
Machine & Wood Shops

— Drill, Mill, Lathe, Wood Router —

Genevieve Parker, AJ Collins, Jett Vaultz, Joseph Paetz

Drill Press

What is it used for?

- Drilling holes at precise angles.
- Drilling in strange shapes (dowels)
- Using specialized drill bits (forstner bits for large holes).
- Drilling Uniform holes
- Can be used with sanding drums to make a spindle sander

How does it work?

- Motor turns drill bit through a series of wheels and timing belts
- Timing belt can be moved to change speed
- Turn lever on the side to lower the drill bit

What are limitations?

- Different models will have different vertical clearances
- Not all models can drill angled holes
- Some models may not be able to drill both wood and metal

Cost? \$100 - \$1000 to buy outright. (Usually free once you have access to a shop)



Lathe

What is it used for?

- Create an object which has symmetry about an axis of rotation
- Cutting, sanding, knurling, drilling, or deformation, facing, turning, with various tools

How does it work?

- Causing the workpiece to be held and rotated by the lathe while a tool bit is advanced into the work

What are limitations?

- Length of the bed
- Size of the chuck
- For the most part, only radially symmetrical parts can be produced

Cost? Free for most campus places once you gain access



Mill

What is it used for?

- Shaping, facing, and precise cuts in metals and plastics. Can make curved and radially symmetric cuts with an automatic mill
- Can be used as a drill press

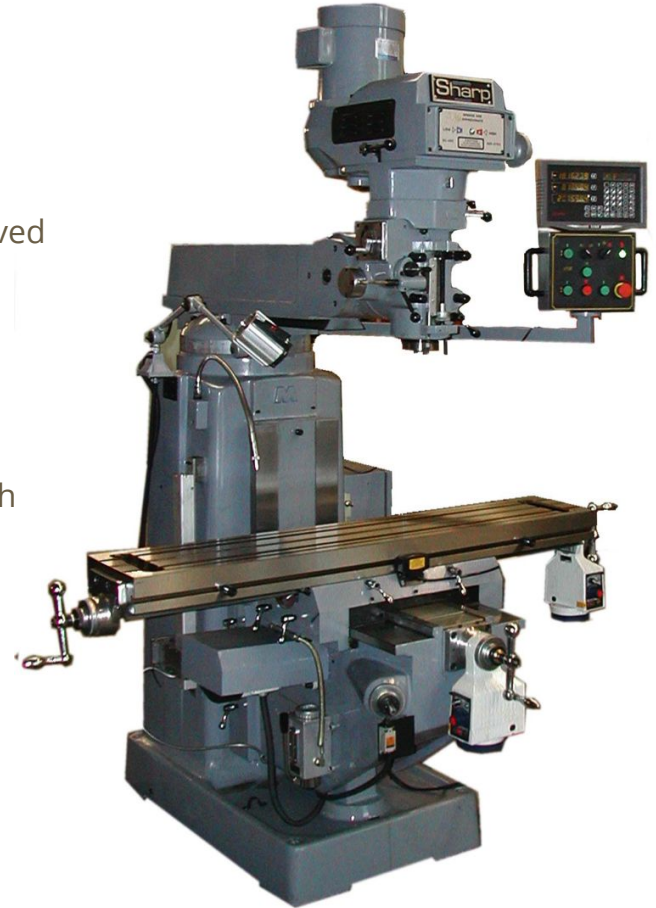
How does it work?

- Rotating the cutting tool while keeping the piece stationary
- Use different types of bits for either facing or cutting holes or for depth
- Clamp the piece into place on bed, move the bed along x,y,z axes with cranks (some are automatic)

What are limitations?

- Some cannot be used for making cuts in woods and composites
- Bed size and depth, and stock size
- it is difficult to make round parts with a non-automatic mill

Cost? Nothing once you have access and are trained for it



CNC Router

What is it used for?

- Creating 3D objects from wood and other materials
- Create precise 2D shapes from sheet goods
- Make complex shapes from wood
- Work on pieces too large or too thick to be cut with a laser cutter

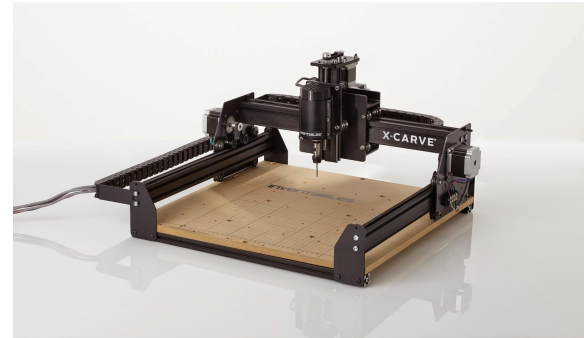
How does it work?

- Motor turns bit that cuts through material
- Work piece is stationary and the cutting head is moved

What are limitations?

- Usually not a very tall z-axis
- Some models can only do 2D shapes
- Desktop models may have weak motors
- Much thicker kerf than a laser cutter

Cost? \$1000 (desktop model) - \$70,000 (industrial model). Most likely little to no cost once in a shop.



Mechanical Engineering Machine Shop

- Location
 - Hamerschlag C124
- Machines
 - Lathe (metal)
 - Drill press
 - Mill
 - Band saw
 - CNC mill, other machines
- How do I gain access?
 - Be a MechE and take course 24-200

Architecture Wood Shop

- Location
 - CFA
 - North Entrance, door just inside on the right
- Machines
 - Lathe (wood)
 - Drill Press
 - An assortment of woodworking equipment
- How do I gain access?
 - Take the Freshman Architecture studio (48-100, Fall only)

ECE Shop

- Location
 - Hamerschlag Hall A108
- Machines
 - Most likely drill press, mill, and lathe
- How do I gain access?
 - Open to ECE students, non-ECE students should be taking an ECE course. Contact Steve Hoffman, shop foreman
 - Take EH&S/bioraft online Student Shop Safety, hand/power tools training, and fire safety training courses: <https://cmu.bioraft.com/>
 - Some machines must be operated by shop technicians

Civil Engineering Shop

- Location
 - Porter A and B levels (in the Civil Engineering departmental area)
 - Enter on First floor, take stairs by Tung Au room. Entrance is at the end of the hallway
- Machines
 - Lathe
 - Drill Press
 - An assortment of saws (Band saw, Table saw, Miter Saw, Radial Arm Saw)
- How do I gain access?
 - Currently, there is no way to gain access to this shop

Chemical Engineering Shop

- Location
 - Doherty Hall B211
 - Go to B level and follow the signs to the Collaborative Machining Center
- Machines
 - Lathe
 - Mill
 - Drill Press
 - (Many others we did not cover)
- How do I gain access?
 - Be trained by Larry Hayhurst, the head of the shop
 - Possible A4 Mini this semester, talk to Susan for more info

Purnell

- Location
 - North side of Purnel (but South of Miller Gallery) on the first floor
- Machines
 - CNC Router
 - Drill Press
 - Lathe
 - Most likely:
 - Mill
- How do I gain access?
 - Be a drama student

School of Art Wood Shop

- Location
 - Doherty Hall C-level Art Wing, C202
- Machines
 - Drill press
 - Dual-action compound miter saw, table saws, band saws, panel saw, scroll saw
 - Several drills, brad guns, jig saws
 - CNC Router
- How do I gain access
 - Must be trained through the shop master, Eli Kessler
 - Non-majors can also use the shop

School of Art Metal Shops

- Location
 - Ferrous metals: Doherty Hall D200A
 - Soft metals: DH B303 and B306
- Machines
 - *In both shops:* Drill press, miter saws, band saws, benders, welding tools, grinders, sanders
 - *In D200A:* Spot welding machines, cutoff saw, various handheld machines/tools
 - *In B303/306:* polishing/buffing machines, various metalworking hand tools
- How do I gain access
 - Free to use, must be trained & in a class that uses the metal shops
 - Contact Eli Kessler

IDeATe

- Location
 - Turn right at landing and it is the first door on your left
- Machines
 - Drill Press
 - CNC Router
 - Basic woodworking tools
- How do I gain access?
 - Make sure you are comfortable using the tools in the shop
 - Ask whoever is on duty at landing and they will let you in
 - Only open when landing is open
 - Not all of the tools are up and running so double check with the landing office

Industrial Design

- Location
 - PH27
 - Enter Porter using the entrance by Hamerslag and Wean
 - Continue down hall and it is the glass door on the left
- Machines
 - Drill Press
 - Mill
 - Lathe
 - CNC Router
- How do I gain access?
 - Take the Industrial Design studio

Robotics Institute

- Location
 - Newell Simon Building, in room NSH-1401
- Machines
 - Mill
 - Lathe
 - Drill press
 - Horizontal and vertical band saws
 - Abrasive cutoff saw, CNC mill and lathe, other machines
- How do I gain access
 - Take a qualification course, work under supervision, charges \$10/hour for use unless special Robotics Institute circumstance

Robotics Club

- Location
 - Basement of CUC down hallway between FedEx and ATMs
- Machines
 - Mill
 - Lathe
 - Drill Press
 - Table saw, compound miter chop saw, table and handheld circular saws, jigsaw, dremel
- How do I gain access
 - Must pay dues of \$15/semester, go to training and pass test(s)

Buggy

- Location
 - Mostly below Stever, key card access
- Machines
 - Lathe
 - Drill press (metal)
 - Band saw
 - Other machines depending on which team's shop
- How do I gain access
 - Join a buggy mechanic team (gets you card access), training if needed/uncomfortable, should be free of charge

Carnegie Mellon Racing

- Location
 - East Campus Garage, near booth cages
- Machines
 - Lathe
 - Mill
 - Drill Press
 - (others we did not cover)
- How do I gain access?
 - Join Carnegie Mellon Racing and attend a shop training
 - Talk to Josh Kubiak

Scotch'n'Soda

- Location
 - CUC Basement, down hallway by FedEx, on the right
- Machines
 - Drill Press
 - Table saw, circular saws, drills, brad guns (and other various hand tools)
- How do I gain access?
 - Shop is open during builds, training if needed, though shop is used only for set construction