

Heat Exchangers

Part 4 - ENVIRONMENTAL CONCERNS





SAVE THE EARTH

Care for the environment is one of the top concerns of many vehicle manufacturers, regardless of the types of vehicles they manufacture or where their production facilities are.

One instance of this industry's firm commitment towards the environment is best reflected in a statement made by Mr. Fujio Cho, President of Toyota Motor Corporation.

"Toyota and the other automakers will not survive the 21st Century unless we pull together now and find ways to limit the car's impact on our planet. We need to make this new century the start of a unified effort to better tune the automotive industry to the needs of the earth. It is more than just good business for Toyota; it is the key to the future of our industry and a necessity for a healthy future for people everywhere," said Fujio Cho.

When asked what they felt would be the biggest factors concerning their products in the future, it was not surprising that most vehicle manufacturers singled out environmental concern as one of them.

Apart from manufacturers, end users are also showing a greater awareness in the need to care for the environment and are therefore embracing products that support green technologies. The future is thus clearly about technologies that minimise environmental damage.

[The efficiency of heat exchangers has
direct impact on engine performance
and fuel efficiency]



HOLISTIC APPROACH

Vehicle manufacturers are adopting a holistic approach to caring for the environment. They are especially concerned about the long-term impact that vehicles and their components have on the environment. This has in turn led to the use of better heat exchangers in vehicles. The following are some ways through which higher efficiency heat exchangers can contribute to the environment:

CLEANER PRODUCTION

The manufacturing of heat exchangers involves the use of toxic substances, such as lead, and the discharge of hazardous wastes. In addition, the manufacturing process consumes energy for heating the cores, which indirectly affects the use of natural resources. As this impacts on the environment, there is an increasing interest in technologies that avoid:

- use of toxic substances
- generation and discharge of hazardous wastes
- excessive consumption of energy

RECYCLING

One way vehicle manufacturers are constantly striving to protect the environment is by using materials that provide a maximum recycling potential and thus produce less harmful effects to the environment.

IMPROVING FUEL EFFICIENCY

The efficiency of heat exchangers has direct impact on engine performance and fuel efficiency. Technologies that improve the fuel efficiency of vehicles will thus play an important role in saving the environment.

Aluminium technology is being replaced by *CuproBraz* technology, which will enable vehicle manufacturers to produce more eco-friendly products.



CUPROBRAZE AND THE ENVIRONMENT

CuproBraz is used in the manufacturing of a new generation of heat exchangers because they provide the advantage of a greener manufacturing process and end product.

The technology not only uses environmentally friendly materials such as copper and brass, but it also employs an advanced process of manufacturing that eliminates the use of hazardous wastes, toxic substances and consumes a lower amount of energy.

When it comes to recycling, copper is virtually 100 percent recyclable. The large, well-established recycling infrastructure that exists has long made copper one of the most widely recycled of all metals

SELF-FLUXING

The brazing process used in CuproBraz is self-fluxing, so no separate fluxing operation is required. This process also eliminates degreasing, which is detrimental to the environment. As no rinsing is required, no hazardous wastes are produced (Fig 1).

CuproBraz uses a non-toxic, low temperature-melting brazing alloy. This special alloy is composed of 75% copper, 5% nickel, 15% tin, and 5% phosphorus. The absence of lead in the brazing alloy material means that the product and process are free of toxicity.

Fig 1: Eco-Friendly Manufacturing Process

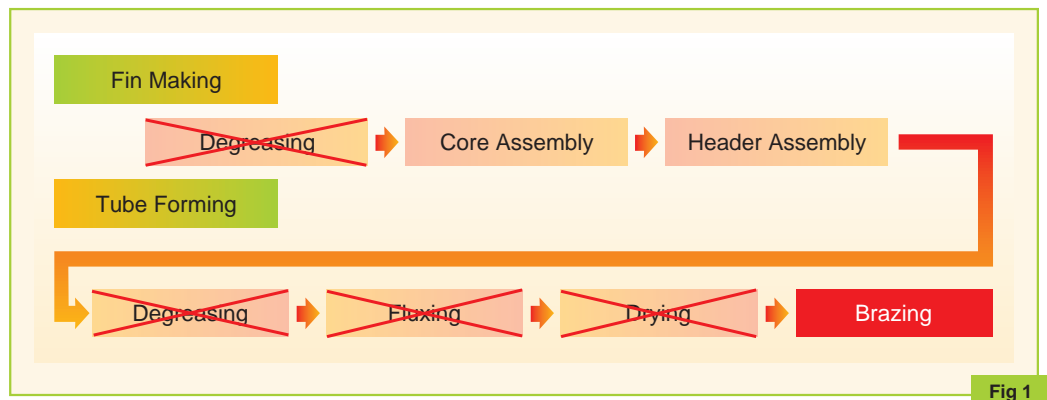


Fig 1

RECYCLABLE

When it comes to recycling, copper is virtually 100 percent recyclable. The large, well-established recycling infrastructure that exists has long made copper one of the most widely recycled of all metals.



CUPROBRAZE AND THE ENVIRONMENT - cont'd

HIGHER ENERGY EFFICIENCY

CuproBrazе allows almost three times more energy efficiency than aluminium, thus preserving the earth's precious natural resources. This in turn results in lower pollution.

At the very basic level, one metric ton of copper requires less than half the energy required to produce one metric ton of aluminium (Fig 2).

Fig 2: Comparison of energy consumption for virgin metal production (copper vs aluminium)

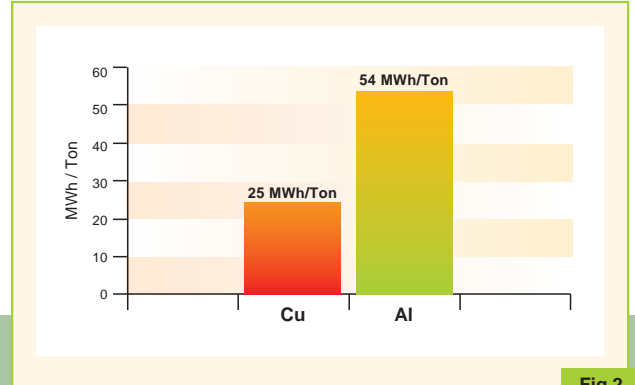


Fig 2

When evaluated in the context of heat exchangers, these energy savings mean a high possibility to save the earth from the greenhouse effect. For instance, changing 50 million heat exchangers from aluminium to CuproBrazе could prevent one million tons of CO₂ from entering the environment every year.

In the future, production of CuproBrazе heat exchangers will require 66% less energy as compared to aluminium ones (Fig 3).

Fig 3: Comparison of energy consumption for heat exchanger production (copper vs aluminium)

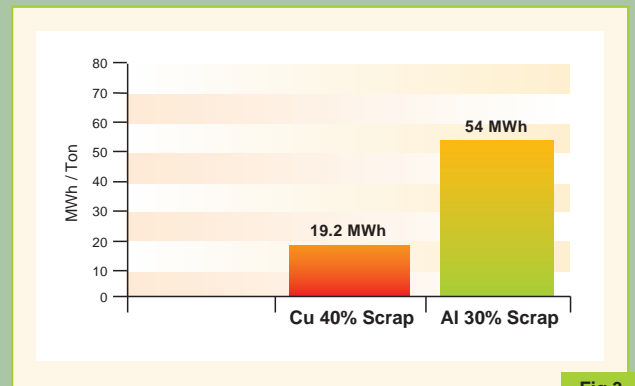


Fig 3

CuproBrazе also consumes less energy during the recycling stage. Recycling one metric ton of copper requires far less energy than it does to recycle aluminium (Fig 4).

Fig 4: Comparison of energy consumption for recycling base metal (copper vs aluminium)

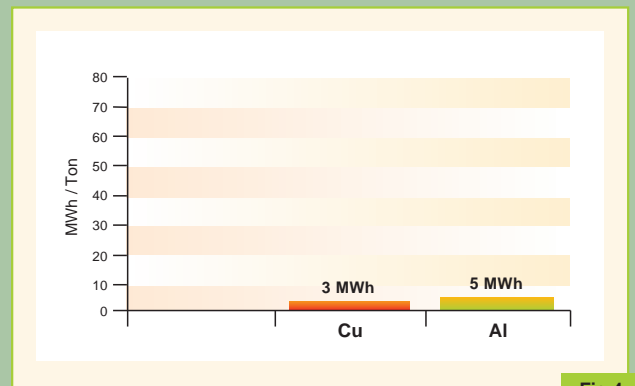


Fig 4

When evaluated in the context of heat exchangers, these energy savings mean a high possibility to save the earth from the greenhouse effect



CUPROBRAZE AND THE ENVIRONMENT - cont'd

LONG-TERM ENERGY SAVINGS

A CuproBraze heat exchanger consumes much less energy over its entire life span as compared to an aluminium one (Fig 5).

Fig 5: Energy Consumption over 200,000km

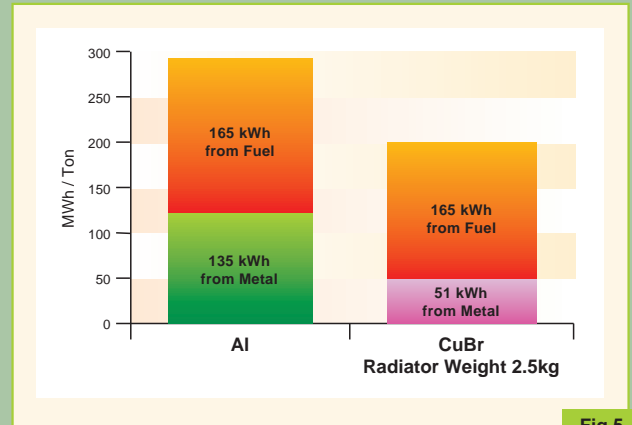


Fig 5

[CuproBraze is now a proven technology that has already been adopted
by some of the leading vehicle manufacturers around the world]



HEALTH BENEFITS

Besides promoting environmental health, copper is an essential metal for human health. The World Health Organisation (WHO) has concluded that copper deficiency is much more of a risk to humans than copper toxicity is.

PROVEN TECHNOLOGY

CuproBraze is now a proven technology that has already been adopted by some of the leading vehicle manufacturers around the world.

Full-scale production of CuproBraze heat exchangers started in 1999. By 2001, four companies had embraced CuproBraze and this number has already swelled to six in mid 2002 and, since then, several more decisions on production have already been taken.



CONCLUSION

Because of their materials content, manufacturing process and function, heat exchangers have a huge impact on our environment. As such, vehicle manufacturers are now showing a greater concern and responsibility towards the preservation of our environment, by adopting more environmentally friendly technologies.

CuproBraze offers many improvements over the existing aluminium technology. The technology will take the automobile industry towards sustainable development where environmental care and economics often go hand in hand.



Useful References:

www.toyota.com/ecologic

Visit this website to view the Toyota North America Environmental Report and to read the latest news on what Toyota is doing for the environment.

www.sae.org

Website of The Engineering Society for Advanced Mobility in Land, Sea, Air and Space.

www.behrgroup.com

Website of Behr GmbH & Co, a specialist in environmentally compatible vehicle air-conditioning and engine cooling. Behr is one of the leading original equipment manufacturers for passenger cars, commercial vehicles.

www.narsa.com/acj/

Automotive Cooling Journal of the U.S. National Automotive Radiator Service Association

www.copper.org

A service of the U.S. Copper Development Association

Resources:

For more information about CuproBraze, free literature and technical tips, you can look up the website of the CuproBraze Alliance at:

www.CuproBraze.com

If you have any questions or requests for information, you can email to: Info.cuprobrazecuprobraze.com

The information in this brochure is obtained or derived from sources believed to be accurate. The CuproBraze Alliance does not guarantee the accuracy or completeness of the information nor shall it be liable for any errors in or omissions from the information or actions taken in reliance thereon.

