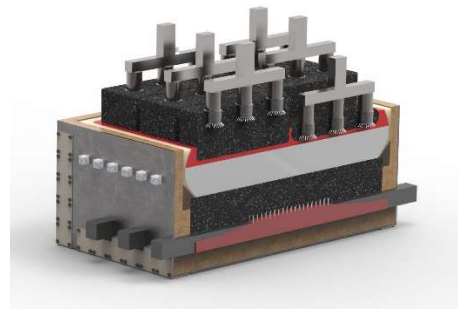


AluCellTech

Technologies to improve the performance of existing and new Aluminium Reduction Cells



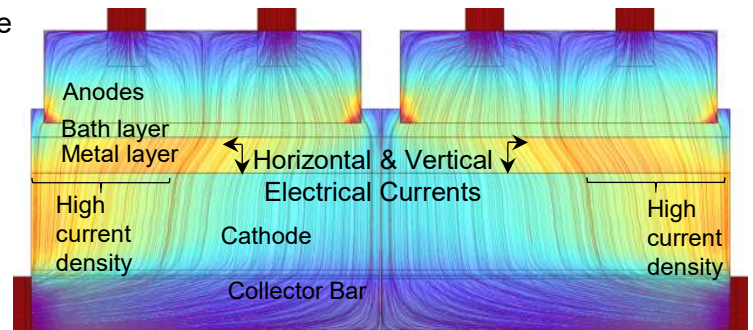
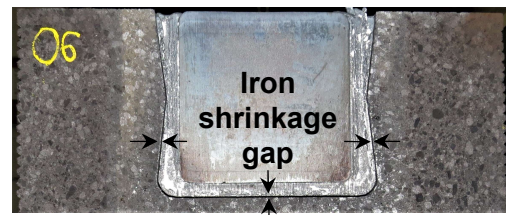
Cathode Assembly Technology

Cathode Nails, Arc-Cast Iron shape, Cast Copper Collector Bars

- Reduce Power Consumption and Reduce Cathode Wear
- Improve Cathode Current Distribution and Current Efficiency

Cathode Assemblies suffer from:

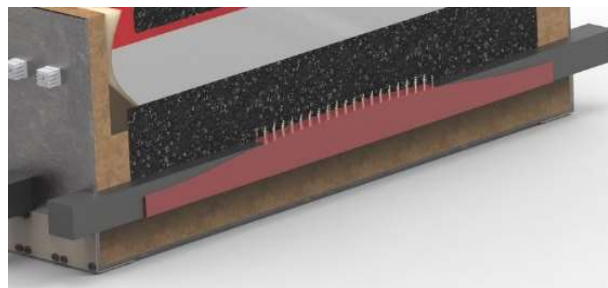
- High electrical contact resistance across the Collector Bar to Carbon connection occurs due to cast iron shrinkage
- High variation in current density across the cathode surface. This variation in current density promotes uneven corrosion of the cathode surface and reduces potlife.
- The high electrical resistance through the collector bar causes horizontal electrical currents in the lower resistance molten metal layer, which promotes turbulence in the metal layer with resulting potnoise and lower current efficiency.



AluCellTech is the exclusive supplier of patented Cathode Nails, Arc-Cast Iron shape and our unique cast copper & stainless steel collector bar technology used in cathode assembly.



Cathode Nails: the only cathode assembly technology to reduce contact resistance



Arc-Cast Iron shape: the only cathode assembly technology to smoothly add resistance to make current distribution uniform



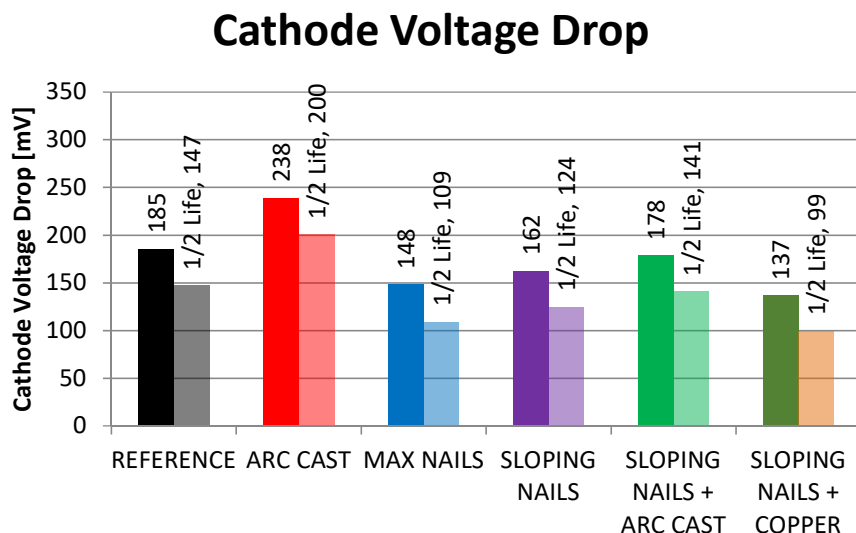
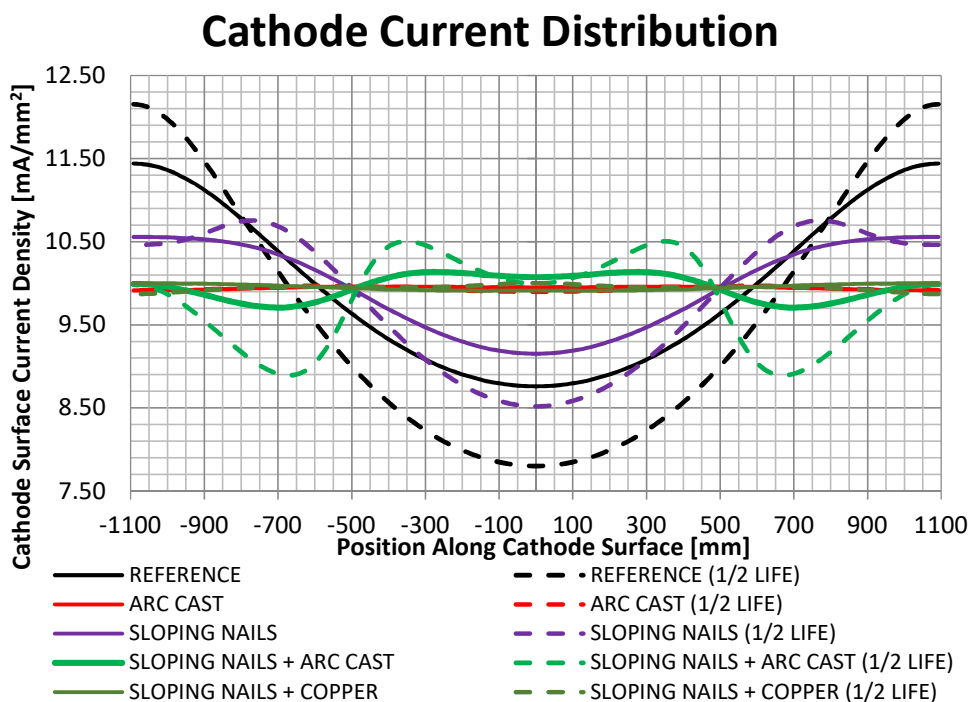
Cast Copper Collector Bar in Stainless Steel casing: resists corrosion and maintains shape in case of copper melting

Benefits of AluCellTech cathode assembly technologies include:

- More uniform current distribution to reduce cathode corrosion for extended potlife
- Reduced horizontal electrical current in the metal layer to reduce turbulence and increase current efficiency
- Lower electrical resistance with cathode nails and copper collector bar to reduce power consumption

The electrical resistance across the top of the cathode determines the horizontal currents in the metal layer and the current density throughout the length of the cathode. The three AluCellTech technologies may be combined to optimize current distribution while also optimizing for local power and material costs.

Current distribution will become more uneven as the cathode wears with age. The chart shows a modelled comparison of cathode surface current density for new and ½ worn cathodes. The cases include the reference case (steel collector bar CB), the Arc-Cast shape with steel CB, Cathode Nails with Steel CB, Cathode nails with Arc-Cast Iron and Steel CB, and Cathode Nails with Copper CB.



The benefits of uniform current distribution must be considered with the impact on cathode voltage drop. The chart shows a comparison of cathode voltage drop for the above combinations of cathode assembly technology. The Arc-Cast method adds voltage drop, while the cathode nails and copper collector bar reduce cathode voltage drop.

AluCellTech cathode assembly technology can be custom configured and optimized to each smelters pot design and desired outcomes of improved performance, longer potlife and low relining cost.

www.AluCellTech.com

CIPO patent PCT CA2014/051178.

International patents pending.

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