Research program: "Analysis of the mechanical behavior of systems, machines, components and materials with high strength-to-mass ratio"

Annex C – code 1

Department of Management, Information and Production Engineering

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RESEARCH PROGRAM

Regarding the research program, the effects of thin hard coatings, surface treatments, and foreign object damages on the mechanical properties of materials and components will be assessed. Tensile and fatigue strength, contact fatigue, stress corrosion cracking and corrosion fatigue will be analyzed. The acquired knowledge will be used to design structural components of machines and systems, by exploiting the synergy between the theoretical-mathematical models, the finite elements numerical methods, and the realization of experimental tests. Experimental activities will involve tensile and fatigue tests on materials with high strength-to-mass ratio, with adequate treatments, in air and corrosive environments. Full-scale testing will be performed on mechanical components. The stress-strain state will be obtained from electrical SG analysis, and compared with theoretical and numerical results. Concerning the experimental activity related to the fatigue behavior in air and corrosive environments, adequate algorithms for crack propagation will be developed, based on fracture mechanics and finite element models of components and materials.