

**World-leading,
highly engineered
flow control
solutions**

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An introduction from Jackie Hu, Divisional Managing Director.



Breakthrough engineering for a better world

IMI Critical Engineering has long been recognised as a world-leading provider of flow control solutions, which allow vital energy and other process industries – from LNG producers to on and offshore oil fields, from petrochemical plants to pharma and process industries, from sanitation to smelting plants – to operate safely, cleanly, reliably and efficiently.

These industrial plants and processes are vital to our modern lives, helping to produce the energy, resources and materials that underpin our lives.

Many of our products have a direct and positive impact on the world, by helping to reduce carbon emissions, improve safety, and making processes more efficient. In other words, our products make dangerous processes safer, as well as cleaner and greener. That is why we describe our purpose as 'breakthrough engineering for a better world'.

IMI Critical's products control the flow of steam, gas and liquids in the harshest operating environments. They are designed to withstand temperature and pressure extremes as well as intensely abrasive or corrosive operating conditions. With over 750,000 valves, including 250,000 bespoke valves, installed in critical industrial plants and processes worldwide, no-one knows more than IMI Critical about operating hazardous processes safely, efficiently and with minimum environmental impact.

Customers come to IMI Critical because of our expertise in solving process control problems going back well over 100 years. We provide bespoke engineering solutions, including additive manufacturing (or 3D printing). Our Valve Doctors® are available to provide expertise and assistance to clients with intractable problems. Our Field Service engineers are available to help diagnose and maintain installed valves.

Please come and talk to us and find out how we can make your plant run more safely, cleanly and efficiently.

Jackie Hu

Divisional Managing Director
IMI Critical Engineering

Our market-leading brands

The unique combination of our IMI Critical Engineering companies' know-how and worldwide experience underpins our reputation as a leading global supplier to the major energy and industrial process sectors.

We help our customers control critical in-plant processes by providing superior, custom engineered valves, actuation and control systems.

Breakthrough Engineering



Established over 135 years ago, based in Mannheim, Germany IMI Bopp & Reuther is a highly regarded control valve business designing a wide range of valves, making plants and processes safer and more efficient.



Presenting an unrivalled portfolio of technologies, including DRAG®, BTG, ABJ® and technology acquired from Sulzer®, to meet extreme pressure and temperature control needs.



We are a leading manufacturer of critical service flow control valves for the nuclear industry, with over 50 years of experience in supplying control valves, isolation valves, and other services.



One of the world's leading designers and manufacturers of silencer technologies within custom-designed products, which are engineered for a lifetime of service.



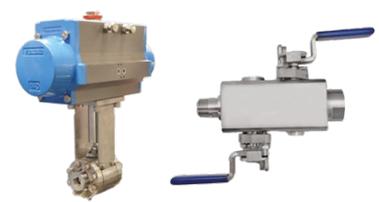
A key supplier of butterfly isolation valves to the Oil & Gas, Sugar, Ethanol Production and Water Treatment process industries throughout Brazil and South America.



Over 60 years' experience working with nuclear plants around the world, developing proven, advanced valve technologies to meet the demanding performance and safety requirements of next-gen nuclear power reactors.



An international leader in the design and manufacture of triple eccentric metal seated butterfly valves, specialising in refining processes and cryogenic valves for LNG.

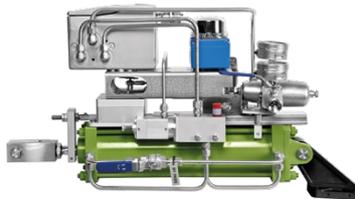


IMI PBM manufactures ball valves and specialty valves for both sanitary and industrial applications. IMI PBM combines specific application requirements with creative engineering and quality manufacturing practices.



IMI REMOSA™

A world leader in slide, gate, goggle and through conduit valves, actuation and control units, specialising in Fluid Catalytic Conversion (FCC) applications.



IMI STI™

Providing control solutions for actuation in critical applications, especially where reliability and performance are vital for process efficiency, plant safety and integrity.



IMI TH JANSEN™

100 years of experience in the design and manufacture of butterfly and gate valves and blast furnace valves for the Iron & Steel, Power, and Petrochemical industries.



MAXSEAL®

For over 60 years has led the way in energy, nuclear and defence industries. Offering a world-class portfolio of fluid control products including the renowned Maxseal® product range.

IMI THOMPSON VALVES™



IMI TRUFLO RONA™

A leading provider of bespoke valves for the Oil, Gas, Chemical and Petrochemical industries, used in applications where safety integrity and performance are critical.



IMI TRUFLO MARINE™

High integrity valves for faultless performance in extreme applications, with technology developed in the Naval Marine industry.



IMI TRUFLO ITALY™

A leader in the Petrochemical, LNG, and shipbuilding industries, producing a range of gate, globe, top & side entry ball valves.



IMI Z&J™

IMI Z&J services very high temperature applications with slide, gate and goggle valves as well as heading and unheading devices for delayed coker processes.



IMI ZIKESCH™

With over 100 years of experience, IMI Zikesch provides total aftermarket service along with a comprehensive valve product range.

Market drivers that guide our growth

Like never before, a number of long-term global trends are driving the demand for cleaner sustainable energy, generated with efficient and reliable production processes. Each of the following market drivers pose significant challenges.

Urbanisation

- Mega cities and transport systems
- 4-hour demand

Energy is an essential building block for the cities of tomorrow. The IMI Critical Engineering businesses design and deploy the technology necessary to support the growth with:

- Attemperators for the most efficient combined cycle plants meeting "time of day" demands
- Turbine bypass systems for super critical plants that serve primary power
- Oil pipeline – transportation infrastructure



Environmental emissions

- Lower greenhouse gases
- Higher energy efficiency

Environmental legislation is striving for a balance between safety and quality. IMI Critical Engineering is at the forefront of innovation to make this happen with:

- Fugitive emission packing for anti-surge valves
- Next generation renewable resources
- Hydrogen



Resource scarcity

- Coal and gas
- Demand for iron and steel

The demand for resources is driving existing and new facilities to be more efficient. IMI Critical Engineering is working with its industry partners to:

- Harness energy from remote locations
- Enhance efficiency for major industries





**Breakthrough
Engineering**
for a better
world.

Breakthrough Engineering for a better world

All of IMI Critical's innovative technology is designed to make a real and positive impact on the world. Working with its customers, IMI Critical believes in addressing the big, global issues through innovation and achieving outcomes that tangibly improve quality of life.

Our relentless drive to solve customers' fluid control problems has resulted in the creation of two proprietary training programmes: The Valve Doctor® programme and IMI Learn.

The Valve Doctors®

Our dedicated team of Valve Doctors® are the industry's leading valve specialists and are focused on solving process flow problems for power, oil & gas and petrochemical plants around the world.

Our focus extends beyond valve design to include plant operation, system layout and control system integration. The Valve Doctors® are the product of a comprehensive training programme that demands our specialists to work in partnership with our customers to achieve the highest levels of performance, safety and reliability.

IMI Learn

IMI Learn further helps to establish our employees at the forefront of valve technology. It provides detailed learning modules to assist all of our businesses to understand more about how to achieve the highest levels of performance and reliability.

New product development

Our commitment to breakthrough engineering and delighting our customers is central to our NPD process. We don't limit ourselves or our people to conventional thinking and mindsets. We operate a cross-divisional approach which focuses in on customer needs, involving input from all regions and departments in the process.

Worldwide engineers

Our staff of over 400 engineers worldwide understand how to convert industry knowledge, market insight and our customers' toughest challenges into solutions that give our customers a competitive advantage.

Our key customers are the world's leading players in the energy and process sectors and include Arcelor Mittal, Thyssen, Tata, Petrobras, Sinopec, Alstom, Mitsubishi Heavy Ind, Siemens, Shanghai Electric, Westinghouse, Urenco, Areva, Chevron and Bechtel.



Our Valve Doctors® operate on-site wherever they are needed around the world.

Industry sector

Oil & Gas

 IMI BOPP & REUTHER™

 IMI CCI™

 IMI FLUID KINETICS™

 IMI INTERATIVA™

 IMI ORTON™

 IMI PBM™

 IMI STI™

 IMI THOMPSON VALVES™

 IMI TRUFLO ITALY™

 IMI TRUFLO RONA™

 IMI ZIKESCH™

As the fastest growing sector, investment in oil and gas is significant. However, producing fields have aged such that the field profiles/mix have changed with smaller, more remote resources being commercialised. This leads to more demanding applications.

Working closely with process licensors and EPCs, our products protect the critical plant component. However, more importantly, our patented IMI STI actuation gives industry leading response times, accuracy and repeatability. This results in LNG trains running optimally, giving operators maximum output. As a result, IMI CCI is the world leader in compressor anti-surge valves.

The LNG process also relies on best-in-class isolation valves: IMI Truflo Rona ball valves and IMI Orton metal seated butterfly valves. Used on the liquefaction plant in a number of applications (cooling system, firefighting, and process valves), we also produce the cryogenic process valves and the loading/unloading valves. Our engineering expertise ensures safe faultless operation at -196°C .

With the need to access remote fields, the growth of Floating Production Storage and Offloading (FPSO) and Floating Liquefied Natural Gas (FLNG) is supported by IMI Critical Engineering. Our valves enable

extreme processes to operate safely with the utmost reliability in what will be harsh environments – not only through the process on board, but also the powering and safety of the vessels.



For noise and vibration control, DRAG® is the world leading solution

High Integrity Protection Systems (HIPPS)

As demand continues for hydrocarbon resources, higher utilization of fields is a requirement. For older fields this means enhanced oil recovery through injecting media to improve flow rates. However, many more difficult fields also contain significant levels of H_2S (sour gas).

As a result, more field owners/operators want to ensure the safety of the field as well as the equipment investment – and HIPPS is a key application. Leveraging a long history of experience, IMI CCI designs control and hardware for the system, which we are successfully supplying to onshore fields in the Middle East.



Our HIPPS team have achieved a SIL4 safety rating

“There are 50 valve manufacturers here but only 3 we would trust in this application”

- Service Engineer Manager, Chiyoda



Core products and applications

- Production chokes
- Fire & safety system valves
- Surge relief valves
- Emergency depressurising / gas to flare
- Isolation valves
- Overboard dump valve

Industry sector

Power

 IMI BOPP & REUTHER™

 IMI CCI™

 IMI FLUID KINETICS™

 IMI PBM™

 IMI ORTON™

 IMI STI™

 IMI THOMPSON VALVES™

 IMI TRUFLO RONA™

 IMI ZIKESCH™

IMI Critical Engineering has been the leading provider of customised severe service control valves for over 50 years through its IMI CCI and IMI Bopp and Reuther businesses for the power sector. With vast experience gained from over 20,000 valves installed, the know-how and expertise of IMI Critical Engineering remains unrivalled.

Supported by our engineers and specialists – dedicated teams of The Valve Doctors® – we draw on vast experience to provide the best solution to maximise system performance, reliability and uptime.

IMI Critical Engineering offers a broad portfolio of products. With control valves including DRAG®, BTG, ABJ and technology acquired from Sulzer®, we can assess process requirements and engineer the ideal combination of technologies to provide the optimised solution.

IMI Critical Engineering has 50 years' experience of working with fossil power plant operators, completing over 20,000 severe service installations worldwide. Over 6,000 turbine bypass valves are currently in operation where our engineering know-how meets plant operators' requirements for thermal shock, high-speed modulation, high



rangeability, repeatable tight shut-off, and low noise with inline design for maintenance.

Supported by over 200 field service specialists, we can commission, service or support your power plant outage anywhere in the world. With manufacturing plants and service centres located around the world, 24-hour customer support is assured.

Control is everything

A major energy provider in North America was wrestling with repeated control valve issues in its boiler main feed pump recirculation application at a 570MW 2x1 Combined Cycle Power Plant (CCPP).

The team found that the existing valves' conventional cage technology had just four stages of pressure reduction. This was inadequate for the operating conditions.

The great news for the energy plant was that this could be achieved without replacing the control valves by incorporating DRAG® Disk Stack technology into the existing valves via IMI CCI's Retrofit3D solution.

Using IMI CCI's Retrofit3D solution, the team designed a custom-engineered DRAG® trim to fit perfectly within the dimensions of the existing valve body without the need for in-situ machining of any parts. Parts were manufactured to replace the cage (with a multi-stage DRAG® Disk Stack), plug assembly, and seat ring.



RETROFIT3D

**"We have a large population
of DRAG® valves at our
stations... your product is the
Cadillac of the industry..."**

- Florida Light & Power, USA



Core products and applications

- **Startup & main feedwater regulation**
- **Atmospheric steam dump & steam venting**
- **Turbine bypass valves**
- **Full load bypass allowing industry leading start up times**
- **Reheat & superheater attemperator spray**
- **Full valve velocity control - avoid excessive noise & vibration**

Industry sector

Petrochemical

 IMI BOPP & REUTHER™

IMI Critical Engineering offers niche, highly engineered valves for critical applications in the Petrochemical sector, with world-leading technologies for delayed coking and fluid catalytic cracking.

 IMI CCI™

 IMI ORTON™

 IMI REMOSA™

Operating reliably and safely for the life of a refinery in extreme temperatures of 1,650°C and in erosive environments demands highly engineered solutions – the specialism of IMI Z&J (Zimmerman & Jansen) and IMI Remosa.

Thermal cracking to produce hydrocarbon coke requires control of the drums and process, as well as, critically, the slide gate valves for top and bottom unheading.

 IMI STI™

A key part of the process, our bottom unheading devices ensure reliable and (most importantly) remote safe unheading to optimise operational efficiency.

 IMI TH JANSEN™

With 25-year lifecycles and extremely corrosive media, our products meet the exacting specifications of process licensors such as UOP, CB&I and Exxon, ensuring your plant performance is optimised.

For dehydrogenation processes (conversion of propane to propylene for plastics) IMI Z&J produces a range of inlet and outlet valves for air and hydrocarbon, as well as for purging.

 IMI TRUFLO ITALY™

 IMI TRUFLO RONA™

IMI Remosa produces bespoke slide, butterfly, gate and through conduit valves that are designed for a specific plant. These are controlled by IMI Remosa's actuators and hydraulic control units to match the increasing demand for high availability and reliability, with diagnostic systems to reduce unscheduled downtime. Used in FCC, these are critical products for the conversion of heavy gas oil to gasoline the world over.

Our wide range of products includes IMI Truflo Rona's top entry ball valves. These highly engineered valves are used in purified terephthalic acid (PTA) for plastic production, where the reaction between secondary petroleum and acetic acid is a highly corrosive medium.

 IMI Z&J™

 IMI ZIKESCH™

IMI Z&J are world-renowned specialists in delayed coker and dehydrogenation processes for ethylene and propylene.

IMI Bopp & Reuther offer a full range of safety and safety relief valves for processes which support safe and reliable plant.



Wedge-in-wedge reactor valve

Catofin® projects

The shale gas revolution in the USA has led to low-cost availability of propane. Propane can be used, via a dehydrogenation process, as the feedstock for the production of ethylene and propylene.

This has resulted in major investment and upgrades to facilities for dehydrogenation units, using the Catofin® process. As a result, customers turned to IMI Z&J, which has 15 references globally for this technology – having worked on every major plant for the last 55 years.

IMI Z&J successfully delivered 42" wedge-in-wedge gate valves and 48" air inlet and outlet valves.



Core products and applications

- Propane desuperheating
- Top entry ball valves
- Goggle valves
- Turbo expander valves
- Double disk through conduit
- Top unheading and bottom unheading devices
- Sliding gate valves

Industry sector

Marine

 IMI BOPP & REUTHER™

 IMI ORTON™

 IMI PBM™

 IMI REMOSA™

 IMI THOMPSON VALVES™

 IMI TRUFLO MARINE™

In the marine environment, both commercial and naval, equipment must be of the highest quality and reliability to deliver long service life under extreme conditions, notably the corrosive seawater environment. When vessels are at sea, repair may be impossible and failure can be catastrophic, so the quality of the design, engineering, qualification, manufacture and ongoing support and maintenance of onboard valve systems are critical.

A typical surface ship contains around 4,000 valves, so the quality of the valve components and materials are of vital importance to safe and efficient operations. In the naval marine environment, specifications are even more demanding, as valves need to be able to withstand the extreme shocks that might be experienced in a combat situation, and still maintain their integrity.

Defence

Although defence spending is under pressure in developed nations, naval marine assets – submarines and surface ships – remain highly valued because of the flexibility they offer defense forces. Trends in new orders are towards local manufacturing, flexibility in the design of components so they can withstand both warm and cold water conditions, and increasingly sophisticated onboard technology including automation and AI. The engineering capabilities and deep domain understanding born of over 50 years specialist design, has made IMI Truflo Marine a trusted partner to navies worldwide. We supply high performance valves for any system

on board a submarine or surface ship, including weapons handling systems. Our valves have a high flow capability and quick shut off, vital to the functioning of critical systems on board. Key technologies include Hull Valves, Top Entry Ball Valves and Hydraulic and Pneumatic Actuators.

Commercial

Commercial vessels come in many guises, from cruise liners to LNG carriers, from container ships to Floating Production Storage and Offloading facilities, but they all depend upon high performance valve systems that can withstand arduous operating conditions, including aggressive marine corrosion environments.

IMI PBM and IMI Truflo Marine provide a full range of valve systems for all types of commercial vessels including 2-Way, Multi-Port, Diverter Port, Cryogenic and Tank Valves, which are available in a wide range of materials. Applications include regulating seawater; fresh, grey and black water; hull isolation; fuel and air.



Top-entry Ball Valve



Specialised Hull Valve

50+ years naval marine legacy

IMI Critical Engineering has been a trusted partner to key Maritime programmes since 1962. We lead the world in the design, manufacture, supply and through-life support of high integrity valves, actuators and pressure regulators and manifolds for nuclear and naval marine applications.



Core products and applications

- **Double ball hull valves**
- **Diesel exhaust valves**
- **ANSI ball valves**
- **Garbage disposal units**
- **Butterfly valves**
- **Pressure regulators and manifold valves**
- **Hydraulic actuators**

Industry sector

Sanitary



Innovative technologies

IMI PBM's Igenix® line of sanitary valves is ideally suited for pure process applications where dead space within the valve need to be minimized. IMI PBM valves exhibit high performance in pharmaceutical, biotechnological, food, beverage, cosmetic, and other sanitary and clean steam applications and validation systems.



2-Way Firesafe Ball Valves



Clean Steam Ball Valves



Radial Diaphragm Tank Outlet Valve

The sanitary industry comprises a diverse range of biotech and pharmaceutical, food and beverage, and personal care and cosmetics companies, but they share a number of common factors. One of the most important is that the products are either for human consumption or, for personal care and cosmetics, may be ingested through contact with the skin. These industries must therefore meet the most stringent regulatory safety requirements, and the process flow technologies that support their production must be unquestionably safe, reliable, drainable and cleanable. IMI PBM's valves are specifically designed and tested to perform in many types of sanitary and clean steam applications.

Biotech and Pharmaceutical

We help the growing biotech industry maintain a sterile environment, batch ferment and bulk process ingredients and additives safely in new medicine research, cell therapy, viral vectors and the new class of antibody drug conjugates. We also provide pharma companies with hi-spec valves for the mass production of medicines, vaccines and vitamins. Specialist technologies include our unique radial diaphragm valves used in vaccine production and other sanitary applications; our Igenix® line of sanitary valves reduce contamination, prevent clogging problems, offer clean-in-place technology and sampling of media. Our technologies are FDA, USP Class VI and ASME BPE compliant.

Food and Beverage

IMI PBM helps breweries, wineries, soft drinks, snacks, food and flavour companies manufacture their products on a large scale, to a very high quality and consistency. Our multi-port, diverter port, tank, sampling and 2-way valves maintain process control and cleaning, and clean-in-place technology allows valves to be cleaned quickly and

thoroughly inline without process interruption. The cleanability and drainability of our valves also prevent contamination between change-overs on the production line. Our technologies are FDA and USP Class VI compliant.

Personal Care and Cosmetics

Valve applications in the personal care and cosmetics industry include the manufacture of cosmetics, perfume, deodorants, hair and skincare, soaps, toothpaste and oral care, detergents, lotions and nutritional supplements. Our radial diaphragm, tank, pinch, check, self-cleaning and 2-way valves provide process control, and clean-in-place capability for quick and efficient process change-overs. Our Fabflex Assembly allows multiple valves to be mounted on a single production line and process multiple different batches simultaneously, making more efficient use of production time. Our technologies use USP Class VI elastomers and FDA-compliant materials.



Core products and applications

- **2-Way clean steam trap ball valves**
- **Spring-less sanitary check valves**
- **Angle stem flush tank**
- **Fabflex® Manifold Assemblies**
- **Self-Cleaning Ball Valves**
- **Sanitary Block & Bleed**
- **Igenix® Radial Diaphragm Tank Outlet Valves**



Industry sector

Process Industries

 IMI BOPP & REUTHER™

 IMI CCI™

 IMI PBM™

 IMI TH JANSEN™

 IMI Z&J™

 IMI ZIKESCH™

IMI Critical is a leading provider of valves that control process steam across a wide range of process industries, including paper and pulp, and sugar and ethanol. Our valves control process steam and auxiliary steam, precisely and reliably, helping industrial plants operate efficiently.

We provide world class products across process industries where safety valves are required to protect pressure systems for steam, gases and liquids.

Safety valves have the function of preventing inadmissible overpressure in all pressurized systems like pipe systems, pressure vessels, power boilers and reactors, in order to avoid danger to people, plant and the environment. These are set typically to the Maximum Allowable Working Pressure (MAWP) - a higher pressure than the operating pressure of the system to be protected. For functional and operating requirements, third party certifications and approvals of safety valves are required by laws, code and standards. IMI Bopp & Reuther safety valves fulfil this for all areas of the world (CE-marking, ASME section I, III and VIII designator, Chinese and Russian type test approvals.

The IMI Bopp & Reuther Si series are most commonly used in process plants. The closed spring bonnet traps the process fluid in the valve and prevents a release to the environment. The straightforward design and reliable guidance of the stainless steel inside parts ensure free and repeated discharge cycles.

Conventional safety valves are usually selected where a short outlet pipe

leads to the atmosphere, where fluid is safely discharged into low pressure systems and where the fluid is non-critical.

Our safety valves with bellows between the body and bonnet are designed for where there is excessive build-up of back pressure, where the fluid is highly viscous or contains solid fractions that could have a corrosive effect on inner parts, where there is media with a very high temperature, or where use of safety valves with lifting devices the environment should be 100% protected against pollution.

IMI CCI has process steam turbine bypass, steam conditioning and desuperheating products to ensure plant uptime and the most cost effective output. With class leading products, including BTG technology - IMI CCI are leaders in applications for sugar, ethanol, paper and pulp processing industries worldwide.

Our range of products serve high temperatures and ensure high repeatable quality, such as our range from IMI Z&J for production of float glass. IMI Th Jansen provides air separation valves used across the world and approved by process licensors for the production of oxygen, hydrogen and other gasses.

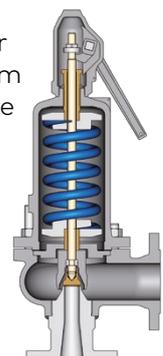
Innovative technologies

- For vapour, gases and liquids
- Protection of pressure vessels
- Protection of heat exchangers
- Suitable for all industrial applications
- Chemical industry
- Petrochemical industry
- Technical gases
- Cooling and oxygen applications
- Power generation and power supply
- Steam boiler up to PN 40

Conventional safety valve



Economic for heating system and water use





Core products and applications

- **Turbo expander butterfly & isolation valves**
- **Through conduit slide valves**
- **Side entry ball valves**
- **Top entry ball valves**
- **Bespoke gate isolation valves**
- **Propane desuperheating**

Industry sector

Nuclear

 IMI BOPP & REUTHER™

 IMI CCI™

 IMI ORTON™

 IMI REMOSA™

 IMI STI™

 IMI TH JANSEN™

 IMI TRUFLO ITALY™

 IMI TRUFLO RONA™

 IMI Z&J™

 IMI ZIKESCH™

IMI Critical Engineering has several businesses dedicated to the Nuclear industry. With over 60 years of proven, reliable nuclear power plant service, over half of the world's nuclear power plants rely on our critical valve technology.

With over 250,000 of our products installed either in nuclear power plants or on vessels or submarines, we have the knowledge and experience to deliver the highest quality, reliability and safety in the industry.

Underpinning all of these offerings is a highly skilled level of technical expertise – over 35% of our workforce are graduate engineers.

Through IMI CCI, we supply severe service control valves featuring Drag®, ABJ or technology acquired from Sulzer®, plus system medium actuated technology for isolation valves and pilot operated safety valves. With IMI Bopp & Reuther we compliment this with industry leading safety and safety relief valves. Combining a range of actuation options, including our QuickTrak®, we provide the highest performing valves in the industry.

To support nuclear power plant operations, we offer emergency core cooling system strainers and filtered containment venting systems to ensure safe systems.

IMI NH has proven technology for long life bellows sealed globe valves, full flow ball valves and high performance butterfly valves, providing sustainable, cost-effective performance for nuclear power plant operators.

The full valve requirement at plants is complimented by IMI TH Jansen's butterfly valve technology for cooling/inlet systems.

IMI Truflo Marine is a specialist designer and manufacturer of high integrity valves, actuators and pressure reducing stations for critical seawater, nuclear and naval marine applications. The leader in the field of hull valves, its technology is critical on nuclear submarine fleets in navies around the world.

Nuclear plant life extension

Following the Fukushima disaster and reviews of nuclear reactors around the world, EDF Energy was required to make additional safety improvements to the primary cooling circuits at Hinkley Point B and Hunterston B Advanced Gas-cooled Reactors (AGRs) in the UK. This required the addition of further nitrogen injection points, with associated valves and pipework for diverse reactor holddown. The new circuitry has the secondary function of introducing an additional reactor gas blowdown function.

Due to the critical application of the valves, the specification calls for conformance with ASME III Class 1. As it was necessary to avoid any increase in pressure drop, which would downgrade cooling system performance, EDF Energy sought a solution that used high-integrity full-bore ball valves. The valves were required to operate with utmost reliability and ensure zero leakage, even at high pressure and temperature. The sites were subsequently granted 7-year life extensions.



ASME III Class 1 nitrogen injection valve



Core products and applications

- **Emergency core cooling strainers**
- **Bellows sealed control & sampling valves**
- **Master steam isolation valves**
- **Turbine bypass valves**
- **Filtered containment venting systems**
- **Cooling water butterfly valves**
- **Safety relief valves**

Industry sector

Metals

 IMI TH JANSEN™

 IMI Z&J™

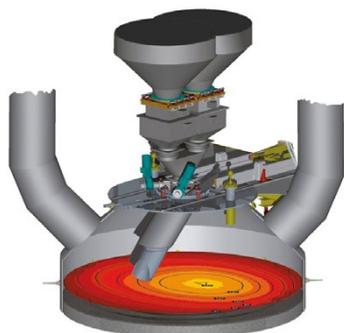
As a truly global industry, smelting plant owners and operators want to ensure the huge investment is utilised to its maximum in a very competitive sector. To do this, they need the most reliable plants, with highest yield and lowest cost to run. For this, they turn to IMI Critical Engineering – specifically our IMI Z&J (Zimmermann & Jansen) and IMI TH Jansen businesses.

This industry needs tailor-made, non-standardised flow control equipment. IMI Z&J and IMI TH Jansen can design and manufacture such equipment – valves of up to 6m diameter, designed to individual plant requirements for total plant lifecycle duration (25+ years).

Typical products are hot blast valves, up to 2.5m diameter, with temperatures of 1,650°C with energy saving designs that, when closed, are man-safe, and Goggle valves up to 5m diameter for 1,100°C in operation. Other products include lever valves and control valves. IMI TH Jansen also makes flat plate gate valves and air separation valves. We also supply tuyere stocks (hot blast/air nozzles) for blast furnaces. IMI Z&J have also developed new technologies to help reduce owners' cost of production.

Our two key products are Top-gas Recovery Turbines (TRT) and No-Bell Top Charger (NBTC) for blast furnaces.

TRTs are specially designed low revolution turbines that use the hot gases from the blast furnace to generate power. The design has been optimised to reduce all drag and friction to produce a high efficiency turbine – 30 years' experience results in the lowest losses. They can simultaneously support two blast furnaces.



No-Bell Top Charger

Innovative technologies

Our No-Bell Top Charger has been designed to optimise burden distribution in the blast furnace. With a flexible chute design, it is possible to charge the burden and the coke to any position in the blast furnace.

The constantly tilting angle is perfectly guided (acoustic gas measurement) to give exact level control. This generates better gas exploitation, leading to increased output from the furnace, but also greatly reduces the consumption of the reducing agents – a significant saving for plant owners/operators.



Core products and applications

- **No-Bell top charger**
- **Through conduit double disk valves**
- **Hot blast valves**
- **Turbo expander valves**
- **Air separation valves**
- **Top-gas recovery turbines**

Industry sector

Aftermarket & Service

 IMI BOPP & REUTHER™

 IMI CCI™

 IMI CCI™

 IMI FLUID KINETICS™

 IMI INTERATIVA™

 IMI NH™

 IMI ORTON™

 IMI PBM™

 IMI REMOSA™

 IMI STI™

 IMI TH JANSEN™

 IMI THOMPSON VALVES™

 IMI TRUFLO ITALY™

 IMI TRUFLO MARINE™

 IMI TRUFLO RONA™

 IMI Z&J™

 IMI ZIKESCH™

IMI Critical has always prided itself on best in class customer support of our products. Our reputation was built on solving customer's problems, resulting in IMI Critical businesses developing the products we have today to provide the robust, reliable and efficient service expected in the harshest of environments.

Our products are designed for the most extreme of environments – extremes of temperature, pressure, erosive media and severity of operation. Our engineers in IMI CCI, IMI Remosa or IMI Z&J in particular act as consultants partnering with customers through the design stage. It is crucial that we therefore support commissioning with our field service technicians – whenever and where ever your project is in the world.

We have our own in-house field service technician team, backed up with planners, coordinators and health & safety to ensure true 24 hour service capability - 7 days a week across the world.

With 15 manufacturing plants supported by service centres across the world, we can provide OEM parts to meet your outage or turnaround requirements. With portable workshops, we can set up on site to ensure outage or refinery turnarounds are managed to time and cost safely.

Our field service technicians can also support service and repair on any installed valves and regularly asked to replace, upgrade or repair competitor's valves due to performance or reliability issues. We have a team able to engineer upgrades and replacement to meet your existing installation and configuration. This is critical for major refinery projects, where existing infrastructure to support the valves must be used.

IMI Critical has over 250 field service technicians across the world. These are also supported by our world renowned Valve Doctors® for any plant

operation issues you have. In addition with IMI Bopp & Reuther and IMI Zikesch we have built even further on our capability.

We can provide aftermarket services for every valve, across all phases of a valve's lifecycle, all over the world. This has added over 100 service technicians to the IMI CCI team with, 4 additional manufacturing facilities and an efficient back office, providing fast and effective support – assisting you from the erection and commissioning of the plant, through regular maintenance and any retrofits as may be required.

Since 1955, IMI Remosa has been operating in the field of industrial maintenance and specifically within refineries and petrochemical plants. With its proven experience in these areas, we are an excellent source of problem-solving as a consultant for engineering, retrofitting and repair work for any type of valve installed in FCC Units and Expander Power Recovery Units. This capability allows the replacement of the internals, along with the modification of the valve inside geometry, without removing the valve from the line.

IMI Z&J has a field service team which will oversee installation and commission of what are the largest valves in the world. We are experts in refinery turnarounds with technicians based out of our manufacturing locations in Duren, Germany and Houston, USA. Our expertise will ensure your plant is optimised whether it is delayed coking in petrochemical, blast furnaces in iron & steel mills or the glass industry.



Core service offerings

- **Valve Doctors™ solve your plant problems**
- **More than 250 service engineers**
- **24 hour response to all global locations**
- **Health and safety of paramount importance**
- **Turnarounds on refineries planned and managed**

Our global reach

For more than 50 years, our business has been synonymous with innovation and performance in the severe service valve and controls industry. We have manufacturing operations in 19 countries and support our customers on the ground via local manufacturing facilities and our global service network, which includes 200 dedicated aftermarket specialists.



Europe

1
IMI Critical Engineering HQ
Birmingham, UK

2
IMI Bopp & Reuther Mannheim
Mannheim, Germany

3
IMI CCI Aberdeen
Aberdeen
UK

4
IMI CCI Austria
Vienna
Austria

5
IMI CCI Brno
Šlapanice
Czech Republic

6
IMI CCI Florence
Montelupo
Italy

7
IMI CCI Manchester
Manchester
UK

8
IMI CCI Sweden
Säffle
Sweden

9
IMI CCI Switzerland
Balterswil
Switzerland

10
IMI Orton
Piacenza
Italy

11
IMI Remosa
Cagliari
Italy

12
IMI STI
Levate
Italy

13
IMI Th Jansen
St. Ingbert
Germany

14
IMI Truflo Marine
Birmingham
UK

15
IMI Truflo Italy
San Nicolo
Italy

16
IMI Z&J Germany
Düren
Germany

Asia

17
IMI Critical Engineering Chennai
Chennai, India

18
IMI Critical Engineering Greater China
Shanghai, China

19
IMI CCI Bangalore
Karnataka
India

20
IMI Critical Engineering Japan
Kobe, Japan

21
IMI Critical Engineering Korea
Paju, Republic of Korea

22
IMI Critical Engineering Malaysia
Kuala Lumpur, Malaysia

23
IMI Critical Engineering Singapore
Singapore

24
IMI CCI SriCity
Andhra Pradesh
India



North America

25
IMI CCI
 Houston
 Texas, USA

26
IMI CCI RSM
 California
 USA

27
IMI Fluid Kinetics
 Kansas
 USA

28
IMI PBM
 Pittsburgh
 USA

29
IMI Z&J Houston
 Texas
 USA

South America

30
IMI CCI Brazil
 Sao Paulo
 Brazil

31
IMI InterAtiva
 Sorocaba
 Brazil

Middle East & Africa

32
IMI CCI Middle East
 Dubai
 UAE

Russia

33
IMI Critical Engineering Russia
 Moscow, Russia

Australia

34
IMI CCI Australia
 Victoria
 Australia

IMI Critical Engineering

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