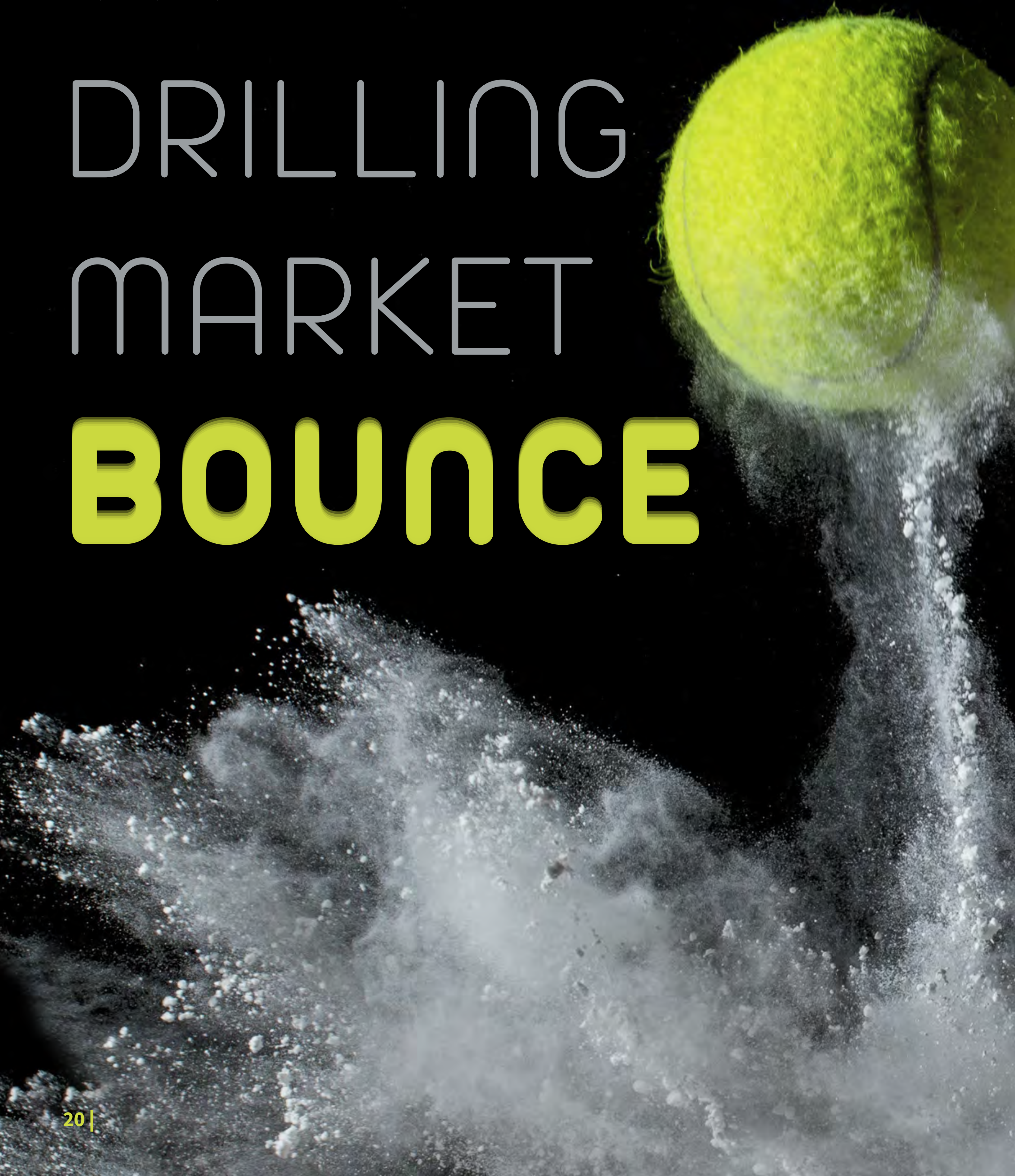
THE DRILLING MARKET **BOUNCE**



Danny Constantinis, EM&I, Malta, considers how drillers have sharpened their focus on reducing out-of-service downtime for operating assets, embracing novel inspection, and demanding robust standards of data security.

Buffeted by recent challenges that have included low oil prices, volatile gas markets, restructuring, and in many cases, insolvency, drillers have emerged confident, focused and determined. This 'focus' appears especially true around asset integrity management.

Asset integrity management

The new-found confidence of drillers seems well-founded. There has been a discernible and welcome growth in development and production in offshore areas worldwide, influenced by oil and gas prices, and crucially, market expectations of potential changes in these prices. This has attracted the big drillers, in particular the US-centric drillers who have been stung by recent announcements limiting the issue of licences in continental and offshore USA. No licences will be issued in 2024 and only three licences are to be issued by 2029. This is a further important factor driving the growth in drilling activity in offshore Brazil and West Africa. Rig day rates, though nowhere close to historical highs, are at least 'good'.

All of this places a premium on the resilience of supply of drilling operations. Maintaining competitive rig fleets, efficient, safe operations, and maximising returns are key to the industry. Some drillers are beginning to focus exclusively on high performance floaters and are sidelining their less efficient jack-up assets, with every last dollar to be squeezed out of the backlog of orders.

In the area of asset integrity management, this crystalises as a laser-like focus on reducing out-of-service downtime for operating assets, embracing novel inspection and repair technologies, and demanding robust standards of data security and management.

Reducing 'out-of-service downtime' and novel inspection

One large driller has made reductions in out-of-service downtime by focusing on equipment

reliability and harnessing its internal technical expertise. Working to improve the reliability of the fleet's well control-related equipment and strengthening the presence of subsea superintendents offshore, the reduction in BOP (blowout prevention) downtime achieved has been greater than 80% (typically reducing downtime from 4000 hr to 700 hr). Elsewhere, a more managed and flexible approach to scheduled maintenance has been taken by drillers with key maintenance events scheduled during 'well hops.'

Diverless inspection and repair that is carried out during normal operation significantly reduces out-of-service downtime. EM&I has contributed to this reduction through adapting its inspection technologies to the drillers' specific needs. As an example, the evolution of ODIN® diverless inspections came first to replace those performed previously by divers: sea chests and ship side valves, visual inspections of hull structures, ultrasonic thickness measurements, cathodic potential surveys, and semisubmersible mooring system inspections. ODIN inspections are performed while the rig is in operation or on a well hop. Inspection of sea chests and ship side valves is now conducted from inside the hull, using ultrasonic and visual inspection including using cameras for the valves, and remote high-definition cameras of the type used in the nuclear industry, for the ballast tanks.

Figure 1. *Valve inspection on a drillship.*

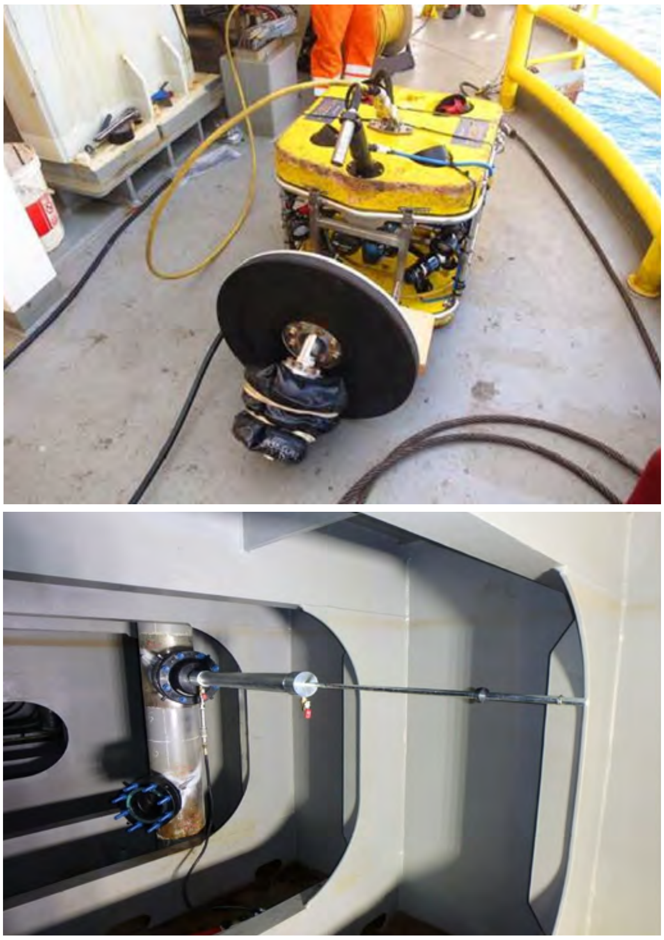


Figure 2. *Methods used to isolate and repair sea valves by ROV and by internal isolation.*

From outside of the hull, further inspection is conducted, such as the examination of hull plating, bilge keels, thrusters, ICCP systems and sacrificial anodes, mooring chains, sea chest inlets, and overboard discharges, vectored thrust ROVs, ultrasonic gauging, chain measurement and cathodic protection surveys.

Diverless repairs not only reduce out-of-service downtime but also mitigate safety risks. The catalyst for EM&I's sea valve changeout methodology was the client-centric requirement that if a defect could be assessed accurately in a diverless way, then surely the sea valve might also be repaired using the same technology. Interest was accentuated with a client investing significant time and money into diving operations and not managing to execute the repairs. The company approached EM&I for a safe, diverless solution that would be more cost effective and less reliant on weather.

Depending on the drillship's status ('underway', 'on a well hop', or 'on location conducting drilling operations') one of two valve isolation and repair methods might be used: a discharge line double isolation where an ROV is used to install an isolation plug and the valve is repaired or changed out, or the internal installation of double isolation plugs on a discharge or suction line. Both methods demonstrably reduce out-of-service downtime through permitting the continuous operation of the drillship, reducing the size of the repair team (of typically 70%, compared to a diving solution) and freeing up the asset's crew and shore personnel for other key production tasks. Costs too are reduced significantly.

Inspecting tanks without manned entry

Remotely operated methods such as EM&I's NoMan Cameras, UAVs (drones) and synchronous laser measurement are methods used to inspect tanks and determine steel plate thickness; they are therefore able to determine remaining life.

EM&I is now examining how steel structures such as those on a drilling rig might be examined for deflection without having to take the structure out of service or the rig to sheltered waters, thus, reducing out-of-service downtime. The basis of the method is to use a laser scan to measure deflections at many points in a structure against a given load. If the load is known and measured, then it should be possible to determine an expected deflection. The company can then go further and say that if a particular deflection is seen, they can use a finite element model (FEM) informed by the deflection at a particular point or area, to calculate residual strength. The concept is currently under evaluation by EM&I's structural experts. So far, this idea appears to work but now needs further evaluation, with laser and finite element analysis trials needed on full scale sections of a typical structure to understand and calibrate the method, before it is confirmed with trials on an operating unit. Eventually, the approval of classification societies will be required.

The importance of cyber security to the oil, gas and renewables industry has grown at almost the same rate as advances in artificial intelligence (AI). The latter brings game changing capability; equally, the pernicious impact of AI brings discrete and worrying threats. For drillers, this threat is especially acute. For those rigs that are dynamically positioned and which use differential GPS, the threat may range from the theft and manipulation of sensitive data to the more malicious interference with operations including the positioning of the rig. Drillers seek to protect their own sensitive information and that of their clients, and guard their operational technology systems and critical data to ensure there is no material or adverse effect.

The implications of this for those asset integrity management companies serving drillers is immense. It means that the development of novel inspection technology that supports remote inspection, live streaming and data-heavy tools, such as finite element modelling, must embrace data security at the outset. Auditable processes and procedures for managing data, including version control, and software upgrades, will then be vital.

Putting the horse ahead of the cart

If all of this is to have value for the drillers, those engaged in meaningful asset integrity management must align with the drillers and their current imperatives of reducing out-of-service downtime for operating assets, embracing novel inspection and repair technologies, and demanding the most robust standards of data security and management. This implies putting the 'horse' of the client's needs ahead of the 'cart' of technical possibility, rather than the reverse.

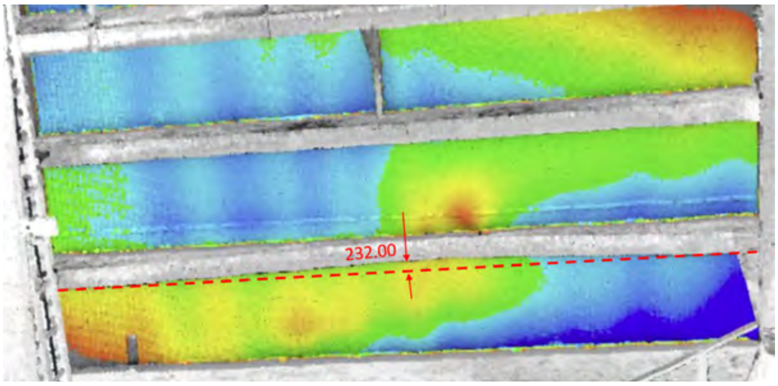


Figure 3. *Laser scan detection of deformation.*

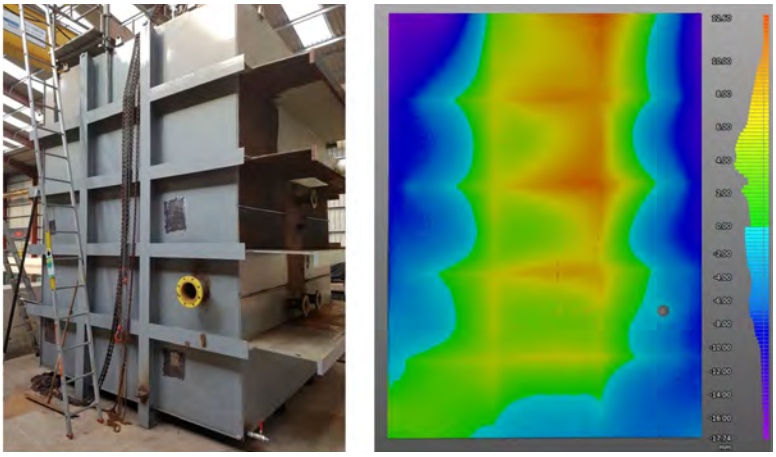


Figure 4. *Test tank and a typical laser deflection scan.*