

jims™

JOINT INTEGRITY MANAGEMENT SOLUTIONS



hydratight®

Joint Integrity Management Solutions

Some 30 years after developing the technology behind hydraulic bolt tensioning, Hydratight continues to push the boundaries with innovative products in bolting, joint integrity, pipe repair and connection systems. Our expertise and experience in tension and torque has created a company with unrivalled technological and process leadership in bolt tightening. Today, Hydratight has manufacturing facilities in four locations on two continents. With offices in 25 countries worldwide and our extensive network of agents, we are truly a global company.

Health and Safety

Health and Safety is a top priority for Hydratight. All senior management, engineering and operational staff have been trained and assessed to ensure competency. New procedures, tool developments and existing inventory are also regularly reviewed to ensure compliance with current best practice. Operationally, all contracts are reviewed for safety requirements and a project specific safety plan drawn up. Part of this process will include the development of interface documents.

Process leaks threaten employees, installations, and the environment

In many territories, installations operate under arduous pressures or even beyond their original design life, elevating the risk of joint leaks. Several government agencies have examined the causes of leaks and concluded their number and severity will increase unless improved management procedures are introduced. Hydratight has been implementing these technical solutions for years, allowing the operator or contractor to achieve leak-free start up and production.

Collectively, they are known as:

Joint Integrity Management Solutions™ jims™

Hydratight is committed to ensuring customers' assets and installations have the safest and most environmentally friendly bolted joints. This commitment is underpinned by a package of initiatives, products and services, supported by experienced engineering teams, available anywhere in the world.



Why is joint integrity so important?

Leaks delay production start-up, cause unplanned shutdowns, and always impact budgets negatively. They are unacceptable and can be avoided.

This is how much leaks could cost you:

- 3" 1500 lb gas line shut down due to insufficient service bolt load: Lost production cost \$2.25m
- 16" 300 lb Valve tightened using untrained operators, subsequently catching fire: Lost production value \$1.68m
- 4" 150 lb seawater flange critically overlooked causing a power generator set to shut down: Lost production cost \$6m
- Multi-asset operator evaluated the average cost of all their leaks at \$100k per leak

Engineering Services

Hydratight works with major engineering contractors to design safe, leak free, and consistent bolt loads prior to



shutdown or before project construction begins. This process often requires detailed flange stress calculations as well as identifying any tooling requirements, special procedures and training that may be required.

Bolted joints can leak

In recent years, investigations by the process industries have highlighted the seriousness and importance of preventing leakage:



For example, UK HSE (1) found that on average 243 leaks occurred per year offshore for the period 1992-2002, 17% of which occurred from bolted joints.

Likewise, the Pressure Vessel Research Council (2) reported the average plant in North America suffers from 180 leaks per year, 2-3% of which lead to full plant shutdown or major repair.

Both studies also found:

- 29% of the leaks were attributed to poor design or incorrectly fitted components
- 26% attributed to mechanical failure
- 12% due to poor workmanship or lack of competency

As a result, a Leak Reduction Group was formed between owners, contractors, governing bodies and Hydratight to develop a framework document for the management of bolted joints.

In June 2002, the "Guidelines for the Management of Integrity of Bolted Pipe Joints" was published. This document sets out the principles of joint integrity management and examples of best practice.

(1) UK Offshore Technology Report – OTO 2001/055
(2) "Flanged Joint User Survey" PVRC 1985



Previous studies into joint integrity have revealed:

- 25% of leaks took place during start-up
- 51% of leaks occurred during operation
- 17% of all releases occurred from bolted joints



Gap Analysis

To assess your current joint integrity status, Hydratight conducts a Gap Analysis. This involves introducing an Integrity Engineer into your organisation to identify areas that currently fall short, meet or exceed our joint integrity requirements. Over a one-two week period our engineer will cover:

- Planning and control measures associated with critical and non-critical joints
- Effectiveness and robustness of procedures
- Traceability and data management procedures
- Criticality and classification methods of joints
- Tagging and reporting processes
- Operator competency and personal training programmes
- Technical performance and procedural compliance
- Software interfacing and historical record keeping
- Technical calculations for critical and non critical joints
- Equipment requirements and specifications



We will then submit a detailed report and agree upon a strategy with timescales and costs broken down between procedures, systems, equipment, training and operational activities.





The Hydratight Philosophy:

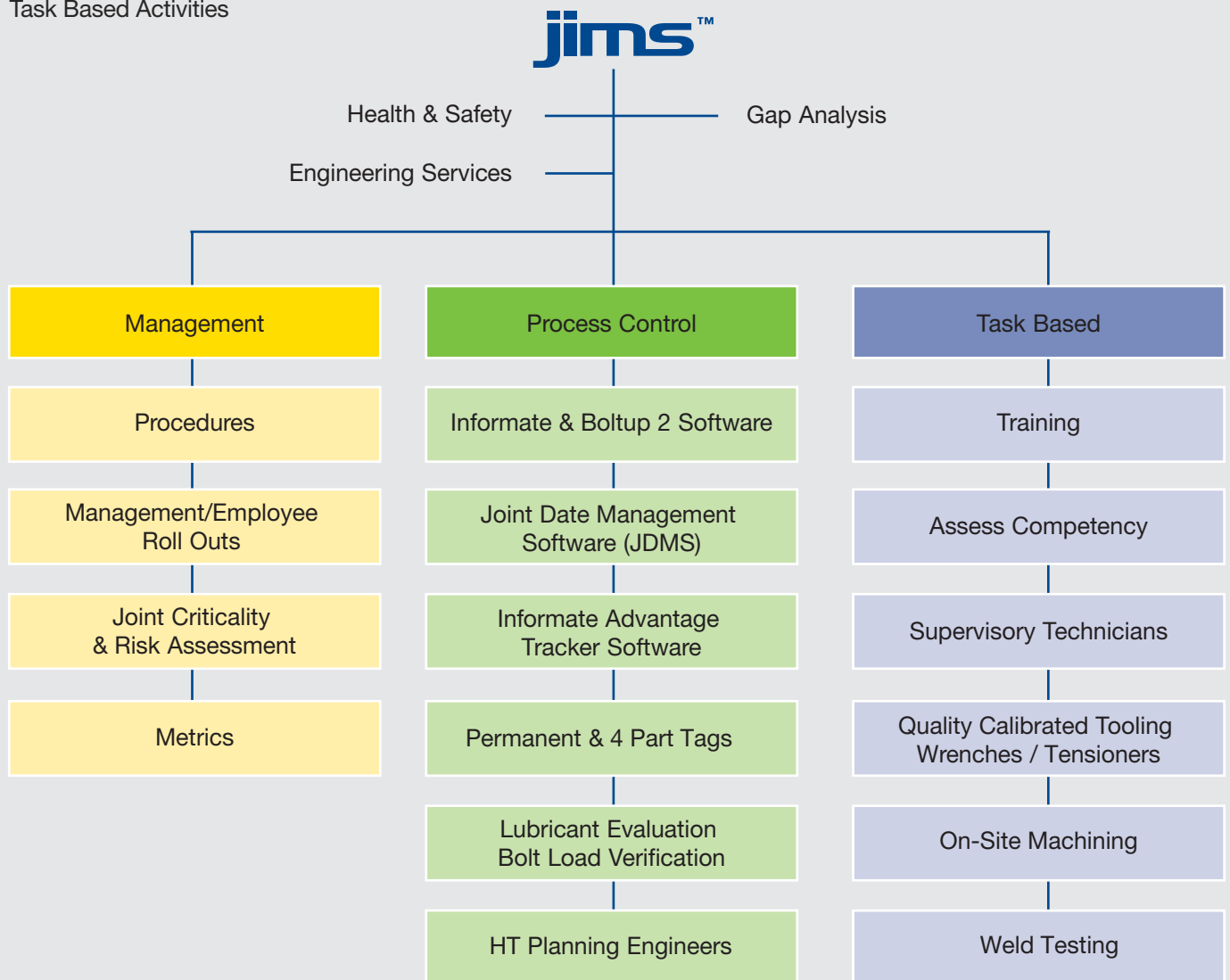
- Our processes and procedures will be well planned, safe and lean
- Our procedures will be industry best practice
- Our client integrity tests will be leak free
- Client's production will be leak free at all times
- Our leak free metric will be the best in the industry



Structure and relationship of the Hydratight Joint Integrity Management Solutions

Our products and services fall into the following categories:

- Management Procedures
- Process Control Procedures
- Task Based Activities





The Hydratight Philosophy:

The cost of preventing leaks is far less than the cost of repairing a leak.



Management Employee Roll Outs

Carefully constructed and agreed presentations can be written for both management and technical personnel. Delivered on-site or offshore, these presentations keep everyone informed, provide commitment to the process and help ensure the installation remains leak-free.



Upgrade your Procedures

Hydratight has worked extensively with many operators to ensure best current practice for bolted joint integrity is used at all times. This includes covering Health and Safety and management of processes, reviewing procedures and ensuring compliance with local legislation and existing systems.



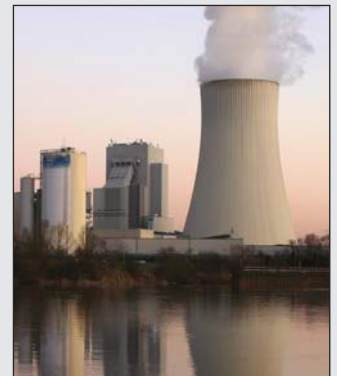
Metrics

Whenever a process is amended, altered or improved, it is important to agree meaningful measurements or 'metrics' so that the effectiveness of the new process can be judged, reported and if necessary, modified.

Risk Assessment and Joint Criticality

Our risk-based assessment process is acknowledged as a proven method for managing the maintenance and inspection regimes associated with any particular bolted joint over its lifetime.

Every plant's process methodology requires risk assessment to identify the likelihood of leaks. This will reflect the experience of the local plant engineers, but will be increasingly supplemented by the joint history and local conditions as data is collected.



The resulting Criticality Rating will determine the tightening method and competency required. Possible other outputs can include reviews of lubricant coefficients, gasket type or manufacturer and bolt loads.

		Hazard Severity		
		Minor	Significant	Major
Leak Potential or Likelihood	Unlikely	Low	Low	Low
	Possible	Low	Medium	Medium
	Likely	Medium	High	High

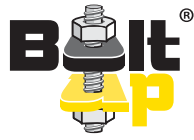


The Hydratight Philosophy:

All leaks can be avoided. Plants are designed to be safe; well executed joint integrity ensures this is achieved.



Pipeline Integrity Management



Our Informaté® range of software includes the Boltup calculation engine.



Hydratight's unrivalled experience in bolt tightening includes torque and tension, bolt load calculation and recommendation and flange stress calculations for specialised equipment.

Customers rely on our bolt recommendations because they are:

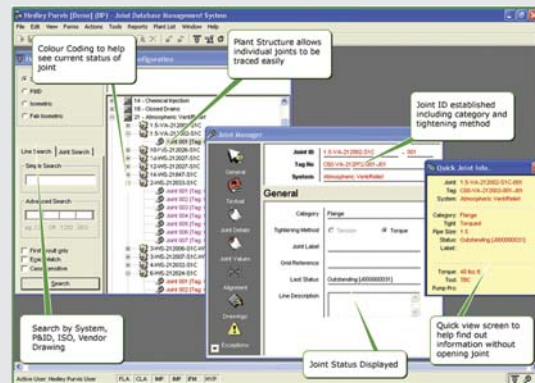
- Controlled by expert engineering procedures and developed by our qualified staff.
- Repeatedly found to be safe: the joint stays leak free and no flange or bolt/nut damage occurs.

For more information please visit:

www.boltup.com or www.joint-integrity.com

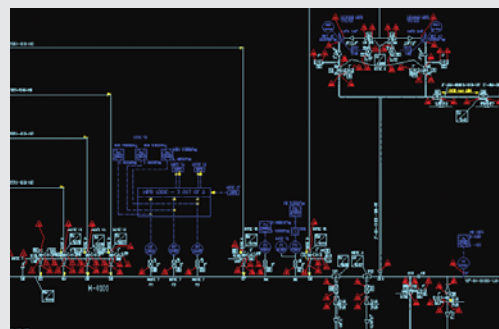
Joint Data Management Software®

The Hydratight Joint Data Management Software® (JDMS®) has been designed to plan and control processes associated with the joint breakout, re-instatement and testing. Used for managing all aspects of joint integrity assurance, it can be configured to suit any installation, irrespective of industry.



For each joint, the software can provide:

- Permanent and full historic data
- Information on all actions and activities performed
- Full technical and operational specifications
- Calculations of appropriate bolt loads to seal
- Detailed tool fit analysis
- CAD interface module that allows access to all joint information from P&ID's or Isometric drawings
- Reports defining current status against plan
- Full search facility
- Support for Risk Bases Inspection systems



Lubrication and Bolt Load Evaluation

Manufacturers' assumed torque values are often based on laboratory conditions, which can lead to incorrect coefficient of friction values. To provide the most accurate readings, our service is based on genuine site conditions. Bolt loads can be measured in two ways – using ultrasonics or hydraulic calibration nuts – which both measure loads to a high accuracy.

Planning Engineers

Hydratight engineers often work in customers' offices to ensure all aspects of joint integrity assurance are identified and planned before the shutdown or construction planning begins. This can include compilation of a temporary Joint Break Register for selection of the correct tools and machining equipment. Using the JDMS® software, we can manage your immediate and long-term needs.

Typical duties include:

- Coordinating with Planners to plan work scope activities
- Developing procedures for work scope
- Performing risk assessments
- Managing manpower requirements
- Developing work scope and detailed equipment requirements
- Ensuring quality safety and environmental requirements are delivered
- Providing full technical and operational support

Temporary Tags

A temporary joint tag - referenced back to the Joint Break Register and JDMS® software - provides a status report to management and a visual indication to site engineers before work begins.



Hydratight Four Part Tags are designed to be weatherproof, easily and indelibly marked up and provide a visual record of the joints that have been opened long after the installation has been returned to service.

Permanent Tags

For full joint traceability, it is common practice to identify the joint by use of a controlled document such as a P&ID or an Isometric. A permanent tag, attached to each joint and embossed with the joint's unique identification number completes the identification. This permanent tag is usually manufactured from stainless steel and attached to the pipe or the flange itself depending on the flange size.



Permanent tags are designed to be cost efficient, easy to install and durable. The tags can be supplied with pre-etched sequential numbering to customer format and will reference the joint to the JDMS® database where historic data can then be saved and reviewed throughout the working life of the pipeline.

Quality Tooling and Machining



We have been designing, manufacturing, selling and renting hydraulic wrenches, hydraulic tensioners, machining tools and nut splitters for many years. All tooling has been designed to be reliable, simple and safe to use and to achieve the correct bolt load or torque value. With

our own range of on-site machining equipment for weld or end preparation, flange facing, milling, and stud removal, our tools are high quality and risk-free.

Full technical details can be found at www.hydratight.com or in our comprehensive product brochures.

Training and Competence

Data confirms that current skills and practices do not always result in leak-free joints, stressing the importance of training



and assessment to improve competence. Hydratight offer an API accredited Training Programme covering all aspects of joint assembly and break out, tightening procedures and preparation, theory and practical modules.

Experienced Hydratight Training Instructors use their extensive on-site experience to make the courses interesting and informative (all Training instructors are former supervisors and have additional coaching qualifications).



Course content includes the Safe and Correct Use of Manual and Hydraulic Torque Equipment as well as Hydraulic Tensioning Equipment. Specially developed courses can also be designed and delivered to suit client's requirements. These can be held either at their place of work or within one of our Hydratight Training Centers.

An API Course is held over two days and covers Manual and Hydraulic Torque and Hydraulic Tensioning, demonstrating typical site usage of the Joint Integrity equipment.

Supervisory Technicians

Our vast experience in supplying manpower to the Petrochemical, Refinery and Offshore Oil and Gas industries makes Hydratight technicians some of the best in the business. Every Hydratight technician carries a “Passport” that provides up to date information on their training status, safety and competence levels for all of our services.

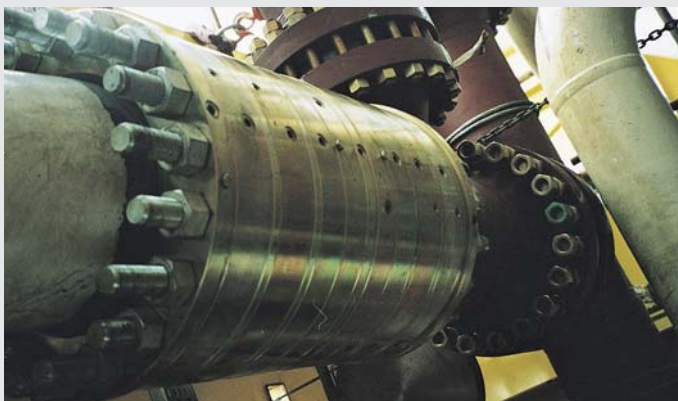


Mechanical Pipeline Connectors

MORGRIP® is Hydratight’s high integrity mechanical connector for connecting process pipe-work when the risks and time constraints associated with conventional welding are unacceptable.

The MORGRIP® fire safety connector has a documented leak free pedigree and can be supplied to connect most metallic pipe-work, often from stock.

For more information please visit www.morgrip.com



JIMS™ Summary

Hydratight’s Joint Integrity Management Solutions eliminate leaks from bolted connections. The key to controlling bolted joint leaks lies in improving the management control processes at every step: planning, preparation, assembly, tightening, control, reporting and review.

Hydratight processes and systems provide easy access to all necessary information about each joint, including gasket, bolt specification, technician details, assembly procedures and current status.

JDMS® software identifies and manages individual joints, providing detailed information of joint activity history, and includes records of technician competencies.

The Training and Competency Program increases technician understanding and reduces the scope for human error, a prime cause of failed or defective joints.

Benefits

- Constant focus on personal Health and Safety
- Increased installation safety
- Increased plant availability and reliability
- Reduced maintenance costs
- No emergency shutdown/repairs
- Faster turnarounds – only one integrity test
- Prevent lost time and high potential incidents
- Positive impact on environment

hydratight®

Global Standards Local Delivery

Our global network means you can rely on the right people, products and services wherever you are in the world.

Email us at: solutions@hydratight.com

Or find your local representative at:

hydratight.com/contact

