

Energy players look to
the future

Sweating Assets:
the reliable way

Industry 4.0

ENERGY+



March 2017



MAGAZINE

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EDITORIAL

Welcome once again to Energy+. The continuing challenging market conditions in the oil and gas industry mean investment levels and new project opportunities are limited and the market extremely competitive. To ensure our business remains strong and stable we are working hard to increase the number of clients we serve across broader market areas. In this edition, we will look at how we are strengthening our position in North America, how to reduce non productive time (NPT) incidents, the importance of maximising assets in a reliable way and our activities in Tunisia for the Nawara onshore gas development. We will also look at some of the opportunities the future holds including the resurgence of concentrated solar power and the possibilities of Industry 4.0.

We thank JGC Corporation, Statoil, Tüpraş, Emas Chiyoda Subsea and SapuraKencana Petroleum Berhad for their contributions.

Stronger than ever



In the short term, the oil prices will most likely remain stable at around \$50 per barrel. This is a recovery when compared to last year and is driving a moderate return to investment by oil companies. There is considerable inertia at this price level, due in part to the “bumper” effect of shale oil and gas which can be brought online relatively quickly in response to increased prices.

As a services provider, RINA needs strong brand recognition and clear market differentiation in order to survive in the current highly competitive energy market. In part, our relevance to clients is enhanced through increased efficiency and expanded capability. We are now literally closer to our clients than ever before, following our decision to distribute our workforce across the globe. This not only reduces cost overheads but also provides access to local knowledge and experience, while speaking the local language.

The timely acquisition of the Edif business has resulted in a significant expansion of our international client base. Edif's expertise in renewable power, power distribution and strong links both with UK industry and banks, and with US oil and gas players, complements our business perfectly. Their geographical presence also extends our global reach, further differentiating RINA from its competitors which in turn is opening up new opportunities.

Historically, RINA has been present in Africa, especially in the Northern parts. However, recently our presence in the sub-Saharan regions has been reinforced and we are now present in countries such as Ghana, Nigeria, Congo, Mozambique and South

Africa. These regions have a large potential for the expansion of renewables and are therefore appealing to foreign investors in the sector. These areas offer the potential of both offshore and onshore work. The same logic applies to North America where RINA is now playing a proactive role, especially in the vendor inspection market. To be successful we must continue to be agile in our business approach, adapt quickly to changing market needs and innovate while harnessing new technologies to create additional client value. Again, there is huge potential for RINA in this area.

As for the future of oil and gas, RINA is currently managing several major projects and pursuing a number of new business opportunities. Industry trends are showing that the gas market is likely to grow more quickly than oil in the future, but the transport of gas is still an issue of lively debate. There are basically two options: LNG or gas pipeline systems. RINA has exceptional experience in both areas. On the other hand, the oil market is preparing for an energy boom and is now focusing on crucial aspects such as cost effectiveness, durability, efficiency of assets and reliability.

RINA's brand recognition and reputation is growing in the oil and gas industry. The company's potential will be further enhanced now that our businesses will unify within a single organisation and under a common brand. The future potential of the company has never been stronger!

■ leonardo.brunori@dappolonia.it

Mutsuto Tone

Long and fruitful relationships are part of creating win-win projects

With its headquarters in Japan, JGC Corporation has been a leading global contractor to the oil and gas industry since it was founded in 1928. It is well known in this sector for its capability in delivering very large developments, including Liquefied Natural Gas (LNG) plants, Gas to Liquid (GTL) plants and complete oil refinery projects. Indeed, it has successfully completed more than 20,000 projects in the oil and gas sector spanning throughout over 80 countries.

We are now taking our vast experience and technical capability in providing engineering, procurement and construction (EPC) services within the oil industry and using it to expand our market areas. These include business investment, operation, maintenance, planning and management services. In the operation and maintenance services sector, we have worked with existing facilities to successfully identify new technologies and improvements that can be made to help them meet current demand trends. Across all of our services, from EPC to maintenance, we work in partnership with our clients to understand their goals and help them expand their business.

Working as the General Manager for JGC's Start-up & Operation Service Department, my biggest challenge is to guide the business to expand its overseas markets. We have to continually look to the future and to where JGC can deliver real benefit to its clients. There are exciting new technologies out there that are redefining the way industries operate. One of our focuses just now is to increase the value of our services through the use of IT technologies such as the Industrial Internet of Things (IoT) that can be used to leverage the huge volumes of data collected across a plant (Big Data). With appropriate context, this data can be translated into meaningful intelligence

BIOGRAPHY

Mutsuto Tone is Associate Executive Officer, General Manager, Start-up & Operation Service Department, Project Management Division of the JGC Corporation, one of Japan's leading consulting engineering and construction companies.

As a graduate from the prestigious Kyoto University, majoring in Synthetic Chemistry, Mutsuto Tone joined JGC Corporation in 1984 to begin a career that has met with considerable success. Starting work within the important R&D department he worked at the leading edge of the company's technical advances.

On receiving promotion, he advanced to the Start-up and Operation service Dept. where he has been working for over 30 years. During this time, he has been responsible for the commissioning and start-up of 18 plants such as Refinery Complex, Gas Plant, LNG, Ethylene, Oil Terminal.



Courtesy of JGC Corporation



Courtesy of JGC Corporation

that can help improve processes, efficiency, productivity, plant availability and, ultimately, profitability. We believe that JGC can make a huge difference to the oil and gas industry in this area by using our process and mechanical engineering expertise and our experience in plant maintenance and inspection to help operators reap the benefits of this digital revolution.

To ensure the JGC brand remains strong and competitive there are a number of areas of my role that are very important. Of course Health, Safety, Security and Environment (HSSE) is paramount throughout the execution of all of our projects. Ensuring we are cost competitive is also vital, especially in these challenging times for the oil industry where prices are low. We have seen a clear change in focus from operators that has made pricing even more critical. However, this all has to be achieved while continuing to ensure the highest quality of service. Part of achieving this comes from maintaining excellent relationships with our subcontractors and a continuous focus on creating win-win situations in the projects we implement.

JGC sometimes employs consulting engineers where we perceive specialist knowledge or knowledge of local regulations will help to shorten project schedules and / or deliver the level of service expected by our clients. Consultants may be used in EPC projects or in our maintenance and inspection activities. We have recently also had experience with classification societies in offshore EPC projects such as Floating LNG (FLNG) vessels.

JGC's relationship with RINA and its subsidiaries goes back more than 15 years. We have worked with them on several Front End Engineering Design (FEED) and EPC projects in countries including Qatar, UAE, Vietnam, Malaysia and Mozambique. We selected RINA as a partner because of their ability to contribute to client satisfaction levels through the provision of professional experts that can resolve technical issues relating to maintenance and inspection. The long relationship between the two companies also means we are

confident in the communication between teams, the ability to work together efficiently and complete work to the required schedule.

More recently, we have been working with subsidiaries from the RINA Group on maintenance and inspection work in Asia. The professionalism of RINA's staff and the quality of deliverables on projects have exceeded JGC's expectations. We have been particularly impressed with their responsiveness at the bidding stage and proactive approach to project execution.

In the near future, JGC Corporation is looking to securing several prospective FEED and EPC projects in the Middle East, Africa and North America that require RINA's expertise. We have no doubt that the success of our relationship with RINA will mean it will continue to be a long and fruitful one; lasting longer than the Sakura (cherry blossom) Season.



Perry Ian Nice

Killing material overkill.
How Statoil is working to reduce costs
while maintaining reliability and safety.

Statoil is a leading, global energy provider. Alongside its operations throughout the oil and gas supply chain, it is also working to develop new energy solutions with particular expertise in offshore wind. I work on the upstream oil and gas production side of the business as a Senior Specialist in Well Materials Technology, supporting the business with its needs for drilling and well completions. The drop in oil price in 2014 has led to a lot of changes in the oil industry and, for me, a shift in the focus of my work.

When the price of oil fell, oil and gas operators simply had to look at ways they could reduce production costs - not just by a few percent but as a real step-change. For my part, the material selection process is a big part of realising the cost reductions we are looking for. Materials for use in a well have historically been of very high specification. However, reviewing the actual needs of each well, analysing fluids and looking at specific corrosiveness often means an alternative, less expensive material could be used without compromising reliability or adding health and safety concerns. We have found, for example, occasions where 13%Cr martensitic stainless steels could be replaced by 3%Cr alloyed steel without affecting well performance - offering significant cost savings. Centro Sviluppo Materiali (CSM), part of the RINA Group, helps us to carry out testing on different alloys to understand where they can and cannot be used.

Historically the cost aspect of a project was not the biggest focus but now it certainly is. Drilling and completing a well is expensive and complicated but

BIOGRAPHY

Perry Ian Nice is currently Senior Specialist Materials Technology in Statoil. After graduating in Materials Technology from the Cranfield Institute of Technology in 1980, Perry Ian Nice began his career as a corrosion engineer for Philips Petroleum working in the Greater Ekofisk Field in Norway. In 1984, he moved to Mobil Exploration and Production where he continued his experience, this time in the Statfjord Field. Following the change in operatorship of the Statfjord Field, he moved to Statoil ASA in 1987 where he still works today. Over the course of his period here, he gained immense experience in materials technology within drilling and well technology. Currently his position is Senior Specialist Materials Technology within Statoil's Drilling and Well Technology Engineering Dept. Perry has been a member of the National Association of Corrosion Engineers (NACE) since 1993 and also stood as Chairman of the Norwegian Corrosion Society from 1986 to 1992. A keen author, Perry has published over 60 papers related to corrosion, environmental cracking and metallurgy in the drilling and well completions area of the Oil and Gas Industry.

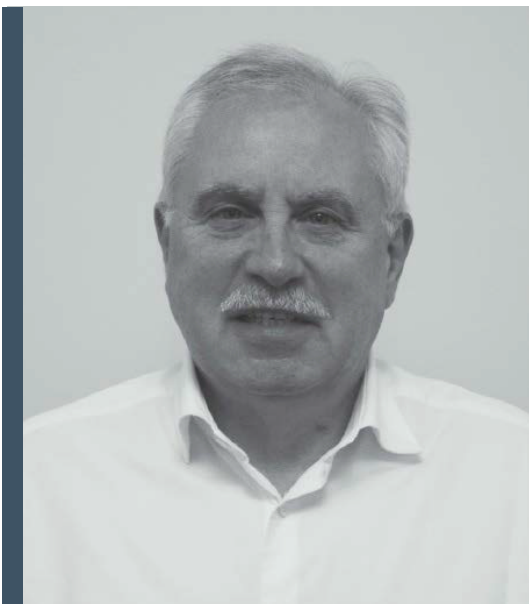




the costly alloys that have been traditionally specified, such as super duplex stainless steel, are often over-specified above what is actually needed. The push for more economical production means we are upturning old requirements and looking at ways to simplify each process and material used. We are asking well equipment and tubing manufacturers to suggest alternative materials. Of course, any change in specification is carefully balanced against the safety of the operation as part of a detailed evaluation. Corrosion tests are carried out in the laboratory to understand how materials react in a simulated environment.

One of the challenges with trying to re-define the materials required is that we are asking manufacturers to invest in developing new alloys at a time where the oil and gas industry has dramatically cut its investment in new projects. However, looking at the gaps in the list of alloys available and suggesting materials that can fill these may also bring them opportunities. We also ask manufacturers to look at their wider portfolio.

Working with them, communicating and helping them understand what we are looking for may mean they already have materials that are being developed or that courted little interest in the past that offer a solution to some of the challenges we face today. For example, we have recently been working with Nippon Steel & Sumitomo Metal Corporation (NSSMC) to create a new alloy for injection wells. Seawater injection is a dynamic and complex process where we have experienced corrosion failures. Alternative alloys, however, can offer savings of around 35-40% and are well worth pursuing. Working with NSSMC we found and tested a material that we could use based on a material they had that was originally designed as a line pipe alloy.



Working with CSM as part of the RINA Group really helps us with the qualification process. Its test facilities, especially its autoclaves that are in a self-contained bunker, offer safety that is second to none. I have worked with CSM since the late 1990s and we have developed a good relationship over this time with excellent communications. I like CSM's approach to the work we do. They don't just carry out the testing, but also look into procedures and how these can evolve to be more effective. They attend Corrosion conferences (e.g. NACE, Eurocorr) where there is a lot of discussion around test procedures. They listen, learn and contribute to these meetings and then apply the knowledge they have gained into improving how they work for customers.

Of course, the metallurgical knowledge within CSM from its processing side also brings additional knowledge into its testing programs. Others don't have this research background or in-depth knowledge of how materials are processed. Ultimately, I feel that by working with CSM we get excellent value for our money.



Courtesy of Tüpraş

Murat Şimşek

Tüpraş Modern Refineries Provide it with Greater Processing Flexibility

Turkish Petroleum Refineries A.S. (Tüpraş) is the only refining company in Turkey. It operates four oil refineries in Turkey with a combined crude handling capacity of 28 million tons per year. Following a Fuel Oil Conversion Project fully completed in 2015, the Izmit refinery, which has a processing capacity of 11 million tons per year, increased its Nelson complexity index (NCI) from 7.5 to 14.5. The other refineries are the Izmir, which also has a processing capacity of 11 million tons per year; the Kirikkale, which processes 5 million tons, and the Batman refinery with 1.1 million tons per year.

The huge capacity Tüpraş has at three of its refineries, namely Izmit, Izmir and Kirikkale is used to process imported crude from global markets delivered by tanker and pipeline. The Batman refinery processes crude produced from numerous small oil fields located South East of Turkey. Oil and semi-finished products are transported via pipelines and road tankers.

As with all refineries, the biggest challenges we face at Tüpraş relate to the tight margins on products and sharp changes in oil prices. We are, however, very fortunate to have a young population that drives market growth and the NCI of 14.5 in our modern refineries presents us with a lot of opportunities. We continually strive to ensure Tüpraş offers excellent processes and products. Achieving the improvements we have made to NCI numbers and processing capacity along with projects to enhance operating efficiencies give us greater flexibility and help to keep our refineries very competitive.

To ensure our refineries remain modern and competitive, over the next 12 months we will typically invest around 250 million USD on ongoing small and

BIOGRAPHY

Murat Şimşek is currently Integrity and Reliability Director in Tüpraş.

An engineering graduate from Gazi University in Ankara, Turkey, Murat Şimşek began his career in BOTAŞ BTC Project Directorate, where he worked as a piping and mechanical supervisor on the Baku Tbilissi Ceyhan Pipeline Project. Following a period as project coordinator in Tekfen Construction for the Samir Refinery Upgrade Project, Murat went on to become HSEQ manager with ATAS at the company's fuel terminal, before joining the Turkish refinery giant, Tüpraş, where he started out as an inspection superintendent. After obtaining an Executive MBA from the prestigious Koç University in Istanbul, Murat's career flourished within Tüpraş as he was appointed Investments QA/QC Manager for the Izmit Refinery in Kocaeli, Turkey. Most recently he received promotion to Tüpraş General Management where he now works as Integrity and Reliability Director.



Courtesy of Tüpraş

mid-size projects and around 50 million USD for maintenance work and operational support activities. This excludes any other major investments that we may consider. During the period from 2006 to 2015 we have increased our operational availability from the third quartile to the second quartile. We aim to increase this further into the first quartile by 2020.

My role is that of Reliability and Integrity Director across the Tüpraş business. The most important part of my job is to assure continued safe operation of the refineries and to help ensure any unexpected shutdowns, leaks or failures are prevented. This involves working throughout the complete lifecycle of every single piece of equipment across the plants. I am involved from the very beginning at the design phase right through to decommissioning or replacement of a unit. We have challenging projects and maintenance schedules and this means we also look to reliable partners to support our activities. To this end, we frequently use third party inspection agencies and consulting engineers who are involved in fabrication and installation activities of ongoing grass roots or brownfield projects.

RINA is currently working as our third party inspection body to the follow up on the fabrication and construction activities relating to our Crude Oil Distillation Revamp Project at the Izmir refinery. We selected RINA for this work as it has a capable and experienced work force and offers competitive commercial terms. This is a required combination as we have to assure the highest quality but, as previously mentioned, we also need to make sure we remain competitive.

The Crude Oil Distillation Revamp project involves the upgrade of furnaces, pumps, heat exchangers and associated piping to improve the efficiency of the distillation unit. The enhancements to these systems will enable the distillation unit to process crude with higher acidity levels and greater sulphur content. Referred to as high TAN (total acid number) crude, this will give us greater flexibility on feedstock quality. The new equipment for the Izmir crude distillation unit is

scheduled to be installed during a shutdown planned for 2017. The shutdown window is very short so we have to be prepared with as much work in advance as possible. RINA is helping us to ensure that pre-fabrication work is correct and quality is high so that the installation will happen quickly and smoothly during the shutdown window.

RINA has been a solution partner for the project team and we are fond of working with them. This good relationship and the fact that we expect successful results on our current activities together mean that RINA's assistance will be sought for future projects.





Courtesy of EMAS CHIYODA

Tiziano Zarbo

A clear focus on client needs

Founded back in 1992, Ezra Holdings is a relatively new company but this family owned business has grown very quickly. It began in the maritime industry, providing management and operation of offshore support vessels in the Asia Pacific region. In 2011 it acquired Aker Marine Contractors (AMC) from Aker Solutions and today, under its EMAS CHIYODA Subsea branding, is a significant global player in the oil and gas industry with three main business divisions offering Subsea Services, Offshore Support and Production Services, and Marine Services.

EMAS CHIYODA Subsea (ECS) is a joint venture between Ezra Holdings, NYK and Chiyoda Corporation, a leading contractor in the oil and gas industry. Along with an impressive fleet of modern subsea construction and installation vessels, ECS offers the offshore industry a great deal of experience and a proven track record of successful projects. It has secured contracts and provided services to many of the major, global oil and gas companies and has quickly become one of the top deep-water subsea construction service companies.

While ECS has seen rapid growth, like many contractors in the oil and gas industry, the low oil price has been a challenge. Although oil prices have recovered a little recently, the industry is still in difficult times. To combat this at ECS we have worked hard at controlling costs, optimising our operations and improving our efficiency. Part of our optimisation strategies have included relocation of key personnel to make sure they are strategically located to most efficiently serve global projects. We have also gone through many careful negotiations of long term procurement agreements and reviews of employment contracts to make sure we remain strong, resilient and efficient.

We have always had a focus on client needs and innovative solutions. In a way, this period of difficulty has just made us a lot smarter with new strategies and 'out

BIOGRAPHY

Tiziano Zarbo is currently Global Vessels & Assets Senior Vice President at EMAS AMC Services BV.

Following his graduation in Mechanical Engineering from the University of Genoa in 1990, Tiziano Zarbo's early career saw him concentrating on the design approval of a multitude of different systems, components and engines inherent to ship certification. He moved on to become a project manager focusing on offshore platforms and other special units before moving to South Korea, where he worked on newbuildings, surveying and testing and approving machinery components.

In 2003, Tiziano joined SAIPEM working initially as the West Africa Assets manager and Base manager in Nigeria, before gaining more experience in Cameroun, Singapore, Jakarta and The Netherlands, where he was appointed Managing Director of the local SAIPEM company. 2014 saw Tiziano return to Singapore, this time as the Senior Vice President for Global Vessels and Assets where he developed an increasingly strategic role in the vast array of EMAS's activities and assets. Most recently, he established and is now leading EMAS CHIYODA Subsea Rotterdam Office to continue and develop his experience.



Courtesy of EMAS CHIYODA

of the box' thinking on how we can make a greater difference for our customers. Our efforts have been well repaid as we now have over \$1bn worth of projects on our books for completion. Besides oil price fluctuations, other trends we have been seeing that affect the oil and gas industry include an increasing trend towards renewable energy sources. Take The Netherlands as an example: 100% of power for electric trains in this country now comes from wind farms. Although we could look to play a role in this area, we have continued to concentrate in oil & gas; optimising where we can and becoming even stronger at what we are really good at.

As a relatively new company in the oil & gas industry, one of the ways that we secured the level of growth we have seen is by employing very experienced people. This has given us a blend of nationalities and experience with a common single focus on performance excellence. It makes us agile, flexible and very adaptable to the exact needs of our customers.

As for my particular job at ECS, the most important part is to ensure we always perform necessary operations and have ships that are safe and efficient in line with final client expectations. We have a clear goal to make sure our customers get what they need and when they need it, while executing projects safely, efficiently and profitably. This is of benefit to all stakeholders in a project. Ensuring ships have the correct certification in line with regulations is one of the most critical parts of this.

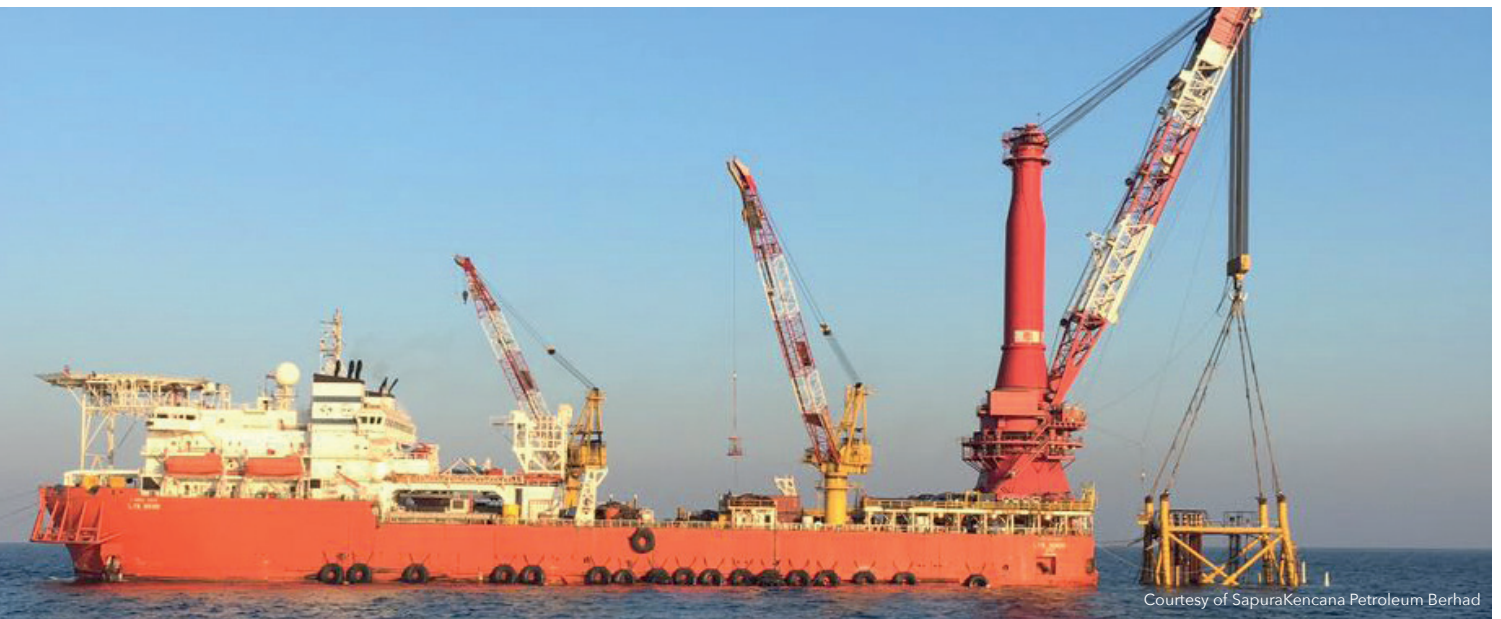
Our relationship with RINA goes back many years. We use their services a lot; in particular on the industrial side of the business where third party certification is required by customers on equipment not covered by certification rules. A good example is some of the sophisticated lifting equipment we use.

RINA is a great company to work with as, like ECS, they are very client oriented. They provide us with the certification we need in a form that is entered directly into our certification management system. There is full integration between RINA documentation and our certification system which helps projects to optimize the

utilization of existing lifting equipment, with remarkable savings on potential purchase of redundant equipment. RINA is good at tailoring its services to the needs of the client and we like how they work.

The relationship between myself and RINA goes back some 25 years and I think it will continue for many more. The additional knowledge of RINA's people and processes further helps the partnership between our two companies.





DS Kumar

A full range of upstream services brings stability to our business

With its headquarters in Malaysia, SapuraKencana Petroleum Berhad is a leading business in the oil and gas industry that provides a complete range of services and solutions for the whole upstream value chain. It is a truly global company with a presence in over 20 countries. One of our major strengths is having the skills and assets in-house that include owning and operating producing oil fields, exploration, development and selling the oil it produces. Other assets include fabrication yards, a full range of support vessels, remotely operated subsea vehicles and drilling rigs. When it comes to the upstream oil and gas industry, we are one of the best placed companies to provide all the services needed.

To further enhance the range of services we can offer, SapuraKencana has recently partnered with Proserv, another leading upstream services provider headquartered in the UK. With most of our business lying in shallow waters we have great experience and expertise in laying subsea pipelines. Proserv brings us particular expertise for deep water subsea work.

It has been a difficult time for the oil industry with the prolonged slump in the oil price, especially in the exploration and production sectors. We continually review new technologies available and, where beneficial, form joint ventures that mean we can deliver the best possible services and opportunities to our customers. One of the main reasons we have maintained a strong business throughout this period is having such a wide range of capabilities in-house. Of course, these leaner times mean that EPCIC contracts are few and far between and we have to keep driving our efficiency and competitiveness to be successful. The goal we are striving for and meeting is to do this while maintaining our high benchmark for safety and quality.

BIOGRAPHY

DS Kumar is actually Senior Executive for Supply Chain Management (SCM) and Contracts in SapuraKencana.

He is an engineering graduate who further studied to obtain an MBA before beginning his professional career in EPCIC Sector, where he worked in the Oil & Gas sector. He spent 20 years with the Offshore Division of Mazagon Dock Ltd in Mumbai, India, gaining considerable experience before moving on to work in the Oil & Gas Special Projects Division of the EPC Larsen & Toubro Ltd. in Mumbai. After a decade developing his competences here, he joined Sapura Kencana HL Sdn Bhd, Kuala Lumpur, Malaysia, in their India Office where he has spent over a year working with the EPCIC Projects Division.



My particular role in SapuraKencana is that of a Senior Executive for Supply Chain Management (SCM) and Contracts. My main priority is to manage the entire value chain for SCM functions and sub-contract services. My role extends to the support of proposals teams to ensure we submit competitive tenders to give us the best chance at securing a project. This is particularly important during this relatively quiet time for the oil industry. Once a project is awarded, I work to ensure we maintain margins through effective management of SCM functions without compromise to timelines or quality.

As for the future, our short term focus is on ensuring our business remains sustainable and retains the in-depth skills and talents we have in-house. We will focus on regions where there are visible EPCIC business prospects. India offers good potential with identified projects up until 2020. Certain pockets of South-East Asia, including Malaysia, Myanmar and Vietnam, also offer potential.

We work closely with RINA and I believe this relationship will expand further in the future. No EPCIC contract can be executed without the expertise and support of classification societies, independent certification / inspection agencies and specialist engineering consultants. Part of my role is to ensure we appoint the best agency for a project in terms of both cost and qualifications.

RINA is currently our independent third party inspection and certification partner for ongoing EPCIC projects in the offshore oil and gas sector. We selected RINA because they add value both in terms of their expertise and experience and, with resources distributed throughout the world, their economy for mobilisation of manpower. It is an established organisation but it was not previously present in certain geographies. This has changed, and this enhanced presence is a real value to us. SapuraKencana sources across the globe and we need people who are ready to support us in local regions. This not only makes manpower costs more competitive in terms of mobilisation, but also adds advantages in terms of logistics, communication and culture.



Our journey and experience with RINA to date has certainly been satisfactory. In the future, I see RINA providing us with more than just third party inspection and certification services. Its involvement in marine classification and safety studies are also of interest to us. When it comes to certifying our own assets, it helps us to have an organization that understands and is familiar with our business.

Alongside the current, ongoing EPCIC projects in South Asia where we are working with RINA, we have bid for future projects worth around USD 750 million. We hope to see success from these bids and expect our relationship with RINA to continue and strengthen as we move forward together.

A Trusted Partner for Tank Farm Certification



Storage tank farms are essential industrial facilities to store oil, petrochemicals and gaseous products. Because of the huge quantities of fuel and hazardous materials they contain, tank farms are a constant source of risk; fire, explosion, toxic spill and release, with the potential to have a serious impact on human health and the environment. Although having a carefully designed site layout does not necessarily prevent accidents, it does help to control and reduce any adverse impact should an accident occur. There are typically several types of atmospheric and non-atmospheric storage tanks including low-pressure, pressurized, underground and double-walled. RINA provides a set of guidelines for technicians involved in the tank farm certification process, both in the design and operational and life extension phases. The first issue to be covered by the guidelines is spill prevention. It is essential to do everything possible to prevent oil from spilling or leaking onto the ground polluting the water table or sea, thereby reducing health risks. But there is also a sound economic argument as well, in that spills often result in huge fines and costly clean-up operations and that is not taking into account the loss of product. But perhaps the most costly result of a spill is the damage to a company's reputation within the market.

The cause does not necessarily have to relate to the design or condition of the tank. Spills can be simple operator errors as a result of poorly designed or improperly installed facilities or just a lack of adequate maintenance.

RINA's guidelines examine problems associated with storage tanks such as design and construction, corrosion of the tank bottom and seam, shell pitting, weeping or leaking, improper venting, or general problems with piping such as installation, joints, and supports. The guidelines can also be used by operators

performing inspections, providing a detailed checklist for both out-of-service and in-service inspections. There are two types of formal documented inspections – external and internal. The external inspection is conducted by a certified inspector to assess the condition of the AST (Above Storage Tank) and determine its suitability for continued service without entry into the AST interior. The internal inspection is conducted by a certified inspector to assess the internal and external condition of the AST and determine its suitability for continued service.

Of course, all inspections should be standardised and conducted as part of a regular maintenance schedule. When conducting the more rigorous inspection, the inspector should adopt the following protocol. Firstly, a checklist should be used to make sure all important areas are thoroughly inspected. This checklist may be revised to meet the needs of specific tank farms. Next, an inspection form should be completed where the findings and conditions are written down with the form being initialled, dated and signed where indicated. The findings should then be followed up, the deficiencies addressed and if there are any significant problems these should be promptly reported to management. RINA has implemented a "Tank Farm Inspection Form" as part of their guidelines which covers every aspect of the internal or external inspection of tanks either in operation or out-of-service. Thanks to its highly skilled, experienced and qualified personnel, RINA has been proven to be a trusted partner, ensuring the reduction of failures, maintenance time and relevant production shutdowns. The company has also offered compliance with industry regulations and legislation as well as plant and equipment reliability with a consequent reduction in cost and failure.

■ giuseppe.cevasco@rina.org

Concentrated Solar Power

Concentrated Solar Power (CSP) describes power plants using conventional power cycles fueled by concentrated sun. The technique is used commercially in the SEGS plants within the US since the oil crisis of the 1980's, and experienced a revival 10 years ago in Spain and the US. The total global installed CSP capacity amounts to about 5GW.

Fitting into the centralized grid infrastructure, CSP plants typically range from 50 to 100MW. Surrounded by a field of sun-tracking mirrors, they convert the reflected sunlight through absorption by a solar receiver into heat, which can then be stored or directly converted into electricity via steam turbines.

Due to its cheap thermal energy storage, CSP is gaining popularity in regions with high evening peaks like South Africa, or where high penetration of fluctuating wind or photovoltaic generation requires reserve capacity or spinning reserve and other ancillary grid services, e.g. in California or Spain. CSP can be retrofitted to existing conventional power plants being able to reach steam temperatures of up to 565°C. Demonstration plants have shown that solar heat generation of up to 1,000°C is possible. This means that in future it will be possible to run efficient Integrated Solar Combined Cycle (ISCC) plants purely on solar energy.

The downside is the cost of currently twice to three times as much per generated GWh as solar PV. Project development times of around 2-3 years and plant construction of about 2 years mean CSP has lost ground to other renewable energy generation methods. Furthermore, as payment is made independent of the time of delivery, the advantage of "dispatchability" of CSP generation is commonly neglected. This will change as clean energy constitutes an increasing share of the energy mix.

CSP is currently enjoying a resurgence, especially in China, where there is a high demand for electricity generation. This take up has been accelerated by an established Chinese low-cost supply chain that is hungry for initial commercial projects. Perhaps most remarkable are the recent developments in Oman where a CSP company has pioneered an innovative solar powered Enhanced Oil Recovery project. Plans are already underway in the region to embark on an additional project which will provide over 1 GW of solar heat. With other potential applications like process heat, process steam, solar desalination and solar chemistry, the possibilities are huge. Moreover, due to the similarities, this technology provides the ideal opportunity for engineers in the fossil energy sector to shift their careers towards a clean alternative.

RINA through its renewable energy competences, has been involved in design review activities for a CSP plant in the Middle East. RINA reviewed the whole CSP basic design package and attended HAZOP meetings to ensure plant safety.



RINA a new Protagonist in North America



VIEW OF HOUSTON



RINA USA TEAM, BASED IN HOUSTON

RINA has further consolidated its presence in Houston and after the Edif NDE acquisition, has proudly announced the opening of the new company's office in September 2016.

The impressive office boasts a solid group of technical managers and coordinators who successfully deliver almost 1,500 hours of inspection per day from upstream to downstream Oil & Gas Markets across a wide range of industries.

RINA aims to boost its offering in the US even more, not only focusing on the provision of inspection services within the Oil & Gas Market, but mainly investing in the synergies that are created bringing together RINA's comprehensive service portfolio with its existing American clients.

The possibility to leverage on the RINA international network of inspectors has enabled RINA to consolidate the long-standing relationship with companies like ExxonMobil and enhance business opportunities. In this respect, RINA Houston is proud to announce that in January 2017 ExxonMobil awarded the company a "Global Master Service Agreement (MSA)" for source inspection services.

The MSA will cover Surveillance Services to ExxonMobil across various countries until early 2022. The scope of services includes Inspector Coordination, Discipline Inspection, Welding, Structural, Drill Pipe, Engineered Equipment, Subsea, Tubular Material, Instrumentation and Electrical, Rotating and Machinery, Coatings, Linings, Fire Proofing and Refractory, HVAC, Civil, Materials, Expediting as well as Auditing.

RINA will thus be able to continue the current service provision and also have the opportunity to provide valued services on future projects, such as The South-East Remora Oil and Gas Discovery, the Golden Pass Products LNG Expansion Liquefaction Plant and Export Pipeline and the Baytown Olefins Plant Expansion: New Ethane Cracker & Two PE Plants.

The good collaboration between RINA's and D'Appolonia's Consulting Engineering teams led to the recent achievement of another important goal. Thanks to these highly skilled teams, and RINA's local market knowledge in Houston RINA USA has won an important contract for the Panama Canal LNG Terminal project feasibility study, which was awarded and signed at the end of 2016. The objective of the study is to assess and plan the development of liquefied gas-related projects for the Panama Canal Authority. RINA Houston and RINA's engineering consulting hub will cooperate closely in the development and successful completion of the contract, which should be achieved by July 2017.

The contract defined ten overall tasks to be completed, involving a number of different areas of the LNG industry, from the analysis of the market to the concept design of an LNG terminal. A handpicked team of experts is working on the contract bringing to bear their experience on aspects such as finance, the environment, a range of legal issues, impact assessment and the overall execution plan.



Management of Electrical Power Networks

The regulatory framework included in EU Commission Directives 2009/72/EC and 2009/73/EC sets out the basis and principles supporting the regulation of access and usage tariffs, used by transmission and distribution system operators to fund the investment and maintenance of this infrastructure. The objective is to deliver real choice for all European Union consumers, new business opportunities and more cross-border trade, ultimately to achieve efficiency gains, competitive prices, higher standards of service, and to contribute to the security of supply and sustainability.

In accordance with the framework, the Italian Regulatory Authority for Electricity and Gas and Water (AAEG) issued Resolutions 539/2015 & 442/2016, which define the new rules for the management of closed power distribution systems (SDCs), including the Internal User Networks (RIUs). These new resolutions provide new constraints and responsibilities to the RIU manager, who is considered a Distribution Network Operator (DNO).

Having become operational from 2017, these new resolutions seek to enhance the equity and transparency of the tariff settings, enable free access to the electricity retail market and to introduce more informative billing systems, with faster and more simple switching procedures and more stringent rules on brand unbundling.

RINA has supported EniPower as the designated engineering consultant for the whole RIU of EniPower in Italy, developing the first case study related to a regulatory assessment of a power distribution network in a highly complex industrial site (the EniPower RIU located in Brindisi).

The activity began with the assessment of the RIU utility (Consumption/Power generation) and the data management system to define the gap between the “as-is” configuration and the regulatory requirements. Using the gap analysis results, a feasibility study was conducted to determine the preliminary cost estimate and the time-frame within which the work should be completed to deliver the network upgrade.

The approach adopted by RINA sought to reduce the impact on the electrical network while optimizing both the metering system and the data management system. The aim was to achieve an interface between the transmission and distribution level based on bi-directional information flows.

The enhancement of these information channels supports competitive and reliable electricity flows to the final customer. The system is managed on the transmission level by system operators and includes balancing services in addition to efficient distribution network planning in coordination with the transmission planning frameworks.

Starting with the in-depth analysis of the regulatory requirements and the assessment of the electrical system configuration, RINA is able to support the RIU Manager in implementing the best strategy for achieving RIU compliance. The results: an improved electrical network and data management infrastructure, together with several benefits related to upgrading the network, real-time monitoring and power-flow management.



Reducing NPT during Drilling Campaign

"At RINA we believe the non productive time (NPT) is anything that occurs outside the original operational plan and not just equipment failure. Vendor shop inspections can capture many failures but NPT doesn't just arise out of failures. If, for example, it takes 13 hours to install a Well Test Flowhead and the planned time was 6 hours, then the 7 hour difference should be considered NPT; however, this is not a commonly held view. By planning ahead and ensuring that equipment is available and correctly prepared and that lifting plans and detailed procedures are put in place then the critical path operational time can be optimised."

Oil & Gas drilling operations are currently challenging but now is the very time when companies should prepare for a business upturn which will be triggered by a more stable oil price. We have experienced or heard about the impact of the low oil price on oil & gas service companies this past year. The market conditions inherently forced those companies to analyze their cost base in order to remain competitive. The measures taken to remain competitive have been very broad.

- Companies have "let go" some of their most experienced personnel, many of whom mentor to the new generation of engineers. As a result we are seeing more errors being made when assembling tools for well operations.
- Some companies have moved the sourcing materials and components to cheaper/untested suppliers to be able to bid competitively but this has increased risk.
- Companies are increasingly reusing or modifying existing

equipment and tools. With less new equipment being bought and with maintenance schedules being extended there has been a corresponding increase in failures. This impacted on logistics with equipment/tools being delayed in getting released from one job to go to another.

Similar impacts have been seen at the manufacturing level, be it in the major OCTG plants or with drilling tool/equipment manufacturers. All the evidence is pointing to more defective product passing through the supply chain.

To further compound the issue, as oil & gas companies drive to reduce costs, important inspection intervention levels are being reduced. All of these factors are putting stresses on drilling operations making the elimination of NPT a real challenge. However, the cost of drilling QA services at all levels from shop floor to drill floor quickly pays for itself versus the cost of NPT.

RINA has the right experts who have the competencies and experience to address the challenges that the oil & gas industry faces providing valued added services which will significantly reduce NPT incidents. Whether the need is for an Inspector in a drilling equipment/tools manufacturing shop, an OCTG Inspector in a pipemill manufacturer or specialist personnel such as Completion Engineers or Well ops Supervisors on the drill floor, RINA can help.

■ doug.davies@rina.org

100% Safety & Performance in Tunisia



Exploration of the Nawara region resulted in the discovery of a large quantity of natural gas. A partnership between OMV and ETAP - the Tunisian National Oil Company - was created to extract the gas which would meet the energy needs of the country.

Located in the desert in a very remote area of the Nawara region, the project comprises three main components; a Central Process Facility with related eight Flowlines, a 380-km export pipeline and a final Gas Treatment Plant built in Gabes. Together the new facilities will be able to treat 2.7 million cubic meters per day.

This project is considered the biggest economic driver in Tunisia and will provide growth accelerating the general commercial development activity in the country.

OMV awarded three engineering companies with EPC contracts for the design of the new gas processing facility in the Nawara concession; the Max Streicher - Bouchammoui Industries joint venture for the CPF Process Facility and Flowlines, Enereco for the pipeline and ABB for the Gas Treatment Plant in Gabes.

Health, safety, security and environment were declared the most important features of this project, to be guaranteed for the entire life of the facilities and RINA, thanks to its highly skilled consulting engineering team, was awarded the development of all HSE and Operation & Maintenance activities by all the engineering contractors.

More specifically, a wide range of hazard identification activities were carried out in order to ensure that all safety issues were thoroughly addressed. These activities provided, through the Quantitative Risk Assessment Study and other Safety Studies, the correct input for the safe design of the facilities.

Occupational Health Risk Analysis was developed for setting up the Occupational Health Management System whilst Failure Mode, Effects and Criticality Analysis and Reliability, Availability and Maintainability Analysis provided the input for the Maintenance and Operating activities. This data was used to define a suitable Asset Integrity Management Plan and maximise plant production performance.

The Environmental Impact Assessment, Waste Management Studies, Oil Spill Contingency and Reclamation Plan were all undertaken in order to guarantee the proper protection of the surrounding environment. In addition, specific Security studies were developed for protecting the facilities against external threats.

This project required the development and execution of a full range of complex Safety and O&M activities. RINA also had to ensure operational consistency while supporting three different international contractors. For RINA this represented a very important and significant achievement.

Resetting Time between Inspections



The number of fixed platforms presently installed in offshore fields for oil or gas production nearing, or even exceeding, the end of their design life is increasing worldwide.

Fixed steel offshore platforms are typically designed with a target service life in the range of 20-25 years; according to that target, the corrosion and the fatigue issues, as well as the strength assessment against extreme environmental loads, such as the 100-yr extreme wave loading, are properly addressed at design stage.

At the end of the design life, for most of the platforms, the hydrocarbon fields on which they are installed have still reserves, and the oil companies need to continue with the production. Approximately, half of the world's oil and gas companies are presently planning for far longer asset life spans than before.

On the other hand, due to a change in economic conditions, operators often want to continue exploiting platforms beyond their 20-25-year designed lifecycle instead of investing in a new platform. This may be a significantly pressing issue in the oil market, particularly when the price of the barrel is low. The challenge is to continue to use, or even reuse, in safe conditions, offshore platforms that have reached the end of their design life, and have this extended use approved by statutory authorities.

In principle, a structure is fit-for-purpose when the risk of structural failure leading to unacceptable consequences is adequately low; for existing structures, it is permissible to have limited individual component failures, provided the reserve against overall system failure remains acceptable.

According to the above outlined criterion, for the reassessment and extension of service life of an existing platform, where some structural components show inadequate capacity to satisfy the usual checks of strength and stability in a given design condition (usually an extreme environmental load condition), an assessment of the whole structural system capacity can be performed.

That assessment is typically carried out by evaluating the ultimate strength capacity of the platform, under storm loading conditions, by the execution of non-linear push-over analyses, to finally evaluate the platform capacity to withstand extreme environmental loads in its estimated residual life.

Following such analyses, the maximum wave height (with relevant return period) the platform is still capable to withstand in its estimated residual life can be defined and certified accordingly. This approach has been successfully used by RINA for assessment of various existing platforms, particularly for international clients such as DOTL and ONGC, and has been adopted, with relevant analyses underway, for the life extension certification of the oldest Eni platforms in the Adriatic Sea.

Assuring durability of new infrastructures



The Turkmenbashi International Seaport, located on the eastern shores of the Caspian Sea, is the main passenger harbor and cargo port and the largest seaport in Turkmenistan. The \$2 billion construction of a new port infrastructure was awarded to the Turkish contractor GAP İnşaat by the State Service of Maritime and River Transportation of Turkmenistan. As part of the contract GAP İnşaat was required to appoint a third party Test Inspection and Certification (TIC) company.

TIC is standard practice when executing large international infrastructure projects as it ensures all relevant parties that the construction meets technical requirements, and that the installation and systems can be safely operated throughout the life-cycle of the installation by personnel and the public alike.

As an independent third party conformity assessment body, RINA was appointed by GAP İnşaat to provide design verification, site supervision and procurement inspections, in order also to assure that equipment, machine, and material will have a relatively long continuous useful life, longer durability without requiring an inordinate degree of maintenance and consequently guarantee cost saving during the exercise.

Design verification will be completed by May 2017, following the review of around 20,000 technical drawings to ensure that all standards and codes are being met in full. RINA's international project management team, totalling more than 10 engineers, has provided solid support in meeting the client's expectations both prior to starting and during the current works.

The RINA site team has been providing a 360° service in order to support GAP İnşaat and the State Service of Maritime and

River Transportation of Turkmenistan, with the completion of all deliverables in compliance with the approved drawings and documents. This provides a guarantee to all parties that the level of construction quality meets the specifications as defined by the contract and/or the relevant Standards and Codes.

Site inspection activities cover all construction phases (pre-fabrication, construction, erection, sampling and testing, pre-commissioning and commissioning) and all disciplines. A dedicated team of expats and locals is deployed to cover the main disciplines of civil, mechanical and electrical engineering.

Reporting and certification are RINA's principal deliverables. The documentary evidence that the equipment and critical systems are safe and compliant is important in its own right, as this information also triggers payment to the contractor.

As a result of RINA's worldwide offices, procurement inspections have been performed with all the contractor suppliers. RINA inspectors from Turkey to Italy, and North Europe to Russia are also involved in carrying out Third Party checks and assessments prior to shipment.

From the design verification stages to final construction, RINA has been embedded at the core of this remarkable project. RINA's goal is the same as that of the State Service of Maritime and River Transportation of Turkmenistan. Large infrastructure projects such as the Turkmenbashi new port demand the highest construction quality and rigorous standards, delivered within predefined project timescales.

■ manuela.dimarino@rina.org

Getting on track with Industry 4.0

Guido Chiappa, CEO of Centro Sviluppo Materiali (CSM), part of the RINA Group, looks at why they are ideally positioned to help organisations plan for the 4th Industrial Revolution.

You may not realise it yet but the next industrial revolution has started. It comes in the form of enabling technologies that are being integrated into production processes to create smart factories. Termed as Industry 4.0 (I4.0), this is a hot topic across all manufacturing industries and businesses that ignore this, do so at their own peril.

I4.0 will not happen overnight. It will be a gradual revolution that involves integrating new technologies along with a radical change to the approach to manufacturing and the implementation of new business models. The benefits I4.0 offers, however, are huge and having an intelligent, strategic migration path to realising these may be one of the biggest factors in determining which businesses will be the strongest and most competitive in the future.

The I4.0 philosophy is based on the combination of manufacturing and digital technology - a bringing together of real and virtual worlds. It will completely change manufacturing processes, give the potential for deeper penetration into existing markets and provide the ability to reach or even define new market areas. It will change the way factories communicate internally as well as with suppliers and customers and enable cost-effective manufacture of individualised orders as a matter of routine.

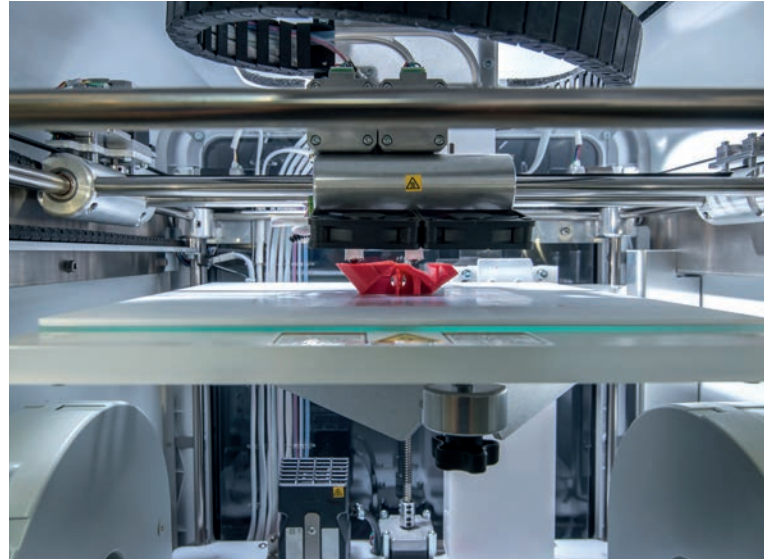
The technologies involved in this manufacturing intelligence revolution include smart sensors, big data, advanced analytics, the Industrial Internet of Things and Cloud computing. The use of digital twins to simulate what is happening in a process, augmented reality, collaborative robotics and additive manufacturing may all be part of a new, more efficient production strategy.

CSM has extensive experience in manufacturing processes, implementing change and promoting innovation. Its expertise spans the design of new production processes, testing of new products and the development of new materials to realise production goals. Offering more than just theoretical ideas, CSM has first-hand experience of how a factory operates and how to implement I4.0.

Based on having such an unusual mix of technology independence and real-world expertise, CSM is offering a three day intensive course aimed at managers, technicians, researchers and students to help them take advantage of the I4.0 digital renaissance. Held from May 9 - 11 in the Tenaris Dalmine plant in Italy, the MIND 4.0 course will cover what is possible with I4.0, how companies should approach it, how to manage the transformation and how to practically start an I4.0 program. Ideal for any organisation looking to capture the opportunities I4.0 offers, the course promotes a gradual digital upgrade based around systems that are already in place. It will help organisations get ahead of the curve in creating a highly competitive factory for the future.



3D printing, the future of Manufacturing



The way we manufacture is changing. Many new technologies are being harnessed to increase production efficiency, reduce costs, make customization easier and better optimize products. Additive Manufacturing (AM) (or 3D printing) is one area that is growing quickly due to its ability to produce larger components and to meet the specific mechanical and metallurgical composition requirements of the manufacturer.

Why are leading companies investing in this technology for the future of their businesses?

Components need to be analysed to see material composition and where benefits of AM may be realised. It may be there is a production bottleneck which could be eased if AM were used. Other benefits and reasons for adopting AM may include the high cost of machining a particular part, or a part that is in some way compromised by machining constraints. Flexibility in supply can be an issue, for example the ability to produce small batches or products that are easy to customize. The next step is to consider what requirements are connected to the component and whether technology exists today to meet these or not. If not, can a special metallic or alloy powder be developed that will meet the needs of the component?

Designing new metallic or alloy powders for use in AM is an iterative process. The powder is designed for specific chemical or mechanical requirements based on existing material properties. This then needs to be trialled in pilot production and the product tested to verify its characteristics to meet the given specification.

With AM, geometries, ergonomics and overall design is optimised. This revolutionises component design, removing the constraints of the traditional manufacturing process, enabling geometries to place strength and integrity precisely where they are needed. This increases component reliability and helps ensure consistent high quality.

An increase in reliability and quality has general appeal but in industries such as oil and gas, it is of particular importance and interest. Oil and gas installations are often located in some of the harshest environments. As AM technology develops to offer ever increasing component sizes, the technology presents many benefits in wider applications. Special metallic and alloy powders can be selected or developed that can specifically handle extremes in corrosion, pressure and temperature. RINA's specialized technology centre in Rome, Centro Sviluppo Materiali (CSM), offers this service. RINA specializes in helping companies that wish to incorporate AM into their business. It can help with everything from the feasibility of the process for a given application through to the selection of material, development of specific materials with special characteristics, if required, and the verification of the completed product. They can also test and validate new products, offering customers the ultimate guarantee of safety and security.

In the future 3D printing will become an enabling technology complementing and competing with the "standard" manufacturing process.

■ j.nardi@c-s-m.it

Smoother Maintenance through CMMS



Located in southern Iraq near Basra, the Zubair Field is one of the largest fields in the world. It was discovered in 1949 by the Basrah Petroleum Company, an associate of the Iraq Petroleum Company, and contains 4.5 billion barrels of proven reserves. Current production stands at 400,000 barrels per day but in the coming years, under the field's expansion program, this level is expected to reach a plateau of 1.125 million barrels per day. The development contract was awarded to a consortium led by Eni (32.81%) with Occidental Petroleum Corporation (23.44%), Korea Gas Corporation (18.75%) and Iraq's state-run Missan Oil Company (25%).

RINA, through its engineering consulting company, has been operating in Iraq since 2012, when the current Computerized Maintenance Management System (CMMS) contract was awarded. ENI Iraq BV launched the tender in order to assist the local Iraqi South Oil Company in the maintenance activities related to the six Degassing Stations located in the Zubair Oil Field. RINA was appointed to manage the implementation of the CMMS.

While managing this project over the last four years RINA has become increasingly proficient in performing a multitude of specialist tasks. A comprehensive range of plant surveys were performed, aimed at listing all of those items subject to maintenance within the six degassing stations. A series of workflows were defined along with various maintenance actions based on the work program in order to assure the

smooth execution of the maintenance plans. In addition, the plant structures that were subject to maintenance schedules were codified and the logical connection between the physical elements and the spare parts utilized was defined. A planning and scheduling system was developed for all maintenance interventions, thereby enabling the better management of the preventive and corrective actions. Technical support was provided to the ZFOD Maintenance Department to evaluate the company requests for improvements and plant modifications.

Spare parts for the plant equipment were identified and selected, leading to material codification in accordance with the company procedures and the population of SAP MM equipment module. Next came the preparation of the first supply spare parts lists required for maintenance activities and the creation of the related budget estimate. Lastly, training sessions for Iraqi personnel were developed and implemented. These sessions were aimed at transferring high-level knowledge and skills of both the processes and applied systems, in addition to the familiarization with the CMMS.

Providing a solution to all the technical issues was made more challenging by operating in the project's high risk environment. RINA had to establish a robust logistic organization to implement the armored escort services needed for day-to-day local transfers and all the life support facilities on site.

■ giorgio.pinnen@dappolonia.it

Leading the Way with New Offshore Directive



Courtesy of Eni

RINA has carried out the first independent reviews and verification of risk management in line with the EU Directive 2013/30/EU for the multinational oil and gas operator Eni S.p.A. Eni performed a first application of the Directive on their fixed offshore platform Angela Angelina, located off the Ravenna coast.

The EU Directive 2013/30/EU was issued in 2013 in response to offshore safety incidents outside Europe including the Deepwater Horizon drilling rig accident in 2010. By July 2015, EU members were obliged to implement a framework for the directive and since July 2016, owners and operators have been required to ensure compliance for any new fixed or floating installations.

Designed to significantly mitigate the risk of accidents and environmental damage, the Directive calls for systematic risk assessment and management. It covers all stages from exploration through production and maintenance to decommissioning. It obliges operators to gain approval from the Competent Authority in the EU state before commencing drilling and they can only commence well operations with an accepted Report of Major Hazards (RoMH).

To obtain operational approval, the Directive stipulates that an independent third party is to carry out review and verification of the risk assessment of the critical safety and environmental elements identified in the project. Risk assessments are based on analysis, comparison with applicable standards or solutions previously executed in similar conditions.

The verification services provided by RINA for Eni included confirmation that the safety and environmental critical elements identified and carried out by Eni were appropriate in accordance with the EU Directive. They also involved a review of the maintenance and test plan for the same critical elements, which was confirmed as adequate.

Since the first application, RINA has been involved in several independent risk assessment verifications related to various offshore platforms, including simultaneous operations due to workover activities by means of rigs and jack-ups.

As part of its commitment to supporting offshore operators and helping protect communities against the risks of accident and environmental damage, RINA has developed internal tools such as guidelines, procedures and check lists to consolidate the quality of the independent verification service.

■ Taken from RINA press release



Showcasing RINA

RINA will be taking part in the Offshore Mediterranean Conference and Exhibition - OMC 2017 - to showcase its exciting range of innovative services dedicated to the Oil & Gas and offshore industry. The exhibition represents an important forum for oil and gas professionals, offering them an ideal place to discuss research and development, technology achievements, and the future challenges facing the energy sector.

Come and visit us at booth No. 7N1 in Ravenna, at Pala de André, 29-31 March 2017.

Our energy experts are on hand to share their experience with you during the various conference sessions throughout the three-day event. Please check out our Technical Paper overview in the following page.

In 2017, RINA will be attending some of the most significant industry events of the year. These will provide excellent opportunities for companies interested in exploring the technical advances and new opportunities that exist within the maritime and energy sectors. So if you want to keep in touch with those innovations that are changing the face of the industry, visit RINA at OMC or any of following key exhibitions:



GASTECH, Chiba (Tokyo), April 4-7

SEA ASIA, Singapore, April 25-27

NOR-SHIPPING, OSLO (Norway), May 30-June 2

BALTEXPO, GDANSK (Poland), September 11-13

OFFSHORE ENERGY, Amsterdam (Netherlands), October 10-11

RINA at OMC: Technical Papers

NET ENVIRONMENTAL BENEFIT ANALYSIS: A TOOL TO INFORM OIL SPILL CONTINGENCY PLANNING

Speaker: Giuliana Iazeolla (Eni Upstream & Technical Services) / **RINA Authors:** Marina Accornero, Chiara Giacchino, Eugenio Napoli

This paper describes the application of Net Environmental Benefit Analysis (NEBA) to the complex environment in which several offshore platforms, sealines, onshore plants and shipping activities constitute a challenge to oil spill response planners.

Wednesday 29th March, 16.25-18.05, Room B - Health, Safety & Environment in Offshore Operations

A GOVERNANCE APPROACH BASED ON ISO 26000 FOR THE OIL AND GAS INDUSTRY

RINA Speaker: Laura Severino / **RINA Author:** Laura Severino

This paper aims to give practical guidance in meeting the International Guidance on Social Responsibility contained within ISO 26000 for oil and gas industry. The paper addresses the highly complex decision making process and includes a practical case study: presentation of Eni case.

Thursday 30th March, 09.00-10.40, Room D - Preparing the industry for the transition

PIRM-DMS: A DECISION MAKING TOOL FOR PIPELINE INTEGRITY AND RISK MANAGEMENT

RINA Speaker: Enrico Di Martino / **RINA Authors:** Enrico Di Martino, Angelo Lo Nigro

This paper describes the "Pipeline Integrity and Risk Management Decision Making Strategy" (PIRM-DMS), a methodology for cost-effective decision making during the pipeline network risk management process applicable to any pipeline system.

Friday 31st March, 09.00-10.40, Room D - Developing new Technologies

MINIMUM REQUIREMENTS FOR DECISION MAKING AND THE MAINTENANCE OF EXISTING FIXED OFFSHORE STRUCTURES

RINA Speaker: Stefano Copello / **RINA Authors:** Stefano Copello, Marco Magliano

This paper addresses the challenge of safely using offshore platforms that have reached the end of their designed lifetime. In addition the paper covers the subject of lifetime extension focusing safety which is identified by the minimum target probability of failure of the existing structure. *Friday 31st March, 09.00-10.40, Room B - Production*

CONDITION ASSESSMENT FOR OFFSHORE PLATFORM REUSE

RINA Speaker: Stefano Gaugenrieder / **RINA Authors:** Stefano Gaugenrieder, Carlo Pellegrino, Stefano Copello

This paper describes how to reuse existing offshore structures that have reached the end of their service life by carrying out an appropriate evaluation on engineering feasibility, cost benefits and structural safety. This is a strategic solution for Oil Companies in comparison to the construction of a new platform.

Friday 31st March, 09.00-10.40, Room C - Decommissioning

OFFSHORE METEO-MARINE MONITORING SYSTEMS

RINA Speaker: Fabio Launaro / **RINA Authors:** Fabio Launaro, Aldo Gallerini

This paper presents the technology and the features of two meteo-marine monitoring systems designed and installed on an offshore platform (Vega "A" - Sicily) and on the jetty and the offshore buoy of a refinery (API Falconara).

Friday 31st March, 11.05-12.45, Room D - Developing new Technologies

ENERGY+

RINA S.p.A. - Via Corsica 12, Genova, 16128
Ph. +39 010 53851 Fax +39 010 5351000 - E-mail: editorial@rina.org

WWW.RINAGROUP.ORG - WWW.RINA.ORG - WWW.DAPPOLONIA.IT

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