CNC Machining

For metal or plastic prototypes

How to optimize your design for CNC machining

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The method

The Computer Numerical Control method is a subtractive production technology used in all sectors of the manufacturing industry.

It is suitable for the production of low-volume parts with metal or plastic materials.

For the success of the process it is essential that the operator has good experience as the installation and maintenance of the individual parts can be quite a complex operation.

The analysis of feasibility and costs for the production of prototypes is performed on 3D files in order to analyze the geometry as a whole.

The starting point is the construction of the toolpath necessary to give instructions to the machine for machining.

Thanks to a CAM software we create the cut of the material plate

which is then blocked on the table and milled with a cutting tool.

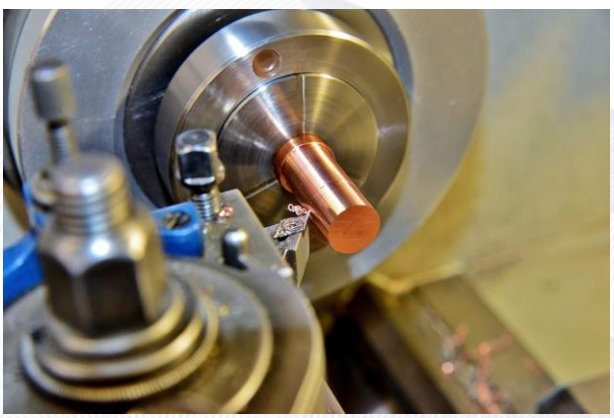
During processing, a continuous review of the operator is required, especially for the production of the first model.

Machines

Almost all metal cutting machines are divided into

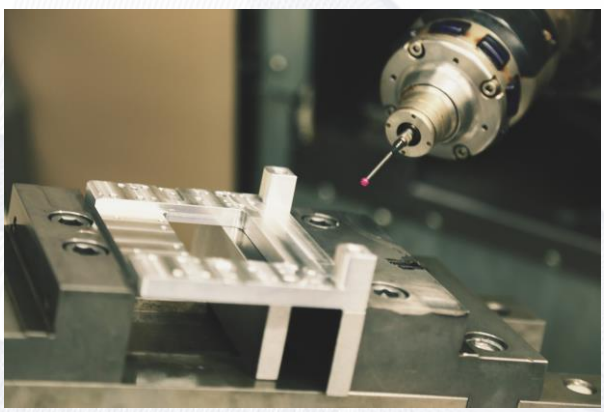
Lathe

It clamps the part in a spindle and rotates it against a cutting tool



Milling machine

The cutting tool works against the piece blocked on the work surface



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Design tips

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The designer must have a knowledge of the process and the production steps.

This is the basis of the success of production and the reduction of times and costs

In general it is good practice to follow these indications

Simple design

- It is better to prefer the decomposition of the geometry into several simple pieces rather than working on a single complex piece, obviously without compromising the functionality of the piece

Tolerances

- To obtain very tight tolerances, the operator probably have to modify the tool program or even rework the piece with a subsequent operation. For this reason it is always recommended to indicate the required tolerances on 2D drawings.

Design tips

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Holes

- Generally the cost of making holes is directly proportional to the depth and diameter of the hole

Thin walls

- The general rule is to design walls that are no more than double their thickness. Very thin walls below 0.5 mm are critical so it is always necessary to carefully evaluate the manufacturability without compromising the processing

High walls and pockets

- It is always necessary to pay close attention to the thin and deep grooves and the surfaces along the upper parts, both of which could greatly complicate the processing

Design tips

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Threads

- It is possible to make threads on prototypes. In general, as for the holes, their cost is directly proportional to the depth

Sharp corners

- Internal vertical sharp corners cannot be made, horizontal and external ones are always better to round them. Making the corner square is a more complex and therefore more expensive operation

Avoid text

- The realization of the writings is a long operation that is performed with a small tool. Creating embossed text is even more complex as you have to mill all the surplus material. Our advice is to request it only when strictly necessary

Our workshop

Our workshop is a structure to follow the production of prototypes and small series even with complex geometries

Machine	Axis	Table surface	X Axis travel	Y Axis travel
ROMI DCM 620-5X	5	600X600mm	620	520
DMG MC	3	800x600mm	635	510
EIKON MC	3	600X300mm	500	280
VMC 32	4	550X1050mm	810	510

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