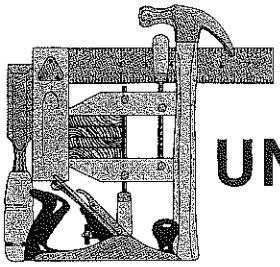

UNIT 10

POWER PLANING

Edges and faces of stock can be smoothed using hand tools or power tools. However, power tools can smooth the stock more efficiently when used properly. After reading this unit, you will be able to identify the power planing tools used in a typical woods laboratory. After the instructor demonstrates the proper set-up and technique, you will be able to properly use the power planers in your laboratory.

THE JOINTER

A JOINTER is used to remove warp and other surface imperfections from the edges and faces of stock. This makes the stock straight and true. Straight and true stock is necessary to ensure that other operations, such as sawing and drilling, will also produce square cuts and holes. The jointer is also used to cut chamfers, bevels, rabbets, and tapers.

The size of the jointer is specified as the length of its KNIVES. The knives are the parts of the jointer that actually do the cutting. A jointer usually has three knives, which revolve in a CUTTERHEAD at about 4500 RPM. A jointer, as shown in Fig. 10-1, is equipped with an infeed table, outfeed table, fence, and cutter guard. The INFEED TABLE, or front table, is adjusted to the desired depth of cut. It is adjusted with either the handwheel or an adjustment lever

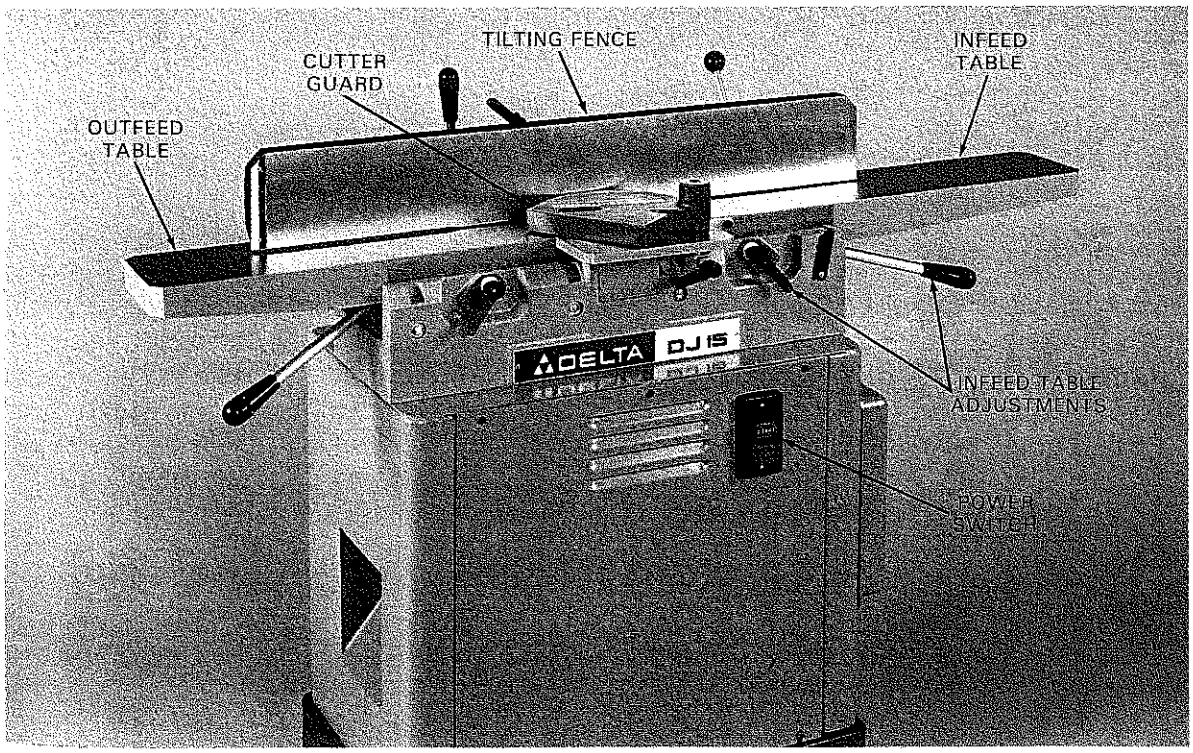

Fig. 10-1. A jointer is used to surface the face, edge, or end grain of wood. (Delta International Machinery Corp.)

located below the infeed table. The OUTFEED TABLE must be set even with the cutting edges of the knives at their highest point in their rotation. The outfeed table should be locked in this position if straight cuts are desired. The FENCE is used to guide stock as it is pushed from the infeed table to the outfeed table. The fence may be moved in or out to accommodate different widths of stock. It may also be tilted to make angular cuts. The CUTTER GUARD is positioned over the cutterhead to protect the operator from injury, and protect the edges of the knives from damage. The cutter guard is spring loaded. When stock is fed across the jointer, the guard only exposes a small amount of the cutterhead and knives. Fig. 10-2 shows a cross-sectional view of the jointer.

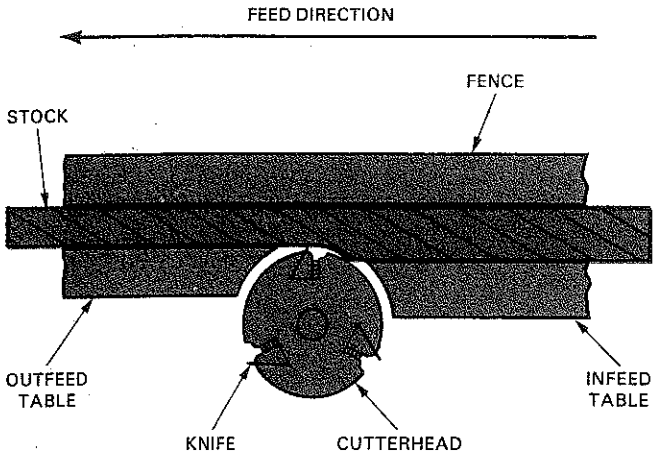

Fig. 10-2. Jointer operation. The cutterhead rotates clockwise, while the stock is fed into it.

Stock Size and Depth of Cut Limitations

Stock to be smoothed on a jointer should be at least 12-inches long. This allows a good portion of the stock to be on the outfeed table as the last portion of the stock is leaving the infeed table. When jointing the surface of stock, the minimum surface width should be 1 inch and the minimum thickness should be 3/8 inch. When jointing the edge of stock, the minimum surface width should be 2 to 3 inches and the minimum thickness should be 3/8 inch, Fig. 10-3. This allows you to keep your fingers well above the cutters. Variations of these minimums are possible with the use of special jigs and fixtures designed for the operator's protection.

Stock that projects beyond the length of the infeed table by more than 18 inches should be

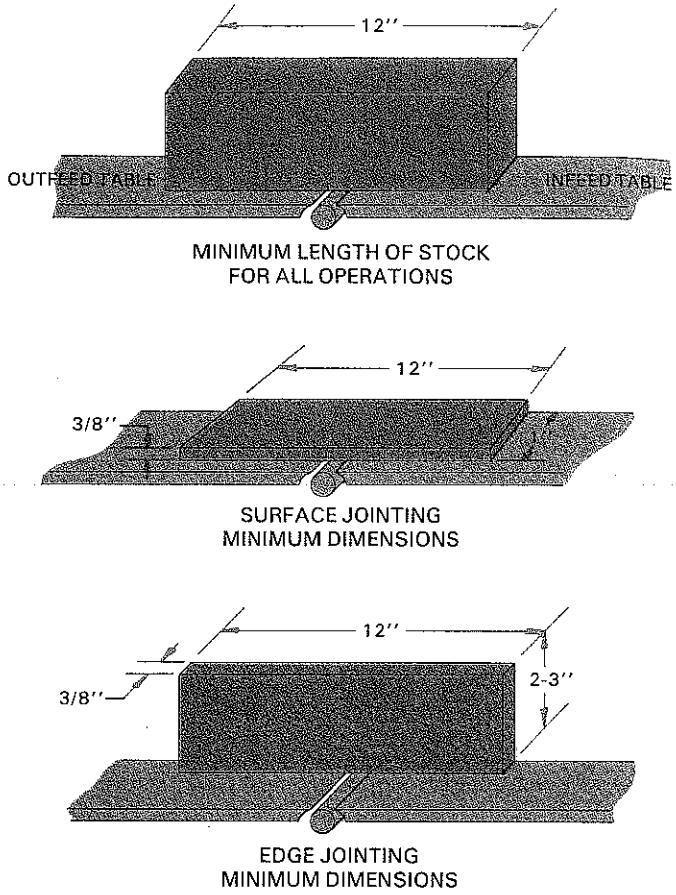

Fig. 10-3. Minimum stock dimensions for the jointer.

jointed by two people. The operator should be in control of feeding the stock, while the assistant should balance the weight of the stock. It is good practice to carefully plan your work to avoid jointing short pieces. Stock that is 48- to 60-inches long is a manageable length. Stock that is 10- to 12-feet long should be cut into two or three manageable pieces prior to jointing, unless the long lengths are necessary for the product.

The depth of cut depends on the width and hardness of the stock, as well as the feed rate. Generally, lumber that is hard and wide should be fed slowly into the jointer. Maximum recommended depth of cut for hardwoods is 1/32 to 1/16 inch. Softwoods may be jointed using a 1/16 to 1/8 inch depth of cut.

Jointer–Safety and Care

1. Always secure permission from the instructor before using the jointer.
2. Only use stock that is free from knots and splits on the jointer.
3. Keep your hands at least 4 inches away from the knives and cutterhead.

4. Use a push stick for planing flat surfaces and jointing narrow edges.
5. Make sure that the area beyond the infeed table is clear before turning on the motor.
6. Jointer knives must be kept sharp. Dull knives cause vibration and poor cuts.
7. Feed the stock so that the knives cut with the grain.
8. Surface cupped stock with the concave side down. This allows you to have two points of the stock in contact with the table.
9. Do not attempt to operate the jointer without the guard in proper position.

Jointing Edges

Adjust the fence so it is square with the infeed able. Place the handle of a try square on the nfeed table and rest the blade along the fence. See Fig. 10-4. When the fence is in the proper

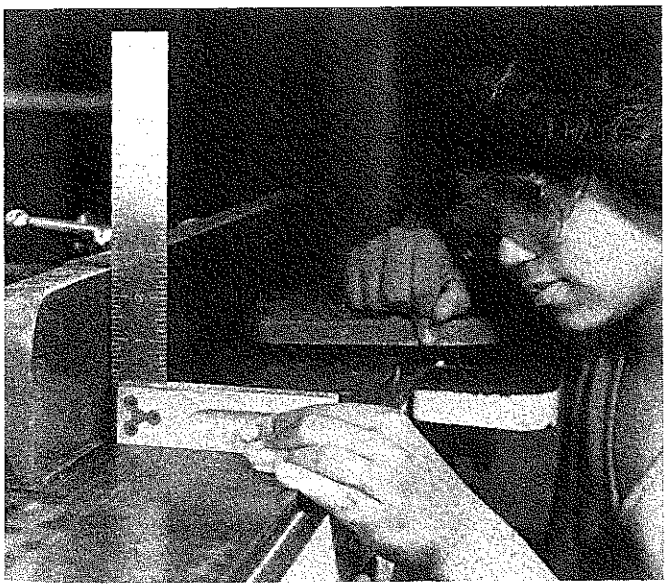

Fig. 10-4. Adjusting jointer fence square with table.

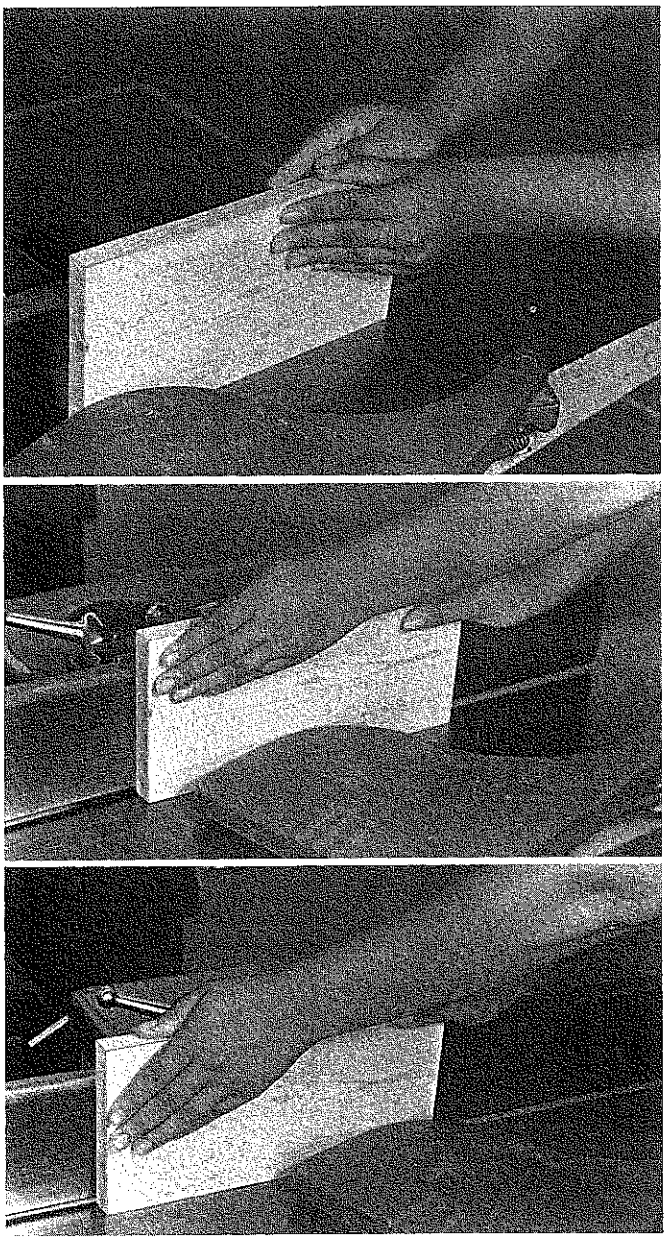

Fig. 10-5. Jointing a board. Above. Applying pressure on the fence and infeed table. Center. Applying pressure on the fence and both tables. Below. Applying pressure on the fence and outfeed table.

position, lock it in place. Set the depth of cut for 1/32 to 1/16 inch using the handwheel or adjustment lever. You might want to check your setup at this time by using a piece of scrap lumber of the same species. When you have determined that you have the correct setup, inspect your finish stock to determine the grain direction. Turn the stock so the knives will cut with the grain.

Make sure the guard is in its proper position over the cutterhead. Place the stock on its edge on the infeed table. Rest the surface of the stock against the fence. Stand to the left of the jointer and turn on the motor. Refer to Fig. 10-5 as you read the next few sentences. Hold the stock firmly against the fence and infeed table while pushing it over the cutterhead. When about a foot of the stock has passed over the cutterhead, lift your left hand from its original position and apply pressure on the stock against the fence and outfeed table with that hand. Use both hands to apply pressure against the fence and outfeed table at the end of the stroke.

Narrow pieces can be jointed safely by using a push stick, Fig. 10-6. Make sure that you have

the push stick in hand before starting the jointing operations. The left hand should be lifted across the cutterhead to apply pressure to the piece against the fence and outfeed table.

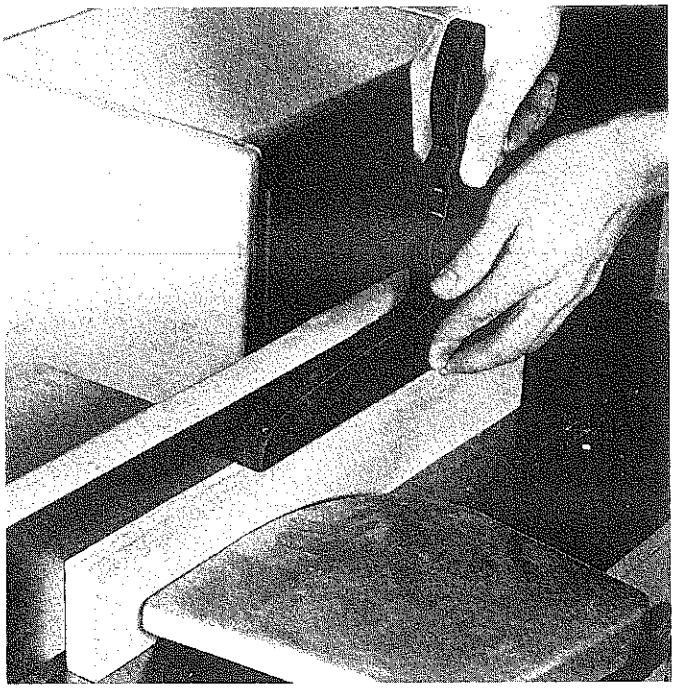

Fig. 10-6. Jointing a narrow board with a push stick.

Chamfering and beveling can also be done with the jointer. Set the fence to the desired angle using a sliding T-bevel as a guide. Then, lock the fence in place. When jointing the edge to the desired angle, make sure that surface of the stock is held firmly against the fence.

Planing Surfaces

The surface, or face, of the stock must be jointed to provide a true surface when laying out other measurements. The first surface, or working surface, is smoothed with a jointer. Set the depth of cut for 1/32 inch. (A smaller depth of cut is required since you will be removing stock from a larger surface area than when edge jointing.) Turn the stock so the knives will cut with the grain. Make sure that you have a push stick or push shoe in one of your hands. It will be needed when planing surfaces. See Fig. 10-7. Step to the side of the jointer, make sure the guard is in its correct position, and turn on the motor.

If the stock is warped, place it on the infeed table with the cupped surface down. Use a push

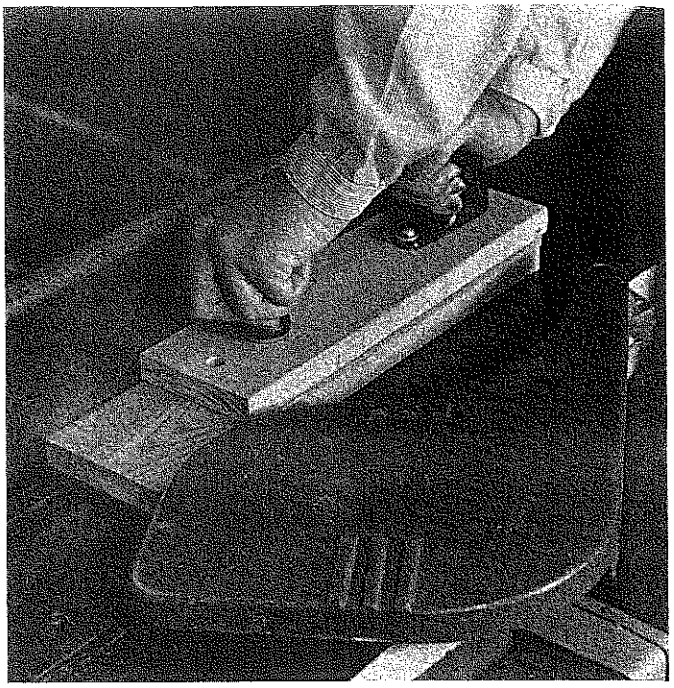

Fig. 10-7. Smoothing the surface of stock using a push shoe.

stick to apply pressure against the fence and infeed table while pushing the stock over the knives toward the outfeed table. Gradually shift the pressure to the outfeed table as the cut is completed. Continue to push the stock across the jointer until the guard snaps back over the cutterhead.

Rabbeting

Rabbets may be formed on the jointer, although there may be more efficient methods of forming the joint. Move the fence toward the rabbeting platform on the left side of the machine. Adjust the fence to the width of rabbet desired. This distance is measured from the end of the knife, not the edge of the table. Lock the fence in place. Set the depth of cut to 1/16 of an inch and push the stock over the cutterhead. See Fig. 10-8. Reset the depth of cut for additional cuts until the desired depth of rabbet is obtained.

PORTABLE POWER PLANES

The PORTABLE POWER PLANE is designed mainly for edge jointing stock, such as doors and plywood panels. It is used in a manner similar to the hand plane. A MOTOR rotates a cutter that precisely removes the desired amount of stock. The planer has an adjustable FENCE

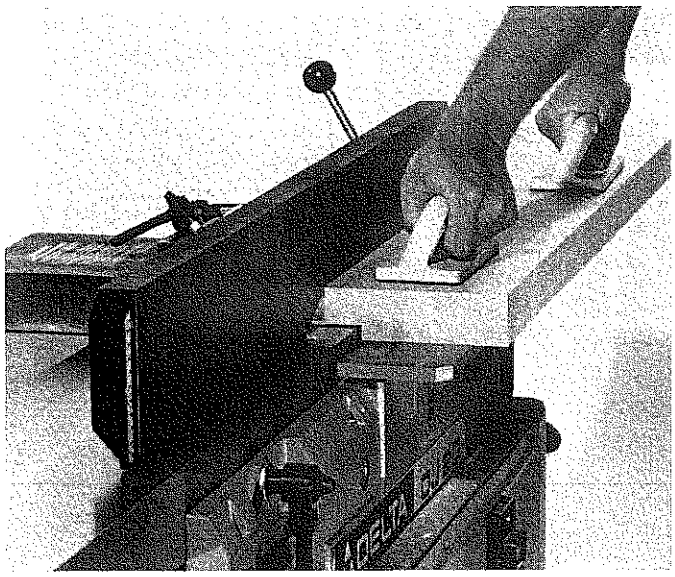

Fig. 10-8. A rabbeting platform is used when making rabbets along the edge of the stock. Note that this operation requires removal of the guard. Always secure your instructor's permission before attempting this operation. Use extreme care when performing the operation and replace and adjust the guard when finished. (Delta International Machinery Corp.)

to set the width of cut, and an adjustable FRONT TABLE to set the depth of cut. See Fig. 10-9. Some portable power planes have a removable fence that allows for surface planing.

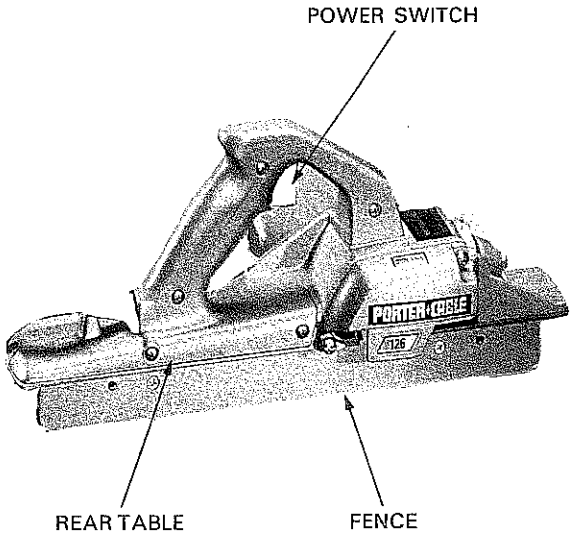

Fig. 10-9. A portable power plane is more efficient than a hand plane. (Porter-Cable)

Planing Edges

Clamp the stock securely in a vise. Make sure that the edge to be planed is accessible. Set the depth of cut on the plane for 1/16 inch. Rest the table of the plane on the edge of the stock. Turn on the motor and allow the plane to obtain full speed. Push the plane across the edge applying pressure against the fence. Follow through at the end of each stroke. Turn off the motor when completed with the operation. Make additional cuts as necessary.

PLANER OR SURFACER

The PLANER, or SURFACER, is used to machine stock to exact thickness. A planer is equipped with a CUTTERHEAD that usually contains three knives, similar to a jointer. However, unlike the jointer, the planer cuts the stock on the top surface. The size of a planer is specified by the length of the knives and the thickness of the stock it will accept. Common planer sizes for the woods laboratories are 12, 18, and 24 inches. See Fig. 10-10.

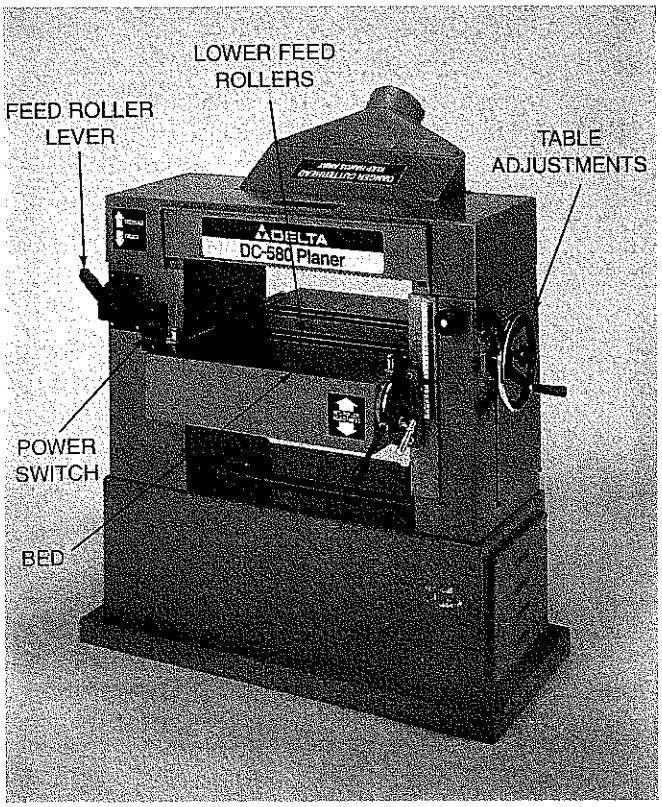

Fig. 10-10. A planer is used to surface stock. Note the positions of the controls. (Delta International Machinery Corp.)

A planer is equipped with four feed rollers-two infeed and two outfeed. The UPPER INFEED ROLLER, which is milled or corrugated, and LOWER INFEED ROLLER pull the stock through the cutterhead. The CHIP BREAKER and the PRESSURE BAR hold the stock down as it is fed through the machine, Fig. 10-11.

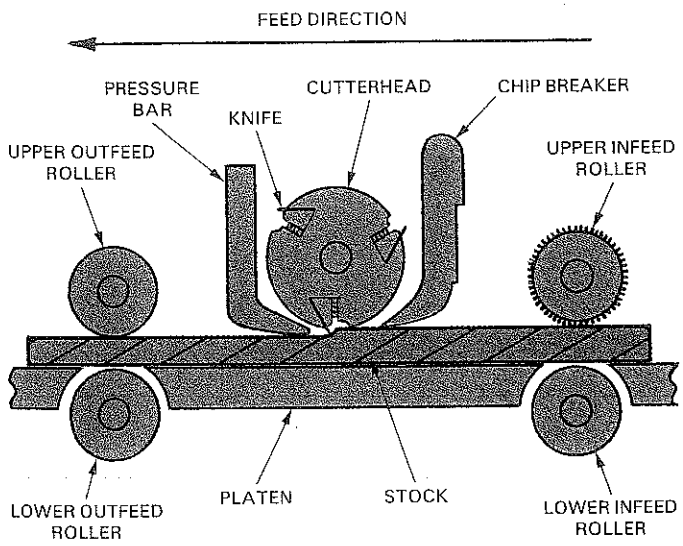

Fig. 10-11. Planer operation. Note the position of the parts.

Depth of cut is set by adjusting the table. The smooth outfeed rollers grasp and pull the stock as it passes below the cutterhead. The combination of the infeed and outfeed rollers ensures a smooth, even feed of the stock across the cutterhead.

Planer–Safety and Care

1. When using the planer, never surface a piece of stock shorter than the recommended minimum length. Consult the instructor or operation manual if this information is not posted on the machine. The minimum length of stock to be used with most planers is 12 to 16 inches.
2. Hold the stock in a horizontal position and with both hands as it is fed into the planer.
3. Feed stock so the planer knives cut with the grain.
4. Wide stock and hardwood stock should be fed at slow speeds. The depth of cut should also be reduced.
5. Inspect the stock for defects. Make certain the stock does not contain any nails or paint, and that it is warp-free.
6. Never look into the mouth of the planer while it is running. If stock gets caught or turns sideways, stop the machine before lowering the table. Then remove the jammed material.

Planing Stock

The stock to be planed must have one true face or surface. This face is first smoothed on the jointer. The cupped shape of defective stock will not be removed by using only the planer. The feed mechanism of the planer will flatten the stock before the stock enters the cutterhead. As the stock leaves the planer, it will return to its original shape. Measure the stock at its thickest point to determine its dimension. Set the planer for this thickness minus the depth of cut. For example, if the stock is 13/16-inch thick and depth of cut is 1/16 inch, set the planer to 12/16, or 3/4, inch. The recommended depth of cut is 1/32 to 1/16 inch for hardwoods and 1/16 to 1/8 inch for softwoods. Make sure that your stock is long enough to pass through the planer without getting caught. The minimum length of stock to be used with most planers is 12 to 16 inches.

Position the stock so the knives will cut with the grain. Make sure the true surface is down. Grasp the board with both hands, one on each side of the stock. Hold the stock horizontally and allow the infeed rollers to pull the board across the cutterhead. Make sure that you do not have your fingers between the stock and the infeed table. Stand to the side of the stock as you feed it; do not stand directly behind the stock, Fig. 10-12. Walk to the back side of the planer to receive the board. Reset the depth of cut and make additional cuts until the desired thickness is obtained. When planing stock that is 6 feet or more in length, either use an assistant to "tail-off," or use an outfeed stand to support the stock. If the stock is not properly supported, the

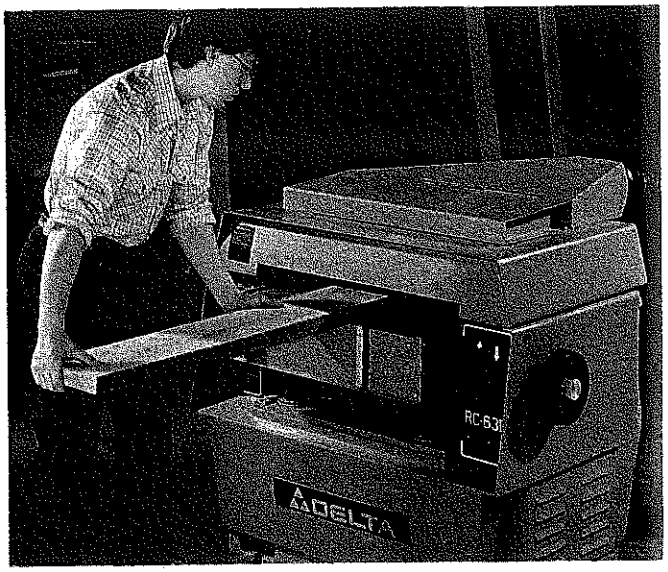

Fig. 10-12. Stand to the side of the stock as you feed it into the planer. (Delta International Machinery Corp.)

weight of the stock pushing downward could result in an uneven finish thickness or damage to the planer.

TEST YOUR KNOWLEDGE, Unit 10

Please do not write in this text. Place your answers on a separate sheet of paper.

1. List four uses of a jointer.
2. The _____ table must be set even with the cutting edge of the jointer knives.
3. The _____ is used to guide stock as it is pushed from the _____ table to the _____ table.
4. Cupped stock must first be smoothed on a _____ before using a planer or surfacer to machine it to the exact thickness.
5. It is possible to cut chamfers, bevels, and rabbets on the jointer. True or False?
6. Why should the cupped surface be placed down when jointing it?
7. Unless a piece of stock has been previously surfaced, one face should be smoothed on the jointer prior to using the planer. Why?
8. The fence on the jointer must be at 90 degrees to the table when cutting a chamfer or bevel. True or False?
9. The guard must always be in place and functioning when using the jointer except when cutting rabbets. The fence is then moved to the outer edge of the table to avoid excess exposure of the cutters. True or False?
10. A piece of stock should not be fed into the planer/surfacer sideways even if the width is above the minimum capacity of the machine. True or False?
11. The rate of feed for softwoods is slower than for hardwoods. True or False?
12. The depth of cut should be reduced when cutting hardwoods. True or False?
13. Stock that extends beyond the outfeed table by 6 feet or more should be handled by "tailing off" or using an outfeed stand. Why?
14. Why shouldn't you have your fingers between stock and the infeed table of a planer?

ACTIVITIES

1. Compare the illustration of the jointer in Fig. 10-1 to the jointer in your wood laboratory. How do they differ? How are they alike? Does your jointer have a handwheel or lever for depth adjustment? Is your fence mounted by the cutterhead or attached to the end of the infeed table? Is there a dust collection hook-up to your jointer? Where is the ON-OFF switch? Are the push sticks and push shoes close at hand?
2. Cut a piece of 2 x 4 dimensional lumber about 3 ft. in length. Set the tables of the jointer even. Disconnect the power and practice pushing the board over the cutter. First, do an edge, then a face or surface. Practice this until you are comfortable with the feel of the guard moving and your stance and hand movement.

   Carefully inspect the edge for knots. Set the jointer to make a 1/16- to 1/8-inch cut. Edge joint the board until the rounded edges have been removed. Adjust the infeed table to make a 1/16-inch cut. Re-inspect the board for defects and place the best face down. Use a push shoe to joint the surface to 1 1/4 inches.
3. Look at the planer/surfacer in your wood laboratory. Who is the manufacturer? Where is the power switch? Does the cutterhead have a brake? Is it manual or electric? Is the dust collector attached to the planer? Where is the adjustment for height of the table? Is ear protection available for the operator?
4. Use the board from Activity 2 and prepare to surface the board using the planer/surfacer. First, measure the thickness of the stock and set the table height of the planer to this distance minus 1/16 inch. Set the feed rate at its lowest speed. Carefully feed the stock into the planer. What happens when the board touches the infeed rollers? Move to the back of the planer and wait for the outfeed rollers to release the wood. Measure your stock. Did the planer remove 1/16 inch? What is the appearance of the surface? Are there any mill marks visible? Increase the depth of cut to 1/8 inch and feed the stock through the planer. Does the machine sound any different with the 1/8 cut than it did with the 1/16 inch cut. Inspect the surface again and note any difference. Increase the feed rate and surface the stock one more time. Develop your own conclusions about the feed rate and depth of cut.