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EXPERIMENTAL STAND AND MECHANIZED MACHINE TO IMPLEMENT THE CAD/CAM SYSTEM IN OXYGAS CUTTING

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Abstract: The paper presents the results following researches made to realize a CNC oxygas cutting equipment. The soft applications are based on the CAD/CAM program.
The soft application is generated for the component the equipment is to cut directly on the attached computer system.
The component design is saved as a file and it can be applied to and used for future cuttings. Practically the equipment uses the files library for different future cuttings.

1. INTRODUCTION

Applications of numerical commands in industrial processes are to be found more and more frequently. In the field of oxygas cutting, from the process point of view, the technological development is advanced. From the application point of view the cutting of complex geometry components supposes higher accuracy and productivity.

Considering all these an experimental research was made on the stand equipped with the modeling system for cutting, the head being numerically computer controlled.

1. EXPERIMENTAL STAND AND RESEARCHES TO ANALYSE THE ADOPTED CAD/CAM SYSTEM

The experimental stand used for the development and verification of programs related to the plane contouring, 2D type, is presented in the block diagram illustrated by figure 1.1, where 1=computer; 2= monitor; 3= drivers supply source (220V ac/100V dc); 4= driver axis x; 5=.driver axis y; 6= Step by step motor axis x; 7= Step by step motor axis y; 8=movement screw axis x; 9=movement screw axis y.

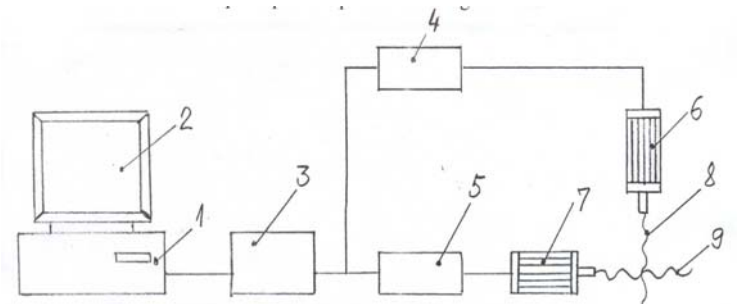

Figure 1.1. Block diagram of the experimental stand

Figure 1.2, figure 1.3, figure 1.4 present 3 assembly views of the experimental stand. Its general composition and constructive characteristics are as follows:

- computer that commands the whole process, which is a compatible IBM-PC computer with the following main characteristics: Pentium II, 400MHz, HDD 2.1 GB, G4 RAM, 4MB video, SVGA type monitor;
- Supplying source for drivers, AMPP type producer SC H.E.L.P. S.R.L. Sfântul Gheorghe;
- Driver axis x and driver axis y are the command blocks of the step by step motors, which have as input parameters a bit for sense and another bit for the command cadence (TTL input) generating as output trains of amplitude pulses for the command of the step by step motors.
- Step by step motors axis x and axis y with the following technical characteristics: TYPE MPPA 322-8, 2 PHASE, 1.8 DEG/STEP 4A;0.7Ω, 8 Nm, producer SC SZISTEP ELECTRIC SRL Sfântu Gheorghe, travel carriage xy which contains the movement screw x and y.

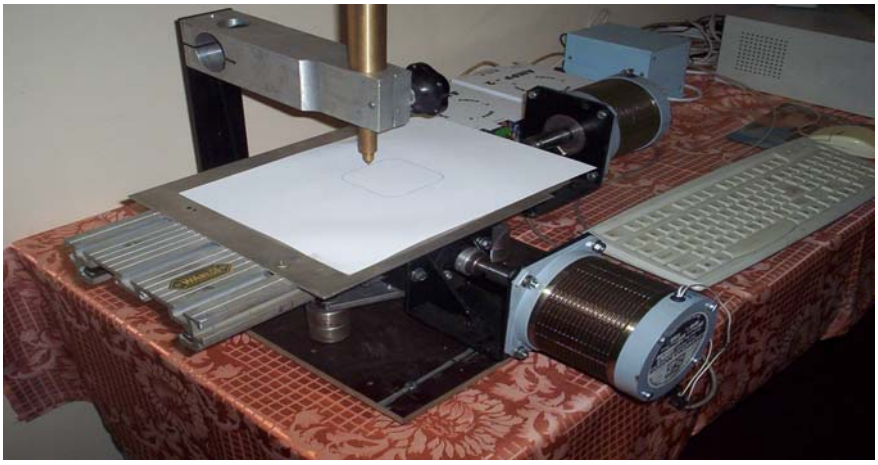

Figure 1.2. Left view of the experimental assembly

Figure 1.3. Front view of the experimental assembly

Figure 1.4. General view of the experimental assembly

In order to draw and visualise on the paper the movement performed, over the xy carriage a marking device has been built for the ordered shape. So, programming the shape, a circle has been drawn, figure 1.6 and a square with round edges, and figure 1.6

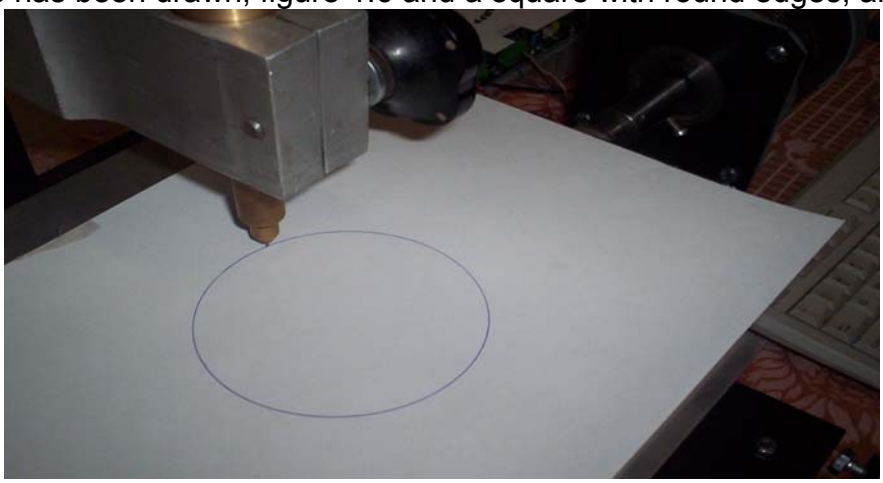

Figure 1.5. Shaping a circle

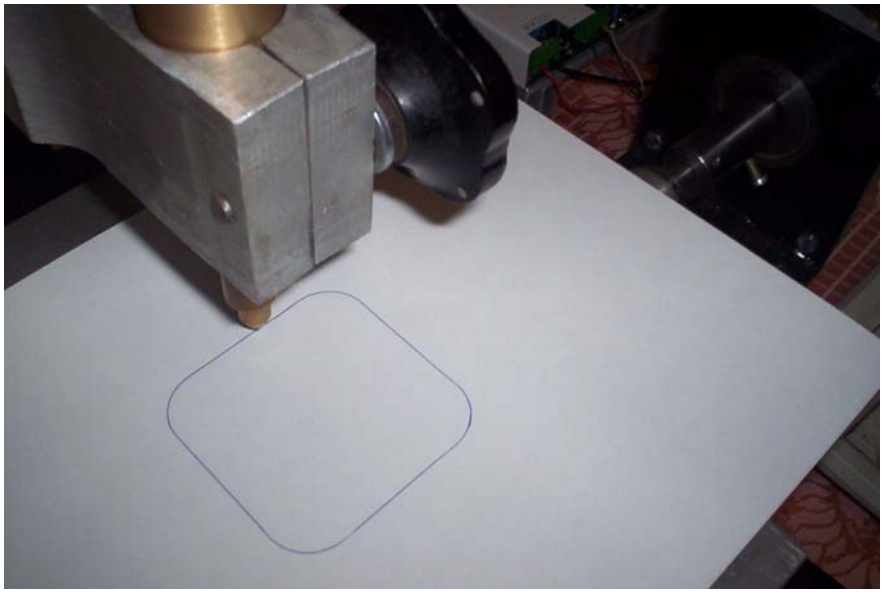

Figure 1.6. Shaping a square with round edges

Analysing the drawings it is found out that the obtained geometrical form is IDENTICAL (for the same type of analysed part), but the CPCM program was three times faster as compared with the CPMT program without needing special programming knowledge (language machine code “Borland etc) inclusively the equidistant contouring facilities, speed variation and line hanging.

2. MECHANISED MACHINE FOR OXYGAS CUTTING AND EXPERIMENTS FOR THE IMPLEMENTATION OF THE CAD/CAM SYSTEM IN REALISING THE CUTTING CONTOUR

After the CPCM program was realised and it was verified on an experimental stand, the issue was how it would behave under real conditions on an oxygas cutting machine.

So, the CAD/CAM system was assembled on an oxygas cutting machine to test the capacity of the built assembly. Figure 2.1, figure 2.2 şi figure 2.3 present this assembly.

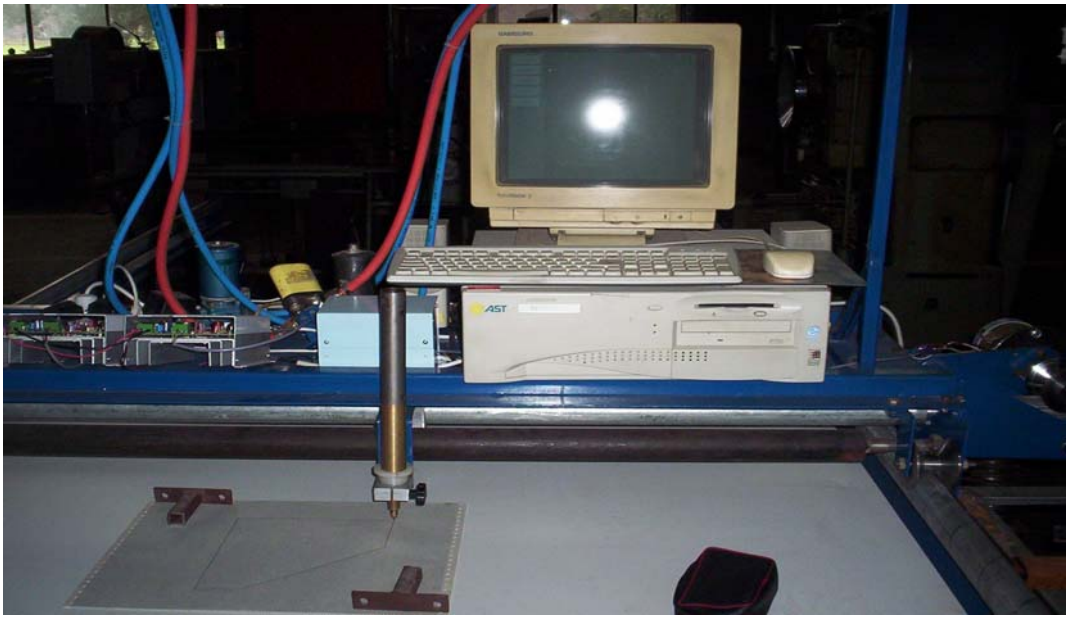

Figure 2.1. Front view of the CNC machine system for the mechanised oxygas cutting

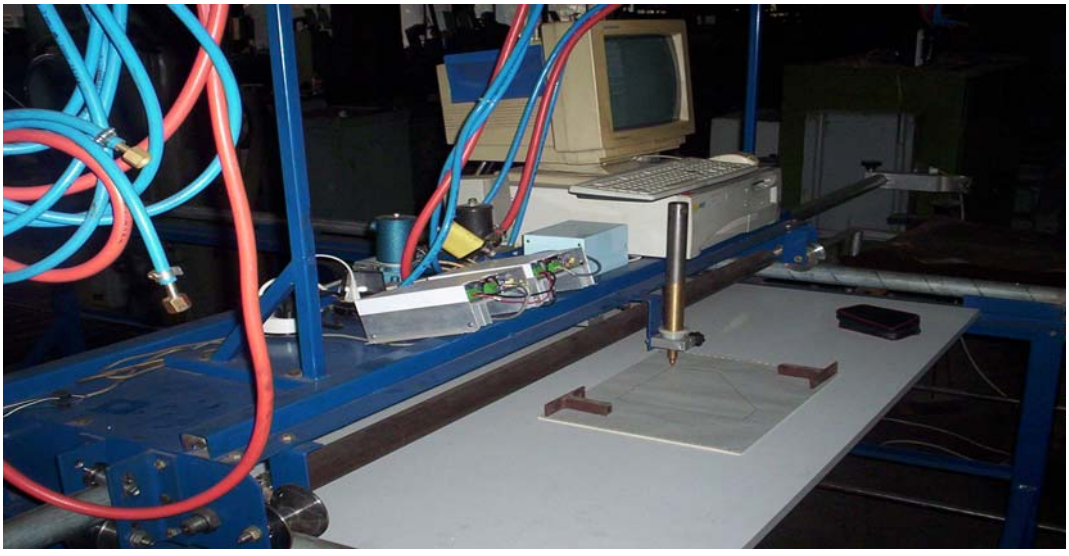

Figure 2.2. Left view of the CNC machine system for the mechanised oxygas cutting

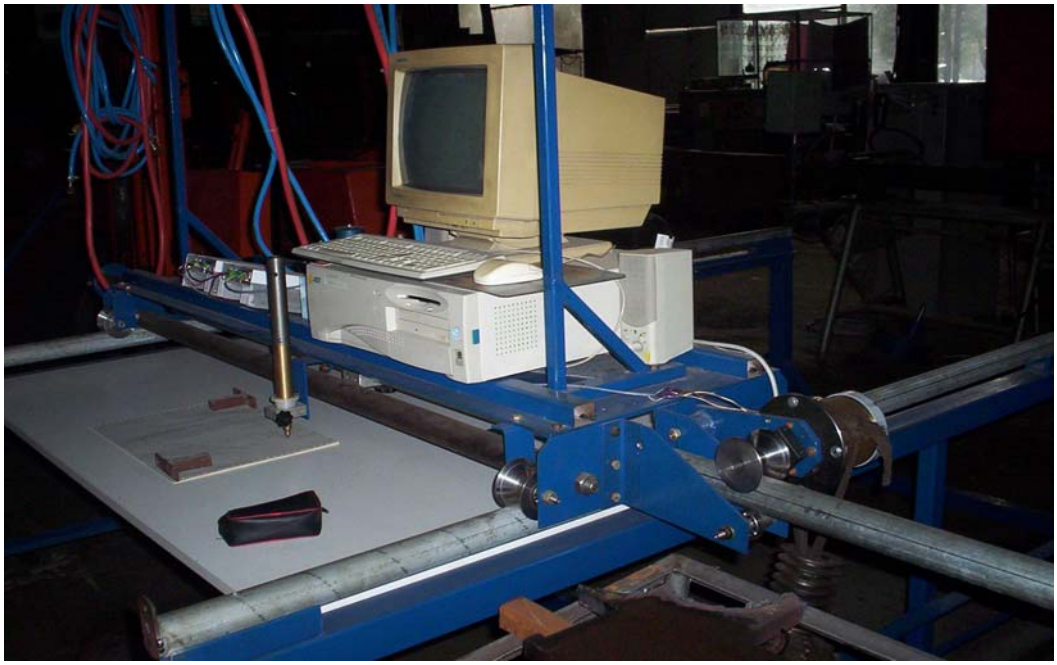

Figure 2.3. Right view of the CNC machine system for the mechanized oxygas cutting

The assembly solution presented above is not an industrial version for delivering oxygas cutting machine, but a model for testing the CAD/CAM system.

The components of the system were positioned on a machine only for a short period of time in order to make functioning and accuracy tests.

Introducing the drawing system in the place of the oxygas cutting apparata, the programmed contour could be seen.

A circle was programmed, figure 2.4, a triangle, figure 2.5 and a trapeze, figure 2.6.

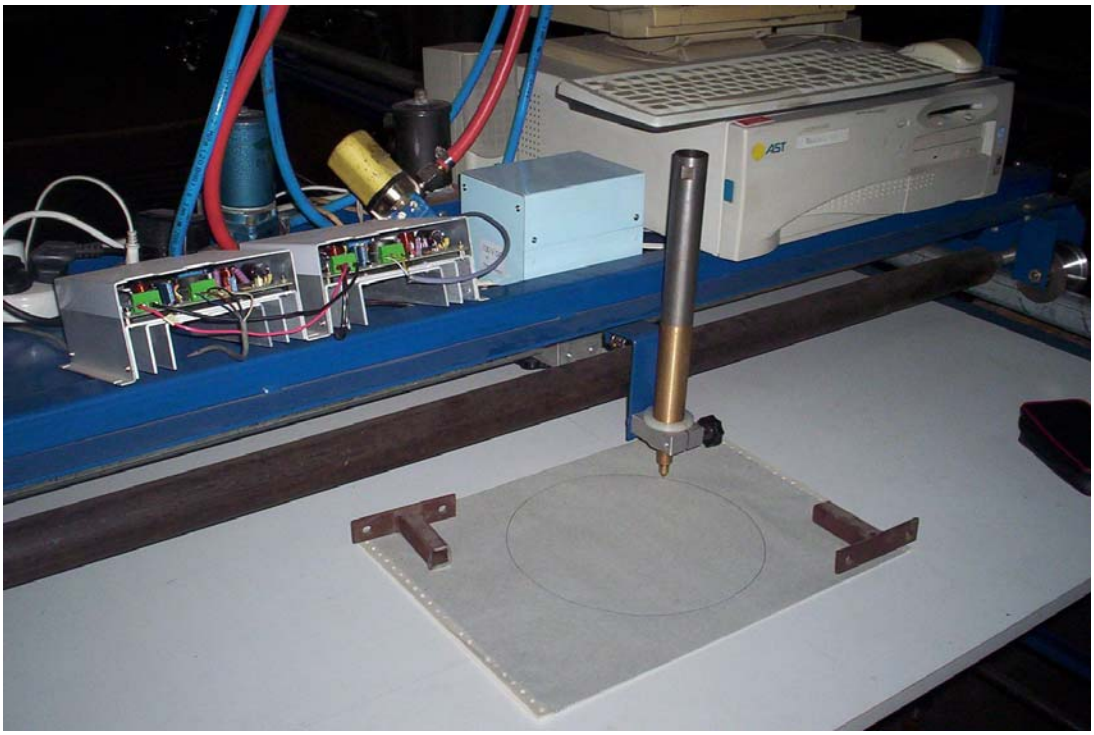

Figure 2.4. Shaping a circle

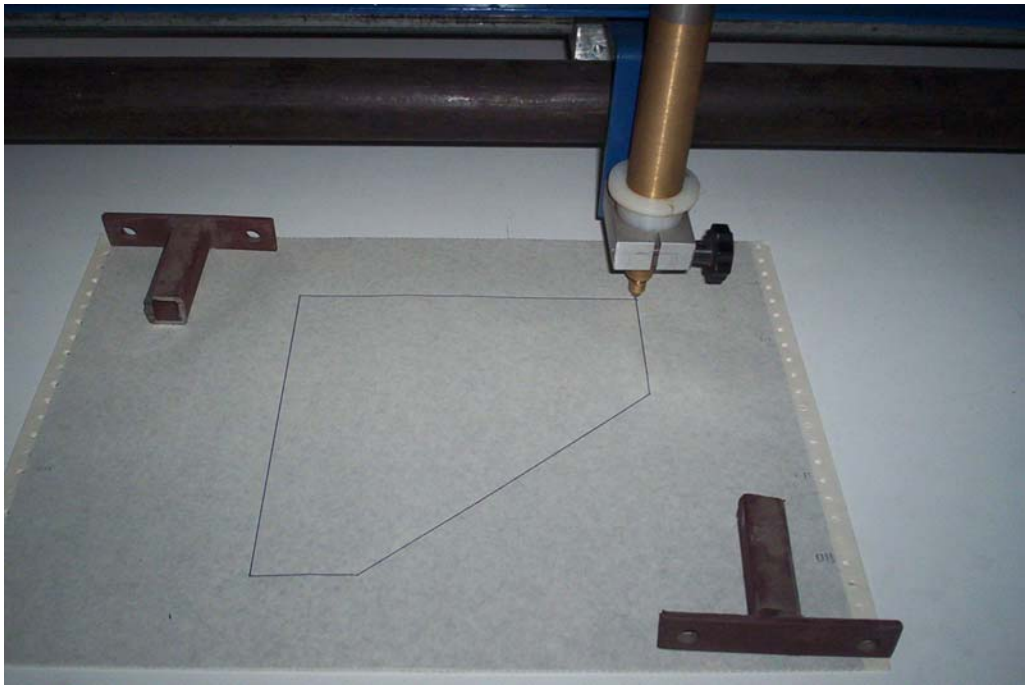

Figure 2.5. Shaping a trapeze

Analysing the drawings it is found out that they are identical for the same type of parts.

The use of the CPCM program system allowed a three times faster programming of the parts, and the following functions were tested: the equidistant contour, contour hanging, the contouring speed could be modified and also the rapid moving speed.

CONCLUSIONS

It is found out that the contoured geometric form is IDENTICAL (for the same type of part that had been analysed), but the CPCM program was elaborated three times faster as compared with the CPMT program, without needing special programming knowledge.

Special results have been obtained when testing the equidistant contour function, the contour hanging function. It was also possible to modify the contouring speed and the rapid movement, respectively.

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