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## Technical University of Łódź Faculty of Material Technologies and Textile Design

### Department of Technical Mechanics and Computer Engineering

#### Head of department:

Prof. Krzysztof Dems, Ph.D., D.Sc., Eng.

#### Current research topics:

- Modelling and identification of the mechanical properties of textile composite materials
- Optimisation of the mechanical and thermal properties of fibre reinforced composites
- Sensitivity analysis and optimal design of the shape and thermomechanical properties of structural elements
- Identification and computer oriented simulation of defects in structures using thermographic methods and modal analysis

#### Area of research activities:

- Mechanics of textiles, textile structures and composites
- Theory and application of textile and structural mechanics
- Sensitivity analysis and optimal design of structures subjected to thermal and mechanical loads
- Numerical methods in textile and structural mechanics
- Computer-oriented analysis, synthesis and optimisation of materials and structures
- Operation of textile machinery and its reliability
- Application of computer science in textile and mechanical engineering

#### Research achievements:

- Creation of a scientific school with varied approaches to optimal design, identification and sensitivity analysis of structural elements, textile products, composite structures subjected to thermal and mechanical loads
- Creation of principles for the modelling of textile products subjected to static and dynamic loads
- Computer oriented analysis and synthesis of textile products, composite structures and structural elements subjected to mechanical and thermal loads

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