

Abstract

The research activities which I have conducted after the completion of the PhD thesis, in 1997, have known along the years different important directions which can be grouped in the domain of industrial engineering, as follows: the quality unconventional process of metallic materials, the quality of cutting processing, the quality of thin sheets processing, the quality of management systems and the quality of food product.

In the process of unconventional processing, the research that was performed followed the study of two technologies: the magneto – abrasive processing and hydraulic processing. Through the research that was performed, the parameters of the processing regime for the two technologies were established in order to improve processing. The research has allowed for theoretical and practical developments which will lead to the implementation of these technologies. In the case of step processing of the cylindrical shapes through the electro-hydraulic method, the established theoretical equations allow for the determination of the wall thickness at the end of the machining.

The modelling of the phenomena, of the interdependences between the factors with the help of the predictive equations have allowed, for the electro-hydraulic processing, to determine the minimum radius of fillet which can be obtained by knowing the variables which govern the phenomena: the energy accumulated in the condensers, the thickness of the sheet, the angle between the sides of the polygon, as for the characteristics of the unloading chamber – with or without a unloading concentrator.

During the research the practical part was also followed, which was finalized by obtaining three patents for the development of new types of devices.

By elaborating the two monographs which discuss the theoretical and experimental aspects referring to the two processing technologies, magneto–abrasive of metals and hydraulic, an empty information space was filled in the specialized literature.

The contributions regarding the milling of metals can be classified in the domain of long bore milling. Ensuring the stability of the bore has been an important part of the research performed from the milling point of view and from the construction point of view of the bores. Thus a theoretical model was obtained, of the resultants of the boring forces by constructing different bores which allow for the area where the bore will be placed to be specified and the size of the guides of the bore. Thus the balance of the milling forces is ensured through the reaction forces of the guides. In the domain of bore processing, I have studied the particularities of the steels 30MoCr10 and 41MoCr11. For these steels, after an analysis of models which exist in literature has been performed, the models which provide the most relevant information regarding the axial force have been chosen, of the torque moment respectively. The performance of the theoretical model has been verified through ulterior experimental research.

The plastic deformation of thin sheets has been an important concern due to the practical application of the experimental research. By using experiment planning, equations have been obtained which can help in finding the number of tests of the determining the mechanical characteristics of the sheets. The predictive models which were obtained have been tested statistically in order to choose the model which provides information as close as possible to the experimental values. Determining the characteristics of thin sheets has been done through tensile test processing and Erichsen processing.

Another research direction in the domain of thin sheet deformation has followed the effect of the chemical and alloy elements from the sheet composition on the parameters: the braking elongation, the breaking strength și Erichsen coefficient. The established prediction

equations allow for the determination of the mechanical properties of the sheets when knowing their chemical composition. Thus an important contribution was made which allow for the characterization of sheets from a mechanical point of view, only by knowing the chemical elements in the composition. The research regarding the influence of the chemical compositions has highlighted the manganese has the largest influence on the intrinsic characteristics of the sheet. The comparative analysis of the two sheets that had their carbon percentage modified, with just a percentage from the chemical composition, has highlighted that this change has significant influences on the mechanical characteristics.

The purpose of contributions in the management of quality systems was to characterize these systems and to clarify some aspects linked to the definition of quality, design, implementation and improvement of the system. The proposal of an expert system for the implementation of marketing systems, defining the process within the management system, presenting the added value in the context of product integration in the system, analyzing the processes and identifying the inputs within a process by categories, constitute as contribution in the system management domain.

The proposals for classifying some costs within the quality costs are presented in the book *Quality Costs*, together with the description of quality costs, their classification in categories and a detailed description of their classification in groups.

The audit as instrument for management used in evaluating management systems, has been analyzed as a process and its functions and functioning principles have been established. The comparative researches between the views that are held by the process managers from the Banat and Moldova regions have allowed the establishment of topologies regarding audit. In the same time there have been concerns regarding the establishment of competences and abilities that must be held by the auditor. The audit of marketing process was presented through a book which exposes in parallel, the theoretical elements of the marketing process and the way in which the audit process of the marketing activities can be applied.

In the domain of food product quality two research domains have been approached: the use of grape seeds in the food products and the rheological behaviour of the dough obtained from the wheat and grape seed flour destined for bakery products. Within the direct contributions, predictive regression equations have been elaborated which allowed for the evaluation of the rheological properties of the dough.