PRECISION MACHINE SPINDLE REBUILDING
Educational Video Series

Part 3b: Assembling a Levin Open Style Headstock

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

0. Introduction

00:00:20 in video Part 3b

Please meet our favorite spindle from the Levin & Son line of lathe spindles. If you have not already done so, please watch video Part 3a first before viewing this video as there are many procedures that we shared in Part 3a that also apply to this headstock spindle. Once you have watched video Part 3a, you are now ready to proceed with this video with your Levin open style headstock.

a) This Sub-Part is focused on a specific Levin Spindle type

This important and informative Introduction focuses on the assembly of the Levin open style headstock. We take the time to review and talk about the parts in detail that are related to the Levin's open style headstock spindle. At this stage of the spindle rebuilding process, we want you to be sure you have all of your parts and materials in their place before starting this assembly process. This is good practice to take when rebuilding machine spindles because you do not want this assembly process to stall due to a missing part, tool, etc.. Also, please pay very close attention pertaining to the belt pulley as it is very important.

b) What Bearing Types will be used?

We share the Bearing Part Numbers that will be used for this spindle. A complete listing of all the bearing part numbers and details that are used on all the Levin spindles can be found under the Levin Bearings section for this video series on our website at the following website link.

http://www.activeatom.com/education-spindle-rebuilding-levin.php

c) Applying Machine Oil on all Spindle Parts

During the spindle assembly process, we want you to begin applying a thin coat of machine oil on all the parts to help reduce rust and corrosion. Also very important to apply a drop of oil on the threads of all fasteners as we have found this to be a common area for corrosion and rust. Of course, we highly recommend what we use, NyOil as it is a highly refined mineral based oil which also prevents corrosion and rust.

d) Chemtronics ControlWipes

We highly discourage the use of paper towels during the assembly of your spindle as they leave too much lint on the wiped surfaces. Instead, we highly recommend the use of Chemtronics ControlWipes which is a spunlaced polyester cellulose fabric that is lint-free and for general purpose use.

These sheets are very strong (will not tear) and are highly absorbent so they are a perfect choice for this application. If you cannot acquire these ControlWipes, you can use a cotton fabric but only if it has been prewashedf first in order to reduce any lint or other foreign material it may have.

1. Parts Review & Belt Pulley Lesson

00:04:08 in video Part 3b Section 1

Before we start assembling any parts, now is a good time to gather all the parts including the headstock housing and lay them out for inspection and inventory. We want to be sure all the parts have been thoroughly cleaned and are in perfect condition without any damage or significant wear. We also want to be sure we have 100% of all the parts necessary to assemble this headstock because we do not want to be in the middle of this spindle assembly procedure and find that we are missing a part. This can be a bad situation where we have already greased the bearings but now cannot continue with the spindle assembly until we either find the part, make a replacement part or order a new part from Levin which can all take time while the freshly greased bearings are sitting around.

Now is a good time to focus on how the belt pulley gets assembled onto the spindle shaft. There is a metal pulley shaft or collar that the pulley mounts to and can only be inserted into the belt pulley in one direction due to the fastener hole being off centered. Also the fastener that gets installed into the belt pulley needs to be perfectly aligned with the pulley shaft and collar, and finally inserted into the fastener hole in the spindle shaft. The most crucial part of this belt pulley assembly is that the tip of the pulley fastener inserts into the fastener hole in the spindle shaft otherwise severe damage can occur to the spindle shaft.

2. Preparing Headstock for Spindle Assembly

00:18:18 in video Part 3b Section 2

The first step in assembling the headstock spindle is to install the snap ring into the front headstock bearing housing where the Angular Contact Bearings seat into place. After installing this snap ring, you then need to install the internal bearing caps (this is the only Levin headstock or spindle that contain these) which are press fit either with your fingers or if more pressure is required (please be gentle), we show the use of a watchmaker press tool for performing this procedure. Once this step is completed, you can continue with the next step.

Reminder that the grease application of the spindle bearings is covered in Part 3a.

3. Installing Bearings onto the Spindle

00:37:13 in video Part 3b Section 3

a) SKF Bearing Installation Tool Kit

For this bearing installation procedure, we will be using our SKF Bearing Installation Took Kit but if you don't have this kit and don't want to purchase one, you can purchase a dead blow hammer and make the bearing insertion tools out of Delrin. You will however need a larger lathe for turning the Delrin parts. We also highly recommend a dead blow hammer (a true life saver in bearing installation) as it provides a much better striking force but most important, it reduces the amount of rebound so the hammer strikes are more controlled. We also share the use of a hockey puck in our bearing installation procedure which protects the spindle shaft from any damage.

b) Lubricate the Spindle for Bearing Installation

00:41:36

Very important to apply a thin coat of machine oil (NyOil) on the spindle shaft to assist in the bearing installation which helps the bearings slide down the shaft and into position. Only add oil to your spindle shaft and the spindle components when you are actually ready to begin installing the bearings to prevent turning your oiled metal parts into foreign material magnets.

In the video, we share what the grease in the bearings should look like.

c) Bearing Arrangement and Alignment

00:45:42

When installing the Angular Contact Bearings, you need to pay attention to the bearing arrangement which for all Levin spindles, is in a Back-to-Back arrangement. Also very important, you will need to align the runout markings on the bearing with the witness mark on the spindle shaft that designates the high spot. The markings on the bearings are installed 180 degrees from the high spot witness mark you made on the spindle shaft. The purpose of this alignment procedure is to reduce the overall runout of the spindle assembly by using the runout on the spindle and bearings to cancel each other out. This will provide the most accurate installation with the most accurate near zero runout you can achieve. So pay careful attention to this procedure, listen closely and take your time.

d) Bearing Installation

00:49:34

At this stage, please take your time as you only get one shot at this. Also please pay attention to the belt pulley details here as you need to get this right. All the Levin Headstocks spindles contain a Duplex Pair of Angular Contact Bearings and a single Precision Deep Groove Bearing. The pair of angular contact bearings will be pressed onto the spindle and will seat together.

Press each bearing individually, not both at the same time. Then insert the spindle shaft into the headstock housing, insert the internal bearing spacer and belt pulley onto the spindle shaft and then press the deep groove bearing onto the spindle shaft.

With your loupe, inspect the bearings and the grease within them to confirm there are no foreign objects that the grease might have captured from yourself, the surrounding or the air, as this is the last time you are going to see these bearings. Also reminder that bearings have an acceptable size tolerance on the inside race bore diameter and this may result in bearings being tighter or looser when installing them on the spindle shaft.

4. Installing the Spindle Nut

01:14:46 in video Part 3b Section 4

a) Remove Fastener on Spindle Nut

Before installing the Spindle Nut onto the spindle, remove the fastener that is used for securing the spindle nut in place. This ensures that we don't damage the very fine spindle threads when installing the spindle nut.

b) Install Spindle Nut & Fastener

01:17:30

The setscrew for the belt pulley can now be installed and tighten to secure it onto the spindle shaft. While installing the spindle nut, we could hold the spindle in place by holding onto the belt pulley but due to the small set screw that is used to secure it onto the spindle shaft, we do not recommend this. Rather, we share the use of nylon pliers that you already utilized for other operations and you will be holding the spindle shaft nose with them while tightening the spindle nut and locking screw.

Tighten the spindle nut and test that the spindle is always spinning freely. Then install the locking screw to hold that spindle nut onto the spindle shaft threads.

5. Installing Bearing Caps

01:29:09 in video Part 3b Section 5

a) Check Spindle Rotation

Before installing the Bearing Caps, rotate the spindle by hand and insure that the movement is smooth with no resistance areas. Do not continue if there are any issues detected with the spindle as it may need to be disassembled for diagnoses. We talk about the tools you will be using for this second to final assembly operation.

b) Install Bearing Caps

For all Levin spindles with the exception of the Levin Closed Style headstocks, the bearing caps contain felt and retainer rings that must be re-installed. These felt rings were removed during the disassembly procedure so that they could be properly cleaned.

c) Install Slinger and Slinger Cover

Now with the bearing caps installed, we need to install the slinger and slinger cover which are press fit on the front head of the spindle shaft. In the video, we show a couple of methods that can be used for installing these parts. When installing the slinger cover, be sure that the front slot is position downward so that if any dirt, grit, etc.. makes it way to the slinger, this material will fall out of the slot via gravity.

6. Not 100% Yet

01:46:40 in video Part 3b Section 6

The headstock may look complete now but there are still a few more parts left to assemble before we can call this part of the procedure 100% complete.

a) Install Mounting Clamps

01:47:50

The mounting clamp parts are what hold the headstock securely to the lathe bed. Be sure to lubricant all the part surfaces as this is a common area that we see rust and corrosion. We show you via the Levin & Son blueprint where thee two clamping mechanisms go and how they work.

b) Install Spindle Indexing Pin

01:49:55

Lastly, the index pin needs to be installed into the side of the headstock and is a loose press fit. Be sure to lubricate this part before installing it.