

**RSTR** ANODES

For Electrorefining and  
Electrowinning

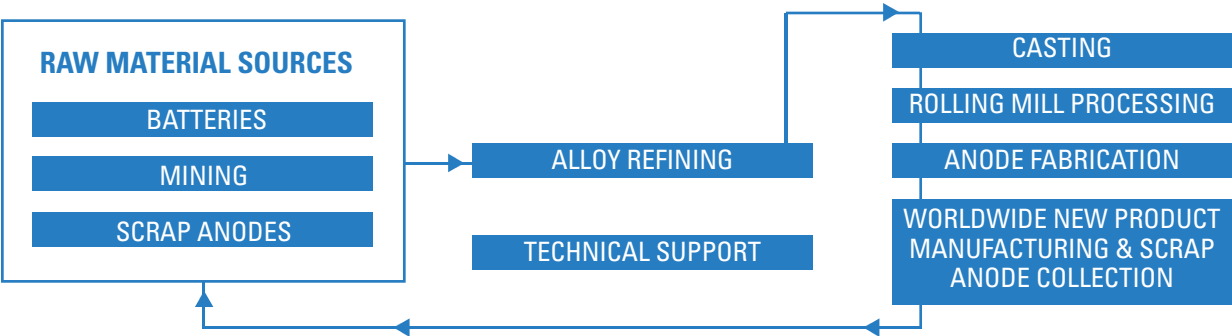


# CONSTANT INNOVATION FOR CONTINUOUSLY IMPROVING PERFORMANCE

Hydrometallurgical processors look to RSR Anodes for years of dependable electrorefining and electrowinning of copper, zinc, nickel, cobalt, manganese and cadmium. RSR Anodes can be relied upon for continuous, high volume productivity because of the unique combination of scientific research and engineering precision that go into their manufacture. From the composition of the alloy to the joining of the copper hanger bar, every aspect of anode engineering is continually investigated to find improvements.

The RSR commitment to quality pertains to manufacturing and environmental considerations. Most anodes are made from 100% high-quality, recycled lead, and we strictly adhere to all material handling and workplace safety standards.

## RSR ANODE LIFE CYCLE





## ENGINEERED FOR SUPERIORITY



The performance of an anode is one of the most critical factors in maximizing efficiency in a hydrometallurgical process. Continuous research and refinement of all aspects of anode production have led to the best product available. In terms of productivity, operating costs and return on investment, RSR Anodes are the best choice.



## Patented Technology

RSR Anodes are designed to make the hydrometallurgical process as efficient and profitable as possible by:

- Maximizing extraction process quality
- Minimizing maintenance needs
- Optimizing energy utilization

These benefits result from the development of numerous unique lead-based alloys containing silver, calcium, tin, aluminum, antimony, and cobalt. International patents on RSR Anodes allow customers to optimize efficiency and cost through:

- Increased electrical conductivity
- Lowered oxygen overpotential
- Rapid formation of uniform adherent  $MnO_2$  and  $PbO_2$  layers
- Resistance against anode passivation
- Enhanced mechanical integrity
- No short circuits related to dimensional instabilities
- Resistance to penetrating corrosion



## CASTING & ROLLING



With over 50 years of lead metallurgy experience, and state-of-the-art casting and rolling mill equipment, RSR Anodes are produced to customer specifications for either new facilities or to replace spent anodes.

Cold rolling after casting further enhances the productivity and life span of our anodes for extracting copper, zinc, cobalt and nickel. Rolling breaks up the grain structure, then elongates and orients the grains which become more homogenous in size. This not only positively effects conductivity, it also:

- Further reduces porosity
- Promotes even conditioning and corrosion resistance
- Safeguards against creep

**Cast anodes are manufactured for specific applications at customer request.**

# SURFACE CONDITIONING

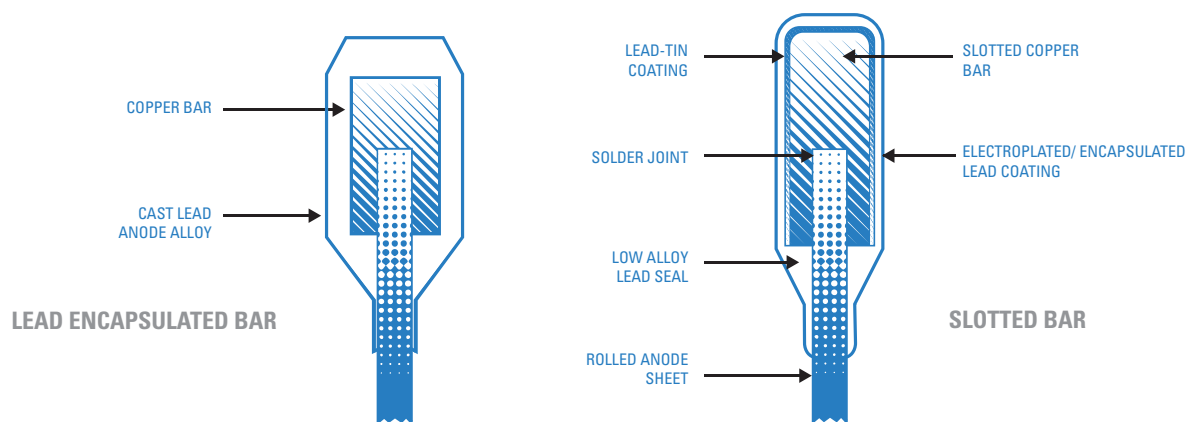
The management of the oxide layer ( $PbO_2$ ) is key to enhanced anode performance in its harsh working environment. As with other aspects of manufacture, we have developed methods for optimizing the surface finish for hydrometallurgical operations. The alloy plays a role as does roughening the surface of the anode. Our environmentally-safe surface pre treatment method for zinc anodes rapidly produces a thin adherent glass film of  $MnO_2$  which forms adherent  $PbO_2$ ; on the very rough, irregular surface with a deep micro-texture featuring indents up to 1mm. Surface treatment of zinc anodes is also critical in minimizing initial mud formation.

The continuing build up of oxidation has detrimental effects to electrorefining and electrowinning such as short circuits, weakened conductivity and structural compromise of anodes if corrosion gets inside. RSR Anodes are engineered for optimal performance and are less prone to these problems.

## COPPER HANGER BAR



RSR's copper hanger bar is another unique feature that makes our anodes more productive and extends their service life. The rolled alloy sheet is fitted into a slot milled into the copper bus bar and attached by a soldering method that ensures a complete bond. There is almost no differentiation in current between the copper and alloy sheet. This consistency continues for the life of the anode.





The bar and joint are protected from electrolyte mist and accidental submersion by either encapsulating or electroplating with a lead alloy coating.

## INNOVATIONS IN SERVICE



Just as we look for ways to make better anodes, we also strive for better ways to serve our hydrometallurgical customers.

Our sales engineers are ready to consult with you on your proposed or existing facility. They will help find ways to optimize the extraction process by engineering anodes to the exact specifications required, and by engineering into each anode powerful cost-saving features.

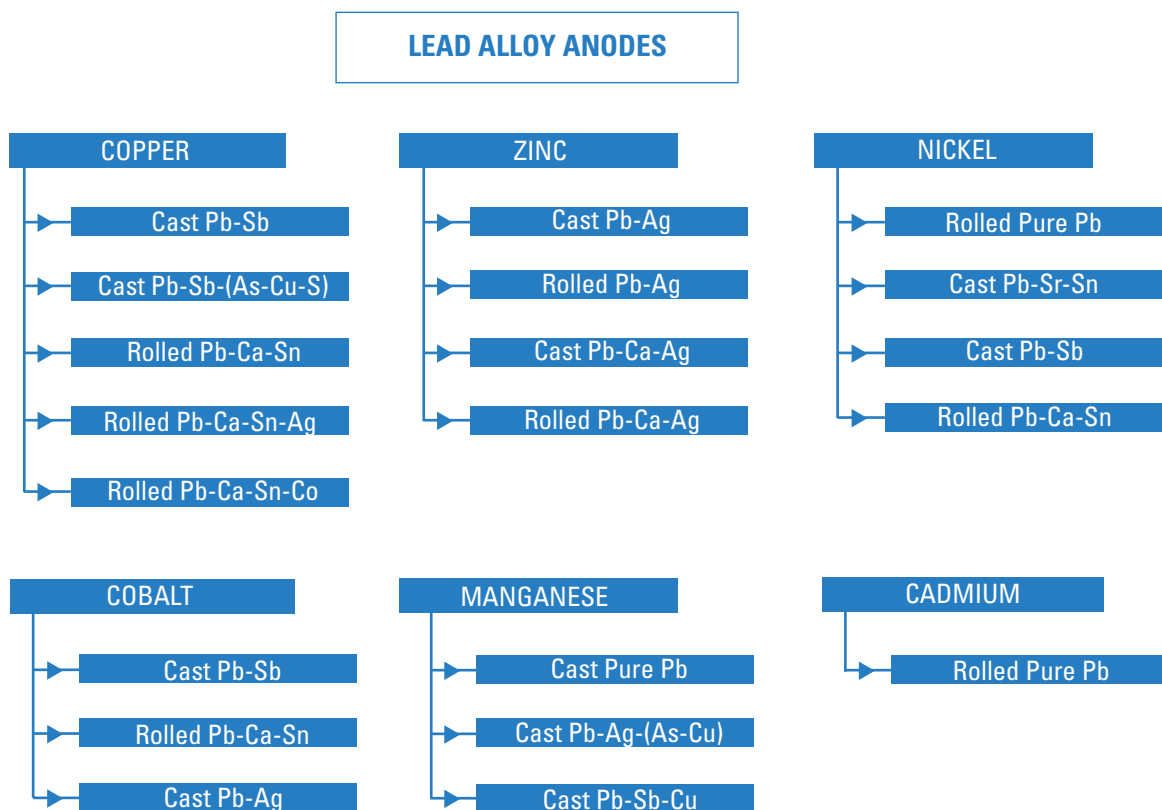
All anodes come with a warranty against defects. We will also provide service contracts to keep your RSR Anodes producing in top condition. We can repair, replace and, at the end of their lifespan, collect anodes for recycling.

# QUALITY AND SERVICE MAKE RSR ANODES YOUR BEST CHOICE

The combination of benefits delivered by RSR Anodes and our global service network makes us your best choice.

- All anodes made to customer specifications
- Patented alloys optimize the electrorefining and solvent extraction process
- Mechanical innovations that improve productivity, anode life and ROI
- Produced from high quality recycled lead from affiliated smelters
- Comprehensive technical support to keep you running at full capacity

## Industrial Anode Materials For Non-Ferrous Metals



**RSR Anode manufacturers** ([www.rsrnodes.com](http://www.rsrnodes.com)):



**Castle Lead Works (South Africa)**

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**ISO 9001 / 14001 / OHSAS 18001**

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**ISO 14001 CERTIFIED**



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