

TP N° 4 Machining centre (CNC)

1. Introduction

A TP (practical work) on a machining centre is a teaching exercise consisting of making a mechanical part using numerically controlled machine tools (CNC).

2. Objective of the TP

- Know the particularities of numerically controlled machine tools compared to conventional machine tools,
- Deepen the knowledge acquired during the course by learning about real-time MOCN,
- Know the application of programming code G.

This practical work involves:

- The modeling of the **CAD** part,
- The generation of a program (an example code (code G)),
- The preparation of the machine,
- Execution of machining operations (such as milling and drilling),
- Then the quality control of the finished part.

3. Comparison of MOCN with conventional machines

In order to compare the MOCN with conventional ones, the criteria should be set:

❖ In relation to the structure and characteristics:

- The functions performed are the same as a conventional machine tool,
- Position and hold the part,
- Position and hold the tool,
- Ensure the relative movements between the tool and the part,
- The general mechanical quality of these machines is much superior to conventional machine tools,
- More powerful motorization,
- Simpler and more robust controlled-variation kinematic chain capable of withstanding significant accelerations and decelerations,
- Control of the trolleys by ball screws with take-up of the game,
- Friction-free slideway using rollers, balls, hydrostatic lubrication and attached linings,
- Widely dimensioned, very rigid structures with excellent damping.

❖ In relation to the main characteristics:

- High power and speed,
- Robust and good wear resistance,
- Rapid, accurate movement, very high accelerations and decelerations,

- Very tight metrological specifications,
- Very weak friction and play,
- Few vibrations,
- Low heating.

❖ In relation to the order:

Flexible control: **the DCN (Direct Numerical Control** - often means that a machine is controlled by a computer) has the ability to store the control instructions and part information

4. Conclusion

In conclusion, the use of the numerical control machine is recommended for projects requiring high precision and speed of production. However, it is important to consider the costs associated with using the machine and invest in staff training to maximize its use.