

The power of carbon for lead-free machining

Considerable savings on tool costs using carbon-based coatings

■ More and more manufacturers, and the automotive industry in particular, will have to face the difficult challenge of machining lead-free brass and copper materials in order to remain successful in future. But forward-looking suppliers of precision machining tools such as Werkö and coating specialists like Oerlikon Balzers have good news: specially designed tools coated with BALINIT HARD CARBON can stop tool costs tripling or quadrupling.

The call for help came in 2015: a plumbing equipment manufacturer and Werkö customer reported hugely increased tool use in production of turning workpieces, which now had to be made from lead-free brass in accordance with the German Drinking Water Ordinance. For this and other reasons, Werkö has since focused on responding to the difficulties of machining these materials.

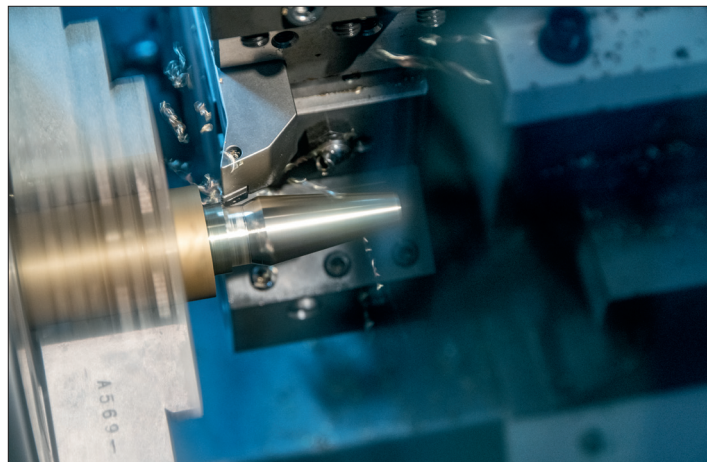
Machining lead-free non-ferrous metals remains a niche market. It came into being partially as a consequence of the EU Drinking Water Directive 98/83-EC, which restricted the lead content of drinking water to 10 mg per liter from 2013 for environmental reasons. The RoHS and other similar directives have also come into force in many countries around the world to limit the use of lead in electronic devices and components. However, it is the ELV (end-of-life vehicles) directive 2000/53/EC that will have the biggest impact in future, as its exemption for copper alloys containing up to 4% lead expires in July 2021.

Unless the exemption is extended, automotive manufacturers will soon have to machine more and more lead-free or low-lead copper. As people increasingly switch to electric and hybrid vehicles, which use up to 3.5

times more copper than vehicles with internal combustion engines (not to mention the electric charging stations, which need copper for contacts and plugs), one study suggests that the demand for copper will rise from 185,000 tonnes in 2017 to 1.74 million tonnes in 2027.

"Companies processing copper and brass need to prepare sooner rather than later," says Vicente Madrid, Product Manager and Direct Sales Team Leader at Werkö in Königsee, Thuringia. "Our plumbing equipment customers found that switching to lead-free brass quadrupled their tool costs and led to long cycle times, damaged tools and lots of scrap." One reason is that the lead which was previously in the brass made machining and chip breaking considerably easier, and another is that some lead-free substitute materials increase tool wear through smearing and produce long cylindrical chips, making the process less safe. "This is a revolution in machining", says Madrid.

After intensive testing in their application center, in 2016 Werkö eventually developed a successful solution using a special tool with a clever spiral design and geometry. And when classic PVD coatings proved ineffective, BALINIT HARD CARBON, supplied by the company's long-term partner Oerlikon Balzers, produced successful results at the second attempt. For Rico Fritzsche, Segment Manager *Cutting Tools*, this is confirmation that Balzers is on the right track: "Since 2014 we have gained invaluable expertise in machining lead-free materials in collaboration with our business and research partners."



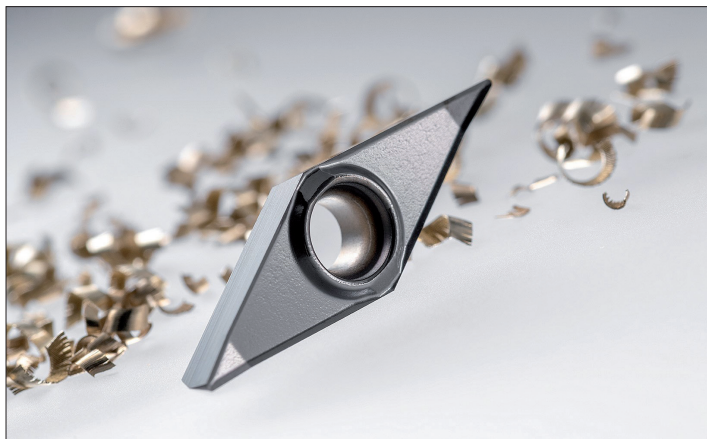
Throughout this development phase, BALINIT HARD CARBON has consistently proved the perfect choice. The carbon coating is chemically inert, prevents built-up edge formation and sticking, restores chip flow and is also suitable for dry machining thanks to its high hardness (5000 HV) and low friction coefficient. Three options are available, with different coating thicknesses depending on the application, and in future customized pre- and post-treatment will enhance chip flow and cutting pressures for shank-type tools.

Combining these advantages with the new, specially designed tool resulted in extremely positive feedback from Werkö's plumbing equipment customer, as it brought tool costs and cycle times back to previous levels.

Werkö GmbH

Founded in 1938 in the Thuringian town of Königsee, today Werkö GmbH is a leading provider of precision machining tools for metalworking applications (HSS, HSCo, Solid Carbide) and is increasingly developing customized solutions. With 76 employees, the company is part of the global TDC Group, which has sites in China, Mexico, Brazil, the USA and elsewhere.

www.werkoe.de



Carbide inserts coated with BALINIT® HARD CARBON extend the service time and improve process reliability when machining non-ferrous metals; the coating is thin, smooth, and with a high hardness, making it ideal for the machining of brass and copper



Rico Fritzsche (left) from Oerlikon Balzers and Vicente Madrid from Werkö

"There's no one-size-fits-all solution here – each need is different, and ultimately it's small details that will determine performance", says Edda Enders. But Werkö's financial director feels the company is in a good position thanks to the expertise it has acquired, particularly as its customers' first copper machining projects are now up and running, and later in 2019 Werkö will move to a new site in nearby Ilmenau with almost double the existing production space. "We're well-equipped to deal with this niche market as it grows", says a confident Enders.

EMO 2019, hall 3, booth F30

information: www.oerlikon.com/balzers



Perfect machining of lead-free brass with BALINIT® HARD CARBON



Thilo Horvatitsch is a freelance author and journalist for technical and business topics, with 25 years of experience based in Essenheim near Mainz/Germany



**ADDING
VALUE**

**BENEFITING
BRIQUETTING**



volume reduction



recovery of cooling lubricants

Briquette chips, dust and sludge from

www.briquetting.com/contact/




Ruf Maschinenbau

1/3 quer im Anschnitt

216 x 108,5 mm

= o.k.

l revenue
ttes

www.briquetting.com

Also at
EMO Hannover
VISIT US!
Hall 7, Stand D71

RUF
BRIQUETTING SYSTEMS