

# Programming of drilling machine with CPU controller

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**Abstract** — The program was elaborated for Topaz factory at the demand of “Selvis-group” srl. The task of the program was to make usage of the drilling machine with CPU controller more easier and to secure PCB (printed circuit board) projects form any kind of unwanted interventions.

**Index Terms** — basic graphics available in TC, bitwise sequences, G-code, LPT (line print terminal) port, mathematical operations and theory for geometrical transformation of the coordinates.

## I. INTRODUCTION

This application was written in collaboration with my father Luca Serghei and “Selvis-group” srl that gave the idea of this course project. The work was divided in two parts, he have done the application what create DRB (drill base) extension files and the task of this application was to read this files, visualize and make last technological changes before production process.

In order to develop this application it was used C language and TC compiler.

The results obtained have a practical application and this program it is used in one of sections of Topaz factory. This program submitted there perforated bands which are very inconvenient in use, they need to be store somewhere then these bands can not be used a lot of times because they are damaged in process of production.

## II. DESCRIPTION OF THE PROGRAM

Steps which are performed by this program:

- 1) Decoding a DRB (drill base) file
- 2) Visualize content of the file on users demand
- 3) Make last technological changes on users demand
- 4) Send information through LPT (line print terminal) port on the drill machine to execute drill work of PCB (printed circuit board)

### 1) Decoding a DRB file

- Coded information in binary code in DRB format is received
- Then from this code it is subtracted a special number and the result is divided by another prime number
- As a result we have a binary code that is transformed in information about tools and coordinates

### 2) Visualize content of the file on users demand

To visualize drilling map user must press F1 on the screen will appear a black background, in the left corner will appear number of instruments and their size, each instrument has its own color to distinguish them on the drill map which will appear in the right.

### 3) Make last technological changes on users demand

This program has 2 functions that make changes in correspondence with the work that is going to be done by drilling machine:

- F5 Mirror: this function is used because different engineers draw PCB projects from different paths from bottom to top or vice versa
- F6 Post: this function changes the order how information about tools is send to LPT port before first coordinate or in the same line with first coordinate

### 4) Send information through LPT port on the drill machine, to execute drill work of PCB

## III. G-CODE

G-code is the common name for the most widely used computer numerical control (CNC) programming language, which has many implementations. Used mainly in automation, it is part of computer-aided engineering.

G-codes are also called preparatory codes, and are any word in a CNC program that begins with the letter "G". Generally it is a code telling the machine tool what type of action to perform, such as:

- rapid move
- controlled feed move in a straight line or arc
- series of controlled feed moves that would result in a hole being bored, a work piece cut (routed) to a specific dimension, or a decorative profile shape added to the edge of a work piece.
- set tool information such as offset. (e.g. [1]).

## IV. LPT PORT

Parallel port is a very commonly known port, widely used to connect the printer to the PC. If you see backside of your computer, there will be a port having 25 pins. That port is known as LPT port or printer port. We can program this port for device control and data transfer. This application uses LPT for transferring data to drilling

machine. But we can program this port for many more applications beyond that. Parallel port has a specific mode to transmit data, by data lines. Parallel ports are easy to program and faster compared to the serial ports. (e.g. [2]).

## V. CONCLUSION

This application is very useful for engineers who are working in the respective section of the factory. And below are noted advantages and disadvantages of this program  
Good points of this application:

- Nobody will be able to change information in a DRB file without knowing the key to decode it
- File DRB contains all the information needed to perform the whole work for drilling PCB
- Visualization of the file offer possibility for operator to see the necessity to mirror or not, and to verify the PCB position on the table of drill machine

Things to improve:

- This application doesn't work on 64-bit systems
- This application have a poor look

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## REFERENCES

- [1] Wikipedia, G-code [Electronic resource] the site: <http://en.wikipedia.org/wiki/G-code>
- [2] Electrosofts, parallel port [Electronic resource] the site: <http://electrosofts.com/parallel/>