Formicary Corrosion on the Rise

by Mike Murphy

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In a world where you only have to change the oil in a car once every 10,000 miles instead of every 3,000, in a world where hot dogs buried in landfills have a half-life of more than 100 years, where in the world is the air conditioning system that will last forever?

My Honda Civic has 186,494 miles on it and it appears that with good maintenance it will last a lot longer. Many years ago that was an almost unheard of feat.

With good maintenance why can't an air conditioning system last forever?

Well, for one very good reason: they shouldn't last forever: Better efficiency levels will continue to trump longevity. If an air conditioning system lasted as long as an uneaten hot dog, tree huggers would eventually break down doors trying to liberate the captive units.

Granted, most mechanical systems — from residential splits to institutional central plants — have a normal useful life of from 12 to 30 years. The real issue comes about when some of those systems only last a year, or a few years before running into major problems. What might be a major problem? Perhaps formicary corrosion that can attack copper tubing like an untreated infection attacks a wounded leg.

CORROSION GETS SHORT STRAW

Maybe no one really wants an indestructible unit as that would simply be unaffordable in the market, and the practicality of an eventual replacement in favor of a more efficient system can't be ignored.

However, any customer who purchases a new unit would never expect to hear a contractor try to explain that the copper tubing is being eaten alive by something more commonly called ant nest corrosion. It is called ant nest because of the nature of the path the corrosion takes; it forms microscopic branch tunnels as it spreads. The corrosion can travel 4 to 6mm in less than a year, thus poking a hole in otherwise respectable copper tubing.

What really causes it and why can't it be stopped? Well, it is somewhat complex,

but here is the short version for those who don't want to read a lot of white papers on the subject: Formicary (formic acid) corrosion needs three things — air, moisture, and the decomposition of organic material that changes to acid.

There are three places that these three elements can come into play: manufacturing, storage (distribution), and fabrication (contractor). In a study of formicary corrosion, [Paper 00646 Corrosion 2000] processing fluids (drawing and finning fluids) in manufacturing, storage conditions in distribution warehouses, and even solder flux at the contractor fabrication stage, were all identified as possible culprits.

This corrosion problem is not really being ignored; manufacturers have been working on it for decades. However, in this humble opinion, it is currently being given the bum's rush out the door by some. The common response, and legitimately so, from the manufacturing community is that organic compounds present in buildings, such as chlorides, household cleaning supplies, off-gassing from new construction materials, construction dust, tighter construction, etc., are cited as environmental causes of formicary corrosion. Obviously, environmental causes are outside the purview of the manufacturing community.

However, consider this: In a world where old problems may have been solved in manufacturing years ago, is it possible that ever-diligent supply chain managers might today be scouring the globe for more cost-effective supplies and materials — maybe newer, less-expensive processing fluids? Could the solder being used in the field be different than it was a decade ago? Could household cleaning agents stored near an evaporator coil be of a different compound?

Subtleties sometimes get overlooked.

RIGHT THINGS FIRST

Solving the problem of formicary corrosion may continue to be an ongoing battle, as new subtleties develop every day in this business. However, simply sitting at a round table while everyone points their fingers to the right is no way to solve the problem — a problem that does appear to be on the rise in recent years. One contractor in the Youngstown, Ohio, area recently reported to his local distributor that his company had experienced 90 formicary corrosion failures.

Rather than passing the buck, I like what I'm seeing from a couple of manufacturers — they are attacking the problem, whatever the cause may be. Carrier Corp. has announced that the u-bends on some coils will be tin-coated. ClimateMaster, a geothermal manufacturing company, also announced tin-coating for u-bends on all residential packaged units. Both are good starts. It is nice to see that problems in this industry can leapfrog past the finger pointing, and get to the real point.

MURPHY'S LAW: Doing things right is different than doing the right things.

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