p 1

The clamping of the workpiece

It is important for processing a workpiece on a CNC-machining center, that the workpiece is held down properly. The demands on a clamping system depend on the workpiece geometry and the type of processing. It can generally be said, however, that the workpiece needs to be positioned in a way that it can not be shifted. This means, that the force of friction between workpiece and clamping device needs to be bigger than the cutting force caused by the machining process.

Common clamping systems in wood processing are either pneumatic or mechanical, or use vacuum. The use of the correct clamping system not only determines the stability of the workpiece rest, its optimal positioning or safety at work, but also the efficient use of CNC-machining centers. The more time is needed to prepare for the processing of a workpiece, the higher the costs per unit. This applies in particular to one-off pieces and small series.

p 2

The clamping of the workpiece

Console tables with hoseless seals are frequently used to hold down workpieces with a large surface. Consoles and seals can be positioned manually or automatically, depending on how the machine is equiped.

Photo: HOMAG AG

Machine manufacturers, as well as suppliers of auxiliary equipement, offer various clamping systems. The range for CNC-machining centers includes smooth machine tables with vacuum seals, grid tables and console tables, where consoles and clamping elements are positioned automatically.

The clamping of the workpiece

The clamping of sizable flat workpieces

Block of four seals with two separate vacuum circuits for smooth machine tables. The modules are sucked against the table on their undersides; the workpiece is held down on their topsides.
Photo: INNOSPANN

The clamping of sizable flat workpieces is generally straightforward. Ideally, they can be clamped with vacuum from below. This allows processing the workpiece on its topside as well as on all its edges. Using vacuum seals close to the edges, also allows processing the workpiece from underneath with special tools. This is not possible when clamping the workpiece on a grid table.

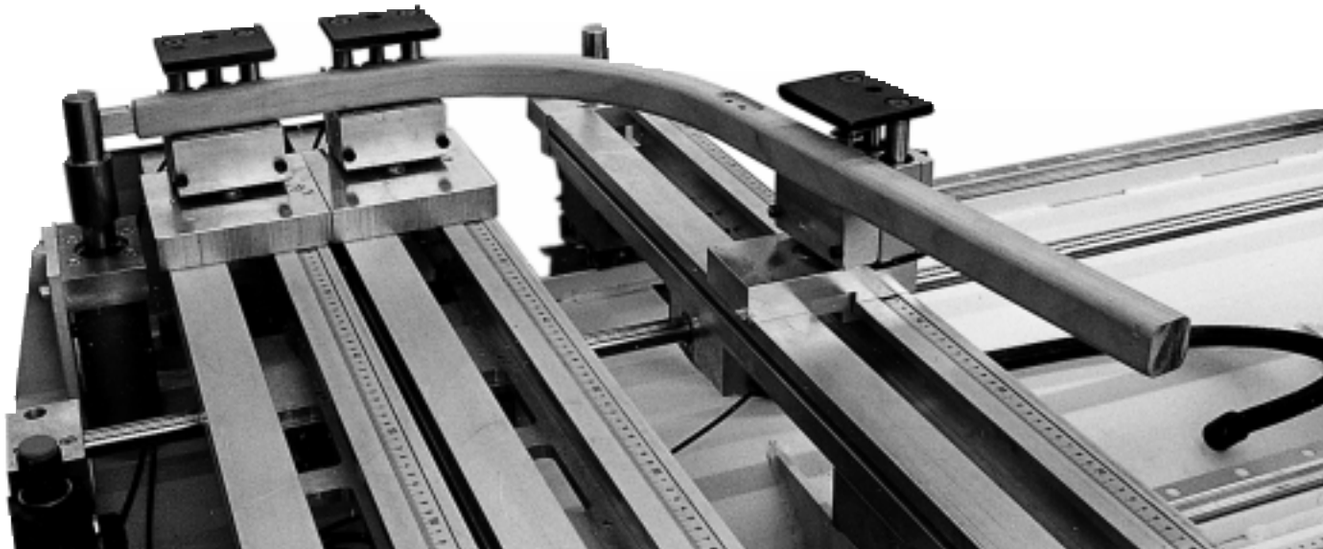
The use of vacuum templates is recommended for small parts, or parts with free form contours. For this purpose, a groove is cut into a particle board parallel to the workpiece contour and slightly to the inside. A rubber string is then inserted into this groove. Should the frictional force, created by the vacuum, not be sufficient, sticking on sandpaper strips can increase it.

The clamping of the workpiece

The clamping of small workpieces

Small workpieces, e.g. carcass parts, can generally not be held down using vacuum. Mechanical and pneumatic power clamps come into use here. As power clamps do not fix the workpiece in a certain position from below, but from one or several sides, or from the top, it takes several machining operations to process the part from all sides. The position of the power clamps needs to be changed after every machining operation, in such a way that the remaining surfaces can be processed.

The simplest type of power clamp is the manually operated clamp. This type of power clamp is screwed, together with stops for the workpiece, onto a particle board, which in turn is vacuum-clamped to the machine table. When positioning the power clamp, it is important to make sure that they are as close as possible to where the cutting process is going to take place without impeding the chosen cutter line.



Pneumatic power clamp for carcass parts.

Photo: IMA

The clamping of the workpiece

Useful devices for positioning the clamping elements

On screen visulisation of the SCM-auto positioning system “AutoSet“. Based on the workpiece contour, the clamping elements are automatically placed in a collisionfree position.

Photo: SCM

The position of clamping devices depends on the workpiece geometry, the type of processing and the machine equipment. The amount of time needed for positioning depends on the workpiece. Solutions are developed with systems, which project the positions of clamping elements with lasers onto the machine table, or which, directly through the NC-program, automatically placed and fasten the vacuum seals in a collisionfree position. When such systems are not at your disposal, you can, in case of smooth machine tables, draw the workpiece contour on the machine table with chalk by running the NC-program. Within this contour, the seals can now be positioned in a way to avoid collisions.