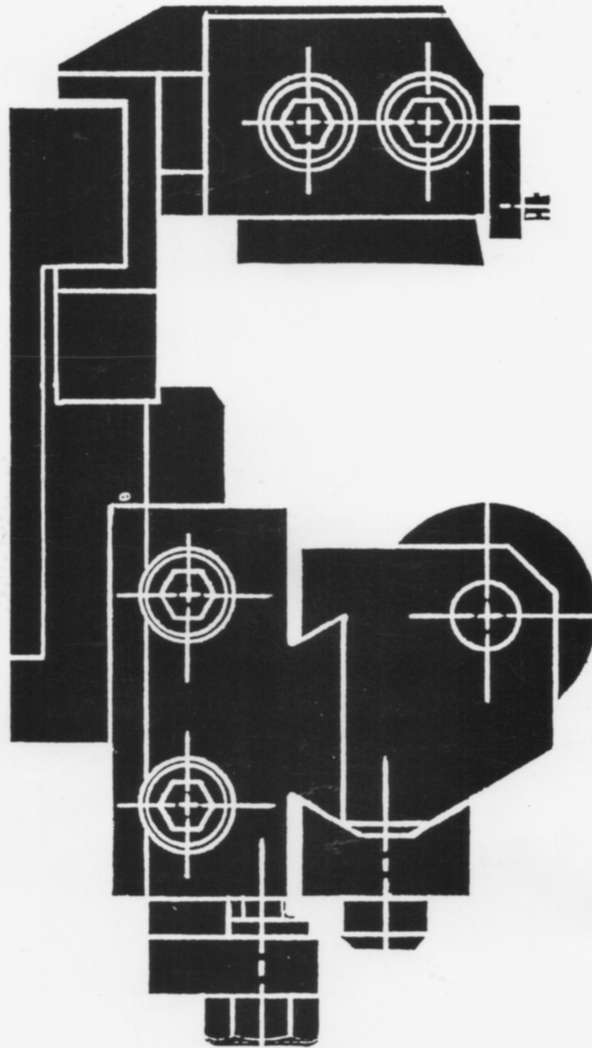


TRAINING MANUAL FOR SHAVING



TEL: (810) 364-4008 • (800) 524-7428 • FAX: (810) 364-4970



TEL: (810) 364-4008 * (800) 524-7428 * FAX: (810) 364-4970

WELCOME
TO THE LANGOLF COMPANY TRAINING MANUAL

WE HAVE SOLUTIONS!

The Langolf Company's commitment to quality has prompted the developing of this manual. We would like to share with you our 25 years of design, engineering, and development. A major consideration was taking suggestions from screw machine operators from all over the country.

The Langolf Company's Training Manual will help increase the operator's perception and education with shave tool holders. This training manual will decrease downtime and set up time by 75%, while increasing the operator's ability to foresee, prevent, and solve problems while on the job. The chapters detail:

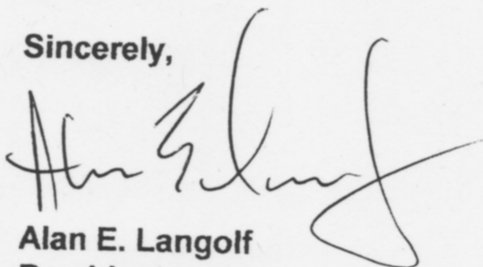
- * Common chatter problems
- * Rough surface finish
- * Tapered diameters
- * Size problems

Each section was precisely written to take the machinist through the problem solving steps.

At *The Langolf Company, Inc.* our customers always come first! Should you have any questions or need further assistance please call 1-800-LCI-SHAVE.

Additional copies of the Langolf Company "Training Manual" are available for \$10 each.

Sincerely,

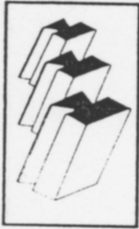


Alan E. Langolf
President

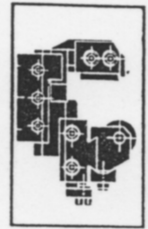


Manufacturer of Screw Machine Tooling

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COMMON PROBLEMS

Identification

Shaving is a process that controls the size and finish of machined parts.

The four most common shave tool problems that you will experience as an operator are:

1. **Chatter** Problems (Figure 1).
2. **Rough Surface Finish** (Figure 2).
3. **Tapered Diameter** (Figure 3).
4. **Size** Problems (Figure 4).

Figure 1

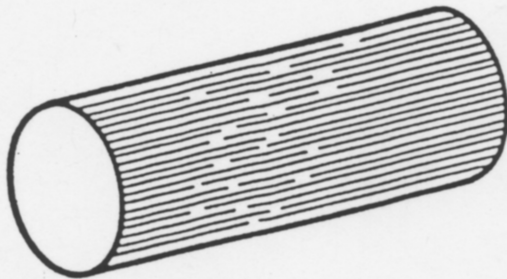


Figure 2

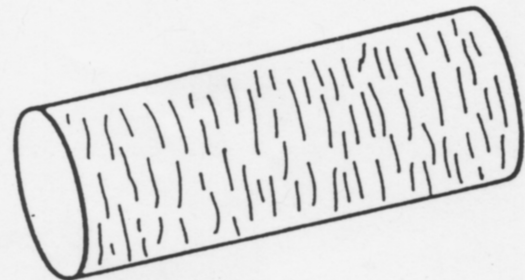


Figure 3

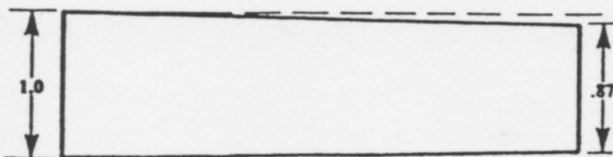
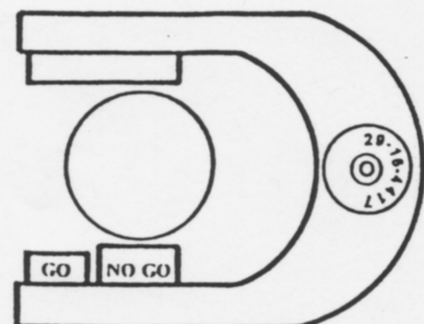


Figure 4



CHATTER PROBLEMS

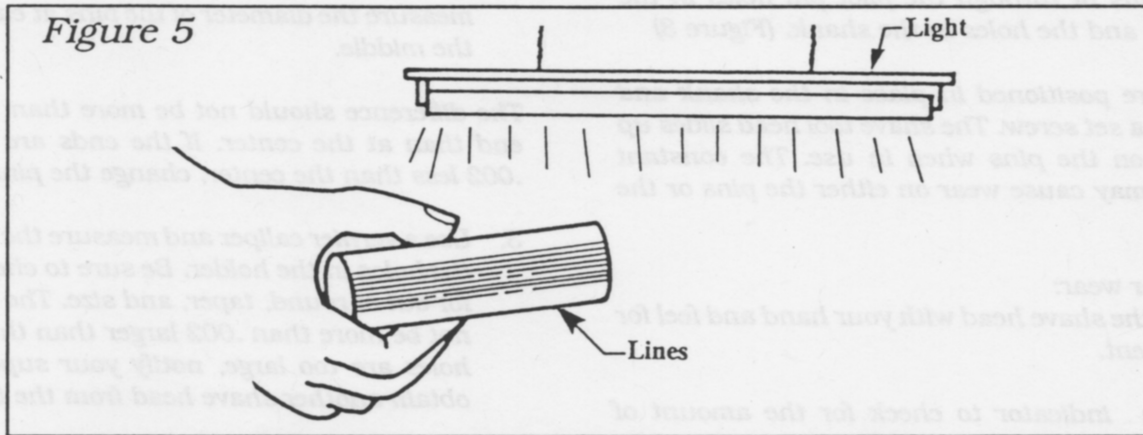
Identification

Now that you know what **chatter** is, the next thing you need to know is how to identify it.

Chatter will appear as lines or ridges running parallel on the machined surface.

To determine if the part has **chatter**, position it under a bright light, and rotate it while observing the machined surface. (Figure 5).

Look for lines or ridges that appear in the reflection of the light.



CHATTER PROBLEMS

Causes

Shave Tool Holders

Some of the **chatter** problems that you will encounter when using a shave tool may be related to the holder you are using.

Two types of shave holders are used on automatic screw machines. They are the Slitters (pin type) and the Langolf Company Inc. Auto Shave Tool Holders - also known as the LCI-Auto Shave (box type).

These holders are different enough in their construction that the **chatter** causes and the corrective action of each one will be described.

1. **Chatter** causes when using a Slitters Holder. (Figure 6)
 - a. Worn pilot pins and pilot pin holes.
 - b. Spring tension.
2. **Chatter** causes when using an LCI-Auto/Shave Holder. (Figure 7)
 - a. Gibs not properly adjusted.
 - b. Spring tension.

Figure 6

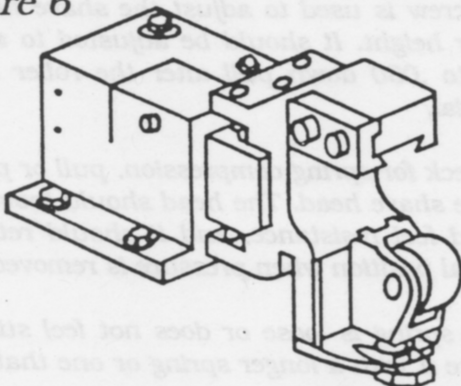
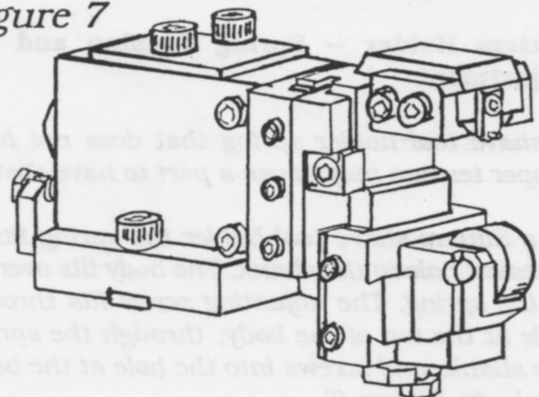


Figure 7



CHATTER PROBLEMS

Causes

Slitters Holder -- Worn Pilot Pins, or Pilot Pin Holes

On a Slitters shave tool holder, **chatter** may be the result of worn pilot pins or pilot pin holes.

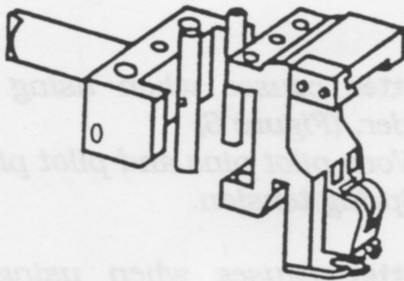
The pilot pins fit through the pilot pin holes in the shave head and the holes in the shank. (Figure 8)

The pins are positioned in place in the shank and secured by a set screw. The shave tool head slides up and down on the pins when in use. The constant movement may cause wear on either the pins or the pin holes.

To check for wear:

1. Grasp the shave head with your hand and feel for movement.
2. Use an indicator to check for the amount of movement.

Figure 8



If you can see or feel movement, this may be the cause of **chatter**.

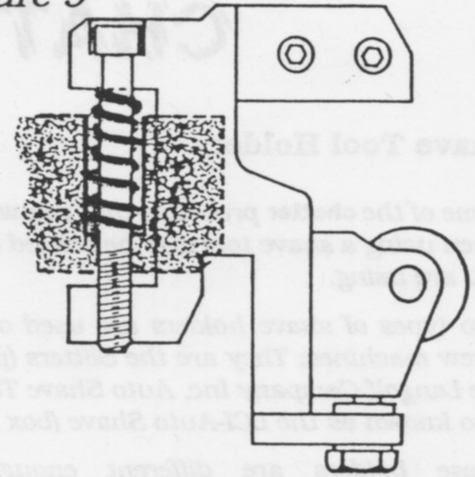
To correct this condition:

1. Remove the pins from the holder.
2. Use a vernier caliper or a micrometer and measure the diameter of the pins at each end and the middle.

The difference should not be more than .002 at the end than at the center. If the ends are more than .002 less than the center, change the pins.

3. Use a vernier caliper and measure the diameter of the holes in the holder. Be sure to check the hole for out of round, taper, and size. The size should not be more than .002 larger than the pin. If the holes are too large, notify your supervisor and obtain another shave head from the tool crib.

Figure 9



Causes

Slitters Holder -- Spring Tension and Height Adjustment

A shave tool holder spring that does not have the proper tension may cause a part to have **chatter**.

In a Slitters shave tool holder the spring fits into a recessed hole in the shank. The body fits over the top of the spring. The adjusting screw fits through the hole at the top of the body, through the spring and the shank, and screws into the hole at the bottom of the body. (Figure 9)

The screw is used to adjust the shave head to the proper height. It should be adjusted to allow from .020 to .030 down pull after the roller meets the material.

To check for spring compression, pull or push down on the shave head. The head should move, but you should feel resistance, and it should return to its original position when pressure is removed.

If the spring is loose or does not feel stiff enough, replace it with a longer spring or one that has more resistance.

CHATTER PROBLEMS

Causes

LCI-Auto/Shave -- Gibs Not Properly Adjusted

A gib that is not properly adjusted may cause a shave tool to **chatter**.

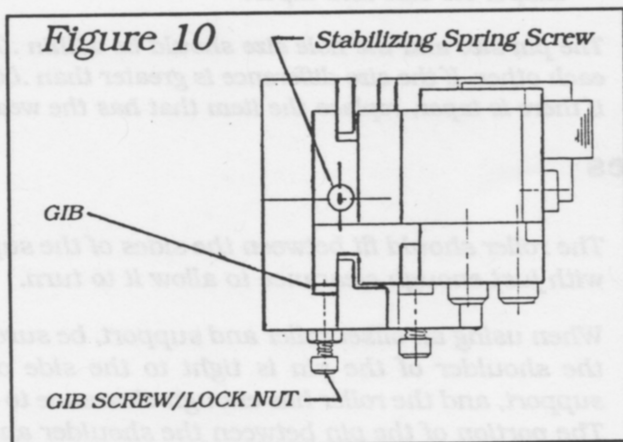
A loose gib may allow the shave head to vibrate and cause **chatter**.

A tight gib may cause the shave head to bind and move in a jerky motion.

The gib on an LCI-Auto/Shave Tool Holder fits between the shave head and the frame of the holder (Figure 10). The sides of the gib are flat. (Figure 11)

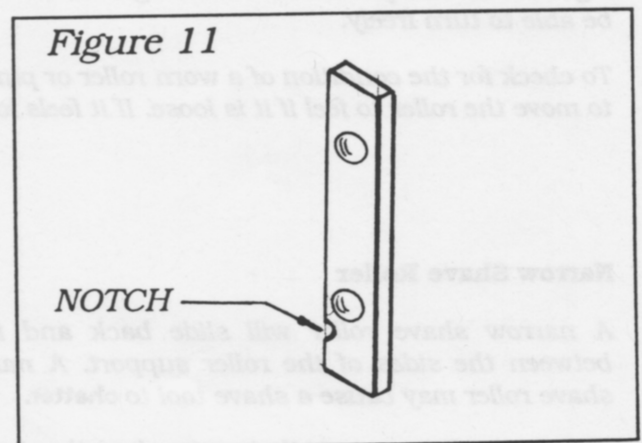
To check for loose gib, wiggle the head sideways and feel for movement. If you can feel movement, the gib may be too loose.

To check for gib that is too tight, push the LCI-Auto/Head up and down to feel for drag. If it has too much drag or binds, the gib may be too tight or may have a burr.



To adjust a loose or a tight gib:

1. If you need to remove the gib you must remove the LCI-Head/Mount assembly. By taking the pressure off the taper adjustment, remove the bolt from the back end. While on your bench, remove the rail that holds the head to the mount (gib side) and loosen the gib screws/nuts.
2. Remove the gib and visually check for burrs. (If burrs are present, remove them with a file.)
3. Replace the gib into the holder, and line up the notch (fig. 11) with the small pin on the mount plate. Re-assemble shave tool holder.
4. Set gib pressure--create a defined drag noticeable on the head/gib while floating it by hand. One way of doing that is by putting the holder in a vice, push down on the head and tighten one screw/lock nut at a time. Loosen screw slowly until head retracts--repeat on each gib screw/lock nut. (Figure 10)
5. Run part to see if condition has been corrected.



CHATTER PROBLEMS

Causes

LCI-Auto/Shave Holder - Spring Tension & Float

An LCI-Auto/Shave Holder spring that does not have the proper spring tension may cause a part to have **chatter**.

On an LCI-Auto/Shave Holder, the spring is located inside the head with a guide pin to guide the spring up and down. To set spring stabilizing pressure, turn the set screw on top of the head. When turning clockwise adds more pressure, counter clockwise takes away pressure. Adjust until proper tension is reached. (Stabilizing spring screw Figure 10)

The pre-set float block numbered 1, 2 and 3 controls the amount of float. You can pre-determine how much float you need for shaving.

Sm. Size Heads --#1 = .015", #2 = .025", #3 = .031"
Med. Size Heads--#1 = .015", #2 = .045", #3 = .125"
Lg. Size Heads --#1 = .063", #2 = .125", #3 = .187"

Note: Pre-set float selection is determined by the tool height of the dovetail tool. Check Tool Height--The formula for tool height is half the smallest diameter to be shaved minus the tool chart constant $\pm .005$ " (pg. 2 in LCI Auto/Shave Tool Holder catalog).

CHATTER PROBLEMS

Causes

Now you have learned to identify and solve the causes of **chatter** that are related to the two types of shave tool holders.

This section will show you how to identify and solve the other **chatter** causes that are common to all types of shave tool holders.

The other causes of **chatter** are:

- A. Worn shave roller or pin.
- B. Narrow roller.
- C. Incorrect grind angle or sharp cutting edge.
- D. Cutting edge behind centerline of roller.
- E. Holder float set too high.
- F. Chatter from previous work station.
- G. Short tool.
- H. Worn or cracked clamp.
- I. End tool slide supports.
- J. Feed and speed incorrect.
- K. Amount of stock for removal.

Causes

Worn Shave Roller, or Worn Shave Roller Pin

A shave roller or a shave roller pin that is worn may cause the shave tool to **chatter**.

A good roller and pin should have a tight fit, but must be able to turn freely.

To check for the condition of a worn roller or pin, try to move the roller to feel if it is loose. If it feels loose:

1. Remove the pin and roller.
2. Check the diameter of the pin with a micrometer or a vernier caliper for both size and taper.
3. Check the diameter of the roller hole with a vernier caliper for size and taper.

The pin size and the hole size should be within .001 of each other. If the size difference is greater than .001, or if there is taper, replace the item that has the wear.

Causes

Narrow Shave Roller

A narrow shave roller will slide back and forth between the sides of the roller support. A narrow shave roller may cause a shave tool to **chatter**.

The shave roller supports that are used are the straddle type (Figure 12) and the offset type (Figure 13).

To check for a narrow shave roller, try to move it back and forth on the pin. If you can move it, the roller is too narrow and may be the cause of **chatter**.

The roller should fit between the sides of the support with just enough clearance to allow it to turn.

When using an offset roller and support, be sure that the shoulder of the pin is tight to the side of the support, and the roller has enough clearance to turn. The portion of the pin between the shoulder and the head should be .002 to .005 longer than the hole to provide clearance. If the roller is too loose, or too tight, change the roller.

If this does not correct the problem, notify your supervisor.

Figure 12

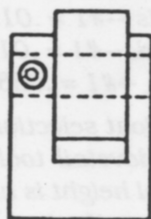
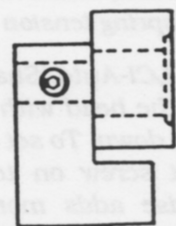


Figure 13



CHATTER PROBLEMS

Causes

Incorrect Grind Angle or Sharp Cutting Edge

An incorrect grind angle or a sharp cutting edge may cause **chatter**.

The degree of angle for a tool will be marked at the bottom of the tool. Most shave tools are ground to one degree.

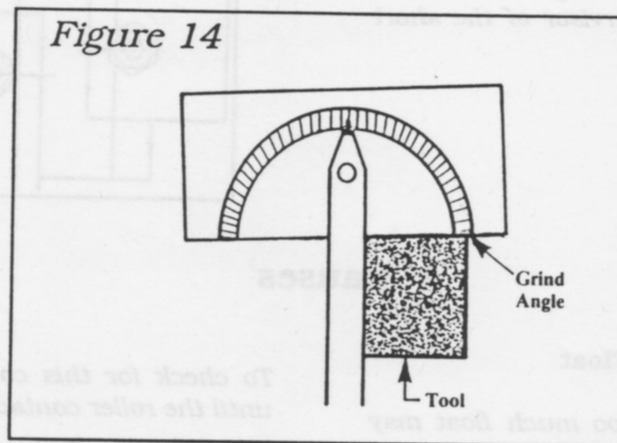
To check for the correct grind angle on a shave tool, remove the tool and measure the angle with a protractor. (Figure 14)

If the tool you are to use does not have the angle that is noted on the base of the tool, you should contact your supervisor.

A new sharpened cutting edge that is too sharp and is causing the tool to **chatter** may be corrected by lightly wiping the edge with a piece of brass.

If the problem continues, notify your supervisor.

Figure 14



CHATTER PROBLEMS

Causes

Cutting Edge Behind Centerline of Roller

When a shave tool cutting edge is set behind the centerline may cause the tool to **chatter**.

The centerline is a line from the face of the shave tool head to the centerline of the roller.

To provide accurate control between the cutting edge and the roller, the cutting edge of the tool must be positioned in line with the centerline of the roller, (on the LCI-Auto/Shave you can set the pre-set stop).

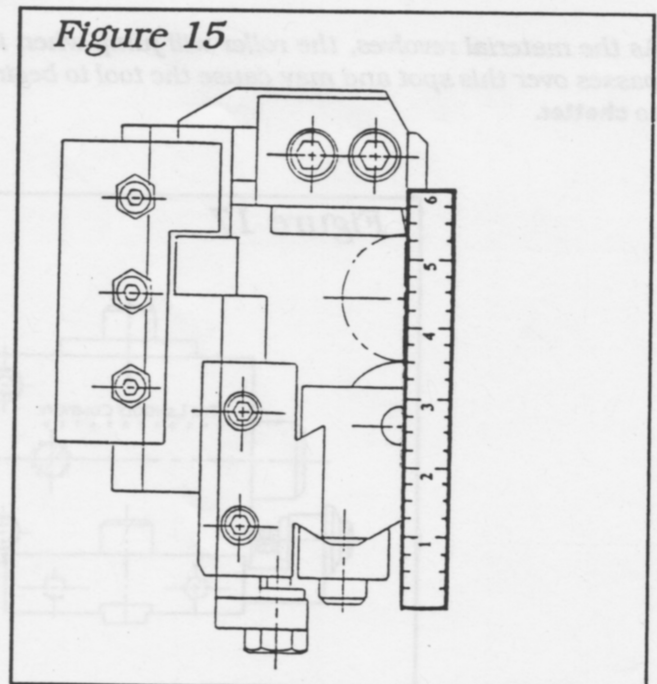
To check if cutting tool edge is behind the centerline:

Place the edge of a steel rule in line with the face of the head to the centerline of the roller, and look for clearance between the cutting edge and the rule. (Figure 15)

If there is clearance, the tool is behind the centerline. Loosen the clamp and relocate the tool.

Note: Check clamp & tool for tightness--Make sure the dovetail portion of the clamp is secured on the tool & that the flat part of the clamp is secured **on the head**

Figure 15



CHATTER PROBLEMS

Causes

Short Tool

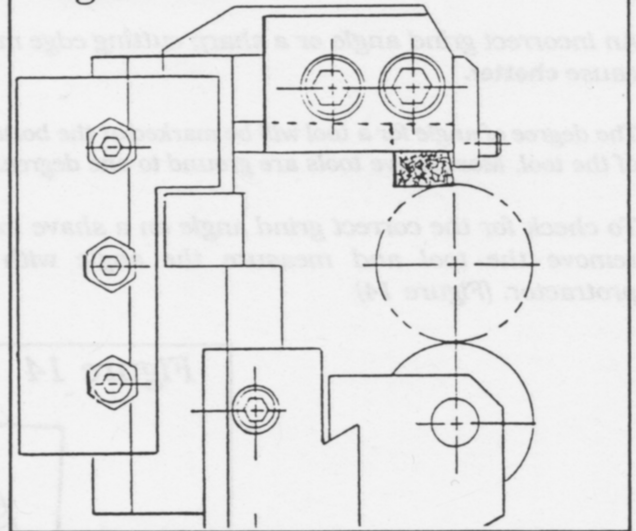
A short tool is a tool that has been reduced in length through usage and resharping.

As the tool becomes shorter, the clamping area is reduced (Figure 16). This may be the cause of the tool to **vibrate** and **chatter**.

To correct this condition, replace the tool with one that is longer.

If this has corrected the **chatter** problem, start machining and notify your supervisor of the short tool.

Figure 16



Causes

Shave Holder With Too Much Float

A shave tool holder that has too much float may cause a part to have **chatter**.

This may be due to the roller making contact with the material higher up than necessary. The holder will pull down too rapidly and may cause the tool to hit or dive into the material.

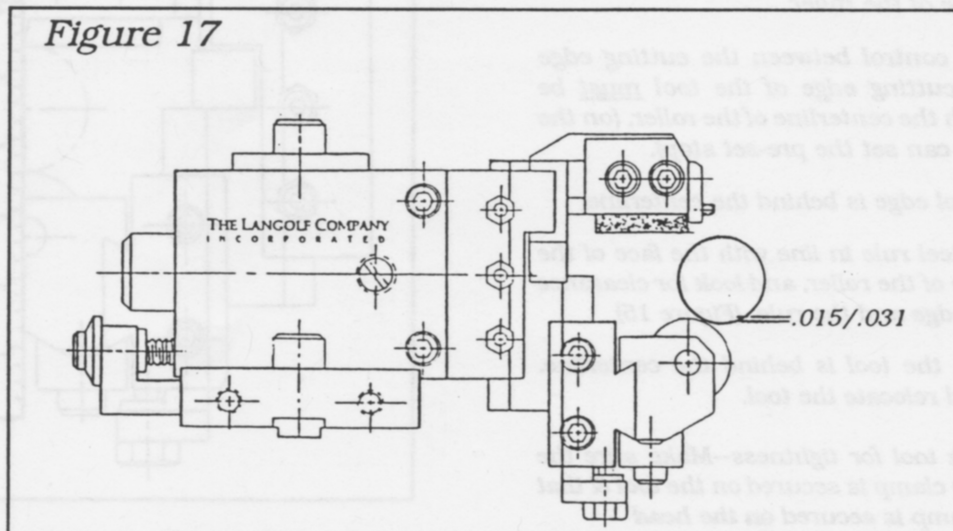
As the material revolves, the roller will jump when it passes over this spot and may cause the tool to begin to **chatter**.

To check for this condition, advance the machine until the roller contacts the material.

Stop the machine and adjust the float selection, this should be set for the roller to pull downwards from .015" to .031" (Figure 17).

Back the machine off until the tools are clear. Run the machine through a cycle and check to see that float is set properly, and that the holder returns to its original position.

Figure 17



CHATTER PROBLEMS

Causes

Worn or Cracked Clamp

A clamp that is worn or cracked may cause a shave tool to **chatter**.

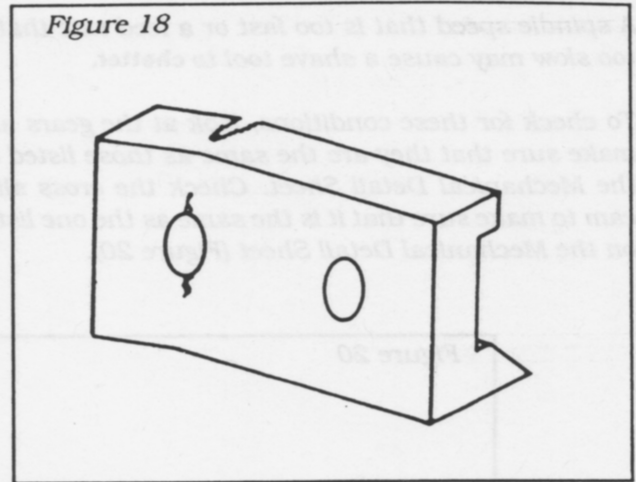
A worn clamp is a clamp whose holding surface is uneven and does not fit the dovetail of the tool firmly. This is usually the result of damage caused by an accident, and the attempt to clean and smooth the surface by filing or grinding.

A cracked clamp is one that has been over tightened and has become bent or cracked (Figure 18).

These bends or cracks appear at the bolt hole locations, and may be the result of clamping a short tool.

To correct the condition of a worn or cracked clamp, change the clamp. If a new clamp is not available, notify your supervisor.

Figure 18



CHATTER PROBLEMS

Causes

Chatter from Previous Work Station

A part that is to be shaved will be formed to provide the basic design of the shaved part. If there is **chatter** before the shave tool operation, it may cause the shave tool to **chatter**.

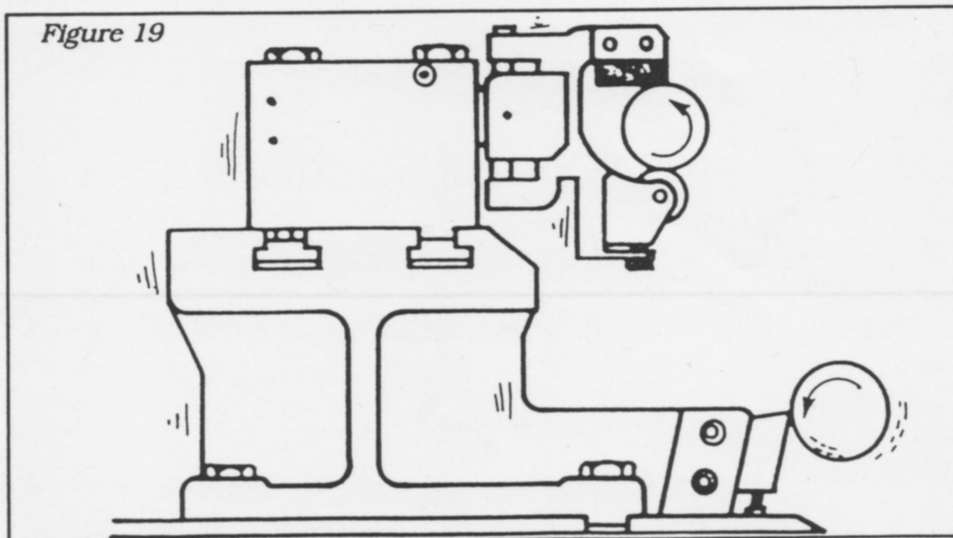
A double deck holder with a shave tool holder mounted on top (Figure 19) may also result in shave tool **chatter**. If the form tool in the lower holder is **chattering**, the **vibration** will follow through the holder to the shave holder.

To check for this condition, look at the part for **chatter** before it goes to the shave tool.

To correct this condition, think back to the causes of form tool **chatter** and make the necessary corrections.

If you are unable to correct this condition, you should contact your supervisor.

Figure 19



CHATTER PROBLEMS

Causes

Incorrect Spindle Speed or Feed Rate

A spindle speed that is too fast or a feed rate that is too slow may cause a shave tool to chatter.

To check for these conditions, look at the gears and make sure that they are the same as those listed on the Mechanical Detail Sheet. Check the cross slide cam to make sure that it is the same as the one listed on the Mechanical Detail Sheet (Figure 20).

If the gears or cam are not the ones listed, change them to the correct ones. Do not use gears or cams that are not listed on the Mechanical Detail Sheet.

Think back to the conditions of chatter. If you have found and solved a condition of chatter and it:

- No longer exists, start machining.
- Still exists, contact your supervisor.

Figure 20

ENTER TO CONTINUE XRYME03 RS7771 .0019 1210AN9
RS7771 OPER: 0010 PPS NOTES EFF DATE: 11MAY82 END DATE:
MACHINE CONTROL SETTINGS

FOR MACH: 9376 A-SPINDLE SCREW MACHINE
MATERIAL SIZE = 2.00DIA
MIN PER PIECE= .83
SPEED RANGE = HIGH NO. JOR REVS = 208
SPINDLE GEARS RPM 287 POSITION TRAVEL FEED
DRIVE--- 24T
DRIVEN--- 89T
FEED RANGE = FINE
FEED GEARS
DRIVE--- 48T
DRIVEN--- 56T
ETS----- 1.000 0048
CS 1----- .100 0000
CS 2----- DD ON 1
CS 3----- .125 0000
CS 4----- .375 0000
CS 5----- .312 0010
CS 6----- .750 0030

CHATTER PROBLEMS

Causes

End Tool Slide Tooling

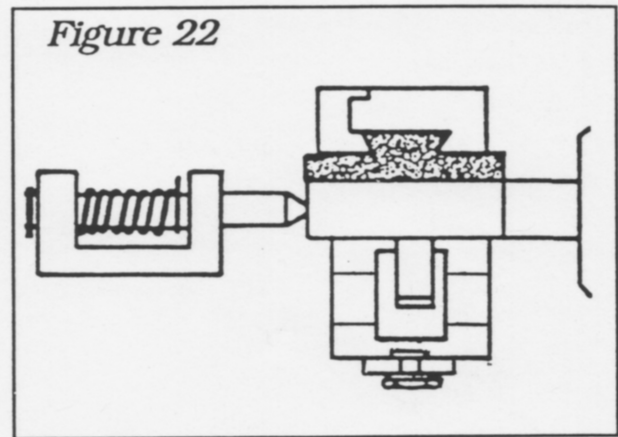
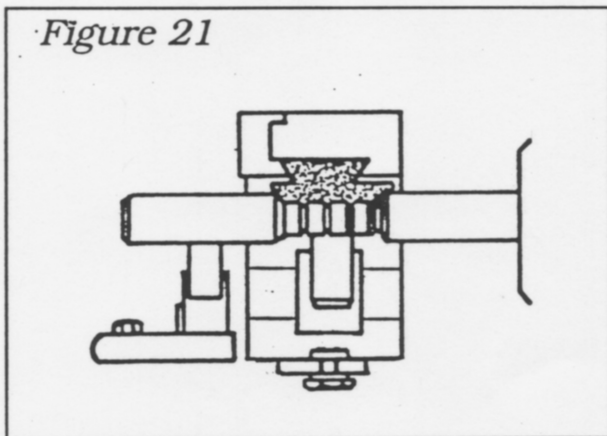
Long parts, or parts that require shaving a long way from the spindle may be the cause of **chatter**.

This may be caused by the shave holder pushing the material away and causing it to **vibrate**.

When running parts of this type, be sure to check the Mechanical Detail Sheet to see if a support is required.

Two types of supports used to control the material when shaving are:

1. Roller support (Figure 21)
2. Center support (Figure 22)



Install the support that is called for on the Mechanical Detail Sheet. Advance the machine until the shave tool roller touches the material.

The rolls on a roller support should be located to a diameter that is not being shaved. The rolls should be set so they will turn with the spindle rotation, and be able to be stopped when finger pressure is applied.

A center support is located at the end of the part. The support is set with pressure on the part. Be sure there is enough travel on the spring to accommodate the balance of the cam rise.

If you are unable to control the **chatter** problem after making these adjustments, contact your supervisor.

CHATTER PROBLEMS

Causes

Amount of Material for Removal

The amount of material that is to be shaved on a part may be the cause of **chatter**.

The proper amount of material that should be left for the shave tool to remove is .010/.012".

If there is not enough stock for removal the tool cannot pull a chip and may result in **chatter**.

If there is too much stock for removal, it may cause **chatter** due to the increased pressure on the tool.

To check for the condition of too much or too little stock for the shave tool to remove, use a micrometer or a vernier caliper and measure the diameter of the part before it reaches the shave tool.

To correct these conditions, reset the tool that is preparing the blank size to allow .010/.012" for the shave tool.

CHATTER PROBLEMS

Causes

End Tool Slide Tooling

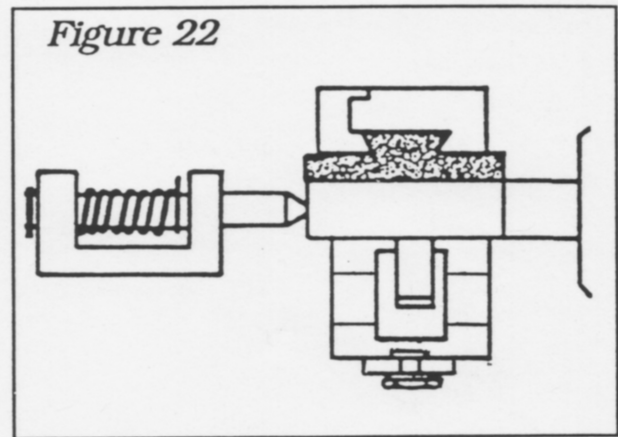
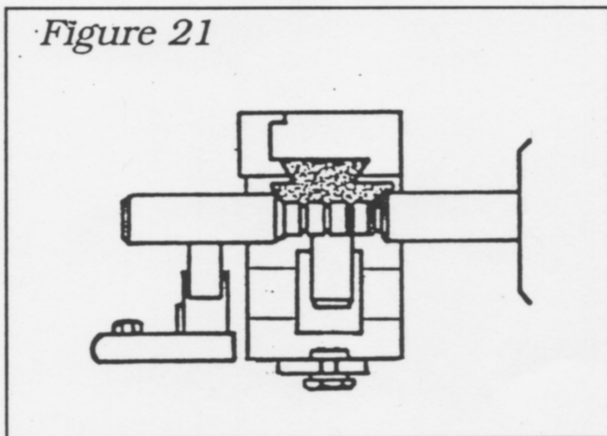
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ROUGH SURFACE FINISH

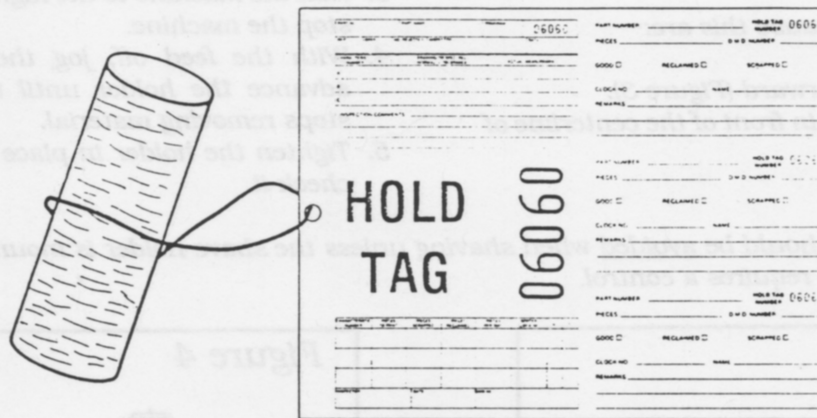
Definition

Another common shave tool problem that you may experience as an operator is surface finish.

Surface finish is defined as the **ROUGHNESS** of the surface resulting from the machining process.

If a part is found during inspection that has a **ROUGHER** surface finish than is indicated on the part print a hold tag (Figure 1) will be placed on the part.

Figure 1



Causes

When you are sure that the part produced has a **ROUGH** surface finish, your next step is to identify the cause of the surface finish problem.

Six causes of a poor finish are:

- A dull cutting edge.
- Cutting edge going past center.
- Amount of material to be shaved.
- Roller that does not turn.
- Incorrect feed or speed rate.
- Inadequate coolant.

Cause 1: Dull Cutting Edge

The cutting edge of a shave tool must be sharp and clean to produce a good surface finish. During normal use, the cutting edge will wear and become dull.

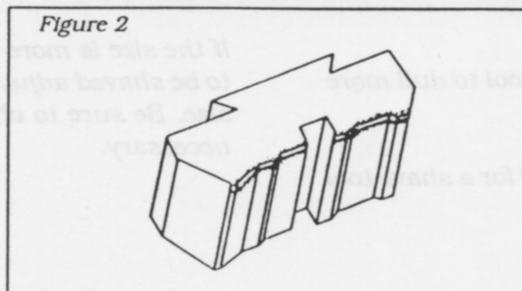
A dull cutting edge will push or rub the material instead of cutting clean.

To check for a dull cutting edge, remove the tool and feel the edge. If the edge appears shiny or feels smooth (Figure 2), it may be dull.

To correct the condition of a dull cutting edge, change the tool.

DO NOT HAND GRIND SHAVE TOOLS!!!

Figure 2



ROUGH SURFACE FINISH

Causes

Cause 2: Cutting Edge Going Past Center

A shave tool cutting edge that moves past the centerline of the part may cause a rough surface finish.

This causes the profile of the tool face to rub on the material surface.

Two conditions that may cause this are:

1. Holder set up too far forward (Figure 3).
2. Cutting edge of the tool in front of the centerline of the roller (Figure 4).

To check for and correct these conditions:

1. Use a steel rule and check to see that the cutting edge is in line with the face of the shave tool head and the center of the shave roller.
2. Back off the holder.
3. Run the machine to the high point of the cam and stop the machine.
4. With the feed off, jog the spindle and slowly advance the holder until the tool cutting edge stops removing material.
5. Tighten the holder in place and run a piece and check it.

The use of positive stops should be avoided when shaving unless the shave holder is mounted on a double deck block whose cutting depth requires a control.

Figure 3

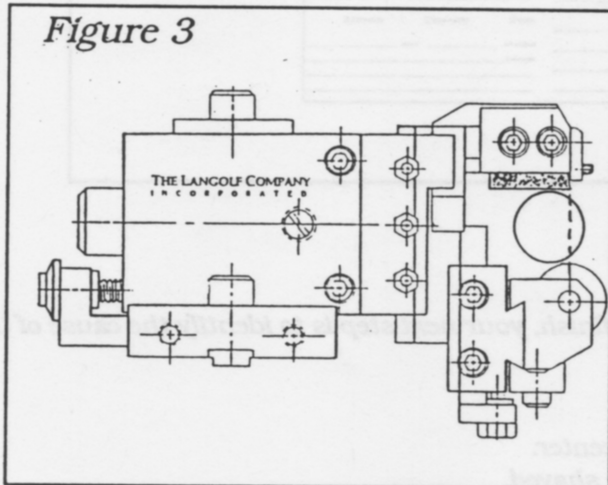
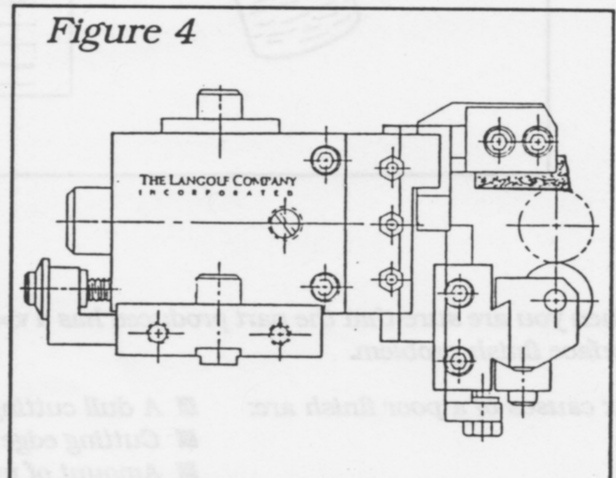


Figure 4



Causes

Cause 3: Amount of Material to be Shaved

The amount of material to be removed by the shave tool may be the cause of a poor surface finish.

If there is not an adequate amount of material for the shave tool to remove, any surface marks or irregularities created by the form tool may not be removed by the shave tool.

Excessive stock will cause the shave tool to dull more rapidly.

The recommended amount of material for a shave tool to remove is .010/.012".

To check for the proper amount of material for the shave tool to remove, measure the diameter of the material before it is to be shaved. The size should be about .010/.012" larger than the finish size the shave tool will produce. It should also be free of any deep ridges or grooves that may not clean up.

If the size is more or less than .010/.012" of the size to be shaved adjust the form tool producing the blank size. Be sure to check the form tool and change it if necessary.

ROUGH SURFACE FINISH

Causes

Cause 4: Roller That Does Not Turn

A shave roller that does not turn may cause a rough surface finish.

A shave roller that does not turn may be due to:

- A flat spot (Figure 5).
- A roller or roller pin that has a build up (Figure 6).
- Side of roller rubbing against a vertical surface (Figure 7).

To check for the condition of a flat spot on the roller remove the roller to see if a flat spot exists. If a flat spot is found change the roller.

To check for a roller or a roller pin that has a build up and will not turn remove the roller and pin and look for a build up on the pin or in the hole of the roller. If a build up is found, this may cause the roller to stop turning. Replace the defective item.

To check for the side of a roller that is rubbing on a vertical surface, advance the machine to the material. Look for clearance between the roller and the material. Check to see if the roller is the one that is listed on the Mechanical Detail Sheet. If the roller is not the same as the one listed, obtain the proper roller. If it is the one that is listed and there is no clearance, contact your supervisor.

Figure 5



Figure 6

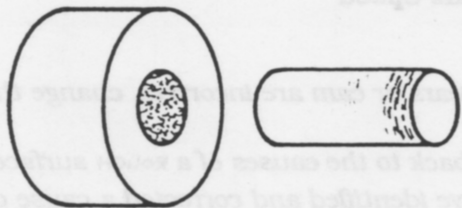
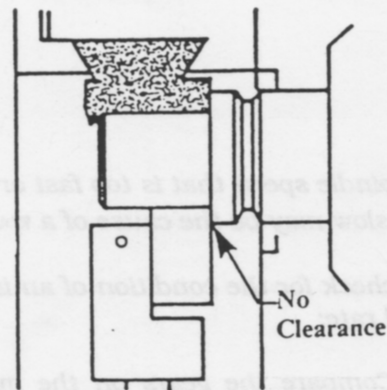


Figure 7



Note: The LCI-Auto/Shave Tool Holder is manufactured with an oil line going into the roll assembly to provide lubrication to the roll and pin.

ROUGH SURFACE FINISH

Causes

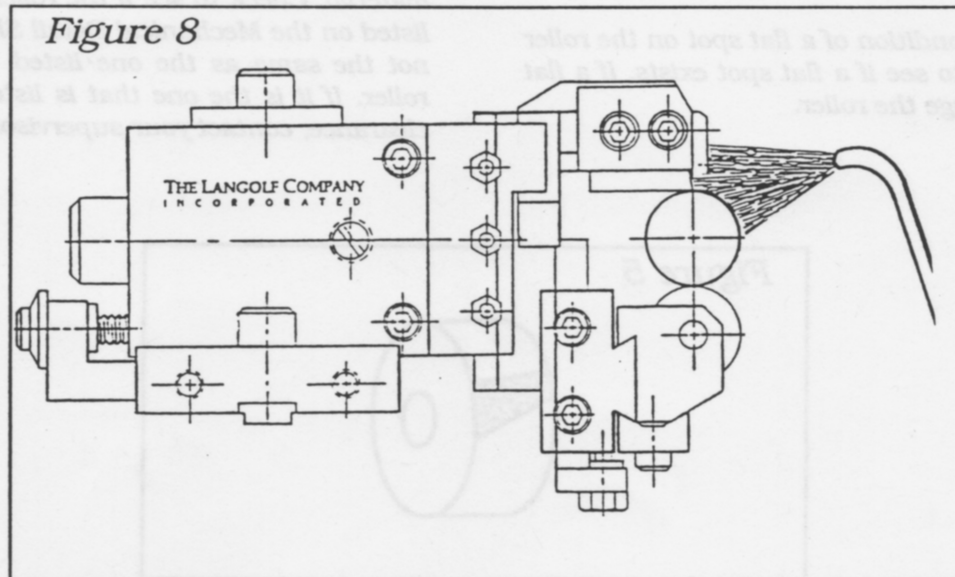
Cause 5: Inadequate Coolant

Lack of adequate coolant may cause a part to have a rough surface finish.

Coolant is used to reduce heat and to flush the chip shavings away from the tool and the work piece.

The chip shavings produced by a shave tool are very fine and may cling to the tool or roller, and begin to rub on the material. (Which is why the LCI-Auto/Shave Tool Holder is manufactured with a direct oil line to the roller to prevent this from happening).

To correct this condition, direct as much coolant at the tool and the work piece as possible (Figure 8).



Causes

Cause 6: Feed Rate and Spindle Speed

A spindle speed that is too fast or a feed rate that is too slow may be the cause of a rough surface finish.

To check for the condition of an incorrect spindle or feed rate:

- Compare the gears on the machine with those listed on the Mechanical Detail Sheet (Figure 20).
- Compare the cam number with the one listed on the Mechanical Detail Sheet.

If the gears or cam are incorrect, change them.

Think back to the causes of a rough surface finish. If you have identified and corrected a cause of a rough surface finish and it:

- No longer exists, start machining.
- Still exists, contact your supervisor.

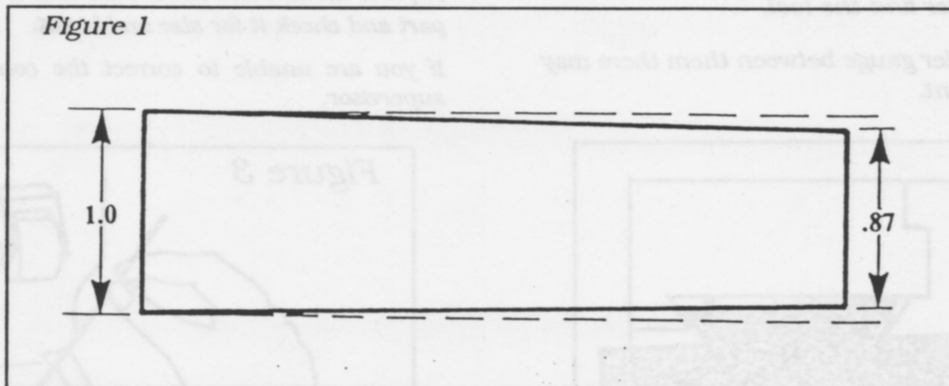
TAPER PROBLEMS

Definition

Another common shave tool problem that you will experience as an operator is **taper**.

A part that has **taper** is larger on one end and smaller at the other end (Figure 1).

A part may be **tapered** and still be within the gauge or print limits. (If this condition exists you should make immediate corrections before the parts become defective and scrap).



TAPER PROBLEMS

Causes

After you have found that you have a **taper** condition, your next step is to determine what caused the problem.

Four causes of **taper** are:

- Part formed off in previous work station.
- Chips or dirt between the tool and the tool holder.
- Shave tool holder not square with the part.
- End tool slide supports not adjusted.

TAPER PROBLEMS

Causes

Cause 1: Part Formed Off in Previous Work Station

A part that is formed with a **taper** in an earlier work station may result in **taper** after it has been shaved.

This may cause one end to be too small and not enough material for the shave tool to remove.

To check for this condition, measure the diameter of the part before it is shaved.

Use a vernier caliper or a micrometer and check the part at each end of the machined diameter that is to be shaved.

Compare these dimensions with the part size that you are producing. If the part has **taper** and is smaller than the shave size it must be corrected.

TAPER PROBLEMS

Causes

Cause 2: Chips or Dirt Between the Tool and Tool Holder

Chips or dirt between the tool and the tool holder may cause a part to have **taper**.

If chips or dirt are present the tool will not fit firmly into the holder and may be tipped (Figure 2).

To check for this condition, try to slip a feeler gauge between the tool holder and the tool.

If you can slip the feeler gauge between them there may be dirt or chips present.

Remove the tool and clean the tool and the tool holder with a blast of air or a brush.

Look for chips or a build up in the holder. If chips or a build up are present in the holder, remove the holder and remove the object with a pick or a file (Figure 3).

Replace the tool and make sure that it fits properly. Run a part and check it for size and **taper**.

If you are unable to correct the condition, notify your supervisor.

Figure 2

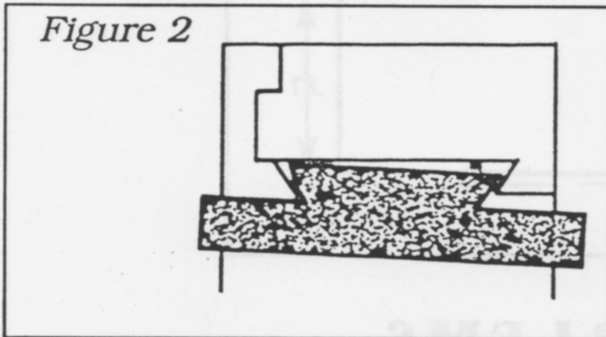
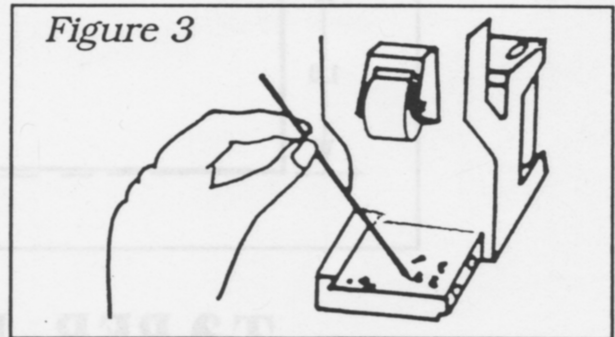


Figure 3



Causes

Cause 3: Shave Tool Holder Not Square With the Part

A shave tool holder that is not square with the part may be the cause of **taper**.

To check a shave holder for being square with the part place a level across the top of the holder. If the bubble is not centered the holder is not square.

To correct this condition with a:

Slitters Holder (Figure 4)

1. Loosen the clamping screw on the shave tool block that holds the shank end of the holder.
2. Adjust the opposing set screws on the tang of the shank until the holder is level.
3. Tighten the clamp and run a part and check it.

Langolf-LCI-Auto/Shave Tool Holder (Figure 5)

1. Do not take Tension off of head bolt.
2. Adjust the **taper** by backing off (loosening) the opposite screw and tightening the opposing screw for the direction of the tilt needed or until holder is level. Go back and re-tighten the original screw.
3. Tighten the head bolt. Run a part and check it.

Figure 4

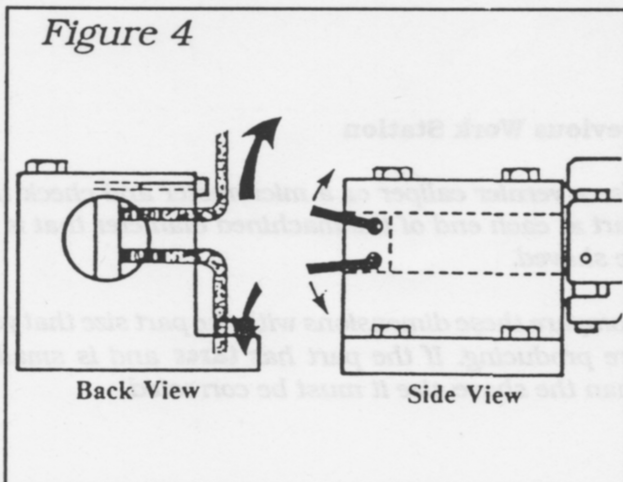
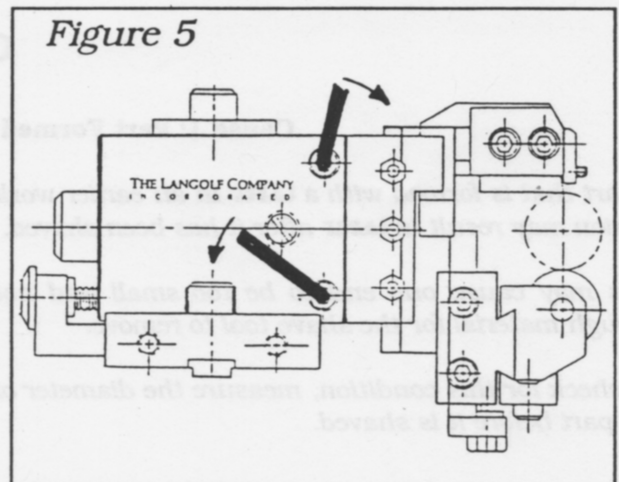


Figure 5



TAPER PROBLEMS

Causes

Cause 4: End Tool Slide Supports Not Adjusted

End tool slide supports that are not adjusted may cause **taper**.

Long parts that are shaved require a support to keep them from pushing away from the tool. If the part pushes away it may be the cause of **taper**.

Two types of end tool slide supports that are used are the roller support and the center support.

To check and correct a roller support:

1. Advance the machine until the shave roller makes contact with the material.
2. The rollers should be positioned to a surface that does not get shaved (Figure 6).

3. Check the rollers for pressure. The rollers should turn with the rotation of the spindle. You should be able to stop the rollers with finger pressure.

To check for a center support:

1. Advance the machine until the shave roller makes contact with the material.
2. Position the center support to the material with a slight amount of pressure on the spring. There must be enough compression left on the spring to allow for the balance of end slide travel (Figure 7).

If you have identified and corrected a condition of **taper** and it:

- No longer exists, start machining.
- Still exists, contact your supervisor.

Figure 6

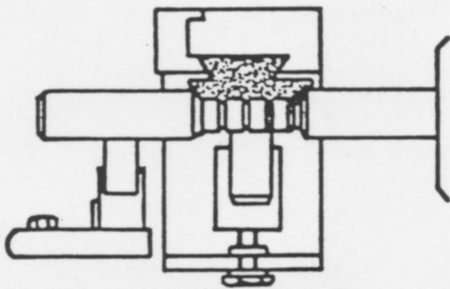
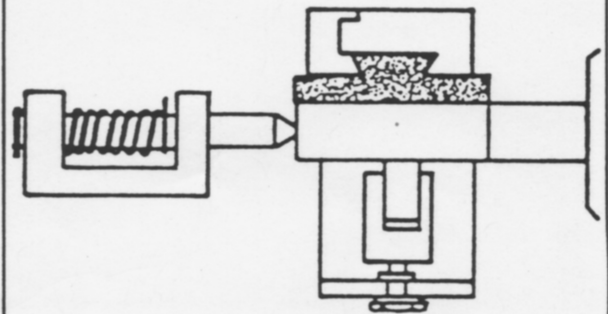


Figure 7



SIZE PROBLEMS

Definition

Another common shave tool problem that you will experience as an operator is **size**.

Size problems may be identified as:

1. Oversize diameter.
2. Undersize diameter.

An undersize diameter is a size that is smaller than the print or gauge size (Figure 1).

If an undersize or an oversize part is found during part inspection a hold tag will be placed on the part.

The operation of shaving parts is performed for the following reasons.

- Part may be finished complete and must fit a mating part.
- Part may have additional machining operations that requires a specific blank dimension.

Figure 1

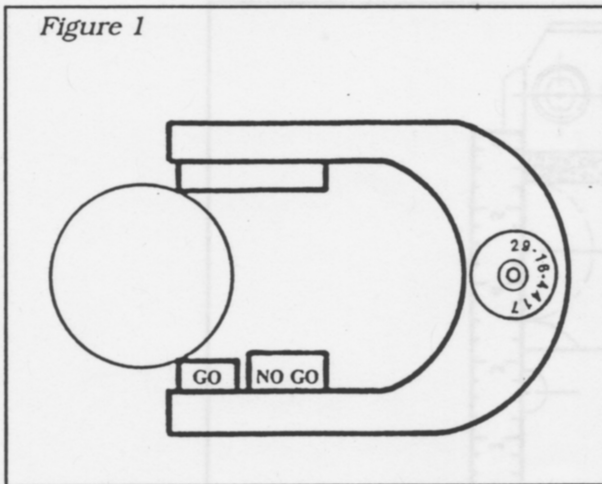
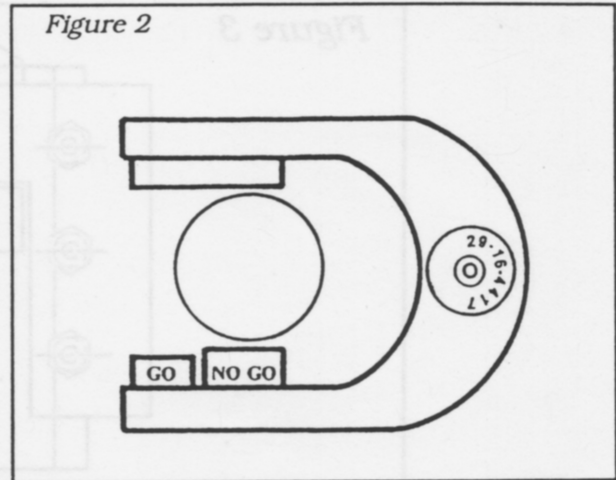


Figure 2



SIZE PROBLEMS

Causes

When you are sure that you have a **size** problem, your next step is to identify what caused the problem.

The five causes of size problems are:

- Cutting edge of shave tool not on center with the shave roller.
- Dull cutting edge.
- Holder not going to center of the part.
- Roller in wrong location.
- Flat roller.

SIZE PROBLEMS

Causes

Cause 1: Cutting Edge of Shave Tool Not on Centerline with Shave Roller

The cutting edge of a shave tool that is not centered with the shave roller and the face of the shave tool head may cause a size problem.

This may cause the shave tool to cut oversize or undersize.

To check for this condition, place the edge of a steel rule on the face of the shave tool head to the center line of the roller (Figure 3).

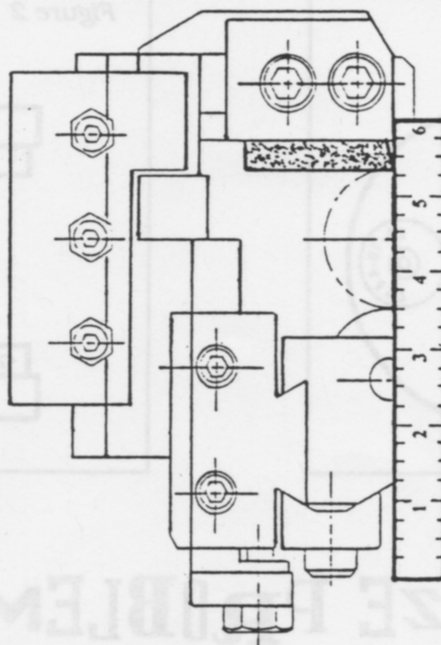
If the shave tool is in back of the centerline you will see a gap between the cutting edge and the rule.

If the tool is in front of the centerline you will not be able to align the rule from the front of the holder to the center of the roller.

To correct this condition reset the tool.

Note: The LCI-Auto/Shave Head provides you with a pre-set stop for the cutting tool.

Figure 3



Causes

Cause 2: Dull Cutting Edge

A cutting edge that has become dull may cause size problems.

This may cause the parts to begin to vary in size. The parts may become larger and cause an oversize part.

To check for this condition remove the tool and feel with your finger to see if the edge is smooth. If the cutting edge appears shiny or feels smooth the tool may be dull.

To correct this condition change the tool.

DO NOT HAND GRIND THE TOOL!!!

Shave tools should be sharpened in the tool grinding room only.

SIZE PROBLEMS

Causes

Cause 3: Tool Cutting Edge Not Advancing to Center of Part

A shave tool that does not go to the center of the part may cause size problems (Figure 4).

To produce the required size and have it be consistent the cutting edge of the tool must advance to the center of the part. The distance between the roller and the tool then becomes the size of the part being produced.

To check to see if the tool moves to the center of the part:

1. Advance the machine to the high point of the cam.
2. Look at the roller, tool and the part. They should all be in line (Figure 5).

3. If the tool and roller are behind center jog the spindle and adjust the tool holder forward until it stops removing material.

4. If the tool and roller are beyond center back the holder up until they are in line with each other.

5. Run a part and check it for size. Make the required adjustments.

Positive stops should not be used to control the travel unless the shave holder is mounted on a double deck block.

If you are unable to correct this condition contact your supervisor.

Figure 4

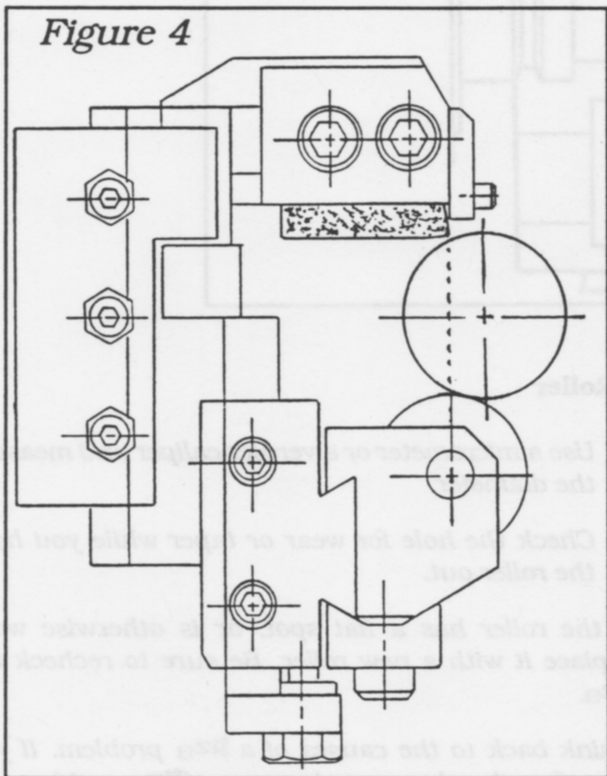
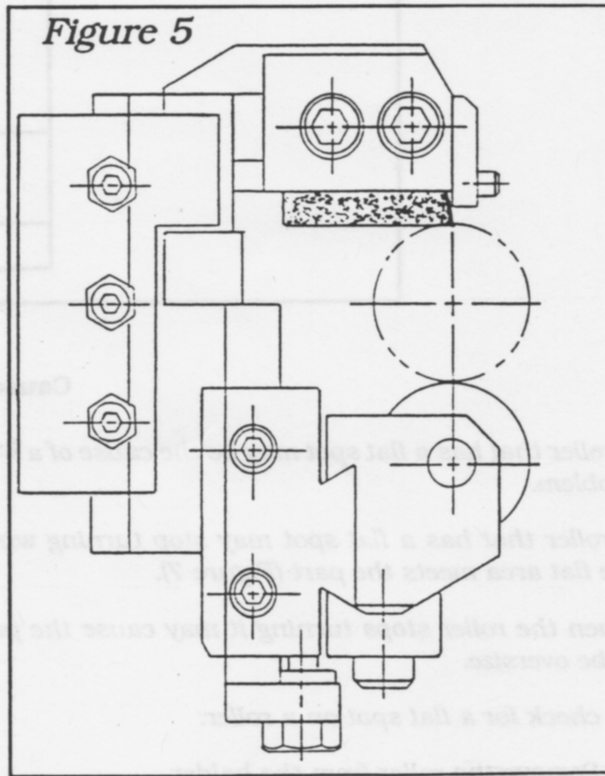


Figure 5



SIZE PROBLEMS

Causes

Cause 4: Roller in Wrong Location

A shave tool roller that is not in the proper location may be the cause of **size** problems.

To check for this condition:

1. Check the roller and roller bracket number. Compare them with the numbers listed on the Mechanical Detail Sheet. If they do not match replace them with the correct items.
2. Check the position of the roller on the part.

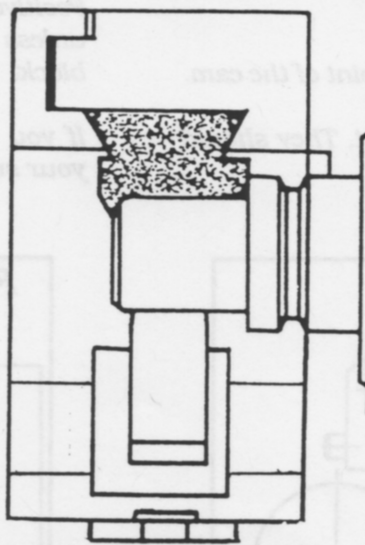
The roller should be positioned on a surface that is being shaved to control the **size** (Figure 6).

The **size** of the part is controlled by the distance between the shave tool cutting edge and the roller.

To correct the condition of a roller in the wrong location move it to the proper location. (The LCI-Auto/Shave Roller moves sideways).

If unable to correct this problem see supervisor.

Figure 6



Causes

Cause 5: A Flat Roller

A roller that has a flat spot may be the cause of a **size** problem.

A roller that has a flat spot may stop turning when the flat area meets the part (Figure 7).

When the roller stops turning it may cause the part to be oversize.

To check for a flat spot on a roller:

1. Remove the roller from the holder.
2. Look for a flat spot.

3. Use a micrometer or a vernier caliper and measure the diameter.

4. Check the hole for wear or taper while you have the roller out.

If the roller has a flat spot, or is otherwise worn replace it with a new roller. Be sure to recheck the **size**.

Think back to the causes of a **size** problem. If you have found and corrected a cause of **size** problem and the condition:

- Still exists notify your supervisor.
- No longer exists start machining.

Figure 7

