

ELECTROLYSIS IN SMALL YANMAR ENGINES

I have owned two Hunter sailboats, each with a different Yanmar engine. Each engine had a section of the Heat Exchanger, surrounding the Tube Core assembly, that disintegrated over time...I know not why.

The first boat, a 1996 Hunter 376 had a Yanmar 3JH3. The second - my current boat - is a 2007 Hunter 44DS with a Yanmar 4JH4. Neither engine has zincs. Apparently Yanmar believes that, since the motor is mechanically and electrically connected to the shaft zincs, that will do the job. This IS NOT my experience! If anyone can enlighten me, I would appreciate it. Otherwise, my purpose here is to document the fix.

I purchased the 44DS in February of 2022. The engine had just under 900 hours on it at the time of purchase. After a successful cruise from Norfolk to Maine and back in 2024, it was time to go through the engine after 350 hours from the summer cruise!

That is when I noticed the telltale accumulation of salt at the 5 o'clock position on the forward end-cap of the Heat Exchanger (p/n 129670-44911); that part of the engine that includes the manifold and Tube Core assembly ("Cooling Pipe" in Yanmar vernacular). Once I got the cap off, the damage was more than apparent. 

With a new Heat Exchanger price in the \$1,400 - \$1,500 range, I decided to see if a machine shop could re-weld and resurface the original. Fortunately, there was just enough room to unbolt and remove



the cooling block without moving the engine. I was not so fortunate with the 3JH3 on the Hunter 376!

The machine shop did what I thought was a good job. Here is what everything looked like before it went back on the engine.



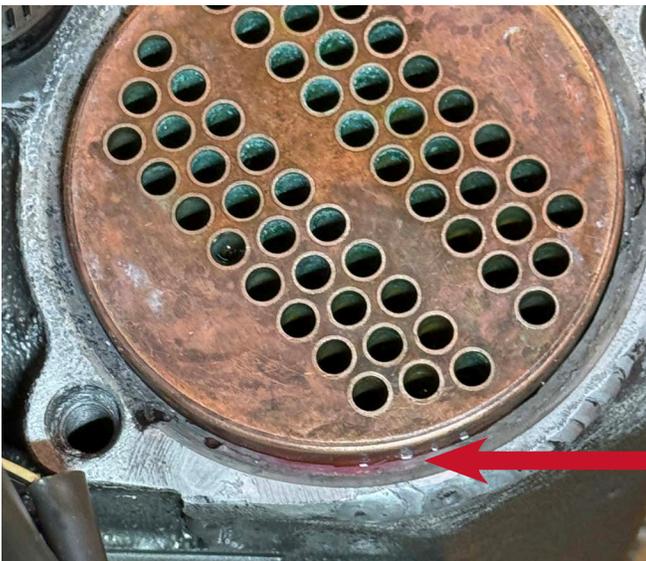
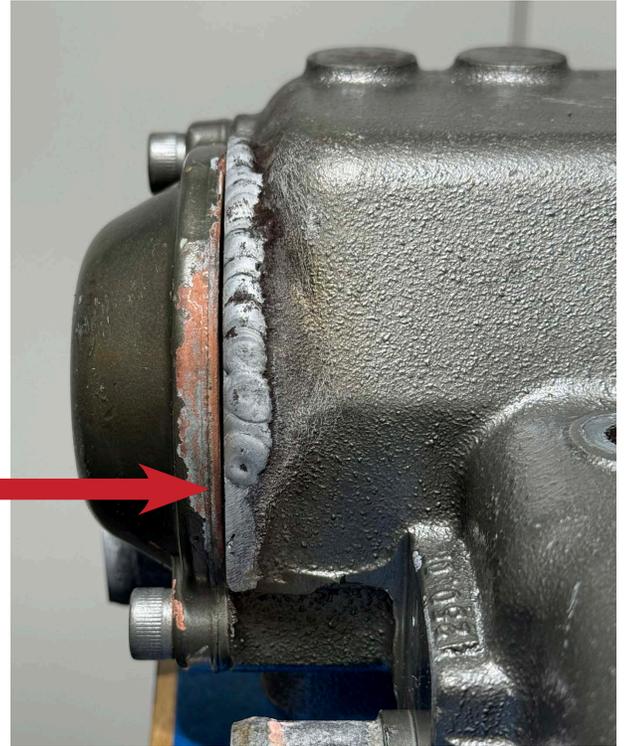
Thinking I had this problem taken care of, I headed back to the boat, installed the repaired Heat Exchanger, reconnected the hoses and filled the coolant reservoir



with antifreeze.

A little while later, antifreeze started dripping out of the forward end-cap. That meant I had two problems: antifreeze was getting by the 'O' ring that surrounded the end of the Tube Core assembly (this is the barrier between the raw water and the antifreeze) and it was leaking from the end-cap. That would result in a raw water leak and eventually a failure of the alternator mounted under it!

You can clearly see that the end of the Heat Exchanger that had been re-welded was not planed properly which left a gap for raw water to escape.



After I removed the end-cap I could clearly see antifreeze seeping out of a small gap in the welded area at the bottom of the Tube Core.

The machine shop approach had not worked. While I could have taken it back for remachining, I decided that would take additional time and money without a guarantee of success. After a hard swallow, I ordered a new Heat Exchanger assembly!



NOTE: I had been so focused on the disintegration of metal at the front of the Heat Exchanger, that I did not examine the dark and sooty exhaust port at the back until my return from the machine shop. This area also had significant metal loss where raw water tended to congregate. Here, I used JB WELD steel reinforced epoxy to fill in the gap.

Conclusions

I have never had an education I did not have to pay for in some way, shape or form. Here is what I learned this time:

- The tolerances were far too tight to repair the damage without extensive time & money (those magic ingredients) which may have approached the replacement cost.
- The Tube Core Assembly needs to be removed every so often for thorough cleaning. Especially where the Tube Core makes contact with the Cooling Assembly block on its ends. All this should be done when changing the antifreeze which Yanmar recommends happen every 2 - 3 years or 2,000 hours.
- Yanmar does, in fact, make a 'zinc' for their small block engines. Below are two pictures of that sacrificial metal: The Heat Exchanger. It is a rather expensive fix so keep a good eye on the one that you have!

