

Drill Press (Upright Drilling Machine)

This study guide will cover the major working parts, functions, and machining techniques that can be found/used on most **Drill Presses** (Upright Drilling Machine)

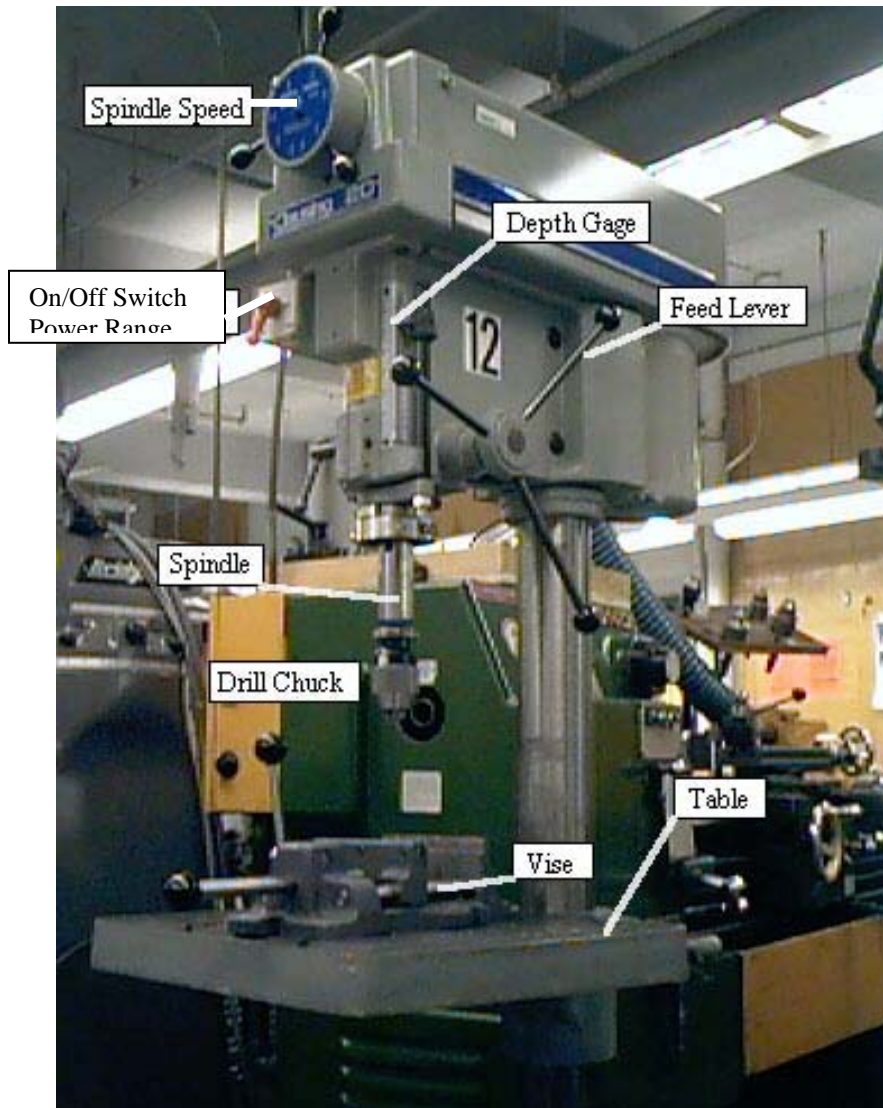
This study guide has been designed to directly represent the questions that will be found on the open book written assessment and as an aid for the hands-on usability assessment. Both assessments will also include questions related to standard machine shop safety and APS internal user safety guidelines.

Answering the questions found at the end of the study guide will enable the user to successfully pass the hands-on usability and written assessments. Study guide practice test and answers can be found at the end of the guide.

The **Drill Press** is one of the most frequently used machine tools. They are used mainly for drilling holes but reaming, countersinking, and boring can also be accomplished with the drill press.

Most machine shops are equipped with at least one pedestal-type drill press. These machines are used to drill holes in wood, plastic, aluminum, brass, steel, and most other common engineering materials. Injuries on this equipment generally arise from careless operation by users who fail to take the time to clamp their work to the table or who try to hold the drill press vise in one hand while advancing the spindle in the other. Be sure to clamp your work securely before drilling. Another common injury results from broken cutting tools. When a drill begins to emerge from the bottom of the work piece on through-holes, the feed rate needs to be reduced in order to prevent the drill flutes from biting too aggressively into the work. This action sometimes causes cutting tool breakage. Reduce the feed force and let the drill advance slowly.

- Machine Guarding required – suggest using a magnetic backed safety shield as a minimum.
- Secure the work piece by clamping it to the table or holding it in a vise.
- Clear the table of unnecessary clutter.
- Wear safety glasses.
- Do not wear gloves while drilling.
- Constrain long hair (wear a hat).
- Constrain loose clothing (roll up your sleeves).
- When the tool is about to break through, ease up on the feed force..
- Remove chip fragments only when the machine spindle is stopped.
- Never remove long stringy chips with your bare hands.



THE CONTROLS

POWER/RANGE

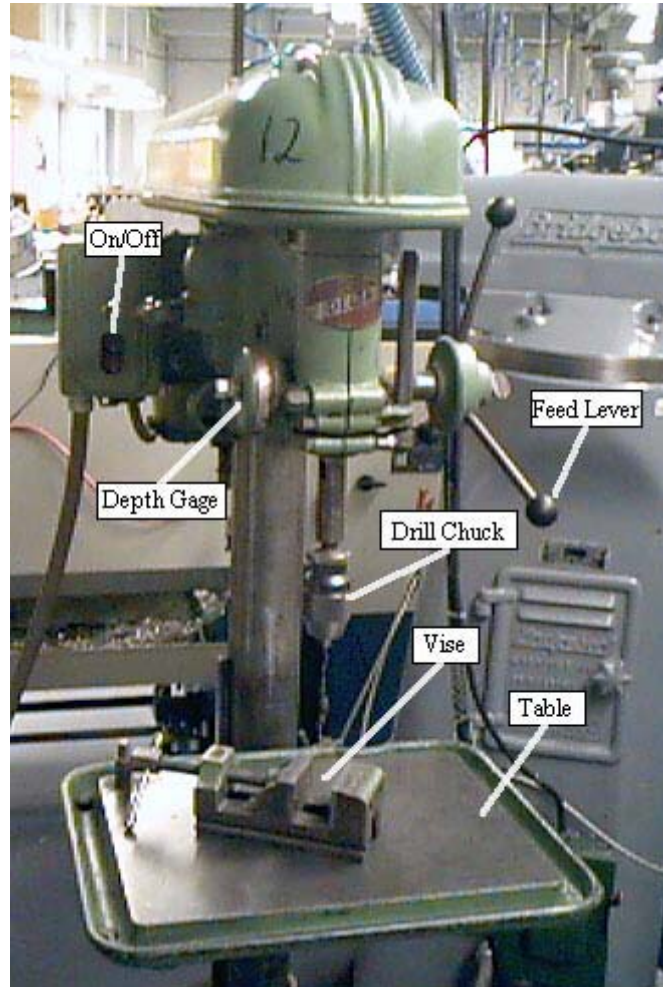
This switch has three positions, high range, low range and off. Low range is used when larger holes or harder materials need to be machined while high range is useful when small holes and softer materials are being drilled. Some machines may have separate switches for power and range, or only one range, as the second picture shows.

SPINDLE SPEED

Both the high range and low range spindle speeds are changed using this control. The speeds should only be changed while the motor is running.

FEED LEVER

The Feed Lever is used to raise and lower the spindle.

**USING THE DRILL PRESS**

Parts being machined with the drill press must either be in a vise or clamped to the table. A piece of plywood must be used under parts that are clamped to the table. This prevents drilling into the tabletop.

After a part is secured it must be aligned under the spindle. The part should have all lines and points laid out with a scribe or punch before moving onto any machining, this will help align the spindle to the proper locations on the part.

The following steps can be used as a guideline for drilling a hole in metal or plastic:

- Step 1:** Drill a center drill hole to start the hole. Note: The center drill should leave an opening big enough to give the first drill a place to start cutting.
- Step 2:** As a rule you should always start with a 1/8th" drill and increase the drill size by 1/8th" increments until the required drill size is approached.
- Step 3:** Use the final drill size. Note: If a hole must be an exact size at finish then a reamer must be used. A hole approximately 1/64th" smaller than the size desired should be drilled before finishing the hole with a reamer.

If these precautions are used the drills will last longer and there is less of a chance that a mistake will be made. Starting holes with small drills can also help avoid breaking the drill off inside your part or cracking Plexiglas parts. The speed of the drill is also inversely proportional to the size of the drill, so small drills require a high spindle speed and as the size of the drill increases the speed of the drill press should be decreased.

Special drilling application:

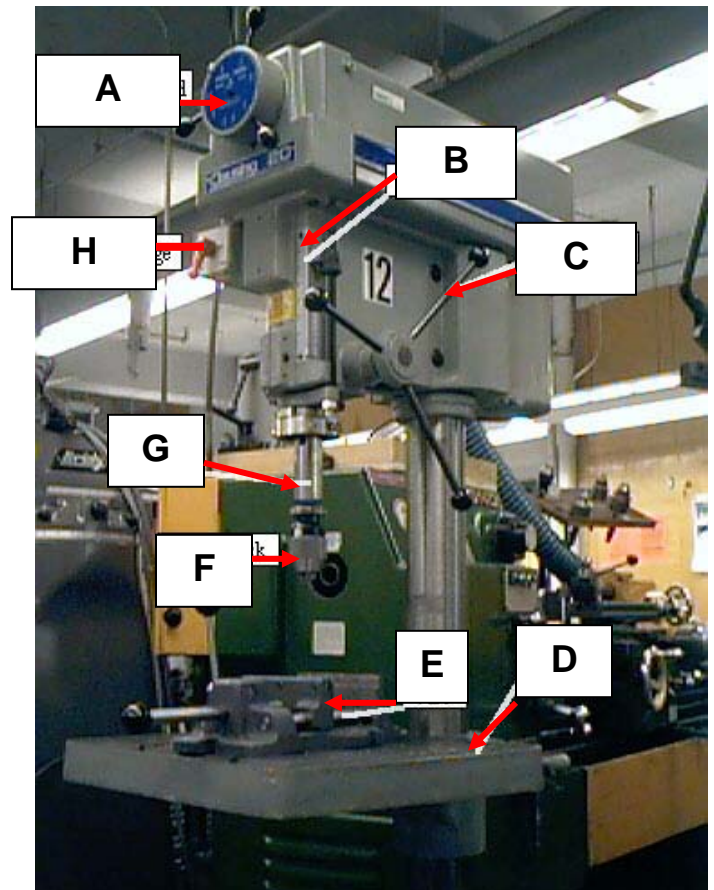
One last note should be made about drilling thin materials, plexi-glass or soft metals. A brand new drill is not always better when cutting plexi-glass or soft metals because it tends to bite into it and may pull it out of the vise. There are special drills that are dulled on the cutting edge in order to avoid this problem.

Practice Test

The following questions have been designed to directly represent the questions that will be found on the individual user written assessments and can be used as an aid for the hands-on usability assessments.

Identify the parts of a Drill Press

1. _____ Power Range switch
On/Off switch
2. _____ Table
3. _____ Vice
4. _____ Spindle Speed
5. _____ Feed Lever
6. _____ Depth Gage
7. _____ Spindle
8. _____ Drill Chuck



9. Always secure the work piece by clamping it to the table or holding it in a vise.

True False

10. Maintain constant awareness of activity in surrounding area.

True False

11. A drill press is a power-driven machine used to drill, counter-bore and counter-sink holes.

- True False
12. Counter-boring is done to prepare a drilled hole to receive a fillister or socket-head screw.
- True False
13. Spot facing is machining a surface to permit a nut or bolt head to bear uniformly (flat).
- True False
14. It is permissible to leave the chuck key in the chuck while drilling a hole.
- True False
15. When drilling a hole on a drill press it is OK to stop the drill chuck with your hands to make the job go faster.
- True False
16. Most drill bits have their size stamped or written on the shank of the drill.
- True False
17. Serious injury can result from a work piece that becomes loose and spins during a drilling operation in a drill press.
- True False
18. What is the name of the tool used to remove the drill chuck from the spindle of the drill press?
- A. Chuck Key
 - B. Chisel
 - C. Drift Pin
 - D. You un-screw it
19. The prick punch is used to mark where a hole is to be drilled.
- True False
20. Too slow a speed will cause the countersink to chatter.
- True False
21. Use only brushes, vacuums or special tools for machine clean up.

True False

22. The work piece should never be held in the hands while drilling.

True False

23. Always use vices or clamps to hold work pieces while machining.

True False

24. Serious injury can result from a work piece that becomes loose and spins during a drilling operation in a drill press.

True False

25. It is permissible to leave the chuck key in the chuck while drilling a hole.

True False

26. Be thoroughly familiar with the placement of the machine's "stop" switch or lever.

True False

27. A drill with a worn margin will:

- A. Drill holes oversize
- B. Drill holes undersize
- C. Run off center
- D. Drill an accurate hole

28. . A high-speed drill will never break.

True False

29. . Brass and aluminum may be drilled faster than steel.

True False

30. While drilling a hole, never hold work piece with your hands.

True False

31. To pick up a hole for accurate drilling a center drill should be used first.

True False

**Study Guide
Answer Sheet**

- | | |
|-----------|-----------|
| 1. H | 17. True |
| 2. D | 18. C |
| 3. E | 19. True |
| 4. A | 20. True |
| 5. C | 21. True |
| 6. B | 22. True |
| 7. G | 23. True |
| 8. F | 24. True |
| 9. True | 25. False |
| 10. True | 26. True |
| 11. True | 27. B |
| 12. True | 28. False |
| 13. True | 29. True |
| 14. False | 30. True |
| 15. False | 31. True |
| 16. True | |