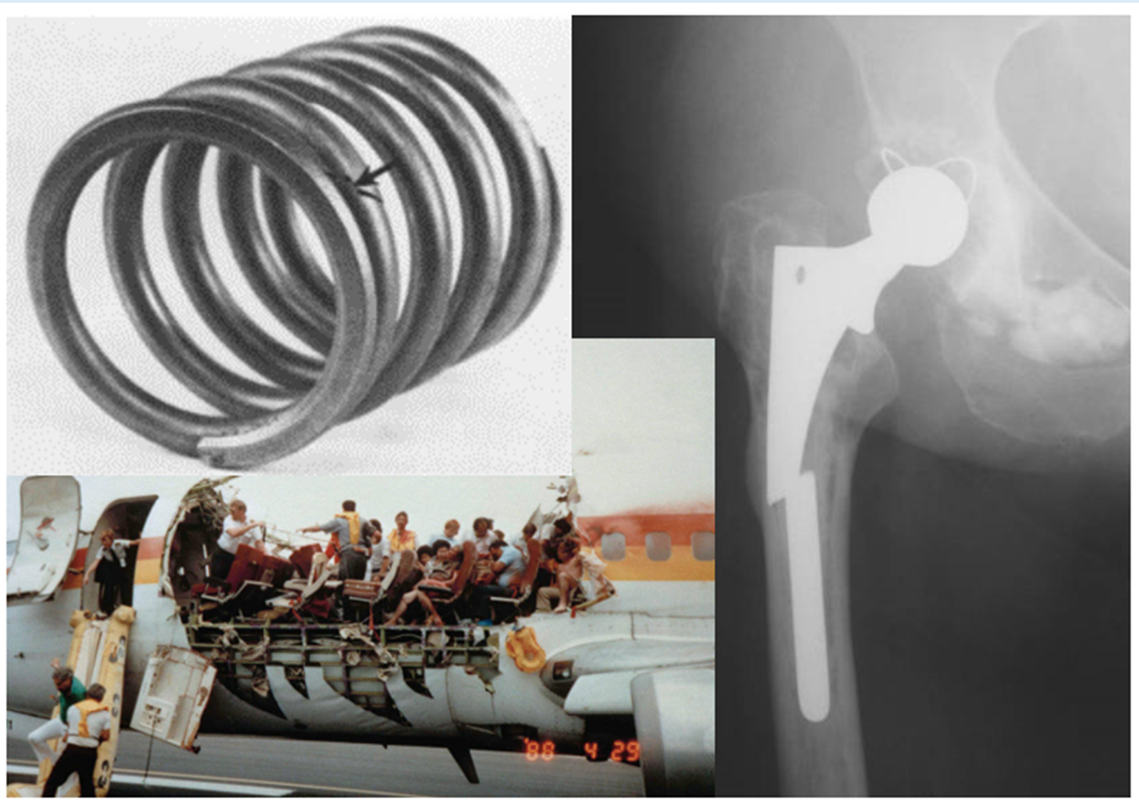
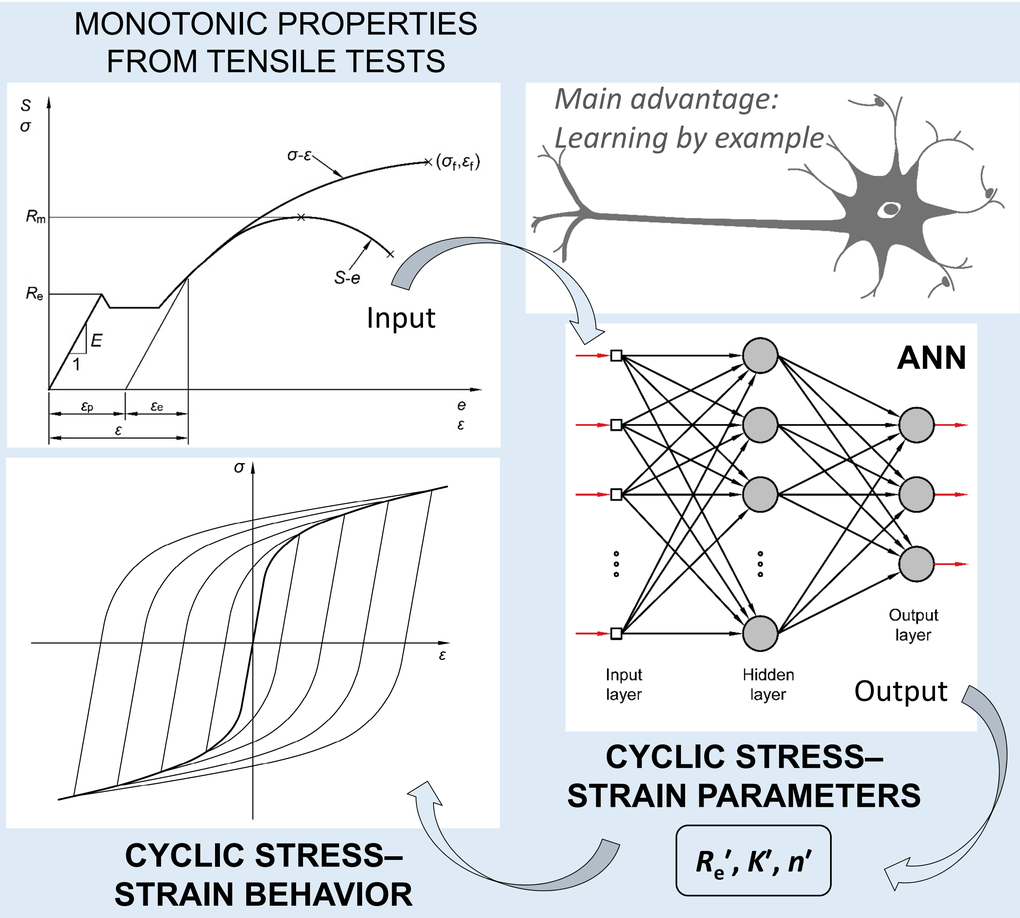
Research and development of machine learning-based predictive models of design-relevant materials' behavior

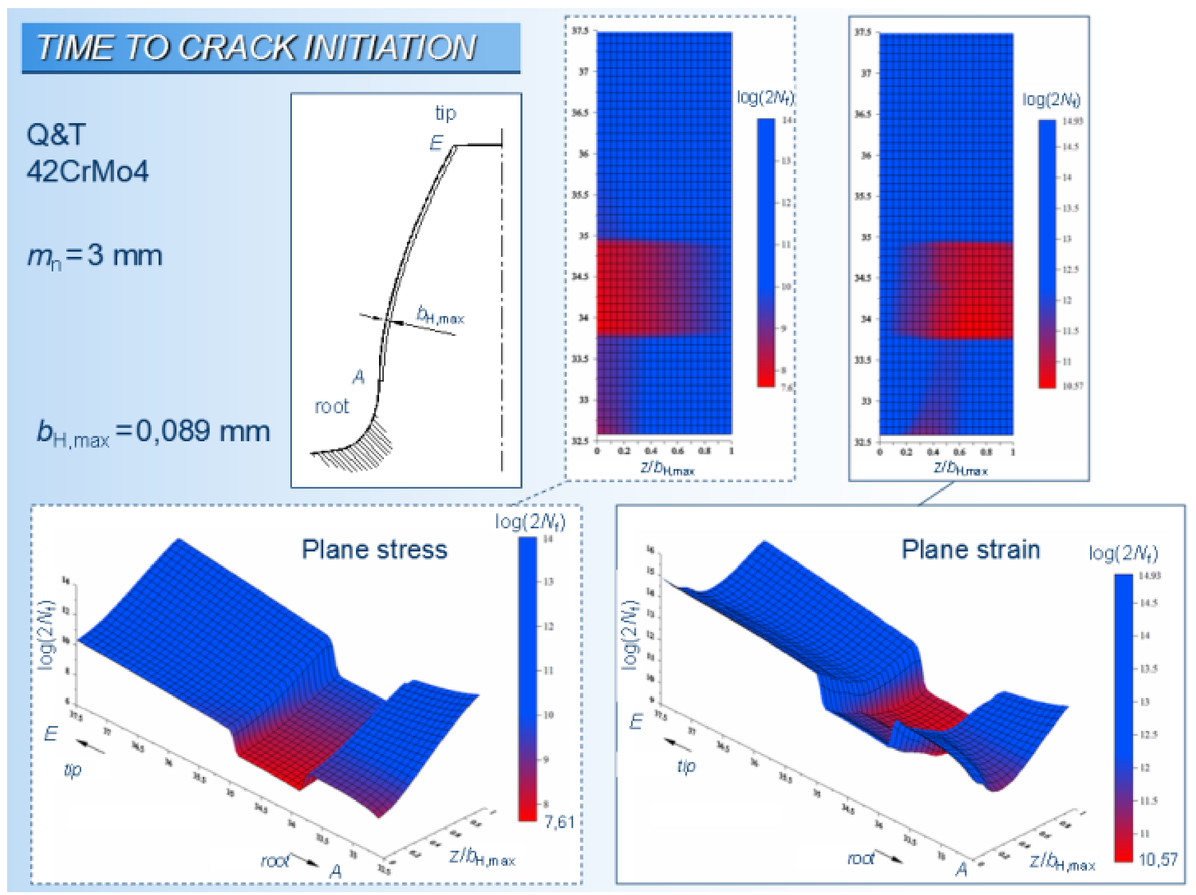




Material modeling and computer simulation of its behavior is a key element of the modern product development which in nearly all its phases involves numerical simulations of load-bearing capacity and durability in order to improve material utilization and reduce mass and expenses. For a successful and accurate modeling of materials, detailed knowledge of their properties and parameters defining their behavior is necessary. Determining them experimentally is the most accurate but also long-lasting and extremely expensive. Thus, advanced (cyclic, fatigue) material parameters are frequently determined using empirical estimation methods using simple and easily available monotonic properties. Previously conducted research revealed numerous deficiencies and insufficient accuracy of existing methods and possibilities for their improvement.

The project goals:

- further development and extension of work on the detailed characterization of material behavior for a more accurate and effective modelling of materials' behavior,
- improvement of previously proposed own approaches and methods based on artificial neural networks,
- investigation of suitability of other methods of machine learning for given applications,
- implementation of newly developed predictive models in computer applications,
- development of solutions tailored for performing on High Performance Computing (HPC),
- increased efficiency and facilitation of planned application of the developed solutions in the industrial environment,
- enabling the planned transfer of knowledge and technology to the interested industrial stakeholders.



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