CONTRASTIVE THEORETICAL COMPARISON APPROACH UPON BLANKING-PUNCHING OPERATIONS ON CNC PRESSING CENTERS AND ON CLASSICAL PRESSES

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Abstract: The paper presents an approach on developing a contrastive theoretical comparison upon two technological methods in industrial applying of blanking-punching operations, respectively on CNC pressing centers and on classical presses. A principle strategy for developing the theoretical approach, some related considerations and the identification of comparison items are first of all included in the paper. A case study of comparative analysis between nesting for CNC pressing centers and for classical presses stamping, together with the related results and conclusions are also presented in the paper.

1. INTRODUCTION. PROBLEM STATEMENT AND STATE OF ART

Blanking-punching operations are one category of the oldest processes used in sheet metal parts manufacturing industry, showing also rapid development in short period of time in the domain which it serves. Blanking process was continuously improved, and we can find it in many areas today, some of its important aspect being the parts nesting and other important steps, together with the factors that influence the stamping process, hereby presented in this paper, [1]. Also, this steps are the base foundation of parts stamping processes, which make possible for the part to be fitted on as small as possible surface on the sheet metal, the resulting parts number to be the highest and the number of wastes as low as possible.

Thus, by research and rapid development in the stamping area, machine-tools were developed to ease the work. So, besides classical presses, seen through out metal sheet manufacturing industry, presses using CNC centers appeared, which helped in raising productivity and obtaining better quality. Two of the researches with many contributions in the area, helping to the general development, was those of Jackson and Mittal, [5], which focused on the blanking-punching operations based on an algorithm, this leading to automatic generation of the CNC program [5], [6]. Also, similar researches involved in the domain, were those of Raggenbass and Reissner [5], which looked into the connection between stamping and laser on the CNC centers, while at Twente University has been studied and developed the metal sheet manufacturing through good planning and management of factors involved in the workability in good conditions using CNC.

Some of the CNC centers used for manufacturing on sheet metal are: TRUMPF, AMADA ARIES, Finn-Power, Mazak, Bystronic and some of the CAD/CAM software used for design and automatic generation of the CNC code are: RADAN, WICAM, Nesting Software, EditCNC, CNCezPRO™.

Looking from the development strategy point of view, due to the exceptional performances in sheet metal parts manufacturing industry, the requirements for obtaining superior economical and technical indicators can be accomplished by continuous improvement of research, design and execution, by improving manufacturing methods, and by using advanced technologies.

2. GENERAL APPROACH STRATEGY

Advanced technical research means a strict scientific step which can deliver a solution suitable to the research domain, starting with a clear strategy over the research aspects and its investigation methods.

That is why the present paper began by conception of a *primal vision over the general approach strategy*, particularly comparative study over parts stamping processes with classical presses or by CNC centers.

In Fig. 1, we can see the primal vision over the general approach strategy.

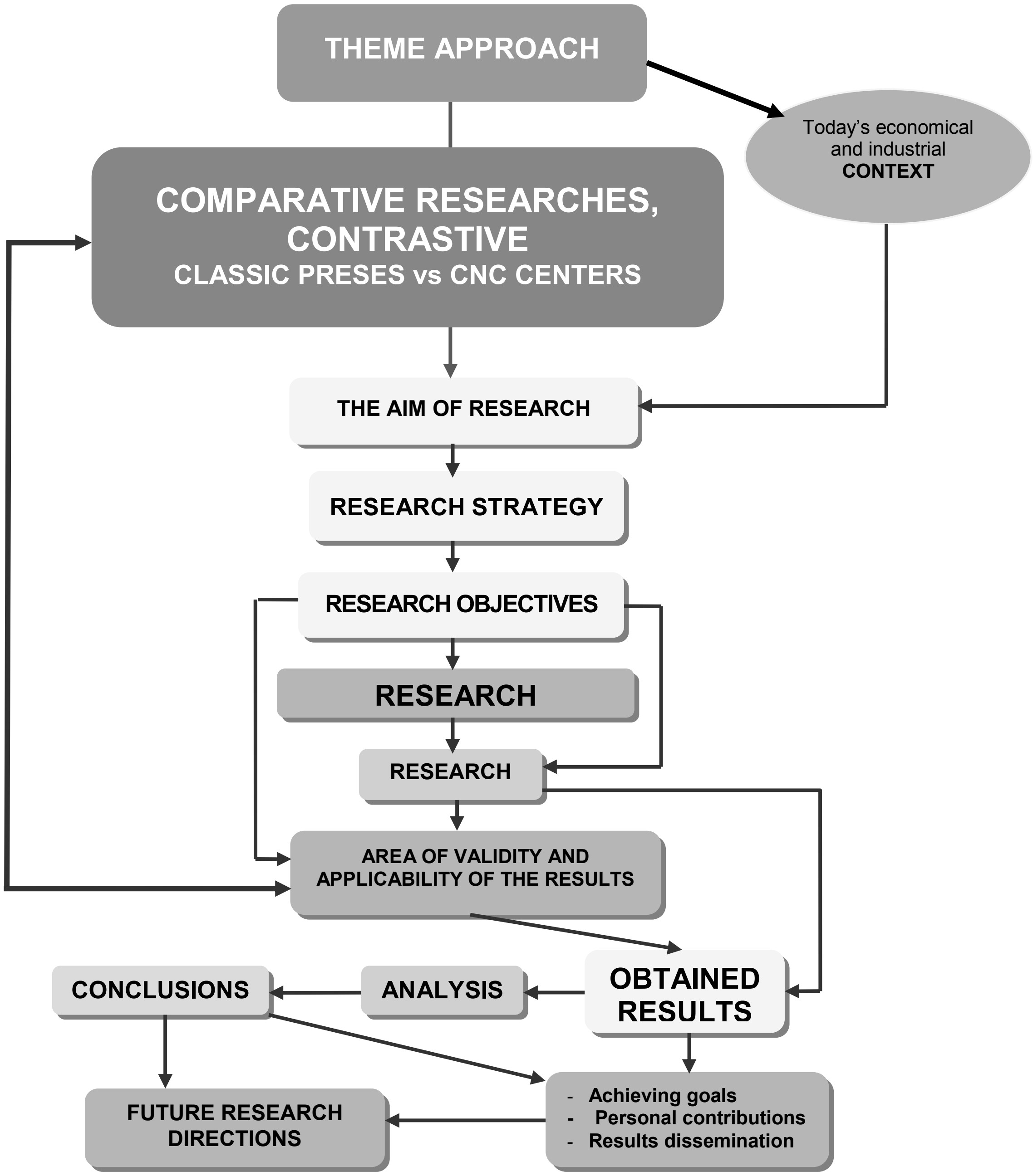

Fig.1. Primal vision over the general approach strategy

The main component is represented by the contrastive - compared research principle over the two methods of stamping, by classical presses or CNC centers, this being the central focus of the entire research strategy for the proposed theme. Knowing the actual industrial

context, allowed to determine the *purpose* of theme's making, which is providing designers, researchers and manufactures clear elements over the optimal conditions to apply such technologies, in order to produce parts by stamping.
These technologies, by precision and surface quality means, can be applied with relatively small costs, by use of the existing machine-tools and CNC centers used in the enterprises. So, they achieve some elements to be applied in upgrading manufacturing processes, of cold plastic deformation, especially blanking-punching parts in favorable economical conditions, the resulting parts being therefore competitive, [4].
To the mentioned purpose, we attached the investigation of existing information related to the theme, in order to establish clear objectives, then there was elaborated the research strategy by knowing the boundaries and research conditions which directly determine the validity and applicability area for the obtained results. The obtained results will be then analyzed and so, based on them, being able to formulate conclusions.
The purpose being comparative study over stamping with classical presses or CNC centers, there is intended to show advantages and disadvantages of each tools in blanking-punching sheet metal, and depending on design drawing requirements of quality, dimensional precision, we can choose between the two of them, considering also productivity and costs. In Fig. 2, there can be seen, schematically, the structuring mode in *applicability domain – performances – costs* triangle. Of course, the efficiency of each studied type can be guaranteed only if work conditions are obtained to ensure the quality of the manufactured part, meaning precision and surface quality imposed by design.

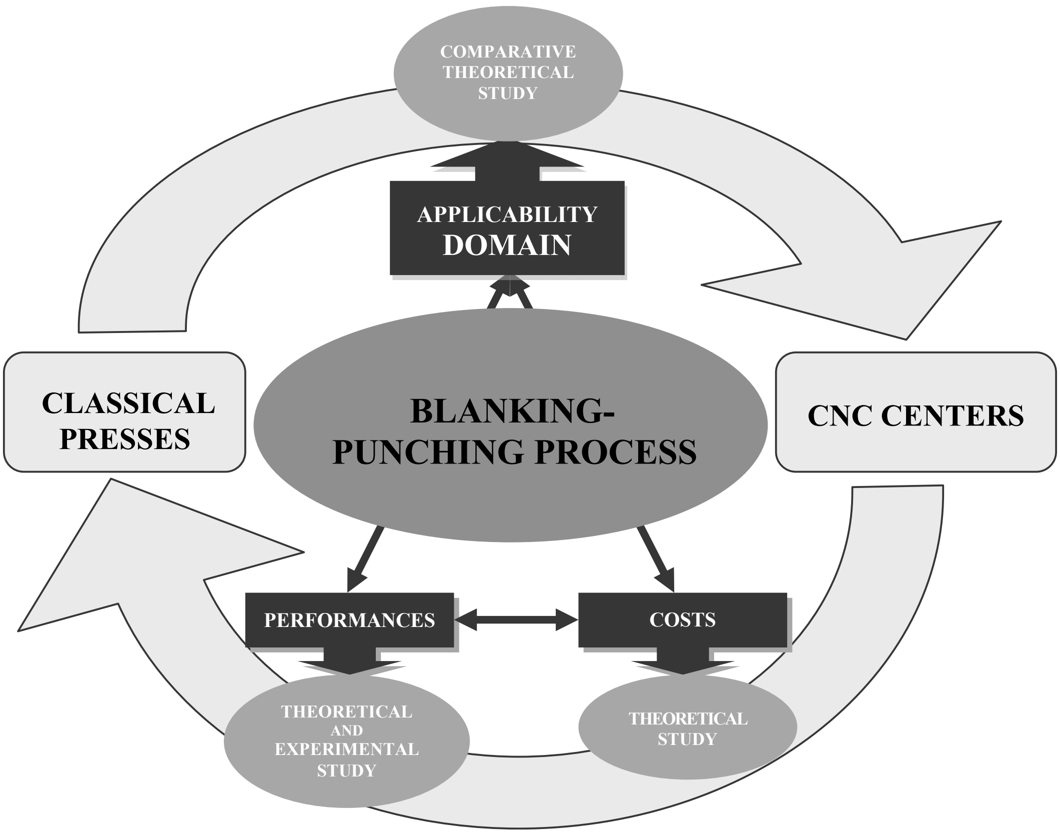

Fig. 2. Research objectives in applicability domain – performances – costs triangle

For accurate results, we have to not forget that blanking-punching process, as any other technological process, is a very complex one, depending on a multitude of interactions.

Related to this, in Fig. 3 we can see some aspects to be considered on comparative theoretical analysis of the two types of manufacturing.

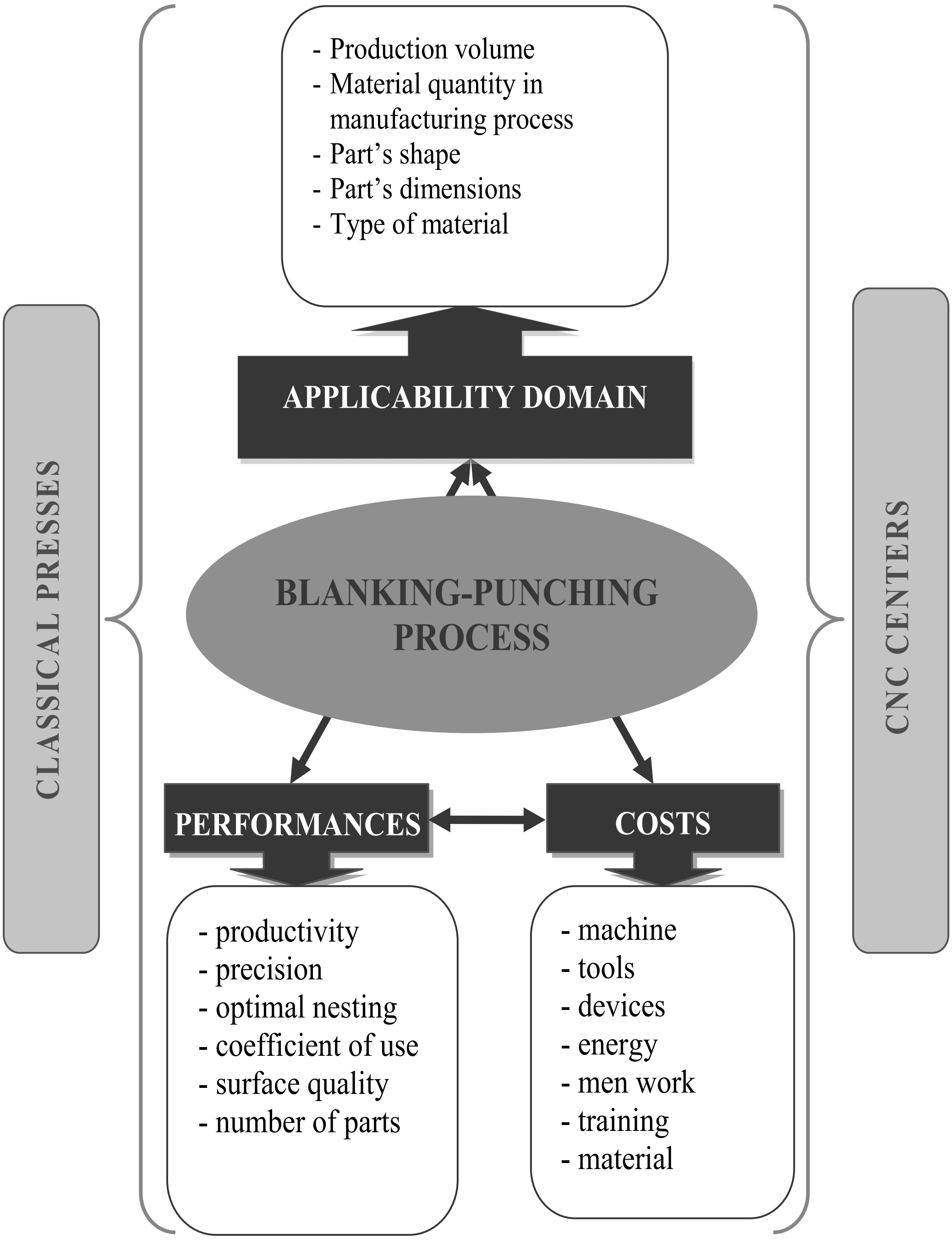

Fig.3. Aspects to be considered on comparative theoretical analysis of the two types of manufacturing