

DESIGNING STRATEGIES IN THE INDUSTRY OF CUTTING TOOLS

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ABSTRACT: The paper briefly presents several trends in the designing strategies in cutting tools industry. Using the innovation system, quality and environmental management, and reengineering, cutting tools producers adapt their managerial strategies and production processes, in order to satisfy industrial customers in various fields. The cycle design – technology – manufacturing – marketing depends on several criteria currently used in the analysis and evaluation of cutting tools. All manufacturers take into account these criteria, which dictate the steps in designing cutting tools.

KEY WORDS: design, cutting, tools, industry.

1. INTRODUCTION

In the recent years there has been seen an explosion of new approach concepts of product design and engineering in general. Applying these concepts in organizations or workshops producing cutting tools inevitably led to profound changes, both in the design process of modern tools and strategies adopted by manufacturers on the market.

The **innovation of the system** is the kind of concept that takes into account the fact that a manufacturer of cutting tools has to face a triple competition: the ones based on cost, time and variety. The winner of the competition is the one who produces a wider range of high quality tools faster and with lower costs than others.

Reengineering is another concept applied in the industry of cutting tools. It consists in a radical improvement of the activities that can be achieved through fundamental changes in all processes within the organization (management, production, research and development, economical and financial, administrative, etc.) with the aim of rebuilding it.

According to the reengineering concept, the people working in companies must “change how they think as well as what they do” ([2], p. 235). People must be certain that they work for customers, not for bosses ([1], p.92).

Another concept applied in the cutting tools field is the **simultaneous (or competing) engineering**. It states that the start of creating a product is the identification and the research process of the need for that product.

Simultaneous engineering deals with the design, manufacture and operation of a product, as an integrated system in which these three processes have the character of simultaneity. Therefore, it integrates solutions in the parallel-successive stages from the frame of determining the marketing strategy, the constructive and technological design and the production [4]. If the design and production are further computer-assisted, is obtained a Computer Integrated Manufacturing (CIM) system.

2. DESIGNING STRATEGIES FOR CUTTING TOOLS

Unlike the traditional design, the constructive design in competing engineering is done with permanent involvement of the technological design. The overall and execution drawings of the tool directly correspond to requirements for use effectively of the

technology accessible to the manufacturer. Any engineer's design strategies go from the criteria that are important to users of the product. Some of the criteria currently used in the analysis and evaluation of cutting tools are shown in Figure 1, the list of remaining still open.

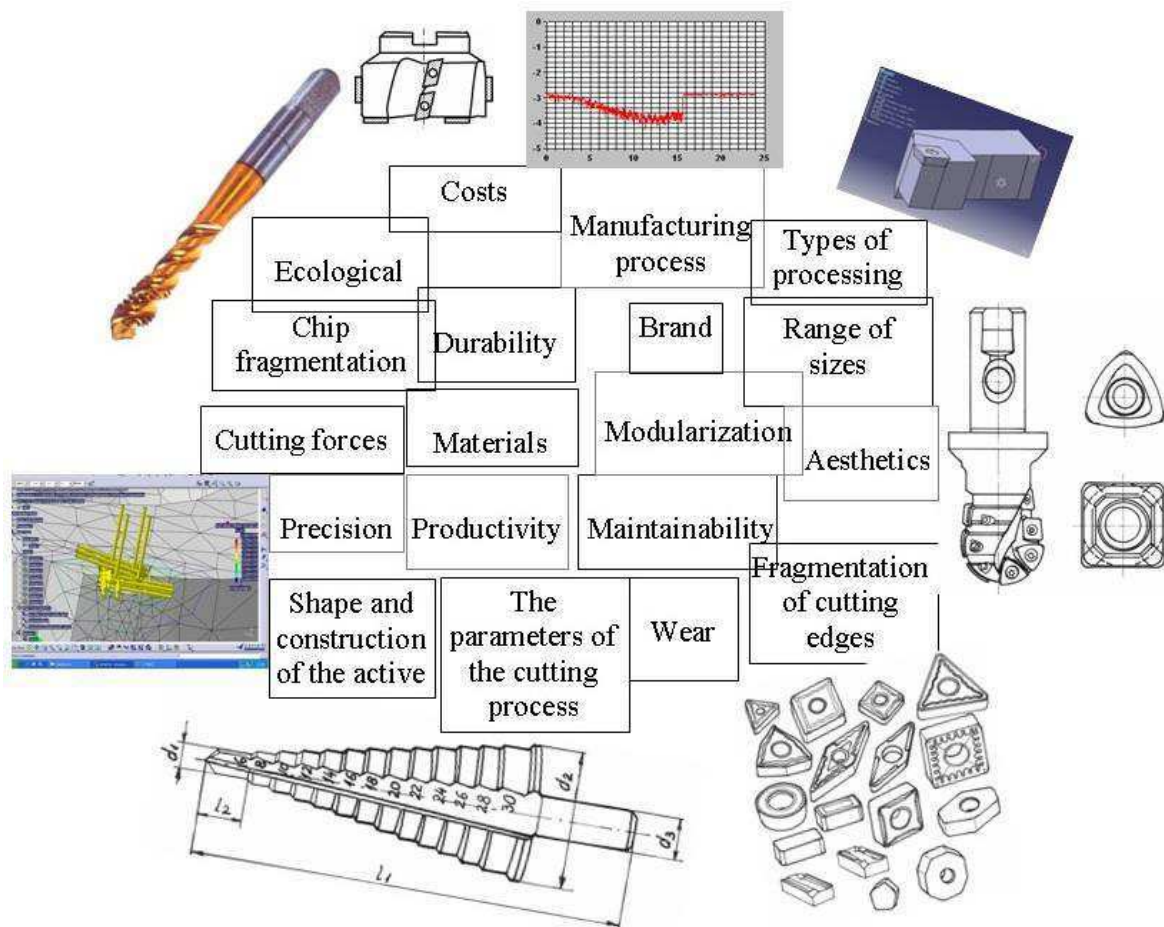


Figure 1. Most important criteria for analysis and evaluation of cutting tools

Of course, the manufacturer can not excel in all evaluation criteria of the tool. For example, the shape and construction of the active part is a criterion commonly used analysis of the tools. A classification of cutting tools by number of pieces from which are built on these, divides them into monoblock tools and tooling from several pieces (glued, welded and mechanically fixed).

The materials used for execution of the tool, in particular for the active part represents another criterion used in the analysis of various tools (Fig. 1), which determine the performance of they (accuracy, durability, operating costs, etc.). Fragmentation cutting edges of a cutting tools can be made geometrical, through the physical interruption (or multiplication) or through both ways [3].

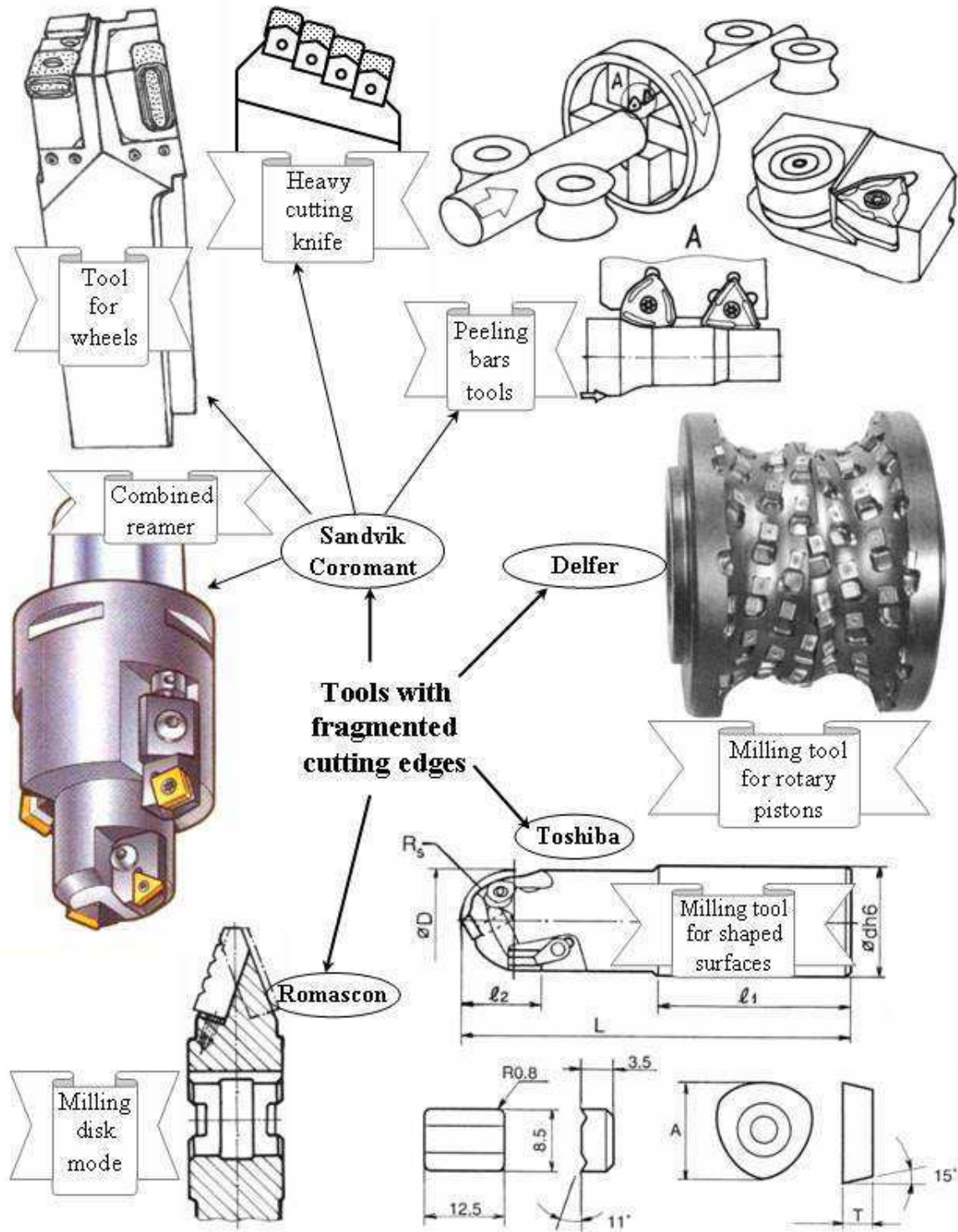


Figure 2. Fragmentation of cutting edges of tools made by various manufacturers [3,5,6,7]

More and more manufacturers use the fragmentation of the cutting edges (Fig. 2), typically for reducing cutting forces [3, 5, 6, 7].

We note two important trends in achievement active part of cutting tools:

making the whole active part from metal carbide or other hard materials, on the one hand, and equip tools with cutting plate, on the other hand.

Processing under optimal conditions, of the profiled surfaces requires

maintenance of the geometric parameters of the tool within certain tolerances. This is more easily achieved if the tool blades are replaceable, in this case could be replaced the broken one without being required the recovery of the profile.

For use of tools with cutting plates, producers have generally divided the production of plates into three main categories, according to the cutting forces with which they work.

In this way the plates were designed to cutting the material with forces small, medium or large. The first category of cutting plates is usually indicated for the finishing processing. The second category of cutting plates is recommended for use of tools in a mixed production, including the heavier or easier processing for different kind of materials. The plates designed for working with high cutting forces are recommended by their manufacturers for the roughing, machining the hard materials and processing with increased risk of vibration.

3. CONCLUSIONS

The design strategy of cutting tools is part of the overall strategy that is practice in the production organizations on industrial market it serves. The desired balance of the players of this market is a "win-win", the user satisfaction of cutting tools will be found both in their own performance – economic and financial, social and environmental - and in the manufacturer's tools.

În esență, strategiile de design sunt orientate către client.

Cele trei tendințe principale acordate de producători în proiectarea și fabricarea uneltelor de tăiere în prezent sunt:

- producerea uneltelor cu partea activă din carbura de metal (sau din alte materiale performante), sau - pentru dimensiuni mici - dezvoltarea integrală a uneltelor din carbura de metal;

- echiparea uneltelor de tăiere cu plăci schimbabile, radiale și/sau tangențiale;
- producerea uneltelor în construcție modulară - pentru dimensiunile care o permit - o tendință bazată pe nevoile industriale ale clienților pentru producerea de piese unice și serii mici.

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