

Lesson #2: Router Bits and Router Safety Test

Objectives

Students will be able to...

- Identify the router's 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

Safety glasses
Router Safety test
YouTube video <https://www.youtube.com/watch?v=TL6T1rYh-CA>
Electric Router Bits Notes

Lesson Sequence

- Have students wear **safety glasses** and enter the shop for a safety and operations demonstration on the router. (10 minutes)
- Return to classroom and hand out the **Router Safety Exam**. Students must pass safety test before they can participate in a project. (20 minutes)
- Watch **You Tube video** <https://www.youtube.com/watch?v=TL6T1rYh-CA> answer any questions students may have (5 minutes).
- Pass out the **Electric Router Bits Notes**. Read together as a class and highlight important information. (15 minutes)

Assessment

Students must pass the router safety exam in order to be able to participate in a project in the shop.

Accommodations/Modifications

Read Safety Test Aloud
Extra Time
Check for Understanding

Router Safety Test

Directions: Fill in the blank spaces with the words from the word bank.

Thick	Bits	Variable	Patient	Reach
Unplug	Diameter	Tear-out	Towards	Off
Shallow	Touching	Pad	Fence	Securely
Both	Sharp	Dangerous	Passed	Lock-lever

1. The material to be routed must not only be smooth and in good condition, but also _____ enough to allow for a safe cut.
2. Whenever you have to adjust the depth of the router bit, make sure to re-secure the lock-knob or _____.
3. After you have _____ your safety exam, and had the router's safe operation demonstrated for you; you may use the router.
4. When routing large pieces of material, be careful that you do not over- _____.
5. Make sure that any bit you intend to use in a given router is smaller in _____ than the hole in the router base.
6. Be aware of the router bit's rotation. Always run the router along the material in a direction that keeps the cutting edge of the bit facing _____ the material being routed.
7. Make a series of _____ passes with the router when making a deep cut or when using a large diameter bit.

8. Make sure the router bit is not _____ the material when you turn the router on.
9. Never try to rout a piece of material and hold on to it at the same time. Use a router _____ or a clamp to hold the material for you.
10. Be _____, allow the router to attain full speed before beginning your cut. This is even more important on a router with a soft start.
11. As will all our tools and machines, never force the router to cut faster than it should. Forcing can damage the router's motor and bearings, while causing _____ of the material being routed.
12. Always hold the router firmly, with _____ hands.
13. Before plugging the router in, make sure that the bit is _____ and in good condition.
14. Always _____ the router when changing bits.
15. Be sure that the router's on/off switch is in the _____ position before plugging the router in.
16. Tighten the collet _____ but avoid over-tightening.
17. With the shop routers that are _____-speed, you can adjust the RPM of the router's motor to match the bit size and material density.

Router Safety Test – Answer Key

1. The material to be routed must not only be smooth and in good condition, but also **thick** enough to allow for a safe cut.
2. Whenever you have to adjust the depth of the router bit, make sure to re-secure the lock-knob or **lock-lever**.
3. After you have **passed** your safety exam, and had the router's safe operation demonstrated for you, you may use the router.
4. When routing large pieces of material, be careful that you do not over-**reach**.
5. Make sure that any bit you intend to use in a given router is smaller in **diameter** than the hole in the router base.
6. Be aware of the router bit's rotation. Always run the router along the material in a direction that keeps the cutting edge of the bit facing **towards** the material being routed.
7. Make a series of **shallow** passes with the router when making a deep cut or when using a large diameter bit.
8. Make sure the router bit is not **touching** the material when you turn the router on.
9. Never try to rout a piece of material and hold on to it at the same time. Use a router **pad** or a clamp to hold the material for you.
10. Be **patient**, allow the router to attain full-speed before beginning your cut. This is even more important on a router with a soft-start.
11. As will all of our tools and machines, never force the router to cut faster than it should. Forcing can damage the router's motor and bearings, while causing **tear-out** of the material being routed.
12. Always hold the router firmly, with **both** hands.
13. Before plugging the router in, make sure that the bit is **sharp** and in good condition.
14. Always **unplug** the router when changing bits.
15. Be sure that the router's on/off switch is in the **off** position before plugging the router in.
16. Tighten the collet **securely**, but avoid over-tightening.
17. With the shop routers that are **variable**-speed, you can adjust the RPM of the router's motor to match the bit size and material density.

Electric Router Bits Notes

Router bits are the cutters that do the shaping. They are machined in many precise shapes and angles called profiles.

- Router bits come with have either a 1/4" or 1/2" shank. Long thin bits and 1/4" shank bits are vulnerable to bending and stress. Be careful when applying pressure to a cut when using bits of this description.
- 1/2" bits are stronger, stiffer and less likely to break.
- Common production bits have a carbide face, for longer service life. Carbide bits are brittle. Do not drop on steel tables or concrete floors, as they can break.
- A saw shop must sharpen carbide with diamond grinding wheels. Carbide is a 'must' for plastic laminate and particleboard due to the abrasive characteristics of these products, but even a carbide-tipped bit will only cut about 75 lineal-feet (running-feet) of MDF before becoming dull.
- Pitch build-up is a sign of a dull bit. The bit heats up and draws pitch out of the wood. Sharpen or exchange the bit.
- Dull bits will tear and chip the grain, causing burn marks on the work and overload the motor.
- Clean and lubricate pilot bearings. Contact cement can seize a bearing and unthread the bearing screw. The bearing can fall off and the router bit will dig into your work. Pay constant attention to the condition of pilot bearings.
- Inspect router bit shanks for damage, which may be a sign of a damaged collet.
- Sharpen or replace bits when you see burn marks. Heat builds up when waste chips are not cleared, or the feed-rate is too slow.

Router bits come in many profiles. That's the term for the shape of the cutting edge. Here are some of the most common:



Straight Bits: A workshop staple, these bits make cuts straight into a material to form a groove or dado (a groove across the wood grain) or to hollow out an area for a mortise or inlay. They come in a variety of diameters and lengths.



Rabbeting Bits: Guided by a spinning pilot bearing at the tip, these bits are designed specifically to cut a rabbet (shoulder) in the edge of a work piece often used to join pieces. They can be purchased in a set that includes bearings of different diameters, allowing a single bit to produce rabbets of different sizes.



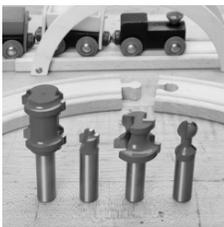
Flush-Trim Bits: As the name suggests, these bits are used to trim the edge of one material flush with the edge of another– for example, trimming a veneered surface flush with a substrate or using a pattern to create multiple identical pieces. They usually are guided by a pilot bearing that's the same diameter as the cutter. The bearing may be at the tip of the bit or at the base.



Chamfer Bits: These bits cut a bevel of a particular angle to ease or decorate the edges of a surface. They also can create the beveled edges needed to join multi-sided constructions.

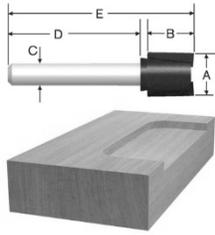


Edge-Forming Bits: As the name suggests, edge-forming bits are most often used to cut a decorative edge. For example, Round-Over bits cut a rounded edge of a particular radius (such as 1/8" or 1/4"); Ogee bits cut variations of an S-shaped profile; Edge-beading bits cut a quarter- or half-circle profile (called a bead); Cove bits cut a concave quarter-circle. Many edge-forming bits include a pilot bearing. In most cases, these bits are used for final decoration of a project where edges have already been established and can serve as guides for the bit.



Specialized Bits: This category includes bits dedicated to specific tasks. Examples are molding bits, which incorporate multiple edge-forming profiles into a single bit; stile-and-rail bits, which are used to shape the frame pieces in frame-and-panel constructions such as cabinet doors; and raised-panel bits, which shape the edges of a door panel to fit into the corresponding slot in the frame's stiles and rails.

These bits are somewhat large and can be used safely only in a table-mounted router. Other specialized bits include dovetail bits, drawer-lock bits, finger-joint bits and lock-miter bits.



Mortising Bit used for: Hinge pockets, Rabbits, Dados, Mortising



Dovetail Bit used for: Used in drawer making, and dovetail jig



Cove Bit used for: Edge detail, Moldings, Used in combination with other details in many moldings