analysis and optimization design for functionally graded thickness (FGT) tube

- Structural Crashworthiness Indicators ; SEA, EA, CFE, Fmax
- Parametric Analyses; Effect of Thickness Variation, Thickness Range, Diameter, Yielding Stress
- Multi-objective Optimization Design; Optimization Problem and Results, Surrogate Models

Mult objective optimization of multi-cell sections for the crashworthiness design

- Definition of crashworthiness optimization problem
- Response surface method
- Design of Experiment (DoE)
- Error evaluation of the surrogate model
- Constrained single-objective optimization
- Multi-objective optimization; The weighted average method

Functionally graded material via L-PBF: characterization of multi-material junction between steels (AISI 316L/16MnCr5), copper (CuCrZr) and aluminium alloys (Al-Sc/AlSi10Mg)

- New material, can be used for our research