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SIMULATION OF A CNC MACHINING PROGRAM

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Abstract. This paper presents the influence of the technology on the CNC machine. The evolution of the information and communication technologies, have had a decisive role in all aspects of the life.

Keywords: CNC Machine, technology, communication, machining, production process.

1. Introduction

The presence of the first machine tools capable of copying profiles from a perforated strip was a substantial advance in that parts could be made by simply replacing the blank.

This stage in the evolution of mechanical machining on CNC machine tools also had major shortcomings, but these were small enough in comparison with the results obtained.

At this stage in the evolution of mechanical machining on CNC machine tools, the entire product design was not directly influenced by technological developments.

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The advent of personal computers, and their integration into the production process, led to a decrease in the time taken to design and manufacture parts.

2. Technology and Communication

By overlapping the times when the machine tools are working, and the CNC program allow simulations, analyses can be made that lead to optimizations of the production processes, without the machine tools wasting time with these optimizations.

Connecting these tools machine, either to internal or external networks, allowed quick access to any problems that might occur during operation, and reduced the time to intervene in the event of an incident.

New information and communication technologies have had a decisive role on the type of relationships at a global level, they are a source of advantage that some market players have quickly identified and invested capital that has generated both economic and social development (Benbunan-Fich, 2002).

The Internet and mobile telephony have been the catalyst for development and interaction between different corners of the world.

They have enabled the transfer of information quickly, securely and cheaply, facilitating access to this hub, even for less developed countries (Jamieson-Proctor *et al*., 2006).

This catalyst has been, and will certainly continue to be, a way to educate different parts of the globe that did not have access to information and technology before.

Once access to technology and information became easy for most societies, the technological leap was made.

Traditional learning processes were and are about to become history (Gasaymeh, 2017).

Even the simple act of walking into a classroom to meet your peers is already becoming outdated.

This role has been taken over by virtual rooms where participants have access to interfaces that allow them to interconnect with like-minded interlocutors.

It is true that the "human" part of the contact between the participants disappears, but several interlocutors can have access to it, the result being an interconnection of different cultures in this process which becomes more friendly and "human" every day (Saleem *et al*., 2013).

3. CAM Program

In this context, CAM program are an advantage for any company using CNC machine tools.

Their introduction, thanks to the increase in computing power, to values unimaginable perhaps 50 years ago, has allowed a reduction in manufacturing time from perhaps months to a few days. In addition to the reduction in manufacturing time, another important aspect that has produced major changes and will continue to produce its effects in the years to come, is the possibility of carrying out complex simulations, identical to the experiments that can only be carried out in high-performance laboratories and with very high testing costs.

In addition, these laboratories, in most cases, do not have the possibility to perform two or more simulations at the same time. This generates additional costs.

In this paper, we have simulated a machining process for a hot forging die. This type of machining is complex by nature, aiming at facilitating the transition from one area to another, so that the heated blank can slide and fill all the areas constituting the forging part.

The use of such a program allows simulating the use of different cutting tools together with the cutting regimes proposed by the manufacturer. It is then possible to check the various contact areas between the cutting tool and the blank in order to identify interferences that may occur.

As can be seen in Fig. 1, the simulation of machining processes is identified by different colours specific to another tool, which allows the quick identification of the tool that is causing a problem.

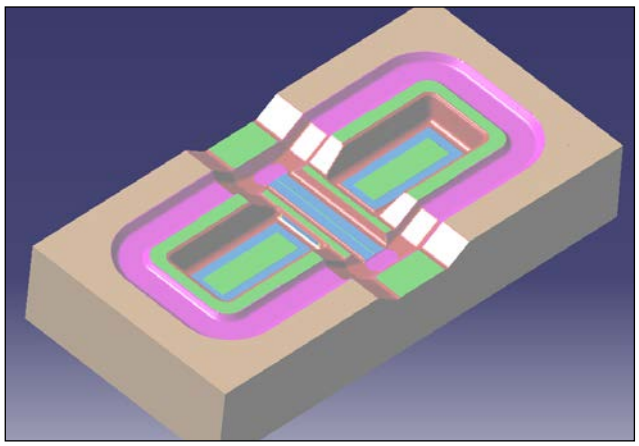


Fig. 1 – Part machining.

In addition to the machining paths, these CAM program can accurately calculate the time required to perform the operation itself.

The use on CNC machine tools of operating systems identical to those available on any PC allows that when the program required for machining is completed, it can be transferred directly to the CNC tool machine.

If the CNC machine tool is 3D modelled and there is a simulator that allows the introduction of the program to be used on the CNC tool machine, then the movements of the tool machine head can be checked.

By comparing the different machining regimes, the program can be optimised so that the shortest machining time can be obtained, depending on the machining tools available in the tool magazine.

4. Conclusions

Technology is the key that opens the doors to communication.

Devices such as PCs, tablets, smartphones, augmented reality devices, are just a few of the tools that can be integrated as needed and used to facilitate communication.

The potential of these communication gateways has not yet been realised in any domain.

The individual's desire for integration, however, will be the force needed to open these channels.

REFERENCES

Benbunan-Fich R., *Improving education and training with IT*, Communications of the ACM, 45(6), 94-99 (2002).

Gasaymeh A., *First year students' acceptance of the formal integration of smartphones into their learning: a study using an extended TAM which includes social influences and perceived enjoyment*, International Journal of Instructional Technology and Distance Learning, 14 (7) (2017).

Jamieson-Proctor R.M., Burnett P.C., Finger G., Watson G., *ICT integration and teachers' confidence in using ICT for teaching and learning in Queensland state schools*, Australasian Journal of Educational Technology, 22 (4), 511-530 (2006).

Saleem A., Shabana T.M., Batcha S., *Application and uses of information communication technology (ICT) in academic libraries*: An Overview International Journal of Library Science, 2(3):49 - 52 (2013).

SIMULAREA UNUI PROGRAM DE PRELUCRARE PE O MAŞINĂ-UNEALTĂ CU CNC

(Rezumat)

Această lucrare prezintă influența tehnologiei asupra mașinilor-unelte cu comandă numerică. Evoluția tehnologiilor informației și comunicațiilor, au avut un rol decisiv în toate aspectele vieții.