



STIRRING UP ENERGY SAVINGS AT MCK METALS PACIFIC LTD

New energy-saving technology is causing quite a stir – of the positive kind – at the New Plymouth factory of MCK Metals Pacific Ltd.

After installing a permanent magnetic stirrer in their gas-fired furnace, the aluminium extrusion and fabrication manufacturer is saving 6.8 per cent in gas energy consumption.

As an energy-saving project, the project was eligible for a 40 per cent grant towards the capital cost as part of Energy Efficiency and Conservation Authority's (EECA) Energy Intensive Business (EIB) grants programme.

The permanent magnetic stirrer effectively performs the same function as a spoon in a cup of coffee, distributing heat through the molten metal.

And according to MCK's project engineer, Lee Liaw, it delivers twin benefits in terms of efficiencies.

"The stirrer not only reduces the melting time required, by improving the energy transfer – it also increases the amount of aluminium we can melt per hour."

The Z-Mag stirrer, which uses permanent magnet technology, is the first of its kind to be installed in Australasia. Unlike electromagnetic stirrers, which create a magnetic field using an electric current, the Z-mag requires minimal energy to operate.

In addition to the significant reduction in gas consumption, the stirrer is also delivering other benefits including improved product quality.



About MCK Metals Pacific Ltd

Originally founded in 1953 and previously owned by a UK-based company, today MCK Metals Pacific is a New Zealand owned business that employs more than 300 people.

The New Plymouth operation spans re-melt, casting, extrusion, fabrication, anodizing and powder coating.

MCK Metals extrudes its own billet (metal bars) from scrap metal to produce finished components for a wide range of industry sectors, adding value through its Fabrication Business Unit.

It also produces the Alco Ladder range and Titan aluminium truck decks.

MCK Metals has branches and sales representation throughout New Zealand and major centres in Australia. Its products are supplied throughout Australasia; as well as global markets including the Pacific Islands, US and Europe.



The business case

Before investing in the Z-Mag technology, MCK Metals had investigated a range of options. They concluded that mechanical stirrers would have too short a life span, while the energy costs of electromagnetic stirrers were prohibitive.

MCK's re-melt facility consists of two furnaces – a small electric coreless induction furnace, and a large gas-fired reverberatory furnace (which has the stirrer fitted to its side).

The gas-fired furnace uses roof-mounted burners, and colder metal located at the bottom of the molten pool is difficult to heat without mixing.

Mechanical mixing would require opening of the furnace doors, which would allow heat to escape. One of the benefits of the magnetic stirrer is that the furnace doors can be kept closed. The stirrer allows the colder metal at the bottom of the molten pool to be exposed to the hearth heat above, thus improving heat transfer.

"By evening out the temperature in the metal, we're able to get more energy transfer," explains Lee Liaw.

Previously, the molten bath would be stirred using a rake attached to a forklift. It took several hours for alloying additions such as copper, magnesium and silicon to mix and stabilise. With the Z-Mag, operators can now resample after just 10-15 minutes.

The permanent magnetic stirrer was developed about three years ago by Z-mag America Ltd of Portland, and has since been installed in companies such as Toyota and Nikkei MC Aluminium America.

Where do the savings come from?

Earlier this year MCK Metals commissioned an independent report on the Z-Mag's performance – running a one-month trial in April to measure energy consumption pre- and post installation of the stirrer.

The two furnaces were studied for eight consecutive weeks, although the electric furnace had minimal impact as it represents only nine per cent of the total foundry energy or electricity usage.

At monthly melt rates of 880 tonnes, savings of 561 MJ per tonne were attributed solely to the operation of the Z-Mag. The energy consumption rate reduced from 8.26 to 7.70 GJ/tonne – a saving of 6.8 per cent%.

The energy costs of the stirrer itself are proving relatively low, drawing less than 10kW of electricity.

As an added benefit the avoided CO2 emissions are 266 tonnes per year.

Project figures

Energy consumption (without stirrer)	8.26 GJ/tonne
Energy consumption (with stirrer)	7.70 GJ/tonne
Estimated reduction in annual energy usage	5,049 GJ (i.e 6.8% saving)

Other benefits

In addition to the energy savings, the stirrer delivers a host of other benefits. It is virtually maintenance-free, easy to operate, and has a large circulation capacity (of more than 50 tonnes per minute).

Importantly, the stirrer is also reducing waste-age and resulting in improved product quality.

According to Terry Fitzgerald, works engineer at MCK, metal quality has improved significantly since the stirrer was installed. Due to the efficient mixing process, the molten metal doesn't get as hot; thus reducing the ash and dross produced.

"The overall impact of the system is a real reduction in furnace energy requirements per tone of product, higher product quality, and reduced losses through dross and scrap," says Terry Fitzgerald.

"It all adds up to a small carbon footprint for our re-melt operation."

Terry Fitzgerald says the technology could provide benefit other New Zealand processors of non-ferrous metals.

EECA's \$100,000 grant towards the capital cost made investing in the stirrer an easier decision.

"The whole process was really straightforward and EECA was really good about helping us along."

Energy Intensive Businesses – Project Grants

EECA has grants available of up to 40% of the capital cost of a project, with a maximum of \$100,000 for each grant. Projects that implement new or under utilised technologies to New Zealand are encouraged to apply.

The implemented technologies should:

- be capable of reducing the energy intensity of an organisation's operation
- have the potential to be applied to a majority of businesses across their industry sector
- be commercially available and offer an acceptable payback period.

Businesses who receive a grant must be willing for their project to be used as a case study, so others can learn from their experiences. Other businesses can look to you as an example of good energy management making you a leader in your field.

Contact: Phone: 0800 358 676
email: eib@eeeca.govt.nz

Other energy grants

Emprove

EECA offers the following services and funding for businesses energy efficiency projects:

Energy Achiever

- Hour-long session with EECA Emprove Account Manager to scope current energy usage
- Free for businesses spending more than \$500,000 a year on energy.

Energy Audit

- Comprehensive energy audit carried out by an independent consultant
- Funding available through Emprove programme towards the cost of an energy audit for businesses with energy bills of more than \$100,000 a year.

Contact: Phone: 0800 358 676
email: emprove@eeeca.govt.nz

Supporting the use of wood residue

The Wood Energy Grant Scheme offers help, by way of funding and information, to businesses interested in using wood residue as an energy source.

EECA can provide:

1. Funding for demonstration projects
2. Funding for feasibility studies that review the use of wood residue as a fuel
3. Relevant information to sawmills, forestry owners and the general public on the use of wood residues via the Bioenergy Knowledge Centre (www.bioenergy-gateway.org.nz).

Funding available for business grants

Business grants for capital/demonstration projects may be up to 40% of the capital cost of the project, with a minimum of \$10,000 and maximum of \$200,000.

Funding is available for projects involving technologies that:

- Have the potential for widespread industry adoption
- Have an acceptable payback period or ROI.

Applicants must be willing to have their project monitored by a third party and allow the results to be published to help promote energy efficiency.

Funding available for feasibility studies

Grants for feasibility studies are available up to a maximum of 75% of the feasibility study costs and the applicant must be willing to have the results of the studies publicised as a case study.

Funding is available for feasibility studies involving technologies that:

- Have the potential for widespread industry adoption
- Are capable of saving energy or have potential for increased use of renewable energy.

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