



DOTTORATO DI RICERCA IN TECHNOLOGY, INNOVATION AND MANAGEMENT (DTIM)



PHD PROFILE, II YEAR STUDENTS, A.A. 2018/2019

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- *Title of the research*
Quasi-static and fatigue behavior of PVD coated light alloys in inert and aggressive environments
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OUTLINE OF THE RESEARCH

The continuous demand for weight reduction in high performance engineering fields makes high strength-to-mass alloys very widespread. The research consists in the characterization of two light alloys, 7075-T6 aluminum and Ti-6Al-4V titanium alloys. The quasi-static and fatigue behavior of the alloys is investigated and the alloys are tested in inert and aggressive environments in order to evaluate the corrosion resistance. The notch sensitivity is also analyzed.

Furthermore, the effects of the deposition of thin hard coatings is investigated. PVD (Physical Vapor Deposition) coatings are deposited on the studied alloys. PVD coatings have good tribological properties and can guarantee the protection of the substrate from corrosion attacks. Although the deposition of PVD coatings can introduce high compressive stresses (1GPa), their contribution of the fatigue strength is under investigation. For this reason, a deep analysis is needed.

In general, the research aims at introducing mechanical components made only of a shell coated by thin hard coatings in order to have lightweight components with high mechanical properties. The emerging technologies such as Additive Manufacturing are of interest in order to achieve this amazing goal. Management skills are also mandatory in order to face the difficulties which new technologies involve.

For these reasons, this research could include cooperation with companies leaders in the deposition of thin hard coatings and in Additive Manufacturing process, but also operating in aerospace, automotive, maritime and biomedical sectors. Cooperation with experts in Fracture Mechanics and Fatigue could be a chance for a stimulating exchange of know-how.