

Summary

The present thesis aims to a synthetic presentation of the scientific, professional and academic achievements of the candidate in the period between public presentation of the Doctoral Thesis until now.

The work is structured in accordance with the National Council for Attestation of University Degrees, Diplomas and Certificates (CNATDCU) guideline and the Methodology on organizing and conducting the process of obtaining the qualification.

Part B of the Thesis is dedicated to personal scientific contributions and achievements, which were structured in 3 chapters, in accordance with the approached research directions, namely:

a) research, trends and achievements regarding orthopedic implants; Elements of biomechanics;

This section presents the scientific concerns addressed to the studies related to the construction and tribological behavior of hip and knee arthroplasties, considered as medical programmed failure biotribosystems. As a result of an observation of orthopedic doctors that, about a year after implanting metal-type prostheses on high-density polyethylene, although the implant was correctly made, patients showed symptoms of "polyethylene" disease, I have focused my scientific interest on this direction. As researcher in Tribology Department at the Institute of Solid Mechanics of the Romanian Academy I identified this phenomenon with the appearance of wear phenomena generated by the sliding movement between the elements of the friction torque of this type of prosthesis. The original contributions of the author in this area, contributions that have been presented at domestic and international scientific conferences, in articles published in specialized journals in the country and abroad as well as in monographs [M1 - M3] can be organized in 3 directions, as follows:

- tribological research and studies on the total hip and knee prostheses
- reconsideration of total metal-on-metal hip prostheses, a very wide-ranging topic subject to debates in the present.
- presentation of a new alternative solution, namely the total hip prosthesis with rolling bodies. A prototype was also made for this solution on which laboratory tests were performed. The researches carried out on the prototype that materializes the concept entitled "total hip with self-directed rolling balls" are presented in their sequence, together with their results.

b) Studies on the tribological behavior of some synthesis engineering materials;

The results of the theoretical and applied researches that the author considers to be relevant to the current state of scientific research in the thematic field of the specialty are

presented in this section. The study of the tribological behavior of various materials, how they or the layers coated on them are manifested in contact with other moving surfaces relative to the presence or absence of a lubricant and the study of their reliability and durability was an important direction of research and study. The choice of the types of materials and their applications was a natural consequence of the research topics and the contracts in which I participated.

c) Studies, measurements and analyses regarding the behavior of some equipment with a high degree of risk in operation

The approach of this research direction started as a natural consequence of the fact that my entire teaching career takes place in the only faculty in the country that offers study programs in the field of crane and transporting facilities, as well as the quality of the undersigned of RADTE (investigations / examinations of a technical nature at lifting and pressure installations expert) and then becoming one of the three extrajudicial technical experts in the field of ISCIR in Romania. The technical application gave me the opportunity to carry out some expert work on various equipment with not only a high complexity but in which it was necessary to identify solutions that required conducting a research activity in the field. This section presents the results of this research, which, by reporting to the engineering and scientific environment has led to the issuance of proposals for good practice. The topicality and relevance of these studies have been validated by their publication through ISI-rated journals in the Q1 category.

Part C of this thesis is dedicated to the plans for the evolution and development of professional, scientific and academic career, respectively the research and teaching directions considered by the author.