



PRECISION MACHINE SPINDLE REBUILDING

Educational Video Series

Part 3: Preparing the Parts for Spindle Assembly

For all the videos in this Educational Video Series, please visit:
<http://www.activeatom.com/education-spindle-rebuilding-videos.php>

0. Introduction

00:00:17 in video Part 3

In this video, we focus on preparing all the spindle parts for the assembly process. Once all the spindle parts are cleaned, we will also be showing you how we properly clean the felt rings which is very important as we do not want to damage the wool material or their forms.

Once all the parts are perfectly clean, the spindle shaft will need to be measured for condition and runout. It is also at this stage where we need to determine if the collet key needs to be replaced.

1. Cleaning all the Parts

00:01:39 in video Part 3 Section 1

This step will be focused on cleaning all the spindle parts to pristine condition with the exception of the felt and retaining rings which will be cleaned using a different cleaning process as will be explained in the next step.

For this cleaning process, you will want to use Acetone for its ability to clean the parts very well and will not damage any of these parts. As much as we recommend the use of 99.9% Isopropyl Alcohol for cleaning purposes, we recommend Acetone for this procedure for its stronger cleaning power.

After all the parts are cleaned, we will want to review each of these parts again like we did in the prior video Part 2 Section 5 but this time, we want to focus more on damage and wear which is easier to detect once the parts are cleaned. If any damage or wear is detected on any of the parts, you will need to decide if the part needs to be replaced and to either purchase a new part from Levin or making a replacement part. Be aware that on older spindles such as the Levin open style headstocks, not all parts are available from Levin so you may be forced to make a replacement part or have it made by a machine shop.

After cleaning and inspecting all the parts but before starting the reassembly procedure, this is the time where you might like to reapply the finishes to your main spindle body such as the headstock bodies or on some of the attachments that contain painted surfaces. We always recommend selecting a good quality paint and trying your best to color match the paint to the original factory colors. Also very important is to strip the original finish down to the metal surface and apply a good quality primer before applying the main top coat finish.

2. Cleaning the Felt Rings & Retainer Clips

00:10:53 in video Part 3 Section 2

The pressed wool felt rings are cleaned using a different cleaning process as we do not want to damage the wool material or the form of the ring. This is a multi-step process that uses Woolite Delicates as the main cleaning component which can not be substituted for another cleaning product. Also do not use tap water, we use only distilled water that is also preheated for stronger cleaning power.

A detailed document has been written that describes the tools and materials required for this cleaning procedure which also includes steps on the felt ring cleaning process. This document can be downloaded under the Documentation section for this video series on our website at the following website link.

<http://www.activeatom.com/education-spindle-rebuilding-docs.php>

After the felt rings are cleaned, we now need to clean the retainer clips and check them on a flat surface to ensure that they are perfectly flat. If any bends in the retainer clip are found, try to bend the clips back using just your fingers as to not damage them as they are made from Aluminum and can be easily damaged. We show in the video how we use our fingers to bend these clips back into shape. If a clip cannot be bent back into shape with your fingers, then the ring can be placed on a flat metal surface and with a flat head hammer, very lightly tap on the ring to flatten it but be very careful as to not deform the shape of the clip. Also during the cleaning process of these retainer clips, do not attempt to sand or file the outside O.D. (outside diameter) surface as this will affect the press in fit (press fit) of it.

3. Measuring the Spindle for Runout

00:41:55 in video Part 3 Step 3

Now that all the parts are perfectly cleaned, we now need to check the spindle shaft for any condition problems. This procedure is performed on a surface plate using v-blocks, high precision test indicator, height gauge and a loupe. Details of these measuring instruments and how they are used are shown in the video.

The measuring instruments you will need are also listing in the Tools & Supplies Checkoff Sheet which can be found under the Documentation section for this video series on our website at the following website link.

<http://www.activeatom.com/education-spindle-rebuilding-docs.php>

Because we are measuring very high precision spindles at the micron level, very high quality and precision measuring instruments must be used that are in perfect condition. Even with the use of these high quality measuring instruments, you may still have a very difficult time detecting any runout on a good condition Levin spindle and the use of a loop may be needed to detect any needle movement on your 50 millionths of an Inch or 1 Micron test indicator.

For all Levin spindles, we check 3 areas of the spindle shaft with the test indicator. We first take a baseline reading at the center of the spindle and then the 2 areas on the spindle where the bearing(s) seat. For this procedure, we are checking for excessive runout that could be caused due to a bent or damaged spindle shaft. In order to meet factory specifications, we do not want to see a runout measurement greater than 0.0000050” or just slightly over 1 Micron (0.001 mm).

Once we have determined that the spindle shaft is in good condition, we now need to find the high spot on the spindle shaft that reads the maximum runout. Again, this can be very difficult to find on a good condition Levin spindle and a loop may be needed to detect any needle movement on the test indicator. Once the high spot is found on the spindle shaft, use a permanent marker and make a witness mark at both outer ends of the spindle shaft. Once these witness marks are made, be very careful not to accidentally wipe these marks off during the assembly process.

4. Replacing the Collet Key on the Spindle

01:17:38 in video Part 3 Step 4

Now is the time to determine if the collet key needs to be replaced because once the bearings are installed onto the spindle shaft, the collet key can no longer be replaced. In addition to obvious issues found with the collet key such as being sheared off or even missing, we also need to detect for minor damage and wear. If you do see slight damage or wear and not sure if you should replace it, go ahead and replace it anyways because you will not get another opportunity to replace it until you do another spindle rebuild. Remember that you cannot take these bearings back off once they are installed without also replacing them as well.

Fortunately collet keys for all Levin spindles can be purchased from Levin for a very reasonable price so there is no need to make one yourself. Once you receive the new key, you will need to adjust the length of the shaft end that gets pressed into the spindle so that it is ready for installation on the spindle during the assembly procedure.

Please note that the collet key is a press fit and is not riveted like many watchmaker lathe manufactures have done. We have rebuilt some Levin spindles where the collet key was replaced and riveted in place which caused permanent damage to the spindle shaft.

If during the collet key installation process, you find that the fit is too loose, you can use a Loctite Retaining Compound such as Loctite 603 or 609 which is a retaining compound that we use when needed.