



# Notes on Converting 3 Rail Locomotives to 2 Rail Operation

By

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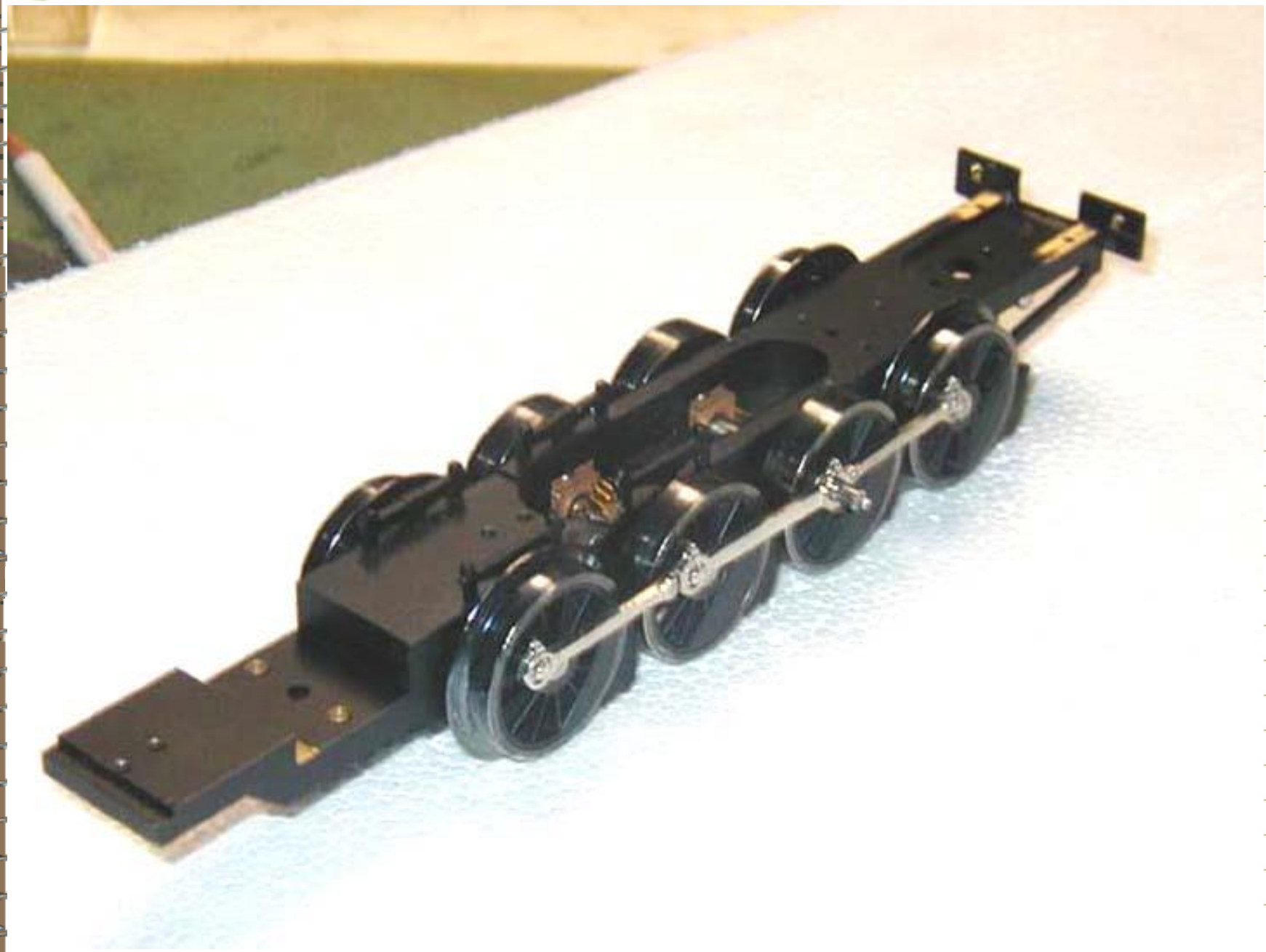
Baldwin, Maryland

# Converting the Drivers on a Sunset 2-8-0

- The following photos and text provide a brief explanation of the work involved in converting three rail drivers on a Sunset model to two rail operation.
- In addition to the work shown, the axles must also be shortened since the driver width is reduced from around 0.22" to 0.16".

# 3 Rail Frame & Drivers

- The following photo shows the original frame and drivers before modifications



# The Drivers

- This photo shows the drivers removed from the axles with the original 3 rail tires removed. I remove the tires on the Sunset engines by lightly chucking the driver (flange side out against the chuck jaws), in the lathe's 3 jaw chuck and using a blunt rod held in a tailstock Jacobs chuck, press the driver centers out of the flanges.



# Driver Turning Mandrel

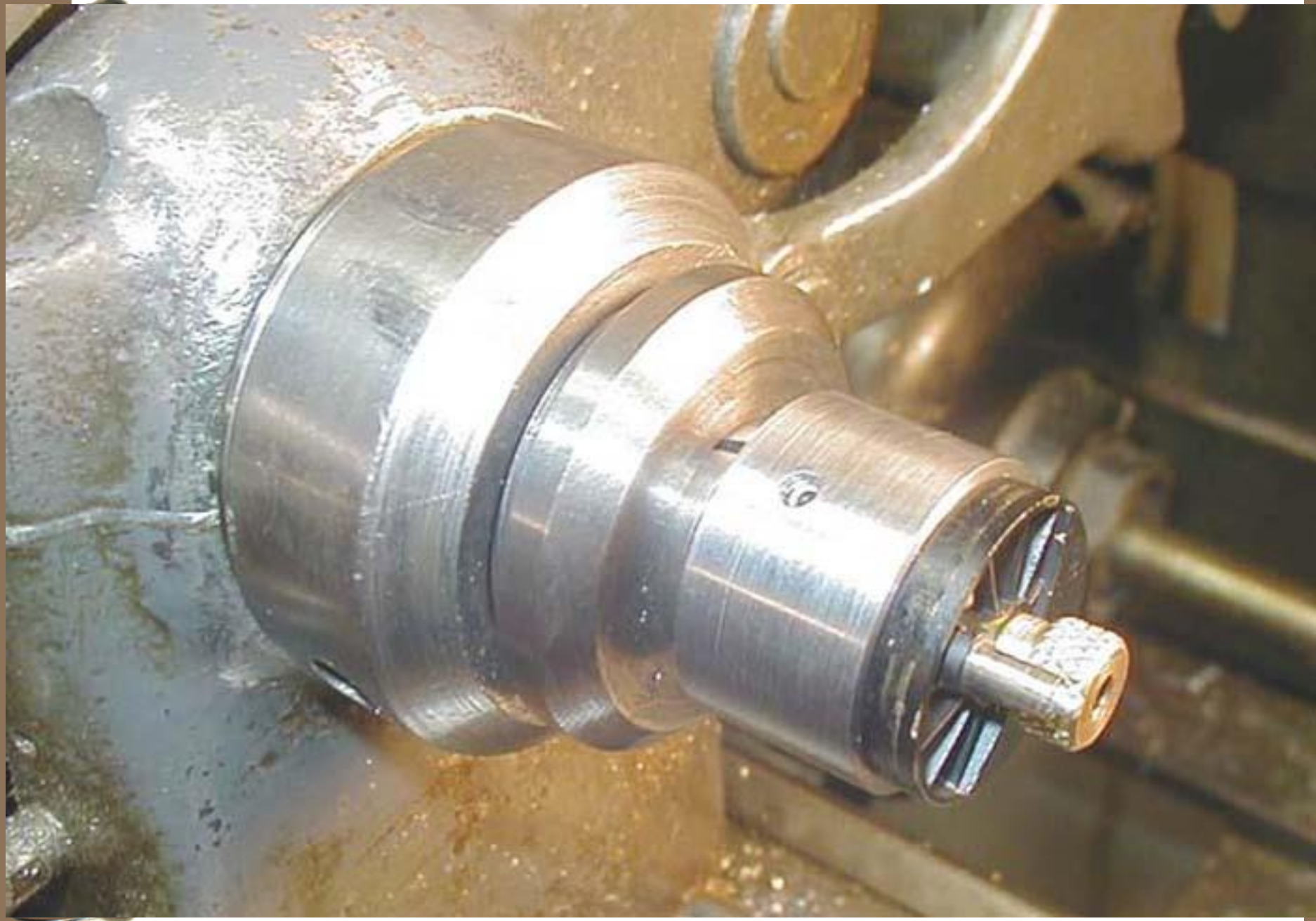
- This is the tool that holds the driver center on my lathe while the new tires are turned on it. The mandrel's rear is turned to 0.5" diameter to fit the 1/2" collet in my lathe headstock. The center pin is a piece of drill rod turned to the locomotive axle diameter. The small pin fits between the spokes to keep the driver from turning and the knurled nut holds the driver tight to the mandrel.





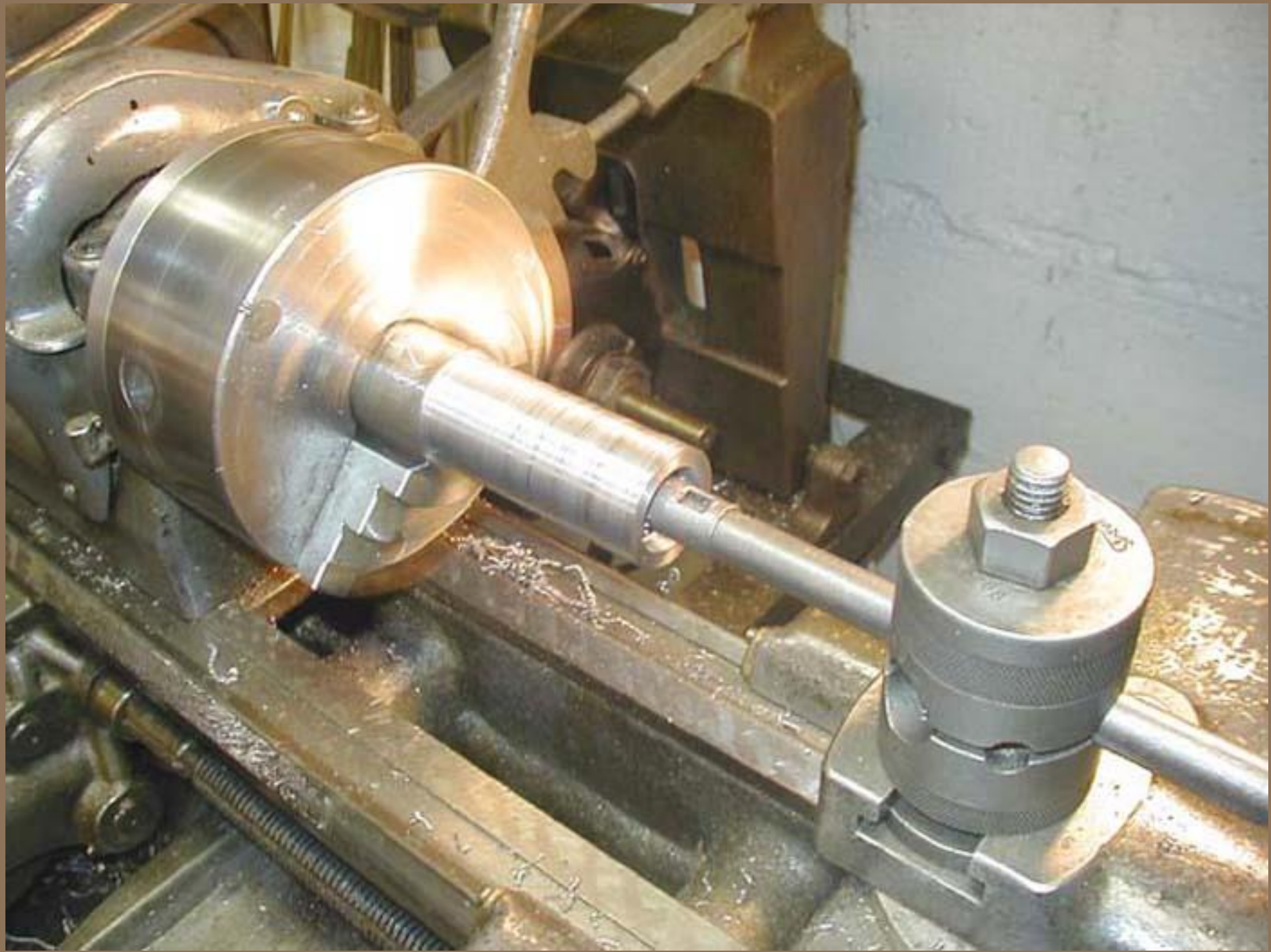
# Mandrel in Collet

- This photo shows the turning mandrel mounted in the lathe headstock collet with the driver center in place. This is not a normal step in the operation but I included it to clarify the use of the mandrel.



# Turning the Tire Material

- Using a piece of 12L14 lead alloy steel or any other steel bar stock that machines freely and is slightly over the size of the OD of the the driver flanges, drill a hole into the stock to form a heavy walled pipe. Then, with your boring bar, turn the ID of the pipe to the approximate OD of the driver center. I like to leave about 0.030 extra for final machining after the tires are rough cut from the bar stock.

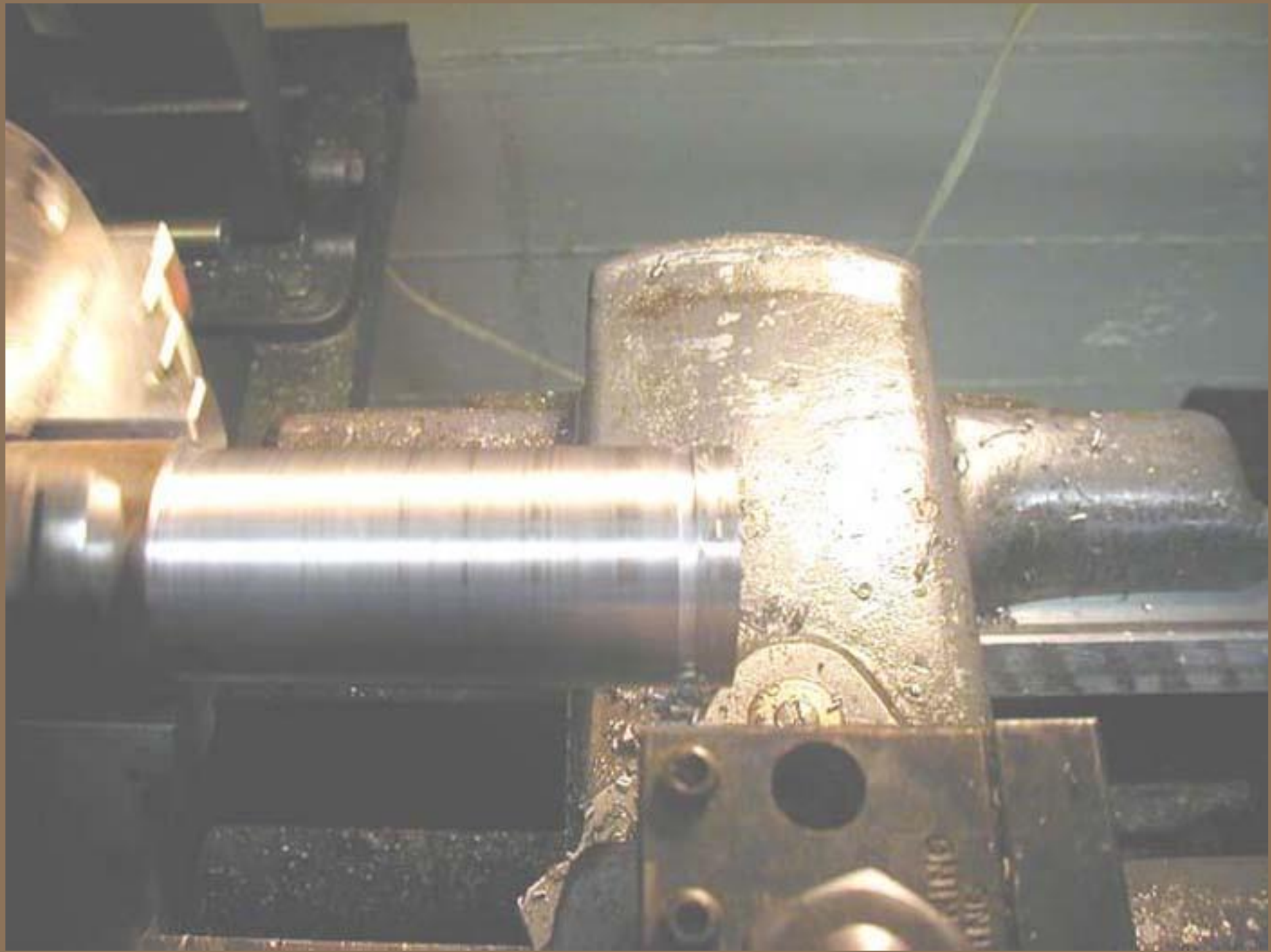


# Insulated Driver Tires

- I insulate my drivers on the Fireman's side of the locomotive per NMRA practice by fitting a shim of 0.010 fish paper between the driver center and the tire. This material is available from Small Parts Inc. in Miami Florida. Remember that half of your tires will have to have an ID 0.020 larger than the driver center to accommodate the fish paper.

# Cutting Off the Rough Tires

- After you have bored out the ID of the bar stock to a sufficient depth to make a number of tires, install the cut off tool in your tool holder or on your compound rest and cut off the tire blanks. I make mine 0.20 inches thick initially to allow for some stock removal.



# Installing Fish Paper

- I have had marginal success in installing drivers tires over fish paper as a tight press fit. I achieve a nice fit that does not distort the paper and then run a heavy bead of Loctite Retaining Compound around the paper allowing it to dry overnight. Once the Loctite sets up you can machine the driver tires and flanges and nothing will move!



# Final ID Turning of the Tire Blanks

- Once the tires have been cut off of the bar stock, I carefully chuck each tire back in the chuck and turn the ID of the tires to their final size. I always make a couple of extra tire blanks in case I over cut a tire. I test fit the first tire to a driver center and if everything fits up OK I open up the remaining tires to the exact same setting on the compound rest feed indicator.

# Turning the Tires

- Once the tire blanks are fitted to the centers it is time to begin turning the blanks into locomotive tires. The trick, of course it to get them to come out all the same size at the end of the job! The first thing I do is take a series of cuts with no taper to reduce the first 0.10 inches of tire about 0.030 on the radius. The next photo shows this operation.



# Reducing the Driver Width

- Remove the collet and mandrel from the lathe headstock and install your 3 jaw chuck. Now chuck you driver rear side outward in the chuck. The step you cut into the tire will register the driver square in the chuck. AHHHH!

# Facing Off the Rear of the Driver

- Now you can remove stock from the rear of the driver and tire to reduce the overall width of the tire to whatever standard you are using. I think NMRA practice is 0.172". I use 0,160" and I never have derailment problems.



# Finishing the Driver Tires.

- Once again, remove the 3 jaw chuck and reinstall your collet and turning mandrel.
- Set your compound rest on 2 degrees and set the face of your cutting tool to form the front edge of your driver flange.
- Set your compound rest top feed to a convenient 0 setting and move the tool up to the edge of the unfinished driver tire.
- Lock the lathe tool carriage in place on the lathe ways.

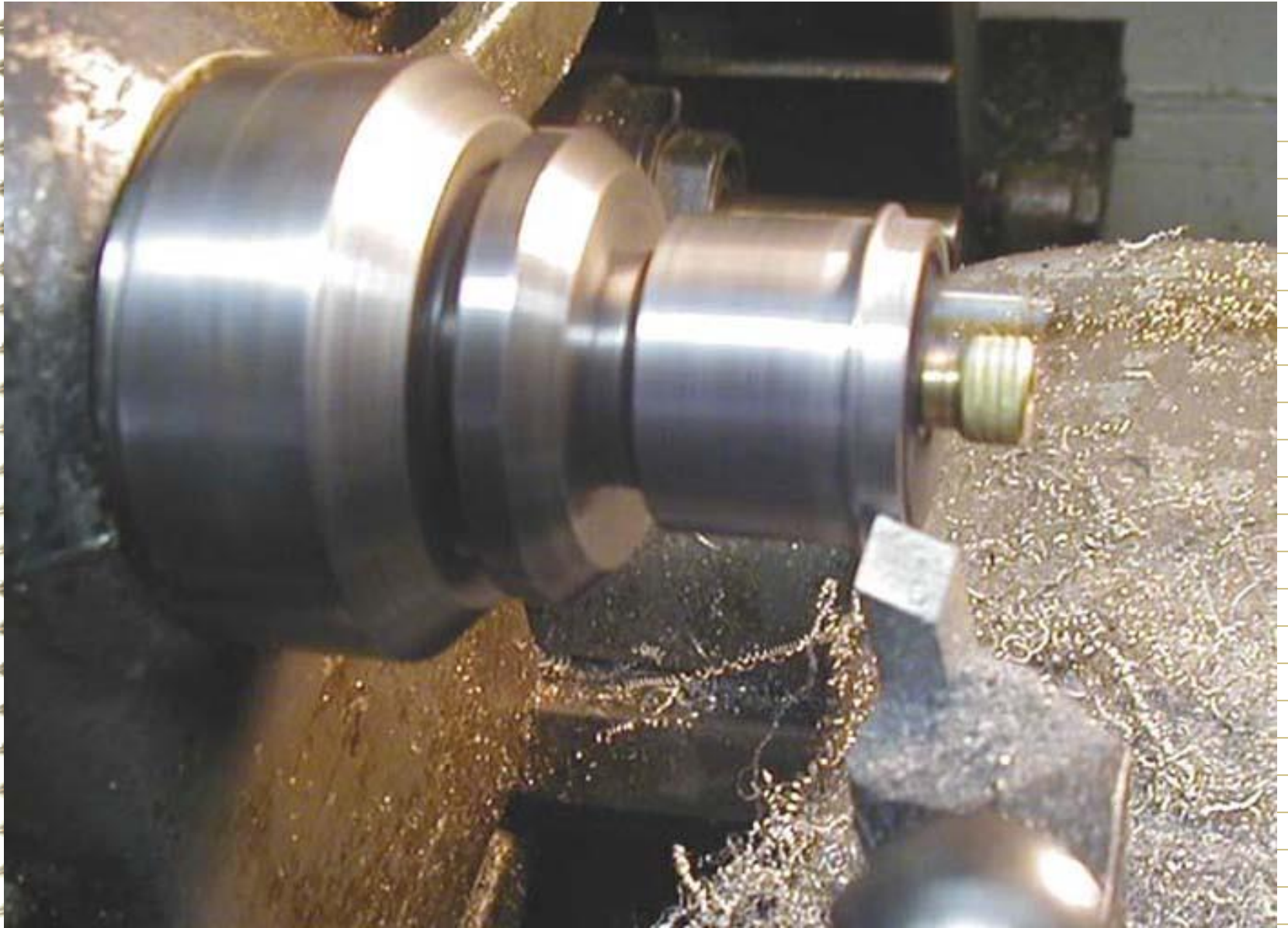
# The Final Cuts

- Turn on the lathe and hand feed the tool with the compound slide into the driver tire taking light cuts (0.010 or so). Since the compound is set at 2 degrees you will automatically cut a taper into the driver tire rolling surface. I run my tool in on 0.160 wide tires 0.120" and stop. Back the tool off of the work and return the top slide back to the 0 setting where you started.



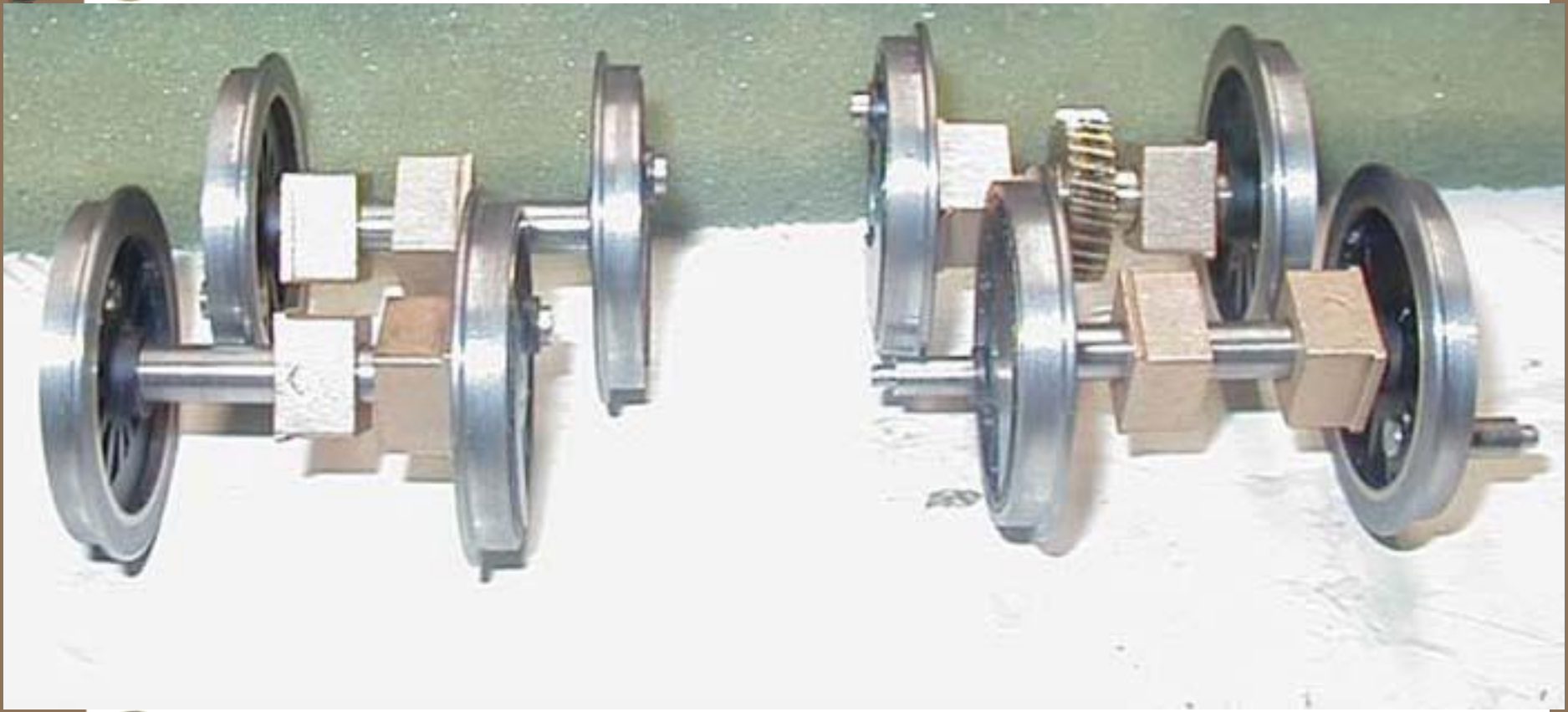
# Final Cuts Continued

- Continue this stock removal until the OD of the tire at the root of the driver tire flange is the desired OD of the driver. Now back the tool off to the desired flange depth and reduce the OD of the flange. Make a note of the settings on the cross feed screw at these finishing cuts and do the rest of the drivers and tires to the same settings. If you do this correctly, all of your drivers will be the same size.



# Flange Finishing.

- If you get this far you will have a nice finished tire with a flat topped flange.
- I finish my flanges with a mill file that has had its side teeth ground off so as not to cut into the tire. I carefully round off the flange with light file cuts and the job is finished. The more you do this the easier this step becomes. Take a look at the final drivers.



# Everything Back Together

- The last photo shows the drivers quartered and back in the frame. More on quartering in the next program!
- Hope you learned something.
- Best regards,
- Joe Foehrkolb

