Bottom blacking is more than just arse covering…V1.0 06/10/24

By Tom Keeling – for customer use only

Welcome to my short explainer on why marine surveyors often recommend painting base plates, and thus grit-blasting and epoxy coating to all underwater plating on steel inland waterways vessels….

Why write this?

Following a recent out-of-water survey of a 26 year old steel narrowboat, which was suffering with widespread pitting corrosion (4.1mm pitting on 5.6mm plating) I made a recommendation to grit-blast the entire hull. The reason is simple, there is no other effective means at our disposal to clean back the vessel, to enable identification of the pitting and subsequent repair. The pitting needed repair as it was compromising the safety of the vessel.

The recommendation was not followed, because the process was not economically viable for the owner. A boatyard manager phoned and asked why marine surveyors always recommend this, basically stating he was “sick of reading it…it’s all marine surveyors say…and surely it’s just arse covering….”…other boatyards have similarly accused marine surveyors of doing nothing but “covering their arses”…

If you are reading this, maybe it’s because you too wonder if we (marine surveyors) just recommend it because it’s a catch-all process which means we are “arse covering”…or maybe you want to protect your boat and see it good for the long-term. It is likely you are reading this because it features as a recommendation in a survey report.

Well, bottom blacking is definitely not just arse covering, and here’s why.

The problem

When we survey steel hulls, the presentation and condition is wildly varied, ranging from clean and beautiful plate to slime-covered pock-marked corroded moon-surface dark nightmares. Sometimes this is on the same vessel, but always belonging to someone who does not wish the nightmare to exist; for that matter neither does the marine surveyor, who has to try and ascertain the overall condition in impossible circumstances.

The “fleet” as it were – the total of inland waterways vessels – is aging as the amount of new boats being entered to the market does not exceed the amount of existing old boats; scrappage is rare. Most of these boats, particularly flat-bottomed narrowboats and widebeam narrowboats, have unpainted base plates, from new. The term “bottom blacking” commonly relates to jet-washing and bitumen coating the area of the hull between the top rubbing strake and the bottom of the hull side, but generally does not include the base plate (ironically, the bottom of the boat).

With the advent of leisure boating following the demise of commercial carrying, the industry set about building boats exclusively for leisure use from around the 1960s onwards, with something of a boom in the late 90s and 00s, initially reflecting the increase of disposable income of the retiring boomer generation, who now in their later years are selling on to Gen X and Millennials who need somewhere to live.

So when marine surveyors look at a boat aged 30 that has never had the base plate maintained thus it’s inches thick in corrosion scale and marine growth, and has pitting on the hull sides at 2.5mm, along with numerous coatings of various bituminous paint of varied success (some would say limited if the hull is pitted…), it is time for action to arrest the deterioration of the vessel. Simply jet washing and blacking over the sides again, and leaving the base plate to continue to deteriorate is no answer.

The long-term continued deterioration of the inland fleet is inevitable because we do not have a system in place that effectively maintains the vessel for life. What we have is an evolution known now as bottom blacking, and that is not always effective.

> *One caveat here, is that a boat well maintained from new with blacking to all underwater plating, kept dry inside (this is crucial) and kept in deep clean moving water, will very probably be absolutely fine and free of significant pitting. However this sort of vessel is the exception not the rule.*

The problem for the marine surveyor is that they have to identify the problem today as well as the course of action to keep the vessel good for tomorrow. Tomorrow in the boat world is long time as people expect boats to last being a large capital investment. Owners depend on preserving their capital, and the boat has to remain good for that to happen.

The solution

Grit-blasting exposes all the pitting on the plating, as well as a host of other minor defects such as poor welds, and enables repair to be completed. A typical repair process is to pit-weld any deep pitting, linish back and repaint. Ideally this will be with a two-pack epoxy type coating, although I have seen excellent results with zinc metal spray coatings, so-called cold galvanising (although it's not cold), which is then overcoated with a paint coating.

The point of doing the base plating is to arrest corrosion, prevent deterioration and thus avoid overplating in the future; it is acknowledged base plating on narrowboats is thicker as a corrosion allowance, because we know it is not required for structural reasons (see this paper here for more info). Note: overplating is frowned upon in other marine sectors and seen as a temporary repair only. We do not yet have a code of practice for inland private boat repair, but we probably will one day, or at least a set of insurance driven requirements.

The problem for the grit-blast and base plate paint process is it is often talked down by legend; there is no economic argument against it, as over the life of a vessel ownership it will pay for itself.

The legends

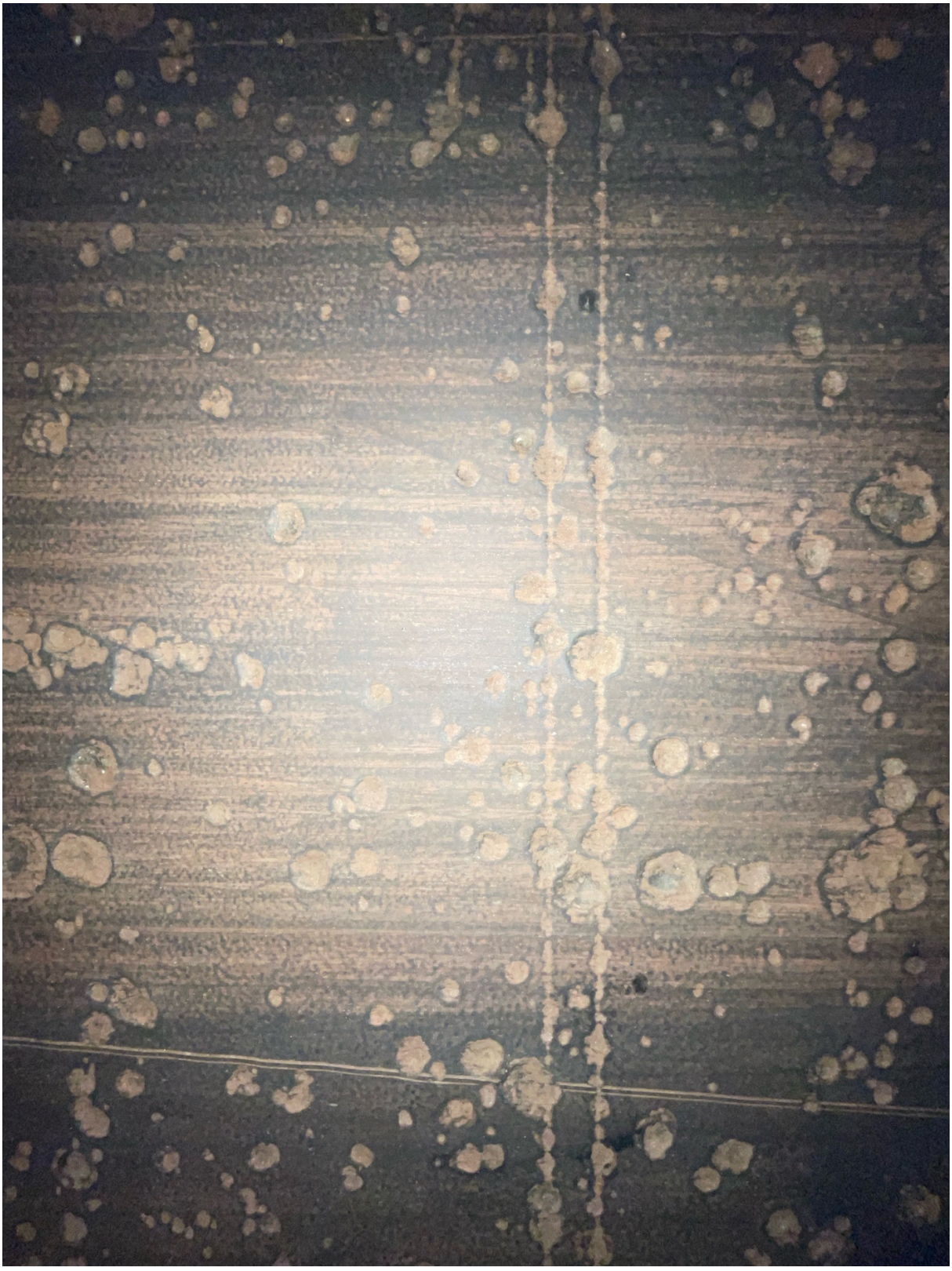
Arse covering: as stated at the start of this, people think surveyors are arse covering, but all the surveyor is trying to do is get the vessel in good shape and keep it that way. Nobody has yet produced any evidence of a better suggestion, nor can anyone say with any sort of honesty that the current system we have is effective long-term.

It just gets scraped off: it doesn't….unless you go out and do 50 hours cruising a week for 30 weeks a year, in which case the bottom will largely clean anyway….The point is even if it does get scraped off in some places, it won't get scraped off in the pits, the thinnest bit that was corroding anyway. It also will not get scraped off when the boat is moored, which is for most boats pretty much all of the time - think evenings, overnight, weekends, the winter – when you actually think about % use of the vessel as in when it is actually underway, it is very little. There are around 8760 hours in a year. If you do 100 hours cruising a year, that means for 98.9% percent of the year the bottom is not even at risk of getting scraped as the vessel is stationery. Furthermore, even if there is a scrape, it won't be in the pits….and soft-bottomed canals and rivers won't damage the base plate paint, so the extent of any potential damage has to based on area and intensity of use. Even a hire boat doing 50 hours a week for 30 weeks a year is stationary for 83% of the year.

There's no oxygen down there: this is bizarre and oft repeated claim that because there is no air underwater the base does not corrode. The only thing that is vaguely sensible about this is that on waterlines, that have been poorly protected, the constant wet/dry wind/water exposure will lead to corrosion and plate tinning, and that in comparison this cannot happen to the base plate.

However this is just a basic misunderstanding about corrosion. If it were true no base plate would corrode, the Titanic would be like new (albeit in two halves) and we would not have any pitted base plates.

The wear edge will be destroyed anyway, may as well plate the lot: it's true that the wear-edge will get worn out over many years, and sometimes things are so far gone with wet bilges etc and no option is available other than scrappage. But where feasible, detailed localised repair still has to be a better repair e.g grit blast the whole plate, locally repair (e.g. fit a shoe plate, weld up the worst of the pitting) and epoxy coat. This will see the boat good for many many years, and if the boat lives a very long time, the shoe plate can be replaced. Pitting will have been arrested and the base plate saved (if the inside is kept dry). The minor repair a shoe plate consists of will have no significant impact on the weight of the vessel, meaning no adverse stability implications and no risk to through-hull fitting clearance (downflooding heights, such as weedhatches).



Pitted base plate on this 1993 narrowboat, grit-blasted and epoxy coated. The pits are full of mud because it hasn’t been scraped off as the boat goes along. The pitting has been arrested and is not getting any worse, held at 3.0mm deep on a 10.0mm plate.

Longer view of the base plating showing the pitting arrested. Note a single graze exists to the right hand of the photo, otherwise the paint has resisted damage. This is a continuous cruiser, paint 5 years old at time of survey.

Paint damage to the starboard lower counter side reveals a silver-coloured zinc-coated hull, despite the paint failure the zinc coating is 100% intact and all pitting is arrested. The paint coating has become virtually aesthetic although it does of course add a layer of protection to the zinc.

This 1992 narrowboat was grit-blasted and epoxy coated from new. In 2014 it was surveyed and found to have only x 1 pit at 1.5mm.

This 20-year old narrowboat has had no maintenance and was covered in pitting. The base plating was covered in over an inch of thick growth / debris / corrosion scaling

Here are some of the reasons the legends exist:

Historical construction: thinking about the early narrowboats of wood construction, they probably didn't need any paint on the base and probably didn't have a life expectancy that involved preventative maintenance. Next we had ¼" iron sides and elm bottoms (3" thick apparently). Iron being particularly corrosion resistant of course, again preventative maintenance was not a priority but the plating seems to have been covered in pitch or bitumen. Often the docks available were built with this in mind, meaning poor access to bottoms, because no maintenance was expected. The steel of the 1940s onwards seems corrosion-resistant too, many early 1900s composite narrowboats being re-footed and re-bottomed in steel in the 1960s onwards, many by BW. Modern era narrowboats and their widebeam sisters are following the process and customs of the mid-20th century, often maintained in facilities built over a hundred years ago. But modern boats are not dealing with the same conditions that their ancestors did, the main differences being electrical systems, complex propulsion and of course microbes.

Steel is crap these days: I don't know if it's nostalgia or fact but old steel seems better, harder, more resistant to corrosion, yet metallurgists will say never has the steel making process been more precise and high-tech. But try drilling a hole in a 1980s boat versus a modern boat and it seems harder to do. There are so many arguments about steel. People pine for the days of virgin British steel and claim the imported modern stuff is rubbish - as is recycled – claiming too many impurities and therefore susceptibility to corrosion. Three things to think on though: 1) the 80s boats still corrode, 2) grit-blasting and epoxy coating works on any age of boat regardless of steel quality, 3) I've only surveyed x 2 of the East-West Chinese-built narrowboats and both were entirely corrosion-free. Not a single pit anywhere, so clearly good steel exists in the East.

Just get the bleach out and it will all be fine: Microbial corrosion is still baffling the sector (read this IIMS paper for an explainer) (or this one from

Vlad); even in the last 20 years the change is palpable. Corrosion is worse now than 20 years ago, my personal archive of boat surveys and 1000s of photographs shows that alone. It's entirely likely that microbial corrosion has worsened, more quickly than we noticed, and is coupled with an aging fleet and outdated maintenance procedures. Thinking about why it has worsened, with no specific research to turn to, obvious factors include climate change (canal water must be warmer), agricultural run-off, industrial run-off, increased habitation meaning more contaminants. It's certain that some geographical areas are worse than others; boats in moving water seem affected less, as are hire boats, suggesting the movement of water / vessel prevents the microbes taking hold.

Sometimes advice in dealing with microbial corrosion is to treat it with a biocide, e.g. bleach, then paint the boat. It probably does work, until the paint gets scraped off and it all starts again. I've not seen a grit-blasted and epoxy coated vessel suffering with microbial corrosion, so I can only conclude that the grit-blasting process kills the lot and the epoxy prevents them taking hold.

Another observation is the effect of anodes; used across the hull with grit-blasting and epoxy coating, any area of paint failure has another defence – anodic.

Cost: there is no denying that grit-blasting and epoxy coating to all plating is expensive. The boat is docked, masked off to the superstructure, blasted, moved to expose hidden bits, blasted, painted, moved, painted….Perhaps £5k for a 60' narrowboat sides and bottom. Compare this to a DIY blacking in a cheaper dock, perhaps a total cost of £500, and the process is a well-trodden path (an "industry standard") and you can see why people find reasons not to do it.

Access: A lot of places simply can't do grit-blasting full stop, and some can't access the base plate at all. Some can needle gun the plating, which can be effective. However, once a boat has been grit-blasted and epoxy coated, there is still plenty of opportunity for other facilities to complete future work. If

maintained, the grit-blasted and epoxy-coated vessel will not need grit-blasting again, and the coating can be topped up at more basic facilities. I've seen good results with conventional bitumen blacking overcoating to epoxy, the two working well together to protect the hull. A base plate that is stationary for 99% of it's life does not get scraped, and is less likely to be scuffed and bumped than the sides, and is usually thicker too. It does not need as much regular maintenance as the sides. Lack of access at the most local facility should not be a barrier to preserving a vessel, nor should it see that local facility have less work.

Summary

Unless a boat has been exquisitely maintained from new by a fastidious owner, the old school faith in simply washing off and blacking a limited area of the hull is misplaced if there is a significant corrosion problem developing.

Owners now expect vessels to last a long time, and when they have finished with it after 10 years of life aboard or happy years cruising the system, they expect to sell it and retrieve their capital. They can only do that if the vessel is in good order, and our aging fleet is unfortunately ever-worsening. Couple this with worsening corrosion across the fleet, and a change in opinion the views overplating in a dim light, we have to move on. To turn the tide of this, it is time to look at modern techniques and apply them. The results and benefits are clear.

So it is not arse covering. It may not be what people want to hear, but what it is is the best way we know to keep a boat good, and we all depend on that.