

## **RESEARCH AND CONTRIBUTIONS ON HEALTH AND SAFETY AT WORK IN INDUSTRIAL ENGINEERING**

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#### **Summary**

The habilitation thesis presents the research and didactic activities carried out after obtaining the scientific title of doctor in engineering. An analysis of didactic and research activities proves the directions in which notable results were obtained. These research and contribution directions can be grouped as follows:

- scientific research and contributions on the technological processes needed to be well-known in order to effectively apply the health and safety concepts specific to these technological processes;
- scientific research and contributions on the influence of various functional, technological and economic parameters on the health and safety aspects of work;
- scientific research and contributions on the construction and execution of different technological equipment specific to the technological processes.

For a synthetic presentation of all didactic and research activity, the habilitation thesis is elaborated on several parts, each part containing several chapters. The habilitation thesis consists of four distinct parts, each part having several chapters. The first three parts present the most important STATISTICAL, PROFESSIONAL AND ACADEMIC ACHIEVEMENTS obtained in the mentioned fields, in the IV<sup>th</sup> Part are presented the NATIONAL AND INTERNATIONAL PRIZES obtained at various competitions for scientific achievements, and the V<sup>th</sup> part contains EVALUATION AND DEVELOPMENT PLANS OF my own PROFESSIONAL, SCIENTIFIC AND ACADEMIC CAREER.

The first part entitled "RESEARCH AND CONTRIBUTIONS ON PRODUCTION SYSTEMS" comprises a synthesis of the books written in this field.

In the book THE PRODUCTION SYSTEM ENGINEERING, published in Printech Publishing House, Bucharest, 2013, comprising 14 chapters, I made a series of original contributions to optimizing the organization and management of the production system through operational research (mathematical programming, stock theorem, graph theory, critical path analysis, queue theory, game theory, simulation methods, and equipment renewal theory).

In the book "CONTROL ELEMENTS", published in the "Printech" publishing house in Bucharest, comprising 7 chapters, I sought to acquire the necessary knowledge in order to avoid the production errors and the possibilities to detect them, to supervise the manufacturing process and to guarantee that they are not will get defective parts, detect and eliminate the disruptive measures of a process, optimize the parameters that influence the process, maintain control of all manufacturing processes and reduce the percentage of scraps and expenses. The book presents the basic notions of control, in a logical and clear manner, in an accessible language, addressing students from Engineering and Quality Management, but it can be useful to mechanical engineers and engineers who want to acquire basic knowledge about control.

In the book entitled "MODELING AND SIMULATION OF ULTRASONIC MOTORS" I continued the research on the subject of the PhD thesis and in 9 chapters, some of them with original contributions in the field of ultrasonic engines, describe step by step the methods of modeling and simulation of ultrasonic engines with one or more degrees of freedom.

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The theoretical research part was included in the book chapters and the experimental part constituted the basis of some research papers published in various specialized journals with national or international recognition or supported and published in volumes of national or international scientific conferences. A synthesis of some of the most appreciated articles published in specialized journals are presented in the end part of part one.

Part II entitled "RESEARCH AND CONTRIBUTIONS ON TECHNOLOGICAL PROCESSES" comprises a synthesis of the theoretical and experimental research done in this field and presented in several books written on this topic. Since welding is a manufacturing process with a wide spread in all industrial branches (there is almost no branch of the industry where the welding process is not used) we have done numerous studies and researches in this area by analyzing with great rigor the process technological welding through various welding processes and elaborated together with a team of authors the book "FAILURE ANALYSIS" published in the Printech Bucharest publishing house. The book contains 9 chapters, the most important contributions being made in chapters 4 and 8.

Because fatigue is one of the most important load of any product, in order to establish the most effective safety and health elements at work, we have done numerous studies and researches on this phenomenon materialized in a book entitled "FATIGUE OF WELDED STRUCTURES", published in the Printech Publishing House of Bucharest, which contains 12 chapters. Several theoretical contributions regarding the calculation of resistance to fatigue are presented in this book.

The laboratory guideline entitled "GENERAL THEORY OF THE CUTTING MACHINING", published in Printech Publishing House of Bucharest, contains a series of practical works that students have to perform in the machining workshop.

The welding joint process is one of the most common processes for making parts and products, but also the most complicated because it implies important safety and health rules in this field. Therefore, some of the studies and researches undertaken have been directed to these processes and have been materialized in the writing of scientific articles published in specialized journals and a laboratory guide entitled "BASES OF WELDING PROCESSES" published in Printech Publishing House in Bucharest, comprising a big number of laboratory papers addressed to the students.

The theoretical part was included in the chapters of these books and the experimental part constituted the basis of some research papers published in various specialized journals with national or international recognition or supported and published in volumes of national or international scientific conferences. The part II concludes with a synthesis of some of the most appreciated articles published in specialized journals: Research on the influence of the alloying elements on the welding plating behavior of the steels; "Case Study on Refurbishment by Welding Load of a Crankshaft", "The effect of SMAW welding deposition technology on the quality of layers deposited on welding refurbishment", and others.

Part III, entitled "RESEARCH AND CONTRIBUTIONS OF REGARDING THE HEALTH AND SAFETY IN WORK" presents a series of theoretical and experimental researches with thematic in this field, materialized in a series of books and scientific articles written and published in various publishing houses and papers. In the laboratory guidance entitled „ELEMENTS OF OCCUPATIONAL MEDICINE" published in the Printech Publishing House in Bucharest, there is a large number of laboratory works to be carried out by the students from the specialty of SECURITY ENGINEERING IN INDUSTRY.

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In order to establish safety and work norms in the field of machining, there are presented a series of studies and researches regarding the technological process of cutting and the technological equipment required in the book entitled "SECURITY AND HEALTH IN THE MECHANICAL FIELD –CUTTING MACHINING PROCESSING ", published in Printech Publishing House, Bucharest, which presents a series of contributions both to the design of cutting machining devices and to the establishment of some rules for the elimination of the risk that occurs in these machining.

Part III ends with the presentation of the results of numerous research carried out over the years in the research laboratories and within research conventions and contracts concluded with various partners or as a result of winning national competitions in the field. Theoretical part was included in the chapters of the books presented above and the experimental part formed the basis of scientific articles published in various specialized journals with national or international recognition or supported and published in the volumes of national or international scientific conferences. Some of these works are: "Methods for assessing the environmental impact of an oil processing company"; "Contributions related to the environmental impact of a machinery and equipment manufacturing company"; " Contributions related to the environmental impact of the welding refurbishment process ".

Part IV, entitled "EVALUATION AND DEVELOPMENT PLANS OF MY PROFESSIONAL, SCIENTIFIC AND ACADEMIC CAREERS" presents the principles who have stayed at the development of the professional career and its extension in the future: continuous improvement of didactic activity based on the evaluation of the learning outcomes by students and regular assessment by students and colleagues; analyzing the qualities and shortcomings of the taught courses, developing the positive aspects and eliminating or reducing the defects; analyzing the qualities and shortcomings of the coordinated curricula and proposing to the decision-makers, on the basis of facts and indicators, their improvement; research activity being a key element of an academic career must be carried out permanently, at a maximum quality level; further development of scientific curiosity and investigative spirit, sustained by constant efforts; opening up to new, team spirit, communication, transparency; publishing the results of scientific research in nationally and internationally recognized journals, disseminating the results of scientific research by participating in national and international scientific conferences, thus opening up the possibility for future collaborations; application of the results of scientific research through collaboration with the industrial environment, involving in this activity industry specialists who can become PhD students, students and master students who in turn can continue their studies; accessing national and european programs and grants as an effective means of developing certain research directions; respecting in any circumstances the standards of university ethics.

The habilitation thesis ends with a bibliography consisting of 124 titles of books and specialized articles, most of which are written by the author as the single author or within research groups.

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