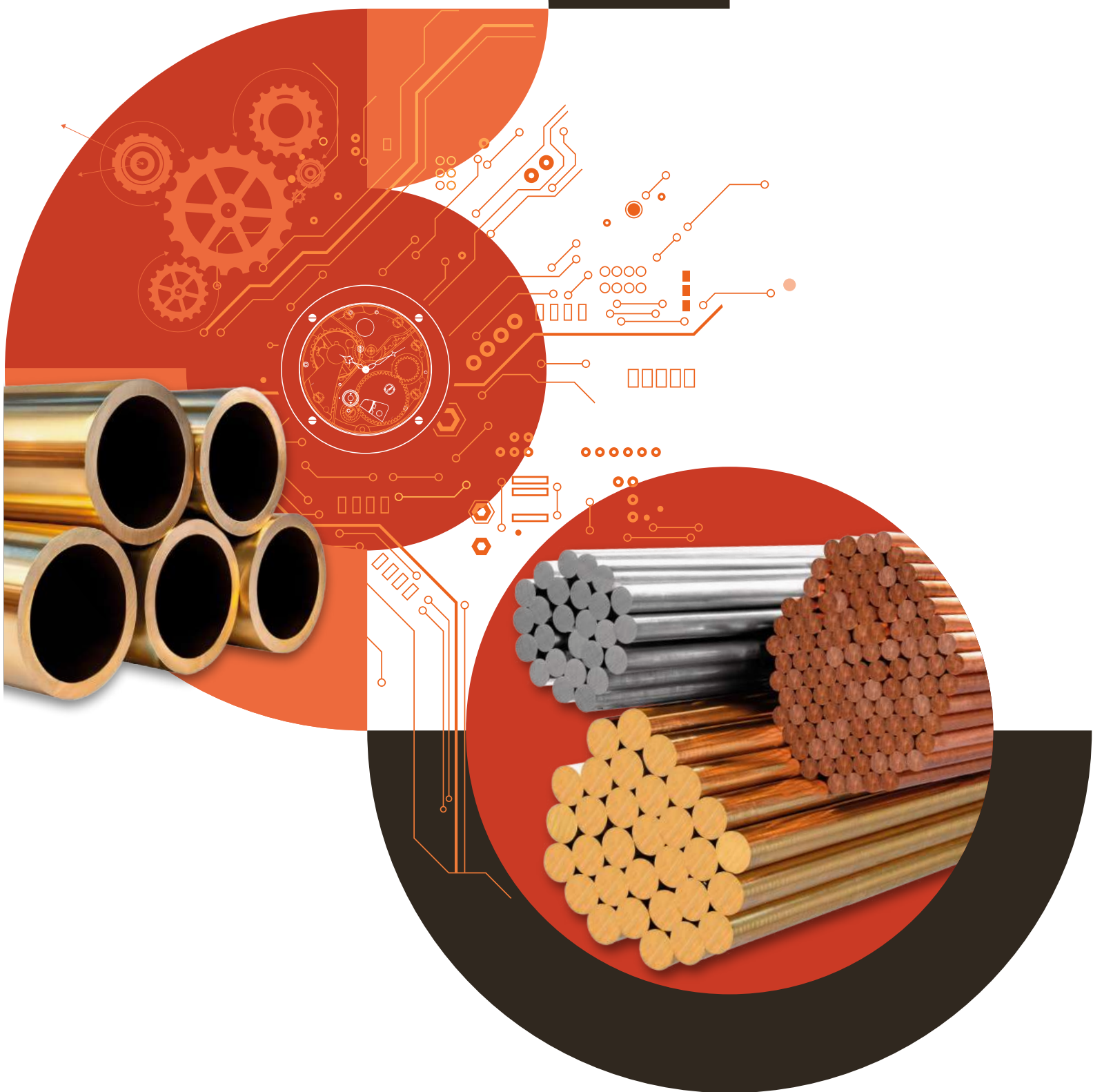


PRODUCT
CATALOG
Bars &
Hollows Bars

24

Uba
lebronze alloys



About Lebronze alloys

Lebronze alloys is a world leader in the **development** and **fully integrated production** of **high-performance copper and nickel alloys**.

Thanks to a multidisciplinary know-how, the Group provides **innovative solutions to all major industries** such as Aeronautics, Electronics, Space, Automotive, Energy, among others.

Our 6 production facilities and 730 employees manage a **unique range of metal processing technologies**: continuous and semi-continuous casting, extrusion, hot and cold rolling, drawing, open-die forging, hot stamping, closed-die forging, cold forming, machining, non-destructive testing, etc.

The Group's commitment is to find appropriate and **optimized solutions for every sector's requirements while optimizing the environmental impact of our products**.

High performance copper and nickel alloys

Fully integrated production process

Optimized environmental impact of our products

KEY FIGURES

- 6 production sites
- 4 service centers
- 730 employees
- 200 + alloys produced
- 239 M€ turnover

History of the Group

2006

The DUMONT family, some private investors as well as some key managers, take over "Le Bronze Industriel", a company founded in France in 1934 specializing in copper alloys production. This change of ownerships, with Michel DUMONT as active Chairman, marked a new period of strategic growth for the company.

2012-2016

Period of massive external growth for the company. Several major acquisitions are made such as Inoforges, Swissmetal Lüdenscheid and CLAL. These acquisitions consolidated our metallurgical expertise through a sharing of experience.

2016

Le Bronze Industriel officially becomes Lebronze alloys. It has been 10 years since the buyout and the Group has now tripled its sales.

2020

Opening of our first service center in Europe at Aldridge (UK). This service center joins an already well-established network of distributor partners around the globe and enables us to provide a greater responsiveness to our customers' needs.

2022

Marks the end of a 2-years industrial repositioning allowing the Group to focus on high added value materials.

2023-2024

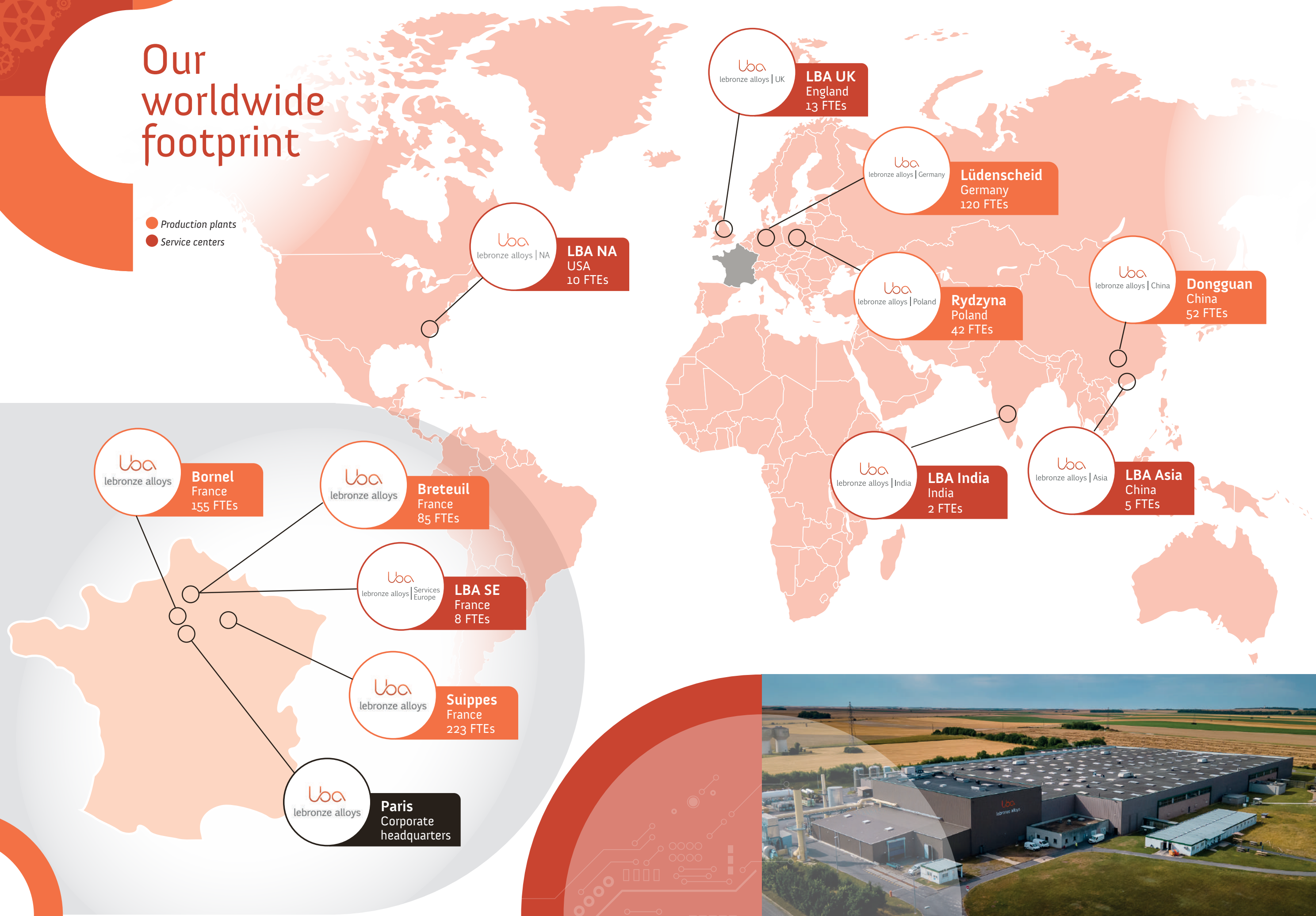
The Group counts over 730 employees, 6 production sites and 4 service centers around the world and generates 239 M€ of sales.

Over the last two years, the Group has strengthened its distribution network by opening **two new service centers**: Lebronze alloys SE (Services Europe) in Breteuil, France, and Lebronze alloys NA in Bristol, USA.



Our worldwide footprint

- Production plants
- Service centers



Product range at a glance

Lebronze alloys offers **more than 200 copper-based and nickel-based alloys** with unique properties which meet the most complex requirements. We supply these alloys in different forms:



Billets



Bars



Hollow bars



Strips



Sheets



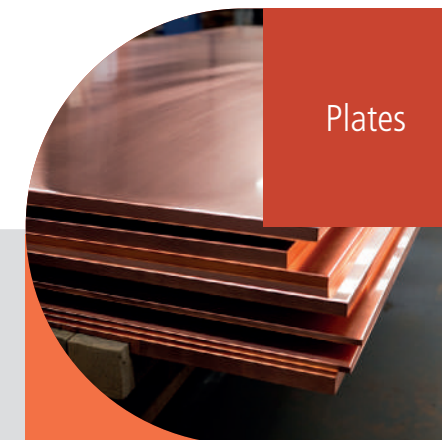
Rods



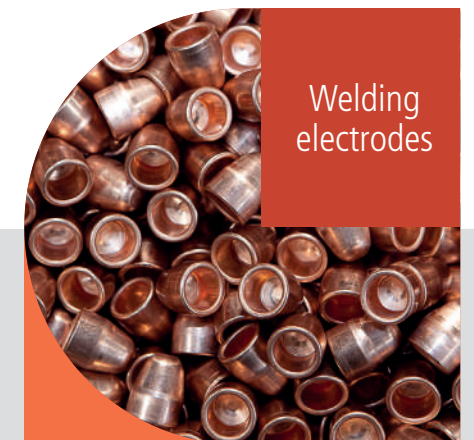
Wires



Standard & complex profiles



Plates



Welding electrodes



Marine tubes & fitting



Machined blanks and parts

A fully integrated production process

One of the Group's major strengths relies in its **fully integrated production process**, from smelting to machining and recycling.

This particularity guarantees a traceability, optimization and strict control of the final properties of our materials so they can suit to the most stringent requirements.

Melting & Casting

- Continuous wire casting
- Continuous bar casting
- Semi-continuous casting

Hot forming

- Extrusion
- Hot rolling
- Free forging
- Hot stamping

Cold forming

- Cold rolling
- Drawing straightening
- Cold stamping
- Heat treatments

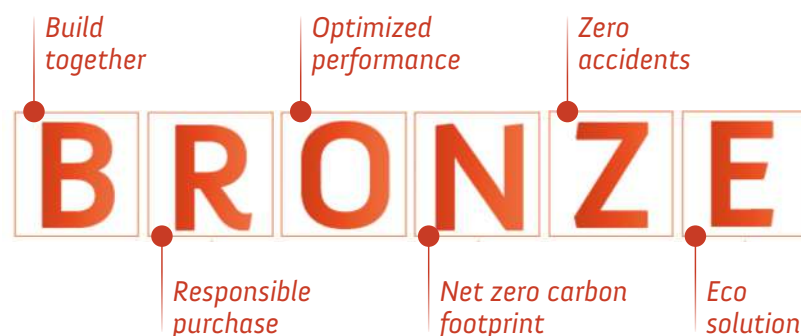
Finishing

- Machining
- Servicing
- Scrap recovery

Our sustainable development policy

To ensure the sustainability of our business, it is essential to strike the **right balance between economic performance, social impact and environmental impact.**

This balance within the Group is structured around our **6 "Bronze" pillars.** Each pillar is broken down into actions and indicators that enable us to be part of a dynamic of continuous progress and sustainability.



Build together: this pillar covers social initiatives that have a positive impact on gender, sex and age equality, as well as projects that improve the well-being of our teams at work.

Responsible purchase: purchases represent more than 50% of Group sales. It is therefore essential that we implement a responsible purchasing policy and tighten up our requirements of our suppliers.

Optimized performance: the Company's economic, industrial and environmental performance is a key factor in meeting the expectations of our relevant stakeholders.

Net zero carbon footprint: taking into account the major challenge of decarbonation, we have decided to make this a specific pillar and to build a path that meets the transformation of the Climate Act and the Paris Agreement.

Zero accidents: our processes require constant vigilance. We are taking actions to anticipate and reduce the risk of accidents as far as possible.

Eco solution: by working in collaboration with our customers and bringing innovations to the market, we are contributing to a more sustainable approach by improving the life cycle of products.

Quality

Lebronze alloys develops for all its activities a formally recognized quality management system which allows to:

- guarantee the traceability of our products, from raw material to the product delivered
- certify our products properties
- control our delivery times

Our state-of-the-art quality-check equipment include:

- **Metallurgical tests** such as traction, resilience, hardness, bending and others
- **Non destructive tests** such as Magnetic Particle Inspection (MPI), ultrasonic contact testing, liquid penetrant Inspection and others
- **Metrology, geometry and surface tests** such as surface metrology, global DEA, profile projectors and others



Our certifications

All our certificates can be consulted on our website

Aerospace certifications



Certified site: Suippes



Heat treating



Certified service center:
Lebronze alloys UK

General certifications



Certified sites: Bornel, Breteuil, Lüdenscheid, Suippes, Rydzyna.



Certified sites: Breteuil, Suippes, Rydzyna.



Certified sites: Bornel



Certified sites: Lüdenscheid, Breteuil and Suippes.

CuNiAl alloys

Copper Nickel Bronze alloys

Excellent corrosion resistance
and high strength

Our Group offers a range of **copper nickel bronze alloys** composed of copper nickel and aluminum. These alloys are characterized by **high mechanical properties, excellent wear, corrosion and erosion resistance**. Main applications are in Aerospace, Oil & Gas and Marine and Defence as **bushings, bearings, control elements, fasteners** and many more.

Our range of copper nickel bronze alloys makes us one of the **major actors on this market** and allows us to meet the **challenging requirements of a large portfolio of customers**.

PRODUCT PORTFOLIO

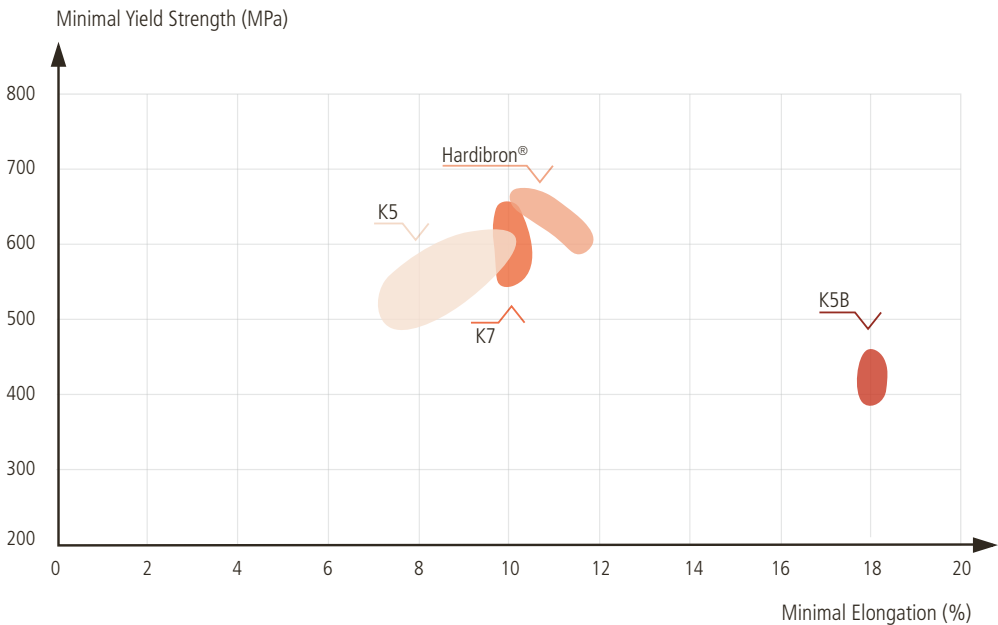
Alloy	ISO	UNS	Other designations	Aerospace specifications
K5	CuNi14Al2 CuNi14Al3	NA	NA	NFL 14-702
K5B	CuNi14Mn4Al2	NA	NA	NA
K7	CuNi14Al3Fe1	NA	2.1504	WL 2.1504 LN 9468
Hardibron®	CuNi14Al3Fe1	NA	2.1504	WL 2.1504 DTD 900/4805

STANDARD CAPABILITY*

Round Bars	Other Bars**	Hollow bars	Plates
ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS

*Other shapes on request
**Depending on alloy, square / flat / rectangular / hexagonal bars

KEY MECHANICAL PROPERTIES



ESG Performance

We aim to offer our Customers products with the leading grade of environmental footprint. To achieve this, we make major investments in innovative processes aiming to optimize energy and water consumption and increasing the use of recycled raw materials. More specifically, we have developed state-of-the-art recycling know-how based on specialized purchasers for sourcing end of life materials to be processed in our Group Upcycling Workshop. Another key aspect of our ESG strategy is to offer substitutes for alloys that are not REACH and RoHS compliant.

- Our CuNiAl alloys are:
- REACH and RoHS compliant
 - On average produced with 93 % of recycled materials



Markets and applications

Aerospace



- Bearings and bushings
- Actuating sleeves
- Control surface components

Oil & Gas



- Marine topsides floating production systems
- Subsea seabed wellhead

Marine & Defence



- Control elements of submarines
- Fasteners for ships and submarines
- Mechanical seals



Bars and Hollow Bars | CuNiAl alloys | K5

K5

$\text{CuNi}_{14}\text{Al}_2$
 $\text{CuNi}_{14}\text{Al}_3$

Cu

copper

Ni

nickel

Al

aluminum

K5 is a copper-nickel-bronze ($\text{CuNi}_{14}\text{Al}_2/\text{CuNi}_{14}\text{Al}_3$) alloy which exhibits very high mechanical properties. This amagnetic alloy, used for Aerospace, Marine, and Defence applications, offers very good resistance to impact, fatigue and corrosion.



MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi14Al2 CuNi14Al3	NA	NA	NFL 14-702	GAM MM11 GAM MM13

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Al	Mn
Balance	14%	2 - 3%	0.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.29 lb/in³
Thermal conductivity	30 W/m.°C	17 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10 ⁻⁶ /°C	9.44 µin/in °F
Young’s modulus	120 GPa	17 405 ksi
Relative magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	19 µΩ.cm	114.29 Ω. circ mil/ft
Electrical conductivity	9 %IACS	

TYPICAL APPLICATIONS

Aerospace industry
Bearings
Marine and Defence industries
Control elements of submarines

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping
Machinability index: 10% of free-cutting brass

KEY FEATURES

Very high mechanical properties
Very good resistance to sea-water corrosion and to oxidation
Good impact and fatigue resistance
No sparks on impact
Strictly non-magnetic

MECHANICAL PROPERTIES

Size	Processes	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
127 ≤ Section ≤ 2 000 mm² (0.2 ≤ Section ≤ 3.10 in.²)	Extruded or forged	≥ 590 (≥ 86)	≥ 780 (≥ 113)	≥ 10	≥ 215
2 000 < Section ≤ 11 000 mm² (3.10 < Section ≤ 17 in.²)	Extruded or forged	≥ 540 (≥ 78)	≥ 740 (≥ 107)	≥ 7	≥ 205
11 000 < Section ≤ 49 000 mm² (17 < Section ≤ 76 in.²)	Extruded or forged	≥ 500 (≥ 72)	≥ 720 (≥ 104)	≥ 7	≥ 200

OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts



K5B

CuNi₁₄Mn₄Al₂

29 63.546 Cu copper	28 58.6934 Ni nickel	25 54.938 Mn manganese	13 26.981 Al aluminum
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K5B is a copper-nickel-bronze (CuNi₁₄Mn₄Al₂) alloy designed for high strength applications in seawater environment. This alloys exhibits outstanding resistance to marine corrosion and erosion. It also has good anti-fouling properties and an excellent wear and galling resistance.

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi14Mn4Al2	NA	NA	NA	NES 835 DEFSTAN 02-835

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Mn	Al	Fe
Balance	14%	4.5%	1.8%	1%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.6 g/cm³	0.29 lb/in³
Thermal conductivity	25 W/m.°C	14 BTU/(h.ft. °F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10 ⁻⁶ /°C	8.89 μin/in °F
Young’s modulus	145 GPa	21 030 ksi
Relative magnetic permeability	< 1.01	
Impact strength ISOD	≥ 40 J	
Electrical properties		
Resistivity at 20 °C (68 °F)	30 μΩ.cm	180.46 Ω. circ mil/ft
Electrical conductivity	5 %IACS	

TYPICAL APPLICATIONS

Marine and Defence industries

Fasteners & controllers for submarines, pumps, shafts, mechanical seals, winch components, gears & shafts, and weapons handling equipment

Oil and Gas industry

Subsea bolting, shafts for pumps valves, valve spindles, hydraulic pistons and cylinders, hydraulic connectors, pressure couplings

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping
Machinability index: 20% of free-cutting brass

KEY FEATURES

High strength and toughness
Outstanding resistance to marine corrosion and erosion
Excellent wear resistance
Good anti-fouling properties
Excellent galling resistance especially with stainless steels
Good thermal properties
No Hydrogen embrittlement
Low magnetic permeability
Galvanic compatibility with other copper alloys and stainless steel
High performance at both elevated and sub-zero temperatures -125 °C (-193 °F) up to 300 °C (572 °F)
Dimensional stability



MECHANICAL PROPERTIES

Size	Processes	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
69.85 ≤ Ø ≤ 125 mm (2.75 ≤ Ø ≤ 4.92 in.)	Forged	≥ 430 (≥ 62)	≥ 725 (≥ 105)	≥ 18	≥ 190
125 < Ø ≤ 139.7 mm (4.92 < Ø ≤ 5.5 in.)	Forged	≥ 400 (≥ 58)	≥ 710 (≥ 103)	≥ 18	≥ 190

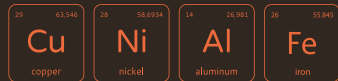
OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts



K7

CuNi₁₄Al₃Fe₁



K7 is a copper-nickel-bronze (CuNi₁₄Al₃Fe₁) alloy designed for high strength applications in Aerospace. This alloy exhibits high mechanical properties and an outstanding resistance to metal-to-metal wear and galling. This alloy can perform at both elevated and sub-zero temperatures.



MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi14Al3Fe1	NA	2.1504	WL 2.1504 LN 9468	NA

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Al	Fe	Mn
Balance	14%	3%	1%	0.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.5 g/cm³	0.29 lb/in³
Thermal conductivity	71 W/m.°C	41 BTU/(h.ft. °F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10 ⁻⁶ /°C	8.89 µin/in °F
Young's modulus	145 GPa	21 030 ksi
Relative magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	16 µΩ.cm	96.24 Ω. circ mil/ft
Electrical conductivity	10 %IACS	

TYPICAL APPLICATIONS

Aerospace industry

Landing gear bushings and bearings
Cargo system bushings
Actuating sleeves
Control surface components
Flap systems

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping
Machinability index: 10% of free-cutting brass

KEY FEATURES

High mechanical properties
High ductility
Outstanding resistance to corrosion & erosion
Excellent wear and galling resistance
Good thermal properties
Good impact resistance
No sparks on impact
Non-magnetic
Stable performance at both elevated and sub-zero temperatures -125 °C (-193 °F) up to 300 °C (572 °F)
Dimensional stability

MECHANICAL PROPERTIES

Size	Processes	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
12.7 < Ø ≤ 50 mm (0.5 < Ø ≤ 2 in.)	Extruded	≥ 640 (≥ 93)	≥ 780 (≥ 113)	≥ 10	≥ 230
50 < Ø ≤ 127 mm (2 < Ø ≤ 5 in.)	Extruded or forged	≥ 590 (≥ 86)	≥ 780 (≥ 113)	≥ 10	≥ 225
127 < Ø ≤ 250 mm (2 < Ø ≤ 9.84 in.)	Extruded or forged	≥ 550 (≥ 79)	≥ 760 (≥ 110)	≥ 10	≥ 225

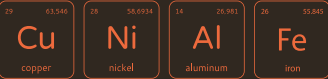
OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts



Hardibron®

CuNi₁₄Al₃Fe₁



Hardibron® is a copper-nickel-bronze (CuNi₁₄Al₃Fe₁) alloy designed for high strength applications in seawater environment. This amagnetic alloy combines outstanding mechanical properties, high ductility and high resistance to wear, galling, marine corrosion and erosion. It does not produce sparks on impact.



MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi14Al3Fe1	NA	2.1504	WL 2.1504 DTD 900/4805	NA

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Al	Fe	Mn
Balance	14%	3%	1%	0.5%

TYPICAL APPLICATIONS

Oil and Gas industry

Marine Topsides Floating Production Systems: marine shafts, bearing bushes, offshore bolting, valves, pumps.
Subsea Wellhead: hydraulic and electrical connections ROV and AUV to Wellhead fap connectors, ROV tools, valves.

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.5 g/cm³	0.29 lb/in³
Thermal conductivity	71 W/m.°C	41 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10 ⁻⁶ /°C	8.89 µin/in °F
Young’s modulus	145 GPa	21 030 ksi
Relative magnetic permeability	< 1.01	
Impact strength IZOD	≥ 14 J	
Electrical properties		
Resistivity at 20 °C (68 °F)	16 µΩ.cm	96.24 Ω. circ mil/ft
Electrical conductivity	10 %IACS	

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping
Machinability index: 10% of free-cutting brass

KEY FEATURES

Very high mechanical properties
High ductility
Outstanding resistance to marine corrosion and erosion
Excellent wear and galling resistance
Good thermal properties
Good impact and fatigue resistance
No sparks on impact
Strictly non-magnetic
Stable performance at both elevated and sub-zero temperatures -125 °C (-193 °F) up to 300 °C (572 °F)
Dimensional stability

MECHANICAL PROPERTIES

Size	Processes	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
12.7 < Ø ≤ 70 mm (0.5 < Ø ≤ 2.76 in.)	Extruded or forged	≥ 640 (≥ 93)	≥ 850 (≥ 123)	≥ 10	≥ 240
70 < Ø < 127 mm (2.76 < Ø < 5 in.)	Extruded or forged	≥ 590 (≥ 86)	780 (≥ 113)	≥ 12	≥ 240

OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts



lebronze alloys

Métallurgie d'exception

www.lebronze-alloys.com