ANNEX A

PUBLIC SELECTION BASED ON QUALIFICATIONS AND INTERVIEW FOR THE AWARDING OF NO. 1 GRANTS LASTING 12 MONTHS FOR CONDUCTING RESEARCH IN ACCORDANCE WITH ART. 22 OF LAW OF 30.12.2010 NO. 240 AT THE DEPARTMENT OF DEPARTMENT OF MANAGEMENT, INFORMATION AND PRODUCTION ENGINEERING OF THE UNIVERSITY OF BERGAMO (ACADEMIC RECRUITMENT FIELD 09/A3 – INDUSTRIAL DESIGN, MACHINE CONSTRUCTION AND METALLURGY - ACADEMIC DISCIPLINE ING-IND/14 – MECHANICAL DESIGN AND MACHINE CONSTRUCTION.

announced with decree of the Rector Rep. no. 241/2017 of 28.04.2017 and posted on the official registry of the University on 28.04.2017

RESEARCH PROJECT

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

General objectives of the program

The candidate will be involved in the research group of the University of Bergamo, coordinated by prof. Sergio Baragetti, relatively to the realization of mechanical systems of high strength and low weight. In the development of this research project it is expected to develop the study of components manufactured with high mass-resistance ratio materials, such as titanium and aluminum alloys, as well as the structural optimization of mechanical components and structural elements of machines. Considering the optimization of the materials to be used in the design of cutting edge mechanical components, it is expected to investigate the effects of machining processes and to improve the behavior of the same, and to investigate the corrosion phenomena in static and fatigue field, as well as on the mechanical propagation of defects in the material also numerically.

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.