Rectifying a stiff Rudder on a Najad 360

Submitted by Simon James

The rudder on my 360 became very stiff, it had got to the point that it was putting excessive loads on the steering mechanism and the auto pilot and something needed to be done. These notes are offered as an approach to resolving the issue but if anybody acts or follows these suggestions they should only do it at their risk and the author accepts no liability of any outcome and it can only be done when the boat is out of the water.

The steps used to rectify this issue were as follows;

A. Remove the steering mechanism and the rudder upper pintle seal where it enters the hull.
B. Remove the rudder assembly.
C. Clean the rudder pintle bearings.
D. Refurbish the lower rudder brass bearing shoe.
E. Re-install the rudder.
F. Re-install the upper pintle bearing seal and steering quadrant.

Below is a description of how each of these steps were undertaken but may not be the only way of doing it. With any new dismantling procedure take copious photographs and notes and carefully note how the various components are disassembled and carefully collect the parts together in sets.

A. Remove the steering mechanism and the rudder upper pintle seal where it enters the hull.

The Najad 360 has a centre cockpit with a cable and wheel steering arrangement. With this mechanism the attachment to the upper pintle is via a quadrant which is made up of 2 parts held by a set of bolts and a key to lock it onto the pintle. Note: 1) there should be an earthing wire to wire the rudder to the anode circuit. 2) the underside of the quadrant could be smothered with dirty grease which needs to be cleaned.

Once the steering cables have been disconnected (record the length of the cable adjustment bolts) and the quadrant has been removed, it will exposes the seal which is made up of compressed packing glands in the cap. Next unscrew the top seal cap which is locked in place with a nut below it. These are large nuts but lightly loaded which

will require large spanners. I made up a pair of aluminium spanners to suit which may be worth doing so that the seal can be adjusted when reassembled and during initial trials. Now carefully slide the cap upwards off the now exposed rudder pintle. It is important to ensure the pintle shaft is not scored or damaged in the vicinity of the seal.

Remove the 2 packing gland rings from the top seal cap, care is needed to not damage the inside surface of the cap in the region of where the seal fits, clean the area of dirty grease and clean the greasing cap on the side of the upper bearing housing.




B. Remove the rudder assembly.

Moving outside, start by blocking up the underside of the rudder to support it as the lower bearing is dismantled. I used several wooden pallets and a hydraulic car jack to control it as it was lowered. When planning the blocking arrangement allow for sufficient space to drop the rudder and clear the top portion of the rudder pintle by about 15 inches.

Once the support has been arranged remove the bottom bearing brass shoe. Remove the M8 counter sunk machine screws then gently part the sealant that will have been used to hold the shoe In place. Remember the shoe is a cast brass fitting on a fibreglass skeg which does not want to be hit heavily with a hammer. In theory the lower shoe takes all the weight of the rudder so as the shoe is dismantled the rudder needs supporting, in practice if the rudder is very stiff it will stay in place and will require a considerable amount of waggling to to drop the rudder.

As the rudder top pintle comes free the rudder needs to be supported and lowered. I managed to do it on my own but would have been better to have had additional help at this point.


C. Clean the rudder pintle bearings.

The lower bearing shoe and thrust washer should use seawater lubricant and should not have had any grease applied. So the brass shoe should be cleaned of sealant and any

crustation removed. At this stage it is worth checking the lower bearing is not excessively worn, if it is, it should be serviced.

Then turn your attention to the upper bearing which has a plastic liner with greasing rings to distribute the grease around the bearing from the grease cap just below the bearing seal, mentioned above. In my case the bearing inner surface was covered with old grease, crustation, and possibly grit held by the old grease, which all had to be cleaned out. I used a piece of plastic pipe just smaller in diameter than the pintle, it was wrapped with wet and dry sand paper and white spirits was used as the lubricant. I used various grades of wet and dry to gradually remove the deposits and smooth the plastic bearing. Keep checking that the actual bearing material itself is not being 'rubbed away'. Pay particular attention to the grease grooves in the plastic liner, they should be cleaned out.

Finally check the bearing inside diameter is not excessively bigger than the pintle diameter. If it is the bearing liner will need to be replaced. Remember the upper and lower bearing need to be in line and if for any reason they are not then the rudder bearing will feel 'tight' but will wear quickly in service and will then allow the rudder to be loose and vibrate in service.

D. Refurbish the lower rudder brass bearing shoe.

The lower rudder bearing shoe needs to be cleaned and checked for wear and corrosion. In my case the M8 machine screws were made from A2 grade stainless steel. These were all replaced with A4 screws washers and nylon lock nuts. Because the shoe is profiled all the machine screws had to be cut to length to ensure they were flush (there should be 2 to 3 thread protruding beyond the nut in its final position). Tip when cutting the machine screws leave the nuts on the parent part of the screw so once they have been cut to length and a small bevel filed on end threads the nuts can be wound off to clean the end thread and tip 2 when cutting the thread, hold the screw vertically in a vice with the cut line flush with the top of the vice, being careful not to damage the thread. Then using a hacksaw use the top of the vice jaws as a guide to cut the screw at right angles.

When assembling the shoe to the skeg use an underwater sealant adhesive such as Sikaflex 259uv (recommended by Sikaflex) although I used 291 making sure there was plenty of sealant around the machine screws or use an electrical isolator compound.

Assemble the shoe and the rudder together ensuring the pintle and bearings are all aligned.

E. Re-install the rudder.

It helps to have some assistance to reinstall the rudder although it can be done on your own with the aid of props. Prior to assembly make sure the upper bearing is smeared internally with a suitable under water grease and the region where the upper seal is located the shaft is not scored in any way. Then when the rudder is aligned, use the car jack to gradually raise the rudder into its final position and attach the lower bearing shoe. The rudder should now rotate smoothly with minimal effort.

F. Re-install the upper pintle bearing seal and steering quadrant.

Going back inside to the aft cabin, start by making sure all the old grease is cleaned and all of the old gland material is removed. Next pack the upper seal cap with gland material, I used a PTFE based gland material. Traditionally you would use at least 3 circular rings with the cut line at 45 deg and space at 120 deg apart. For this application I used 2 rings one 8 mm square for the inner or top position and 6 mm square for the lower ring because this was adjacent to the thread and was a smaller diameter. The rings need to be cut so they are a nice snug fit with no gaps and the joints 180 degrees apart.

Assemble the seal housing lock nut and wind it right to the bottom. Next add the upper cap with gland material very carefully lowering it down the pintle making sure it is not damaged or scored by the key way in the shaft. Next wind the cap on to the sealing housing, initially finger tight and then a couple of nut flats. The object is to compress the gland material so a seal is formed but not too tight which would add a lot of friction. Rotate the rudder to bed the seal in then check the cap is still tight and then lock it off with the bottom lock nut. Finally renew the grease in the grease cap below the seal, inject plenty of fresh grease into the bearing by winding the grease cap. The cap should be hand tightened then the rudder worked and cap rechecked a few times.

Finally replace the steering quadrant, the cable adjustment bolts and earthing wire and check the steering for stiffness.

If the seal, made up of packing glands, is used on a prop shaft it is expected to weep slightly during operation, if it it too tight it over heats. For a relatively static seal on a rudder shaft you should be able to adjust the seal cap so that it does not actually weep but still be relatively free. If you need to adjust the tightness to stop the seal from leaking in service, back off the lower lock nut and adjust the top seal cap and re tighten the lock nut with your home made spanners. It is better to under torque the seal cap initially as the gland material compresses but does not spring back when the pressure is released.

Replace the steering quadrant tightening the cable bolts to the initial recorded dimensions. Reconnect the electrical earthing wire. Check everything is working correctly, steering, auto pilot, electric conductivity, the quadrant stops, etc. prior to launching the boat,

The whole exercise took me about 6 hours, but would be a lot quicker the next time.