November 2019 Newsletter

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From the Masthead

Regular readers may have noticed that the format of the Marine Systems Excellence eMagazine, a feature article alternating with an Ask Steve/Photo Essay, every two weeks, has not been as regular as usual. Fall tends to be a busy time for the marine industry and this one has been no exception, I've been on the road almost every week, from Fort Lauderdale and Seattle to Malaysia and Taiwan. Add to that moving both house and office, a handful of boat shows, along with a few lectures, and my writing time is significantly curtailed. For that lapse I apologize to readers, once through the fall boat show season you can expect the schedule to return to normal.

The Art of Listening

Recently, while working on an overseas project, I had to take a train journey that lasted a few hours. I arrived at the station early after an overnight flight, before the ticket counter opened. Standing in front of me were two men, both also from the US. It was impossible not to overhear their conversation in the near-deserted train station, and after a few minutes I ascertained one was a yacht broker, on his way to a yard to check on the progress of a build. I also discerned that until they arrived at the train station, the two

had not met previously. Waiting for the half hour it took until the ticket counter opened, the broker talk, and talked, and talked, and the talking continued after we all purchased tickets and walked down to the platform. As luck would have it, I ended up seated in the same car as them, again within earshot, and the talking continued, nearly all of it by the broker. His monologue was familiar to me, full of quips and stories, he'd been everywhere, done everything, knew everyone, had everything figured out and his thumb in many pies. The other passenger and I heard his life story, his wife's life story, his kids' life stories, and the story of every business in which he'd ever worked. His luckless companion managed maybe two dozen words in nearly two hours, and I'm sure as he was saying them, the broker wasn't listening, because his next lines were simply a continuation of what he was saying previously, he was talking at rather than to his seatmate; more importantly, he wasn't listening. It's a trait, not listening, I find especially unattractive, along with constantly interrupting.

The ?victim? disembarked before the broker (I sometimes wonder if he got off, and then got back on the next train), and as he did so he politely said, ?It was nice to meet you, if I ever decide to buy a boat, I'll let you know?. I doubt it, I'm sure he was glad to escape the broker's clutches, I know I was relieved he'd left because his departure mercifully brought the incessant talking to an end. I quickly put my earbuds in and buried my head in my laptop, lest I be subject to the same treatment.

The moral of the story is not to bash the broker, I'm sure he's a fine fellow, and he seemed to enjoy his work. Rather, the point is, it's important in business to practice being a good listener. My grandfather used to say, ?You have two ears and one mouth because you should listen twice as much as you talk?. As I've worked in this industry, and have progressed into roles where I'm expected to do much of the talking, I've become more conscious of my grand-father's advice; the only voice I hear in a ?conversation? should not be my own, primarily because if I'm not listening, I'm not hearing what my companion or client is saying, and therefore I am like an unguided missile, not knowing what is important to him or her, or what he or she wants to learn.

If you are a boat owner or buyer, take note of the fact of whether or not those you are working with in the industry listen, really listen, without interrupting, to what you have to say before sharing their thoughts. If they aren't, then they don't really know what's important to you, nor will they understand your needs, and it's unlikely they will be able to deliver on your requests.

If you are in the industry, make a conscious effort to listen, without interrupting, to your clients (and others). When a client is sharing with me his or her ?story? for the first time, I often say, before responding with any thoughts, ?I don't want to interrupt, I want to be sure I hear everything you want to share before letting you know what I'm thinking?. Give it a try, you might be surprised at how good it feels.

Photo Essay: Fuel Temperature

It's a truism in the world of boats, at least where machinery is concerned, heat is your enemy, it accelerates wear and aging of everything from wiring and electronics to hoses, belts, flexible mounts, acoustic insulation and a host of other gear. It is for that reason that boat builders (should) make every effort to properly ventilate and keep cool engineering spaces.

One area that's often overlooked is diesel fuel. It plays an important role in heat removal from fuel injectors, which are exposed to combustion chambers, and thus extremely high temperatures. The majority of fuel that's sent to injectors isn't used; it's returned to the fuel tank. In that process it absorbs and removes heat from the injectors, transporting it to the fuel tank, where it is then, ideally, radiated into the water (for integral tanks) or air that surrounds it, or both. If that process fails for some reason, the fuel temperature will rise, possibly to critical levels, thereby allowing injectors to overheat and wear or malfunction. Overheated fuel also has lower viscosity and thus lower lubricating ability.

While modern electronically-controlled engines can offset or adjust for some of the issues related to higher fuel temperatures, they are unable to deal with the effects on the fuel itself. Super-heating fuel causes it to degrade more rapidly, and once it reaches its flash point of about 125° Fahrenheit for #2 diesel, its volatility within the tank increases, and inherent safety diminishes; exposure to an ignition source can cause it to ignite or explode. High fuel temperature can occur for a variety of reasons, from tank and fuel distribution/return system design flaws, undersized tanks, high engine room temperature or a fuel return system malfunction. While some engine manufacturers include fuel coolers in their design, it is by no means universal; however, they can be added to almost any fuel system.

In the example shown here, the engine's PowerView monitor is alerting the user to critically high fuel temperature. While some make little or no mention of it, many engine manufacturers identify different maximum allowable fuel temperatures to ensure proper engine operation, however, and once again, these often do no take into account the temperature-induced degradation of the fuel itself, or issues with fuel storage and safety. Ideally, it's best if fuel within the tank does not exceed the flash point. If your engine does not measure and display fuel temperature, you can take readings using an infrared pyrometer, either at the secondary fuel filter or the tank wall below the fuel level.

Ask Steve

Steve,

I read an article that you had written for PassageMaker on Mar 21, 2011, titled 'Stainless Steel and Corrosion'. Exhaust systems were included in a list of applications for stainless alloys, pointing out the possibility of crevice corrosion.

The next paragraph includes cupronickel in a list of alloys that are preferred over stainless, in certain applications.

It has been suggested to me that a wet exhaust system could be fabricated using cupronickel. Can cupronickel be used for a marine wet exhaust system?

Thank you for your consideration,

Mike Dilley

Mike:

In a word, yes, cupronickel can be used successfully for wet exhaust systems, I've had many made using this material. It's not as popular as it once was, however. Today, the most corrosion resistant, readily available alloy used for wet exhaust system fabrication is called Inconel. Inconel is used for heat exchangers in power plants and in nuclear applications, it's very durable. Not every

fabricator can work with it, it requires special welding skills, but there are those who do; I would guess more than those who work with cupronickel.

The next best alloy would be 316L.

Steve,

I just finished reading your 2013 article on battery terminals and am wondering if you can shed some light on an interesting phenomenon that occurred while performing a conductive test.

My wife and I own a 1997 Hallberg-Rassy 42F with a bank of seven Optima Bluetop house batteries and one Optima Bluetop start battery. Five of the batteries had been purchased May 2016, one had been purchased July 2015, and the others were purchased in 2013 (and are candidates for replacement). I purchased a Solar BA9 battery tester and was using it to determine battery health a few days ago in prep for the new season. Each battery had been completely disconnected after hauling the boat and periodically topped off with a smart charger during the winter. All were completely charged according to the charger. When using the BA9, I attached it to the stainless steel bolts where I connect the cables. In that configuration, 5 of 8 were shown to be bad (below the threshold for adequate CCA). After getting over my dismay, I re-read the instructions for the BA9 and noticed part of the instructions that said to only use the clip leads on the lead posts (that the stainless steel bolts would give false readings). I re-checked all the batteries with the clips on the lead posts and found all eight batteries to be in good shape (even the older ones although their results certainly showed some degradation in performance over the newer ones).

Long paragraph but the punch line- could we assume that in the battery construction there is some amount of resistance or loss at the connection between the cell and bolt terminal that is greater than that between the cell and lead post? Would that mean that we should be attaching to the lead post for most optimum performance of the battery? Your article seems to favor attaching to the terminal bolt versus the lead post due to reduction in the applied stress to relatively soft lead. I have included a picture of the set-up in 2015 when we bought the boat (don't pay attention to the wing nuts, they are gone and I am in the process of revamping the whole mess with external copper buss bars to reduce the daisy chaining). As I research this more, I would entertain your thoughts.

Regards,

Jim Young

Jim:

The phenomenon you are encountering is not surprising. Stainless steel possesses a fraction of the conductivity of, or conversely has significantly greater resistance than, copper or lead. Conductivity is expressed by the Greek letter ?, or sigma. Silver is highly conductive, it's sigma is 6.30×107. Copper is only slightly less conductive, at 5.96×107. Lead is less conductive, its sigma is 4.55×106. However, this pales in comparison to stainless steel, whose sigma is a mere 1.45×106. It is for this reason that stainless steel should never be placed in the current path for electrical circuits, particularly in high current scenarios such as starters, alternators, bus bars, and battery bank connections. This frequently occurs when a stainless steel washer is inserted between a battery terminal, or fuse holder, and a ring terminal. Doing so is not unlike inserting a resister in the circuit, in many cases, again particularly where high current is present, the stainless steel will become very hot, and expand, which in turn can lead to loosening of connections, arcing, and even fire.

In your case, there's no need to switch all of your connections to the lead posts, which would require the use of an adapter lug, which introduces its own resistance issues. If you look carefully at the stainless steel studs, you will see the metallic base from which they protrude is in fact lead. Therefore, the stud is, or should be, nothing more than a securing mechanism, the ring terminals in fact make very good contact with the lead (I'd recommend the use of conductive paste). No doubt some current will flow through the

stud however, it will be little because it is not the path of least resistance, the bulk will flow through the lead base, which is attached to the battery's plate, as is the lead post terminal.

Hi Steve,

Longtime fan.....thanks for what you do and post.

My genset's starting battery is recharged by the alternator on the genset itself. That battery, because of its position, also powers my bow thruster.

While doing the Loop, I spent way more time in marinas than usual. That, and positioning in locks, was discharging that battery more than charging.

My question: May I hook that battery in with one of my house bank 4 Ds? When the genset is running, that battery, and its new mate, will be getting a charge from both "ends" of the genset.

Any harm being done to any battery, either end of the genset, or my inverter?

Hold course and speed,

Larry Moynihan

Larry:

Battery charging for these scenarios, while at times challenging, has become much easier in the past few years with a variety of products. You say, ?May I hook that battery in with one of my house bank 4 Ds?? That concerns me for a few reasons. You can't connect the genset/thruster battery to just one house bank battery, if you connect it to one you connect it to all. Therefore, it becomes one bank. If the batteries are of a different case size or age, that can be problematic as these should not be mixed. It also means that if you deplete the house bank, you would be unable to start the genset (presumably your engine has its own dedicated battery). Additionally, if you connect your thruster battery to the house bank, when using the thruster it can have an effect on that bank's voltage, which, depending on its size, could cause sensitive electronics to crash and re-start.

A less problematic approach would involve the installation of a charge sharing or paralleling device. A sharing device, such as a Magnum Energy SBC or a Balmar DuoCharge, would send some charge from the house bank, when it's being charged from any source, to the genset/thruster bank. The charge current is limited to 25 amps unless you use an optional relay, however, that's typically more than enough as it remains present whenever the house bank is being charged, again from any source. Additionally, keeping these batteries in a float charge state when not being used will increase their lifespan.

Alternatively, you can use an automatic paralleling device such as a Blue Sea ACR, which, while less sophisticated, would simply parallel the banks, again whenever a charge source is present. Depending on the model you choose, it can also act as a manual battery paralleling switch between these banks, which can be useful. It would by necessity require the installation of larger cables than the SBC or DuoCharge.

Finally, charging from both the genset alternator and house charger is not harmful. When using the above devices both battery banks would receive a charge if either, or both, the genset or house charger were operating, it's fully automatic and again not harmful.

Hi Steve,

We are installing an electric windlass on a steel boat. The windlass motor is of the isolated earth type. It has been suggested that we insulate the windlass and chain from the hull to prevent electrolysis.

The all chain rode exits the starboard side of the hull through a long stainless hawsepipe. This pipe makes insulating the chain very difficult.

We have two questions. Wouldn't the concern be galvanic corrosion and not electrolysis (as the motor's ground is isolated)? And what potential problems might we foresee if we don't insulate the assembly?

Many thanks,

Wendell Gallagher

Wendell:

There are two valid corrosion concerns. The first involves galvanic or dissimilar metal corrosion. If the windlass was bronze, and the deck aluminum, for instance, they would be galvanically incompatible, and should therefore be insulated from each other. If the deck were steel, as it is in this case, there's less of an incompatibility concern, however, bronze is nobler than steel, and thus when both are wet, the steel would be sacrificial. The windlass should be installed on an insulating pad, GPO3, which is essentially prefabricated fiberglass sheet, or G10, which is similar except its epoxy-based, would work well. Because of its hygroscopic nature, wood, regardless of species, should not be used. The windlass base, insulating pad and all fasteners should be thoroughly bedded to prevent moisture ingress, further minimizing the likelihood of corrosion.

The second corrosion concern is stray current, wherein stray DC positive current is conveyed back to its source by an unintended path. While that can occur in above the waterline installations, it's unlikely. If this were to occur, if the positive DC cable made contact with the windlass body or the deck, it would represent a short circuit, which should trip a circuit breaker or blow a fuse. In order for this to work, however, the windlass housing must be bonded to DC negative using a cable that is the same size as the DC positive supply (this is a requirement for ABYC compliance). A direct electrical connection to the deck, via mounting bolts, would achieve the same goal. The deck/hull would also need to be bonded to the DC negative, and the connection between the two must be made in only one location. In the absence of such bonding, a fault of this sort would remain, and if the current were to find an unintended path back to its source, via an undersized wire for instance, it could cause a fire, or corrosion.

While there is no need to electrically insulate the chain from the hull per se, preventing it from damaging the coating inside the chain locker is worthwhile. A protective barrier should, therefore, be placed between the chain and hull. The barrier should be designed so that it does not retain moisture against the hull.