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CUTTING AND PASSIVE TIMES CALCULATION FOR THE TURNING PROCESS

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ABSTRACT

This work presents a procedure of calculating, with exact equations, the cutting times and the passive times for turning and boring process. Cylindrical, conical, semi-spherical and facial workpieces geometry were considered. Such geometries are typical almost all parts to be cut. The knowledge of cutting times is a fundamental issue, since with them it is possible to know tool lives cutting edges and establish deadlines and costs searching for more market competitiveness.

Keywords: cutting time, turning, competitiveness.

INTRODUCTION

One of the factors most frequently investigated in machining is related to the cutting edge tool life. However, it is very common that cycle time being considered as if it were cutting edge tool life time. So, a cutting edge may be being changed prematurely. The literature shows a series of researchers that deal with the subject related to the objectives of this work. Using CAD / CAM features, Andrade, (2001) presented a solution for cutting time determination by calculating the cutting path of the tool. Also, d'Donna (2013) developed a procedure to determining the shortest production time using genetic algorithms. It was presented by Bouzid (2005) a method to calculate the ideal cutting conditions with criterion based on maximum rate of production. For measurement but not calculation of cutting time, Souza *et al*. (2012) performed a work that used computational vision. In this work was recorded the evolution of a turning process. A computer program was provided to treat the video and convert the images into cutting and passive times. This work presents a procedure to calculating, applying exact equations, Coppini (2015), the cutting times and the passive times for turning and boring process. To make it easier to solve the equations, a spreadsheet was proposed.

RESULTS AND CONCLUSIONS

EXCEL spreadsheets were prepared to cutting and passive time calculation. A stepped cylinder supposed workpiece example is showed in Figure 1. The user should start by the following: (1) Select an option among the existing three in the Figure 1 left side; it was suggested to calculate the cutting time for constant cutting speed; soon the corresponding button is pressed, a spreadsheet of step (2) will open; pressing the cylinder button, spreadsheet in (3) will open and the user should selected and digitalize the parts geometries profile following the sequence cutting tool movement. The user can go forward and come back pressing the corresponding buttons. After all part stretches are calculated, the total time is displayed in the worksheet (1).

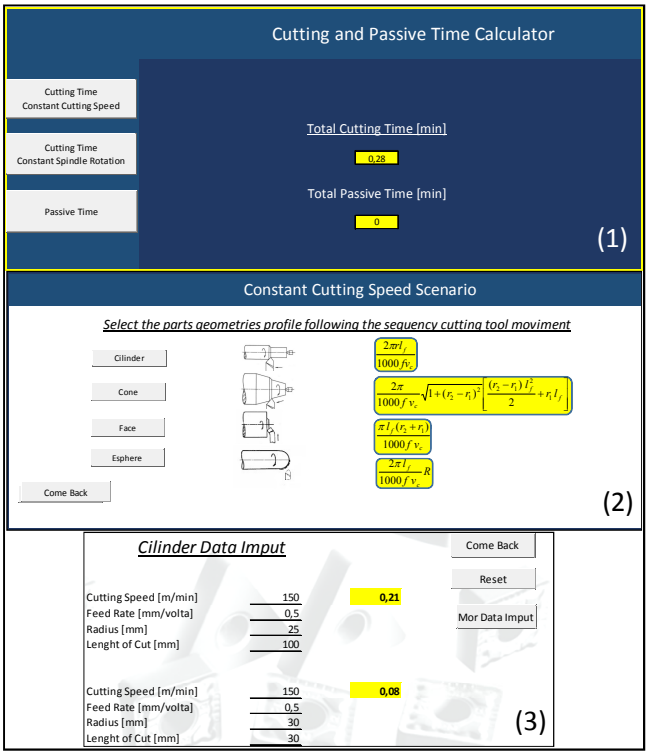

Fig. 1 - An example showing how to use the proposed spreadsheet.

It was possible to conclude that the proposed and developed EXCEL spreadsheet leads the users, a process planner for instance, to calculate and apply the results in their own work environment and not needing to be close to the turning machine tool at the company's plant. Future improvements will be providing to any kind of machine tool and cutting process.

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