COURSE NUMBER: 02

COURSE TITLE: ROUTER AND TABLE ASSEMBLY OPERATIONS

COURSE HOURS: 3

Safety is a personal issue. The Guild and the author do not accept responsibility for any accidents that may occur while using this guide.

I. COURSE OBJECTIVES

- To learn the basic safety and operating practices related to the Porter Cable, 3 HP, and Variable Speed Router when used in conjunction with:
    i. A Router Table
    ii. Woodpecker's Quick Lift
    iii. Incra Twin Linear Fence.

This guide does not cover free hand routing or specialized applications on the Incra Fence.

II. CLASS MATERIALS

- 1 pc. 4/4 hardwood 4'X6"
- 1 pc 4/4 hardwood 6" X 15" with curved [profile on one side.
- Hearing and eye protection

III. LESSON PLAN

A. EXPLAIN GENERAL SAFETY RULES

- Never operating any machinery when tired, sleepy or under the influence of any medications which may cause drowsiness
- Wear clothing which holds close to the body. Shirts should be short sleeved. Pants should not snag on machinery. Do not wear gloves
- Remove all jewelry possible. This includes watches, rings, and especially necklaces
- Footwear should be sturdy, have good traction and protect the toes. Sandals should be avoided

- Long hair should be secured under a cap so as not to hinder vision and pony tails should be tucked into the shirt
- Always wear approved safety glasses or goggles
- Always use hearing protection
- Always keep tool surfaces clean & clear of misc. materials
- Always be aware of other people operating in your vicinity
- Always provide proper support for materials as outlined later in this training plan
- Always make sure the tool is in proper working order
- Never use a dull tool
- Always seek assistance when handling heavy or awkward materials or anytime you are unsure about how to proceed
- Always respect the tool for what it may do to you or someone nearby if there is a lapse in safe operating procedures
- Think and plan before you cut, never rush your work, and never force the tool.

B. SHOW THE COMPONENTS OF THE ROUTER

- Variable speed
- fixed in table – upside down
- Soft start
- Connecting the router
- Overload protection – If activated, the router will need to be turned off, the cause determined and the router switched back on.

C. EXPLAIN THE SPECIFIC ROUTER SAFETY ISSUES

- Exposed bit can cut operator
- Bit can eject from collet
- Running at wrong speed
- Feeding in wrong direction
- Cutting between router and fence (bearing bits only)
- Wood kicks back – too deep a cut, feeding too fast, foreign object in wood, incorrect feeding angle.

D. SHOW THE COMPONENTS OF THE TABLE

- On/off switch on side
- Mobile – requires wheels to be locked when in use
- Accessible plug – must be removed when adjusting the Router or other table components
- One dust collection gate and two ports
- Review contents of drawers and shelves, including the approved guides, supports, tools, fence instructions and templates.

E. SHOW THE DETAILS OF THE PRECISON ROUTER LIFT (PRL)

- Replaces height adjustment on router
- Adjust height from top of table
- Requires a hex wrench be inserted in designated slot and turned to raise and lower the router.
- Each full turn adjusts the height 1/32”
- Has automatic break feature
- Includes set of insert twist lock rings
- Includes a starter pin

F. EXPLAIN THE SPECIFIC PRL SAFETY ISSUES

- Must raise the router to within ¼” of maximum height to change bit
- Never adjust height while router is running

G. SHOW COMPONENTS OF THE TWIN LINEAR FENCE

- Makes cuts exactly where you want them
- A wooden fence with a zero clearance insert has been added so the split fence is inoperable
- Carriage clamp controls movement, locks at 1/32” intervals
- Carriage clamp has interim setting for micro adjustment which allows settings between 1/32”
- Contains primary and rotating scale
- A high fence, a stop assembly and a push guide are available but since it requires removal of the wooden fence they should not be used..
- Master reference guide, template library, Operating manual (OM)

H. EXPLAIN THE CHOICES OF BIT SELECTION

- Two categories – with/without bearing
- Many shapes and sizes
- Shank size, bigger is best

I. EXPLAIN SPECIFIC BIT SAFETY ISSUES

- Bits dirty or not sharp
- Cutters chipped or damaged
- Carbide not secure
- Bit too large for router

J. SHOW THE CHOICES OF BITS WITH BEARING

- Designed to cut without fence – note: on straight cuts use of the fence is recommended
- Bearing follows the profile of edge of wood
- Types: coves, round over, ogee, rabbits, raised panel,
- Can adjust depth of cut by changing bearing

K. SHOW THE CHOICES OF BITS WITHOUT BEARING

- Must use fence
- Types: dados dovetails, coves.

L. DEMONSTRATE AND HAVE THE STUDENT PERFORM THE INSTALLATION OF THE ROUTER BIT

- Remove plug from outlet
- Set fence away from work area
- Remove twist lock ring
- Insert hex wrench into slot and raise the router to within a ¼" of its maximum height. Select appropriate collet
- Be sure collet is free of debris
- Insert bit – NOTE – Bit must be inserted into collet at least ¾", more on larger bits, and must clear the bottom of the collet by at least 1/16"
- Tighten securely. NOTE – avoid damaging the edges of the PRL twist ring opening.
- Adjust the router cutting height by turning the hex wrench until the router reaches its final setting

M. EXPLAIN AND HAVE THE STUDENT PARTICIPATE IN THE FOLLOWING BEFORE YOU PLUG IN THE MACHINE:

a) You must install the starting pin if using bearing bits. Note:
Used only to start the cut and Kick Back can occur if wood does not approach the bit at the correct angle

b) Make a decision, full cut vs. partial cut.
- Factors - Hardness of wood
- Size of bit
- Type of router
- Tear out characteristics of wood
- Sharpness of bit

c) Decide on use the fence
Recommended on straight cuts for safety reasons

Requires knowledge of fence set up – covered below

d) Set speed of router; five positions

- 1/2" - 3 1/ 2" bit – 10,000 rpm
- 2 - 2 ½ 15000 rpm
- Smaller than 2" 15 – 24000 rpm.

e) Check clearance on collet – bit height may require adjustment, but do not exceed minimums and maximums for bit insertion.

f) Install appropriate twist lock ring – be sure it is locked in place.

N. SHOW AND HAVE THE STUDENT PRACTICE RAISING AND LOWERING THE BIT FINE ADJUSTMENTS ONLY

- Quick Lift has an automatic brake
- Turn crank to increase or decrease the height, clockwise to rise.
- For all adjustments be sure the router is not running
- Determine the final height of the bit and zero the dial indicator. Make sure screw is tight
- Set height to initial cutting height.

O. SHOW AND HAVE THE STUDENT PRACTICE ADJUSTING THE FENCE

- Fence is moved by releasing the carriage clamp
- Bit gap is set by inserting the appropriate zero-clearance insert via the two socket head screws. Be sure the original fence clears the router bit as well! It is also adjusted by loosening and tightening four socket-head screws.

P. SHOW AND HAVE STUDENT PRACTICE HOW TO ZERO THE FENCE TO ROUTER BIT - OM PAGE 14

- Align the fence to the inside of the bit. Clamp
- Set measurement at zero under hairline cursor
- Move fence, say one inch, and make cut.
- Use micro fence to set final distance at one inch .OM page 9.

Q. SHOW AND HAVE STUDENT USE THE FENCE WITH THE BEARING

- Align fence with outside of the bearing, using a straight edge against both fences and bringing it up to just touch the bearing.
- Clamp in place. If it is not perfectly aligned use the micro adjustment to set final distance.

R. SHOW AND HAVE STUDENT PRACTICE CUTTING OPERATIONS

a) No bearing bits – must use fence

- Fence is on the right of the wood. Bit is left of the fence.
- Feed from front fence to back fence, switch is on left. Never feed in the opposite direction
- KEEP HANDS AWAY FROM CUTTER
- No small pieces
- Scale may need to be adjusted to reference the bit on the inside, outside or center.
- High rise fence may be needed OM page 5
- Stops may be required OM page 6& 7
- Practice feeding the wood through the router at different heights to get a feel for the proper height setting.

b) Bearing bits – no fence

- Be sure fence is out of the way, all keys and wrenches removed and the work space clean.
- Check to see switch on table in off position
- Turn on dust collector
- Plug in machine
- Start machine
- The router bit should be to the right of the wood.
- Place the wood against starting pin and gently ease into
- The cutter. Starting corner of wood must be beyond the center point if the bearing or kick back may occur.
- Once the wood is engaged with the bearing, release it from the starting pin and proceed with a smooth even cut, not too slow not too fast. Do not stop or you will burn the wood.
- Maintain a firm grip on wood.
- At the end of the cut be sure the cut does not “drop” over the back corner
- Do not force tool. Stop if force is required
- KEEP HANDS AWAY FROM CUTTER. Use hold downs and push sticks.
- Do not over reach.
- No small pieces
- If taking several passes, stop the router before adjusting depth of cut
- If cutting all the way around a board do cross cut fist to reduce tear out. It can be further reduced by clamping a board to the support the exit edge.
- Tip, if taking several passes, set final depth. Then count # of turns on handle to bring router up to make the first pass. Then count the turns for each pass until you are at the final depth.

c) Bearing bits - fence

- Fence must be aligned with the outside of the bearing, meaning most of the bit is inside the fence gap.
- Feed wood against fence with a smooth even movement, no stopping
- KEEP HANDS AWAY FROM CUTTER
- Wood is feed from front fence to back fence. Router table switch on left.
- Never feed between bit and fence
- Tip. You can elect to take smaller cuts by moving the fence instead of changing the depth of the bit.

S. SHOW AND HAVE STUDENT CONDUCT THE FOLLOWING OPERATIONS AFTER CUTTING IS FINISHED

- Stop dust collector
- Pull plug
- Clean up
- Remove twist lock ring
- Do not touch hot router bit just after cutting.
- Set router to maximum height and remove bit. Tip: Cannot get the bit out. Initially you loosen the collect with the wrench. Once free continue to loosen it free hand. When the collect becomes hard to turn, one more turn with the wrench and the collet becomes loose and the bit is freed from the collet.
- Check bit to see if it is still sharp and undamaged. Return it to appropriate storage
- Use the hex wrench to lower the router to its lowest position, and install the blank twist lock ring

T. REVIEW TOPICS WITH STUDENTS

U. PERFORMANCE AND CERTIFICATION

Student demonstrates safety and operational knowledge in the following areas:

- Changing bits
- The table
- Pro Lift
- Adjusting and aligning fence
- Cutting operations using bearing and non bearing bits

REVISED
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