



# LUXFER CORPORATE BROCHURE





## Environmental

Many of Luxfer's specialist products are in tune with today's need to protect & improve the environment.



## Healthcare

The medical sector has long been an important market for Luxfer.



## Protection

Many of Luxfer's specialist products are used to protect people and equipment in emergency and conflict situations.



## Speciality

The environment, healthcare and protection sectors have emerged as important growth areas for the Group, alongside our traditional specialist markets and speciality technologies, such as the magnesium engraving plate shown here.

## About Luxfer

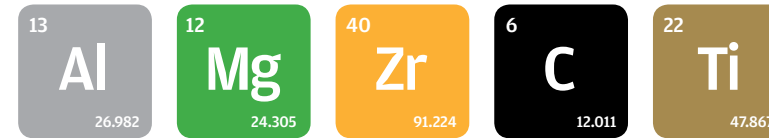
Luxfer is a global materials technology company specialising in the design, manufacture and supply of high-performance materials, components and gas cylinders to customers in a broad range of growing end-markets.

Our aim is to develop close collaborative relationships with our customers to find innovative solutions to their needs for advanced materials, components and gas containment.

Our focus is on demanding applications where our technical know-how and manufacturing expertise combine to deliver a superior product.

Our business development is focused on the growing markets for environmental, healthcare, protection and speciality technologies.

Learn more about Luxfer and download a copy of our Annual Report at [www.luxfer.com](http://www.luxfer.com)



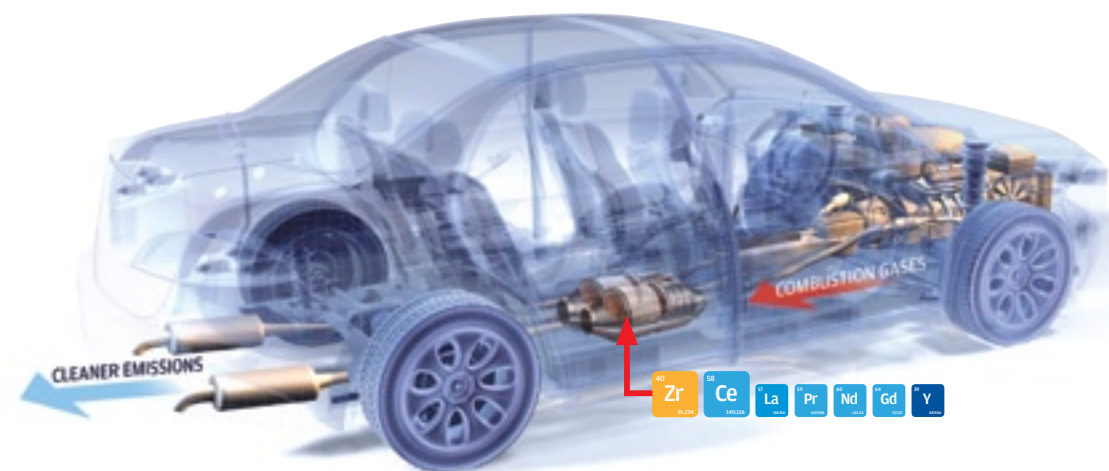
Our area of expertise covers the chemical and metallurgical properties of aluminium, magnesium, zirconium, carbon, titanium and rare earths, and we have pioneered the application of these materials in many high-technology industries. For example:

- We were the first to use rare earths to develop and patent a magnesium alloy (EZ33A) for use in high-temperature aerospace applications such as helicopter gearboxes.
- We were at the forefront of the commercial development of zirconia-rich mixed oxides for use in automotive catalysis.
- We were the first to manufacture a high-pressure gas cylinder out of a single piece of aluminium using cold impact extrusion.
- And we developed and patented the superforming process and the first superplastic aluminium alloy (AA2004) and were the first to offer superformed aluminium panel-work commercially.

We have a long history of innovation derived from our strong technical base, and we work closely with customers to apply innovative solutions to their most demanding product needs.



**Rare earths** - (also known as **rare earth elements** or **rare earth metals**) are a set of seventeen chemical elements in the periodic table, specifically the fifteen lanthanides plus scandium and yttrium.



Luxfer's G4 Zirconium products are widely used in automotive catalytic converters.



# Our Markets

## Environmental

The versatility of our core raw materials means that many of Luxfer's specialist products are very much in tune with today's need to protect and improve the environment. Care of the environment features strongly in current sales and applications and is an important consideration as we develop future business.

### Cleaning up the environment:

Luxfer's zirconium products are non-hazardous to the ecosphere and provide safe substitutes for more harmful traditional materials.

### Cleaning up exhaust emissions:

Luxfer has sold ceria-zirconia products into the automotive industry for many years for use in catalytic converters in petrol engines. New products are under development for both mobile and static diesel engines.

### Water purification:

Luxfer's Isolux® range of water purification products is an environmentally safe system for the removal of arsenic, lead and other heavy metals from drinking water.

### Industrial clean-up:

The MELSorbs® range of industrial wastewater treatments removes heavy metals for safe disposal from wastewater streams.

### Improving fuel efficiency:

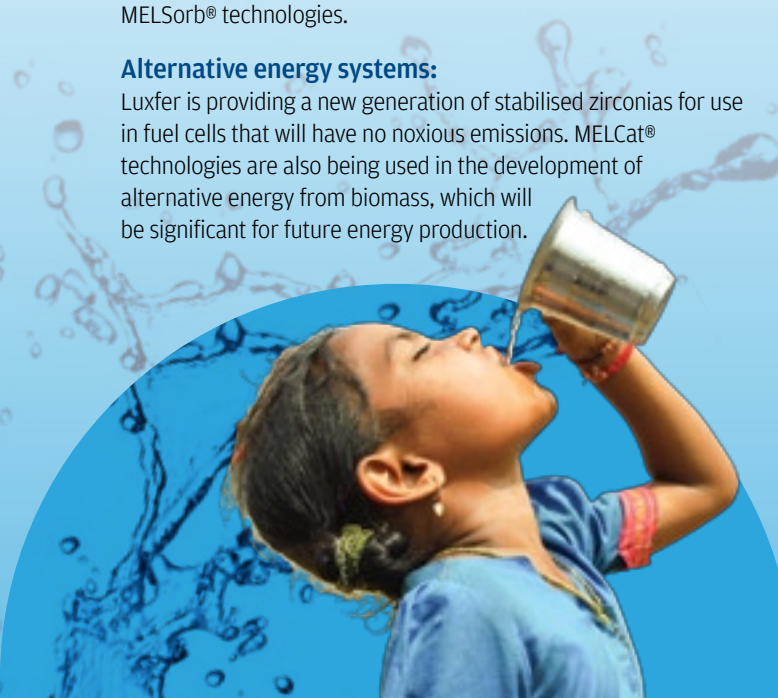
Luxfer's Elektron® lightweight magnesium alloys and lightweight Superform® aluminium, magnesium and titanium panels are widely used for aircraft, rail transport, trucks, buses and cars to lower weight and improve fuel efficiency. Luxfer's composite gas cylinders and associated fuel control systems are being used for alternative fuel vehicles.

### CO<sub>2</sub> capture:

Capturing CO<sub>2</sub> is a key developing application for Luxfer's MELSorbs® technologies.

### Alternative energy systems:

Luxfer is providing a new generation of stabilised zirconias for use in fuel cells that will have no noxious emissions. MELCat® technologies are also being used in the development of alternative energy from biomass, which will be significant for future energy production.



## Healthcare

The medical sector has long been an important market for Luxfer, and we are committed to developing new products to benefit patients.

### Containment of medical gases:

Luxfer offers the world's most comprehensive range of cylinders for medical gases. Our aluminium cylinders are 30% lighter in weight than comparable steel cylinders and are safe to use around MRI equipment because they are non-magnetic. Recent innovations include the lightweight IOS® (Intelligent Oxygen System) featuring Luxfer's patented L7X® higher-strength aluminium alloy and carbon composite cylinders integrated with Luxfer's patented SmartFlow® valve-regulator technology.

### Emergency medical services:

Luxfer offers a growing range of carbon composite cylinders that are up to 75% lighter in weight than steel cylinders. These are becoming increasingly popular in emergency medical services (EMS). Luxfer's L7X® lined composite cylinder is the world's lightest-weight, high-capacity medical cylinder and has already been adopted by BOC Medical for EMS use. These carbon fibre-wrapped cylinders use Luxfer's exclusive, patented L7X® higher-strength aluminium alloy.

### Medical treatment:

Luxfer's MELSorbs® technologies are being used in the development of portable dialysis equipment, "a wearable artificial kidney". Luxfer has developed Synermag® bio-absorbable magnesium and is working with partners to develop its use in vascular intervention, skeletal repair and tissue repair.

### Medical equipment:

Luxfer developed the magnesium alloy used in the world's first portable, wireless, digital, radiographic imaging device. Superform's non-magnetic, lightweight aluminium and magnesium panels are used on advanced medical equipment, including MRI and CAT Scan units.



## Protection

### Protection of emergency service personnel:

Our super-lightweight LCX-SL® breathing-air cylinder, incorporating our latest carbon composite technology, offers significant weight saving to emergency service personnel operating in dangerous environments where every ounce counts.

### Protection of military aircraft:

Luxfer's ultra-fine atomised magnesium powder is a principal ingredient in infrared counter-measure flares used to protect aircraft from heat-seeking missile attack. Luxfer is the largest producer of atomised magnesium powder in the world.

### Protection of military personnel:

Several of Luxfer's Elektron® rolled magnesium alloys qualify as military armour material. Good ballistic performance and low density provide high-level troop protection and fuel conservation while maintaining manoeuvrability critical to the success of armoured vehicles.

### Fire protection:

Luxfer has supplied one-piece aluminium cylinders for CO<sub>2</sub> fire extinguishers for decades.

### Escape equipment:

The latest Luxfer carbon-wrapped cylinder technology has been developed to provide rapid-exhaust lightweight cylinders for inflation of aircraft emergency escape slides.

Luxfer has also developed miniature cylinders for use in personal escape sets. These provide sufficient air to safely exit from a burning building, ship, train or other smoke-filled environment.



## Speciality

### Graphic arts:

Photo-engraving plate is used by printers and sign makers to produce high-quality finishes. Luxfer produces the industry standard in magnesium photo-engraving plates.

Lightweight, fast-etching and environmentally friendly, magnesium is used for a variety of high-quality applications.

Luxfer is the global leader in engraving metals and etching chemicals. With the increasing trend to high-quality, customised packaging for consumer goods, this market will remain an important growth sector for us.

### Speciality gas containment:

Luxfer has developed a range of cylinders for special applications, including:

- ▶ Speciality gas cylinders for rare gas and high-purity gas applications, including gases used in the manufacture of semiconductors and other electronic products.
- ▶ Welding, cutting and fabrication gas cylinders.
- ▶ Carbon dioxide cylinders for beverage dispensing.
- ▶ Carbon dioxide cylinders for aquarium applications.
- ▶ Cylinders used in refrigeration applications.
- ▶ Compressed-air cylinders used in paintball markers.
- ▶ Nitrous oxide cylinders used to boost engine performance in race cars and race boats.
- ▶ Sampling cylinders used in petroleum product production.
- ▶ Cylinders used for air enrichment in agricultural and hydroponic farming applications.





## Our business strategy is underpinned by the Luxfer Model, which consists of five key themes:

- Building and maintaining strong, long-term customer relationships.
- Achieving high levels of manufacturing excellence by improving processes and reducing operating costs, thus insulating us against competitors in low-labour-cost economies.
- A commitment to innovation that generates products that are well-equipped to address opportunities created by heightened chemical emissions controls, global environmental concerns, public health legislation and the need for improved protection technology.
- Maintaining technical excellence relating both to our products and to the processes needed to make them.
- Selling high-performance products into speciality markets that require products with high-technology content for which customers are willing to pay premium prices.

Each of our businesses has developed a strategic roadmap, based on a balanced scorecard methodology and driven by the Luxfer Model. These strategic roadmaps contain business-specific initiatives, actions and measures necessary to guide the businesses towards achieving their financial objectives.



### STRONG CUSTOMER RELATIONSHIPS

Luxfer's business philosophy places the customer at the centre of everything we do. We strive to establish lasting relationships, enabling us to work closely with customers as partner-of-choice to ensure that our products meet or exceed their operational goals. Many of our customers are blue chip companies that have worked with us in this way for decades.



### MANUFACTURING EXCELLENCE

Over many years the Group has focused on achieving world-class levels of operational performance, supported by a major investment in ERP (Enterprise Resource Planning) systems. A fundamental part of Luxfer's approach is using external auditors to benchmark progress against a rigorous checklist of world-class standards.



### INNOVATION

Luxfer has always recognised the importance of harnessing the creative ability of its employees. This ability to harness marketing insight and design skills to its research and development capability constantly generates new solutions to customer needs. Every year we make a major investment in product development across the Group. Thanks to the ingenuity of our own people and close collaboration with the best research departments in universities around the world, Luxfer has developed a steady stream of new products, including carbon composite lightweight gas cylinders, L7X® aluminium gas cylinders, G4 zirconium oxides for automotive and chemical catalysis, Isolux® zirconium separation products and Elektron magnesium alloys for advanced aerospace and specialist automotive applications. This commitment to innovation is driving the growth of the Luxfer Group worldwide.



### STRONG TECHNICAL BASE

Expertise in material science and a commitment to extending the boundaries of our core materials, and world-class manufacturing and processing techniques, are at the core of Luxfer's business. Luxfer's proprietary technologies, technical know-how and global presence generate our competitive advantage over alternative suppliers.



### HIGH-PERFORMANCE PRODUCTS INTO SPECIALIST MARKETS

Our expertise in metallurgy and materials science enables us to develop advanced materials and products with superior performance to satisfy the most demanding requirements in the most extreme environments. Luxfer products can be found in operation from the depths of the ocean to the far reaches of the solar system. We design some products to operate at absolute zero and others to work with molten metal. We produce materials that operate in a complete vacuum and cylinders that safely contain gases at high pressures. Increasingly our technologies are in demand because of the growing need to protect the environment, to provide better healthcare solutions and to protect people and equipment in the safest possible ways.



## Delivering the Strategy

### Continued focus on innovation and protection of intellectual property

We will maintain our commitment to innovation by investing in our own research and development and through collaboration with universities, industry partners and customers around the world. We will protect our intellectual property.



### Increase the flow of higher-value-added products for specialist markets

We will continue to use our metallurgical and material science expertise to develop new products for high-growth, specialist end-markets, particularly the Environmental, Healthcare and Protection markets.



### Enhance awareness of Luxfer brands

We will maintain and improve global awareness of our four major brands: Magnesium Elektron, MEL Chemicals, Superform and Luxfer Gas Cylinders.



### Focus on continued gains in operational and manufacturing efficiencies

We will continuously improve operational efficiencies, investing in modern enterprise planning systems and automation of our processes to provide protection against competition in low-labour-cost economies.



## Luxfer Group has four global brands

### Material Technology

Luxfer Group focuses on speciality materials based on aluminium, magnesium, titanium, zirconium and rare earths. We sell our products through three brands.

#### Magnesium Elektron

Under our Magnesium Elektron brand, we develop and manufacture specialist lightweight, corrosion-resistant and flame-resistant magnesium alloys, extruded magnesium products, magnesium powders, magnesium plates and rolled sheets and photo-engraving plates. These products are used in the aerospace (lightweight alloys and components), automotive (lightweight alloys and components), defence (powders for countermeasure flares) and graphic arts (photo-engraving sheets) industries.

#### MEL Chemicals

Under our MEL Chemicals brand, we develop and manufacture speciality zirconium compounds for use in automotive applications (exhaust catalysts), electronics (ceramic sensors), structural ceramics, aerospace (thermal barrier coatings), filtration (water purification) and chemical synthesis (industrial catalysts).

#### Superform

Under our Superform brand, we design and manufacture highly complex, lightweight products for a wide range of industries, including aerospace (engine air intakes), specialist automotive (body panels and door inner), rail transport (train fronts and window frames) and healthcare (non-magnetic equipment casings).

### High-Pressure Gas Cylinders

#### Luxfer Gas Cylinders

The Gas Cylinders division manufactures products made from aluminium, composites and other metals using technically advanced processes. Under our Luxfer Gas Cylinders brand, we develop and manufacture advanced high-pressure aluminium and composite aluminium/carbon fibre gas containment cylinders for use in healthcare (oxygen), breathing apparatus (air), electronics (industrial gas), fire-fighting (carbon dioxide) and transportation (compressed natural gases) applications.







**MAGNESIUM**

Service and innovation in magnesium

Magnesium Elektron specialises in the development, manufacture and supply of magnesium products and services to technology industries worldwide. Since they first began processing magnesium in 1936, the company has earned a reputation for innovation based upon an ability to extend the metallurgical boundaries of magnesium alloy technology.

From manufacturing facilities in the United Kingdom, United States and Czech Republic, Magnesium Elektron offers the widest range of high-performance magnesium products in the world:

**Magnesium casting products**

Speciality and commercial lightweight magnesium casting alloys for use in the aerospace, electronic and automotive industries.

**Magnesium wrought products**

A broad range of wrought magnesium alloys for a variety of engineering applications. Products include plate, sheet, coil, extrusion, bar, tube and cast products.

**Magnesium powders**

Magnesium powders for decoy flares used in the protection of aircraft and Grignard reagents for pharmaceutical and chemical synthesis, reduction of speciality metals such as Boron and Tantalum, steel desulphurisation and iron nodularisation processes, and commercial pyrotechnics.

**Magnesium photo engraving plate**

The world leader in engraving metals and etching chemicals.

**Magnesium recycling**

The Elektron Recycling Service, launched in 1997, offers a complete "collection of scrap to delivery of ingot service". It is used by more than 20 of Europe's leading automotive manufacturers and first-tier suppliers.

For product information or sales enquiries please visit [www.magnesium-elektron.com](http://www.magnesium-elektron.com) or contact [customerservice@magnesium-elektron.com](mailto:customerservice@magnesium-elektron.com)



**ZIRCONIUM**

Innovative solutions in material technology

MEL Chemicals is a global producer and supplier of inorganic chemicals that specialises in zirconium-based chemicals. With research and development and manufacturing operations in the United Kingdom, United States and Japan, MEL have a long-established, global reputation for the production of high-quality zirconium-based chemicals.

MEL Chemicals produce an extensive range of pure zirconia, doped zirconia and reactive chemicals. A commitment to research and development allows MEL to tailor zirconia products to customer needs.

**Catalysis**

MEL Chemicals supply a wide range of catalyst-grade zirconium hydroxides and oxides for applications from automotive to hydrogenation, isomerisation and fuel-processing catalysts.

**Water treatment**

Isolux® is an environmentally safe, highly efficient inorganic adsorbent system for the removal of heavy metals from drinking water systems, while MELSorbs® removes heavy metals from waste water streams.

**Carbon dioxide sorption**

Carbon capture is important for environmental protection. However, in addition to traditional end-of-pipe-type reactions, many other chemical reactions and processes benefit from removal of carbon dioxide.

**Ceramics**

Use of zirconium oxides and doped zirconium oxides in technical and advanced ceramics is well established, notably for their electrical, wear and heat-resistant properties. Our doped and undoped zirconias are vital ingredients in a huge range of industrial and domestic products.

**Nano technology**

MEL Chemicals supplies aqueous suspensions of nano zirconia and nano stabilised zirconia materials with a particle range of 10-100nm.

For product information or sales enquiries please visit [www.zrchem.com](http://www.zrchem.com) or contact [melchemsales@melchemicals.com](mailto:melchemsales@melchemicals.com)



**SUPERFORM**

Shaping the future together

Superform is the world's leading supplier of Superformed components for a wide variety of industries, including aerospace, automotive, rail transportation, medical and architecture.

From its two manufacturing facilities in the UK and USA, Superform supplies complex parts to customers such as Airbus, Aston Martin, Bentley, Boeing, Bombardier, British Aerospace, Goodrich, Lamborghini, Lockheed, Honeywell, Morgan Cars, Rolls Royce, Fisker, Siemens and many others around the globe.

**Materials Capability:**

Over the past 38 years Superform has developed exclusive forming processes for materials ranging from medium strength aluminium alloys for automotive and rail applications, to high-strength airframe alloys, including magnesium, titanium sheet and carbon composites.

**Unique Forming Process - Low Investment Tooling Solutions:**

Superforming gives designers the freedom to create complex geometric shapes that conventional forming processes cannot produce. On most projects, the tooling investment for Superforming is far less than that associated with conventional matched-die tools and offers significant cost benefits where low volume, high variety manufacture is required. Superform has also developed the ability to form complex parts from magnesium sheet and to hot-form titanium sheet.

**Advanced Technologies:**

Superform has extensive Computer Aided Engineering capabilities including process simulation and Computer Aided Design offering three dimensional sheet forming solutions from car body panels to engine nacelles for business jets. These state of the art tools allow modelling of new components to determine process feasibility and provide key information in terms of thickness distribution to support customer Finite Element Analysis.

With ongoing investment in technological development in tooling, part handling and press control, Superform continues to push back the boundaries of what can be achieved using the unique Superforming process.

For product information or sales enquiries please visit [www.superform-aluminium.com](http://www.superform-aluminium.com) [www.superformusa.com](http://www.superformusa.com) or contact [sales@superform-aluminium.com](mailto:sales@superform-aluminium.com)



**GAS CYLINDERS**

Setting the standard worldwide

Luxfer Gas Cylinders is the world's largest manufacturer of aluminium and composite high-pressure gas cylinders for gas storage. From manufacturing facilities in the United Kingdom, France, United States, China and India, Luxfer supplies high-performance products to customers in more than 50 countries.

**A legacy of gas-containment innovation**

Aluminium gas cylinders were invented in 1941 in France by Luxfer France (then known as Société Métallurgique de Gerzat). Luxfer invented the cold-extruded, seamless aluminium cylinder in the mid-1950s and began manufacturing its first cylinders in the United Kingdom. It began producing aluminium cylinders in the United States in 1972. In 1976, Luxfer added fibre-glass-reinforced, hoop-wrapped cylinders to its growing product range, followed by full-wrapped models ten years later. In 1997, the company introduced ultra-lightweight composite cylinders fully wrapped with aerospace-grade carbon fibre. These technological advancements helped make Luxfer the world's leading supplier of life-support cylinders for firefighters and other emergency personnel. Medical cylinders are another important market, for which Luxfer manufactures a wide range of aluminium and composite models.

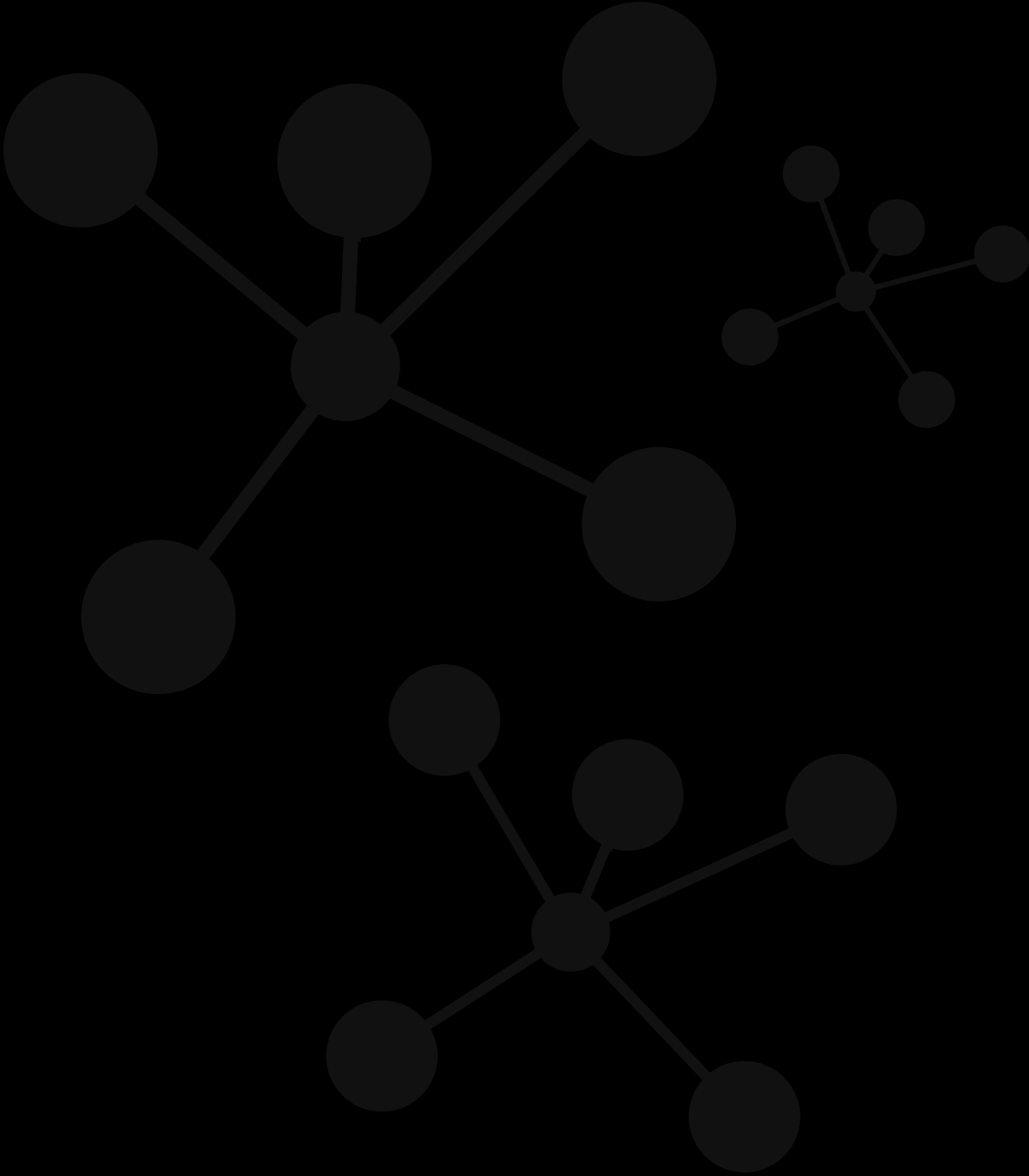
Luxfer manufactures products for a wide variety of other applications, including cylinders for industrial and speciality gases; beverage cylinders; and fire extinguisher cylinders.

Over the years, Luxfer Gas Cylinders has introduced many major innovations in gas containment, including its patented higher-strength L7X® aluminium alloy and its advanced composite technologies.

**Composite product growth**

In recent years, Luxfer innovations in lightweight composite products—including its IOS® Intelligent Oxygen System with patented SmartFlow® technology—have led to rapid growth in the oxygen therapy sector. Another major growth product is large carbon composite cylinders for storage of compressed natural gas used in alternative fuel (AF) vehicles, including trucks, buses and automobiles. From its state-of-the-art facility in Riverside, California, Luxfer supplies an expanding range of AF cylinders to customers around the world. Luxfer also operates an exclusive European centre in Italy that supplies both cylinders and complete AF systems.

For product information or sales enquiries please visit [www.luxfercylinders.com](http://www.luxfercylinders.com) or contact [customerservice@luxfer.net](mailto:customerservice@luxfer.net)



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LUXFER GROUP

INNOVATION FOCUSED ON TODAY'S GLOBAL CHALLENGES

12  
**Mg**  
24.305

environmental

40  
**Zr**  
91.224

healthcare

13  
**Al**  
26.982

protection

6  
**C**  
12.011

speciality

22  
**Ti**  
47.867