

The Copper Industry's EU Newsletter

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from The European Copper Institute

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EDITORIAL

Black September... and after?

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The world is in the midst of its worst financial crisis since 1929. Some of Wall Street's most flamboyant houses have disappeared, as well as some more common names in the banking and insurance sectors in the U.S. and Europe. The whole industry of derivative markets is shaken to its foundations and many people are calling for a radical change in capitalism without exactly knowing what this entails.

Black September arose from a fairly classical housing crisis in the U.S., as well as in Britain, Ireland and Spain. We are now back to the 'real economy' with roughly 55% of world GDP in a situation of recession: Europe, Japan and probably the U.S. too – despite the fiscal subsidies thrown at households last June. Still, the world economy is growing at an annual rate of 3.5% thanks to emerging countries and especially to China with its 10% annual growth for the last ... 32 years!

China is also key for world commodity markets. Commodity prices peaked at the end of spring 2008. Oil almost reached \$150 a barrel in early July, grain

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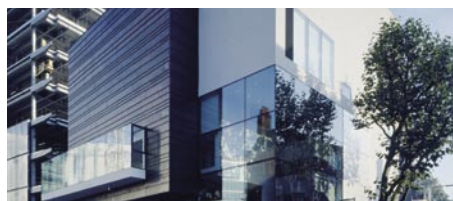
Energy and REACH dominate 4th quarter

Following on from its successful participation at Green Week (organised by the European Commission's Directorate-General for the Environment) in early June, where ECI focused on the sustainable use of copper and arranged a visit for European Commission officials to the Metallo-Chimique metals recycling plant, ECI will be focusing on two key dossiers for the remaining months of 2008.

ECI's first priority will be energy issues. Energy efficiency should have a central role within the Second Strategic Energy Review, to be published later this year by the European Commission, and which intends to address the challenges of security of energy supply. Through its participation in the [Energy Efficiency Forum](#), a broad coalition of industries offering energy efficiency services and products, ECI calls for a set of regulatory and fiscal measures to accelerate the implementation of already existing energy efficiency measures.

ECI will also deliver the data necessary to support the industry's position under the EU's Emissions Trading Scheme. This shows that energy costs use up a very significant percentage of the value added available to the European smelting, refining and processing sectors. It also demonstrates that, due to copper prices being fixed on

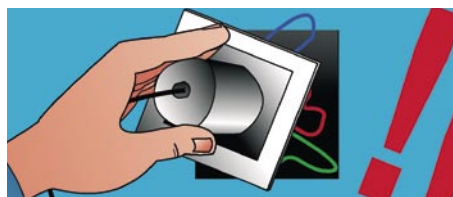
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EDITORIAL

Black September... and after?

By Professor Philippe Chalmin, University of Paris-Dauphine

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prices were at their highest level in April. Some peak levels were obtained in June for dry freight and steel, copper (\$8,985 a ton on 3 July) and for aluminium, tin and wool and even scrap. For the month of July, our 'Cyclope' commodity index reached its record level – more than 7 times higher than its lowest reading in July 1986.

Since that peak, commodity prices have dwindled. Dry freight prices have lost three-quarters of their value (-52% just in the month of September). Oil is back to \$ 100 a barrel. Most metal prices are down; scrap prices fell by half and steel prices seem to be on the decline. Agricultural prices are suffering too due to what looks like an exceptional 2008/2009 crop.

What is the main reason for this spectacular downturn in commodity prices? One could attribute some of the most hectic movements on markets, such as oil or non-ferrous metals, to the behaviour of financial interests. But, on the whole, as was shown by studies conducted during the summer by agencies like the US CFTC, one can hardly say that financial speculation has an important influence on the medium-term trends of commodity markets.

We must go back to the fundamentals, to the law of supply and demand. On the demand side, it is clear that recession in the Western world will

have an impact on consumption of manufactured goods, on housing or car industries. Prices which had reached unsustainable levels (like steel and nickel) were due to fall as has indeed been the case. On the other hand, one should take into account the impact of financial worries on investment projects, especially as far as oil and mining projects are concerned.

Overall, the key factor for commodities in the near future will be the level of Chinese demand. If Chinese growth weakens, then most commodities will see their prices decline again. But if China maintains its 10% growth path,

then one could consider present prices as representative of new equilibria.

Once the smoke of the financial disasters has dissipated, it will appear again that most commodity balance sheets are still in a precarious state, that more investments are needed to feed world demand. The 2008 boom is probably over but we are far away from any kind of commodity doom like we had at the end of the 20th Century.

These are some of the lessons of that exceptionally black month of September 2008. ■

Professor Chalmin is also President of Cyclope.
For further information: www.cercle-cyclope.com

ECI's Green Week stand and side-event

Between 3 and 6 June, ECI participated in Green Week, the annual event organised by the European Commission's Environment DG. The purpose of ECI's stand was to educate and inform visitors about copper and, in particular, its role as a sustainable material. In addition, on 5 June, as a side event to Green Week, ECI organised a visit for Commission officials to Metallo-Chimique's metals recycling plant near Antwerp.



Christian de Barrin, ECI's Communications Manager, welcomes EU Commissioner Dimas to ECI's Green Week stand

Brochure showing how copper is used as a material in sustainable homes



EDITORIAL – ECI

Energy and REACH dominate 4th quarter

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global commodity exchanges, the industry is unable to pass on these costs to customers. Accordingly, ECI is calling for the copper industry to be granted free allocations for the direct and indirect effects of CO₂ emission taxes.

Through its work in the Leonardo ENERGY programme, ECI will remain active in delivering professional education and advocacy messages that will help to address the challenge of reducing CO₂ emissions. It is clear that the lifestyle of Europeans and the energy performance of the products and goods used every day

have a significant impact on overall energy consumption and therefore on the pressure that human activity exerts on the environment. This is why green design – in which copper plays a unique role (see our article on the Ecodesign Directive in the Environment section) – has become an essential component of EU policy.

In its role as Consortium Secretariat, a second area of emphasis for ECI will be to support the copper industry in achieving REACH compliance. The first milestone, the pre-registration of phase-in/existing substances, must be

done by each legal entity, even if part of a single corporate group, before 1 December 2008. Following the successful pre-registration, on 1 June 2008, of copper metal in the European Chemicals Agency system by the Lead Registrant, Norddeutsche Affinerie, ECI has drafted guidelines for all Consortium Members to carry out their own pre-registrations. ■

visit to Metallo-Chimique's recycling plant

ECI's visitors outside Metallo-Chimique's recycling plant in Beerse, near Antwerp. The plant processes more than 12,000 tonnes of Waste Electrical and Electronic Equipment (WEEE) each year, as well as 340,000 tonnes of other secondary raw materials.



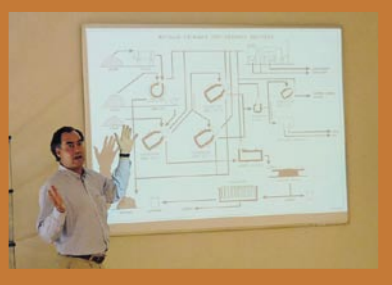
Scrap awaiting recycling



Christian de Barrin introduces visitors to copper and its properties



Each month, Metallo-Chimique's plant melts down 1,000 tonnes of WEEE scrap and produces refined copper with 99.99% purity



The recycling process in a nutshell

CONSTRUCTION

Copper – ancient metal meets the cutting edge

Copper and its alloys have had a variety of uses in architecture down through the ages. This is not only due to its malleability, durability and corrosion resistance, but also to the fact that it is light, easy to work with and aesthetic. It is also highly sustainable, thanks to its 100% recyclability. It is important to mention that copper products, used in the construction sector, contain over 70% recycled content. Over the last decade, copper has been experiencing a revival in architecture and is being put to innovative uses in interior design.

Visit Aachen Cathedral in Germany and you will find bronze doors dating back to around 800 A.D. Elsewhere in Germany, a 13th Century copper church roof survives intact to this day. Florence cathedral's baptistry is famous for its three sets of bronze doors with relief sculptures completed by Lorenzo Ghiberti in 1423.

Whereas in the past, copper was used mainly to roof important buildings, its use is now becoming much more widespread, including all roof slopes, cladding, soffits, fascias, flashings, gutters and down-pipes.

Today, some of the world's most distinguished architects are using copper because of its unique combination of natural, technical and aesthetic properties. 'We choose copper for its exemplary environmental credentials: a natural material, with low embodied energy in production, with a high percentage from recycled sources, and the potential for future recycling. Its longevity and ability to age gracefully, with a changing patina through time, make it a truly sustainable and beautiful material', said Keith Bradley, from the architecture practice Feilden Clegg Bradley. Furthermore, developments in surface treatments now allow copper to come in a wide variety of shades



and it can even be installed with its distinct weathered green patina from "Day One" if so desired.

In late 2007, the 74 entries into the Copper in Architecture Awards revealed an exceptional diversity of projects from all around Europe. The European winner was the Jewish Centre in Munich designed by Wandel Hoefer Lorch Architekten. Three other contrasting projects were also Highly Commended for their exceptional design quality: the Vicar Theatre in Spain, the Svalbard Science Centre in the north of Norway, designed by Jarmund/Vignsnaes AS Architects, and the Kumu Art Museum in Tallinn, Estonia, designed by Vapaavuori Architects. In the UK, shortlisted buildings included the Collection Museum in Lincoln and Portcullis House and the Unicorn Theatre (see picture) in London. In the latter, copper was used for the exterior and then carried on into the interior, where the main auditorium is copper clad.

Along with many other examples across Europe, a French TV clip

(TV5 Monde), showing examples of contemporary copper architecture in London and featuring interviews with architects, may be viewed at <http://www.copperconcept.org/>.

So what are the key properties of copper in construction?

As mentioned above, copper roofs last. Copper is also light in weight compared with many other roof coverings. It is only half the weight of lead and just a quarter of the weight of roof tiles. Thus, considerable savings can be made in supporting structures and materials.

Copper is the supreme low-maintenance material that can be formed into complicated and attractive designs. It does not require decoration or cleaning and is therefore suited to many types of roofing and facades.

With their increased awareness of the environmental impact of the materials they use, architects are becoming more aware of the low 'embodied energy' of copper. This is the total energy consumed during every phase of a material's life-cycle, from cradle to grave (see also our article on eco-design). The most accurate copper life-cycle data is now available via a dedicated website www.copper-life-cycle.org

Lastly, copper maintains a consistent malleability and "feel" which makes manual working entirely predictable. Indeed, metal roofing installers show a clear preference towards copper because it can be worked at all temperatures and, unlike some other metals, does not become brittle and break to form sharp edges in cold weather. ■

More information on copper's use in modern homes may be found at: http://www.eurocopper.org/files/pr_house_of_the_future_en%283%29.pdf

ENERGY

Study shows growing awareness of electrical safety in the home

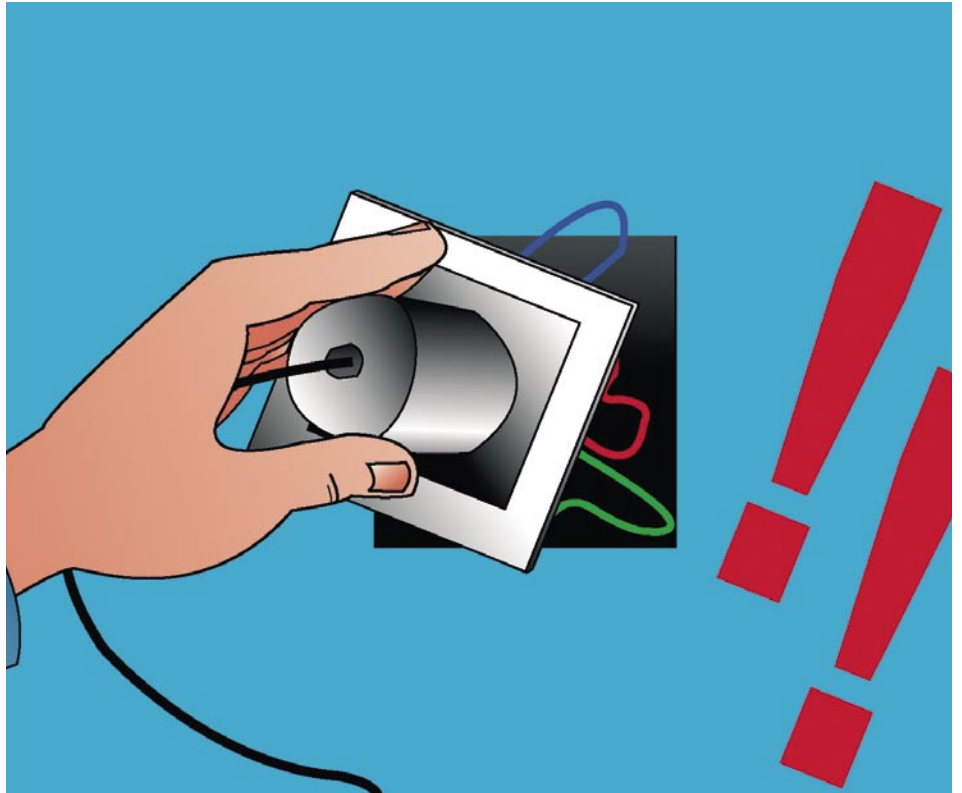
Each year, 16,000 injuries and 540 deaths occur in Europe from accidents due to electricity¹. This situation, mostly the result of fire and electric shock, is largely preventable. People expect to be at their safest when in their homes. However, a lack of awareness of the risks of unsafe installations – bearing in mind that electricity cannot be seen or smelt – means that many homes are in fact an electrical hazard. In autumn 2008, ECI will publish the results of its recent survey which shows that there has been an increase in the share of homes whose electrical installation has been upgraded since 2000.

Hazardous homes

According to the European Association of Electrical Contractors (AIE), 60% of residential buildings in Europe are over 25 years old and the majority of them have never been inspected, tested or updated. These buildings need to be properly adapted, maintained and renovated so that their technical installations can meet the higher standards of functionality, security and safety required by today's lifestyle.

While in most EU countries, newly built dwellings are inspected as a matter of course, such provisions do not often apply to existing buildings, except when they have been renovated. In some cases, the regulations are not properly enforced. Thus, a major proportion of the housing stock does not have the important safety features introduced in the 1970s, such as residual current devices. As of 1 January 2009, in France, it will be compulsory to prepare a report on all dwellings for sale where the electrical installation is 15 years old or over. Further information is available from: www.gresel.org

Results of the AIE/ECI's recent survey show that there has been a change in the rate of renovation of electrical



installations, increasing from around 0.5% in 2000 to around 3% in 2008. Nevertheless, when it is borne in mind that a 2004 report² estimated that about three-quarters of the European housing stock was in need of inspection (i.e. about 190 million dwellings), and about 130 million dwellings required renovation, this rate is still well below what is required to ensure that installations are not only safe, but also energy-efficient and adapted to users' needs, e.g. for smart ageing or telemedicine.

Copper improves electrical safety

A well designed and maintained copper electrical installation improves the electrical safety of a home. Electricity flowing through copper meets far less resistance than any other metal (except silver) making it the material of choice for electrical power systems. Furthermore, copper's durability increases the reliability and longevity of these installations.

Safer, greener energy systems

The high electrical conductivity and durability of copper certainly improve electrical safety in the home but there are added benefits. Optimising the copper content in electrical equipment can reduce energy losses by up to 70%, thus generating energy savings and reducing CO₂ emissions. In addition, the copper contained in electrical products, that have reached the end of their useful life, can be entirely recycled without any loss of quality or performance. ■

Further information on electrical safety in the home is available from: <http://www.leonardo-energy.org/drupal/electricity>

1. www.fisuel.com/pages/angl/angl_index.htm
2. Reiff, E-C, Schubnell, H, Brandverhalten von Kabeln und Leitungen, de, 4/2004, 1 page

ENVIRONMENT

Ecodesign: copper at the fore of the eco-design revolution

With increasing pressure to achieve the Kyoto commitments, improved energy efficiency is of crucial importance in the energy supply/demand balance. As the best electrical conductor of all the non-precious metals, increased copper content in electrical and electronic products can improve their performance and reduce energy loss.

What is Ecodesign?

Ecodesign focuses on reducing the lifetime energy use of products, as well as including other environmental considerations throughout their entire life cycle, i.e. from their conception and design, right through to their commercialisation and use. Environmental aspects cover the use of raw materials and water, polluting emissions, waste issues and recyclability. Ecodesign is important because an estimated "80% of all environmental

impacts (of a product) are determined during the design phase"³ – since the design affects the performance in use. The EU's Ecodesign Directive takes into account the fact that typically over 90% of the environmental impact of an energy-consuming product comes from its use phase and, for this reason, its energy performance is paramount.

Priority products

Priority products cited in the Directive include domestic appliances, lighting, office equipment, consumer electronics, heating and water heating equipment, electric motor systems and heating, ventilating and air-conditioning (HVAC) systems. Moreover, a specific implementing measure is anticipated to encourage progress in the reduction of stand-by losses. Electrical appliances are of particular importance as they have been identified as "the fastest growing source of greenhouse emissions

after cars in OECD countries"⁴, with projected energy demand expected to grow by 25% by 2025.

Ecodesign toolbox

As part of the work of ECI's Leonardo ENERGY initiative, targeted at sustainable energy professionals, an Ecodesign Toolbox for energy-using products (EuP) has been developed. The objective is to define the business case for higher government or voluntary standards for energy efficiency by demonstrating that, through improved energy performance, the environmental impact of products can be significantly lowered. More information is available from: www.leonardo-energy.org

Copper: the 'green' metal

The greater energy efficiency of copper has a significant impact on reducing greenhouse gas emissions. In fact, according to the President of the International Electricity Union, Ronnie Belmans (University of Leuven, Belgium), "the judicious use of 1 tonne of copper in the energy sector makes it possible to reduce CO₂ emissions by 200 tonnes per year".

Other attributes of copper that make it an ideal material for meeting ecodesign requirements include its durability and recyclability. Copper can last for several centuries and is also 100% recyclable. This means that the exploitation of natural resources can be limited and the volume of waste greatly reduced. Copper's high performance across the three main criteria targeted by the Ecodesign directive (energy efficiency, durability and recyclability) highlights how instrumental it is in limiting the environmental impact of energy-hungry mass-market equipment and consumer goods. ■

“The judicious use of 1 tonne of copper in the energy sector makes it possible to reduce CO₂ emissions by 200 tonnes per year.”

Energy		Washing machine
Manufacturer Model		
More efficient		A
A		
B		
C		
D		
E		
F		
Less efficient		
G		
Energy consumption kWh/cycle (based on standard test results for 60°C cotton cycle)		0.95
<small>Actual energy consumption will depend on how the appliance is used</small>		
Washing performance	A B C D E F G	
<small>A: higher G: lower</small>		
Spin drying performance	A B C D E F G	
<small>A: higher G: lower</small>		
Spin speed (rpm)		1400
Capacity (cotton) kg		5.0
Water consumption /		55
Noise (dB(A) re 1 pW)	Washing	5.2
	Spinning	7.0
<small>Further information is continued in product brochures</small>		

3. eceee policy brief pg. 1. [www.eceee.org / european_directives/Eco_design/](http://www.eceee.org/european_directives/Eco_design/)

4. eceee policy brief pg. 4, idem

HEALTH

EU Member States approve copper risk assessment

April 2008 saw the completion of the 3-year Member State review of the voluntary risk assessment, initiated by the copper industry in late 2000 to prepare for REACH, the EU's regulation on chemicals and their safe use. This comprehensive assessment, covering the production, use and end-of-life aspects of the copper value chain, shows that existing regulatory framework generally safeguards Europe's environment, the health of industry workers and the general public.

As part of its preparations for the entry into force, in July 2007, of the REACH (Registration, Evaluation, Authorisation and Restriction of Chemical substances) Regulation, the European copper industry, in 2000, took the decision to initiate a voluntary risk assessment (VRA) of copper. The VRA covered copper metal, copper powder and four copper compounds.

The assessment process was agreed with the Italian Government's Istituto Superiore di Sanità, acting as the review country on behalf of the European Commission and the EU Member States. After an intensive initial review, in May 2005, on behalf of ECI, Italy submitted the draft risk assessment for further review by the Commission and EU Member States. After three years of detailed analysis and improvement, this review process was completed in spring 2008.

The first step of the risk assessment was to quantify the emissions and exposures to the environment and to humans, from the production (local), use and disposal (regional) of the chemical. This was followed by a second step, to determine at what levels these exposures start to give rise to concern. Where exposures are above these levels, corrective action, usually described as risk management,

is needed. Where exposures are below these levels, there is no need for further action. Because the quantification of these emissions and exposures, as well as the setting of safe levels can be highly complex, the European Commission provides a Technical Guidance Document to ensure a common approach to issues such as methodologies, data collection and analysis methods.

Throughout the VRA process, ECI worked closely with recognised scientists as well as the European Commission, the Member States, and the industry to ensure objectivity, credibility, transparency and high quality. Information from the producers of anodes, cathodes, copper powders and copper chemicals, as well as from many semi-fabricators, cable companies and other downstream users, was collected from over 100 sites across the EU.

The VRA has been agreed by the Commission's Technical Committee for New and Existing Substances (TCNES). The human health part of the dossier has also been agreed by the European Commission's Scientific Committee on Health and Environmental Risk (SCHER), with the environmental part currently under review.

The main conclusions of the comprehensive 1,800-page dossier are:

- the use of copper products is, in general, safe for Europe's environment and the health of its citizens,
- the safe threshold value for acute effects in drinking water is 4.0 mg/l of copper, with the general public typically exposed to 0.7 mg/l. This is consistent with the 2.0 mg/l guideline for copper advised by the World Health Organisation,
- for adults, the minimum daily dietary intake is 1 mg, with a maximum threshold of 11 mg. Actual intakes range between 0.6 and 2 mg,

suggesting that deficiency may be more of a concern,

- the European-wide safe levels for copper in freshwater and marine waters are respectively 7.8 and 2.6 µg Cu/l. The safe level for copper in soil is 79 mg Cu/kg dry weight. The safe levels for copper in freshwater, estuarine and marine sediments are respectively 87, 144, and 338 mg Cu/kg dry weight,
- the copper levels measured in European waters, sediments and soils are usually well below these safe threshold levels,
- environmental risks are possible at a few industrial sites – where there is insufficient on-site water treatment, and/or where the effluent goes into a water body with low dilution,
- occupational health risks are possible at a few industrial sites – involved in the production of copper chemicals and powders,
- copper is not a CMR (carcinogenic, mutagenic, reprotox) or a PBT (persistent, bio-accumulative, toxic) material.

The VRA thus concludes that, with the exception of a few local industrial emissions and exposures, there is no need for further risk-reduction measures beyond the ones already in place. It also confirms the recommendations, reached by the World Health Organisation's International Programme on Chemical Safety⁵, in 1998, that 'there is a greater risk of health effects from deficiency of copper intake than from excess copper intake'. ■

Further information on the voluntary risk assessment is available from: <http://www.eurocopper.org/copper/copper-ra.html>

5. World Health Organisation International Programme on Chemical Safety, Environmental Health Criteria 200: Copper, Geneva, 1998, page 266.

TRANSPORT

Full speed ahead: CuproBrazé's contribution to cool locomotion

Copper and brass continue to be important in the truck sector for cooling systems. Thanks to CuproBrazé technology, used to manufacture heat exchangers, they are also the materials of choice for cooling diesel and electric-powered locomotives.

In the early 1990s, engineers discovered a new brazing technology that would make it possible to produce lighter, stronger, more durable copper/brass radiators. This marked the birth of the CuproBrazé process from which a range of other applications have been developed, including a key one in the rail sector: oil coolers for locomotives by Bombardier Transportation.

In conventional copper/brass systems, the copper fins are joined to the brass tubes by soldering. In the CuproBrazé process, the fins are brazed to the tubes, making the joints stronger and allowing thinner metal components to be used.

In certain electric locomotives, the old transformer-oil cooler design was one of the weakest points. The previous heat exchangers were based on round copper-alloy tubes, with aluminium fins, made by a number of small manufacturers at great expense. However, they did not measure up in terms of durability. As the locomotives overheated frequently, the coolers had to be overhauled, taking them out of service.

After considerable laboratory testing and study of CuproBrazé, by the cooling experts at Bombardier Transportation, the opportunity arose, in 2007, to put the technique to the test. Bombardier was contracted by South African Railways (SAR) to overhaul its line of 45 Class 11E locomotives and provide them with an additional lease of life of 30 years. These locomotives haul coal for some 400 kilometres through very harsh terrain, from Ermelo in the north



east to the coal terminal at Richards Bay. 8 trains ply the route each day, with the average train being 3.5 kilometres long, and the 4 locomotives pulling 200 wagons containing 22,000 tonnes of coal.

The heat exchangers are subject to the extreme conditions of clogging, shock and vibration, as well as to high air humidity, salt and dirt from the sugar cane fields through which the train passes. The journey also requires extensive electric braking, because the altitude drops from 1,700 metres to sea level over a short distance.

Once the prototype cooler was completed, it was fitted in one locomotive, while the old-style coolers remained in the others. Bombardier studied closely the CuproBrazé cores for more than a year and concluded that the durability was clearly superior. It also transpired that the initial costs of CuproBrazé heat exchangers were lower than the previous technology. This made the decision by SAR to use CuproBrazé straightforward given their all-round superior performance.

In a number of countries, many locomotives are reaching 20–30 years

of service. Bombardier is confident that the CuproBrazé technology will be used to replace oil coolers when some 400–500 locomotives need refurbishment over the next five years. The company is, furthermore, examining how to use the technology in new designs of original equipment.

Because the brazing process is lead-free and more energy-efficient than the old-style technique, as well as the fact that copper and brass are 100% recyclable, the CuproBrazé technology clearly has important, positive effects on the environment. Given that products using the technology can perform to a high standard in difficult geographical and climatic conditions, such as South Africa, and are easy to clean and repair (meaning that locomotives are out of service for less time), it looks like copper's use is on a winning streak. ■

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