

Lesson #5: Drill Press Identification and Safety

Objectives

Students will be able to...

- Identify the Drill press major components and safety operation.

Common Core Standards

LS 11-12.6
RSIT 11-12.2
RLST 11-12.2
Health and Safety 6.0, 6.2, 6.3, 6.5, 6.6
Technical Knowledge and Skills 10.0, 10.1, 10.2
Demonstration and Application 11.1
Cabinetmaking and Wood Products Pathway A4.1, 4.3, & A4.4
Residential and Commercial Construction Pathway D2.1, D3.1, D3.2, D3.3

Materials

Drill Press Identification and Safety Worksheet

Lesson Sequence

- Complete the *Drill Press Identification and Safety Worksheet* with students gathered around the drill. As the parts of the drill, not only discuss what their function is, but also demonstrate how they function. (30 minutes)
- Return to the classroom and have students work on the safety questions. (15-20 minutes)

Assessment

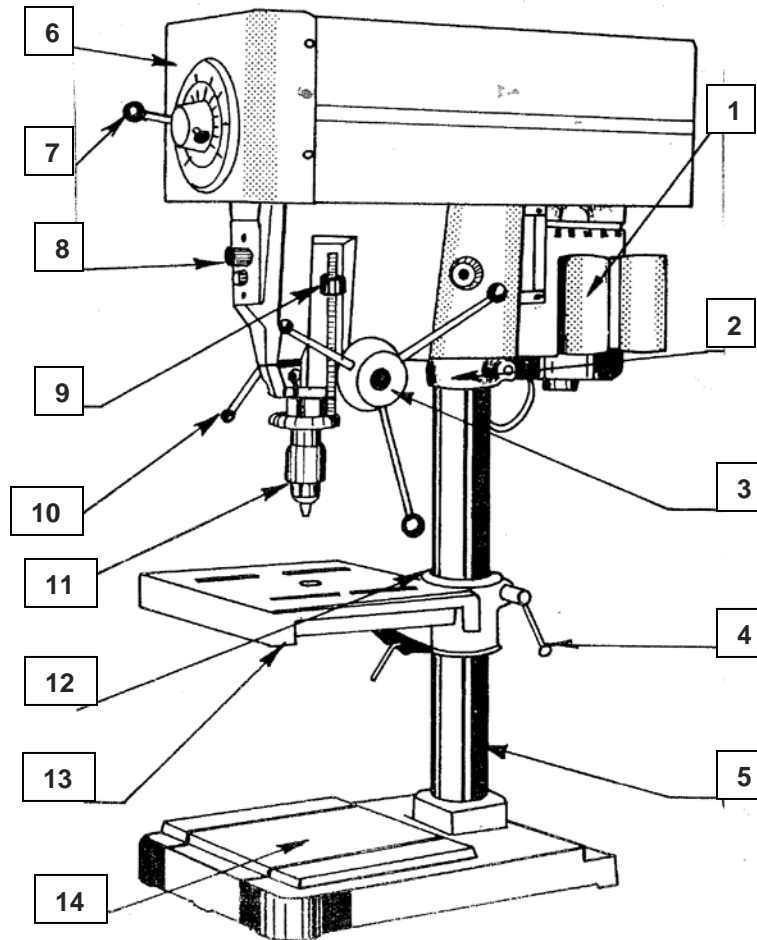
Monitor student learning through questioning. Monitor student learning by roaming around the classroom while students are working on their safety questions.

Accommodations/Modifications

One on One Support
Partner as Needed
Check for Understanding

Drill Press Identification and Safety

Part 1: Identify the numbered parts on the drill illustrated below.



- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____

- 8. _____
- 9. _____
- 10. _____
- 11. _____
- 12. _____
- 13. _____
- 14. _____

Part 2: Safe Operational Procedures

1. General drilling:

- a. Use a drill gage to determine drill size.
- b. Be sure drill is sharp and ground properly
- c. Be sure the material is clamped firmly.
- d. Feed drill into material at a constant rate.
- e. When drilling round stock, use a "V" block vise.
- f. Place work on a block of wood to prevent damage to the table.

2. Wood drilling:

- a. Using a combination square, draw two lines perpendicular to each other with their intersection being the center of the hole to be drilled.
- b. Select proper drill speed
 - Use 1250 RPM for most wood drilling up to 3/4 "diameter.
 - Larger bits should be run at a slower speed.
 - Expansive bits will burn if run much over 600 RPM

3. Metal drilling:

- a. Use a scribe or scratch awl to mark point for punch mark.
- b. Center punch a mark large enough to receive the point of the drill.
- c. Select the exact size of drill.
- d. Use a pilot hole for holes larger than 1/2".
- e. Select the proper drill speed for drill size.
- f. Use cutting oil when drilling into steel.
- g. When drilling holes to be tapped, be sure to use the exact drill for the size tap selected. (See drill and tap charts). The hole should be approximately 1/16" smaller than the tap size.

DRILLING SPEEDS AND FEEDS							
Speed: Revolutions Per Minute							
Diameter of Drill, Inches	Cast Iron		Steel		Brass		Feed Per Revolution, Inches
	Carbon Steel Drill	High Speed Steel Drill	Carbon Steel Drill	High Speed Steel Drill	Carbon Steel Drill	High Speed Steel Drill	
	35 ft. per min.	70 ft. per min.	30 ft. per min.	60 ft. per min.	100 ft. per min.	200 ft. per min.	
$\frac{1}{4}$	535	1070	458	917	1528	3056	0.005
$\frac{1}{2}$	268	535	229	458	764	1528	0.008
$\frac{3}{4}$	178	357	153	306	509	1018	0.010
1	134	267	115	229	382	764	0.012

Part 3: General Safety Practices

1. Wear eye protection always when operating the drill press.
2. Do not operate the drill press without permission from the instructor.
3. Clamp the material to be drilled securely to the table.
4. Place the long end of the piece being drilled to the left so it will hit the post and not the operator should the material slip and start rotating.
5. Be sure chuck is tight on drill and that the drill and chuck match. The chuck should always be tightened in all three tightening positions.
6. Always remove the chuck wrench from the chuck immediately after using it.
7. Be sure drill is sharp and operating at proper speed.
8. Never wear gloves while operating the drill press. They may get caught.
9. Do not wear loose-fitting clothes when operating the drill press.
10. Do not feed the drill faster than it can be easily cut.
11. Remove the chips from the machine with a brush.
12. Do not reach around the machine.
13. Keep long hair tied back or covered to keep it from getting wrapped around the chuck.
14. Do not talk to anyone while operating the machine.

15. Do not drill into a container that may have contained gasoline or other flammable materials.
16. Support long material being drilled.
17. Slow drill feed when it is breaking through the material to finish hole.
18. Hold round stock in a "V" block.
19. Clamp sheet metal between two blocks of wood and drill through wood and metal.

Part 4: Completion Questions

1. A drill gage can be used to determine _____.
2. A _____ block should be used to hold round stock.
3. A _____ placed under the material being drilled will prevent damage to the table.
4. Expansive wood bits should not run faster than _____ RPM.
5. A _____ punch should be used before a hole is drilled in a piece of metal.
6. As a rule, larger drills run _____, while smaller drills run _____.
7. When drilling a hole in metal larger than $\frac{1}{2}$ ", use a _____.
8. _____ oil should be used when drilling steel.
9. When drilling a hole to be tapped, the drill size should be approximately $\frac{1}{16}$ " _____ than the tap size.
10. The long end of a piece of material should be kept to the _____ to prevent injury to the operator should it start to rotate.

Drill Press Identification and Safety – *Answer Key*

Part 1:

1. Motor
2. Head support safety collar
3. Pilot wheel
4. Table locking clamp
5. Column
6. Safety guard
7. Variable speed pilot wheel
8. Switch
9. Depth stop
10. Quill lock
11. Key chuck
12. Tilt angle scale
13. Tilting table
14. Lower table or base

Part 4:

1. Drill size
2. V
3. Block of wood
4. 600
5. Center
6. Faster; slower
7. Pilot hole
8. Cutting
9. Smaller
10. left