Flexitallic®

INTEGRITY SERVICES

MAKING THE WORLD SAFER AND CLEANER THROUGH ENGINEERED SEALING SOLUTIONS

www.flexitallic.com

The Flexitallic Group

FLEXITALLIC ENGINEERING SERVICES

CREDIBILITY

Est. 1912

OVER 100 YEARS
OF SEALING INNOVATION

50+
INDUSTRIES SERVED

10 **WORLDWIDE**
MANUFACTURING LOCATIONS

30+
GLOBAL
APPLICATION
ENGINEERS

QUALIFIED ENGINEERS
CEng, BSc (Hons), IMechE, PEng, MSc, HNC

13
PRODUCT
PATENTS

2 **R&D**
TEST LABS
UK & USA

QUALITY STANDARDS
ISO, OHSAS, API

24/7
CALL-OUT
SERVICE/SUPPORT

TECHNICAL PAPERS & SPEAKERS
NACE, ASME PVP, AICHE, HEAT EXCHANGE ENGINEERING

OVER
200
SITE AUDITS
CONDUCTED
ANNUALLY

5 **UK ACCREDITED**
AJI TRAINING
CENTRES

NORTH SEA
SAFETY CERTIFIED
BOSIET/MIST

2020
10,000

GASKET DESIGN, SPECIFICATION & EXCHANGER REVIEWS
PROVEN PROBLEM SOLVER

1 **ECITB**
APPROVED
TRAINER

DEDICATED REFINERY TEAM

5 **IChemE**
APPROVED
TRAINING COURSES

STATE OF THE ART
TRAINING RIGS
- FADU

MEMBERS OF
ESA, STEP CHANGE, EIC, NOF, NEPIC, EEMUA, FLMUG

COMMITTEES & GROUPS:

- ASME PCC-1-2019 Research & Development Group
- BSI PSE/015 Flanges Jointing materials – committee member
- Member of CEN TC 74 working group 8 (Convenor)
- ASME B16 standard, subcommittee G (Gaskets), active participating members
- Chairman of ASTM F03 Gasket Committee
- RCC-M standards committee members
- ESA Committee Member

Flexitallic

WHY FLEXITALLIC?

FLEXITALLIC IS THE MARKET LEADER IN THE MANUFACTURE AND SUPPLY OF STATIC SEALING SOLUTIONS, DELIVERING HIGH-QUALITY INDUSTRIAL GASKETS AND PROVIDING SUPPORT AND ENGINEERING SERVICES ON A GLOBAL SCALE.

The Flexitallic Group is committed to its mission of

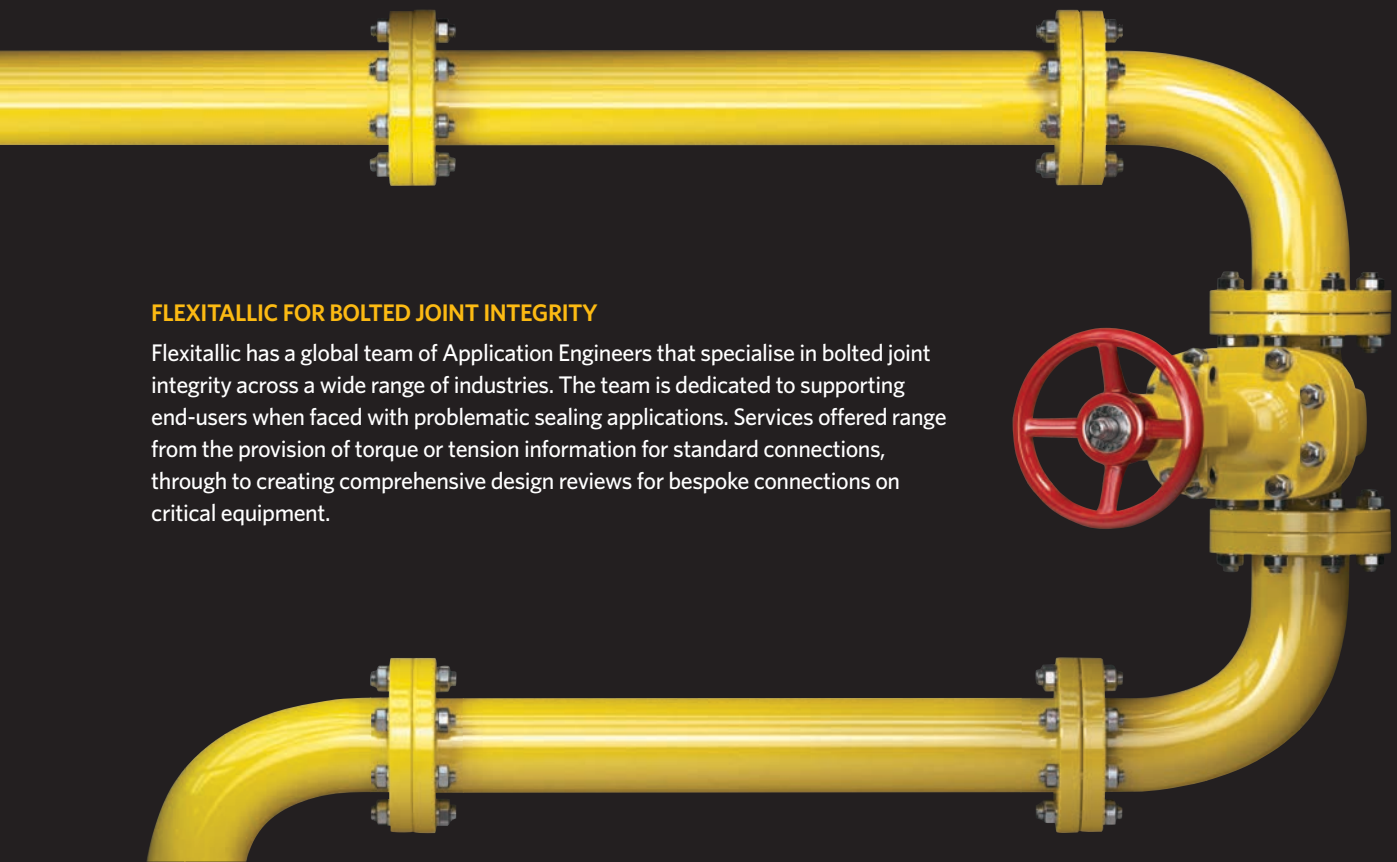
"Making the world safer and cleaner through engineered sealing solutions".

Flexitallic strives to provide best-in-class sealing solutions enabling customers to operate their plants, complete projects, and start-up from turnarounds safely and efficiently. The goal of Flexitallic is to help customers achieve leak-free start-up and operation within the scheduled maintenance cycle.

FLEXITALLIC FOR GASKETS

Since inventing the spiral wound gasket in 1912 Flexitallic has focused on innovation and continues to create new products that overcome evolving challenges encountered when sealing in industrial processes. These include materials to remain gas-tight at extreme temperatures such as Thermiculite®, remain stable in aggressive chemicals such as Sigma®, to offer resilience in thermally cycling applications such as Change® and provide class-leading flange isolation with products such as ISOFLEX™. By drawing upon extensive experience and applying this to present-day values of safety, quality, continuous improvement, teamwork, integrity and performance, Flexitallic remains at the forefront of developing sealing solutions for industries around the world.

The Flexitallic reach extends around the world with manufacturing and engineering services offered through a global network. In addition, Flexitallic has an Allied Distributor programme, ensuring that customers can access Flexitallic products and engineering services wherever they are needed.



FLEXITALLIC FOR BOLTED JOINT INTEGRITY

Flexitallic has a global team of Application Engineers that specialise in bolted joint integrity across a wide range of industries. The team is dedicated to supporting end-users when faced with problematic sealing applications. Services offered range from the provision of torque or tension information for standard connections, through to creating comprehensive design reviews for bespoke connections on critical equipment.

FLEXITALLIC IS RECOGNISED AS THE **INDUSTRY LEADER** IN THE PROVISION OF INDUSTRIAL SEALING RELATED ENGINEERING SERVICES.

FLEXITALLIC APPLICATION ENGINEERING

GLOBALLY, FLEXITALLIC EMPLOYS OVER THIRTY DEGREE QUALIFIED APPLICATION ENGINEERS, WITH SIX CURRENTLY BASED WITHIN THE UK COVERING MECHANICAL AND CHEMICAL DISCIPLINES.

Flexitallic's engineering design proposals are based on a sound understanding of the requirements of recognised pressure vessel and pipework standards such as ASME BPVC VIII and ASME B31.3. As a consequence, design validation is supported with industry-recognised calculations such as BS EN 1591-1, ASME VIII Div 1 App 2, ASME PCC-1 App O and EN 13445-3 amongst others. Such an analytical approach allows Flexitallic to help customers identify opportunities to increase plant process efficiency and minimise maintenance costs.

APPLICATIONS TEAM

Dene Halkyard
Technical Director
Dene has been creating technical sealing solutions for over 35 years and still enjoys the challenge of solving problematic sealing applications, that are both technically sound and cost-effective. With an industrial chemistry background, Dene brings an alternative discipline to the development team as they seek to create solutions to sealing issues on a global scale. Dene is an active member of both British and European standards committees and as such plays a pivotal role in supporting Flexitallic customers with vital information on quality and technical specifications.

Richard Rodgers
Senior Applications Engineer
Richard's early career was focused around fluid transmission and mechanical design before moving on to positions in project and engineering management. As an experienced member of the Applications Engineering Team, Richard brings with him a wealth of sealing related knowledge, with a proven track record of resolving complex sealing issues. Richard plays a key role within the group providing technical and engineering support to meet the requirements of Flexitallic customers.

Vinay Tripurana
Applications Engineering Manager
Vinay oversees the Flexitallic UK Applications Engineering Team which provides comprehensive technical support and training to our global customer base and helps in strengthening Flexitallic's position as a leading supplier of sealing products and engineering excellence. Vinay is a Chartered Mechanical Engineer with Masters' degree in Manufacturing Systems and has several years' experience in providing engineered solutions to a wide range of industries including automotive, fabrication and sealing technology. Vinay and the team have both the qualifications and the expertise required to support the company's diverse client base.

Matthew Dentith
Applications & Systems Improvement Engineer
Matthew complements the Application Engineering Team with his hands-on experience and problem-solving skills. Qualified to HNC level in mechanical engineering Matthew brings with him 10 years experience in manufacturing in the automotive, aerospace and marine industries. A valued member of the team Matthew has a wealth of expertise in dealing with complex sealing issues across various industries.

Shaid Rahman
Applications Engineer
With more than a decade's experience in the sealing industry, Shaid has a particular specialism in Flexitallic product manufacturing capabilities, developing product costing tools to support customer services. Shaid's analytical and process-driven capabilities have been honed during his time at Flexitallic following his earlier career in the pharmaceutical industry.

Gary Milne
Academy Training Director & North East Business Development Manager
Gary's early career involved Application Engineering and Technical Lead for a major energy company focused on Hydrocarbon Offshore Integrity Management. Gary founded the *"Academy of Joint Integrity"*- Flexitallic UK Training Division - and is a member of IMECHE /ASME, also an EEMUA Lead Representative. Site visits to supervise gasket installations and propose/ deliver training and flange management systems to control Loss of Containment issues are in demand. Extensive knowledge of the Bolting /Training Industry underpin the Application team capability.

Josh Tillotson
Applications Engineer
Josh adopts a hands-on approach to engineering challenges, supported by his extensive experience of mechanical assembly, fitting, and pressure testing. Having graduated with a first in Mechanical Engineering, he gained six years' experience in valve design, project management and prototyping working with several companies operating in the Oil & Gas sector. Josh has the necessary aptitude to support the business with high-level technical information, as well as ensuring clients can maximise the performance of Flexitallic products.

BS EN 1591

WHAT IS BS EN 1591?

BS EN 1591 IS A SET OF EUROPEAN STANDARDS, SPECIFICALLY DESIGNED TO MINIMISE EMISSIONS FROM THE BOLTED FLANGED CONNECTION. THIS IS ACHIEVED THROUGH THE USE OF SOPHISTICATED CALCULATION AND STRUCTURED TRAINING OF PERSONNEL RESPONSIBLE FOR THE CLOSURE AND INTEGRITY OF BOLTED CONNECTIONS.

WHAT IS BS EN 1591-1?

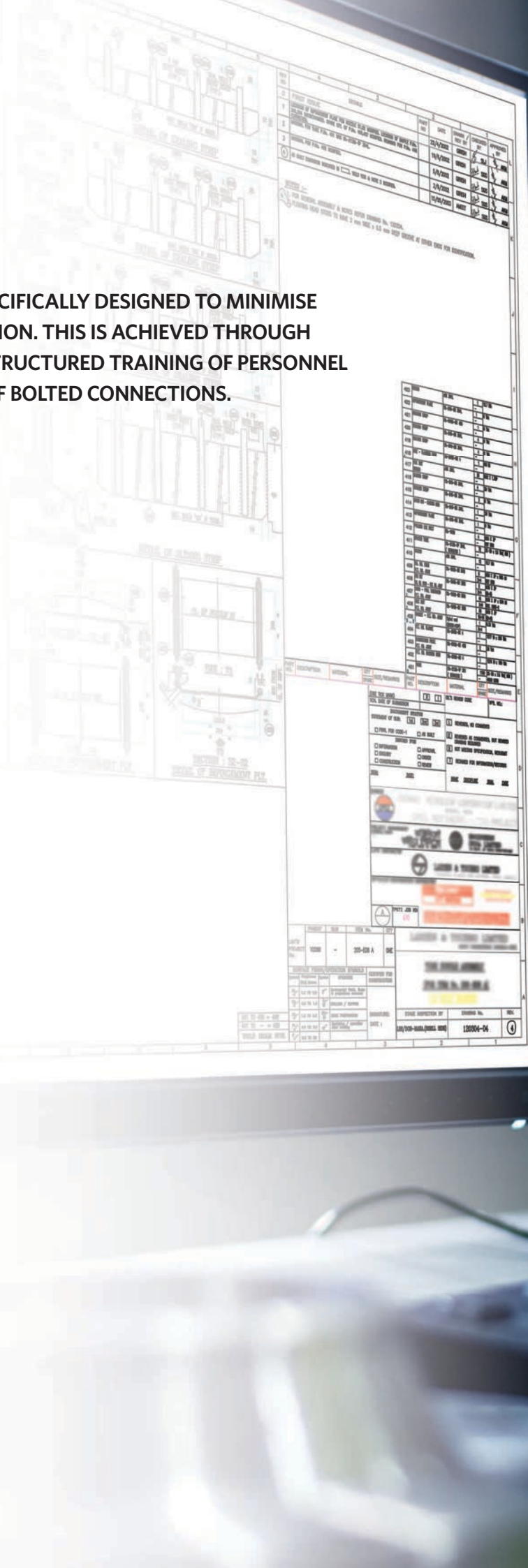
BS EN 1591-1 is a bolted joint calculation. Its purpose is to ensure structural integrity and control of leak tightness. The calculation is designed to satisfy the requirements of both strength and leak criteria.

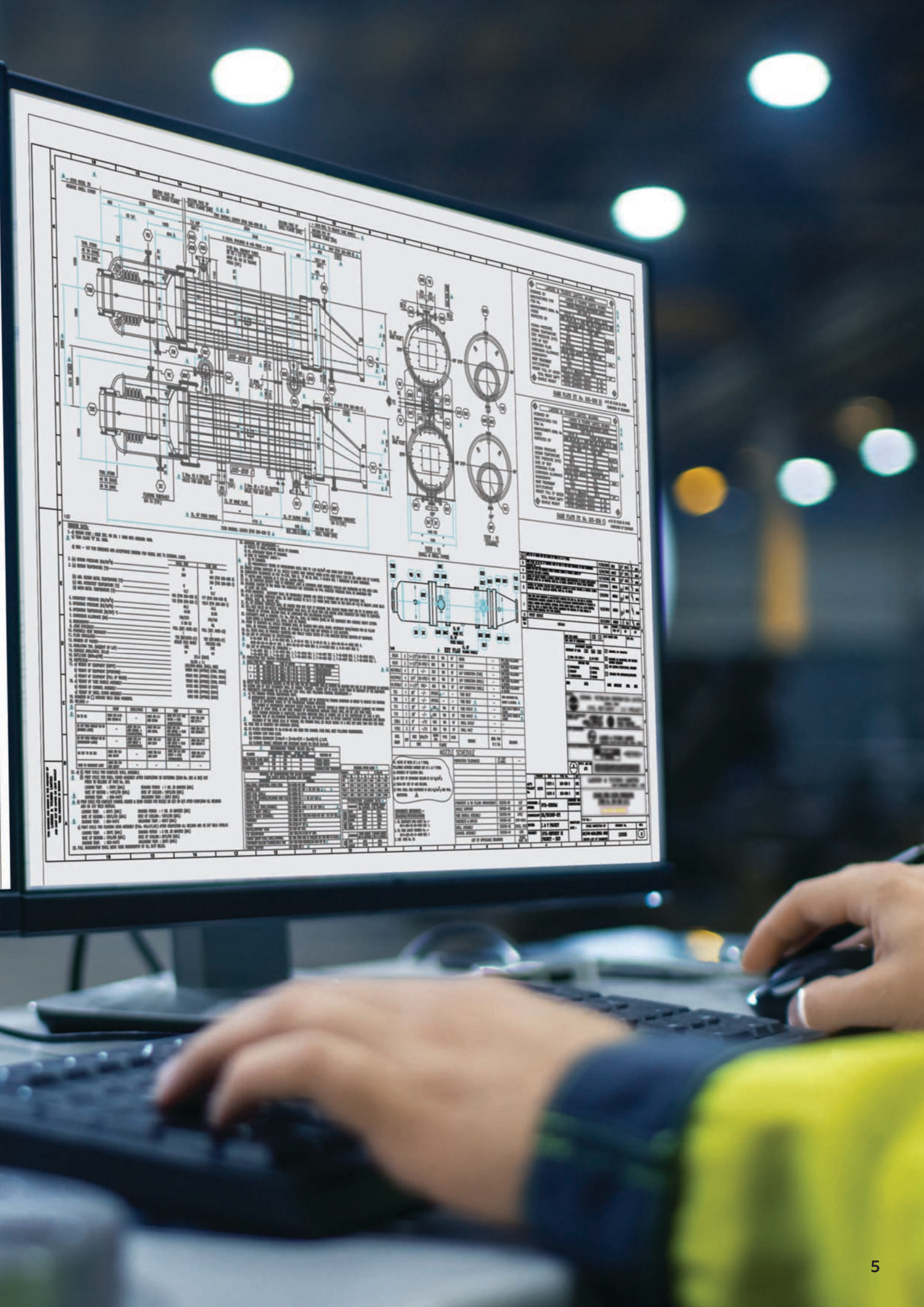
The bolted connection is a complex mechanical entity. Ensuring integrity through calculation requires the consideration of many interrelated factors under all relevant load conditions; assembly, working, design and test. It is only when the bolted connection is considered in this holistic way that joint reliability and safety can be maximised.

The current version of BS EN 1591-1 represents the latest bolted connection calculation methodology. It differs significantly from mechanical compliance calculations found in many pressure vessel codes such as ASME VIII Division 1, BS PD5500 and BS EN 13445. It also offers benefits over pseudo integrity calculations such as those currently found in ASME PCC-1 Appendix O, and the draft Pressure Vessel Research Council (PVRC) Convenient Method.

BS EN 1591-1 considers all mechanical elements in the connection (flanges, bolts and gasket) under all load conditions and, when appropriate, external forces acting on the connection. Elastic interaction between all elements, with allowance for plastic deformation of the gasket, are reviewed. Joint tightness requirement is quantified by the assignment of a leakage class.

Such a sophisticated approach requires detailed knowledge of gasket behaviour within the service envelope of the bolted connection. This is achieved through gasket characterisation following BS EN 13555. Gasket factors related to fundamental gasket behaviour such as leakage, creep, compressive strength and modulus are required for the accurate modelling of connection performance. Flexitallic has the inhouse capability for determining gasket characterisation for all gasket styles across a wide envelope of application conditions.





EQUIPMENT CONNECTION OPTIMISATION (BS EN 1591)

WHY USE BS EN 1591-1 OVER OTHER CALCULATION METHODOLOGIES?

When considering pressure vessels Flexitallic engineers understand and are aware of the impact that changing gasket style, geometry or materials can have on complying with mandatory pressure vessel design code. To this end, Flexitallic Application engineers routinely undertake relevant mechanical compliance calculations when proposing alternative sealing solutions. However, such calculations have little or no bearing on how the connection will perform in service. By supplementing this approach with BS EN 1591-1 not only is code compliance verified but optimised connection integrity is assured.

Studies have shown that the application of the highest closure force within the elastic mechanical limits of the flange components gives rise to the most robust connection. Through iterative calculation, BS EN 1591-1 determines this limit and advises the appropriate bolt load, either via the application of torque or tension.

BS EN 1591-1 is at the forefront of bolted joint integrity calculations. It evaluates the elastic interaction between forces during assembly and all subsequent load conditions. As such, it uniquely allows the engineer to assess joint integrity under field service conditions, without the need to perform costly and time-consuming Finite Element Analysis.

THE FLEXITALLIC APPROACH TO BS EN 1591-1

There is no doubt BS EN 1591-1 is a powerful tool in getting the best out of the bolted connection but when combined with the knowledge and experience of a team of dedicated Application Engineers it has the potential to become so much more. It becomes a design tool in its own right, allowing engineers to optimise the gasket style, materials and geometry. Flexitallic can perform 'what if' scenarios to investigate any number of process and/or component related variables. By using this approach Flexitallic Application Engineers can assist clients in several areas:

- Optimal gasket style and geometry.
- Optimal material selection (bolting, gasket and lubricant).
- External force effects (risers, hung pipework etc).
- Thermal differential effects across flanges and tubesheets.
- Emissions or tightness criteria compliance.
- Bolt extension (use of bolt collars).
- Torque and, or tension values.
- Installation guidance.

EQUIPMENT CONNECTION OPTIMISATION (BS EN 1591)

CASE STUDY: ETHYLENE PLANT – SCOTLAND

CHALLENGE

Flexitallic supported one of its key clients at an Ethylene plant in Scotland. The Ethylene plant is one of only a few situated within the UK and is a fundamental contributor to the UK's ethylene supply.

The client had planned to perform maintenance work on a range of heat exchangers during an upcoming, major outage.

Having recently secured a global contract with the client, due to its engineering capabilities, Flexitallic was asked to support in the optimisation of the heat exchanger connections at the site.

Many of the Heat Exchanger units used out of date gasket technology, such as jacketed clad gaskets, and were prone to poor performance due to limitations in their design.

The client wanted to improve the general performance of the connections to ensure that they maintained the integrity of the connection for an extended period until the next major shutdown.

SOLUTION

Flexitallic initiated a project plan with the client on-site engineering and planning team to review each heat exchanger that was scheduled for remedial work.

As part of the plan, Flexitallic reviewed over twenty heat exchangers and generated a complete set of EN1591-1 calculation and design reviews for each exchanger based on the supporting information provided.

The EN1591-1 design review process considered the existing gasket specification and looked to improve it. By inputting the existing flange data into the Flexitallic calculation engine and replacing the existing gasket design with a Change™ gasket, the connection was optimised to give the best performance possible.

The calculation took on board not only the performance characteristics of the gasket but those of the other components such as the flange and bolting materials.

One of the unique features of the Flexitallic calculation methodology was that it was possible to also characterise the connection under cyclical loading (caused by pressure and/or temperature cycling across the connection). By modelling this, Flexitallic was able to determine the tightness criteria for the gasket and the connection to ensure minimised leakage rates.

BENEFITS TO THE CLIENT

The client has benefited in many ways through the engineering support of Flexitallic. Notably, the following benefits were identified by both parties:

- Maintenance cost savings. Heat exchanger trips and unplanned maintenance of the units minimised.
- Future-proof connection integrity. A longer Mean Time Before Failure of the connections.
- Engineer friendly documentation to accompany each heat exchanger. Should any connection need to be disturbed in the future, the client now has ready access to key information of that connection through the documents provided, and will not need to review old drawings.
- Torque values provided by Flexitallic assist service personnel in the assembly of the connections.

REVERSE ENGINEERING

THE DESIGN LIFE OF PROCESS EQUIPMENT IN A RANGE OF INDUSTRIES IS OFTEN EXTENDED, BEYOND ITS ORIGINAL EXPECTANCY. THE EXTENSION OF SERVICE LIFE CAN LEAD TO SITUATIONS WHERE REPLACEMENT OEM PARTS ARE DISCONTINUED.

Gasket specification includes sealing products used in OEM equipment. OEM's usually stipulate that warranties on their equipment are only valid when original parts are installed. OEM parts are traditionally given unique descriptions making it difficult to identify alternatives in the future.

Flexitallic helps clients overcome such challenges through the provision of precision reverse engineering services.

SERVICES OFFERED ARE:

- Finite Element Analysis.
- Technical review of legacy gasket designs and materials.
- On-site identification of existing gaskets.
- Comprehensive dimensional inspection.
- Connection integrity validation.
- Prototype trial profiles ensuring 'first time fit'.
- Database creation for future spares.

FLEXITALLIC HELPS CLIENTS OVERCOME CHALLENGES WITH **REVERSE ENGINEERING.**

PIPING & GASKET SPECIFICATIONS
AND ASSOCIATED DOCUMENTATION

HSE REGULATIONS REQUIRE PROCESS PLANTS TO MANAGE AND MAINTAIN DOCUMENTED PIPING/BOLTING SPECIFICATIONS, AMONGST OTHER PROCEDURES AS PART OF THEIR SAFE OPERATING PLANS.

Flexitallic works with various bodies and safety committees associated with fluid sealing safety and related factors. These factors impact on plant integrity.

Flexitallic partners with customers to derive, update and implement specifications and Flange Management Systems. The process follows a full review of plant operating conditions, chemistries and site objectives, providing structured, auditable and practical control systems.

THE FOLLOWING SERVICES ARE OFFERED:

- Review of repair procedures and advise alternatives to conventional costly solutions.
- Review and provision of bolting procedures following industry best practice and guidelines.
- Generate bolt load tables to use across the site on standard connections. Use to simplify in-field work and reducing the workload for on-site engineers.
- Review existing specifications and advise where integrity improvements can be made.
- Advice on standardisation of bolting materials and associated lubricant.

MATERIAL STANDARDISATION

GASKETS SPECIFIED FOR USE IN PROCESS PLANTS CAN EVOLVE OVER THE LIFE OF THE PLANT. GASKET SPECIFICATION IS LIKELY TO BE BASED ON THE TECHNOLOGY AVAILABLE AT THE TIME OF DESIGN.

Gasket technology is often quickly outdated. New technology is specified for new equipment with legacy gaskets not updated, creating a wide range of gasket styles in use, and large inventories.

Multiple gasket styles can lead to confusion. Uncertainty creates an opportunity for mistakes in critical situations. Mistakes can lead to poor sealing reliability, containment losses and other safety issues.

Flexitallic works with its customers to provide a safe, reliable and optimised range of gasket styles to meet their requirements. Analysis of application temperatures, pressures and chemistries are completed with clients. The result is a reduction in inventory and associated cost-savings which Flexitallic can extend to bolting and lubricants.

FLEXITALLIC PARTNERS WITH CUSTOMERS TO DERIVE, UPDATE & IMPLEMENT SPECIFICATIONS AND FLANGE MANAGEMENT SYSTEMS.

ON-SITE SERVICES

FLEXITALLIC OFFERS MANY ON-SITE SERVICES THAT SUPPORT THE DRIVE FOR OPTIMISED BOLTED JOINT INTEGRITY.

ON-SITE INSPECTION AND HEALTH AUDITS

Flexitallic engineers attend site to assist in driving leakage reduction and improved reliability.

Flexitallic can perform site audits, leakage surveys, assess MTBF and put in place emission reduction programmes.

MOBILE MANUFACTURING SERVICES

Flexitallic operates a mobile service unit that can be situated within the customer's process operations to provide manufacturing and engineering support for gasket-related challenges during a turnaround. The unit is blast-proof (100mba) and complies with electrical safety to mitigate risk.

The shutdown unit enables the quick and efficient manufacture and refurbishment of a range of gaskets. The immediate availability of gaskets on-site reduces risk to the interruption of critical schedules and the cost of the dedicated transport of gaskets to site.

MATERIAL INSPECTION AND REFURBISHMENT

Flexitallic performs forensic investigations into seal failures, including evaluation of bolted connection.

Flexitallic carries out a detailed inspection of used gasket components. Our technicians are skilled in complete gasket refurbishment and repair. Flexitallic offers bespoke products such as carrier rings and kammprofile gaskets, designed for re-use.

These solutions increase product longevity and offer cost-effective alternatives compared to purchasing new components.

WITNESSED INSTALLATIONS

Flexitallic can assist clients when installing gaskets, especially on critical equipment. Flexitallic engineers attend site to co-ordinate with installation teams and ensure that the gasket and associated bolting materials are handled correctly, and that best practice is followed during the installation process.

FLEXITALLIC CAN PERFORM SITE AUDITS, LEAKAGE SURVEYS, ASSESS MTBF AND PUT IN PLACE EMISSION REDUCTION PROGRAMMES.

FLEXITALLIC OFFERS STOCK MANAGEMENT SERVICES.

MANAGED INVENTORY

FLEXITALLIC OFFER SOLUTIONS FOR THE MANAGEMENT OF GASKETS ON-SITE.

STORES SURVEY

Flexitallic performs stores surveys to identify any areas of cost and performance improvement with existing stock items.

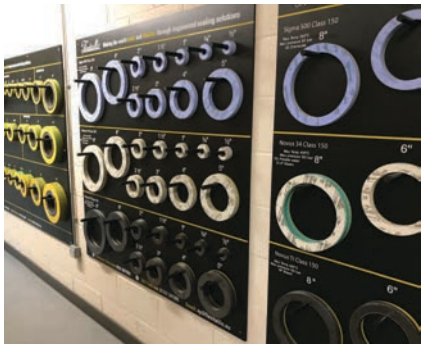
MANAGED STOCKS

Flexitallic offers stock management services, working with customers to develop the optimum storage and replenishment solution for their needs.

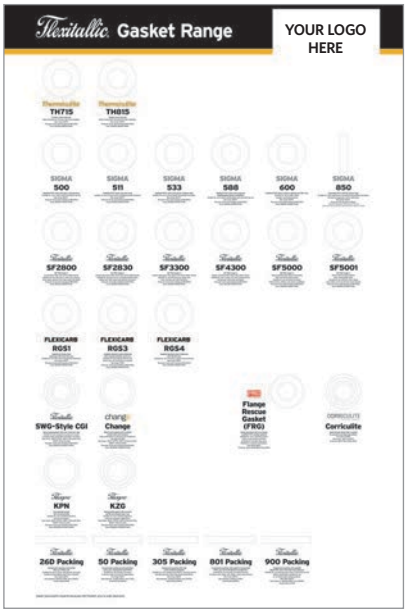
For many OEM's, the Flexitallic Kanban and bin fill systems can be employed to ensure products are continuously available whilst never overstocked, reducing operational costs.

GASKET BOARDS

FLEXITALLIC SUPPLIES BRANDED GASKET BOARDS TO CUSTOMER REQUIREMENTS.



- Safe and secure storage.
- Easy gasket identification.
- Maintain stock control via Kanban, can visually see when stock is low.
- Wall mountable to save on floor space.
- Reduce risk of selecting wrong gaskets or mixing the wrong gaskets together.
- Livery contains emergency contact details for resupply and technical support.
- Available branded with customer logo/colour scheme.



SOFTWARE

FLEXITALLIC HAS AVAILABLE A COMPLETE RANGE OF SOFTWARE TECHNOLOGIES TO SUPPORT BOLTED JOINT INTEGRITY. ALL SOFTWARE IS SUPPLIED VIA OUR PARTNER, ELISIAN LIMITED.

Elisian Software

BOLT TORQUE CALCULATION

Flexitallic's torque calculator ensures that the gasket and bolt stresses applied to each connection are optimised. Assessment of the required gasket stress using three separate industry-standard calculation methods allows the determination of the mechanical limit imposed by one of the three connection components (gasket, bolts and flange) from which the optimum assembly stress is selected.

This Flexitallic calculation methodology considers both assembly and design load conditions to achieve leak-free sealing while ensuring all mechanical components remain within allowable limits.

The optimised closure stress is subsequently converted to bolt torque using the methodology outlined in ASME PCC-1 App J (2013).

JOINT INTEGRITY MANAGEMENT SOFTWARE (JIMS)

The Joint Integrity Management module is part of the eLogbook software product, it enables the integrity owner a view of all gaskets, flanges or joints around the asset as to current status along with a full history of all activities that pertain the respective maintenance lifecycle.

Key benefits of using the Joint Integrity Management module include:

- Web based access.
- Customisable in-line with local tagging process.
- Configurable business rules.
- Integrated Flexitallic torque calculator.
- Test/work packs generation.
- P&ID annotation.
- Fully functioning API for further integration.
- Mobile based companion application.

FLEXITALLIC'S JOINT INTEGRITY CALCULATOR ENSURES THAT THE GASKET AND BOLT STRESS APPLIED TO EACH CONNECTION IS OPTIMISED.

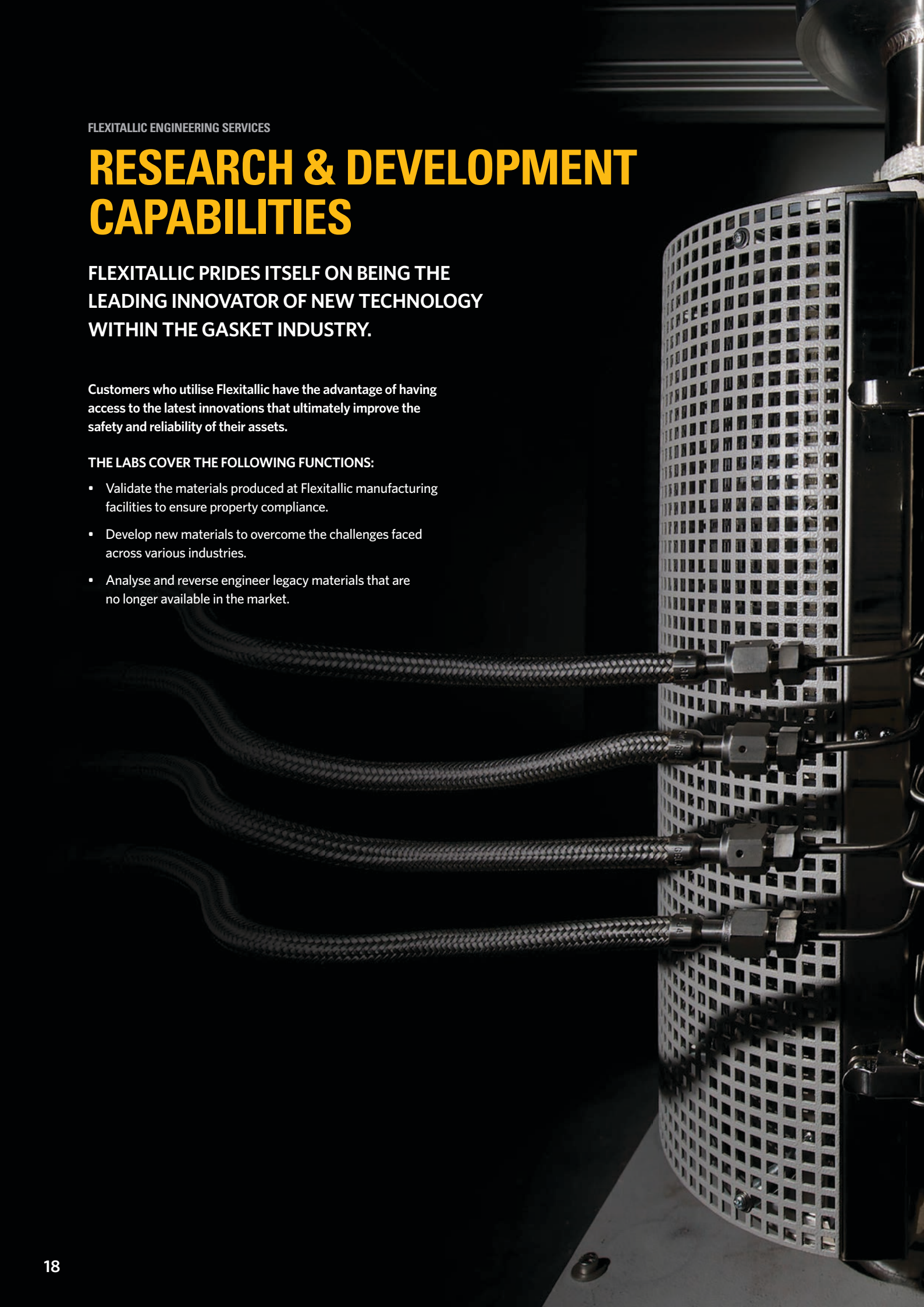
RESEARCH & DEVELOPMENT CAPABILITIES

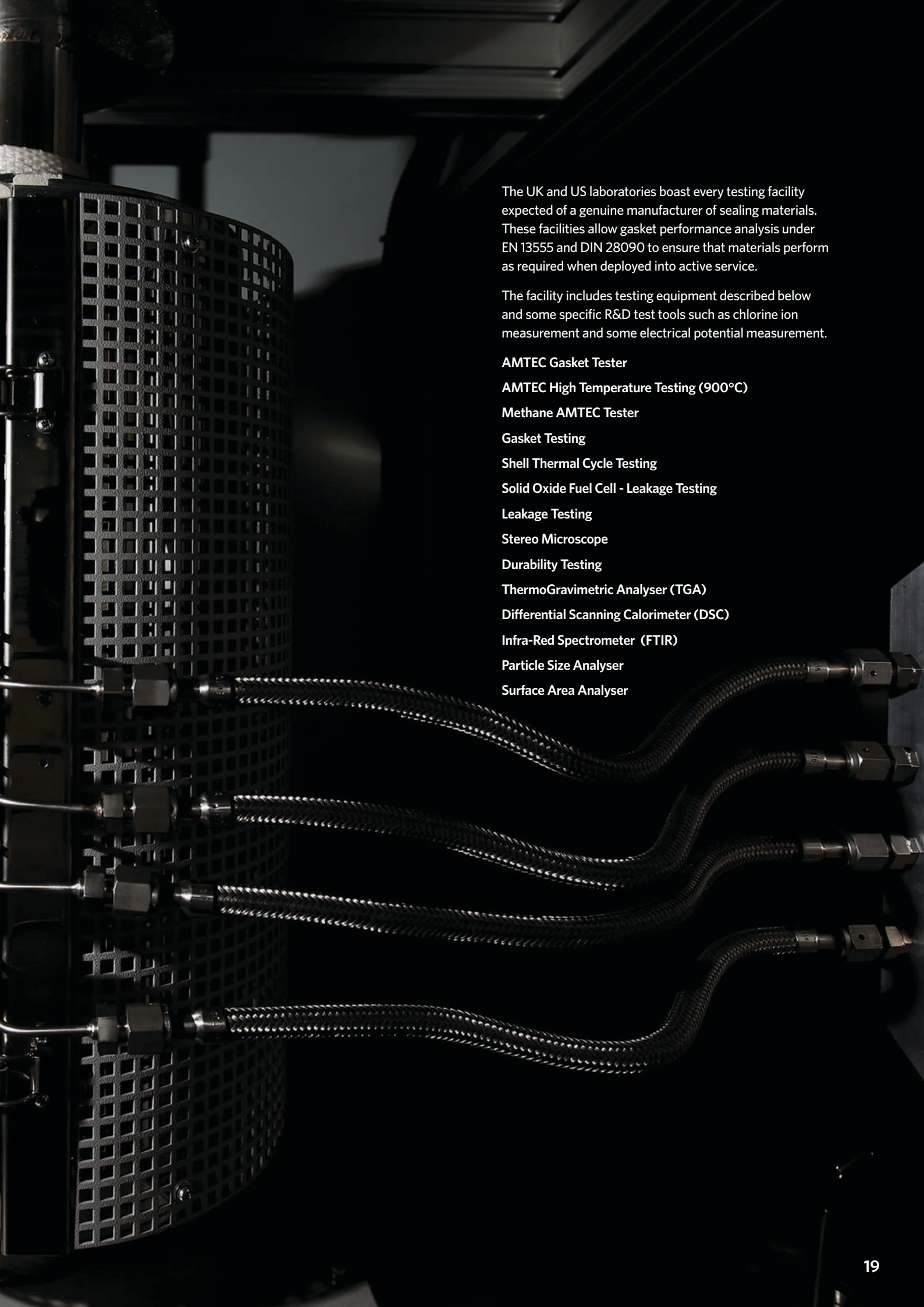
FLEXITALLIC PRIDES ITSELF ON BEING THE LEADING INNOVATOR OF NEW TECHNOLOGY WITHIN THE GASKET INDUSTRY.

Customers who utilise Flexitallic have the advantage of having access to the latest innovations that ultimately improve the safety and reliability of their assets.

THE LABS COVER THE FOLLOWING FUNCTIONS:

- Validate the materials produced at Flexitallic manufacturing facilities to ensure property compliance.
- Develop new materials to overcome the challenges faced across various industries.
- Analyse and reverse engineer legacy materials that are no longer available in the market.





The UK and US laboratories boast every testing facility expected of a genuine manufacturer of sealing materials. These facilities allow gasket performance analysis under EN 13555 and DIN 28090 to ensure that materials perform as required when deployed into active service.

The facility includes testing equipment described below and some specific R&D test tools such as chlorine ion measurement and some electrical potential measurement.

AMTEC Gasket Tester

AMTEC High Temperature Testing (900°C)

Methane AMTEC Tester

Gasket Testing

Shell Thermal Cycle Testing

Solid Oxide Fuel Cell - Leakage Testing

Leakage Testing

Stereo Microscope

Durability Testing

ThermoGravimetric Analyser (TGA)

Differential Scanning Calorimeter (DSC)

Infra-Red Spectrometer (FTIR)

Particle Size Analyser

Surface Area Analyser

TRAINING

COMPETENCE AND AWARENESS

A BOLTED FLANGED JOINT ASSEMBLY IS A SURPRISINGLY COMPLICATED AFFAIR: LITERALLY HUNDREDS OF FACTORS AFFECT THE RESULTS WHEN WE ASSEMBLE A JOINT, AND HUNDREDS MORE AFFECT ITS BEHAVIOUR AND LIFE WHEN WE PUT THAT JOINT TO USE – THAT ALL IMPORTANT CLAMPING FORCE THAT HOLD THE JOINTS TOGETHER IS CREATED BY THE ASSEMBLER.

Ref: *Handbook of Bolts and Bolted Joints* – John H Bickford/ Sayed Nassar

All personnel involved in mechanical joint operations should have sufficient knowledge of the specific tasks to be undertaken and the risks which the work will entail, along with sufficient experience and ability to carry out their duties concerning mechanical joint integrity operations, whilst recognising their limitations and be able to take appropriate action to prevent harm to themselves and those affected by the work.

The focus is on risks to the safety of people and avoiding loss of containment, particularly where activities present potential major accident hazards. It will also improve environmental protection and reduce business interruption. For all assembly and disassembly operations, the risks should be formally assessed.

Control of the training and competence assurance of personnel working on mechanical joints is a critical factor in achieving asset integrity. Therefore, an important element of the competence assurance and management system is to ensure that any person working on a given joint has been trained and assessed as competent to perform the task.

Effective and lasting improvement can be achieved when all concerned, from senior management to those carrying out work on the plant, share a genuine commitment to achieving and maintaining mechanical joint operations procedures to a high standard.

Training provided by Flexitallic is designed to equip personnel with the necessary competence to ensure leak-free connections throughout the lifetime of the joint.

The courses are delivered by industry experts, with extensive site experience and utilise a combination of practical and theoretical training and assessment, and are aligned to International Standards:

- **ASME PCC 1 Appendix A**
  Training and Qualification of Bolted Joint Assembly Personnel.
- **EN1591-4:2013**
  Qualification of Personnel Competency in the Assembly of Bolted Flanged Joints.
- **EN 1591-1:2013**
  Flanges and their joints. Design rules for gasketed circular flange connections. Calculation – Awareness.
- **ECITB Route to Competency and Mechanical Joint Integrity**
  Critical Bolting Units – MJI10/MJI11/MJI18/MJI19/MLI20.
- **IChemE Approved Courses**
  Site-specific approved courses in accordance with International Standards.

THE COURSES ARE DELIVERED BY INDUSTRY EXPERTS, WITH EXTENSIVE SITE EXPERIENCE AND UTILISE A COMBINATION OF PRACTICAL AND THEORETICAL TRAINING AND ASSESSMENT.

TRAINING

COMPETENCE AND AWARENESS

TRAINING, COMPETENCY, EXPERIENCE AND KNOWLEDGE ARE OFTEN CONFUSED WITH EACH OTHER; TRAINING IS NO GUARANTEE OF COMPETENCY, NEITHER IS EXPERIENCE A GUARANTEE OF KNOWLEDGE AND UNDERSTANDING. "TRAINING, EXPERIENCE AND ASSESSMENT OF KNOWLEDGE ARE ALL REQUIRED TO ACHIEVE COMPETENCY".

The following aspects are considered for reviewing a site training request:

- **Site Visit**
  To understand the fabric maintenance / Aged Assets / Site Procedures / Site culture.
- **Human factors**
  Examples – Gasket Optimisation – rationalize material selections.
- **Work force/ Contractor Competence**
  Assessment / Training records.
- **Flange Management Procedures**
  Review.
- **Unconscious and conscious incompetence**
  Maintenance backlogs /workload.
- **Lessons Learnt**
  Failure Mechanisms.

Candidates will gain knowledge of joint integrity management and the global guidelines and legislation that are required, including identification, inspection, and compliance through associated documentation.

LUNCH AND LEARN / WORKSHOPS

Flexitallic is at the forefront of ensuring technical authorities and mechanical engineers alike are kept fully up to date on the latest technology and standards available for the integrity of bolted connections.

Flexitallic's nationwide engineering team is available to support customers locally and we can arrange and host a wide range of focused training and lunch and learn sessions at customer premises.

Sessions include, but are not limited to:

- An introduction to gasket technology.
- Material selection.
- Overview of calculation methodologies.
- Introduction to EN1591-1 and its impacts on the reliability of Heat Exchanger connections.


Thermiculite

"The installation of the Flexitallic Change Gasket went very well using the torque values that we agreed upon (220 Nm then 450 Nm). I would like to express my deep gratitude for your expert advice and your professional flanged joint calculations."

TA Level 1 – Major Oil & Gas company

"Flexitallic helped us overcome issues that have been occurring for decades. Their involvement vastly improved reliability across site. Flexitallic is applying science to sealing."

Reliability Engineer - Major Agrochemical site

"The support provided by Flexitallic clearly demonstrates a company with both a passion for gaskets and a truly deep technical understanding. Whilst this isn't unique in itself, their initiative in arranging a forum for TA's to get together and share learnings on the best practice use of gaskets rightly sets them apart as the partner of choice for gasket development and supply."

TA – OMajor Oil & Gas company

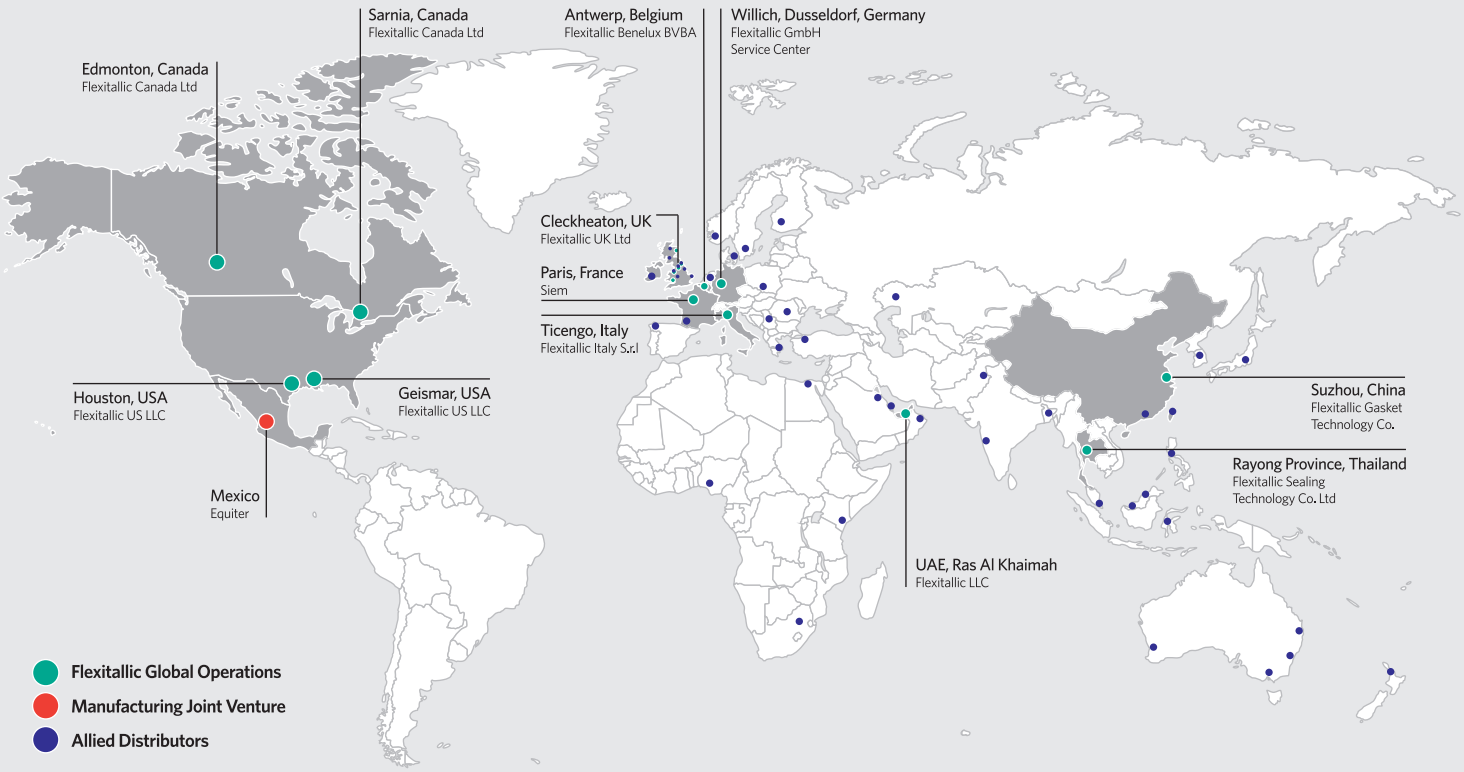
"We have commissioned Flexitallic on several occasions to deliver bespoke training courses designed specifically to our site needs using the Flange Assembly Demonstration Unit, experienced training instructors delivered the course with practical and theoretical elements – feedback from all attendees has been very positive. This gives us confidence that our employees can demonstrate competence in safety critical tasks."

HSE Training & Quality Manager - Pharmaceutical company

FURTHER INFORMATION

24/7 SUPPORT. CLICK & CHAT. WWW.FLEXITALLIC.COM

Flexitallic®



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