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Statistical Study of NC Address

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Abstract

The programming of NC machines based on standard programming commands. These standards are incomplete. Builders directors CNC fit the specifications of their machines. This work aims to study the statistical inconsistencies addresses digital control FANUC, FAGOR, NUM SINUMRIK in turning and milling. Both parties have been developed. The first is to highlight the differences preparatory functions and their impact on programming. The second part presents a statistical study of the NC addresses for different programming languages to aid selection of the Director of CNC.

Index terms— NC, Statistical, address.

1 Introduction

he 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.

With the help of computers, parametric programming enables adaptation procedures. In addition to reducing outstanding (splitting long series production and just-in-time), the flexibility of labor, the development of CN's goal is compliance with more stringent time by optimizing the time of preparation of dead time and machining time as well as accurate and easily reusable machining programs.

The program content is developed with reference to the ISO regarding the machine language frequently in control manager regarding the specificities of each manufacturer DNC [1]. Given that each manufacturer of control manager by trying all means of differentiate its products from those of the competition and develops programming languages standard FANUC SINUMERIK, NUM, PHILIPS, BOSCH, FAGOR, MAZOL, ... Some manufacturers offer features that differentiate the potential of their governing control compete on the guiding control microprocessor, the programming language is interpreted to be translated into a workable framework. Despite numerous efforts to standardize the machines have different languages, resulting in the need to adapt to the peculiarities of the machine on which they should be loaded.

NF standards (ISO 6983-1) (NF Z68-037), NF [ISO 4342] describe programming languages. Each manufacturer of control manager tries by all means to differentiate their products from the competition and develop standard programming languages. These incompatibilities have despite many efforts to standardize.. The non-uniformity of the language used creates confusion such as differences in the timing of a function, the ambiguities of appointment (eg tool) and the programming of machines of the same manufacturer [2].

This work aim to study the incompatibility of NC commands the most used .

2 II.

3 Conflicts of Preparatory Functions

Table 1 show the differences G preparatory functions most used in industry controls (FANUC [3, **??**] SINUMERIK [4] NUM [5,9] and FAGOR [6,8]). Common codes to four commands such as G00, G01, G02, G03, G40, G41,

G42 .... T This study highlights a proposal for the following classification:? SINUMERIK ? FANUC ? NUM ? FAGOR

On the commercial side, the manufacturer FANUC offers two control options to reduce the existing differences in relation to other competing manufacturers, allowing it to be used in the majority of CAM software.

The advantage of the Sinumerik (Siemens) lies in the lack of differences for the same code when there and turning and milling unlike Fagor or the difference is relatively large order.

NC programming in ISO code is considered unfriendly given the complexity of the addresses used in the programming of machining cycles such instructions: G.. EH .. EF .. EI .. EJ .. EQ .. ER ... ranging from one code to another, hence the diversity of managers control Regarding the auxiliary functions, there is a correlation between the main functions such as starting, stopping the spindle lubrication, rotation, change tools, end of the program.... With the exception of auxiliary functions used by different manufacturers in a competitive purpose, the main difference lies in the subroutine call and end subroutine respectively coded M98 and M99 in the case III.

4 Statistical Study of Conflicts of Preparatory Functions

Statistical analysis showed differences in the command codes studied in terms of existence of code, number of codes used number of standardized codes and other criteria as shown in Table **??**.

of FANUC, unlike other commands (FAGOR, NUM) using preparatory functions G, while SINUMERIK uses the letter L followed by the number of the desired machining cycle. This work has helped to highlight the differences and incompatibilities between the addresses of the various commands. We find that 62.50% of the addresses using one or two appointments, while the remaining addresses, or 37.50%, using four to nine nominations. This study could be used as a criterion of choice of material depending on the desired goal.

About a third of the addresses do not change regardless of the order designations used. The syntax for writing a block of program database used for the development of an adaptation module of the NC machining instructions and learning NC programming

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Figure 1: 2 Global

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	CODE FANUC SINUM NUM FAGOR												CODE FANUC SINUM NUM FAC											
	G				TR	ML	TR	ML	TR	ML	TR	ML	G				TR	ML	TR	ML				
	05						+		+				56						+					
	07								+				57						+					
	09						+						58						+					
	10						+					+	59						+					
013 2	11	12					+					+	+	60	61				+					
																			+					
Year	13											+	62						+					
	14										*	*	63						+		+			
	15										*	*	64						+		+			
	16						+				*	*	65								+			
	17						+			+		+	66								+			
	18						+			+		+	67											
	19						+			+		+	68				*		*					
	20							+		*		*	69				*		*					
	21							+		*		*	70				+							
	22							+		*		*	71				+							
	23									*		*	72				+							
Global	24	25	26	27	28	29	+	+		+	+	+	*	*	*	*	73	74	75	76	77	*	*	+	*	*	+
Journal	30	31	32	33	34	36	+	+		+		+	*	*	*	*	78	79	80	81	82	*		+		+
of Re-	37						+	+					*	*	*	*	83	84	85					+		+
searches													+		*									+	*	+
in Engi-													+													+
neering (													*													+
D D D D																										
) J																										
	38								+				86													+
	39						+						87				*		*							+
	43						+					+	88				*		*							+
	44						+					+	89													+
	45						+			+			90				*		*							
	46						+			+			91						+							

Figure 2: Table 1 :

[FANUC ()] , *FANUC* 1995. (Manuels de tournage B62634/02 et fraisage B62644/02, FANUC GE LTD)

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