James Walker at the heart of the oil & gas industry

James Walker has long been committed to the provision of sealing solutions for the upstream and downstream oil and gas industries.

As the technology employed to exploit natural resources has developed, the materials and products used have likewise had to evolve in order to provide essential reliability under increasingly arduous operating conditions.

Over the years James Walker has invested in the necessary infrastructure with advanced manufacturing facilities and test laboratories, supported by technologists and engineers, offering maximum production flexibility.

Our staff work closely with many of the world’s major oil companies and original equipment manufacturers to develop sealing solutions that deliver optimum performance in a range of hostile operating environments.

This philosophy has fostered the constant development of improved materials, processes and new generations of products that push forward the boundaries. Our comprehensive research, development and testing programmes ensuring that each design or material innovation is verified and validated to industry and customer-specific standards.

By this means, and through bringing new companies with complementary technology, design and manufacturing skills into the James Walker Group, we have maintained and enhanced our reputation as a world leader in the materials and design technology behind the engineering solutions required by today’s oil and gas industry.

With key hubs located in the UK, Norway, Brazil, Singapore and Houston, James Walker provides a true global service with the added benefit of local representation and technical service.
Introduction

The core principle of James Walker is of challenging convention. The fact that something is done in a certain way does not necessarily mean that a better way can’t be found… and with this ever present thought in mind our engineers begin their work.

Leveraging the inherent strengths and properties of thermoplastic materials, our engineers seek to replace and improve upon the performance levels of existing components manufactured in materials including bronze, brass, hardened steel, laminates and incorrectly specified low performance plastics.

In addition to manufacturing superior performance components, we offer an exclusive “idea to innovation” service. Working in tandem with clients, the company’s engineering teams explore unique solutions to engineering problems, combining technical expertise, project management and state of the art equipment to offer optimal solutions to difficult application problems.

Serving a global industry

James Walker is able to place its products and facilities at the disposal of operators and OEMs through 50 production, engineering, distribution and customer support locations spread across Continental Europe, Australia, New Zealand, SE Asia, South Africa, South America and the USA. These are supported by a further network of James Walker Group companies and official distributors supplying products and services to over 100 countries.

The thermoplastic materials science, products and expertise developed across a range of diverse industries are now an integral part of the James Walker offering, providing additional solutions and new approaches to solving critical engineering issues for industry, end-users and OEMs.

Our expertise in engineering plastics creates an additional dimension within the James Walker portfolio of sealing solutions and engineering products. Increasing the available options in some applications and elsewhere extending the James Walker service into new areas. These unique abilities are now backed-up by the group’s dynamic international e-commerce systems, logistics operations and technical facilities that provide customers with the surety of supply they require.
Design & prototyping

Through our innovative approach we identify areas where our materials will offer performance improvements and cost savings. The relevant grade of material is then selected, based on the requirements of the application, before using CAD technology to model and design components.

We work in partnership with clients throughout the development process until the design is signed off and transferred to the manufacturing floor, where our bespoke facilities allow us to cast and machine individually tailored products capable of performing in the most demanding subsea environments.

Where necessary, designs are first manipulated and modified using 3D solid modelling techniques to reduce the necessity for early prototypes and help reduce development costs. James Walker also has the facility to carry out finite element analysis and kinematic simulation, which allows components that are intended to fit within other assemblies to be validated at the design stage before any investment in tooling.

Application of these techniques not only allows new designs to be optimised in the most cost effective manner, but can also be used to troubleshoot and improve existing components.

Manufacturing capabilities

James Walker's strength lies in its total control of the entire production process, from initial design through to the end of the manufacturing process, every step is undertaken and controlled in-house.

James Walker exercises complete control over the formulation and compounding of the basic materials from which its products are manufactured. Devlon® thermoplastic materials are mixed at the point of casting using modern techniques which allow instantaneous switching between formulae and colours of materials being cast. This facility offers optimal production flexibility and allows rapid reaction to urgent requests without unduly disrupting the manufacturing process.

The casting process differs from injection moulding and extrusion in that it produces a material by polymerisation directly in the mould.

Polymerising in the mould produces a material with higher molecular weight and crystallinity. This in turn leads to improved dimensional stability, easier machinability and higher compressive and tensile strengths than those achieved by extruding or moulding.
The process of polymerisation produces a chemical chain reaction to form Devlon®. Devlon consists of three main components: the raw material caprolactam plus an activator and a catalyst which are required to control polymerisation. Additives, such as plasticisers, lubricants and heat stabilisers, can be used to modify or improve the material's performance.

The technology behind these additives is what differentiates Devlon from the competition. The dosage of additives influences the reaction. By varying the volume of components and additives in the mix, our technologists produce materials with specific properties to suit the requirements of each customer application.

Control over the initial casting or billet material provides the ideal starting point for the machining process. Our state of the art machining facilities provide the most expedient and cost effective component production, adding to the speed and flexibility of the whole manufacturing or design to application process.

Dimensional stability within close tolerances for complex components is achieved by interstage annealing, which guarantees that the components delivered to our customers are safe, reliable and will achieve their maximum life expectancy.

Operating a process-based management system within a lean manufacturing framework and actively supporting a culture of continuous improvement, James Walker recognises that quality is of the highest importance.

Extensive quality checks are carried out at all stages of manufacture, from incoming raw materials through casting batches and every step of the machining and finishing process to ensure that the finished product measures up to design criteria, customer specifications and any relevant industry standards. Where necessary, third party witness testing, application testing and destructive testing are carried out at a range of registered facilities.

The company is certified to, and operates within, the scope of BS EN ISO 9001:2008 and the Environmental Management Systems BS EN ISO 14001:2004 standard.

Specific to the oil and gas industry James Walker is a fully registered company under the FPAL (First Point Assessment Limited) database scheme.
The Devlon® range of thermoplastics has distinct advantages over other materials...

Devlon® thermoplastic materials are amongst the toughest and hardest wearing available. Produced by monomer casting and extrusion, they provide a comprehensive range of wear resistance, impact strength and toughness with almost limitless application potential.

The advantages are clear:
- lower cost
- 1/6th the weight of bronze
- zero corrosion
- low friction
- resistant to shock loading
- significantly improved lifespan
- exceptional resistance to wear
- does not support marine growth

A range of materials capable of tackling the toughest applications...

Devlon®
Devlon® is designed to solve the problems of wear, corrosion and lubrication, directly replacing traditional engineering components manufactured from materials such as bronze, brass, hardened steel, laminates and incorrectly specified low performance plastics.

The material can be produced by extrusion or monomer casting, providing a comprehensive range of impact strength and moisture absorption properties. These properties are linked to the molecular weight; the higher the value, the greater the toughness and wear resistance of the material.

In addition to offering substantial benefits over traditional materials, our components are manufactured precisely to customer specification and as such are directly interchangeable with existing parts.

Devlon® T100 is our proprietary cast material which covers a wide range of applications. With its inherently stress free and excellent wear properties, low friction and improved impact strength, it is a proven work horse in a range of applications and industries.

Typical applications include bushes, crane sheaves, rollers/wheels, racks and pinions, clamps and bearing rings.
**Devlon® S Grade** has the highest molecular weight which gives superior mechanical properties, rendering it our premium engineering grade thermoplastic. Particularly suited for larger sized components, it yields optimum performance in rigorous and abrasive applications at ambient temperatures.

Typical applications include bearings, rollers, pulleys, thrust plates, seal rings and gears.

**Devlon® V-API** gives similar performance levels to S-grade, but has been specifically tailored for high temperature/high pressure applications. Dimensional stability is a particular feature of this material due to its particularly low moisture absorption, making it ideal for offshore applications where weightsaving, non-corrosive and impact wear properties are imperative.

Typical applications include valve seat inserts, bundle spacers, tubing hanger centralisers, cable protectors and hot stabs.

**The Devlon® V-API material is marketed by James Walker in China under the product name JW DV-API.**

**Devlube®** is a self-lubricating material ideally suited for dry-running applications requiring low friction where lubrication is not possible. Reduced wear through lower friction means excellent retention of physical properties and very little maintenance is required for this material.

Typical applications include wear pads, cam followers, worm screws, bearing blocks and conveyor components.

**Devlon® A153** is a specially formulated high viscosity Nylon 6/6, giving superior wear characteristics, improved impact strength and rigidity, providing greater design reliability when strength, weight and size are critical.

A153 has a significantly lower linear coefficient of thermal expansion than standard grade Nylon 6/6 and therefore maintains dimensional tolerances and clearances more accurately in applications involving thermal cycling.

A153 has a maximum operating temperature of between 90°C and 120°C, compared to 85°C for standard grade Nylon 6/6.

Typical applications include journal bearings, thrust washers, bearing cages, rollers/wheels, piston seats and wear pads.

In addition to our Devlon® range of specifically formulated materials and where applications dictate, James Walker can supply over 50 different materials including:

- **Polypropylene** – low density (buoyant in water), excellent chemical resistance, good electrical insulator, low tensile strength and elastic modulus.

- **UHMWPE** – exceptional toughness, low friction, high impact strength, good abrasion resistance.

- **Acetal** – reasonable load capacity, easily machined, dimensional stability, high strength and stiffness.

- **PTFE** – chemically inert, wide temperature range, low friction, limited load capacity, high thermal co-efficient of expansion.

- **PEEK™** – good radiation resistance, high operating temperature, good electrical properties, chemical resistance, good load bearing, but can be expensive.

*PEEK™ is the trademark of Victrex plc.*
## Material technical data

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<tr>
<th>ASTM Specification</th>
<th>Physical Property</th>
<th>Units</th>
<th>DEVLOX® T100</th>
<th>DEVLOX® S GRADE</th>
<th>DEVLOX® V-API</th>
<th>DEVLOX® A153</th>
<th>DEVOLUBE®</th>
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Notes:
1. This is not an extensive list of the materials available but is merely a summary of the properties of the most commonly specified grades. For filled or alternative grades please contact James Walker.
2. The test figures stated are typical values and their aim is to assist the specifier in material selection. They are not intended to represent exact specifications.
3. • Denotes no data available at the time of publication. Please contact James Walker for further information.
Material technical data

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SE = Self Extinguishing
WR = Water Repellent

PEEK™ is the trademark of Victrex plc.
A history of successful innovation

Clamping systems

**Riser clamps**
- Vast weight reduction when replacing steel
- Does not support marine growth
- Single operative assembly
- Cost reduction versus steel
- Zero corrosion

**Umbilical clamps**
- Lightweight
- Cost effective
- Simple and quick installation
- Ensures adequate support for umbilical
- Enables simple running of umbilical in congested area

**Piggy back clamps**
- Lightweight
- Robust construction
- Easy to assemble
- Corrosion free
- Tailored to line dimensions

**Pipe handling clamps**
- Vast weight reduction when replacing steel
- Corrosion free
- Easy to assemble
- Cost reduction versus steel
- Robust construction
- Impact resistant
Pipelines / Flowlines

Flowline bundle spacers
- Replaces traditional steel spacers
- Reduced weight, reduced cost
- Exceptional wear resistance at pull through
- Low thermal conductivity
- Maximum utilisation of restricted space
- Zero corrosion

Pipe-in-pipe centralisers
- Low thermal conductivity
- Exceptional creep characteristics – even at elevated temperatures
- Excellent abrasion resistance
- Low drag co-efficient at pull through
- No measurable deflection on reeling trials

Complex casting / machining

ROV buckets
- Does not support marine growth
- Impact resistant
- Reduced cost versus metal options
- Long life
- Robust construction
- Significant weight reduction when replacing metal
- No painting or coating required
A history of successful innovation

Valve seats

Extensive testing carried out at the University of Leeds in the UK and by leading global valve OEMs, compared the performance of Devlon® V-API against a range of the most common thermoplastic materials used in valve seat applications.

Devlon® V-API offers better performance than standard polyamides or PTFE and is significantly more cost-effective than PEEK™

The benefits of Devlon® V-API valve seats

- Single material specification replaces a range of thermoplastics
- Superior pressure / temperature operating range in comparison to PTFE or Nylon 6
- Available in diameters from 1/2” (12mm) to 77” (1950mm)
- Available in billet form or as semi-finished or fully machined valve seats
- Excellent ‘machineability’ allows creation of desired surface finish
- Proven in operation at a pressure of 414bar (6000psi) at +176°C (350°F), subject to valve and seat design
- Low moisture absorption level enhances dimensional stability
- Superior dimensional stability over PTFE in high pressure applications
- Lower frictional losses than PEEK™ products
- Exceptional resistance to wear and abrasion
- Sufficiently conformable to seal in low pressure valve applications
- Excellent life performance in soft valve seat application

The Devlon® V-API material is marketed by James Walker in China under the product name JW DV-API.
James Walker
Advanced elastomer science

With James Walker you have access to leading edge development in elastomeric sealing products.

Our in-house capabilities and expertise extend from materials chemistry and applications engineering, through prototyping and manufacture, to some of the most comprehensive testing facilities currently available.

Our ability to carry out exhaustive RGD testing and simulate operational conditions in extreme environments helps ensure James Walker elastomeric sealing solutions remain at the forefront of sealing technology within the oil and gas industry.

James Walker
Tension control technology

RotaBolt® is alternative engineering at its very best.

Replacing traditional engineering practice, this unique product guarantees installation to a pre-set tension and continues to accurately measure the tension maintained across the bolted joint.

Providing a simple visual or tactile check of tension, RotaBolt technology has been instrumental in improving safety and reducing maintenance costs and is fast becoming the industry standard bolting system for critical applications in harsh conditions.
Products & services

James Walker
Metallic gaskets & specialist machining

James Walker has over 40 years of experience in the production of API metal ring joints and other metallic gasket products. The proven reliability of these items, displayed by their ability to operate the full oilfield life cycle, is at the heart of our success. For the past 25 years, the company has developed special in-house machining techniques for the production of precision components from high-nickel and standard alloys for the OEM market where innovation and long-term reliability are imperative.

James Walker
Custom expansion joint service

Our focus is on optimising the life and performance of expansion joint technology.

From on-site thermographic surveying through design, materials selection and testing to manufacture, our design and production teams ensure that our field installation engineers will be installing a bespoke solution that will exceed performance and reliability expectations, whatever the location or operational...

James Walker
Vibration attenuation & isolation

As a James Walker Group company, Tiflex has over 50 years of experience in the manufacture and distribution of a wide range of polymer based materials and components, specialising in the manufacture of products which are made from cork-elastomer composites.

The company's in-house research facilities are a centre of excellence for the development of solutions to eliminate vibration and sound transmission.

To order or for further details, call your local contact shown on rear cover or listed at www.jameswalker.biz
Confidentiality

Because of the confidential nature of much of our proprietary work, we willingly sign confidentiality agreements with our clients, and honour these agreements without exception.

Information

Health warning: If PTFE or fluoroelastomer (eg, FKM, FFKM, FEPM) products are heated to elevated temperatures, fumes will be produced which may give unpleasant effects, if inhaled. Whilst some fumes are emitted below 250°C from fluoroelastomers or below 300°C from PTFE, the effect at these temperatures is negligible. Care should be taken to avoid contaminating tobacco with particles of PTFE or fluoroelastomer, or with PTFE dispersion, which may remain on hands or clothing. Material Safety Data Sheets (MSDS) are available on request.

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