



Industrial nitrogen gas from generation to application

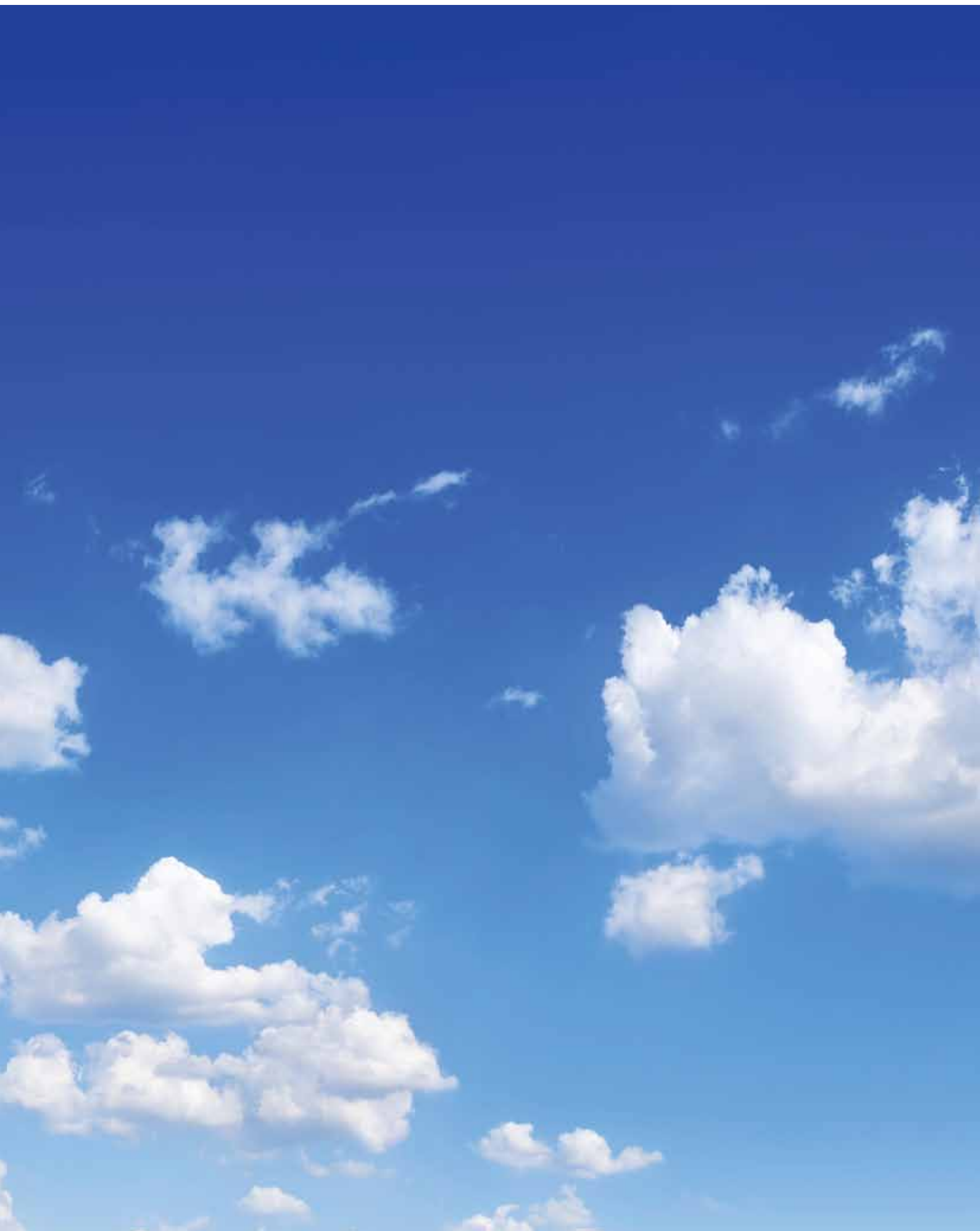
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Filtration, purification and separation is our business

Parker is a world leader in the filtration, purification and separation of compressed air and gases.

Parker specialises in purification and separation technologies where compressed air and gas purity, product quality, technological excellence and global support are paramount. It designs and manufactures compressed air treatment products, gas generators and ancillary equipment for many key industries where ease of integration, low cost of ownership and energy savings can make a real difference.

Nitrogen Gas

Nitrogen gas is used for a wide range of industrial applications, from modified atmosphere packaging for perishable food products, to preventing fire and explosions in chemical plants. However, while nitrogen is all around us, making up 78% of the air we breathe, obtaining a ready supply of the gas can be problematic and expensive.

Parker offers an ideal solution to this requirement with a comprehensive range of cost effective nitrogen gas generation systems that enable users to produce their total demand for nitrogen gas on their premises, under their complete control.



Problems with typical nitrogen supply methods

Obtaining a ready supply of nitrogen gas can be problematic and expensive. Typical supply methods include high pressure cylinders, liquid mini tanks or bulk storage vessels. However, each of these options introduce a range of problems that need to be solved.

When considering an out sourced nitrogen supply, a reliable supplier must be found, valuable space in or outside the company's premises must be allocated and procedures to monitor and manage the supply and arrange delivery and payment of the gas must be made. Additionally, safety and handling concerns need to be taken into account.

The cost of addressing these issues can be high and difficult to budget for, while the price of gas and supplier rates continually increase and the environmental impact of truck based deliveries gain significance.

An ideal solution lies in a range of gas generation systems from Parker, which enable users to produce their total demand for nitrogen gas on their premises, under their complete control. As a result, companies can generate as much or as little nitrogen as needed, at a fraction of the cost of having the gas delivered by an external supplier.



The dedicated, cost effective solution

Nitrogen gas generators allow companies to take control of their own gas supply and reduce their costs considerably.

Integrated nitrogen generation systems from Parker use air from a standard industrial compressor that is essentially 'sieved' so that oxygen and other trace gases are removed, while nitrogen is allowed to pass through to the application.

Air separation is not a new idea, but the design and control features employed on Parker generators help maximise gas output and reduce air consumption to achieve high levels of efficiency.

Taking control of a nitrogen supply in this way, rather than relying on a third party, can reduce costs considerably.

Cylinders, liquid mini tanks and bulk storage vessels present many on-going costs such as rental, refill and delivery, environmental levy and order processing charges. However, once a nitrogen generation system has been purchased, such costs can be reduced by up to 90%.

For instance, if a company using liquid nitrogen switched to gas generation technology, it could expect the new system to pay for itself in typically less than two years, while for a company using cylinders, the payback period could be even sooner; less than 12 months in many cases.

In addition to the cost benefits, nitrogen generation units also offer a more convenient solution compared to external sources.

The compact systems can be installed quickly, easily and with minimum cost and disruption and require only a pre-treated compressed air stream to start production.

The systems eliminate the need for transportation and storage which are essential for external supplies, so they help to minimise the environmental impact of using nitrogen for industrial processes.

Moreover, the systems can help achieve safer working environments as they remove the safety risks concerned with external supplies such as storage, handling and changing heavy, high pressure cylinders.



Technological excellence

Using the latest technology, Parker designs and manufactures hollow fibre membrane and pressure swing adsorption (PSA) nitrogen gas generators to provide a solution for almost all applications that require nitrogen gas.

The Parker range of generators include:



NitroFlow basic membrane nitrogen gas generators



NitroFlow membrane nitrogen gas generators



NitroSource HiFluxx membrane nitrogen gas generators



MIDIGAS PSA nitrogen gas generators



MAXIGAS PSA nitrogen gas generators



A dedicated solution for multiple applications

Nitrogen is a clean, dry, inert gas primarily used for removing oxygen from products and/or processes and is used in a wide range of industries and applications.

Food

Most food products start to deteriorate from the moment they are harvested or prepared for packaging, being under attack from a multitude of spoilage mechanisms. By flushing, storing and/or packing with nitrogen, oxygen that many of these micro-organisms need in order to survive and multiply, is removed and the spoilage process is significantly reduced.

Prepared salads and vegetables, fresh chilled ready meals, meat, poultry, fish, dairy produce (including cheese), breads, coffee as well as snack foods such as potato chips and nuts can all benefit from 'modified atmosphere packaging' (or MAP as it is often referred to).

By using nitrogen gas from a Parker generator, the product shelf life is increased and the appearance and quite often taste, is also improved.

In addition to MAP, nitrogen is also used for 'controlled atmosphere storage' of fresh fruits and vegetables, sparging and blanketing food oils as well as bulk powders, cereals and liquid ingredients.

Beverage

Alcoholic and non-alcoholic drinks and ingredients can suffer similar spoilage mechanisms to food, however one of the most significant threats to product quality is oxidation which adversely affects product taste.

Beer and wine can absorb unwanted dissolved oxygen throughout the production process. In addition, oxygen can also reduce the effectiveness of natural or added vitamin C which may be used in fruit juices.

Parker nitrogen gas generators provide an ideal cost effective solution for all of the processes involved in beverage production including:

- **Blanketing**
- **Sparging**
- **Pressure transfer**
- **Purging**
- **Bottling**
- **Kegging**
- **Packing**





Lasers

Laser Cutting

By far the largest use of nitrogen gas within this industry sector is for CO₂ laser cutting. Nitrogen gas is used as an 'assist gas' to prevent oxidation or discoloration and to blow away the molten material from the cut edge.

It is also used in certain types of laser cutting machine as a 'purge gas' to ensure the laser beam guide path from the resonator (where the beam is generated), to the cutting head, is free of contamination that could otherwise affect the power or alter the shape of the beam.

Laser Sintering

Laser sintering or rapid prototyping uses a laser to form a solid 3D structure within a plastic powder material. Complex shapes and patterns can be constructed and modelled with ease. Nitrogen is used to blanket and prevent oxidation of the powder material while it melts and solidifies to shape under the heat generated by the laser beam.

Laser Ablation

Nitrogen is used to expel fumes and blanket delicate electronic circuits where a laser beam is used to erode pathways on micro printed circuit boards.

Laser Eye Surgery

Nitrogen is used as a beam purge and pneumatics gas on Eximer laser machines which are used in the corrective treatment of eyesight defects.

Parker nitrogen gas generators offer a convenient, safe and cost effective solution for all of these cutting edge processes including 40 bar g continuous output or 350 bar g high pressure storage systems for CO₂ laser cutting applications

Chemicals

The chemical components of products such as paint, dye, resin and varnish can often be flammable, oxidative or both.

Removing oxygen from the storage, manufacture and packing process of such chemicals can help to prevent fire and explosion. It can also help to avoid deterioration of the chemicals' properties, colour index or surface skinning which may be caused through 'oxidisation'.





Electronics

Electronics manufacturers are faced with an increasingly challenging set of criteria due to stringent RoHS and WEEE directives and the developments of safer, more environmentally friendly materials and production processes.

One area where nitrogen is extensively used is soldering, especially with the advent of the new generation of directive compliant “lead-free” alloys.

Parker has considerable expertise in providing nitrogen gas solutions for electronics manufacture including:

- **Wave soldering**
- **Selective soldering**
- **Re-flow ovens**
- **IC production**
- **Quartz crystal oscillators**
- **Forming gases**
- **Burn-in ovens**
- **Deionised water storage**
- **Inert storage of components**

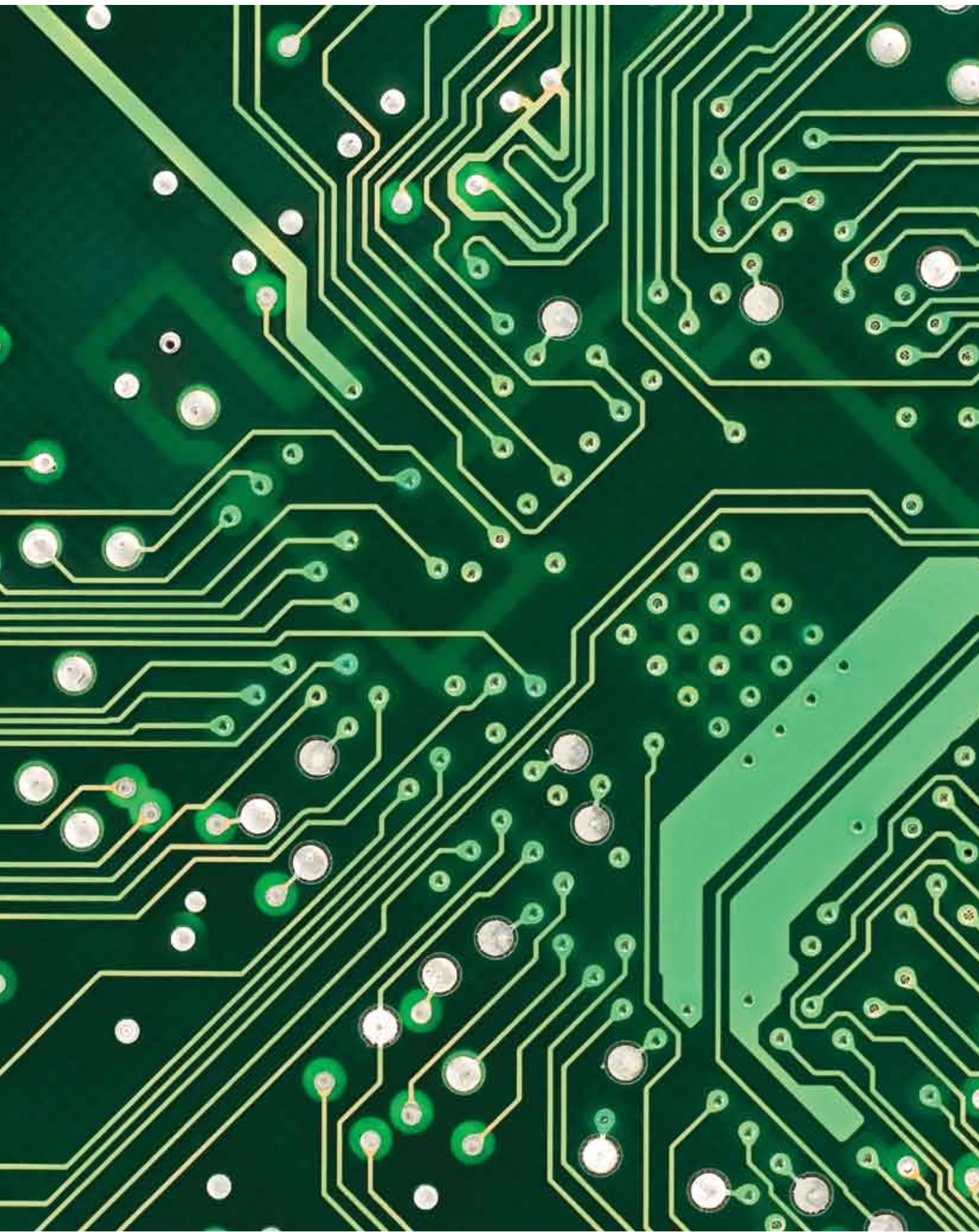
Pharmaceutical, research and academia

Whether in primary or secondary pharmaceutical product manufacture or as a centralised QA laboratory supply; within research establishments or universities and colleges, Parker can offer a solution to suit the critical demands of this industry sector.

For blanketing of pharmaceutical product ingredients and pressure transfer within reactor vessels, to micronising powders to prevent oxidation or explosion, Parker nitrogen generators can cut costs, reduce risk and improve productivity.

Centralised laboratory systems remove the need to have high pressure cylinders within the working environment and the possibility of running out of gas during a QA analysis procedure. Parker nitrogen gas generators are typically used for analytical equipment such as LC/MS, GC, reaction blanketing within fume cupboards, solvent evaporation, ICP, ELSD, NMR and circular dichroism.





Safety in the oil and gas industry

In the oil and gas industry, nitrogen is used to provide a low oxygen environment to prevent possible fire and explosion.

It is used for a wide variety of processes such as purging flammable gas compressor seals, 'pigging' or purging pipe-lines, blanketing storage tanks and vessels, flushing out flaring systems, well-head pressurising and catalytic reactor purging.

Due to their unique design, energy efficiency and compact size, Parker nitrogen gas generators can provide a stable, dependable and high quality nitrogen gas supply for use in some of the most inaccessible areas.

Heat treatment

The oxidisation of materials undergoing heat treatment is a constant problem. Not only can oxygen create an unwanted discolouring oxide layer on the surface of the component, it can affect the molecular properties of the material altering its strength and durability.

Nitrogen gas is commonly used to exclude oxygen from heat treatment furnaces and ovens. Parker can supply nitrogen gas generation systems to replace expensive bulk vessel liquid supplies for many heat treatment processes.

Typical applications include:

- **Belt furnaces**
- **Batch furnaces**
- **Vacuum ovens**
- **Brazing**
- **Carburising**
- **Tempering**
- **Annealing**
- **Gas quenching**
- **Neutral hardening**
- **Normalising**
- **Sintering**

In addition to applications for non-metallic materials such as pressurising autoclaves for Kevlar and carbon fibre based composites.





Aviation

Civil and military aircraft use nitrogen gas within several components. Tyres are generally inflated with nitrogen gas to prevent deflation caused by oxygen permeating through the tyre wall and reduce the risk of fire.

Undercarriage struts are basically an oil/compressed gas spring. Nitrogen is the inert choice for the gaseous component of the spring. The new generation of aircraft, with centre wing fuel tanks, require inert gas blanketing due to more stringent safety regulations.

Air from the engine compressor section is fed to a purpose manufactured Parker nitrogen module to provide a continuous stream of gas to blanket the tank.

In addition to on-board nitrogen, autoclaves used in the manufacture of composite material airframe sections are pressurised with nitrogen gas. Undercarriage and tyre manufacturing / maintenance facilities use nitrogen gas along with escape slide cylinder filling stations.

Fire prevention and archive protection

From the preservation of treasures for the generations after us, to preventing essential data destruction due to fire, Parker nitrogen generators provide a unique solution.

Oxygen depleted air can be pumped into buildings that house treasures and archives or computer stored data to help prevent total loss caused by fire. Museum pieces,

paintings, artefacts, furniture and valuable fabrics can all be protected.

In general, only a modest reduction in normal ambient oxygen levels is enough to prevent fire. At 16% oxygen content, archives are protected whilst intermittent human exposure to these levels will have no adverse effects.

Training and fitness

Altitude training can be of great benefit in certain sports or activities, where it is permitted. Reducing the oxygen levels breathed can, over time, increase the red blood cell count and the body's ability to take up even more oxygen at sea level. One of the main problems can be not living in, or close to, a mountain range area to achieve the desired altitude.

Using a nitrogen generator to provide oxygen depleted air along with a hypoxic enclosure, can simulate training at high altitudes within a sports or research facility. In addition, this type of equipment is also valuable for clinical research which studies the effects of oxygen starvation on human physiology.





OEM partnership

Parker is an ideal partner for developing customised OEM solutions and its gas generation systems can be fully integrated into companies' own system designs.

Parker professionals have the skills, expertise and experience to work closely with company design teams to help significantly add value and deliver optimum results.

As a partner, Parker offers:

- **Intimate, in-depth knowledge of gas generation technology**
- **Knowledge of a wide range of applications and markets**
- **Expertise in integrated system design**
- **Experience in developing customised solutions**
- **Support for integrating the system into business' processes**

Committed to environmental responsibility

Parker is fully committed to its environmental responsibility and it is certified to ISO14001 standards. This means that it is taking steps to minimise its environmental impact; both by the way it conducts business and with the type of products and solutions it offers.

Gas generation offers a real low carbon alternative to traditional methods of nitrogen supply and one that environmentally aware customers may welcome.

A significant amount of energy is wasted through process inefficiencies when considering traditional nitrogen supplies, such as turning air into a liquid at very low temperatures, or compressing gas to high pressures, not to mention the CO₂ emitted from the delivery trucks.

However, Parker nitrogen generators offer a convenient and energy efficient option; producing just the right amount of gas at low pressure and ambient temperature, at the site of the application and without any waste or delivery trucks to consider.



The Parker design philosophy

In addition to nitrogen generation, Parker offers a wide range of high quality compressed air purification solutions which are essential to all modern production facilities. It has built an unrivalled reputation for delivering high quality products which are developed using The Parker design philosophy.



Parker has been supplying industry with high efficiency filtration and purification products since 1963. Its philosophy 'Designed for Air Quality & Energy Efficiency' ensures products

not only provide the user with clean, high quality air, but also with low lifetime costs and reduced carbon dioxide (CO₂) emissions.



Air Quality

Parker has been instrumental in the development of both ISO8573 and ISO12500, the international standards for compressed air quality and compressed air filter testing

respectively. All Parker products are designed to provide air quality in accordance with ISO8573-1:2001, the latest revision of this air quality standard.



Energy Efficiency

In times of increasing energy costs, an efficient and cost effective manufacturing process is a major factor in maintaining the profitability and growth of businesses. All Parker

products are designed to not only minimise the use of compressed air and electricity in their operation, but also to significantly reduce the operational costs of the compressor by minimising pressure loss.



Low Lifetime Costs

Equipment with a low purchase cost may turn out to be a poor investment in the long term. By guaranteeing air quality and ensuring energy

consumption is kept to a minimum, Parker purification products can reduce the total cost of ownership and help improve profitability through improved manufacturing efficiencies.



Reduced CO₂ Emissions

Many countries worldwide are looking closely at their manufacturing industries in an effort to reduce the amount of harmful greenhouse gases released into the atmosphere. The use of electricity has a direct impact

on the generation and release of CO₂. By significantly reducing the energy consumption of its products, Parker can help businesses to reduce their carbon footprint and protect the environment.

After sales service

Businesses need much more than just a supply of high quality products in order to maintain their competitive edge.

Modern production technologies are becoming increasingly demanding on the provision of high quality and reliable solutions.

Products that are manufactured by Parker are designed to meet and often exceed international standards.

As well as the requirement for quality and reliability, there are additional factors to consider when choosing the right service provider for purification and separation systems.

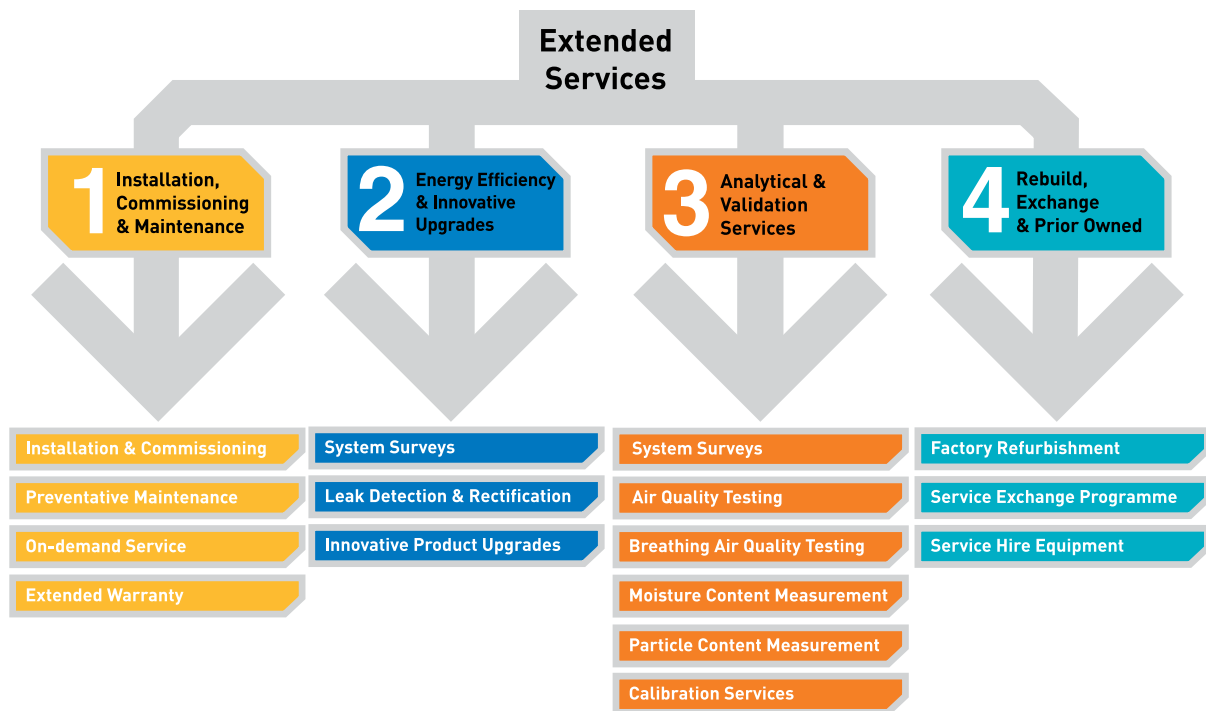
For example, knowledge of the many regulations regarding the management of industrial waste, energy efficiency improvement programmes and environmental considerations.

It is anticipated that future legislations will demand further in-depth technical and knowledge-based support from service providers.

Parker's commitment to industry does not stop with the supply of high quality products. It is also committed to ensuring that its equipment provides a trouble-free service from a bespoke maintenance and verification package – all tailored to specific requirements.

The company offers a wide range of valuable services that will impact positively on businesses production efficiency and product quality, with reduced production rejections and operational costs.

From initial selection to installation, commissioning, preventative maintenance and extended services, Parker is redefining customer service.



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Parker's Motion & Control Technologies

At Parker, we're guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value. Whatever the motion and control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker. For further info call 00800 27 27 5374.



AEROSPACE

Key Markets

- Aircraft engines
- Business & general aviation
- Commercial transports
- Land-based weapons systems
- Military aircraft
- Missiles & launch vehicles
- Regional transports
- Unmanned aerial vehicles

Key Products

- Flight control systems & components
- Fluid conveyance systems
- Fluid metering delivery & atomization devices
- Fuel systems & components
- Hydraulic systems & components
- Inert nitrogen generating systems
- Pneumatic systems & components
- Wheels & brakes



CLIMATE CONTROL

Key Markets

- Agriculture
- Air conditioning
- Food, beverage & dairy
- Life sciences & medical
- Precision cooling
- Processing
- Transportation

Key Products

- CO2 controls
- Electronic controllers
- Filter driers
- Hand shut-off valves
- Hose & fittings
- Pressure regulating valves
- Refrigerant distributors
- Safety relief valves
- Solenoid valves
- Thermostatic expansion valves



ELECTROMECHANICAL

Key Markets

- Aerospace
- Factory automation
- Food & beverage
- Life science & medical
- Machine tools
- Packaging machinery
- Paper machinery
- Plastics machinery & converting
- Primary metals
- Semiconductor & electronics
- Textile
- Wire & cable

Key Products

- AC/DC drives & systems
- Electric actuators
- Controllers
- Gantry robots
- Gearheads
- Human machine interfaces
- Industrial PCs
- Inverters
- Linear motors, slides and stages
- Precision stages
- Stepper motors
- Servo motors, drives & controls
- Structural extrusions



FILTRATION

Key Markets

- Food & beverage
- Industrial machinery
- Life sciences
- Marine
- Mobile equipment
- Oil & gas
- Power generation
- Process
- Transportation

Key Products

- Analytical gas generators
- Compressed air & gas filters
- Condition monitoring
- Engine air, fuel & oil filtration & systems
- Hydraulic, lubrication & coolant filters
- Process, chemical, water & microfiltration filters
- Nitrogen, hydrogen & zero air generators



FLUID & GAS HANDLING

Key Markets

- Aerospace
- Agriculture
- Bulk chemical handling
- Construction machinery
- Food & beverage
- Fuel & gas delivery
- Industrial machinery
- Mobile
- Oil & gas
- Transportation
- Welding

Key Products

- Brass fittings & valves
- Diagnostic equipment
- Fluid conveyance systems
- Industrial hose
- PTFE & PFA hose, tubing & plastic fittings
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects



HYDRAULICS

Key Markets

- Aerospace
- Aerial lift
- Agriculture
- Construction machinery
- Forestry
- Industrial machinery
- Mining
- Oil & gas
- Power generation & energy
- Truck hydraulics

Key Products

- Diagnostic equipment
- Hydraulic cylinders
- Hydraulic cylinders & accumulators
- Hydraulic motors & pumps
- Hydraulic systems
- Hydraulic valves & controls
- Power take-offs
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects



PNEUMATICS

Key Markets

- Aerospace
- Conveyor & material handling
- Factory automation
- Food & beverage
- Life science & medical
- Machine tools
- Packaging machinery
- Transportation & automotive

Key Products

- Air preparation
- Compact cylinders
- Field bus valve systems
- Grippers
- Guided cylinders
- Manifolds
- Miniature fluidics
- Pneumatic accessories
- Pneumatic actuators & grippers
- Pneumatic valves and controls
- Rodless cylinders
- Rotary actuators
- Tie rod cylinders
- Vacuum generators, cups & sensors



PROCESS CONTROL

Key Markets

- Chemical & refining
- Food, beverage & dairy
- Medical & dental
- Microelectronics
- Oil & gas
- Power generation

Key Products

- Analytical sample conditioning products & systems
- Fluoropolymer chemical delivery fittings, valves & pumps
- High purity gas delivery fittings, valves & regulators
- Instrumentation fittings, valves & regulators
- Medium pressure fittings & valves
- Process control manifolds



SEALING & SHIELDING

Key Markets

- Aerospace
- Chemical processing
- Consumer
- Energy, oil & gas
- Fluid power
- General industrial
- Information technology
- Life sciences
- Military
- Semiconductor
- Telecommunications
- Transportation

Key Products

- Dynamic seals
- Elastomeric o-rings
- EMI shielding
- Extruded & precision-cut, fabricated elastomeric seals
- Homogeneous & inserted elastomeric shapes
- High temperature metal seals
- Metal & plastic retained composite seals
- Thermal management



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