

# SAFETY AND HYGIENE REGULATIONS



Servei de Prevenció de Riscos Laborals  
UNIVERSITAT POLITÈCNICA DE CATALUNYA

## MILLING MACHINES

CODE

**SHR 205**

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### DESCRIPTION OF A MILLING MACHINE

Milling refers to a set of operations that can be used to machine flat surfaces, grooves, cogs and even curved or warped surfaces.

Milling machines are normally divided into two types: horizontal and vertical. The operation of face milling is used to create a flat surface on the piece. In a vertical mill, a wide range of machining operations can be carried out on horizontal, vertical and tilted surfaces.

The main movement of a milling machine is rotation, which is carried out by the tool or milling cutter. The forward and penetrating movements are generally in a straight line, and carried out by the tool or the workpiece, depending on the type of machine tool and the operation.

The transmission powertrain (belts, gears, friction gears, etc.) is attached to the driving motor and transmits power to the machine tool's headstock, where the main movement of rotation of the tool is generated. This rotation occurs around the main axis or spindle of the machine.

The tool is generally held in the machine by a cutter arbor. The piece that is going to be milled is attached to the supporting work table. All these elements are fixed to a baseplate that can be fixed to the floor so that each of the elements is structurally rigid.



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### GENERAL RECOMMENDATIONS

1. It must be ensured that switches and other operating controls of milling machines cannot be activated accidentally.
2. Gears, drive belts, pulleys, drive shafts and even the smooth axes that jut out must be protected by covers.
3. The electric circuit of the milling machine must be earthed.
4. The distribution board that the machine is connected to must have a circuit breaker that is sufficiently sensitive.  
The protective covers of gears and drive belts must have switches installed in series, to prevent the milling machine from starting up when the covers are not properly closed.
5. All inspections, measurements, adjustments, etc. must only be carried out if the milling machine is completely shut down.
6. Chips that are produced during machining should never be removed by hand as they can cause cuts or puncture wounds.
7. Dry chips should be removed with a suitable brush when the machine is shut down. It is better to use a rubber brush for wet or oily shavings.
8. It is extremely dangerous for operators to work on a milling machine when they are wearing rings, watches, bracelets, necklaces, ties, scarfs or any other item that hangs down. It is also dangerous to wear long hair loose. Long hair should be tied back under a cap or similar item.

### PERSONAL PROTECTION EQUIPMENT (PPE) TO USE

#### SAFETY GOGGLES OR SHIELDS

- Workers must wear safety goggles or shields that protect against impacts, particularly when hard, fragile or easily broken metals are machined, due to the eye hazard caused by chips and fragments of the milling cutter that could fly out.
- Safety goggles should be used during sharpening of the milling cutter.
- If, despite all precautions, a foreign body enters your eye, **DO NOT** rub it: this could cause an injury. Clean your eye with abundant water, cover with gauze attached with surgical tape, and go to the nearest health centre.



#### SAFETY FOOTWEAR

- Operators should wear well-fitting clothing. Sleeves should be tightly fitting at the wrists, with elastic instead of buttons, or worn rolled up inwards.
- Safety footwear must be used to protect feet from heavy work pieces falling on them and from cuts and punctures.



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### BEFORE MILLING

Before the milling machine is switched on to start the machining work, the following checks should be made:

1. The clamp, dividing plate or device for holding the workpieces to be machined is firmly anchored to the table of the milling machine.
2. The workpiece is correctly and firmly secured by the holding device.
3. The milling cutter is fitted properly into the axis of the headstock and secured firmly.
4. There are no obstacles blocking the path of the table.
5. There are no parts or tools left on the table of the milling machine that could fall or get caught in the milling cutter.
6. The covers protecting the pulleys, gears, drive shafts and axis of the headstock are in place and securely attached.
7. Whenever possible, protect the milling cutter with a cover to prevent accidental contact or projection of fragments of the tool if it breaks. This protection is essential when the milling work is carried out at high speeds.

### WHILE MILLING

1. When you are machining, keep your hands away from the rotating milling cutter. If the work is carried out in an automatic cycle, your hands should not rest on the table of the milling machine.
2. All inspection, adjustment and other operations must be carried out when the milling machine is completely shut down. This applies particularly to the following actions:
  - Moving away from or leaving the workplace.
  - Securing the workpiece.
  - Measuring and calibrating.
  - Checking the finish.
  - Cleaning and greasing.
  - Adjusting guards.
  - Guiding the flow of coolant.
3. Even when they are shut down, milling machines are tools that cut. When you put down or pick up pieces, take care not to cut your hands or arms.



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## MAINTENANCE, ORDER AND CLEANING

1. The milling machine must be kept in good condition, clean and well-lubricated.
2. Likewise, care must be taken to keep tools, implements and accessories clean, well-maintained and in good order. Each item must have a place and be kept in it.
3. The work area and the area around the milling machine must be kept clean and free from obstacles and oil spills. Objects that have fallen or are scattered on the floor could cause people to trip or slip and put them at risk. Therefore, all objects that fall on the floor must be picked up before this can happen.
4. Chips must be removed regularly, rather than waiting for the end of the day, using a brush for dry chips and a rubber brush for wet or oily chips.
5. Tools must be kept in a suitable cupboard or place. No tool or object should be left loose on the milling machine.
6. Both raw and machined pieces must be stacked safely and in an orderly way, and suitable containers should be used if the pieces are small. An entry and exit corridor to the milling machine must be left free. No materials should be stacked up behind the operator.
7. All waste, cloths or cotton that are impregnated with oil or grease, which could easily catch fire, must be deposited in suitable containers (metal and with a lid).
8. Electrical faults in the milling machine can only be inspected and repaired by specialist staff. Whenever a fault of this type is detected, however small, the machine must be disconnected and an **“OUT OF ORDER”** sign hung on it. Specialized staff must be notified.
9. Electric wires must be protected against cutting or damage by chips and/or tools.
10. During repairs, a sign stating **“DO NOT TOUCH – DANGER – MEN AT WORK”** must be hung on the main switch. If possible, the main switch should be padlocked or its fuses removed.