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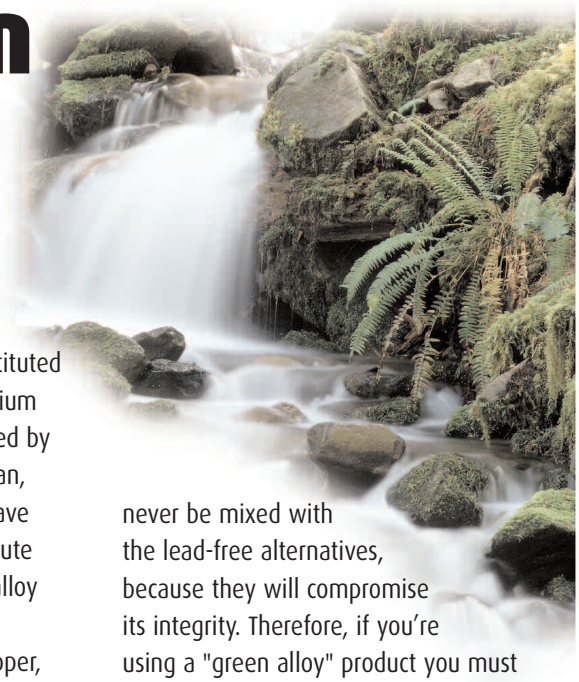
Lofthouse Goes Green With Lead-Free Brass



Lofthouse Manufacturing recently underscored its position as an industry leader in forging with the decision offer lead-free brass as a part of its production ability.

Traditionally, copper alloys used in the production of brass forging have contained several percentage points of lead to improve "machinability". Industries like those who produce pressure fittings depend on the strength and corrosion resistance brass offers. However, lead content results in environmental concerns – leaching into drinking water, creating lead debris during machining and casting, and causing disposal difficulties when discarding lead-contaminated foundry sand.

As a result, a growing interest on the part of governments suggests that in future, they may further legislate mandatory changes to the percentage of lead allowed in water-related systems like water meters, pipes and plumbing fixtures.

Several "green alloys" with names like Enviro Brass, Federalloy and Eco Brass have been developed for the world market with each manufacturer taking a different approach to the elimination of lead. Some have substituted lead content with bismuth and selenium and others, like the product developed by Sambo Copper Alloy Company of Japan, feature silicone in the makeup. All have been developed to serve as a substitute for 377 – the commonly used brass alloy rod which typically would reflect an approximate composition of 59% copper, 39% zinc and up to 2.5% lead content.

Gerry Birmingham, Vice President of Engineering reviews test results of lead-free brass forging prototype.

A Studied Approach

Gerry Birmingham, Vice President of Engineering at Lofthouse, says the company has been studying lead-free brass for more than a year.

"We're aware of the turning tide that's developing against the use of lead in products like water faucets, precision parts, valves and fittings"

"But we needed to look at the issue from all sides. It's necessary for us to find lead-free alloys we think will serve our purposes and have decided to conduct our own testing over a period of time. We not only look at the cost, but at forgeability and machinability. We want to determine what challenges we'd meet, then put solutions in place to counteract them."

One of those issues is recycling. "Brass is a 100 percent recyclable material", continues Birmingham. "In standard useage a full 65% goes back for recycling after the manufacturing process. However, the leaded-brass alloy in common use can never be mixed with the lead-free alternatives, because they will compromise its integrity. Therefore, if you're using a "green alloy" product you must totally segregate stock and isolate materials during change-over and machine cleaning. Without those safeguards, the material left over that would normally be recycled is considered contaminated. It's easy to see what that could do to costs. It also represents a challenge for the companies that handle the recycling.

Because lead-free brass is only a small portion of the overall market today, there isn't a network established to handle its recycling for return consumption here in North America. That means, if a size is not stocked in North America the transportation lead times increase. Of course that will change with time, but if we're using lead-free brass now, we need to have a system in place that will ensure we can recycle it. One North American distributor has been

very helpful in that respect and has established contacts to source and establish a scrap stream."

The Pros and Cons

Gerry and the team at Lofthouse have investigated a number of aspects surrounding the use of "green alloys" and how they perform when compared to 377. Typically, lead-free brass can cost up to twice the price of 377 Forging Alloy. As well, the group has looked at how these alternative products will act in normal forging operations, their inherent properties and how Lofthouse will use them. With a higher cost, they can have an effect on the costing of individual projects and due to their differences in performance, they will impact the ongoing maintenance and renewal of tooling and resources at the two Lofthouse production centres.

"We've found differences in forgeability" Gerry notes. "We think 377 has a tighter forging band. With it, if you run too hot it cracks; run it too cold it cracks. Eco brass has a more tolerant band, where the fluidity performs well at a wider temperature differential. However, some results on hot compression we had seen suggested the forgeability of a product like Eco Brass for instance, was 95% of 377, but our results brought it closer to about 70%. This will mean that due to the higher copper content, billets will run hotter. We'll add energy cost and reduce die life. And there will be added tool wear at machining".

One finding of the ongoing testing at Lofthouse revealed that lead-free brass is stronger than 377, and Birmingham expects this will deliver about 20% more strength. "We see this as an excellent opportunity for clients in the pressure valve sector", he predicts. "For those applications you need strength but you also have to consider wall thickness. In products like solenoid valves or pressure washers for instance where you need 3,000 psi a "green alloy" product means we can deliver the same physical strength for the size, but use less material. To me that says potential".

What Lies Ahead

The subject of lead-free brass is a major topic in the forging industry today and one that is charged with excitement. On one side of the issue are those who see a host of possibilities for these products; on the other a number of mills that would prefer not to have to deal with the demanding requirements surrounding non-contamination and scrap-stream safety.

However, with a strength equivalent to that of some stainless steel and product applications that run the gamut from plumbing – with its demand for lead-free requirements – to others like fire protection devices and ball valves, it is clearly one that could gain even more momentum in a few short years.

Birmingham says he thinks he and the team at Lofthouse have just scratched the surface of possibilities. "I can see other applications as well; products like zone valves, aqua components, medical equipment or other plumbing valves, when weight isn't a factor but Dezincification concerns are. A "green alloy" can potentially deliver the kind of strength and corrosion resistance those products could use and without the need to heat treat after forging. As for us, we'll continue to conduct our testing and determine what role lead-free brass can play in our operations. Inevitably it won't be the product we use everyday, but we'll be in a position to offer it to a customer who wants to specify its use.

"We've stuck our flag in the sand on this. We were one of the first forging companies to be ISO certified and now we're one of the first with the ability to offer this type of lead-free brass."

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