

CORROSION

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Stray currents

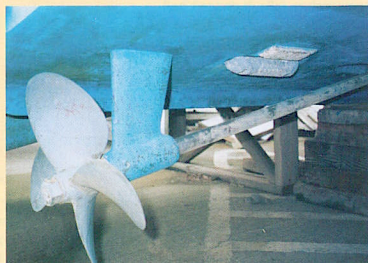
Q I think my propeller is corroding from a stray current passing into the water, because the corrosion happened very quickly last season whereas in previous seasons there has been no problem. How can I determine where this current is coming from? Is there a methodical sequence of tests to go through?

A The source of a stray current can be a devil to locate and, as you say, needs methodology to be successful. I recommend you read Nigel Calder's book *Boatowner's Mechanical and Electrical Manual*, published by Adlard Coles. ISBN 0-7136-4291-2

Inert anodes

Q Why does my anode hardly corrode from year to year?

A It's either not electrically connected to the item(s) it's supposed to protect or is too far away. You need a very low resistance circuit from anode to item, and that is difficult to maintain in the damp bilges of a boat. Check with a multi-meter. An anode can really only give protection if it can 'see' the item it's supposed to protect and is less than a foot or two away.



▲ A large anode doing its job - but it can only be effective if there is a low resistance path between it and the stern gear - check with a multimeter

Stainless steel fasteners

Q Why is it fine to use stainless steel bolts in an aluminium fitting?

A Aluminium is way down in the galvanic series and is attacked by virtually all other metals. But stainless steel has a tightly adherent oxide coating, which effectively gives a degree of insulation when in contact with any other metal. So it is common practice to use stainless bolts to fasten down aluminium hardware, despite the apparent gap shown by the galvanic series.



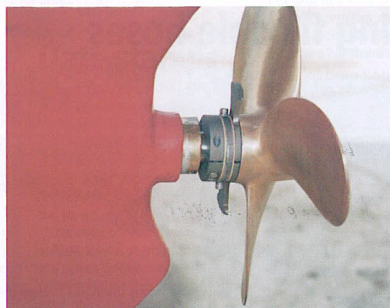
▲ The zinc has leached out of these screws

Brass and bronze

Q What's the difference between brass and bronze?

A Brass is a mixture of copper and 30-40% zinc. The zinc strengthens the soft copper but unfortunately, in the presence of moisture the zinc leaches out (de-zincifies) leaving a weak skeleton of copper. This can be disastrous in the case of seacock bolts, but it even happens inside a cabin after a few years. Brass has little use on a boat. Manganese bronze is a brass.

Bronzes are copper strengthened with a bit of aluminium, silicon, nickel or tin (gunmetal) and are strong and very corrosion-resistant.

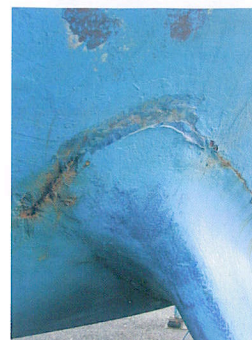


▲ If all underwater metal items are high quality and not electrically connected to anything, there is no need for an anode

Why fit an anode?

Q I have been told I should fit an anode to protect my stern gear as one day it might start to corrode. Is this true?

A If there has been little corrosion over the years, the best advice is to leave it alone. A good principle is that if the underwater metal items are of good quality, (eg. nickel aluminium bronze propeller, high-grade stainless-steel shaft, bronze stern tube, and bronze seacocks) they will individually be very corrosion-resistant and will not need protection. The proviso is that there must not be any electrical path between them, eg. piping must be plastic, and there should be a plastic/rubber flexible coupling to isolate the engine from the shaft.



▲ Does this rust staining mean the keel bolts are rusting away?

Dodgy keel bolts

Q My 20-year-old boat has a cast iron keel held on with steel bolts (I can see the tops in the bilge). Could rusting be taking place, meaning one day the keel will fall off?

A You should withdraw a sample bolt. It's a concern if the bolts are plain steel in a wooden hull, but this is not so important on a GRP boat with stainless steel bolts all encapsulated.

The grade of stainless is important. Today 316 is the industry standard, but in years gone by 304 was common, which is much more susceptible to crevice corrosion.

Aluminium hulls

Q My surveyor says that I would be well advised to steer away from an aluminium-hulled yacht I am thinking of buying. Why is this?

A There are pros and cons to all hull materials. Aluminium makes a very good hull material, providing the grade is 5083. It is light and strong and virtually all fast ferries are made of it.

However, beware of galvanic corrosion. Fittings should be either aluminium or stainless steel (never bronze, steel or wood)



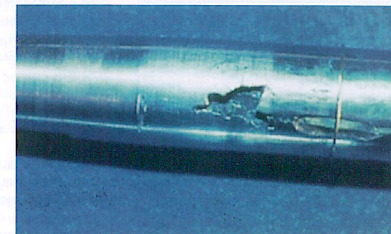
whether above or below the water. Also, as with a steel hull, condensation is a problem and the hull can be noisy.

▲ Aluminium hulls need appropriate skin fittings

Pitted prop shafts

Q My rubber bearing has been torn up by a badly pitted stainless shaft. How can I stop this happening again?

A Fit a new shaft with a higher resistance to crevice corrosion, preferably better than 316. Look for a proprietary brand name claiming to be better. Also, it's a good idea to fit a shaft anode if possible, or a separate anode close to the bearing. Turn the shaft each time you visit the boat, as the crevice corrosion occurs when the boat is idle and each stave of rubber presses against the shaft starving the stainless of oxygen.



▲ Pitting can occur on low grade stainless steel where the surface is shielded from oxygen

Rusting stainless

Q Why is it that you get irritating rust stains on deck fittings made of so-called stainless steel?

A Stainless steel has a very thin 'skin' of tough oxide, which protects the underlying ferrous material. Where the skin is thinned as it goes over a rough area or sharp edge, slight rusting can form which then trickles down as a stain. That is why after cutting or welding, all surfaces need to be thoroughly polished to a shiny rather than 'bright' finish. Persistent staining often comes from a drilled hole or a weld - the only permanent solution is to take the fitting off and polish properly.



▲ Stainless steel needs to be well polished to avoid rust bleeding.

Chromium plate corrosion

Q My engine control lever looked fine in the shop but it has quickly pitted and will not clean up. How can I restore the brightness?

A Salty air will soon pit the thin chromium plating and there is no way of retrieving the situation. Even in a cabin, light fittings, for example, will not last long. You may notice that where the surface is handled regularly, it remains bright and shiny. That's a hint at how to keep the surface bright. Wipe it frequently with an oily rag or car wax.



▲ This chromium-plated engine control looked like this after only a few months of being left with salty moisture on the surface