

EXECUTIVE *Report*

Chinese Company Brazes Copper-Brass Heat Exchangers

Nanning is Site of First *CuproBraze* Plant in China

Automotive industry players, local government leaders and international media recently gathered in Nanning, China for the unveiling of the country's first *CuproBraze*® manufacturing plant. At its inauguration ceremonies, Nanning Baling Technology Co., Ltd. (NBT) proudly announced that it will manufacture heat exchangers using *CuproBraze*

technology for brazing copper fins to brass tubes and tubes to brass header plates.

Rounding out the event's activities were a ribbon-cutting ceremony, a tour of the new facilities (including the plant, office building and technical center), testing-equipment demonstrations and an orienteering competition sponsored by Swedish supplier Outokumpu.

Outokumpu supplies copper strip to NBT's parent company, Nanning Eight Rhombus Motors Accessories

Co. Ltd., a producer of conventional copper-brass radiators and other heat exchangers. Following Outokumpu's recommendation, Nanning Eight Rhombus and individual investors shelled out 86.86 million RMB (Renminbi, valued at approximately 8.28 per US dollar) for the *CuproBraze* project.

The innovative *CuproBraze* technology involves the brazing of copper and brass for the manufacture of durable and efficient radiators and charge air coolers (CACs). NBT plans to turn out 500,000 *CuproBraze* heat exchangers annually for China's domestic automotive industry, according to a company representative. The new plant also provides capacity for NBT to export to the global automotive parts market in the future.

In the meantime, the venture is expected to cater to the growing demands of NBT's current customers. Using *CuproBraze* technology, the company can offer more choices and more solutions to OEMs, allowing them to select high-quality, high-performance heat exchangers that are well suited to specific applications. Among NBT's clients are Second Automotive Group, Dongfeng, Shanghai Automotive Industry Corp. (SAIC), Chongqing Automotive Co., SGM Wuling Co. Ltd, and Chang An Motor Corp.

"It is a milestone for Nanning Baling Technology to become the first company in China to mass produce *CuproBraze* heat exchangers," said Gu Yu, the company's general manager, at the inauguration ceremonies for its new plant in Nanning's High and New Industry Zone.

Automotive Market Shows Rapid Growth

NBT's new enterprise represents a significant increase in the production of *CuproBraze* radiators worldwide. The company, which began building prototype *CuproBraze* radiators late last year, joins the growing list of manufacturers in Russia, Finland, France, Thailand, Japan, United Kingdom and the United States who have adopted *CuproBraze* technology.

It was only a matter of time before China caught on. The country is one of the fastest growing economies in the world. According to *FOURIN China Auto Weekly*, both production and sales in China's automotive sector doubled from 2000 to 2003 [1]. China manufactured more than 5 million automobiles in 2004. Trucks accounted for 1.5 million of those vehicles, a 23.3 percent increase over 2003. All this considered, China ranks fourth in automobile production volume, behind the United States, Japan and Germany.

One key concern within China's automotive industry is the environment. The Chinese government is imposing fuel economy standards on new cars. Furthermore, more stringent emissions stan-



A festive inauguration ceremony (above) marked the opening of NBT's new plant (below), which is dedicated to the production and testing of *CuproBraze* heat exchangers.



The International Copper Association, Ltd. (ICA)

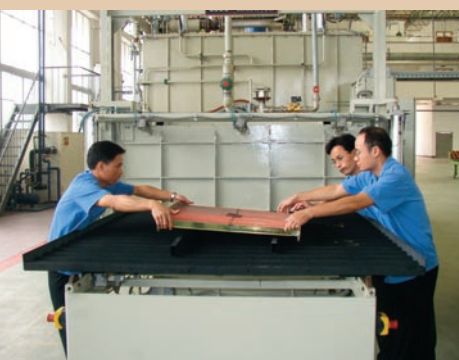
is the leading organization for the promotion of the use of copper worldwide. The Association's twenty-nine members represent about 80 percent of the world's refined copper output, and its six associate members are among the world's largest copper and copper alloy fabricators. ICA is responsible for guiding policy, strategy and funding of international initiatives and promotional activities. With headquarters in New York City, ICA operates in 28 worldwide locations through a network of regional offices and copper development associations.

For general mailing information about the CuproBraz process or ICA's CuproBraz consulting services, please contact International Copper Association at mrosario@copper.org. For technical information contact cuprobraz@copper.org. For European inquiries contact ndc@eurocopper.org.

REFERENCES

1. *FOURIN China Auto Weekly* can be found on the Internet at www.fourin.com/chinaautoweekly. It is a publication of FOURIN, a privately owned, world automotive industry research and publishing company.

2. European Union, Japanese, Californian, Asian, Australian and South American diesel emission standards for various years are summarized on the Internet at www.dieselnet.com/standards.html.



NBT technicians examine a heat exchanger core brazed by the CuproBraz process.

dards are being adopted. Industry experts are predicting that heat exchangers for new clean diesel engines will need to retain their strength at high temperatures and reject heat more efficiently.

According to DieselNet, an online service that provides information on clean diesel engines and diesel emissions, the first emission regulations in China became effective in the 1990's [2]. Chinese standards are based on European regulations but lag behind a few years. Large metropolitan areas, like Beijing and Shanghai, have adopted more stringent regulations ahead of the rest of the country. Beijing is expected to implement Euro 4 standards for light-duty vehicles by 2008, around the same time Euro 3 standards should be implemented nationwide.

With the environment and energy efficiency as major concerns, Chinese automotive manufacturers are looking at advanced technologies. CuproBraz heat exchangers are more resistant to corrosion than aluminum. The process uses an environmentally friendly brazing alloy composed of 75% copper, 15% tin, 5% nickel and 5% phosphorus, which provides increased corrosion resistance. The brazing alloy is of the same nobility level as the fin and tube materials, so CuproBraz products are not subject to galvanic attack like the conventional soft-solder products. Furthermore, the tube alloy contains 85 percent copper, which is less sensitive to stress corrosion cracking and dezincification than conventional brass alloys.

Putting CuproBraz to the Test

Besides corrosion resistance, other key advantages of the CuproBraz process are durability, thermal performance and reparability. Durability testing of copper-brass heat exchangers has been ongoing in China in places like Hainan Island, the southernmost province, which has a monsoon tropical climate. Poor road conditions are of concern in certain parts of China, so the reliability of heavy-duty trucks is crucial. Rough roads place great stress on cooling units, because of mechanical vibrations and exposure to dirt, dust, corrosive elements and other harsh conditions.

Research and testing have shown that cores made from copper and brass can reject more heat per unit volume than any other material system. This means that a CuproBraz cooling

system can provide more cooling in the same space compared to competitive systems. In its technical center, adjacent to the new CuproBraz plant, NBT has the equipment necessary for measuring cooling efficiency. Among that equipment is a wind tunnel from the US. Wind-tunnel testing and heat-transfer simulations show that copper-brass cores hold the advantage for the most efficient heat rejection.

Off-road trucks in China need to operate in a wide range of climates and be forgiving to the quality of coolants. Drivers cannot afford to deal with frequent failures of cooling systems. Because their tubes are made of brass rather than aluminum, CuproBraz charge air coolers and radiators can withstand extremes of pressure and temperatures, thereby limiting repairs in the field. When repairs are necessary, CuproBraz heat exchangers can be easily repaired in the field using simple soldering methods.

Still More to Come

With the rapid growth of vehicle sales in China, NBT is likely to be just the first of many Chinese automotive manufacturers that will produce CuproBraz radiators. Testing results have so far been very encouraging, reports the International Copper Association.

Interest is also being shown in other parts of Asia. Developing countries that lack an infrastructure for producing aluminum radiators are eager to adopt the technology. Mass production of CuproBraz radiators and charge air coolers is well under way in Western Siberia (SHAAZ), Japan (NAJICO) and Thailand (Radicon). Already, radiators and CACs are being installed in on-highway and off-road heavy-duty trucks in Russia. Soon, NBT's products will begin appearing in Chinese heavy-duty vehicles.

"We are optimistic about the success of CuproBraz in China," said Nigel Cotton, Automotive Manager for the International Copper Association. "Its adoption will be spurred by demonstrations of its reliability over millions of kilometers of service life. Now we are gaining on-road experience in Russia, China and other parts of the globe, with the result that CuproBraz is being considered as the first choice for heat exchangers in ever-increasing numbers of applications." ■

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