

# Energy efficient electrical connections

## CSIRO consulting services

Through our advanced scientific capabilities and extensive industry experience, CSIRO is uniquely positioned to add value to your operation. Utilising ongoing analytical support, training or solution development, we can help you optimise your high amperage DC electrical connections in electrolysis and electrowinning processes.

We deliver significant cost and environmental savings to energy-intensive industries that utilise high amperage DC electrical connections, such as aluminium smelters, and copper, nickel and zinc electrowinning or electrorefining operations.

### Company poised to save 8 MW in power

A recent client was suffering from electrical inefficiencies and energy wastage. They required a re-design of their electrical connections and contracted us for the modifications. We designed a solution and verified significant power savings of more than 8 MW using a combination of in-plant measurements, off-line testing and computational modelling (*presented at the TMS Annual Meeting in Phoenix in March 2018*).

### The cost of energy losses

Energy wastage affects your plant's stability, consumes excess power and impacts production. In electricity-intensive industries it is critical to identify points of energy inefficiency in the plant. Eventually, extreme energy wastage can result in curtailed production or even plant closure due to non-competitive electricity prices and production costs.

Our studies show that approximately 10 per cent of electrical energy is consumed in the electrical conductors and contacts in simply getting the electricity to the electrochemical process as a result of suboptimal design and maintenance.

### Reducing energy consumption

Improving electrical connections can generate more than 30 mV savings for each electrolytic cell through low or no capital cost improvements. For a typical modern aluminium smelter producing 1 million tonnes of aluminium per year, the energy savings represent:

- The energy usage of 17,000 average Australian households; and
- Aggregate cost savings of more than US \$3 million per year.

### Reducing industrial carbon footprints

This service is part of our strategy for carbon mitigation via technologies that reduce greenhouse gas emissions.

A 30 mV voltage saving on each reduction cell in a 1 million tonne per year aluminium smelter can result in an annual reduction of CO<sub>2</sub>e that is comparable to removing 48,500 cars from the road.

Reducing power loss is the most effective way to reduce the industrial carbon emissions associated with electricity use. This is especially so in countries that are highly reliant on coal-fired electricity plants.

It is vital to benchmark the performance of these connections against industry best practice and develop a pathway to optimise them to reduce costs, electricity consumption and associated CO<sub>2</sub>e emissions.



David Molenaar delivering a training session.

## Our service

SERVICES	CONTENT	DELIVERABLES
<b>Specialist engineering design and review</b>	Design and modification, providing a tailored solution to an identified problem.	<ul style="list-style-type: none"> <li>• Purpose-designed engineering solutions which provide optimal electrical efficiency and cost balance.</li> </ul>
<b>Process audits</b>	<p>Detailed review of existing plant design and process conditions.</p> <p>Detailed recommendations for tailored process improvements and assessment of potential impact on voltage and greenhouse gas emissions.</p>	<ul style="list-style-type: none"> <li>• Identification of low or no capital solutions.</li> <li>• Focus on short (&lt;1 year) payback.</li> <li>• Likely savings &gt;US \$1 million per annum per plant.</li> </ul>
<b>Implementation support</b>	<p>Verification of possible benefits for implantation, via a targeted campaign of precise measurements.</p> <p>Assessment of benefits of each energy saving opportunity identified in the process audit, conducted as a separate project.</p>	<ul style="list-style-type: none"> <li>• Expert advice on implementation technique.</li> <li>• Cost-benefit analysis.</li> <li>• Business case development.</li> </ul>
<b>Technical training</b>	<p>Intensive training seminars for operational managers (crew leaders, process specialists, reduction line management, R&amp;D support staff).</p> <p>Awareness sessions delivered to operational staff via 'tool box' meetings.</p>	<ul style="list-style-type: none"> <li>• Better informed operational decision-making.</li> <li>• Staff gain a rapid understanding of the fundamentals of maintaining efficient electrical connections.</li> <li>• Empowering workforce to identify new improvement opportunities.</li> </ul>

### CONTACT US

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### AT CSIRO, WE DO THE EXTRAORDINARY EVERY DAY

We innovate for tomorrow and help improve today – for our customers, all Australians and the world.  
 We imagine. We collaborate. We innovate.

### FOR FURTHER INFORMATION

#### Mineral Resources

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