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Section 1
General Preparation

1.1 Introduction

The Winter attachments incorporate various features which make them different from other forms of tooling you may have used. First, it provides both sizing and feed rate control functions that are normally performed by the machine. Secondly, the pressure required to perform thread rolling is generated by the attachment, not by the forward movement of the cross-slide • Because of these differences, set-up procedures and operating conditions that are typical for other forms of tooling may not be applicable to the Winter attachment. The following sections provide information necessary to prepare the machine so that you may obtain the optimum performance from your Winter thread rolling attachment.

1.2 Air Pressure and Volume Requirements

THE WINTER ATTACHMENT MUST BE PROVIDED WITH A STEADY SOURCE OF CLEAN DRY AIR AT A MINIMUM PRESSURE OF 80 P.S.I. THROUGH A SUPPLY LINE OF AT LEAST 1/2” I.D.

To perform thread roiling, it is necessary to force the thread rolling dies into the work piece with sufficient pressure to exceed the yield strength of the material being rolled. While most forms of tooling rely on the forward movement of the cross-slide to force the tool into the work, the Winter attachment performs this function by means of the air cylinder mounted at the rear of the attachment. Because of this, OPERATING THIS ATTACHMENT WITH LESS THAN THE RECOMMENDED AIR PRESSURE AND/OR VOLUME WILL RESULT IN INCONSISTENT THREAD DIMENSIONS AND POSSIBLE DAMAGE TO THE THREAD ROLLS AND/OR THREAD ROLLING ATTACHMENT.

1.3 Cam Specifications

The Winter attachment is equipped with a flow control valve which regulates the penetration (feed) rate of the thread rolls into the work.

The cam will have a 1 1/4” drop to clear min. to 1 5/16” drop to clear max with a no-lead (i.e. zero feed rate) dwell cam with approximately 20 part revs of dwell. A dwell portion in excess of 20 part revs, will not affect the thread rolling function in any way. However, excess dwell should be avoided because while in the full forward position the attachment is exposed to chips which may enter and damage the compensating mechanisms. Fast, early thread rolling may also allow additional end working time.

1.4 Blank Sizing Requirements

The importance of proper blank design and preparation to the success of the thread rolling operation cannot be over emphasized. The diameter to which the blank is formed, the tolerance to which this diameter is held and several other considerations, such as thread relief and blank chamfer, are important factors which will have significant impact on both the quality of the finished parts and the life of the thread roll dies.

FOR OPTIMUM PERFORMANCE PROM YOUR WINTER THREAD ROLLING ATTACHMENT, IT IS IMPORTANT THAT THE MACHINE HAVE THE CAPABILITY TO PRODUCE BLANKS HELD TO A TOTAL TOLERANCE OF .001 (i.e. PLUS OR MINUS .005). For this reason, we recommend that the blank be finish-formed using a skiving or shave type tool taking a light cut. Recommended blank diameters for most thread sizes can be obtained from the Reference Data Charts in Section 5. The accuracy of the finished thread is directly affected by the accuracy of the blank by as much as 3:1 ratio.

Section 2
Attachment Preparation

2.1 Set-Up Information

The information necessary to prepare the attachment for specific application is contained in the Reference Data Charts in Section 5. Locate the specific thread size for which you are setting up for and write down the wedge, wedge roller, spring and blank diameter. (If your application is not contained in these charts, please call C.J Winter Machine Technologies, Inc at 1-800-288-ROLL)

“Stock Clearance” refers to the largest diameter that the attachment will clear when rolling that thread size. Note that this dimension varies with each application. Therefore, it is important that the stock clearance diameter dimension be checked each time the attachment is set up for a specific application. Be sure to calculate the dimension across the points of hex stock (Hex size x 1.1547) rather than using the hex stock size itself.

“Blank Diameter” refers to the recommended initial diameter to which the blank should be shaved prior to the thread rolling. NOTE: THIS RECOMMENDED BLANK DIAMETER IS A STARTING POINT ONLY. FOR OPTIMUM RESULTS, THE IDEAL BLANK DIAMETER MAY HAVE TO BE ARRIVED AT THROUGH TRIAL AND ERROR BY MAKING MINOR ADJUSTMENTS TO THIS INITIAL RECOMMENDED DIAMETER. ONCE ARRIVED AT, THE IDEAL BLANK DIAMETER SHOULD BE HELD TO A TOTAL TOLERANCE 0F .001 (i.e. PLUS OR MINUS .0005).

The C.J Winter attachment is supplied with various wedges, wedge rollers and roll arm return springs which are used in combination to provide the different diameter adjustment ranges necessary to roll all of the thread sizes within the capacity of the attachment. Therefore make sure all wedges, rollers and springs are kept in a central location.

2.2 Installation of Wedge Rollers

Loosen the fulcrum pin set screws and remove the fulcrum pins from the attachment. Remove the roll arm assemblies from the attachment, being careful not to over-extend the roll arm return spring. Loosen the wedge roller pin set screw, remove the wedge roller pin, wedge roller and roll arm return spring. Install the correct wedge roller and roll arm return spring. Insert the pin and tighten the set screw making sure to align the retention flat on the pin under the set screw. MAKE SURE THAT EACH END OF THE WEDGE ROLLER PIN IS FLUSH OR BELOW THE SIDES OF THE ROLL ARM. Do not reinstall the roll arm at this time.

2.3 Installation of Wedge

NOTE: When installing the wedge and during initial sizing procedures, the piston in the attachment air cylinder can be positioned in the full forward or full backward position by directing short bursts of air from a hand operated blowgun into the quick disconnect sockets located at the front and rear of the cylinder.

Rotate the pitch diameter adjustment knob fully in the (-) direction, then use the above procedure to position the piston in the full forward position. Loosen the wedge adapter pin set screw and remove the pin and the wedge. Reposition the correct wedge size in the wedge adapter, reinsert the wedge adapter pin and tighten the set screw making sure to align the retention flat on the pin under the set screw. Reposition the piston in the full backward position

Install the roll arm assemblies back on to the roll arm bracket assembly, reversing the procedure used to remove them (refer to 2.2). Again, be sure to align all pin retention fiats under the set screws. Note: A slight realignment of the idler gears inside the roll arm assembly may be necessary to fully insert the fulcrum pins.

NOTE: IF THE IDLER GEARS HAVE BEEN REMOVED FROM THE ROLL ARM ASSEMBLIES FOR ANY REASON, INSURE THAT THE IDLER GEAR HUBS FACE IN OPPOSITE DIRECTIONS WHEN REINSTALLTNG. THEY MUST BE OPPOSITE TO ALLOW THE COMPENSATOR TO FUNCTION PROPERLY.

2.4 Installation of Thread Rolls

NOTE: Observe that the carbide roll pin is held in position between a slotted taper adjusting screw and a hex socket set screw. THE SLOTTED TAPER ADJUSTING SCREW IS USED FOR TAPER ADJUSTMENT ONLY. ITS POSITION SHOULD NOT BE CHANGED WHEN REMOVING OR INSTALLING THREAD ROLLS. IF THE POSITION OF THE TAPER ADJUSTING SCREW HAS BEEN CHANGED, REFER TO SECTION 5 FOR CORRECTIVE TAPEW ADJUSTMENT.

Remove the roll gear guard and observe the positions of the roll gear, roll gear washer and thread roll. Loosen the hex head set screw and remove the roll pin. Install the correct thread roll, making sure to engage the tangs of the roll gear in the thread roll drive slot. Insure that the roll gear washer is properly positioned between the roll gear and the thread roll. After all the components are properly assembled and aligned, reinsert the roll pin, align the visible retention flat with the slotted head taper adjusting screw, and tighten the hex head set screw securely.

2.5 Initial Adjustment

NOTE: When the attachment is placed on a workbench for initial adjustments, be sure that the weight of the attachment rests on the roll arm bracket dovetail. (If the lower roll arm assembly contacts the workbench, your initial adjustments will be inaccurate.)

Direct a short burst of air (see procedure outlined in Section 2.2) into the quick disconnect socket located at the rear of the air cylinder so that the wedge moves to the full forward position. Check the distance between the thread rolls using a gage pin, gage block or blank, equal to the minor diameter of the thread to be rolled. If the distance between the rolls is greater than the minor diameter, turn the pitch diameter adjustment knob at the rear of the attachment in the minus (-) (counter clock wise) direction. Direct another burst of air to the rear quick disconnect and check the distance between the thread rolls again. Repeat this procedure until the thread rolls are the proper distance apart.

If the dimension between the thread rolls is less than the minor diameter of the part to be rolled, turn the pitch diameter adjustment knob in the plus (+) (clockwise) direction. The wedge will be drawn back until the dimension between rolls allows the blank on the gage bock to pass through. Direct a short burst of air into the front disconnect of the cylinder so that the wedge travels to the full backward position. Turn the pitch diameter adjustment knob at the back of the attachment in the (+) direction. Then direct a short burst of air to the rear quick disconnect so that the wedge moves to the full forward position again. Repeat this procedure until the dimension between the thread rolls when the wedge is in the full forward position is equal to the minor diameter of the thread

AFTER THE DISTANCE BETWEEN THE THREAD ROLLS HAS BEEN ADJUSTED SO THAT IT IS EQUAL TO THE MINOR DIAMETER OF THE THREAD TO BE ROLLED, TURN THE PITCH_DIAMETER ADJUSTMENT KNOB AT THE BACK OF THE ATTACHMENT TWO FULL TURNS IN THE (+) DIRECTION.

2.6 Synchronization of Thread Rolls

Direct a short burst of air to the quick disconnect at the rear of the cylinder so that the wedge is in the full forward position. Loosen the adjusting collar cap screw on the attachment compensator mechanism and rotate one thread roll until the timing mark on that roll points directly at the other thread roll. While holding this thread roll in position, rotate the other thread roll until the timing marks are pointing directly at each other. Tighten the cap screw in the adjusting collar securely.

NOTE: THE TIMING MARKS SCRIBED ON THE THREAD ROLLS ARE PROVIDED FOR YOUR CONVENIENCE AND REPRESENT A RECOMENDED STARTING POINT ONLY.
A FINAL ADJUSTMENT OF THREAD ROLL SYNCHRONIZATION IS MOST ACCURATELY OBTAINED THROUGH THE OBSERVATION OF A ROLLED PART.
FINAL ADJUSTMENT WILL BE MADE DURING ROLL TRACKING TESTS IN SECTION 4.1. TYPE OP MATERIAL, ROLL SPEED AND PART RIGIDITY MAY AFFECT THE FINAL

SETTING.

Section 3
Installing the Attachment

3.1 Installation of Mounting Hardware in 4th Position

NOTE: Special care must be taken in the timing of your 4th Position cam to minimize interference between 3rd and 5th position arms, the transfer arm or basket countersink. If your attachment interferes with any of these, you may have to grind clearance on these items.

A dwell cam is required for your Davenport 134-SA attachment. The working portion of the cam should run between 6 and 25 hundredths, depending on the thread and the material.

Your Winter Thread Rolling Attachment is designed to provide longitudinal movement. We are assuming that before you begin installation you have your set-up far enough along that you can put a blank into position to set the position of the attachment over the part.

Before attempting to install the base plate and riser block, be sure the 4th position cross slide bracket assembly has been completely removed and the machine is in the 1/2 index position, with a blank in 2nd position. Remove all grease fittings and deburr any rough edges from the key way. Remove the spring arm from the top of this assembly.

Please observe the way the three adapter plates were shipped. This is the way they mount on the machine.

Mount the riser block (134-021) to the base plate (134-020) with the wide end towards the rear of the plate. Check that the riser block is flat against the surface of the base plate in all areas.

Next, mount top plate (134-022) on to the riser block (134-021). Locate this plate securely on the dowel pins and check to insure all areas are flush against the riser block.

Insert all three caps screws into the top (134-022) plate, making sure these have been tightened securely.

Check to insure the cap screws are flush or below the top of the plate.

Locate the slide plate assembly on the dowel pins on the face of the base plate. (See pictorial "A" in Section 5). Check to insure that there are no chips and that there is a flush fit in this area. Insert the three cap screws and tighten securely. Be sure the dead stop screw is all the way down into the slide plate.

Detach the 4th position tool spindle turnbuckle from the cam lever and slide the tool spindle back into the box.

Insert the gib against the left side rail. (See pictorial "B" in Section 5). Slide attachment into the dovetail. Snug gib into position by adjusting the gib spool while the attachment is in the down position until a proper slide fit is obtained. Do not over tighten. The attachment should be moved by hand in an up and down motion until you have no slide play at the bottom of the stroke. Lock spool down into position by tightening gib screw nut against the spool.

Insert the gage (134-100) into the 4th position tool spindle so that the flat is square to the work and pins. Move attachment up or down so roll pins rest on gage.

Loosen the lock nut on the dead stop bolt and raise the bolt until it hits against the dead stop. Lock down the dead stop lock nut.

Mount the 4th position cross slide bracket and the control valve bracket (134-054) over the rear hole and tighten the three bolts making sure that the assembly fits flat against the top plate.

Mount the tip bracket (134-024) to the attachment, back off the adjusting screw as far as possible. Next, mount the mounting plate (143-044) and the trip valve (125-401) to the top plate (134-022). (See pictorial "A" in Section 5).

Insert the pin from the swing arm bracket into the top hole of the dead stop (134-045) and tighten the set screw. Connect the springs to the spring posts. Make sure the attachment is now in the up position so spindle will clear the index.

Jog the machine until the cam lever is positioned on the full dwell portion of the cam, and the blank in 2nd position is not in 4th.

Set longitudinal position and tighten all three bolts on the base plate securely. Install the cam link assembly into 4th position cam lever making sure that the end with the 1" nut is positioned away from the cam lever. Reassemble the turnbuckle in the 4th position tool spindle. Insert spring and washer on top end of spring arm and let them rest against 1" (134-053) nut. Insert pin from 4th position cross slide bracket into spring arm and tighten set screw. Attach the linkage to the cam lever.

Tighten the 1" nut until it bottoms out against the shoulder on the spring arm. The cam link utilizes a spring to put a predetermined, amount of pressure on the dead stop when attachment is in its full index position. This prevents the machine from overdriving the attachment on the dead stop causing a cam link shear pin to break.

3.2 Installation of Mounting Hardware in 3rd Position

Before beginning, remove all existing attachments or arms to ready your machine for your 134-SA 3rd position attachment. Put the machine at the half-index position.

Place the arm (134-975) over the front yoke and run the eccentric pin (134-210) through the arm and yoke until the small end is just past the small boss on the swing arm.

Next, place the thick tool arm nut (134-213) and then the spacer (134-215) on the eccentric pin. Continue to feed the eccentric pin through the tool arm and place the other spacer and the thin tool arm nut (134-212) on the eccentric pin.

Adjust the beginning horizontal position by adjusting the thick and thin nuts to a position that provides clearance to being your set-up. Then place the machine in the full index position.

Insert the gage pin (134-221) into your 3rd position tool spindle. Run the height adjustment gage (134-220) into the dovetail. Be sure the locking pin is in the retracted position. Adjust the gib (134-226) so the gage moves freely along the dovetail of the arm.

Apply light pressure to the locking pin in the gage and slide it forward until the pin locks in the slot on the dovetail. Tighten the gib by adjusting the locking nuts (134-214).

Rotate the eccentric until the height gage slides over the gage pin and allows the arm to move in the rolling position. To lock the arm, tighten the hex bolts (134-205) on the swing arm.

Connect the swing arm to the cam lever shaft buy inserting the pin and tightening the set screw (140-287)

Remove the gage.

Provide sufficient return pressure for the thread rolling arm by using a heavy spring or two normal springs on the cam lever. This will offset the weight of the attachment.

Place the attachment into the dovetail and replace the gib. Position the machine to the high point of the cam. Rest the dead stop (134-204) on the adjusting screw (134-209). Put the centering gage (134-100) into the third position tool spindle and adjust the location of the attachment until the roll pins rest evenly on the shelf of the gage and lock the gib into place.

Loosen the jam nut (134-216) on the stop nut (134-204) and position correctly. Then lock down the jam nut.

Remove the centering gage.

Bring a blank part into 3rd position and make final positioning adjustments.

Mount control valve (125-404) onto trip bracket (134-202) using provided cap screws (141-427).

Mount control valve assembly (134-700). Use same configuration as described for 4th position, but on the opposite side in such a manner that hoses reach attachment and allow for clearance on any moving surfaces. Quick connect plugs might require some adjustment for easier installation.

To adjust control valve, loosen trip bracket (134-202) and bring back to fully retracted position. Bring attachment down to rolling position making sure arm is bottomed out on button (134-203). (This is done by adjusting screw and additional quarter to half turn and lock trip bracket into place using cap screw (140-244).

Refer to section to make final adjustments to attachment.

Make all necessary connections and then perform the following final adjustments:

A) Adjust the air regulator to obtain a gage reading of 80 - 100 P.S.I.

B) Operate the flow control valve connected to the chip purge line and note the increase or decrease in escaping air. The setting of this flow control valve has no effect on the thread rolling operation. The purpose of the chip purge line is to pressurize the compensator mechanism area to help eliminate chip accumulation in-the compensator gears. Open the valve approximately 2-3 turns, or until a sufficient amount of air escapes through the gear guards.

C) Depress tie trip valve button several times by hand while operating the flow control valve in the red (out) line. Note that the attachment will cycle faster or slower, depending upon where the valve is set. SET THIS FLOW CONTROL VALVE FOR THE FASTEST POSSIBLE ATTACHMENT CYCLE, AS THE MOST COMMON ERROR IS ROLLING TOO SLOWLY. THE PINCH ACTION COMBINED WITH AIR POWER ALLOWS THREAD ROLLING AT A VERY RAPID RATE. ONE-HALF SECOND OR LESS IS TYPICAL.

3.4 Checking Clearances

NOTE: BEFORE JOGGING THE MACHINE THROUGH A COMPLETE CYCLE, DISCONNECT THE ATTACHMENT AIR LINES TO PREVENT THE THREAD ROLLS FROM CLOSING DOWN ON A STATIONARY OR OVERSIZED BLANK. THIS CAN ALSO BE DONE AND IS RECOMMENDED AS AN EASY SAFETY PRECAUTION TO ALLOW CHECKING THE BLANK AFTER TOOLS HAVE BEEN GROUNDED.

Carefully operate the machine through one complete cycle in order to check for sufficient clearances for the attachment and/or thread rolls. Check for sufficient clearance between the attachment, 3rd & 5th position swing arms, transfer arm, 5th position countersink and basket countersink. Also, check that the slide has sufficient backward travel to provide enough clearance between the attachment and advancing turret tooling. Also, check that there is sufficient clearance between the attachment in the full forward position and any end-working tooling operating simultaneously. Finally, check that there is sufficient clearance for the thread rolls during machine index. As a rolled thread is bigger than the blank, reconnect the air lines to the attachment, making sure that the thread rolls are clear of a stationary or oversized blank. Note the routing of the air lines insure that they will not be damaged by moving machine parts when automatic operation begins.

Section 4
Final Adjustments

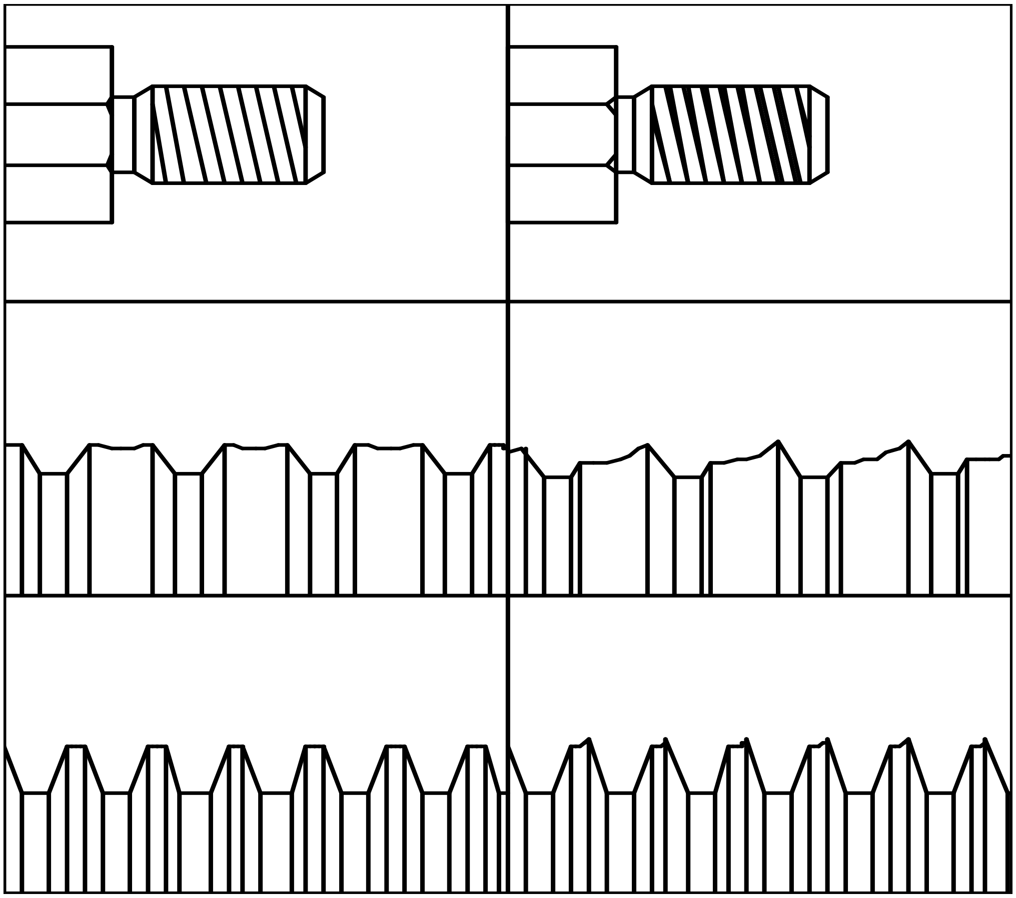
4.1 Adjustment of Roll Synchronization

TO PROPERLY CONDUCT THE ROLL TRACKING TEST, THE THREAD ROLLS MUST BE SYNCHRONIZED (SECTION 2.6), INITIAL PITCH DIAMETER ADJUSTMENT MUSTBE MADE (SECTION 25) AND THE THREAD ROLL PENETRATION RATE MUST BE SET AS FAST AS POSSIBLE

Start the machine and adjust the pitch diameter adjusting knob at the rear of the attachment so that the thread rolls produce a very light scribe line (approximately .010- .015 deep) around the circumference of the sized blank. Observe the resulting line and insure that there is only one line. (See Fig. 1). If there are two closely spaced scribe lines, stop the machine, loosen the compensator adjusting collar and slightly re-adjust the positions of the thread roll timing marks. Tighten the adjusting collar, run another part, and again observe the tracking lines. Continue this sequence of steps until the blank has a single tracking line around its circumference. (See Fig. 1).

Figure #1

Synchronized Non-Synchronized



Start the machine and turn the pitch diameter adjustment knob in the (-) direction until the parts produced have approximately half the required tooth height. Observe the rolled part under a magnifying glass and note that the crest appears slightly concave. The thread form should appear symmetrical with the peaks at either side of the crest approximately equal in height. (See Fig. 1). If this is not the case, continue making very slight adjustments to the thread roll synchronization until the tooth form is balanced and symmetrical. Rolling too slowly will also cause this condition as the rolls will tend to “walk” toward the collet.

4.2 Adjustment for Pitch Diameter

NOTE: During final adjustment for correct pitch diameter, it is advisable to reduce the blank diameter approximately .002 to prevent over-rolling. It is always better to start with an undersize blank to set the pitch diameter and then increase the blank size to obtain proper O.D.

The depth of penetration of the thread rolls into the work is controlled by the pitch diameter adjusting knob setting. In general, the depth of penetration determines the pitch diameter of the finished part.

The major diameter of the finished part is controlled by the blank diameter.

the top view, the diagonal lines on the thread rolling blank are light (approx. .010 deep) tracking lines (tooling marks) made by the thread rolls. If the rolls are properly synchronized, they will roll a single line around the circumference of the blank. In the lower views, note that properly synchronized rolls produce a thread form that is symmetrical with peaks of equal height on either side of the thread crest.

Start the machine and begin reducing the pitch diameter by turning the pitch diameter adjusting knob in the (-) direction. Check the rolled parts using the Go and NoGo gages. For the moment, do not check the major diameter of the rolled part, since the reduced blank diameter will result in an undersized condition. Continue making pitch diameter adjustments in smaller increments until the Go gage consistently threads the entire length of the part and the NoGo gage consistently does not. Be careful not to over roll. When the correct Go and NoGo gaging conditions have been met, the pitch diameter adjustment of the attachment is properly set for the thread size being produced. If there is any variation, see the troubleshooting section.

4.3 Adjustment for Major Diameter

In Section 4.2, the blank diameter was reduced slightly so that the attachment could be adjusted to produce the proper pitch diameter without the possible interference of over-rolling. The result should be a finished part which meets the pitch diameter requirements, but is undersized as far as major diameter requirements. To achieve the correct major diameter it will now be necessary to make gradual increases in the blank diameter. It should be stressed at this point that these increases should be in as small an increment as possible since any increase in blank diameter will in most cases, result in approximately 3 times the increase in the major diameter. In other words, if the blank diameter is increased .001, the major diameter on the finished part can be expected to increase approximately .003 (assuming there is room in the root of the thread roll for this amount of increase). IT SHOULD ALSO BE NOTED THAT SINCE OVERROLLING IS THE MOST COMMON CAUSE OF PREMATURE DIE FAILURE, CAREFUL ADJUSTMENT OF THE BLANK DIAMETER CAN SIGNIFICANTLY EXTEND ROLL LIFE.

Begin to increase the blank diameter until the correct major diameter is achieved. Because the blank diameter has been increased, the amount of resistance to the thread roil penetration has been increased. Since it is the depth of thread roll, penetration which controls the pitch diameter, it may now be necessary to make a very slight adjustment of the pitch diameter adjustment knob in order to maintain the correct gaging requirements. Continue making blank diameter adjustments and attachment adjustments as required to obtain the correct major diameter while maintaining proper gaging requirements. Adjust one thing at a time to be sure of the effect.

After all dimensional requirements have been met; observe the crest of the rolled thread under a magnifying glass. If the tooth height is fully formed and the thread crest is sharp with no visible seam and is highly burnished, then an over-rolling condition exists and a reduction in potential roll life can be expected. If the tooth form is approximately 70% formed and there is a slight roughness or a visible seam on the crest of the thread, then the over-roiling condition has been eliminated and the maximum potential roll life can be achieved. Although the appearance of the correctly rolled part is not as favorable as that of the over-rolled one, it should be noted that the very slight increase in tooth height on the over-rolled part has little or no effect on the strength of the part or the quality of the thread, yet the stress on the thread rolls to produce this increase is drastically higher.

4.4 Adjustment for Penetration (Feed) Rate

The chart on page 14 shows the recommended number of part revolutions for a wide variety of thread roiling applications.

The thread roll penetration rate is adjusted by means of the flow control valve connected to the “out” line of controls valve assembly. (Do not confuse this flow control valve with the flow control valve on the chip purge line).

Although the penetration rate can be expressed in terms of inches per revolution or rolling time, these figures are of value for estimating purposes only, since there is no accurate method of setting the flow control valve so that the penetration rate is at the calculated value. (The thread rolling time formula will,

be provided later in this section.) The following method of determining and setting the correct penetration rate has proven to be the easiest and most accurate.

A) Using the chart, determine the recommended part revs.

B) Obtain the number of starts on the thread roll from the Reference Data Charts.

Thread Rolling	Brass Aluminum	Steel Up to RC 15 400 Series Stainless Steel	Steel Rc 15 – 32 300 Series Stainless Steel
8-12 TPI Acme	9 - 12	10 - 13	Consult Factory
8-13 TPI UN or 3.0-2.0 MM	8 - 11	9 - 12	10 - 14
14-20 TPI UN 1.75-1.5 NM	7 - 10	8 - 11	9 - 12
20-28 TPI UN or 1.25-1.0 MM	6 - 9	7 - 10	8 - 11
29-Finer TP1 UN or 0.8 MM-Finer	6 - 7	6 – 8	6 - 9
Knurling			
12-17 TPI	8 - 11	9 - 12	10 - 14
18-25 TPI or 64 DP	7- 10	8 - 11	9 - 12
26-35 TPI or 96 DP	6 - 9	7 - 10	8 - 11
36-50 TPI or 128 DP	5 - 8	6 - 9	7 - 10
51-Finer TPI or 160 DP	5 - 7	5 – 8	6 - 8

C) Divide the recommended part revs, by the number of starts on the thread roll to determine the recommended compensator revs.

D) Start the machine and observe the adjusting collar on the attachment compensator mechanism while rolling. (Redirect or shut off the machine’s coolant flow temporarily if necessary.)

E) Adjust the penetration rate flow control valve until the compensator makes the recommended number of compensator revs.

NOTE: It is easier to count the compensator revolution if the compensator is marked with a white line or a small piece of paper is placed in the adjusting collar.

Example I

Thread Size: 1/4-28   Mat: 303 Stain1ess Steel

a) Recommended part revs: 10
b) Number of starts on thread roll: 6
c) 10/6 = 1.7
d) Set the penetration rate flow control valve so that the adjusting collar on the compensator mechanism makes approximately 1 1/2 revolutions

Example 2

Thread Size: #4-40 Mat: 2011-T3 Alum.

A) Recommended part revs: 6
B) number of starts on thread roll: 16
C) 6/16 = .3
D) Adjust the penetration rate flow control valve so that the adjusting collar on the compensator mechanism makes approximately 1/2 of a revolution.

Calculating the penetration rate in terms of rolling time is useful for determining maximum recommended machine spindle speeds or for calculating attachment cycle times for estimating purposes.

REMARKS: The most common error in setting up is rolling too slowly. Slivers and flakes or mangled cross tracked threads are all indications of rolling too slowly. Don’t be afraid to go fast. You will be surprised at how quickly most threads can be rolled.

The following formula is used to determine the rolling time.

$$\frac{\text{Machine spindle speed (in R.P.M)}}{60} = \text{Revs. per second}$$

$$\frac{\text{Recommended part revs.}}{\text{Revs. per second}} = \text{Rolling time (in seconds)}$$

Example 3

Thread Size: 3/8-18 NPTP Material: Brass Machine spindle speed: 2350 R.P.M

$$\frac{\text{2350 R.P.M.}}{60} = \text{39.2 revs, per second}$$

$$\frac{\text{9 part revs}}{\text{39.2 revs. per second}} = \text{.23 seconds rolling time}$$

Example 4

Thread Size: #2-56 Material: 2011-T3 Aluminum Machine spindle speed: .2950 R.P.M.

$$\frac{\text{2950 R.P.M.}}{60} = \text{49.2 revs. per second}$$

$$\frac{\text{6 part revs}}{\text{49.2 revs. per second}} = \text{.12 seconds rolling time}$$

After any change in the setting of the penetration rate flow control valve has been made, it may be necessary to make minor re-adjustments to the pitch diameter adjustment knob and/or blank diameter to re-establish the correct dimensions of the finished part.

A) The wedge and roll combinations supplied in the data reference portion of the manual supply the correct finish center distance for the rolls, but may not allow the attachment to operate slowly enough to produce a thread that is acceptable. It is necessary at times to stay on a part longer than normal to produce an acceptable part.

Due to the two stage air cylinder on the 134-SA, the piston stroke must be long enough to allow for the flow control valve to operate properly. It may be necessary to use a smaller wedge roller than noted in the data reference sheets to provide this extra travel.

1) Two extra sets of rollers are provided, 140378 (.688 dia) and 140379 (.813 dia.). These rollers should only be used when necessary.

2) All 134-SA attachments are provided for standard bed machines. If you are using extended bed machines, you must specify this at the time of your order. We will supply a longer lever or extension to allow for the attachments use on these machines.

3) An additional spacer (134215) is provided for 3rd position Assembly (134975) to make sure that the thin and thick Tool Arm Nuts (134212 & 134213) have ample thread engagements. The Spacer is used for applications that require the 3rd position arm be extended at maximum limit away from collet.

SECTION 5

REFERENCE INFORMATION

5.3 TAPER ADJUSTMENT

Winter thread rolling attachments are equipped with a taper adjustment feature to insure that the centerlines of the roll pins and thread rolls are parallel to the centerline of the part. This parallel alignment is necessary if the finished part is to have consistent major diameter and crest truncation specifications.
It is also possible using the taper adjustment to more closely align tapered pipe thread rolls with the blank, or compensate for a slight taper in a straight blank.

Note that using calipers to measure across the roll pins is not an adequate method of setting taper adjustment. Although this method guarantees that the roll pins will be parallel to each other, they may not be parallel to the attachment mounting surface end therefore will not be parallel to the spindle centerline once the attachment is installed on the machine.

Prior to making the taper adjustment, determine the attachment mounting surface that will be used. Set the attachment on the surface plate with this mounting surface supported on parallels. Using a dial indicator or height gage, indicate each side of the roll pin and adjust for parallelism using one of the following methods:

The roll pin is held in position between two hex socket head set screws, one of which is located on the inside portion of the roll arm, and the other located on the outside portion of the roll arm. Adjustment is made by loosening one of these set screws and tightening the other, until equal indicator readings are obtained from each end of the pin. AFTER THE FINAL ADJUSTMENT HAS BEEN MADE, USE ONLY THE OUTSIDE SET SCREWS WHEN REMOVING OR INSTALLING THREAD ROLLS.

Threading Problem Checklist

Problem	Cause	Solution
Poor Thread Form	1. Work bending during rolling 2. Rolls not in match 3. Too many revolutions 4. Center line of rolls not parallel with center line of work	1. Support part during rolling 2. Resynchronize rolls 3. Increase rate of roll penetration 4. Check slide for alignment
Thread filled out in center, but not towards ends or vice versa	1. Blank with varying diameter from end to end 2. Center line of rolls not parallel with center line of work	1. Check blank for taper or shave tool not reaching center 2. Check slide for alignment
Poor finish on thread	1. Overfilling rolls 2. Rolls not synchronized 3. Material accumulated in threads on roll 4. Material not ductile enough for cold-working. 5. Chips, from other operations, between rolls and work 6. Corresponding poor finish on rolls 7. Rolls that are worn or broken	1. Check blank diameter oversize 2. Resynchronize thread rolls 3. Replace rolls if material cannot be removed 4. Change material 5 Make sure a good jet of clean oil is reaching rolling position 6. Replace rolls 7. Replace rolls
Split thread-axially	1. Seamy stock 2. Mark from shave tool or hollow mill	1. Change stock 2. Regrind tooling
Crests not filled out (Many users do not consider this a serious objection and by allowing their threads to pass with crests not filled out, overloading of rolls is avoided and life is prolonged)	1. Blank too small 2. Thread on roll too deep	1. Increase blank diameter 2. Replace rolls with rolls of correct depth for job. Note: Special truncated rolls are available from Winter
Scuffed Crests	1. Attachment not retracting fast enough 2. Rolls and gear train binding 3. Rolling not on center line of work 4. Material accumulated in threads on rolls	1. Increase speed of roll retraction 2. Check gear train, remove any foreign matter 3. Reset slide with gauge 4.Check oil jet flowing on rolling position
Hollow work, hole closed in.	1. Insufficient wall thickness 2. Improper supporting mandrel 3. Feed rate too high, causing too rapid of penetration	1. Machine hole later in operation or use smaller drill 2. Use proper supporting mandrel 3. Slow down penetration rate
Hollow work, hole enlarged	1. Material extruding due to insufficient wall thickness 2. Supporting mandrel too tight 3. Blank too large on major diameter 4. Feed rate too high causing too rapid penetration	1. Use smaller drill before rolling 2. Reduce mandrel diameter 3. Reduce blank diameter 4. Slow down rate of penetration
Hollow work, out of round	1. Material deforming due to insufficient wall thickness 2. Feed rate too high causing too rapid penetration 3. Too few work revolutions	1. Drill later in cycle 2. Slow down rate of penetration 3. Slow down rate of penetration
Hollow work, tapered threads	1. Uneven and insufficient wall thickness 2. Improper mandrel not giving support where needed 3. Feed rate too high causing too rapid of penetration 4. Taper of rolls not great enough to compensate for tendency of work to taper	1. Drill later in cycle 2. Check mandrel for size with hold 3. Slow down rate of penetration 4. Use correct rolls for job

Threading Problem Checklist

Problem	Cause	Solution
Slivers or flakes on threads	1. Rolls not in match 2. Center line of rolls not parallel with center line of work. 3. Loose or worn cross slide or adapter 4. Overfilling rolls 5. Material not adaptable to cold-working 6. Rough finish on blank 7. Seamy stock 8. Feed rate too slow, causing rolls to slip on work 9. Incorrect roll diameter	1. Resynchronize rolls 2. Check slide for alignment 3. Check slide gib and springs. Tighten adapter if used. 4. Reduce blank diameter 5. Change material. Check with material supplier 6. Regrind tooling. 7. Not suitable for roll threading 8. Increase rate of penetration. 9.Use correct rolls for job
Drunken Threads	1.Rolls not in match 2. Center line of rolls not parallel with center line of work. 3. Inaccurate rolls 4. Work bending during rolling	1. Resynchronize rolls 2. Check slide for alignment 3. Replace rolls 4. Support part during rolling operation or slow down penetration rate if possible
Off-size threads 1.Pitch diameter and major diameter, both oversize 2.Pitch diameter oversize, major diameter correct size 3. Pitch diameter oversize, major diameter undersize 4. Pitch diameter correct size, major diameter oversize 5. Pitch diameter correct size, major diameter undersize 6. Pitch diameter undersize, major diameter oversize 7. Pitch diameter undersize, major diameter correct size 8. Pitch diameter and major diameter both undersize	 1. Oversize blanks 2. Oversize blanks. If finished thread is full, thread on roll is too shallow 3. Insufficient penetration on rolls. If finished thread is lull thread on roll is too shallow 4. Blank too large. Thread on roll deeper than necessary 5. Blank too small. If finished thread is full, thread on roll is too shallow. 6. Excessive penetration. Thread on roll deeper than necessary 7. Blank too small. Thread on roll deeper than necessary. 8. Blank to small	 1. Reduce blank diameter 2. Use correct rolls for job 3. Increase roll penetration 4. Reduce blank diameter 5. Increase blank diameter. Use correct rolls for job 6. Reduce roll penetration. Use correct rolls for job. 7. Increase blank diameter. Use correct rolls for job. 8. Increase blank diameter.
Out-of-round thread	1. Out of round blank 2. Center line of rolls not parallel with center line of work. 3. Feed rate too high 4. Insufficient work revolutions 5. Material not ductile enough for cold-working 6. Attachment not on centerline of work.	1. Shave tool not reaching center or not cleaning up rough form diameter. 2. Check slide for alignment 3. Reduce rate of penetration 4. Reduce rate of penetration 5. Change material. Check with supplier. 6. Reset cross slide with gauge
Tapered Threads 1. Pitch diameter straight. Major diameter tapered and not filled out on small end 2. Pitch diameter and major diameter both tapered same way 3. Pitch diameter and major diameter tapered in opposite directions and thread not filled out on end with small major diameter.	 1. Tapered Blank 2. Tapered blank 3. Rolls not penetrating deep enough on edge with large pitch diameter and small major diameter, or work bending during rolling.	 1. Straighten blank 2. Straighten blank 3. Support part during rolling. Part deflecting out of contact with center rolls
Thread with expansion lead	1. Expand lead in rolls 2. Material extruding on short length of blank	1. Use correct rolls 2. Use longer blank and remove excess in another position
Thread with contracted lead	Contracted lead in rolls	Use correct rolls for job