Development of a Software Module for Selection of Nc Axes

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***Abstract* —** *The NC is a technique of controlling the operation of a machine from a program without direct operator intervention during execution. With the advances in microelectronics and computer industry, whose costs have continued to decline while the performance and usability have increased significantly, this method of control is increasingly present in the workshops. This technological evolution has replaced controls hardwired equipment by microprocessors that provide real-time calculations that previously had to be done when programming. The objective of this work is to develop a tool to assist in the selection of NC axes depending on the shape of the part. This module performs several functions such as; the choice of axes as a function of machining operations, machining applications in video, how to use canned cycles for turning and milling.*

Keywords— *Tool , machine NC , Axis.*

I. INTRODUCTION

The programming of NC based on standard programming languages. It turns out that these standards are not complete. The directors of CNC (DNC) to adapt the specifications of their machines.
The standards describe programming languages also called commands. Each builder DNC trying by all means to differentiate its products from those of competition, and develop the standard programming languages [1].

In each family, mounting methods and work are totally different, but they agree on the principle of programming, the vast majority of machines using an ISO (except robotics) language. At this interface can say "conversational" man-machine or learning that can help simplify the use of the machine add

To describe the monitoring by the tool path to machine the workpiece, an axis system is standardized. These areas will include used to write NC programs. A program will be easily transferable to another NC machine. Soichi Ibaraki et al [2]; used a laser light barrier system to identify rotary axis location errors under thermal influence by spindle rotation. Yang Liu et al [3]; proposed a generalized actual inverse kinematic model to compensate geometric errors of five axis machine tools. Károly Szipka et al [4]; proposed a novel procedure for the prediction of machine tool errors under quasi-static and loaded conditions. An Wan et al [5]; propose a volumetric error compensation approach for a machine tool. A laser tracker is used to measure the volumetric error. Sitong Xianga and Yusuf Altintas [6]; presented a new method to compensate volumetric errors of five-axis, serial CNC machine tools, based on the kinematic model of the machine.

II. NC ADDRESS

The most common standard is the ISO standard (ISO 840) which defines the alphabet based on the ASCII code and additional standards that define the programming format (ISO 1056,1057,1058,1059,2539)[1].

Table 1 shows some differences in codes with two names for the same code [7].

Table 1: Incompatibility of codes based on a designation

codes	Turning	Milling
G76	Threading cycle	bore
G90	Removal cycle	absolute programming
G92	Threading cycle	absolute programming
G94	Face turning cycle	Feed (minute)
G98	Feed (minute)	Return to starting point

Some manufacturers of DNC (FANUC, FAGOR ...) use the same code in turning and milling for two different designations such as for Fanuc and different codes for the same designation. These differences are even more pronounced in the case of FAGOR. To the SINUMERIK, the same codes are generally used for the same designations. As for the NUM control, using the ISO code, there have been no differences in designation for the same code.

With the exception of preparatory functions and auxiliary functions, the result after the statistical study of these addresses the following [8]:

- 37.50% use the same designation
- 25% use two names
- 08.33% use three designations
- 08.33% use four designations
- 08.33% use five names (addresses Q, H)
- 04.16% use seven nominations (address P)
- 04.16% use eight nominations (Address R)
- 04.16% use nine nominations (e-K)

Faced with a likely lack of consultation and a fierce business competition, it continues to see a non-uniformity of language difficulties caused by the programming of CNC [9]. Hence the importance of developing a tool for NC programming for different orders.

III.AXIS

The study involves the analysis used in the design of key machinery technology solutions. Possible kinematic machines are analyzed to suggest ways to selection of machines based on the characteristics of the parts to be produced.

Standard [ISO 841] [10], defines a coordinate system and refers to the various movements so that a programmer can describe the machining operation regardless of machine kinematics. Always the movements of the tool relative to the workpiece held for fixed considering. The normal system is a rectangular Cartesian coordinate system of the forward direction, connected to a workpiece placed on the machine, and having parallel to the edges of the machine main runners.

The Fig 1 [11] shows the primary translation axes X, Y, and Z of rotation A, B, C.

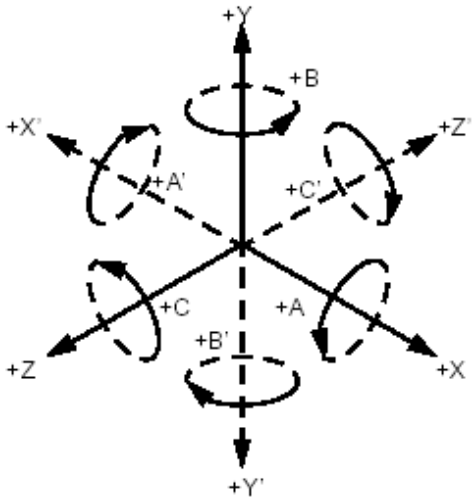

Fig 1: Standardized axis

IV. DEVELOPED MODULE

The main of this tool is the:

- Entities machining;
- Axis machine tools;

The Fig 2 shows the main functions of the developed tool.

Fig 2: Main functions

A. Milling cycle

Fig 3 illustrates milling cycles.

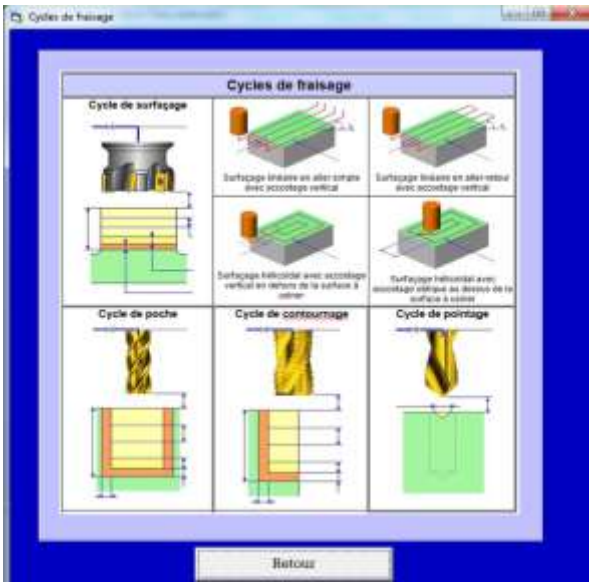

Fig 3: Milling cycles.

B. Turning cycle

Fig 4 illustrates turning cycles.

Fig 4: Turning cycles.

C. Axis of a machine tool numerical control

Fig 5 illustrates the axes of NC machine

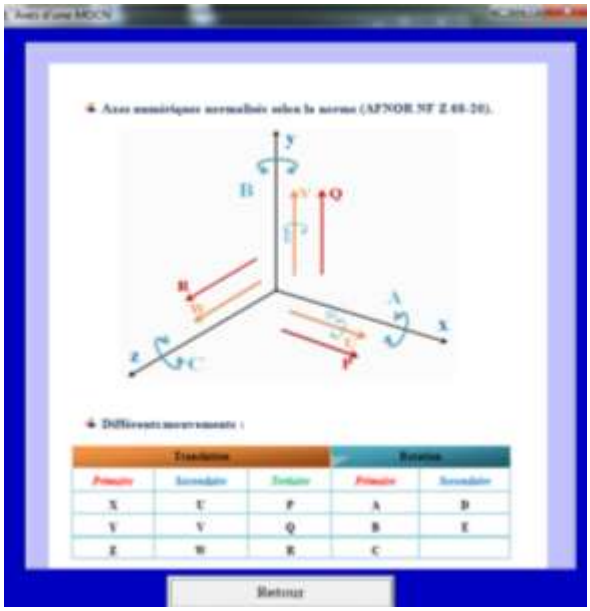

Fig 5: Numerical axes.

D. Entities machining

Fig 6 illustrates the entities machining

Fig 6: Machining entities.

The Fig 7 shows the parameters of the part 1.

Fig 7: Setting part 11.

The Fig 8 shows the parameters of the part 10.

Fig 8: Setting part 10.

E. Video Examples

This function provides machining video for various industrial parts.

Fig 9: Video Examples

V. CONCLUSION

This NCAx module builders and manufacturers have fairly clear ideas for adapting the NC axes forms of mechanical parts to achieve. This tool provides the optimal choice of a machine tool according to the entities, particularly in the case of a machine park varied. Digital axes fourteen in number, are diverse and complex. Their proper choice has a major influence on the shapes of the parts to be made and ensures optimal cost for any acquisition of equipment. Understanding of the system of axes is more beneficial in a spirit of concurrent engineering work to reduce the machining problems from the engineering failing to remove them.

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