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## **Milling Machines**

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A milling machine is a machine for machining metal and other parts with a mill as the workpiece moves progressively.

The production of machine tools is known from ancient times. Milling work today is one of the main types of processing of metal parts. Milling is a method of processing workpieces, the main movement of which is the rotation of the cutter. The feed movement in this case is the translational movement of the workpiece in the vertical, transverse or longitudinal direction. The milling cutter with which the workpieces are machined is a cutting tool equipped with several blades.

There are several types of milling machines.

Horizontal milling cantilever machines are characterized by the presence of the console and the horizontal spindle position when machining with cylindrical, angular and shaped mills of flat and shaped surfaces of blanks of various materials.

Universal milling machine has a horizontal spindle and is designed for milling a variety of surfaces on small and lightweight parts in a single and mass production.

Unlike a horizontal, vertical milling machine has a vertically positioned spindle, which in some models of machines allows for displacement along the axis and rotation around the horizontal axis, thereby expanding the technological capabilities of the machine.

Keyway milling machines are designed for milling mortise keyways gutter mills. There are two ways to cut

keyways. In the first method, the cutter first cuts to the full depth of the groove, then moves in the longitudinal direction. In the second method, the cutter reciprocates along the key groove, crashing after each stroke to a certain depth.

Milling and centering machines are designed for double-sided milling and centering of the ends of the rollers, which are then machined on a lathe.

Copy milling machines are made for milling surfaces of complex shape: dies, molds, turbine blades, molds, metal models, copiers, blanks of non-circular wheels.

Rotary milling machines are designed for surface treatment of various parts with end mills in conditions of mass, large-scale and individual production.

Universal dividing heads. These machines are used for periodic rotation of the workpiece around the axis and for its continuous rotation, consistent with the longitudinal feed of the table when cutting helical grooves.

One of the main conditions for high-performance cutting tools is the correct choice of tool material. For the manufacture of cutting elements of milling tools in the woodworking we may use tool steel (alloyed, high-speed), hard alloys, metal-ceramic materials. For the manufacture of tool cases we use structural quality steel, structural alloy steel, and special light alloys.

Mounted mills, depending on the design, are divided into integral and modular ones. Solid mounted mills, in turn, can be single and in the form of sets of mills (composite).

During operation, machine parts wear out, increased gaps appear in the mated pairs, which leads to the loss of machine strength and the appearance of vibration – a source of even more intensive wear of parts.

One of the crucial factors in milling machines operation is the lubrication of milling machines. Lubrication in the machine is necessary to reduce friction losses, reduce heating

and wear on working surfaces, and ensure reliable operation of the machine components.

To ensure reliable operation of the milling machine, organizational equipment is needed. Organizational equipment consists of devices for placing on the workplace of industrial equipment, blanks and machined parts, as well as lifting transport devices and local lighting, creating conditions for safe and productive work.

In conclusion, we would like to mention that no factory can do without milling machines. Obtaining parts by milling, with this type of production, seems to be the most economical method. By providing a high class of roughness at the milling stage it is possible to reduce the finishing time, which is the most time-consuming part of the process.

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