

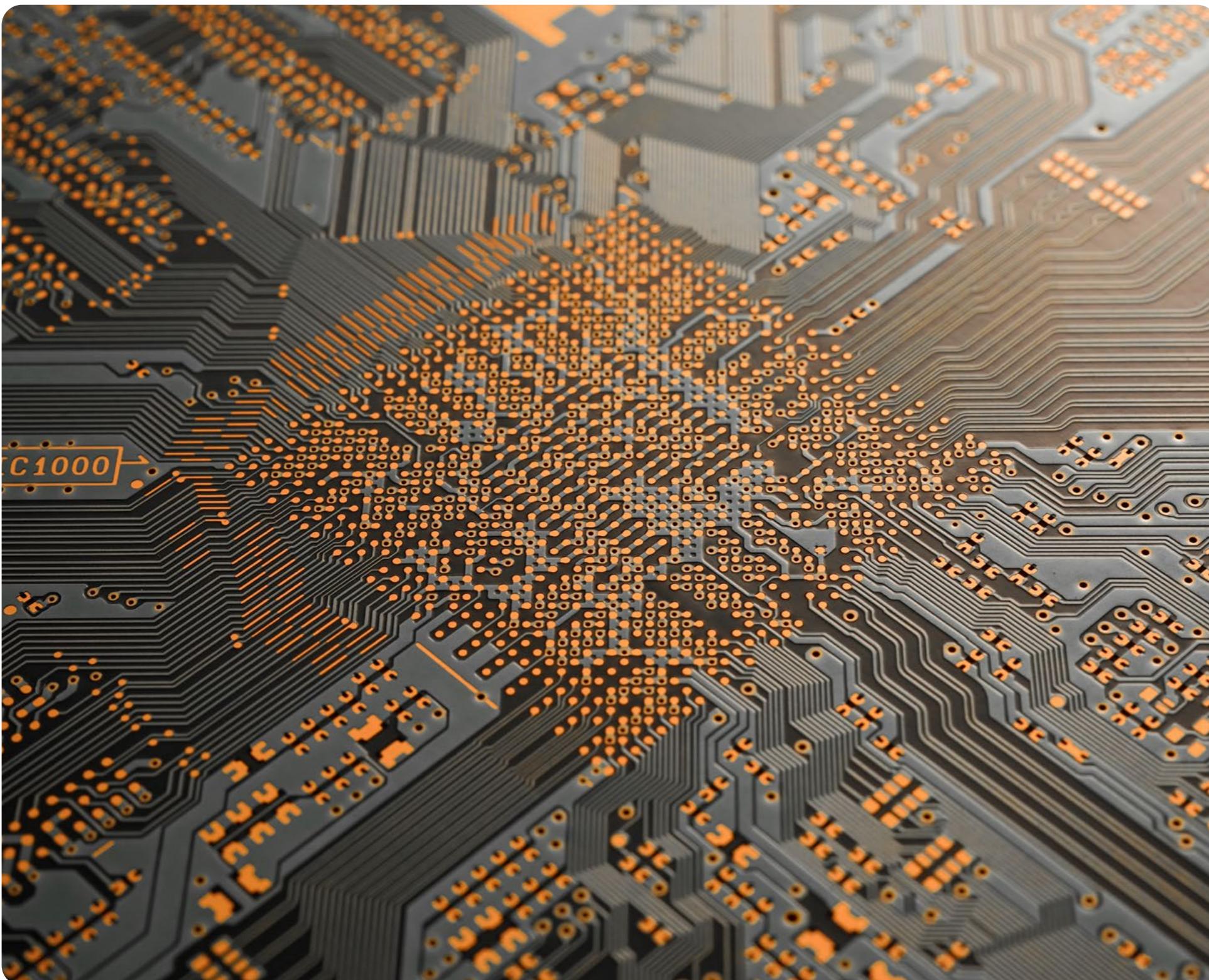


Copper Anodes for Electroplating

Consistent product performance from the first anode to the last

LUVATA
Partnerships with a Promise

Copper in Electroplating



The electroplating process coats items with a thin layer of metal. This coating can alter the chemical, physical or mechanical properties of the item, making it for example, harder, stronger or less corrosive.

Copper is often the chosen coating. It is relatively inexpensive and it has a high plating efficiency. It is good at covering substrate defects that can accelerate corrosion. It is an exceptional electrical conductor and is commonly used in products such as printed circuit boards.

A Clean Product for Optimum Adhesion

In the electroplating process, any impurities can impede successful adhesion of the coating. That is why we are rigorous in our copper cathode selection and employ stringent lean manufacturing processes. Our shiny, clean copper anodes are trusted for their predictable coating thickness and performance.

Consistency in Every Anode

At Luvata we have been manufacturing anodes for over fifty years, and we know that the quality of the anodes used is critical to a successful electroplating process. We use only high-purity copper, and our rigorous production process ensures consistent structural and chemical properties in every single anode. This ensures our customers of the reliable electrical conductivity, plating and ductility performance on which they depend.

At Luvata we have a reputation for innovation, delivery and a collaborative approach. Our whole process, from casting to manufacture, is in-house so we have full control of product quality. As a solid, dedicated organization, we take good care of our customers, working in partnership with them to innovate, problem-solve and create tailor-made solutions.

As a global company we also take our responsibility to the planet very seriously. We believe in a more sustainable future and we are determined to be a force for good in the development of the green transition and electrification of societies. We aim to benefit people, society and the Earth, and play our part in building a better tomorrow for everyone. **II**

President & CEO
Pekka Kleemola

Superior copper material

At Luvata, each casting campaign of oxygen-free copper anodes or phosphorus copper anodes is made under highly controlled and optimum conditions. This leads to the lowest variation in structural and chemical properties and therefore high consistency of the end product. Luvata's manufacturing process guarantees anodes to behave exactly the same way – from plating bath to bath.

Ultimate high purity level

Impurities like iron, nickel, zinc and arsenic tend to dissolve in the plating bath and get enriched as time goes by. If the impurity level is high enough, elements start to interfere with the plating process by precipitating on the coating. This leads to lower electrical conductivity, stresses and changing mechanical properties of the coating. Impurities can reduce the physical properties such as ductility.

Tin, lead and silver form sludge that floats in the bath causing inclusions and a rough finish to the coating. Antimony and bismuth will reduce the mechanical stress capability. Inhomogeneous casting structures with oxides and pores can decrease formability and therefore the quality of the end product.

The Luvata advantage

The most important property of a Luvata anode is purity. Copper purity is essential. Pure copper means greater predictability.

Luvata anodes have uniform grain structure and phosphorus content. Oxygen-free copper has no pores in the cast state and no copper oxide inclusions. Both oxygen-free and phosphorus deoxidized copper have homogeneous single-phase structure that does not form sludge.

In the casting process phosphorus is added to the master alloy which melts very fast. Due to diffusion and continuous movement of the copper melt, the melt is instantly homogeneous (evenly distributed in the melt). This leads to even phosphorus content in the anodes.

The copper crystal structure of Luvata cast balls consists of large grains, see figure 1. As a result of Luvata's casting process, both grain size and shape are the same in the entire batch of anodes. Large copper grains dissolve evenly and guarantee a stable anode film on the ball surface. Large grain size also ensures better anode film adhesion and thus less anode sludge creation and less consumption of organic plating additives. Large crystals are very good in prevention of porous erosion of the ball and to avoid nodular plating caused by undissolved copper dust in the plating tank.



Figure 1. Luvata's anode balls contain large cast grains.

Specifications

Phosphorous copper anodes

Luvata phosphorous copper anodes have high quality plating properties and are widely used for demanding plating applications. The oxygen-free melt in the Luvata casting process gives the anodes a phosphorous content of P 0.04 – 0.06% that remains consistent from bath to bath. Phosphorous copper anodes are used in acid copper plating baths.

Oxygen-free copper anodes

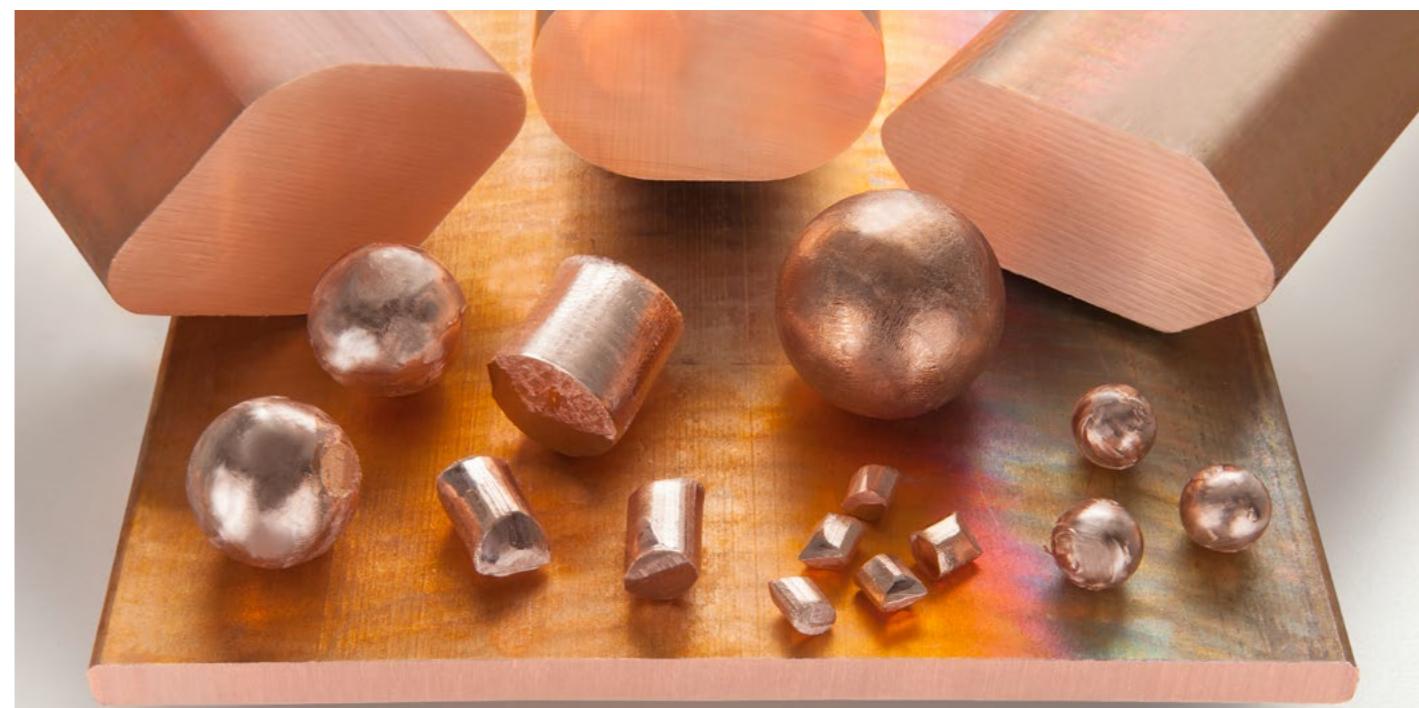
Luvata oxygen-free copper anodes are made specifically for electroplating purposes. They have a high purity level and clean surface. Because of their cast crystal structure and even particle size, Luvata anodes are easily dissolved and their free-flowing material allows ease of handling.



Shapes				
Balls	15	28	42	50
diameter	25	40	45	55
Slugs	8x15	12x8	14x10	25x25
diameter	8x20	12x10	14x20	25x30-40
		12x20	19x20	
Plates	25x10xL	100x10xL	152x19xL	175x15xL
	60x12xL	100x15xL	152x15xL	200x10xL
	80x12xL	100x20xL	158x12xL	200x12xL
	80x15xL	130x19xL	170x15xL	200x20xL
Ovals	48x65xL	51x76xL		
Dogbones	94x34xL			
Hexagonals	39x78xL			
All dimensions in mm; ask for other shapes and sizes				

Packing	Sizes	Packing type	
Balls and Slugs	40-55 mm 15-25 mm	20kg carton boxes on pallets 25kg carton boxes on pallets max 1000kg big bags on pallets	
Plates and Profiles	500/1000 kg	Bundles	Wooden cases

Further packaging options available upon request.



Applications



Coin blanks



Rotogravure printing cylinders



Printed circuit board plating



Decorative plating



Radiators



Printed circuit boards



Automotive parts

Luvata - Partnerships with a Promise

Working for People, Society and the Earth

We all want to ensure a sustainable future for our planet. As a manufacturer, we know that we have both an opportunity and a responsibility to contribute positively to the changes needed to secure that future. We have stated that our vision is to be the leading provider of copper solutions that benefit people, society and the earth, and this is a serious commitment. We are active in markets such as e-mobility, healthcare, electrification and the green transition, all of which have a need for copper products. We believe that our innovations will help drive these markets forwards, making green solutions more easily accessible to all.

We also recognize the need for our operations to be sustainable. To this end, we are striving to reduce greenhouse gas emissions, aiming to be using 100% renewable electricity by 2035 and to be fully carbon neutral by 2045.

Helping our customers grow and thrive

We have always worked in partnership with our customers, getting to know their businesses and collaborating on custom-made solutions. We take great satisfaction in seeing our customers thrive, and knowing that we played a part in their success.

Where we believe we can make a real difference is in sharing our robust manufacturing capabilities, technology and material knowledge, and by using our unique expertise to develop technically-demanding products. Together with an emphasis on lean production, innovation and value-added solutions, we work hard to ensure that we are the partner of choice for our customers, every time.

Partnerships with a Promise

At Luvata, we deliver on our promises. We have pledged always to treat people with respect, keep an open mindset and work together with others.

Our global footprint stretches across four continents. Our diversity of locations, cultures and markets gives us access to a wealth of knowledge and expertise that continues to grow. It also means that we are local to our customers, wherever they are, so we can continue to forge the strong relationships we are known for.



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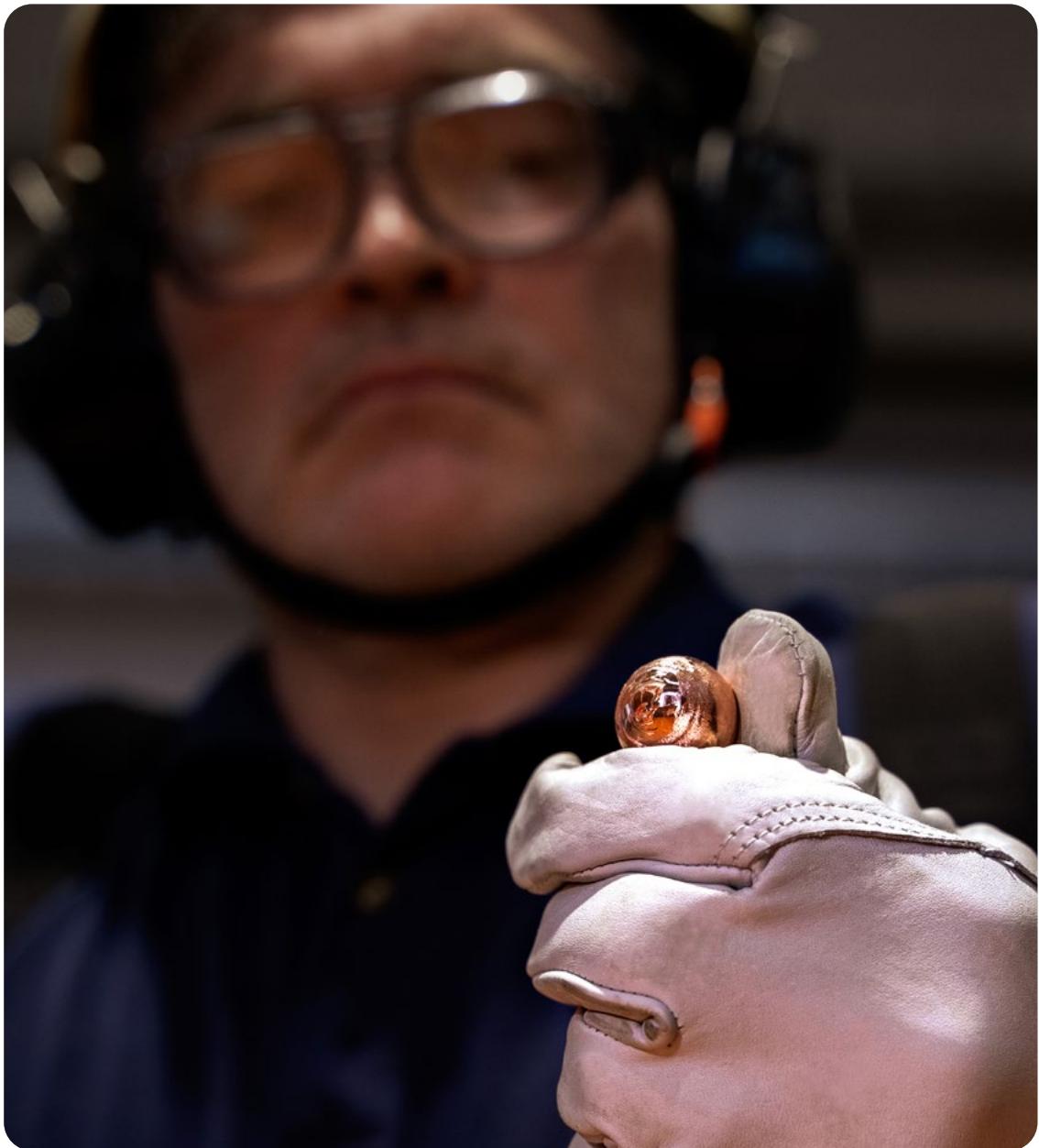
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About Luvata

Luvata is a world leader in copper manufacturing and related engineering services. It brings together people, innovation and technology to create solutions in areas such as e-mobility, healthcare, and in electrification & the green transition. The company's success is driven by innovation, lean production and value-added sales, and its vision is to provide copper solutions which benefit people, society and the earth. Employing over 1,400 staff on four continents, Luvata works in partnership with customers such as ABB, CERN and Siemens. Luvata is a group company of Mitsubishi Materials Corporation.



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