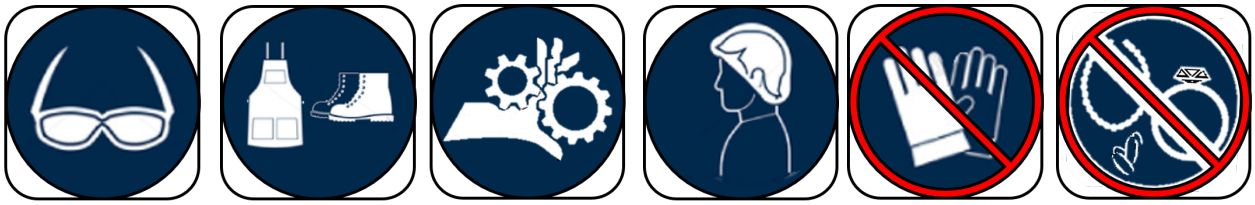
SAFE OPERATING PROCEDURE

Milling Machine

Machine:	Milling Machine
Make/Model:	PM 25MV
Revised:	3 / 10 / 2023
Author:	Trevor Marks
Location:	Engr. II, rm 2226
Department:	Mechanical Engineering

DO NOT use this machine unless you have been trained in its safe use and operation!

Personal Protective Equipment



Safety Glasses Required | Protective Clothing | Entanglement Hazard | Contain Long Hair | Do Not Wear Gloves | Do Not Wear Jewelry

Potential Hazards

- Eye injury from flying chips or broken bits
- Cuts from contact with cutting tools or pointed end of center
- Entanglement in rotation machine parts
- Pinch from moving machine parts
- Burns from hot tools or hot work pieces
- Metal Splinters
- Falls due to poor housekeeping around the machine

Procedure Checklist

PRE-Operation:

- Identify ON/OFF switch and emergency stop button.
- Check to ensure the cutting tool is clear of the work and securely mounted.
  - Keep overhangs as small as possible and check that the work piece is securely clamped either in the vise or to the table.
- Remove all tools and parts from the mill table.

- Make sure chip shield(s) and guards are in place.
- Ensure cutting tool is clear of work and can turn freely.
- Set the correct rotation direction.

Operation:

- Turn on power — never leave the mill running unattended.
- Set the correct speed for machining process and for the cutter being used.
- Use a brush — never a rag — to remove chips.
- Use cutting fluid as needed.
- Power down machine when finished with task(s).
  - Do not attempt to slow/stop the chuck or spindle by hand.

POST-Operation:

- Use a brush or rag to clean machine.
- Remove any custom fixtures used.
- Ensure the space and floor around the mill is clear of chips, debris, and oil.
- Leave the machine and work area in a safe, clean state.

Do's and Don'ts

Do:

- Read the user manual: [GitHub Link]
- Approved materials for this machine: some steel, aluminum, brass, and plastic.
- Consult with lab manager or Machinery's Handbook for cutting fluid choices.
  (typically WD40 for aluminum and brass and dry for plastics)
- Work from a drawing and a project plan (ask the lab manager for templates).
- Take the time to properly layout your work.
- Use a light to help illuminate the work area.
- Use a rag to handle cutting tools.
- Use care when removing a cutting tool or drill chuck from the spindle — always support the tool with one hand when removing.
- Manually tap holes (do not power mill for tapping operations).
- Use the axes locks for a better finish.

Don'ts:

- Do not use the mill without approval!
- Do not use custom fixture without approval.
- Do not use your bare hand to wipe away chips.
- Do not use compressed air to clean any part of the mill.
- Do not power the machine in an attempt to tighten or loosen the spindle.

- Do not transversely load drill bits.
- Do not use end mill bits in the drill chuck.

Speed and Feed

Table 1: **Spindle speed** for HSS end mills. Speeds given in RPM (*revolutions per min*).

End Mill Diameter	Aluminum	Brass	Delrin	PC
3/16”	Note 1	Note 1	Note 1	Note 1
1/4”	Note 1	Note 1	Note 1	Note 1
5/16”	Note 1	2140	Note 1	Note 1
3/8”	Note 1	1780	Note 1	Note 1
7/16”	2450	1530	Note 1	Note 1
1/2”	2140	1340	Note 1	2290
9/16”	1900	1190	Note 1	2040
5/8”	1710	1070	2440	1830
11/16”	1550	970	2220	1670
3/4”	1430	890	2037	1530

Table 2: **Feed rates** for 2-flute end mills. Speeds given in IPM (*inch per min*).

End Mill Diameter	Aluminum	Brass	Delrin	PC
3/16”	23	14	33	37
1/4”	17	11	24	28
5/16”	34	9	49	44
3/8”	29	7	41	37
7/16”	24	6	35	31
1/2”	21	5	31	28
9/16”	23	10	33	33
5/8”	21	9	29	29
11/16”	19	8	27	27
3/4”	17	7	24	24

Note 1 Run at machine maximum; approx. 2500 RPM.

Note 2 Speed and feed values are suggested starting points; they may be increased or decreased depending on machine conditions, depth of cut, finish required, etc.

Note 3 Depth of cut should not exceed the diameter of the cutting tool.

Speed and Feed Calculator hosted by LittleMachineShop.com
https://littlemachineshop.com/mobile/speeds_feeds.php