New wave
Connect, collaborate and control with eWorking

Making waves
Hi-tech monitoring on, off and under the water

Wave goodbye
All your asset integrity problems taken care of
Pushing the boundaries

There is a world of difference between pure, blue sky thinking and the very real problems of existing facilities. We can call on both aspects, this is where our strength lies; generating truly pioneering ideas to transform old ways and injecting real world experience to make sure our progressive thinking is still realistic and achievable.

In this issue you may notice some connecting themes. One crucial element that should be considered throughout the life of an asset is integrity. We address this in a number of ways, as highlighted in our foldout piece and it is present in a number of other articles. Our corrosion specialists in Norway have integrity firmly in their sights when they think about inspection and repair. The software we have developed to monitor infrastructure performance specifically targets pipeline integrity. The success of safe life management into decommissioning is very much dependent on how well integrity has been maintained on a facility.

Standards have become higher even as our assets have become older; another connection is with the regulators who set the standards for various structures and systems that reside in and around our oceans. We have good working relationships with regulatory bodies so we can assure our customers that our solutions will meet the recognised standards and help extend the working life of many assets.

A pipeline that our software monitors has recently been recertified for service, and in our last issue we highlighted Balmoral, another asset which has been classified for further service well beyond its original design life. We also worked closely with these regulators to develop the right approaches for our Corrosion Assessment Manual.

Breathing new life into old assets has provided some of the most significant and satisfying challenges for our experts. I hope you enjoy reading about our progress.

Steve Wayman
Executive president, strategy and development

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News in brief

A better focus on commissioning

Real innovation produces a step change, whether that’s in safety performance, cost or timescale. Ideally you get a combination of all three.

On a recent UK commissioning contract, we looked beyond the boundaries of our work scopes to add value and bring greater assurance to the customer across the most crucial stages of the operation.

Because we offer a full suite of services across the asset lifecycle, we know the most vital touchpoints are at the start and end of each stage. These handover points represent the greatest risk to both safety and schedule. On this contract, our main goal was to deliver a seamless transition from construction through commissioning and handover to operators.

Gaps in communication, lack of clarity and definition on work scopes, and mismatched expectations were turning these handovers into challenging hurdles but the knock-on effects meant that the consequences didn’t materialise until later in the operation.

Our approach to improve was to step outside the boundaries of our work. Our wider experience of the commissioning process helped us identify and close the gaps, and bring more transparency and understanding. We introduced more robust processes with greater detail up front but more importantly we took more ownership of the job, taking responsibility earlier and following the work through to completion.

Our original scopes covered construction and pre-commissioning work for brownfield modifications. With the bigger scopes we began to push for more definition on commissioning and deeper engagement to make the handover more seamless. By vertically integrating further with the customer we were able to gain more clarity on the requirements at all stages and streamline the process.

As an example of this enhanced process, procedures that were taking almost a month to complete are now being turned around in less than a week.

Engaging sooner and getting more detailed definition in the early stages of the work allowed us to schedule the commissioning work efficiently and smoothly the transition through mechanical completion to systems handover and ongoing operations.

By thinking outside the boundaries of our own job we were able to create a more seamless process and reduce some of the interface effort, de-risk a critical part of the project and speed up the schedule.

To find out how we can make construction and commissioning more efficient for you, contact

danny.mcllwain@woodgroup.com

Flexible JIP knowledge

Wood Group has spearheaded almost 30 joint industry projects (JIPs) in the past 20 years, leading new technical research and working with partners and peers to drive best practice across the industry.

Our latest JIP, Sureflex, provides an update to global failure statistics of flexible pipe and industry guidance on integrity. This initiative also assesses the tools and technologies used for inspection and monitoring of these critical components.

The JIP has been widely supported in collaboration with operators, manufacturers, inspection and monitoring vendors, engineering contractors, certification bodies, and regulatory authorities.

We are launching our JIP report with Oil & Gas UK at the Offshore Europe conference and exhibition in Aberdeen, Scotland. We will share key findings of the report at the event, highlight areas of current technology development and explore operator case studies relating to flexible pipe integrity management.

Find out more at our Offshore Europe presentation, on Wednesday, 6 Sep 2017, at 10.00am or contact

ian.macleod@woodgroup.com, engineering manager - integrity management.

From theory to practice

The decommissioning phase is nurturing some very different philosophies for asset management in later life.

Whilst there have been some significant decommissioning projects undertaken in the North Sea to date, this remains very much an emerging sector. The levels of complexity and cost associated with these activities are serious, not just for our clients but also across a wider stakeholder community. Many projects carry significant uncertainties but what has become clear is that for the decommissioning challenge a traditional approach delivers a less than optimal outcome. What is required is a new way of thinking and dealing.

The journey starts long before cessation of production and recognises that the approach and methods used to operate, maintain and maintain these facilities through the early and mid-life are not always appropriate to the late life and decommissioning phases. As a service contractor we have to remain responsive and adaptable to our customer’s needs, but we must also take the initiative, offering customers solutions that are safe, efficient and ultimately cost effective.

Naturally when approaching decommissioning for the first time there is a tendency to take an overly cautious approach. The reputation of all parties is paramount but employing traditional approaches can yield significant cost and complexity. With that in mind Wood Group is using the considerable experience it has amassed over two decades of decommissioning activity to unlock the potential to reduce or remove the need for manning these facilities after making them safe and to hold them until the point of removal. Leveraging theory into practice allows us to test new approaches and adopt existing techniques and technology.

By way of example, the record breaking single lift of Brent Delta was a milestone in North Sea decommissioning but as the top sides were being lifted in May the learmings and next stage innovations were already being developed to significantly reduce the cost of preparing the next asset. Brent Bravo.

This included evolving a more construction-led approach aligned to the way the asset operates, which drives far better outcomes than the previous engineering-led process.

These decommissioning projects are not just challenging but also extremely exciting with regular opportunities to push the technological and operational boundaries. Many of the methods being evaluated and deployed have never been tried before offshore or contain elements that are truly unique. In contrast to the oil steel construction on Delta, the Bravo lift will see lifting points constructed in situ below the facility from reinforced caps that will be filleted with concrete. This team is currently working on the challenge of supplying, pouring and curing grout in open boxes suspended over the sea.

Exciting technical challenges like these are just part of the appeal of decommissioning, providing our brightest and best employees with opportunities to develop and grow. Our clients benefit from our focus on new thinking, leveraging technology and driving continuous improvement to set the benchmark in excellence for this emerging sector and ensure Wood Group remains at the forefront of this fascinating market.

Need support for your decommissioning project? Contact

nigel.lees@woodgroup.com

Inspired: Issue 3 2017

Inspired: Issue 3 2017

Inspired: Issue 3 2017
The digital oilfield

Leveraging analytics solutions in production loss reporting and operational excellence.

The industry’s low commodity prices, combined with cost inflation over the preceding decade, accelerated the drive among operators for step-change solutions in production and cost efficiency. Technology advances in monitoring, connectivity, communications and data analytics are key enablers to making this change possible.

Wood Group’s operation and maintenance teams support operators in diverse roles ranging from resource services to full duty-holder responsibility for the performance and maintenance of producing assets. This role offers unique insight and experience in production efficiency, loss reporting, regulatory reporting, maintenance planning, and safety barriers. It also offers insight to the innovation and process improvement required to bring enhanced value to production operations and the avoidance and management of production losses. In production loss reporting, information needs to flow between multiple stakeholders: production personnel, production engineers, maintenance managers, the OMG, asset manager and field partners.

Historically, this was achieved through multiple spreadsheets, loss reports, action registers and disconnected documents that failed to give a timely, consistent or integrated picture of deferred production. Lack of visibility and absence of a ‘single source of truth’ meant inefficient and unscalable processes for managing leading indicators and the actions required to minimise or prevent production deferments.

Recognising these challenges, Wood Group has developed Proevx, an analytics-enabled, web-based software platform for production efficiency and loss reporting that has transformed awareness of the causes and consequences of production deferrals and facilitated efficiency tracking, action tracking and regulatory reporting.

Crucially this platform provides that single source of truth, accessible to all stakeholders, allowing engineers to focus on avoiding downtime while bringing insight and data analytics to maintenance planning.

The Proevx platform has recently been deployed to two producing assets in the North Sea, transforming the practice of production loss reporting and management, and bringing value and insight to production operations.

Proevx can bring step-change benefits to production operations, loss reporting and operational excellence for producing assets.

A key factor in the success of this platform has been the integrated team of production engineers working with our software developers and analytics engineers to develop a fit-for-purpose solution, designed and constantly modified in an agile development framework to suit the needs of the production engineers who use it daily.

The software itself has individual modules designed by production engineers for production engineers, including:

- **Dashboard:** Shows daily production and losses, and overlaying historical data with production losses and their causes. This module provides production and operating efficiency profiles and helps with regulatory reporting.
- **Action Tracker:** Captures any actions assigned to production losses, linking these to loss reports and responsible personnel, and traffic-lighting progress.
- **Field Performance:** Tracks production volumes for each field relative to budget and targets.
- **Losses Breakdown:** Visualises losses by category, system and reason codes according to user-defined tags (for example, commercial losses, topsides plant/ facilities losses, subsea losses, reservoir losses).
- **Loss Tracker:** Provides a tabular summary of loss reports which can be sorted by system, status, deferred production volume, actions and other key parameters. Designed for use by production engineers to track and report issues at stakeholder meetings.

The platform has an Asset Integrity module that aligns with Wood Group’s Operational Excellence Framework, tracking process safety performance indicators (PSPIs) and showing key safety barriers (HSSEQ, plant integrity, maintenance, control, people, procedures and recovery measures) relative to user-defined limits in a simplified visual that gives a composite and traffic-lighted indicator of process safety, performance and barrier effectiveness. All of this allows Operators better access to the performance of their asset, reliable operations can be benchmarked and faults identified for early intervention, helping customers get the best from maintenance resources and budgets.

Find out how Proevx can improve your asset performance, contact kieran.kavanagh@woodgroup.com
In the mid-eighties two business consultants Tom Peters and Bob Waterman co-authored a management book that reached out beyond the narrow confines of senior executives and other consultants and became a global best seller. ‘In Search of Excellence’ developed the concept of the seven ‘S’s as the basis of an excellent company. Each ‘S’ – structure, strategy, systems, style, shared values, staff and skill represents a key area that a business needs to focus on. Each business could have its own approach but the attributes needed to be aligned and consistent in order to support the drive for excellence.

In Wood Group we use this framework as a basis for testing the positioning, approach and effectiveness of our business. This helps us to maintain the right balance in each core area and provides the foundations for our own service excellence.

Each service line has defined what excellence means for them and set out clear expectations of how it can be achieved. In a document called the Service Excellence Framework (SEF), the service line defines the means of delivering the expected standards of performance and how that performance will be assured.

The document is founded on our collective knowledge, lessons learnt, best practices and customer feedback. By following it our projects and contracts have a clear methodology for delivering a consistent high-quality service every time.

Each service line also has a Community of Practice consisting of the senior representatives of the service line who work together to identify good practice and support each other where required. This community ensures that the SEF is being followed and refreshed as new lessons are learnt.

In addition to identifying current best practices we focus on improvements both through work processes and technology. Our leaders are committed to identifying and introducing innovative technologies that support our business in order to deliver a better, more efficient service. To that end we have introduced an innovation seed fund which provides funding to our businesses to investigate new technologies and where appropriate develop them into products and services that bring increased value to our customers.

Our investment to date has delivered innovations that range from increasing wind farm efficiency to reducing design hours on capital projects, and dramatically improving communication between remote offshore assets and onshore support teams. Each innovation has the same focus of driving excellence into our business.

So we are setting high standards in our service excellence frameworks, using communities of practice to identify best practices, and introducing innovative services and products to provide increased value for our customers.

If you’re searching for excellence you must never stop looking.

In search of excellence

We’re always looking for ways to improve our service, and we have a structure for the search…

John Kearney has spent a lifetime seeking excellence and is still energised by the pursuit.
Inspired: Issue 3  2017  Inspired: Issue 3  2017

Nord Stream transports gas from the west coast of Russia to Germany through a 1200km twin pipeline that runs along the bottom of the Baltic Sea. The pipeline uses an innovative telescopic design that saved millions of dollars and our Virtuoso PAS system protects the network from over-pressurisation which could damage the pipeline and result in a costly shutdown.

The telescopic design is so-called because the pipe has three different wall thicknesses, at the inlet where the pressure is highest the wall is thicker, and as the pressure drops along the length of the pipe so the wall thickness can be safely reduced, saving on material costs.

Virtuoso keeps a close eye on the pressure along the length of the pipeline in real time, helping to ensure supply meets demand comfortably without stressing the network.

Nord Stream AG’s nomination validation process contributes to the safe operating conditions of the pipeline at all times. The shipper’s specifications of how much gas they want to deliver through the pipeline, the nomination, is broken down into volumes of gas per week, day and, ultimately, per hour. The Virtuoso software’s Gas Transportation Planner (GTP) supports Nord Stream’s dispatchers by running simulations to ensure the nominations are feasible, and developing a weekly and daily plan which forms the basis for providing the right volume of gas at any given time.

If Virtuoso predicts that the pressure from current operation or from a possible shutdown (settle-out pressure) will breach the mechanical limits of the pipeline, the system alerts the operators of Nord Stream main control centre so they can adjust accordingly.

When the system needs to switch from dual pipeline operation to single operation, to allow maintenance for example, the GTP and Virtuoso help schedule and monitor such activity around demand requirements. Miscalculations in this complex multi-day process could result in high penalties due to undelivered gas.

In addition to its pressure protection function, Virtuoso also monitors the system for leaks, restrictions and meter performance. The software continuously tracks the gas inventory and is used to cross-check against the fiscal meters at both ends of the pipeline on a daily basis. In the event that the numbers do not match, the inventory difference initiates a process of fiscal meters accuracy investigation.

A strong feature of Virtuoso is its ability to interface with multiple systems and networks. This allows the customer to monitor many aspects of pipeline and operational infrastructures. Being able to highlight anomalies quickly is crucial to the integrity of this infrastructure system and, ultimately, to the security of the energy supply.

Our custom design software models flow rates so we can optimise delivery on long distance pipelines.

To find out more about Virtuoso contact dale.erickson@woodgroup.com

The 1200km pipeline has the capacity to deliver around 12% of Europe’s natural gas demand.
Human involvement tends to impact both ends of the scale when it comes to operational performance. Ingenuity is a uniquely human trait, that ability to sidestep conventional thinking and create new and exciting solutions to old problems is something that cannot easily be replicated or automated. However, incidents and failures can equally be traced to simple human factors.

Advances in technology enable us to address both issues, freeing up our operators to apply themselves more effectively while removing many of the elements that contribute to human error.

Better equipping our workforce has been a driving theme of the development of our eWorking portfolio, a growing suite of tools designed to provide simple solutions, systems and processes tied together across common hardware and mobile platforms.

Looking across other industries that have to meet extreme operational challenges, we have put together a set of tools to enable operators, technicians and engineers to collaborate more effectively, streamline work processes and improve safety performance.

Our digital roadmap looks at connectivity, workflow, operator safety, support monitoring, inspection and execution, drawing all these strands together in a family of solutions that is transforming the way we deliver our services.

For more information on eWorking contact eworking@woodgroup.com
Virtual reality check

Virtual reality (VR) is becoming more popular in many arenas, especially as a training tool, due to its ability to provide a more immersive learning experience.

Computer based training (CBT) is used extensively in the oil and gas industry to train site based workers. However, our new VR training supplements traditional methods and enables users to experience the full repercussions of their actions without the exposure and risk of the real-world situation.

One of the major benefits of training with VR is that the trainees are not watching someone else do a task, or listening to how another person would do it; they are learning by doing. Trainees are immersed in virtual training situations where they can make real operational decisions and see the consequences of their actions.

We explored new ways of enhancing employee training by using our VR capability to provide a unique and in depth experience. Digital Solutions, our in-house VR development team, created a hazard identification training environment which allows users to identify hazards within a site operation and use a ‘Stop the Job’ button to identify an unsafe act. Trainees interacted with the scenario to find out more information, learn about the correct processes for the job and become confident in identifying potentially hazardous situations.

A further advantage of this system is the ability to overlay local translations, helping trainees to feel completely at home in the virtual environment.

Our VR session focuses on improving HSE awareness, trainees are assessed on safe practice and the application of our safety behaviours and principles. This allows the business to test how well individuals have understood our safety requirements.

The scenario tested the trainees’ ability to physically identify listed faults. Correctly identified faults ‘disappear’ and the user can indicate when they are finished inspecting. If all hazards are identified correctly the operation plays out safely.

A further advantage of this system is the ability to overlay local translations, helping trainees to feel completely at home in the virtual environment.

The training has been extremely well received, with trainees commenting that it is interesting and thought provoking. Participants enjoyed the training and cited a new appreciation for their surroundings as a key factor in the effectiveness of the program. Training is more deeply embedded, which is reflected in the safety performance of the teams.

We are developing a suite of VR environments to address key safety issues which will be made available for delivery with contracts and customers.

Application possibilities for VR training include:
- Initial and refresher training in key safety practices
- Identifying new areas of behavioural and process risk by seeing how people interact with hazards
- Inductions and familiarisation for sites that are difficult or expensive to access
- Conducting technical skills tests or assessments

Explore the potential of virtual reality contact innovation@woodgroup.com
Wood Group modified and applied an onshore technology to provide a more efficient (one-year timeline) solution on Anadarko’s Lucius deepwater Gulf of Mexico production facility.

Long-time Wood Group client, Anadarko Petroleum Corporation, upon commencing first production discovered unanticipated production chemistries. The natural gas produced on its Lucius floating spar production facility exceeded anticipated levels of carbon dioxide (CO2) that required a remedial solution for longer-term operation.

Wood Group was selected to provide pre-FEED, FEED and detailed design for this project as it had work for the Lucius facility itself and numerous other Anadarko deepwater facilities. The project was both technology and schedule-driven. During pre-FEED, Wood Group engineers researched available technologies for CO2 removal. Standard offshore options were either weight, or size-prohibitive or would take too long to design and implement. Therefore, the project pivoted to considering approaches widely used in other industry applications. Specifically the onshore world provided a compelling case when considering the high number of units already in use, and as a subset the rental market, which had existing equipment that could be modified for offshore use.

Wood Group performed a comparative assessment of the onshore equipment against the offshore offering and recommended pursuing an already built onshore equipment opportunity for weight, footprint and schedule advantage versus the pre-packaged modular offshore offering.

Ultimately an MDEA (methyldiethanolamine) amine technology and onshore vendor were selected. While proven in onshore applications, this was the first implementation on a floating offshore facility in the Gulf of Mexico.

Anadarko was able to secure an available amine unit that had to be reconfigured and modularised to adapt to a compact cantilevered extension of the facility and take up real-estate on the facility’s main deck without exceeding weight limits or exceeding the facility’s center of gravity limitations.

Unlike onshore applications, the amine unit had to withstand vessel motions and the offshore marine environment. Internal and external component parts and vessels had to be reinforced with thicker walls or internal coating to extend their useful lives in the corrosive offshore environment. Components and devices on the unit are required to meet applicable rules and regulations for safety and reliability.

The compressed schedule dictated innovative construction sequencing. To save time, Anadarko’s selective correction did significant pre-fabrication of equipment onshore to minimise offshore hookup. This work included fabrication of double-decked skid modules for re-assembly on location.

Offshore work also required parallel efforts by engineering and construction personnel to complete multiple tasks concurrently. Other schedule and cost savings included modifications to the facility’s existing pedestal crane so heavy lifts could be accomplished without the need for a heavy lift vessel.

These efforts produced safe and exceptional outcomes for the project. The results, accomplished by a close-knit team of experienced, dedicated and trusted partners, came in under the total installed cost (TIC) budget and on schedule. Wood Group engineered and supported Anadarko to safely meet its scheduled equipment and engineering deliverable dates and total required facility shut in duration for construction.

The Lucius Amine Project established itself as a Wood Group offshore benchmark for innovation, maintaining fast-track schedule and technology adaptation.

For more details contact donnie.thompson@woodgroup.com
Drone inspections taking off

Global adoption of unmanned aerial vehicle (UAV) or drone technology has increased significantly in recent years and Wood Group is now using this high-tech, low-risk solution within its inspection service offering.

We have assembled a team of safety-conscious UAV pilots who work alongside our established multidisciplinary team of highly experienced, certified inspection engineers to deliver impartial engineering analysis of operational assets and structures.

Initially developed to support our clean energy business, its success has prompted Wood Group to invest and develop this service further, with UAVs now being introduced across oil & gas and marine sectors.

A UAV survey complements existing methods: ground scope surveying is fast and unobtrusive, typically operating at some distance from the asset, and rope access is more time consuming but allows for closer inspection, especially in hard to reach areas. Drone survey bridges the gap between these options enabling fast access for hard to reach areas.

Most inspections are effected with high resolution cameras, providing all the necessary detail to determine whether further action is necessary. We can also call on thermal imaging to add further data.

We have used drones in a variety of inspection scenarios from turbine blades and flare tips to under deck surveys and tank inspections. Coupled with our broader asset familiarity and experience, we can help you target the right areas and provide focus and direction to your surveys.

Our commitment to safety is a priority when selecting our UAVs and setting the standard for pilot competence. Our pilots have Civil Aviation Authority (CAA) flying endorsements and have completed over 5,000 commercial flights.

Wood Group’s UAV inspection is available as a standalone service or as part of a suite of services supporting operations and maintenance.

Further capability

In its simplest form, an inspection allows problems to be addressed proactively, meaning fewer assets fail and production is maximised. An inspection is also the starting point from which we, as an independent technical advisor, can:

• Advise on repair or replacement best practices
• Identify erosion mechanisms
• Determine extended lifetime solutions

Key benefits:

• Reduce working at height
• Faster inspection time
• Full photographic record of asset condition
• Reduce the use of manned helicopters
• Minimise or eliminate unnecessary downtime
• Improve turnaround planning

Global adoption of unmanned aerial vehicle (UAV) or drone technology has increased significantly in recent years and Wood Group is now using this high-tech, low-risk solution within its inspection service offering.

Our trusted inspection process:

Step 1 – Define customer requirements

Our methodology for each project is defined by understanding our customers’ individual requirements and tailoring our service to meet their expectations.

Step 2 – Safety planning

UAV operations are planned and performed in line with CAA Permission for Commercial Operation and OHSAS 18001 accredited Health and Safety Management System processes.

Step 3 – Data collection

Our UAV inspection team consists of a two-man team - a pilot and payload operator. Choosing from a variety of camera payload options and working to the methodology defined in Step 1, our UAV team swiftly captures 100% photographic coverage of the asset or structure, highlighting any safety critical defects on site to the owner / operator.

Step 4 – Data processing

Our asset integrity team uses its own software to quickly locate defects and reference their size and location. The nature of the defects are then determined and categorised against a defect standard to detail their severity.

Step 5 – Reporting

Inspection results are delivered using Wood Group’s own industry leading interactive software with a traditional format report also available for download.

For more information, please contact

michael.moir@woodgroup.com
How do you keep an eye on thousands of wells scattered throughout remote areas of Canada? How do you do that across timescales ranging from one hour to 30 days? You get Wood Group on the job.

Three trillion barrels of oil are waiting to be lifted from beneath Canada and the US. The recovery of much of this will be with small units using steam assisted gravity drainage (SAGD). In this process steam is injected underground to melt the bitumen or heavy oil, which drains through to a collection point where it is pumped to the surface. This deceptively simple process has a number of complex variables including flowrates, pressure, temperature and time.

Operating these wells requires close monitoring and regular adjustments to optimise production - multiplied across thousands of wells this was becoming prohibitively complex and expensive. Reservoir modelling is common to the industry but this works across long timescales; operational modelling needed to be faster and more accurate, and for SAGD, both have to be done in tandem to operate efficiently.

Enter the automation experts at Wood Group.

Our Intelligent Operations team went to work adapting our Virtuoso software to model the wells. The simulations they came up with are the first to properly model and predict outcomes for production operations. Our unique solution includes reservoir modeling and adds the first to include data from the well and associated equipment, allowing the actual operation of the well to be simulated. The models can be run at high speed – up to 100x real time – to quickly determine the outcomes of various scenarios and optimise things like steam flowrates and distribution, pump speeds, and oil or water flows. The models can also be used to simulate all kinds of scenarios, from early planning to complex operational scenarios, to support decision making at every stage of well operation.

By using this software to optimise production, production teams can determine the best course of action to get more predictable results and save money on steam and improve reliability. The information we gain over time will help refine the next generation of well and design. Wood Group has consistently led the field in SAGD technology and this latest development is the only one of its type on the market.

Find out how Virtuoso can improve well performance, contact dale.erickson@woodgroup.com

Benefits:

**Well testing.**
Virtual metering brings improved reservoir modelling for better drill planning.

**Gas lift optimisation.**
The software models production behaviour and can be used to test how control actions impact oil production across timescales from hours to days.

**Temperature prediction.**
The model also enables users to predict flow control settings and identify hot spots and short circuits in the well.

**Steam allocation.**
Virtuoso allows you to allocate steam flowrates to predict heat loss and total flowrates for pressure and temperature leaving the unit.

**Diluent blending.**
Modelling the export pipeline helps optimise diluent use to improve capacity and reduce net cost.

**Temperature prediction.**
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**Diluent blending.**
Modelling the export pipeline helps optimise diluent use to improve capacity and reduce net cost.
Project Intrepid, shifting the engineering paradigm

Paradigm is shifting the 

and consistent. 

design information is valid, accurate technical design but ensure that all the to develop not just a fully compliant with varying levels of quality. So we have projects arrive in all types of formats and Documentation and data for large scale can change during the design process. 

complicate things further, many inputs functionality, fabrication inputs, and specifications, design requirements, a project, the overall requirements for Designing an industrial facility is massively by 50% without impacting safety or objective of reducing project man hours and related costs. 

A strong start 

Company-wide brainstorming sessions purposely mixed engineers and personnel of all disciplines, experience and variety of focus within a project to get the broadest range of opinions. The sessions uncovered project pain points, frustrations, information bottlenecks and time wasters while revealing opportunities for positive benefits and values. New and unified technologies were discussed as part of a wish list to improve project performance. Ten global sessions generated more than 1,700 ideas, which were categorised into key concepts to be explored. 

Cost and benefit information was collected through detailed interviews with subject matter experts, project and functional leaders to determine the ideas with the most potential. This phase identified 77 ideas to be assessed in three groups. 

Standardisation 

Traditionally, a large percentage of engineering projects are customised for the client. While this provides excellent results and unique solutions, it can easily lead to cost overruns, especially when there are process, environment or feedstock unknowns. 

How far can you standardise? Project Intrepid uses standard designs for specific components, systems, modules and even full projects. Standardising a complete facility is not common but this approach was theoretically achieve our 50% reduction target in one move. Intrepid is targeting that improvement for a broader range of activities. In practice we take lessons from executing the first project to improve the second, adding further efficiencies and improving the design. 

This method has also been used for onshore refining and other process applications. New software contributes to data centric execution, an environment that enables significant amounts of data to be managed with greater speed and reliability. Project proven, industry accepted software has been adapted for process engineering execution. These tools provide the right intelligence for integrating disciplines and creating the many iterations of critical documents including P&ID’s, equipment line lists and instrument data sheets needed to move the project forward. 

Projects of any size experience ongoing changes. Data centric execution provides a means of integrating any changes to maintain current, consistent and accurate information for immediate decision-making. Automated document handling reduces input and increases quality in the data output as well as flowing it directly to the customer or relevant project stakeholders. Through dashboard environments internal checks and balances maintain alignment with the latest supporting information. 

Our ultimate target is to develop a completely data-centric process where all data is entered once into the system and all information including drawings are transferred electronically to the fabricator and the client’s operations team. 

Efficiency 

Communication on projects can be a bottleneck. The paperwork handoff may be redundant and not value-adding. Man hours are wasted searching through document trails and archives. Automated handover of information between project contributors saves time and improves quality. New software contributes to decision-making by consolidating calculations and making them available for accurate and immediate delivery. 

Implementation and Results 

We have identified 77 use cases where we can improve our efficiency. To date, we have reduced our engineering man hours by over 10% on projects and are currently driving forward on areas which will increase those gains. Twenty-three ideas have already been deployed on projects, with significant man-hour savings. A further ten ideas are being developed to bring even more value. Our clients are feeding back that they are pleased with the first improvements, and excited to see the next ideas implemented. 

Project Intrepid combines digital and automation, past performance, engineering expertise, adaptation of software, existing knowledge, and standardisation of work processes. The status quo has given way to technologies designed to dramatically reduce project man hours while maintaining traditional quality, safety and innovation. Project Intrepid continues to shift the project execution paradigm as we develop better technologies and learn from our progress.
Corrosion assessment manual

The offshore environment is well known for causing corrosion. It is estimated that the annual cost of marine corrosion worldwide is $50-80 billion.

The deterioration of offshore structures results in higher maintenance costs, early system failures and shortened service life. DNV-GL, one of the leading certification and classification organisations, estimates that “60% of the world’s offshore fleet are past their theoretical design age of 20 years”, while some are nearly double that age. Corrosion control is of great concern to the offshore industry. With metallic components exposed to various environments and therefore different levels of risk and corrosion rates, it is difficult to know when parts will need to be upgraded or replaced.

Understanding the causes of marine corrosion and the factors in which protective systems and operating regimens can be used to reduce corrosion problems is a crucial discipline. The corrosion assessment of primary steel structures typically involves quite simple methods with broad assumptions. This leads to uncertainty, and the wide scope inspection plans needed to support the assessment are extensive and time-consuming.

We use statistics and data analytics to gain knowledge. Together with our experience with corrosion assessment, this offers considerable benefit here. With our detailed knowledge we can limit the assumptions, creating greater certainty and more focused and effective inspection plans for our customers and their assets, supporting condition-based maintenance.

We have poured all our experience and the understanding gained from assessing a range of mobile offshore units over the last five years into a corrosion assessment manual (CAM). The manual identifies acceptable corrosion limits for each structural element, based on strength limit states and possible corrosion scenarios. Wood Group worked closely with the customer and classification society to develop the CAM content, this has helped us understand the requirements.

When advising customers, any solutions and repairs we develop can be pre-approved in principle, reducing the time taken from finished drawing to repair commencing. By using standard repair solutions, replacement parts can be planned in advanced to reduce lead times as well as the burden of wasted materials and cost.

Our experience and the information held in the CAM enables us to improve our corrosion predictions together with historical measurement databases on floating systems. In a recent project the predictions we made prior to inspection were confirmed by the customer during the surveys, validating our capability on future work.

Need help identifying and reducing corrosion? Contact bd@woodgroup.com

“Identifying, monitoring and treating corrosion is an ongoing task that only becomes more critical as the asset ages. Targeting and treating it effectively has a major impact on the life of an asset. The more we can do to predict, manage and reduce corrosion the better returns our customers get from their investment.”
Integrity touches on so many areas of the asset life cycle, having a major impact on safety, cost, reliability and operational performance. At Wood Group we have brought forward-thinking to all areas of integrity to build a suite of services that protect your asset from top to bottom.

Integrated integrity – Tom Gilchrist, operational integrity

Operations is the main stage of the life cycle, accounting for the majority of an asset’s life. We can help you to manage, improve and service complex infrastructure and have a deep understanding of the issues you face. The key to successfully extending the life of a platform is to have an effective way to resolve their integrity issues. Our experienced specialists can advise you on anything from day-to-day problems to the development of innovative solutions for new projects.

We appreciate the tight turnarounds Wood has to take to manage, maintain and improve service. To do this we have to understand the critical nature of the projects and the solutions we have to offer. It is important to work with a diverse range of specialists.

At the top end of asset integrity support we bring 40 years of operational experience to bear in advising and creating integrated maintenance and operational philosophies for assets that are in safe hands and fit for the future.

At Wood Group we have developed innovative commercial contracts that are very closely aligned with the ongoing performance of the asset and the charge we put on it.

We have made a significant commitment to expanding internal technologies to ensure we can get maximum value through the life cycle, from initial project through to decommissioning and operation.

Integrity is a broad subject. It covers a spread of disciplines and functions, and whatever the market or environment it can offer an increasing role in the life cycle of any asset. Across our operations and maintenance work with particular emphasis on meeting regulatory requirements, we have been instrumental in developing unique coatings and technology for a variety of oil and gas operating projects. National and local authorities like Bridge and the Fort Road Bridge have been successfully rehabilitated and protected with new coatings developed by Brendan.

Mohammad Nabavian, structural integrity

Subject to the very high conditions our planet can cope with, offshore and onshore assets have to weather a multitude of stresses and threats. There are high stresses and loads, structural elements subject to unusual and ultimately destructive forces. Mohammad has to be aware of all the challenges of analysing these stresses, predicting the risks and preventing the worst from happening.

More than a third of offshore platforms worldwide are operating beyond their original design life. As more oil and gas discoveries have been made, operators have been required to extend the life of their offshore assets to maximise returns without compromising safety or environmental impact.

The structural integrity of our assets, particularly those exceeding or approaching their design life, is of paramount importance when considering the future. Coordination is required between the environment and the asset, operational requirements and objectives, and the business to align all circumstances for the best solution.

Managing structural integrity is one of the most challenging tasks facing our offshore operations. It involves close collaboration and helps us to further understand the challenges and develop new technologies to mitigate such forces.

Brendan Fitzsimons, fabric maintenance

Fabric maintenance helps to protect your asset against these threats. Our approach embraces the cost, safety and equipment to offer the best solution in any circumstance. We work closely with our clients to ensure the opportunity to maximise returns. We build integrity in to our operations and maintenance work with particular emphasis on meeting regulatory requirements, we have been instrumental in developing unique coatings and technology for a variety of oil and gas operating projects.

Mohammad Nabavian, structural integrity

Mohammad has to be aware of all the challenges of analysing these stresses, predicting the risks and preventing the worst from happening.

Brendan has been instrumental in developing unique coatings and technology for a variety of oil and gas operating projects. National and local authorities like Bridge and the Fort Road Bridge have been successfully rehabilitated and protected with new coatings developed by Brendan.

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Instant integrity – Grant Gibson, repair orders

Repairs are a fact of life for an oil and gas asset and a key part of any integrity programme. Typically an asset will need repairs on a daily basis and the frequency of repairs can increase as the asset ages. High Operator capabilities are required to ensure repairs are completed in a timely fashion. Typical repair orders are: small site repairs, that are relatively simple and can be completed in a matter of days; fabricator repairs that can take longer but are usually completed by a single fabricator; and complex repairs that can take longer to assess and plan.

To easily identify and assess vibration risks in process piping, and supports, our complementary Veridian software, a web-based screening tool, provides a range of information to help customers assess and mitigate vibration problems. You can use the software to identify vibration hot spots, validate and report on many aspects of integrity and operational performance. Our flexible asset integrity management software suite, integrated with our leading-edge in-house Wood Group deliverables, is easy to fit and can reduce vibration by a further 80% over conventional methods.

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From top to bottom:

A complete suite of integrity services

- Philosophy
- Maintenance Strategy
- Duty Holder
- Maintenance Contracts
- Fabric Maintenance
- Repair Orders
- Campaign Maintenance
- Specialist Services
- Structural Integrity

A vision of things to come

We continually develop new technologies and ideas, finding more ways to apply our smart tools for the benefit of our customers. Here are some of the recent milestones in Wood Group’s digital evolution.

- **Seeing is believing**
  Using our qualitative reliability assessment tool iQRA and a random sample from over 1,700 subsurface safety valves in our vast database, we proved that self-equalising subsurface safety valves are less reliable than the non-self-equalising type in gas wells.

- **ENVision the future**
  Our real-time environmental information management software, ENVision™ provides emissions monitoring, troubleshooting, data gathering and interpretation for process and industrial plants.

- **Doing well in shale**
  iWIT™ well integrity and operations management system now supports the management of over 800 wells in the Eagle Ford, Permian Basin and Utica shales.

- **Eyes on corrosion**
  ECE is our industry-leading corrosion modelling, evaluation and materials selection software. The latest update adds multistream bulk calculations and reporting. Flushing iXcel MT™ further provides more accurate calculation and improved estimation of corrosion effects for well integrity applications.

- **Big data, big value**
  Wood Group established a new centre of excellence in data analytics Galway, Ireland.

- **Record breaker**
  Optima™ software helps a number of operators and drilling contractors with engineering studies and operational support for drilling at water depths beyond 10,000 ft and in the most challenging offshore environments.

- **A better workflow at your fingertips**
  Paperless eWorkpack allows real-time review and editing, reducing mark-up time and providing a single reference source for ongoing operations.

- **A virtuosic performance**
  Extensible and scalable software for monitoring and analysing data across multiple inputs and assets, Virtuoso™ supports production operations across Europe, Russia, the Middle East, and South East Asia and Australia.

Inspired is written, edited and produced in-house by the Wood Group marketing team. Submissions and feedback are welcome and can be sent to inspired@woodgroup.com

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