

**Rezumat**  
**TEZĂ DE ABILITARE**  
**HABILITATION THESIS**

**CONTRIBUȚII LA PROIECTAREA FUNCȚIONALĂ A  
PRODUSELOR ȘI LA ERGONOMIA LOCULUI DE  
MUNCĂ**

**CONTRIBUTIONS TO THE FUNCTIONAL DESIGN  
OF PRODUCTS AND TO THE WORKSTATION  
ERGONOMY**

**Domeniul: Inginerie Industrială**

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## Abstract

The habilitation thesis provides a synthetic overview of the academic, professional, and research activities carried out between 2007-2023, after the doctoral thesis entitled "*CONTRIBUTION TO THE ANALYSIS OF ITERATIONS IN THE DESIGN PROCESS: PROPOSAL OF PERFORMANCE EVALUATION INDICATORS*" which was elaborated in cotutelle (between the University of Pitești and the University of Technology of Belfort-Montbéliard, France) under the guidance of Prof. Ungureanu Ion and Prof. Garro Olivier, in May 2007 in the field of Industrial Engineering.

The habilitation thesis "*CONTRIBUTIONS TO FUNCTIONAL PRODUCT DESIGN AND WORKPLACE ERGONOMICS*" is in the within the field of industrial engineering and is structured into four parts, which are briefly presented below.

**Part I** presents the scientific, professional, and academic activities and results achieved between 2007-2023. This section provides a synthetic overview of the main research, teaching, and university management activities, highlighting the capacity to organize and carry out teaching and university management activities, as well as the ability to coordinate the research teams.

**Part II** presents the main results of the scientific research carried out after the completion of the doctoral thesis. This part is structured into two chapters, associated with the two main research directions developed immediately after the doctoral thesis.

**Chapter 1**, Functional Product Design, presents the research results obtained in three sub-directions of research:

- The study of iterations in the product design process;
- Design for Additive Manufacturing (FDM);
- The study of the possibilities of using materials specific to the aviation, aerospace, nuclear industries, in the automotive field.

The research presented in this chapter represents the results obtained within research teams composed of academic staff from the University of Pitești, "Gheorghe Asachi" Technical University of Iași, Romanian Academy of Technical Sciences, CNRS Odeillo Font Romeu, Four Solaire from France, National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest, National Institute for Research and Development in Mechatronics and Measurement Technique – INCDMTM, Technical University of Cluj-Napoca, COMOTI: National Research and Development Institute for Gas Turbines, IMSAR: Institute of Solid Mechanics, as well as doctoral and master's students. These research have been developed within several research projects:

- Implementation of additive technologies in the manufacturing of complex and highly stressed components (DigiTech) / PN-III-P1-1.2-PCCDI-2017-0224, Project component coordinated by the University of Pitești: Research on the implementation of Artificial Intelligence in the design of automotive components for 3D Printing manufacturing (RIZEA et al., 2018);

- Influence of structural transformations performed by thermal shock on thermal diffusivity alloy zircaloy-4, Solar Facilities for European Research Area (SFERA): Transnational projects FP7, The European Commission, Contract nr.312643 (ABRUDEANU et al., 2015);
- STUDY OF VARIATION OF THE MECHANICAL PROPERTIES OF SUPERALLOYS INCONEL 718 AND RENE 41 UNDER THERMAL SHOCK – TERMOINCORENE, Solar Facilities for European Research Area (SFERA): Transnational projects FP7, The European Commission, Contract nr.312643 (Daniel-Constantin ANGHEL et al., 2016);
- Thermal shock and fatigue on shape memory alloy from CuZnAl and CuAlNi systems – HTSMAs (TERMOMEM), under SFERA II (Solar facilities for the european research area), SFERA, PROMES, FP7-INFRA-312643, (STANCIU et al., 2017);
- The influence of sintering temperature on the structure and properties of ceramics/ SURPF2201300021, Cod: Horizon 2020/ Access SFERA III European project Grant 823802 (Daniel-Constantin ANGHEL et al., 2022).

**Chapter 2**, Workplace Ergonomics, presents the results of research activities in this field, focusing on human operator activity, working conditions, equipment used in the workplace, and transportation conditions to the workplace.

The research presented in this chapter is the result of teams composed of faculty members from the University of Pitești and industry specialists. Within the research project "Intelligent manufacturing technologies for advanced production of parts in the automotive and aerospace industries (PN III-PCCDI-2017-0446, contract 82PCCDI2018)" (NITU et al., 2018), contributions have been made to the development of products aimed at increasing workplace ergonomics, analyzing the human factor using the RULA (Rapid Upper Limb Assessment) method, as well as analyzing the microclimate in the workplace using specific equipment, a data acquisition and control platform, and Artificial Neural Networks.

**Part III**, Academic, Scientific, and Professional Development Plan, outlines the main directions of action for developing an academic career.

**Part IV**, Bibliographic References, provides a list of titles of works in the specialized literature that formed the basis of the research carried out, as well as the titles of the author's own scientific papers and studies published.