# Installing the Crank Yoke

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***06/12/2008***



Over the last few days I have been ***carefully*** installing the crank yoke. As time and effort go into the shaper, my degree of care increases. Here you see the result of my effort. The crank yoke is safely nestled inside the shaper's body. Previous articles dealt with the machining of the crank yoke, bearings, and slide block.

Before I could begin the crank yoke install, I had to cut the crank pin to size. Gingery calls for a stack of washers to hold the slide block away from the crank. I decided to just cut my own washer from 12L14. It is 1 1/4” in diameter and about 0.2” thick. The center hole is a close fit to the crank pin.

The slide block is fitted to the bull wheel and helps support the crank yoke. I have stacked a 1-2-3 block and a parallel up to support my right pivot boss and permit me to slide it forward and back as part of the final adjustment. The left pivot boss has been secured to the pivot rod via its set screw so I can slide it out and make contact with the left side. The C-clamps permit me to easily adjust the pivot's location and secure it for alignment testing.

It is hard to see, but the left boss support is now supported by a 1-2-3 block, a parallel, and some thin packing. I am using an inside caliper to verify that the yoke crank is parallel to the inside of the column. The exact position of the yoke crank is not critical because I can slide the bull wheel in and out in order to keep the slide block centered.

You are looking at the underside of the ram on top and the inside calipers resting on the back cross brace. You might be able to see the the caliper jaws are contacting the left vertical of the column and the left face of the crank yoke.

After double checking the range of motion of the crank yoke as per Gingery's instructions, it was time to start match drilling and tapping the 4 holes. Here I have already drilled the pilot hole through the aluminum side plate and steel boss support. The 5/16 -18 tap is being used to tap the boss support.

Note that I have completely finished this first fastener before starting on the second one. In this way the second fastener must exactly fit. A quicker but riskier way to do this task is to drill both holes, tap both holes, screw in the first bolt, and ***hope*** that the second bolt fits. No thanks. I've learned this lesson the hard way.

On this second hole I will show you more of my procedure. I am using a bench block to guide the pilot hole. Note the blocks under the bench block which let me clear the flange ring.

I'm using an electric hand drill here because it is easier to control than trying to perch the shaper column on my drill press. I don't have the headroom to put it on my mill/drill. The holes must be reasonably square so this approach is fine.

The drill was periodically pulled from the hole so I could see when I had broken through the aluminum and into the steel. I used WD40 as a cutting fluid in the aluminum and cutting oil once I hit the steel. A shop vac was handy to clean out the blind hole.

No surprise here. Both screw must perfectly fit into their holes.

I wish there was some way to hide my awful welds but it is the only way you can see how the screws have run through the pivot support.

Note the large change in thickness of the support plate. As explained in a previous article, the bottom of the plate and bore of the boss are all that matter here... within reason. It does give me some pain so see such poor craftsmanship but not so much that I want to make a new one.

All four screws have been installed and the crank yoke is securely in position.

The crank yoke is in the maximum forward position. You can see the scotch yoke through the hole along with the bull wheel.

This is a poor man's movie. The yoke is vertical with the crank pin at the top of its stroke.

And finally, the crank yoke is at its maximum rear position. It looks a lot cooler in real life.

This is a top end view. Note that the top of the crank yoke is about 1/8” away from the rear cross brace.

This is a side view of the crank yoke peaking out the front. It passes through the front casting.

I have reinstalled the ram and you can see the 1/8” clearance between the bottom of the ram and the top of the crank yoke.

This is the same position but viewed from the front. You can see that the top of the crank yoke has been milled to provide clearance in the front. The plans called for a 2” wide crank yoke but I had 2.5” wide stock. Rather than throw away the extra steel, I reduced the width as needed.

The thinning of the crank yoke was done on my mill/drill with a 1/2” diameter end mill. It should have been a routine task but at a critical instant my mind wandered. The end mill snatched the yoke out of the vise and proceeded to dance along the yokes face. In hind sight I realized that I had been up milling as I cut the back of edge of the yoke but this became down milling as I began to cut the front edge. The increase in cutting force was more than my soft jaws could handle. Fortunately I was not hurt and the dings in the yoke are superficial. Gee, I thought I was paying full attention!

The next step is to make the ram clamp and links. This will permit me to attach the ram to the crank yoke. The design will be modified so the clamping action will be via a nut on the top of the ram like on store bought shapers.

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