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HOW TO MACHINE WORK HELD IN A CHUCK ON A LATHE

Lesson One

Lathe Setup and Workpiece Preparation

TPC Training Systems

32501

Lesson

1 Lathe Setup and Workpiece Preparation

TOPICS

Checking the Lathe
Basic Holding Methods
Chuck Size Selection
Installing a Chuck
Installing Work in a Chuck
Correcting Misalignment
Centering Odd Shapes in a Chuck
Using a 3-Jaw Universal Chuck
Using a Collet Chuck
Using Mandrels
Workpiece Description
Planning the Work Sequence
Using a 4-Jaw Independent Chuck
Removing a Chuck

OBJECTIVES

After studying this Lesson, you should be able to…

- Select and install a chuck.
- Install and center work in a chuck.
- Use a 3-jaw and 4-jaw chuck.
- Use a collet chuck.
- Use a mandrel.

KEY TECHNICAL TERMS

Back plate 1.13 the back section of a 3- or 4-jaw chuck which contains the internal threads that screw onto the lathe spindle nose

Chuck key 1.13 a device that fits into the screws that tighten the jaws of a 3- or 4-jaw chuck

Jaw slots 1.13 slots located around the circumference of a 3- or 4-jaw chuck that are used to locate and hold the jaws

Many workpieces cannot be mounted and machined between lathe centers because of their particular size and shape. These pieces must be held in a chuck or mounted on a mandrel for machining.

This Lesson describes how to select the best holding and mounting methods for machining the shorter workpieces that cannot be mounted between centers. It describes how to install and adjust the jaws of a chuck so that the work in held firmly in the correct position. It explains how a mandrel is used to hold larger work in the lathe.

This Lesson also covers inspection of the lathe and its parts. The process of setting up the lathe to make a sleeve bearing housing is described. Description of this setup also includes installation of the rough workpiece in the lathe for initial operations. Along with this, a general setup is described for a 3-jaw universal chuck, a collet chuck, and a mandrel.

Checking the Lathe

1.01 Regardless of the method you use for holding a workpiece, always check the lathe before setting up for a job. Inspect the spindle threads for nicks and burrs which could cause binding or misalignment of a chuck or faceplate. Be sure there are no chips in the threads or around the spindle nose. With the lathe power off, use a clean tag to wipe off the spindle threads. Apply a light coat of oil to the thread surfaces.

1.02 Make sure the lathe is level and the ways are in good condition. Locate the automatic speed and feed controls and check their available operating ranges. It is also wise to check with the last operator of the machine. You may learn things about the lathe's general condition that can help you make minor adjustments that will save time and money.

Basic Holding Methods

1.03 It is important to know the basic chuck and mandrel holding methods. You will use these methods in many of the jobs you will encounter. Holding methods covered in this Lesson are:

- 4-jaw independent chuck
- 3-jaw universal chuck
- collet chuck (sometimes referred to as a spring collet)
- mandrel (not considered a chuck).

Each of these holding methods is of equal importance. The workpiece you will eventually machine in this Unit will be held in a 4-jaw independent chuck.

1.04 The two most commonly used chucks for holding medium to large workpieces are shown in Fig. 1-1. They are the 4-jaw independent chuck and the 3-jaw universal chuck. The jaws of the 4-jaw independent chuck shown in Fig. 1-1A are adjusted inward or outward separately. These jaws grasp and hold the workpiece. The jaws of the 3-jaw universal chuck shown in Fig. 1-1B operate in unison. A chuck key is used to adjust the jaws of both of these types of chuck.

1.05 The jaws of the 4-jaw independent chuck can be reversed to hold larger diameter work, as shown in Fig. 1-2B on the following page. A 3-jaw universal chuck sometimes has a separate set of jaws to handle larger work, since its normal jaws do not reverse.

Fig. 1-1. The two basic kinds of chuck

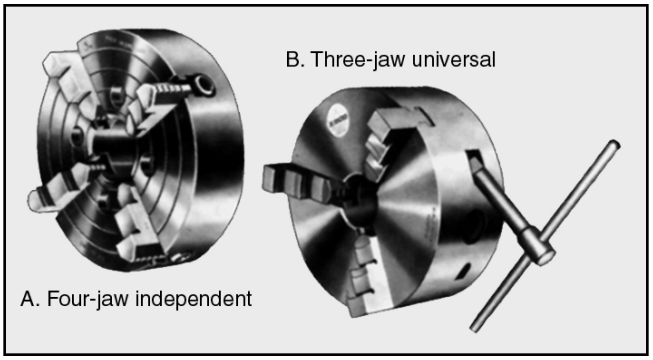
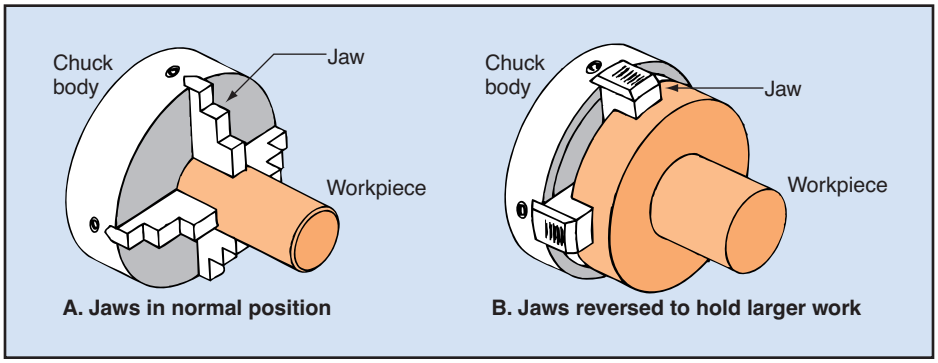


Fig. 1-2. Reversible chuck jaws



1.06 Irregularly shaped work can usually be handled by a 4-jaw independent chuck. Extremely odd shaped workpieces are best held on a faceplate by special holding and clamping devices. These methods and devices are explained in a later Lessons of this Unit.

1.07 The 3-jaw universal chuck is quick to set up and convenient to use. However, the extra gripping power of the 4-jaw independent chuck offsets the small amount of additional time needed to set each jaw separately against the workpiece.

1.08 Several other kinds of chucks are also used for holding work in a lathe. However, the use of most of these types of chucks is limited to highly specialized work. An exception is the common collet chuck, which is often used when very small diameter workpieces must be held.

Chuck Size Selection

1.09 The size of a lathe chuck is designated by its diameter, as shown in Fig. 1-3. The size needed for a given job is largely determined by the maximum diameter of the workpiece.

1.10 Table 1-1 shows the common sizes of chucks in both 3-jaw universal and 4-jaw independent designs. Table 1-1 also shows the size of lathe needed to accommodate a specific chuck.

1.11 Never try to stretch the lathe size by using a chuck with a diameter that gets too close to the lathe swing. This is an unsafe practice and can cause damage to both the lathe and the chuck. Using Table 1-1 as a guide, you would select a 4-jaw independent chuck with a $7\frac{1}{2}$-in. diameter to hold the $6\frac{1}{4}$ in.-diameter workpiece shown in Fig. 1-4. You must reverse the jaws of the chuck to hold this piece properly.

Installing a Chuck

1.12 Lathe chucks are precision tools. Handle them with care so the jaws and adjusting mechanisms are not damaged in any way. Study the chuck that you have selected to use. Inspect the internal threads to be

Fig. 1-3. The size of a chuck

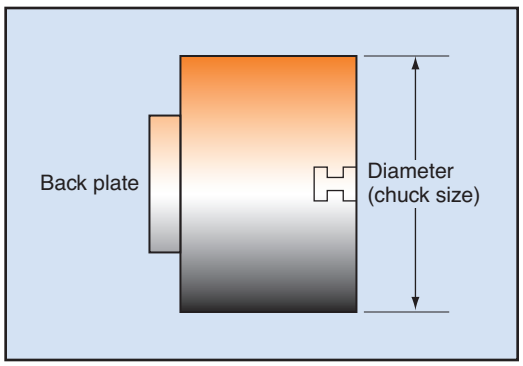
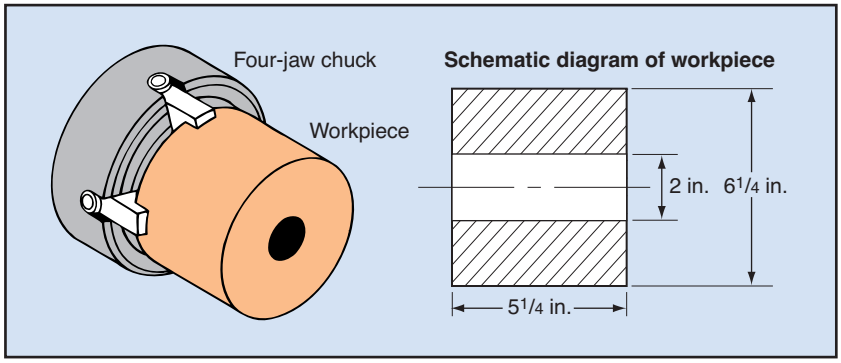


Table 1-1. Recommended chuck sizes for common lathe sizes

Size of lathe (swing, in.)	Diameter of chuck (in.)	
	Four-jaw independent	Three-jaw universal
9	6	5
10	6	5
13	$7\frac{1}{2}$	6
$14\frac{1}{2}$	9	$7\frac{1}{2}$
16 to 24	10	$7\frac{1}{2}$

Fig. 1-4. Fitting the chuck to the workpiece



sure they are free of nicks or burrs which could cause damage to the spindle threads.

1.13 Be sure the jaws move freely when the chuck key is inserted and turned. Inspect the jaw slots in the body of the chuck. Clean them out if necessary. Always be sure that you use the correct chuck key. The use of the wrong size key will damage the screw. Clean the internal threads in the back plate. You can do this by using a wire thread cleaner, as shown in Fig. 1-5. After cleaning the threads, apply a light coat of machine oil to the surfaces.

1.14 If a job requires the use of a 3-jaw universal chuck, study the chuck carefully. These chucks are usually stamped or marked with an identifying symbol or number. A matching set of jaws and chuck body must always be used together. Do not try to interchange these parts with other chuck bodies or jaws.

1.15 Each one of the jaws on a universal chuck is marked by a number "1," "2," and "3." The slots in the chuck body are marked with the same numbers. These numbers must be matched when fitting the jaws into the slots in the body of the chuck.

1.16 When removing the jaws from the chuck body, you must always remove them in "3," "2," "1" order. You must follow these assembly steps so that the scroll-and-bevel gear jaw adjusting mechanism, which is the heart of the universal chuck, will be able to work properly.

1.17 Before picking up the chuck, place a board across the lathe bed and ways under the spindle nose. This will protect the bed and ways if you were to drop the chuck during installation. Hold the chuck firmly in both hands and lift it up to the end of the spindle nose (Fig. 1-6 on the following page). Carefully place the chuck on the spindle without striking the nose. Do not let the weight of the chuck rest on the threads.

1.18 Turn the chuck clockwise until the threads take hold. Be sure the threads of the chuck and the spindle fit properly with no binding. If binding occurs, carefully back the chuck off the spindle. Clean the threads or otherwise correct the binding condition. Never use power of any kind to install a chuck on the spindle threads.

1.19 Manually turn the chuck onto the spindle nose until the back plate contacts the shoulder of the spindle. Do not use a spinning action to turn the chuck during installation. Turn the chuck onto the spindle slowly to avoid jamming it against the spindle shoulder.

Installing Work in a Chuck

1.20 The two main objectives when installing work in a chuck are to have the work centered prop-

Fig. 1-5. Cleaning internal threads of a back plate

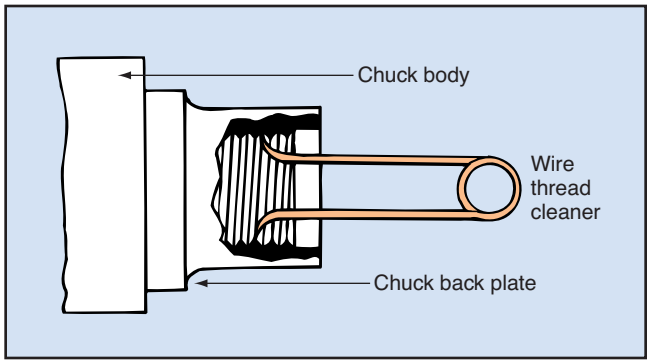


Fig. 1-6. Mounting a chuck

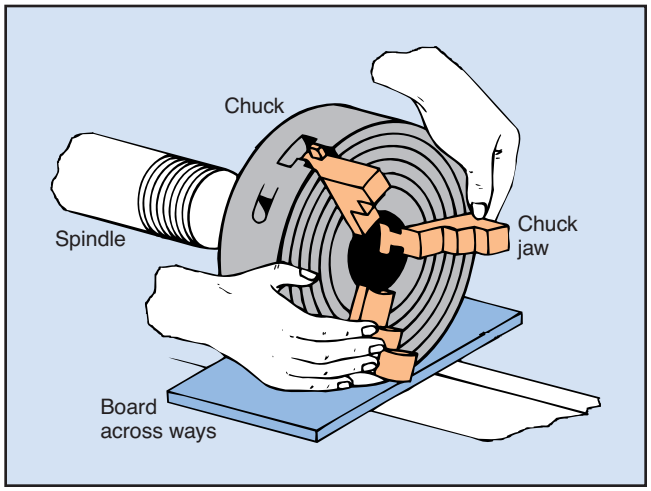
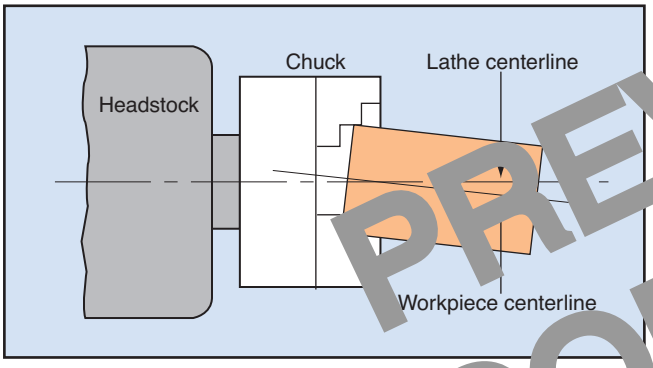


Fig. 1-7. Misaligned workpiece



erly, and to have the work axis parallel to the centerline of the lathe. Depending on the accuracy required for your job, and the type of chuck you are using, use one of the methods mentioned in this Lesson to center and hold work squarely in the chuck.

Correcting Misalignment

1.21 If the workpiece centerline is not parallel with the centerline of the lathe (Fig. 1-7), the work will appear to wobble when turned. This misalignment can be measured two ways—with chalk or by placing a dial indicator against the ends of the work. Both methods are described later in this Lesson.

1.22 To correct misalignment, position the inside end of the workpiece squarely against the chuck jaws or against the face of the chuck, depending on the position of the chuck jaws (regular or reversed). If you find high spots on the ends of the work, loosen the jaws slightly. Use a soft mallet and lightly tap the end of the workpiece until it seats squarely.

1.23 Figure 1-8 shows the sleeve bearing housing workpiece you will be machining in this Unit. Figure 1-4 shows this piece prior to machining. Mount the workpiece shown in Fig. 1-4 in a 4-jaw independent chuck. Use a test dial indicator to measure and set up the workpiece to obtain the lowest possible reading on the dial. Turn the chuck by hand when using this method.

Fig. 1-8. Sleeve bearing housing workpiece

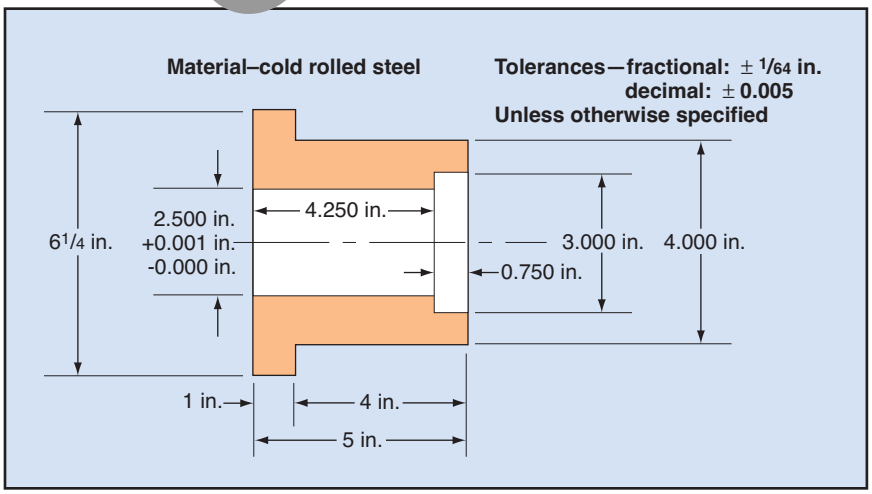
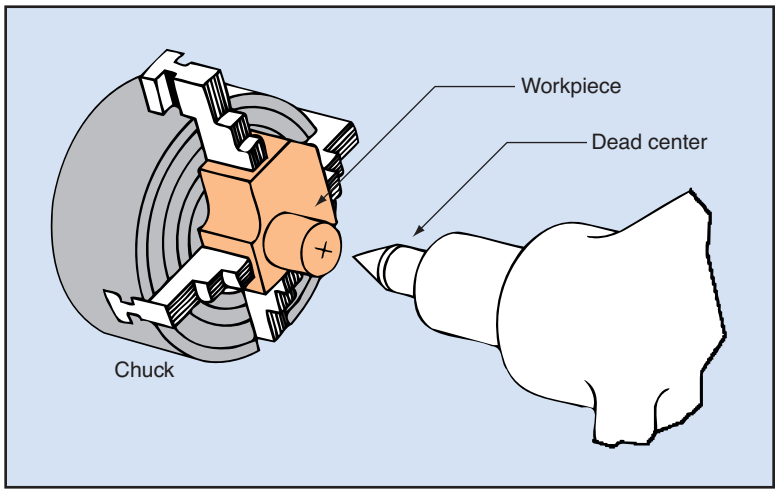


Fig. 1-9. Centering work with a dead center



Centering Odd Shapes in a Chuck

1.24 Some lathe jobs may require you to install and center irregular or oddly shaped work in a chuck. You can do this by using the dead center, as shown in Fig. 1-9. First, locate and mark the center of the workpiece. Use a center punch to mark the exact location of the center.

1.25 It is best to hold odd or irregularly shaped workpieces in a 4-jaw independent chuck. Open the jaws to accept the workpiece. Next, locate the marked center point as close to the center of the chuck as it is possible to do by eye. Tighten the jaws to grasp the work.

1.26 Loosen the tailstock and move it toward the headstock of the lathe. Unclamp the dead center spindle and manually run the point of the dead center close to the workpiece. Be careful not to let the dead center strike the workpiece. Turn the crank by hand and observe where adjustment is needed to make the punched center mark match the point of the dead center.

1.27 Adjust the jaw on the high side of the workpiece toward the center while backing off the opposite jaw an equal distance. Continue making adjustments until the marked center point lines up with the dead center. When the work is centered, tighten all jaws equally. Other devices and methods used to hold odd and irregular shapes are covered in Lesson Five of this Unit.

The Programmed Exercises on the next page will tell you how well you understand the material you have just read. Before starting the exercises, remove the REVEAL KEY from the back of the book. Read the instructions printed on the Reveal Key. Follow these instructions as you work through the Programmed Exercises.

1-1. The jaws of a 4-jaw independent chuck are adjusted _____.	1-1. SEPARATELY Ref: 1.04
1-2. Extremely off shaped workpieces are best held in/on a(n) _____.	1-2. FACEPLATE Ref: 1.06
1-3. When very small diameter workpieces must be held, you should use a(n) _____.	1-3. COLLET CHUCK Ref: 1.08
1-4. A set of 3-jaw universal chuck jaws can be used with any chuck body. True or False?	1-4. FALSE Ref: 1.14
1-5. When installing a chuck, always place a board across the ways under the _____.	1-5. SPINDLE NOSE Ref: 1.17
1-6. Work will appear to wobble when turned if its centerline is not parallel with the lathe _____.	1-6. CENTERLINE Ref: 1.21
1-7. To seat a workpiece squarely in a chuck, you can tap it with a(n) _____.	1-7. SOFT MALLET Ref: 1.22
1-8. Center the workpiece in a 4-jaw independent chuck by adjusting the jaws _____ each other.	1-8. OPPOSITE Ref: 1.27

Using a 3-Jaw Universal Chuck

1.28 Round and hexagonal workpieces can be installed and removed quickly in a 3-jaw universal chuck. However, check the chuck to be sure that normal wear on the scroll plate and the bevel gears has not affected the accuracy of the chuck adjusting mechanism.

1.29 Open the jaws wide enough to accept the workpiece. Place the work in the chuck and use the chuck key to move the jaws inward to grasp the work. If you are chucking onto a finished surface, make a sleeve of soft metal to protect the finish from the jaws.

1.30 Tighten the three jaws firmly on the workpiece. You can now use one of the two methods for measuring misalignment. For the first method, hold a piece of chalk in your right hand so that it barely touches the outside diameter of the workpiece. Be sure that the lathe drive mechanism is disengaged. Rotate the chuck with your left hand. Watch for any high spots as indicated by a chalk mark on the work. If greater accuracy is needed, use the dial indicator method to locate high spots. Place the point of the indicator on the outside diameter of the work. Be sure the base of the indicator is seated on a firm surface of the lathe.

1.31 If the mounted workpiece is correctly centered in the chuck, you are now ready to machine the work. Some makes of 3-jaw universal chucks have features which can be used for finer adjustments of the jaws or chuck. If the 3-jaw chuck in your machine shop is equipped with such features, you can center the work more accurately. Otherwise, use a 4-jaw independent chuck for very accurate centering.

Using a Collet Chuck

1.32 Figure 1-10 shows a typical headstock assembly for mounting a draw-in collet chuck. This method of holding work is limited to small diameter workpieces with a finished outside diameter. Select and thread a spindle nose cap onto the spindle. Be sure that it is seated all the way.

1.33 Select a collet size that will accept the diameter of the workpiece, with a tolerance of ±0.001 in. included. Never go above or below this tolerance when selecting collet sizes. You can damage the collet or the workpiece if the workpiece is not gripped properly. Place the collet in the sleeve. Insert the drawbar in the back of the headstock. Thread the end of the drawbar onto.the threaded end of the collet.

1.34 Place the work in the open end of the collet and turn the handwheel on the drawbar to the right. This will draw the collet into the sleeve, causing the collet to grasp the workpiece firmly. No centering is needed when holding work in a collet chuck. After you finish the job, release the collet by turning the handwheel to the left.

Using Mandrels

1.35 Some short workpieces cannot be held in a chuck for machining. Their lengths also prohibit them

Fig. 1-10. Draw-in collet chuck attachment

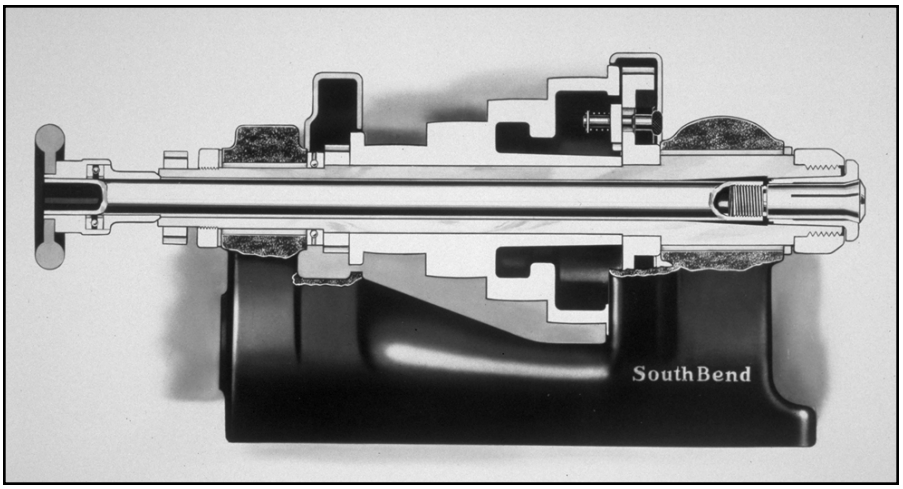
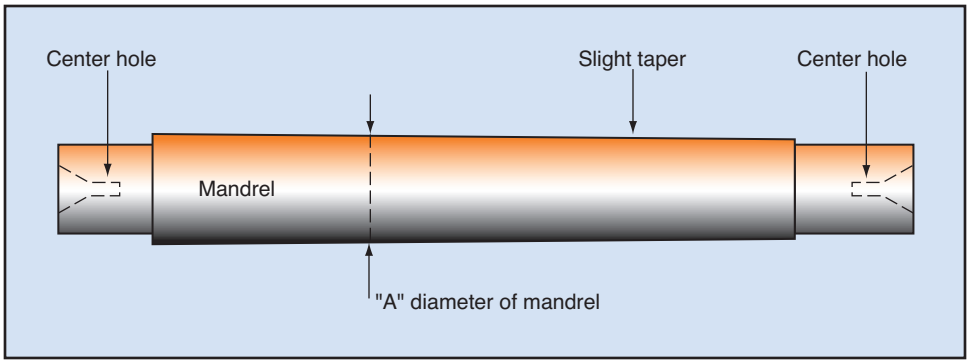


Fig. 1-11. Mandrel



from being mounted between centers. (Many times, a mandrel is also chosen because work must be machined concentric to the bore location on the mandrel.) The mandrel is then mounted between centers in the lathe.

1.36 Standard mandrels are usually made of tool steel which has been hardened and ground. Mandrels are available in a wide range of sizes. These sizes are based on the diameter of the work mounting surface "A" in Fig. 1-11. This surface has a very slight taper so that the mandrel can be pressed tightly into the bore of the workpiece. Figure 1-12 shows a gear blank mounted on a lathe mandrel.

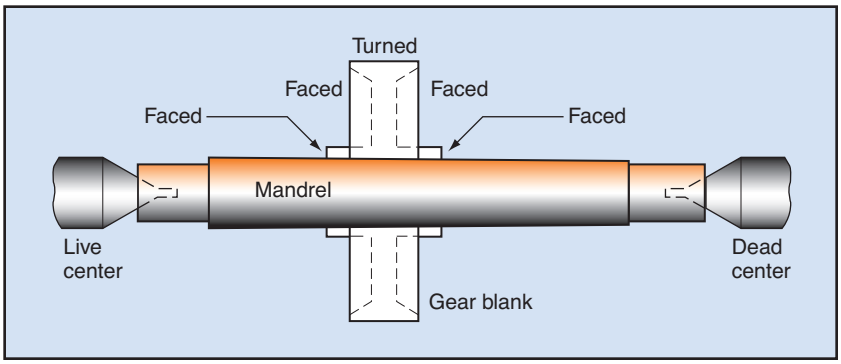
1.37 It would be impractical to mount the gear blank in a chuck for machining the outside diameter. You would have to turn one part of the gear face and then turn the workpiece end for end to machine the other part. Realigning the chuck jaws twice to turn the same surface greatly increases the chance of error in centering. This same problem applies to facing the ends.

1.38 Installing work on the mandrel. Always apply a coating of oil to both the mandrel O.D. and the bore of the workpiece. This prevents the mandrel from seizing so tightly that separating it from the workpiece after machining could damage one or both parts. After you have finished machining, be sure to drive the work off the mandrel in the opposite direction than the direction in which it was mounted. (All turning and facing procedures used for machining work on a mandrel are the same as those used on work mounted between centers.)

1.39 You must always be sure to seat the workpiece firmly and securely on the mandrel so that it does not spin during contact with the cutting tool. Some larger pieces, such as pulleys or drums, can be held by a pin. One end of the pin is held in a lathe faceplate. The opposite end is passed through the workpiece. This prevents the workpiece from spinning on the mandrel when the cutting tool is working far from the axis of the workpiece.

1.40 Lathe mandrels can be made in special shapes and of various materials to suit the applica-

Fig. 1-12. Gear blank mounted on a mandrel



tion. However, if your job requires only one piece to be made, always try to use a standard mandrel for economic reasons.

Workpiece Description

1.41 In this Unit, you will be machining a workpiece mounted in a 4-jaw independent chuck. This workpiece is a typical bearing housing used on many industrial machines (Fig. 1-8). In practical use, this part has a sleeve or bushing pressed into a bore with a 2.500 in. diameter. The sleeve can be bronze or other suitable bearing material depending on the job. The bearing housing has a length of 4.250 in.

1.42 The workpiece's 0.750 in. counterbore with a 3.000 in. interior diameter can be used to hold some type of oil or grease seal. The 1 in. long flanged portion, which has a diameter of 6 1/4 in., locates and holds the bearing housing on a machine side panel or other mounting surface.

1.43 The actual procedures for facing, rough turning, and finish turning are covered in Lesson Two of this Unit. The boring and counterboring steps needed to finish the sleeve bearing housing workpiece are presented in Lesson Three. Boring and counterboring are the last steps taken in making the sleeve bearing housing.

1.44 Figure 1-4 shows how the rough workpiece would arrive at the lathe ready for mounting in the chuck, facing, and turning. At this stage, the workpiece has already been cut off and drilled.

Planning the Work Sequence

1.45 Making the sleeve bearing housing shown in Fig. 1-8 involves facing, turning, boring, and counterboring. The 6 1/4 in. outside diameter of the flange portion is not a critical dimension since no other machine part fits closely on its surface. Therefore, no machining work is necessary on this outside diameter.

1.46 The rough workpiece is 5 1/4 in. long. It must be faced to produce an overall finished length of 5 in. The outside diameter under the shoulder must be turned down from a rough 6 1/4 in. to a finished diameter of 4 in. along a length of 4 in., as shown in Fig. 1-8. You will make this turn down to produce a square shoulder corner. However, you must also face both ends of the workpiece to ensure squareness with the work axis.

1.47 Hold the work in a 4-jaw independent chuck. The four jaws hold the work firmly enough for the heavy operations to be performed on this particular workpiece. A 3-jaw universal chuck would save on setup time, but the extra holding power of the 4-jaw independent chuck compensates for the extra setup time involved.

1.48 Face off approximately 1/8 in. from each end of the work to arrive at a 5 in. finished length. You must reverse the workpiece end for end only once to provide a square face on each end. After facing the ends, all turning can be completed with the work still held in the chuck as it was during the second facing job.

Using a 4-Jaw Independent Chuck

1.49 While its use provides greater accuracy in the centering and alignment of the workpiece, the 4-jaw independent chuck usually takes more time to adjust properly than does a 3-jaw chuck. However, as you gain experience working with this type of chuck, you will be able to set up a workpiece quickly and efficiently.

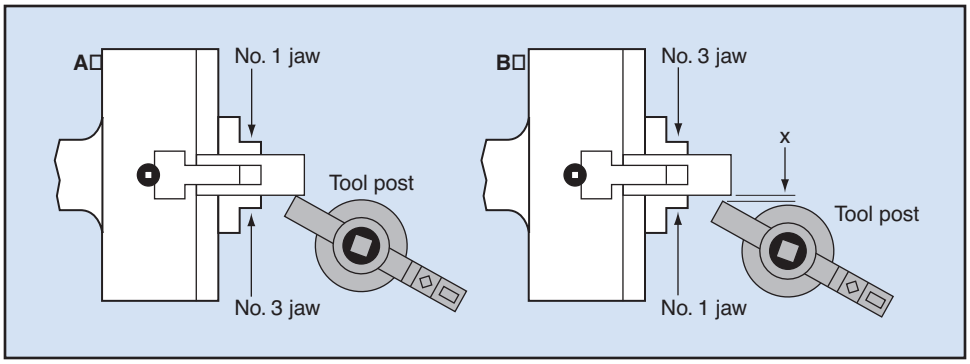
1.50 The face of a 4-jaw independent chuck is inscribed with a series of concentric rings. These rings are used as rough reference points when adjusting the individual jaws. Open the jaws wide enough to accept the workpiece. To hold the workpiece shown in Fig. 1-4, first reverse the jaws in their slots.

1.51 Place the workpiece in the chuck while holding it in position with your right hand. Use your left hand to turn the chuck key in each of the adjusting screw heads. Each jaw should be in the same position relative to a given ring on the face of the chuck.

1.52 You can use either the chalk method or a dial indicator to check the concentricity. Never use a dial indicator on a rough surface or when the workpiece is turning under power. The tip of this instrument is highly finished and easily damaged.

1.53 Another method to check proper centering of chucked work is shown in Fig. 1-13 on the following page. Place a straight tool holder in the tool post with the butt end of the holder facing the lathe centerline.

Fig. 1-13. tool holder method for centering



Do not tighten the tool post screw down on the tool holder.

1.54 Run the lathe carriage up by hand until the saddle is under the chuck. Turn the tool post and holder at a slight angle, as shown in Fig. 1-13. Use the hand cross feed to move the butt of the holder into contact with the work, as shown in Fig. 1-13A.

1.55 Turn the chuck slowly by hand. When a high spot comes around, it will push the butt end of the tool holder away from the workpiece by that amount. This is shown by dimension "X" in Fig. 1-13B. The low spot on the workpiece will be 180 degrees opposite the high spot. Keep turning the chuck until you find the widest "X" dimension between the tool holder and the workpiece.

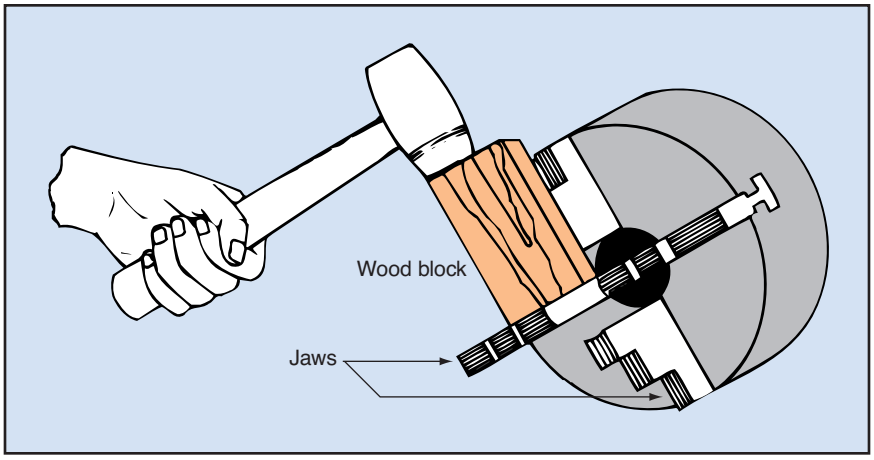
1.56 First adjust the jaw nearest the widest "X" gap and also the opposite jaw. In Fig. 1-13B, you would move No. 1 jaw slightly outward and No. 3 jaw slightly inward for proper adjustment. Adjust the remaining two jaws in the same manner if required. Always adjust the two opposite jaws and then the other pair of opposite jaws.

1.57 Continue adjusting the jaws until the tool holder does not move when set against the workpiece. If you use a dial indicator, continue adjusting the jaws until the reading on the dial is within specifications. When you have centered the work piece correctly, tighten all four jaws equally onto the workpiece.

Removing a Chuck

1.58 Use caution in removing a chuck so that you do not damage either the chuck or the lathe. Lay a board across the ways underneath the spindle nose. With the power off, put the lathe drive mechanism in the lowest back gear position. This will keep the spindle from turning as you unscrew the chuck.

Fig. 1-14. Chuck removal with a wood block



1.59 Place a block of wood on one of the jaws as shown in Fig. 1-14. Use a soft mallet to strike the other end of the wood block until the chuck is rotated one full turn. Unscrew the chuck the rest of the way by hand. Keep both hands on the top part of the chuck's outside diameter to prevent injury if the chuck should accidentally drop. If the chuck is too heavy to handle in this manner, use a small crane. Be careful not to damage the threads of the chuck or spindle as the chuck nears the spindle end.

1.60 A chuck can also be removed by inserting a chuck key in one of the jaw adjusting holes. With the power off and the lathe transmission in the lowest back gear, tug sharply toward you on the key handle and loosen the chuck. If this method does not work, use the wooden block procedure.

1-9. Both round and hexagonal workpieces can be installed in a 3-jaw universal chuck. True or False?	1-9. TRUE Ref: 1.28
1-10. No centering is needed when holding work in a _____.	1-10. COLLET CHUCK Ref: 1.34
1-11. A mandrel is mounted _____.	1-11. BETWEEN CENTERS Ref: 1.35
1-12. When installing work on a mandrel, always apply oil to the bore of the workpiece and to the mandrel _____.	1-12. OUTSIDE DIAMETER Ref: 1.38
1-13. When seated on a mandrel, larger work, such as pulleys or drums, can be held by a _____ to prevent spinning.	1-13. PIN Ref: 1.39
1-14. The face of a 4-jaw independent chuck is inscribed with a series of _____ to use as rough reference points when making adjustments.	1-14. CONCENTRIC RINGS Ref: 1.50
1-15. Using a dial indicator is the best way to check the concentricity of a rough-surfaced workpiece. True or False?	1-15. FALSE Ref: 1.52
1-16. When removing the chuck, with the power off, put the lathe drive mechanism in the _____ back gear position.	1-16. LOWEST Ref: 1.58

Answer the following questions by marking an "X" in the box next to the best answer.

1-1. Which of the following is true of a 3-jaw universal chuck?

- ☐ a. Its jaws are reversible
- ☐ b. A chuck key is used to tighten the jaws
- ☐ c. Work is automatically centered as the jaws are tightened
- ☐ d. All of the above

1-2. Extremely odd-shaped work can best be handled by mounting in/on a(n)

- ☐ a. faceplate
- ☐ b. collet chuck
- ☐ c. mandrel
- ☐ d. 4-jaw independent chuck

1-3. A collet chuck can be used when

- ☐ a. work is of very small diameter
- ☐ b. work does not have to be centered
- ☐ c. the outside diameter of a piece is rough
- ☐ d. all of the above

1-4. The jaws of a 3-jaw universal chuck must be removed by number sequence of

- ☐ a. 2, 3, 1
- ☐ b. 1, 2, 3
- ☐ c. 3, 2, 1
- ☐ d. 2, 1, 3

1-5. Which of the following should you do when installing a chuck?

- ☐ a. Place a board across the lathe bed
- ☐ b. Turn the power on "low"
- ☐ c. Use a soft mallet and a block of wood
- ☐ d. Use a spinning action to install the chuck

1-6. When using the dead center method for centering odd shaped work, hold the work in

- ☐ a. a collet chuck
- ☐ b. a 3-jaw universal chuck
- ☐ c. a live center
- ☐ d. a 4-jaw independent chuck

1-7. Which of the following is true of a mandrel?

- ☐ a. It is mounted in the dead center
- ☐ b. You should use a soft metal sleeve with it
- ☐ c. It has concentric rings around its O.D.
- ☐ d. It is slightly tapered

1-8. The face of a 4-jaw independent chuck is inscribed with

- ☐ a. slot numbers
- ☐ b. concentric rings
- ☐ c. micrometer rings
- ☐ d. centering angles

1-9. A test dial indicator should NOT be used

- ☐ a. if chalk is available
- ☐ b. to adjust work in a 4-jaw chuck
- ☐ c. if the work surface is rough
- ☐ d. to adjust work in a 3-jaw chuck

1-10. When unscrewing a chuck from the lathe spindle, you should put the lathe drive mechanism in the lowest back gear position

- ☐ a. and turn on the power
- ☐ b. so the spindle won't turn
- ☐ c. and remove the workpiece from the chuck
- ☐ d. so the lathe won't run backwards

SUMMARY

Holding the workpiece in a chuck is one of the most common setup methods in lathe work. This method is used when the shape or size of the workpiece will not permit you to mount the work between lathe centers or on a mandrel.

Lathe chucks come in various types and sizes. They range from the collet chuck used to hold small, highly finished pieces to the larger 3- and 4-jaw chucks used for heavier work. Chucks are delicate and must be handled carefully at all times. Adjustments on the chuck jaws are used to center and align a workpiece so that it is ready for turning, facing, boring, or other lathe operations.

Always be sure the chuck you are using is in good condition. If the workpiece is held incorrectly because of a faulty chuck, damage to the lathe or workpiece could result.

Answers to Self-Check Quiz

1-1. b. A chuck key is used to tighten the jaws. Ref: 1.04

1-2. a. Faceplate. Ref: 1.06

1-3. a. Work is of very small diameter. Ref: 1.08

1-4. c. 3, 2, 1. Ref: 1.16

1-5. a. Place a board across the lathe bed. Ref: 1.17

1-6. d. A 4-jaw independent chuck. Ref: 1.25

1-7. d. It is slightly tapered. Ref: 1.36

1-8. b. Concentric rings. Ref: 1.50

1-9. c. If the work surface is rough. Ref: 1.52

1-10. b. So the spindle won't turn. Ref: 1.58

Contributions from the following sources are appreciated:

Figure 1-10. South Bend Lathe, Inc.