



# Forging Industry Solutions

Higher fatigue  
strength & longer  
lifespan for parts

For Welding **Professionals**



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For more than 50 years, Welding Alloys has partnered with customers to provide innovative products and service solutions to solve wear problems.

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## Our company

Welding Alloys is a leading manufacturer specialising in cored welding wires and electrodes designed for a wide range of applications, such as hardfacing, joining, maintenance and repair. The company also offers a range of automated welding machines for improved welding productivity, consistency and quality. Complementary to our welding consumables and machines, we provide engineered wear services, in our workshops or on-site, and fabricate a range of wear plates, pipes, and components.

Since its establishment in 1966, Welding Alloys has set the standard for excellence in research and development (R&D), consistently developing innovative products and advanced technical solutions through uncompromising commitment to quality and the latest technology.

Welding Alloys is an active participant in the United Nations Global Compact, aligning with principles related to the environment, labour, human rights, and anti-corruption. In line with this commitment, the company has developed welding wires that emit fewer harmful fumes and employs manufacturing processes that produce less harmful waste for the environment.

The company's service solutions also play a role in decreasing energy consumption and carbon dioxide emissions by extending the life of new and existing parts through repair and maintenance. Ongoing efforts are focused on improving products and processes to minimise the negative impact on both the welder and the environment. Welding Alloys stands out not only for its technical expertise but also for its dedication to environmental responsibility and sustainability in its operations and product development.

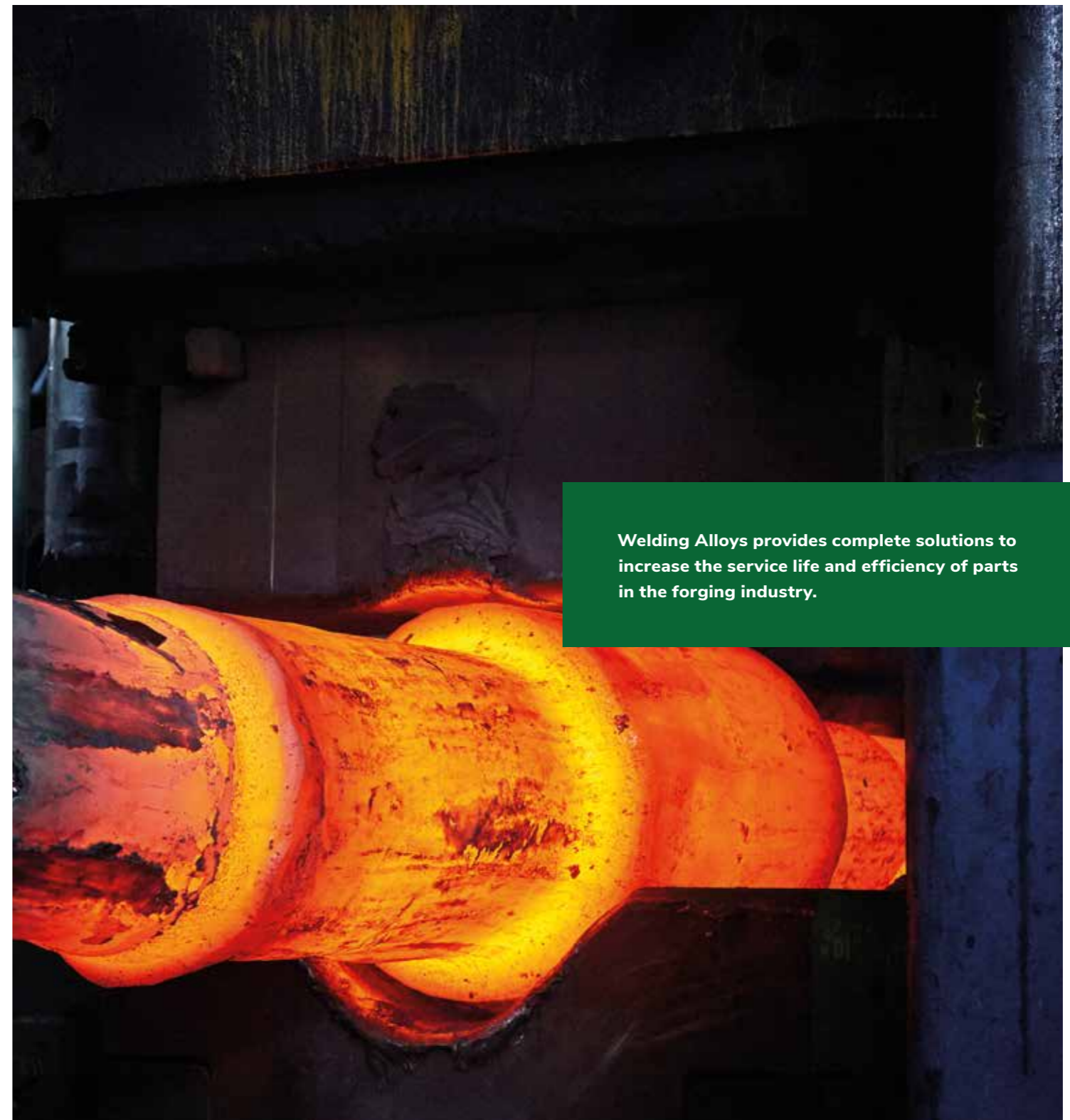
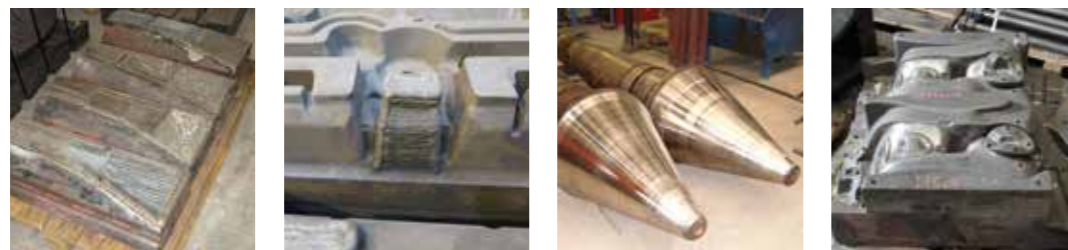
# Welding Alloys and forging: our integrated offer

As every forging process is unique, understanding its parameters, outputs, and constraints is vital for proposing the most suitable solutions. Welding Alloys works closely with customers to establish their specific requirements and provide bespoke solutions.

Our commitment lies in providing innovative products and services to enhance part performance and reduce the total cost of ownership. This dedication is reflected in our comprehensive product and service portfolio.

Our advanced welding consumables are produced using our own manufacturing equipment across global sites, dedicated to increase the wear resistance of parts used in forging. Our range includes tool steels, nickel based alloys and cobalt based alloys. We also design and produce automated welding equipment, to improve maintenance efficiency and minimise downtime.

Complementary to welding consumables and machines, we have fully operational Integra™ service teams strategically placed worldwide, offering wear protection services and solutions. These teams use Welding Alloys' own welding consumables and automated welding equipment, ensuring a seamless and customised approach to addressing wear-related challenges in the forging industry.



Welding Alloys provides complete solutions to increase the service life and efficiency of parts in the forging industry.


# Welding consumables

Our advanced cored wires are formulated with specific alloy compositions to address the particular wear problems encountered by our customers. Mechanical fatigue, thermal fatigue, temperature, abrasion, corrosion, and wear from impact can cause serious issues in forging operations. Engineered for harsh working environments, our cored wires provide the required hardness, toughness, and wear resistance. This makes them ideal for repairing components that must maintain their properties even under significant stress.

The range includes tool steels, which provide temperature resistance, toughness, and machinability. We also manufacture a range of nickel based alloys offering high temperature strength, corrosion resistance, creep resistance, and compatibility with hot environments. Finally, to complete the range, we offer cobalt based alloys for increased high temperature strength, corrosion resistance and toughness.

Welding Alloys supports the forging industry to effectively repair and maintain tools, ensuring continued productivity and efficiency in operations. Our range is optimised for the rebuilding and repair of critical components such as dies and hammers used in both closed and open forging processes.

Minimising wear plays a crucial role in lowering overall production costs, and Welding Alloys is the right partner to provide a solution that tackles this challenge.

 The wires presented in this catalogue represent the products that can be used with standard welding processes, such as gas shielded, self shielded and submerged arc welding. We have also developed a specific wire range dedicated to the laser-wire welding process. For more information about these wires, please contact us.

A complete range of cored wires to improve resistance to wear from thermal and/or mechanical fatigue, temperature, abrasion, impact and corrosion.



## Tool steels

Product	Welding process	Standard diameters [mm]	AISI nearest correspondance	EN 14700 standard	Description and applications	Composition [%] - Fe balance										Hardness as welded	
						C	Mn	Si	Cr	Ni	Mo	V	W	Co	Ti		
ROBOFIL M 700	-G	1.2 - 1.6		-	High-strength alloy deposit with good toughness. Used for joining and repair of high strength or low and medium alloyed steels. <b>Applications:</b> Build-up prior to hardfacing.	0.06	1.5	0.5	0.5	2.5	0.5						22 - 26 HRC
HARDFACE 40	-G	1.2 - 2.4		T Z Fe3	Medium alloyed bainitic steel deposit. Suited for the repair and rebuilding of forging dies. Offers a crack-resistant deposit with excellent resistance to low abrasion and moderate impact. <b>Applications:</b> Rebuilding die and sow blocks, rams, die holders.	0.1	0.9	0.6	2	3	1						37 - 42 HRC
HARDFACE 45	-G	1.2 - 2.4	P20	T Fe2	Bainitic alloyed steel offering a crack-resistant deposit with a similar chemical analysis and matching colour to AISI P20 tool steel. HARDFACE 45 is fully compatible when polishing or etching is required. Can easily be used on lower-grade base metal to provide better wear performance. <b>Applications:</b> Casting dies, plastic injection moulds.	0.4	1.5	0.7	2.5		0.5						43 - 47 HRC
HARDFACE 45W	-G	1.2 - 2.4		T Fe3	HARDFACE 50W is a martensitic alloyed steel compatible with AISI H11, H12, and overalloying the H13 tool steels, guaranteeing high performance. The high content of tungsten, vanadium, molybdenum, and chromium makes this wire highly resistant to temperature and thermal fatigue when subjected to heating and cooling cycles. Withstands high temperatures without softening for consistent wear resistance. HARDFACE 45W is the low carbon equivalent product with low cracking sensitivity, making it suitable for rebuilding and/or buffering on very large components. <b>Applications:</b> Shallow impressions, hot and cold trim dies, shearing dies, extrusion dies, plastic injection moulds, punches.	0.25	2	0.8	6.5		1.5		1.6				42 - 46 HRC
HARDFACE 50W	-G	1.2 - 2.4	H11 H12 H13	T Fe3	HARDFACE 55WCO is fully compatible with AISI H19 hot work tool steel. This weld metal provides excellent hot hardness combined with abrasion resistance. <b>Applications:</b> Shallow press dies, hot punches, trim dies.	0.3	0.8	0.8	6.8		2	0.6	2				50 - 53 HRC
HARDFACE 55WCO	-G	1.2 - 2.4	H19	T Z Fe3	Special martensitic alloyed steel deposit offering similar performance to cobalt based alloys. The Fe-Cr-Co-Mo welding deposit is especially suited to resist metal-to-metal wear, oxidation, and corrosion at temperatures up to 600 °C. Economic alternative to cobalt based alloys. <b>Applications:</b> Hot stamping punches, press dies, casting rollers.	0.4	0.35	0.3	4.5		0.5	2	4.3	4.3			55 - 60 HRC
HARDFACE DCO	-O -G -S	1.6 - 2.4 1.2 - 2.4 2.4 - 3.2		T Z Fe3	Martensitic alloyed steel deposit. High strength and good toughness. Outstanding resistance to hot oxidation thanks to the high chromium level. Preferred solution for the lower half of impressions (buffer layer). <b>Applications:</b> Connecting rods, crankshafts and yokes.	0.15	0.5	0.8	13.5	0.6	3			13			45 - 52 HRC
HARDFACE 50Cr	-G	1.2 - 2.4		T Z Fe8	Martensitic alloyed steel deposit. High strength and outstanding resistance to hot oxidation due to its high chromium content. Additionally, the inclusion of vanadium and tungsten enhances its resistance to heat checking. The welding deposit is advantageous for intricate impressions where toughness is required. <b>Applications:</b> Shallow hammer dies, press dies.	0.2	0.6	0.6	10	1.5	2.7				0.1		48 - 52 HRC
HARDFACE 55Cr	-G	1.2 - 2.4		T Fe3	Martensitic alloyed steel deposit giving a near-matching AISI M2 high-speed tool steel, maintaining high hardness even at high temperatures. The welding deposit remains hard, giving excellent properties on cutting edges, draw beads, and radii. <b>Applications:</b> Draw dies, shear blades, stamping dies.	0.35	0.5	0.4	8	2	2.3	0.3	0.3				50 - 55 HRC
HARDFACE 60Mo	-G	1.2 - 2.4	M2	T Fe4		1.1	0.5	0.5	5		7.4	1.1	2.3				57 - 63 HRC

Gas shielded (-G) Open arc / self shielded (-O) Submerged arc (-S)

## Nickel Based Alloys

Product	Welding process	Standard diameters [mm]	EN 14700 standard	Description and applications	Composition [%] - Ni balance									Hardness as welded	Hardness work hardened
					C	Mn	Si	Cr	Fe	Mo	W	Co	Others		
STELLOY C	-O	2.4 - 2.8	T Ni2	<p>Nickel based alloy cored wire with a chemical analysis matching the C276 parent alloy (Ni-15%Cr-16%Mo-4%W). Resists oxidation, corrosion to a wide range of media and mechanical or fatigue stresses at high temperatures up to 1100 °C. High tolerance to dilution makes this flux cored wire suitable for buffering before hardfacing with STELLOY NI520 or STELLOY NI519Co2</p> <p><b>Applications:</b> Ring rolling cones, extrusion equipment, impression dies, hot shearing blades.</p>	0.02	0.6	0.8	16	4	16	5			200 HB	350 HB
	-G	1.6 - 2.4													
	-S	2.4 - 3.2													
STELLOY CCo	-O	2.4 - 2.8	T Ni2	<p>Nickel based alloy (NiCrMo) with addition of cobalt. Resists oxidation, corrosion to a wide range of media and mechanical stresses at high temperatures up to 1100 °C. Cobalt gives the deposit improved resistance to high temperature, thermal fatigue and high temperature corrosion.</p> <p><b>Applications:</b> Tube extension dies, mill guides, hot extrusion dies, hot working tools, ring rolling cones, impression dies, hot shearing blades.</p>	0.02	1.2	0.6	15.5	2	16	4.4	2.3		220 HB	350 HB
	-G	1.6 - 2.4													
STELLOY NI520	-G	1.6 - 2.4	T Ni4	<p>Nickel based superalloys offering extremely high temperature resistance combined with good mechanical properties, thermal shock and corrosion resistance. Titanium and aluminium elements form intermetallic precipitates at the grain boundaries which strengthen the welding deposit. Recommended with a buffer layer of STELLOY C or STELLOY CCo.</p> <p><b>Applications:</b> High speed forging tools, tube extrusion mandrels, forging hammers, rotary dies and flat dies.</p>	0.06	0.1	0.2	13	1.5	6	1	11.5	Ti: 3 Al: 2	250 HB	38 - 42 HRC
STELLOY NI519Co2	-G	2.4	T Ni4	<p>Nickel based superalloys offering extremely high temperature resistance combined with good mechanical properties, thermal shock and corrosion resistance. Titanium and aluminium elements form intermetallic precipitates at the grain boundaries, which strengthen the welding deposit. Recommended with buffer layer of STELLOY C or STELLOY CCo.</p> <p><b>Applications:</b> High speed forging tools, forging hammers.</p>	0.03	0.1	0.1	20	0.4	6.1	1	12	Ti: 3 Al: 2	250 HB	32 - 40 HRC

Gas shielded (-G) Open arc / self shielded (-O) Submerged arc (-S)

## Cobalt Based Alloys

Product	Welding process	Standard diameters [mm]	AWS A5.21	Description and applications	Composition [%] - Co balance							Hardness as welded	Hardness work hardened
					C	Mn	Si	Cr	W	Fe	Others		
STELLOY 25	-G	1.2 - 2.4	-	Low carbon cobalt base with low cracking tendency. Highly resistant to high temperature wear and metal-to-metal abrasion. Maintains a good level of hardness at high temperatures. <b>Applications:</b> Straightening guides, vertical mill rolls and foot rolls in continuous casting, press dies, punching and shearing dies, extrusion dies and dummy blocks.	0.15	1.5	1	20	14	4	Ni: 9.5	210 HB	38 - 40 HRC
STELLOY 21	-G	1.2 - 2.4	ERCCoCr-E	Low carbon cobalt base with low cracking tendency. Ideal choice for resistance to multiple combinations of stress such as corrosion and cavitation. Maintains a good level of hardness at high temperatures. Can be work hardened and polished, low coefficient of friction. <b>Applications:</b> Industrial valve work, forging dies, hot trim and shearing dies, punches.	0.35	1	1	28		3	Ni: 3.2 Mo: 5.5	33 HRC	45 - 48 HRC
STELLOY 6	-G	1.2 - 2.4	ERCCoCr-A	Combines all the outstanding properties of cobalt based alloys, including abrasion and erosion resistance. Medium hardness deposit with good machinability. Tailored compositions are also possible by adjusting the carbon content. A lower carbon content, and therefore lower cracking tendency, facilitates machining. A higher carbon content allows the required hardness to be obtained on low alloy steels from the first layer. <b>Applications:</b> Hot trim and shearing dies, punches.	1.1	1	1.2	29	5	3.5		40 - 44 HRC	
STELLOY 12	-G	1.2 - 2.4	ERCCoCr-B	Good resistance to mineral abrasion due to its high hardness. Particularly suited to the production of cutting tools. <b>Applications:</b> Cutting tools, hot trim and shearing dies, punches.	1.5	1	1	30	7.5	3.5		44 - 48 HRC	
STELLOY 1	-G	1.2 - 2.4	ERCCoCr-C	Highest hardness of the cobalt based alloy range, offering excellent resistance to abrasion and corrosion. Self polishing, promotes scratch free sliding of abrasive materials. Not suitable for impact resistance. <b>Applications:</b> Hot trim and shearing dies, punches.	2.4	1	1.2	28.5	12.5	3.5		52 - 55 HRC	

Gas shielded (-G) Open arc / self shielded (-O)



# Welding machines

Automating the welding process improves efficiencies by offering consistent and high-quality repairs, whilst minimising downtime. Customers can benefit from a comprehensive range of advanced welding equipment from Welding Alloys, designed for hardfacing, cladding, rebuilding, and joining of components.

Our machines incorporate state-of-the-art technology, enabling precise, consistent, and repeatable welding with our advanced D3 Touch and D3 Pendant control systems. The range includes heavy-duty fixed installation machines, portable machines, and custom machines tailored to specific applications.

For precision overlay welding on forging dies, our H-Frame welding machine is the perfect solution. Available in both lightweight and heavy-duty models, it caters to any workshop size and adapts to various configurations, maximising your welding versatility.



**Achieve consistent and high-quality welded repairs, whilst minimising downtime with a Welding Alloys machine.**

# Engineered wear services



**We provide services in our workshops or in situ, to optimise the service life and performance of parts such as cones, rings, dies and hammers.**

Welding Alloys offers an industry-leading range of engineered wear services in our workshops or in situ. Our Integra™ service teams provide solutions for the wear challenges faced in the forging industry, to increase uptime and reduce total cost of ownership of key components.

Our technical experts can provide a wear audit that will analyse parts such as cones, rings, dies, hammers, rams, and punches. The audit will provide information on wear rates and the condition of the parts or components. From this we can provide solutions tailored to the specific needs, using optimised welding procedures, advanced consumables and state-of-the-art welding equipment to minimise maintenance downtime and reduce costs.

With over 50 years of experience and more than 80,000 projects completed, Welding Alloys will propose the most viable and cost-effective solutions. Our projects are delivered to international quality and safety standards.

Through our ongoing commitment to research and development, an experienced global workforce, and the adoption of new technologies, customers are assured of top-quality engineered wear services anywhere in the world.

# Quality & innovation



Innovation is at the core of everything we do, we never stop learning.

Innovation is an integral part of Welding Alloys' approach to industrial solutions, and we have consistently invested in this area since our inception in 1966.

Our continuous development approach has aided the identification of new opportunities in the forging industry, and enabled us to develop tailored products and services for this sector, always with customer satisfaction as our focus.

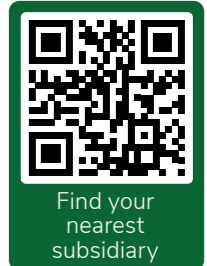
Our simple philosophy allows us to continue to deliver best-in-class products and services to customers operating in the forging industry across the globe. Our unique culture of

continuous innovation forms the backbone of the company and our teams of engineers are constantly interacting to share knowledge, information and ideas. Collaboration across on-site operations and the consideration of customer requirements to improve existing products and develop new ones, are always based on sound scientific principles and engineering solutions.

Over the years, Welding Alloys has built, and continues to grow, a global network of universities and research organisations. This allows us to remain at the forefront of the latest market trends and state-of-the-art technological innovations.

# Our global footprint

Our specialists and industry experts are active in 150 countries across the world and have an in-depth understanding of the operating conditions and customer requirements across a wide range of sectors.



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