IMI Critical Engineering

IMI Critical Engineering

The world-leading provider of highly engineered flow control solutions for critical applications

Breakthrough Engineering

Contents

IMI Critical Engineering

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. Our products make dangerous processes safer, as well as more efficient and sustainable. That is why we describe our purpose as 'breakthrough engineering for a better world'.

IMI Critical Engineering'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 Engineering about operating hazardous processes safely, efficiently, and with minimum environmental impact.

Customers come to IMI Critical Engineering because of our expertise in solving process control problems going back well over 100 years. We provide custom made 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.

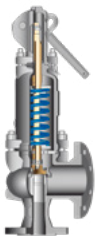
Come and talk to us, or visit imi-critical.com and find out how we can make your plant run more safely, cleanly, and efficiently.

Our market-leading brands

The unique combination of our IMI Critical Engineering product brands 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

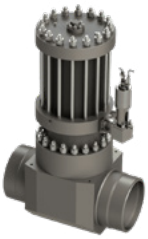


IMI BOPP & REUTHER™

Established over 150 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.

IMI CCI™

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



IMI CCI™

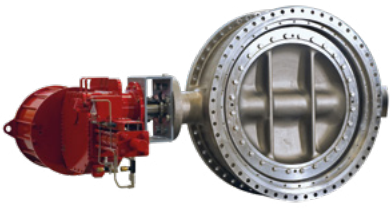
A leading manufacturer of critical service flow control valves for the nuclear industry, with over 60 years' of experience in supplying control valves, isolation valves, and other services.

IMI FLUID KINETICS™

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

IMI NH

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.

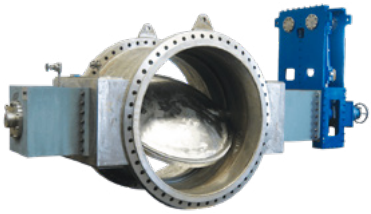


IMI ORTON™

An international leader in the design and manufacture of triple eccentric metal seated valves, concentric and double eccentric butterfly valves, focused on the energy sector, with a recognised expertise in cryogenic valves for LNG.

IMI PBM™

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 of tailor made slide, butterfly, diverter, variable orifice, and withdrawal plug valves and hydraulic actuating systems, specialising in FCC (Fluid Catalytic Cracking).

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 of butterfly, gate and blast furnace valves for the iron & steel, power, and petrochemical industries.

IMI THOMPSON VALVES™

For over 60 years, IMI Thompson Valves has led the way in the energy, nuclear, and defence industries. Offering a world-class portfolio of fluid control products renowned for reliability and productivity.

IMI TRUFLO RONA™

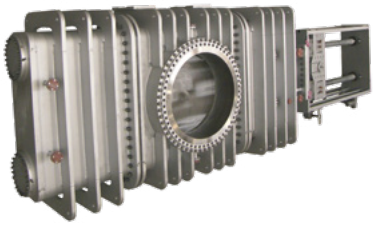
A leading provider of bespoke ball valves for the oil, gas, chemical, and petrochemical industries, used in applications where safety integrity and performance are critical.

IMI TRUFLO MARINE™

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

IMI TRUFLO ITALY™

An international leader in the design and manufacture of top entry, side entry ball valves and double eccentric torque seated valves in the energy, petrochemical, and shipbuilding industries.



IMI Z&J™

IMI Z&J services very high temperature applications with 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.

IMI VIVO POWER TO LIFE

IMI VIVO is the brand name of IMI Critical Engineering's hydrogen and green technology portfolio.

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
- 24-hour demand

Energy is an essential building block for the cities of tomorrow. Our businesses design and deploy the technology necessary to support 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
- Transportation infrastructure for oil pipelines, moving fuel where it is needed

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 production choke valves
- Next generation renewable resources
- Ensuring plants are running at the optimum performance

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

Custom engineered valves for critical processes

Our key customers are the world's largest players in the energy and process sectors

Breakthrough Engineering for a better world

All of IMI Critical Engineering's innovative technology is designed to make a real and positive impact on the world. Working with our customers, IMI Critical Engineering 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.

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 elite team – The Valve Doctors® operate on-site wherever they are needed around the world, diagnosing problems, evaluating process requirements, and optimising configurations.

We serve the following sectors:

- Oil & Gas
- Power
- Hydrogen
- Petrochemical
- Marine
- Sanitary
- Nuclear
- Metals
- Process Industries
- Service & Upgrades
- Pharmaceuticals
- Water

Industry sector

Oil & Gas

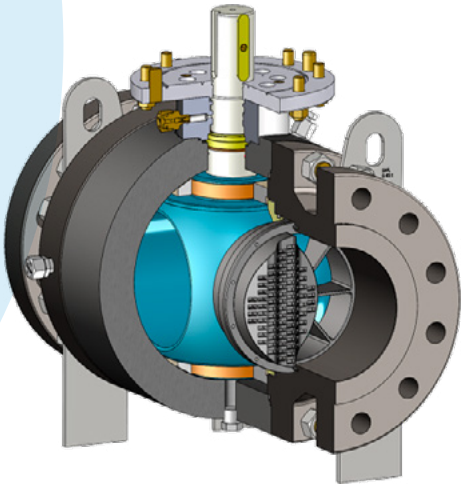
- IMI BOPP & REUTHER™
- IMI CCI™
- IMI CCI™
- IMI FLUID KINETICS™
- IMI ORTON™
- IMI STI™
- IMI TRUFLO ITALY™
- IMI TRUFLO RONA™
- IMI ZIKESCH™

Oil & Gas producing fields have aged such that the field profiles/ mix have changed. Smaller, more remote resources are now being commericalised. This leads to more demanding applications.

Working closely with process licensors and EPCs, our products protect critical plant components. For example, our patented IMI STI actuators gives industry leading response times, accuracy, and reliability. 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.



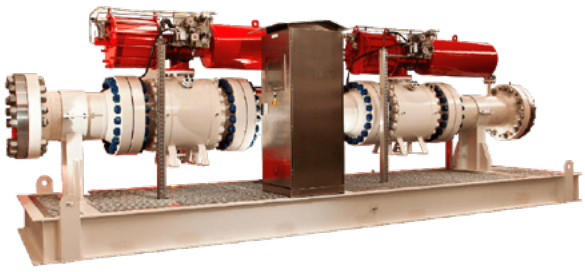
dBX Shield ultilises DRAG® technology to reduce noise and control vibration

High Integrity Protection Systems (HIPPS)

As countries around the world strive to reduce CO_2 emissions and reach net zero, removing the need to flare gas whilst safeguarding systems is even more important. With IMI Critical's expertise, we design HIPPS systems that prevent the burning of excess gas or pressure relief gas, greatly reducing greenhouse gases.

With more difficult fields containing significant levels of H_2S (sour gas), 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 in Italy

designs control and hardware for the system, which we are successfully supplying to fields in the Middle East.



HIPPS ensures your investment and production output is protected

> **"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 ORTON™
- IMI STI™
- IMI TRUFLO RONA™
- IMI ZIKESCH™

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

Supported by our engineers and specialists – with dedicated teams of 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 optimal solution.

IMI Critical Engineering has completed 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.

Critical support for power suppliers

With expanding populations, safe and consistent power supply has never been more important. For a power station in the US that was experiencing temperature control and cracking issues with competitor attemperators, IMI Critical Engineering's swift and successful intervention was crucial to continue production. The customer had tried to resolve the problem by using the competitor's field service engineers, but with no success. IMI CCI Valve Doctors®, concluded that the poor temperature control and safety concerns were caused by water leakage, cracking in the steam pipe, and thermal shock. The engineering team proposed the model DAM-B ring-style attemperator with OP-HT nozzles and 100DSV DRAG® control valves to solve the problem. The customer is now planning to implement the IMI CCI system solution at other plants facing similar issues.

> "We have a large population of DRAG® valves at our stations... your product is the Cadillac of the industry...."
>
> - FPL, Florida Power & Light, USA

Core products and applications

- Turbine bypass
- Startup & main feedwater regulation
- Atmospheric steam dump & steam venting
- Steam Desuperheaters & Attemperators
- Safety valves
- Flashing service applications

Industry sector

Petrochemical and Oil Refining

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

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.

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.

IMI Remosa produces custom made slide and butterfly fate 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. SIL certificate issued by a Third Party Agency is also available. Used in FCC, these are critical products for the conversion of heavy gas oil to gasoline the world over.

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

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.

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

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.

Our wide range of products includes IMI Truflo's top entry wedge ball valve. IMI Truflo Italy also manufactures the C-Rex valve, a double eccentric segmented torque seated ball valve, that is ideal on severe service conditions, especially where fluid media contains dirty particles.

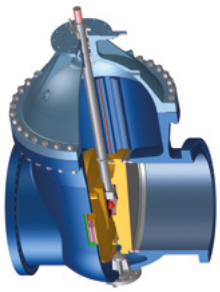
IMI Bopp & Reuther offer a full range of safety and relief valves for processes which support safe and reliable plants..

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 wedge-in-wedge gate valves actuated by IMI Remosa power and control systems.



Wedge-within wedge reactor valve

Core products and applications

- **Delayed coking**
- **FCC**
- **PDH**
- **Ethylene**

Industry sector

Marine

IMI BOPP & REUTHER™

IMI ORTON™

IMI PBM™

IMI REMOSA™

IMI THOMPSON VALVES™

IMI TRUFLO MARINE™

In a 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 effects of seawater. 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.

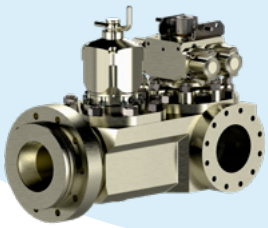
A typical surface ship contains around 4,000 valves, so the quality of the valve components and materials are of vital importance for safe and efficient operations. In the naval marine environment, specifications are even more demanding, as valves need to be able to withstand the extreme shocks that 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 60 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 o ffloading facilities, but they all depend upon high performance valve systems that can withstand arduous operating conditions, including aggressive marine corrosion environments.

IMI Critical Engineering 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.



Double ball hull valve

Inline valve

Over 60 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
- Ball valves
- Garbage disposal units
- Butterfly valves
- Pressure regulators and manifold valves
- Hydraulic actuators

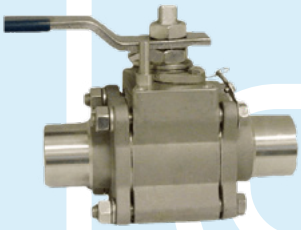
Industry sector

Sanitary

IMI PBM™

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 minimised. 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, 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
- Springless sanitary check valves
- Angle stem flush tank
- Fabflex® Manifold Assemblies
- Self-cleaning ball valves
- Sanitary block & bleed
- Igenix® radial diaphragm tank outlet valves

Igenix®
CLEAN
Valve Solutions
IMI PBM

Industry sector

Process Industries

IMI BOPP & REUTHER™

IMI CCI™

IMI REMOSA™

IMI TH JANSEN™

IMI Z&J™

IMI ZIKESCH™

Across chemical and process industries, safety and reliability are of paramount importance. It is essential for plants to operate without interruption, and that turnaround times for plant maintenance or upgrades are fast and efficient.

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 pressurised systems like pipe systems, pressure vessels, power boilers and reactors, in order to avoid danger to people, plants, 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, codes and standards. IMI Bopp & Reuther safety valves fulfil this for all areas of the world (CE-marking, ASME section I, III and VIIII 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. They are used where the fluid is highly viscous or contains solid fractions that could have a corrosive effect on inner parts. They are also used where there is media with a very high temperature, or where the use of safety valves and lifting devices should protect the environment 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 world class leading products, including BTG technology, IMI CCI are leaders in applications for sugar, ethanol, and 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 is approved by process licensors for the production of oxygen, hydrogen, and other gases.

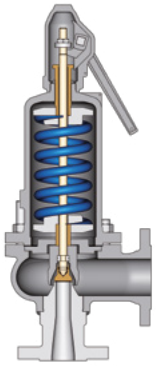
IMI Remosa also supplies large diameter butterfly valves to control the flow of the expander and patented expander isolation valves to allow for safe isolation of the expander unit.

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
- Tailor made gate isolation valves
- Propane desuperheating

Industry sector

Nuclear

- IMI BOPP & REUTHER™
- IMI CCI™
- IMI ORTON™
- IMI STI™
- IMI THOMPSON VALVES™
- 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 and 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.

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 to 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 adding 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 a high pressure and temperature. The sites were subsequently granted 7-year life extensions.

Core products and applications

- Emergency core cooling strainers
- Bellows sealed control & sampling valves
- Main steam isolation valves
- Turbine bypass valves
- Cooling water butterfly valves
- Safety relief valves
- Pressuriser safety valve
- Main steam relief isolation valve
- Feed water control valve

Industry sector

Hydrogen

IMI BOPP & REUTHER™

IMI CCI™

IMI ORTON™

IMI PBM™

IMI REMOSA™

IMI STI™

IMI THOMPSON VALVES™

IMI TRUFLO ITALY™

IMI TRUFLO MARINE™

IMI VIVO POWER TO LIFE

Hydrogen's unique properties make it a powerful enabler for the energy transition from fossil fuels to renewable sources and the decarbonisation of various end-uses.

We are a leader in the valve, actuator, and position control technologies required for the hydrogen value chain from production, storage, and transportation to end-use cases. Meanwhile, with our extensive engineering expertise, we have developed advanced PEM (Proton Exchange Membrane) electrolyser solutions for green hydrogen production.

We serve every part of the hydrogen-related process including electrolysis, steam methane reforming, coal gasification, hydrogen pipeline for transmission and distribution, hydrogen liquefaction, liquid hydrogen carrier, and regasification, as well as the use cases of hydrogen in refinery and petrochemical, ammonia and fertiliser, iron and steel, mobility, and any process where hydrogen is processed and/or used.

Our products increase plant efficiency, safety, and reliability. Our expertise is in handling critical service conditions under extreme temperatures and pressure. We are a trusted partner for the maintenance of customer assets, from service and predictive maintenance to upgrades and problem-solving.

Apart from what we can offer with the existing portfolio, we work closely with our customers in the hydrogen sector to help tackle the most challenging industrial problems. Some examples of what we are focusing on include the efficiency improvement of electrolysis, carbon capture and utilisation, effectively storing and transporting hydrogen, and how green hydrogen or green ammonia can be utilised as fuel for industrial heating, power or propulsion of transportation. By leveraging our engineering expertise in fluid handling in critical service, we are always striving to create value for our customers in the hydrogen value chain.

IMI Liquid Hydrogen Valves

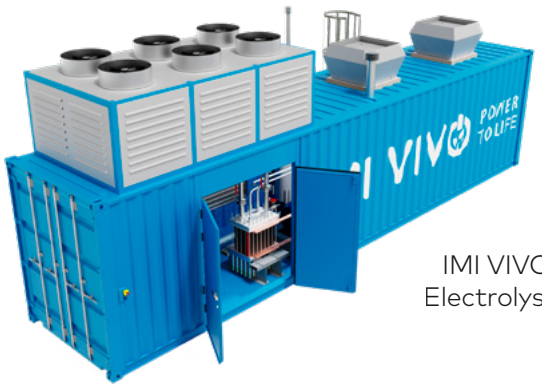
IMI Critical Engineering is a leader in the valve, actuator and position control, and isolation technologies required in liquid and cryogenic gas hydrogen. Our experts understand that the importance of safety in any plant is of paramount importance. Isolation and control valves are critical to plant and personnel to ensure operators are safe performing their daily tasks as well as maintenance when needed.

IMI VIVO Electrolyser

With hydrogen expected to play a key role in the energy transition, growing from 2% to 18% of the energy mix by 2050, IMI Critical Engineering is expanding its portfolio and solutions across the hydrogen value chain. At the heart of its portfolio is the IMI VIVO Electrolyser, which transforms water into hydrogen using renewable electricity – thus creating 'green' hydrogen. It is a 'turnkey' solution – a complete, packaged solution for producing green hydrogen that includes the electrolyser, water distillation, control and storage.

Core products and applications

- Electrolyser
- Liquid hydrogen ESD (Emergency Shut-Down) valves
- Liquid hydrogen ball valves / butterfly valves
- Hydrogen tank globe valves / 3-way valves
- Safety relief valves
- Instrumentation valves
- Control valves
- Isolation valves



IMI VIVO
Electrolyser

Industry sector

Service & Upgrades

IMI BOPP & REUTHER™

IMI CCI™

IMI ORTON™

IMI REMOSA™

IMI STI™

IMI TH JANSEN™

IMI TRUFLO ITALY™

IMI TRUFLO MARINE™

IMI TRUFLO RONA™

IMI Z&J™

IMI ZIKESCH™

IMI Critical Engineering has always prided itself on best-in-class customer support of our products. Our reputation was built on solving customers' problems. This led us to develop the products and services we have today, providing robust and reliable solutions for 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. Crucially, we support commissioning with our field service technicians – whenever and wherever your project is in the world.

We have our in-house field service technician teams, backed up with planners, coordinators, and health & safety personnel 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 the project is managed safely and within budget.

Our field service technicians can also support service and repair on any installed valves and are 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 replacements 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 Engineering 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 of aftermarket support.

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. This provides 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 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.
Remote Assistance through augmented reality technology is available to reach our customer anywhere anytime.

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

The way we work

IMI Critical Engineering has been a leader in innovation in flow control solutions for decades. Our DRAG® technology revolutionised the valve industry and practices in the 20th century. Now, we are harnessing advances in manufacturing, technology, and analytics to make further advances in the 21st. Our dedicated innovation hub applies an accelerator mindset to solving every more complex valve problem. By bringing together a multi-disciplinary team and working in sprints, we can fast-track ideas from concept to solution and deliver 'breakthrough engineering for a better world.'

IMI Critical Engineering's EroSolve range solves erosion problems in industrial process valves

Erosion is a common problem in many industrial processes, caused by extremes of temperature, pressure or the makeup of the materials being processed. Erosion can damage components and cause leakage or clogging, resulting in higher maintenance costs and unplanned downtime.
IMI Critical's EroSolve portfolio of products is designed to fix common erosion problems in industrial valve processes, including flashing and wet steam. Available in a range of angle and globe configurations, using materials resistant to erosion, with specially engineered seals and cages, the EroSolve range improves valve safety, lifespan, and operational performance.

Retrofit3D breathes new life into valves

When operators experience valve problems, they often attribute them to the age of the plant or the components. But often, the problems reflect a change in process conditions, which means the valve components are no longer suitable. In the past, the solution would have been a full valve replacement, with significant costs and disruption. Now, thanks to IMI Critical's innovative Retrofit3D solution, operators can choose to upgrade the valve trim, rather than the valve. Retrofit3D uses '3D printing' (additive manufacturing) to engineer a trim, incorporating IMI Critical Engineering's renowned DRAG® technology, that is customised to the process conditions. This is a speedy and cost-effective solution to many valve problems. IMI Critical Engineering is at the forefront of additive manufacturing, playing an active role in the industry, from the development and testing of materials, parts qualification, to standards development and digital security.

IMI Insyt predicts failures before they occur

Power plants, which historically operated continuously, increasingly supplement renewable power supplies, resulting in frequent stopping and starting of the plant. This cycling puts additional pressure on plant equipment, causing cracking in pipes and valves. This can compromise plant safety and also lead to costly repairs and lost income from unplanned downtime. Now IMI Insyt, a new digital analytic tool, can carry out a sophisticated analysis of plant data, including steam flow, spray-water profiling, and thermal cycling performance, and predict plant failures before they occur. By taking remedial action, operators can avoid unexpected shutdowns, lost revenue, and hazardous working conditions.


BREATHER

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 Austria
Vienna
Austria

4
IMI CCI Brno
Šlapanice
Czech Republic

5
IMI CCI Manchester
Manchester
UK

6
IMI CCI Sweden
Säffle
Sweden

7
IMI CCI Switzerland
Sirnach
Switzerland

8
IMI Orton
Piacenza
Italy

8
IMI Truflo Italy
Piacenza
Italy

9
IMI Remosa
Cagliari
Italy

10
IMI STI
Levate
Italy

11
IMI Th Jansen
St. Ingbert
Germany

12
IMI Thompson Valves
Poole
UK

13
IMI Truflo Marine
Birmingham
UK

14
IMI Z&J Germany
Düren
Germany

Asia

15
IMI Critical Engineering Chennai
Chennai, India

16
IMI Critical Engineering Greater China
Shanghai, China

17
IMI CCI Bangalore
Bangalore
India

18
IMI Critical Engineering Japan
Kobe, Japan

19
IMI Critical Engineering Korea
Paju, Republic of Korea

20
IMI Critical Engineering Malaysia
Kuala Lumpur, Malaysia

21
IMI Critical Engineering Singapore
Singapore

22
IMI CCI SriCity
Andhra Pradesh
India

North America

23
IMI Critical Engineering Houston
Texas, USA

23
IMI Z&J Houston
Texas
USA

24
IMI Critical Engineering Americas
California
USA

25
IMI Fluid Kinetics
Kansas
USA

26
IMI NH
Ontario
Canada

27
IMI PBM
Pittsburgh
USA

South America

28
IMI Critical Engineering Brazil
Sorocaba, Brazil

Middle East & Africa

29
IMI Critical Engineering Middle East
Dubai, UAE

30
IMI Saudi Industry
Dammam
Saudi Arabia

Australia

31
IMI CCI Australia
Victoria
Australia

IMI Critical Engineering
Lakeside, Solihull Parkway
Birmingham Business Park
Birmingham B37 7XZ
United Kingdom

Tel: +44 (0)121 717 3700
Fax: +44 (0)121 717 3701

www.imi-critical.com

IMI Critical Engineering

Breakthrough Engineering

AB01025.01-22en