

Prevention is better than cure

The majority of platforms in the North Sea were designed for an operating life of 25 years. Several of these are now approaching 40 years old and many more are being considered for a further extension of life by up to 20 years. Dr Peter Millar, Lloyd's Register EMEA, explains how many of the problems from which such ageing platforms suffer can be prevented with increased inspection and maintenance regimes.*



Figure 1: Lack of inspection and maintenance on a flange and bolts

One way of considering the life of an oil or gas platform is to compare it to a human body. As every one of us knows, the older we get the more problems we have. Once we have been affected by the early childhood diseases, such as mumps and measles, we normally have a relatively healthy life during our teens, twenties and thirties. Things start to slide in our forties and fifties and, by our sixties, the majority of us have had some kind of health problems. Cancer is normally predominant, with breast cancer being the biggest 'natural' killer of women and prostate cancer being the biggest 'natural' killer of men. Other cancers such as lung and skin cancer are usually self-inflicted and, to a great extent, can be prevented by not smoking or having prolonged exposure to the sun.

Oil platforms follow a similar pattern. After the initial minor commissioning and start-up problems the majority of platforms have a relatively trouble-free life until they are retired from service

and decommissioned. However, with many now having exceeded their design life, we are seeing the results of 'old age' and the increasing number of problems that go with extended use. Just like the situation with the human body, many of these problems can be prevented with increased inspection and maintenance regimes. (See **Figure 1**.)

Steel 'cancer'

Corrosion is basically the cancer of steel and the old expression 'Rust never sleeps' holds very true. Steel is actually thermodynamically unstable with respect to its oxides and rusting is the primary way for steel to lose the energy that was added in transforming iron ore into a steel ingot. Under normal onshore circumstances, steel which has been given a generous paint coating and is inspected and repainted regularly would be expected to remain in sound structural condition for many tens of years.



Figure 2: Typical corrosion under insulation

Offshore, things are not so simple. The ocean is one of the harshest environments on the planet. Not only is sea water and salt spray highly corrosive, wave motion and wind will also impart fatigue loading, which combines to give corrosion fatigue. Corrosion fatigue is considered synergistic. This can be thought of as $2 + 2 = 5$, which means that the combination of corrosion and fatigue acting together is worse than the effects of them both acting separately.

Delayed diagnosis

Many human diseases remain undiagnosed and hidden for years and only become noticeable when they start to affect other organs or bodily systems. The same is true for offshore platforms. Take, for example, corrosion under insulation (CUI). CUI is insidious and fairly difficult to detect. An inspection regime requires the removal and reinstatement of the insulation and, in many cases, scaffolding is needed to gain access to the area. For this reason CUI has tended to only become noticeable once the piping has perforated. Figure 2 shows a typical example.

Given adequate time, money and resources, inspection regimes can be developed to ensure not only the present integrity of offshore structures and facilities but also guarantee their extended working lives. However, in locations like the North Sea, unknowns such as the weather and fog can intervene to sabotage even the best inspection plans.

Another point that is often overlooked also correlates with the medical

model, and that is frequency of inspection. In our youth and midlife we tend to have very infrequent visits to the doctor; however, in later years, these increase significantly as our bodies succumb to the ravages of time and, in many cases, neglect. The same is true for offshore installations. The inspection frequency profile for a platform cannot remain static; it has to be a living, dynamic thing that changes as the asset ages. No one would argue that the inspection and maintenance schedules for a three-year-old platform are the same as for a 30-year-old one – yet, at times, it is easy to forget that simple fact. (See Figure 3.)

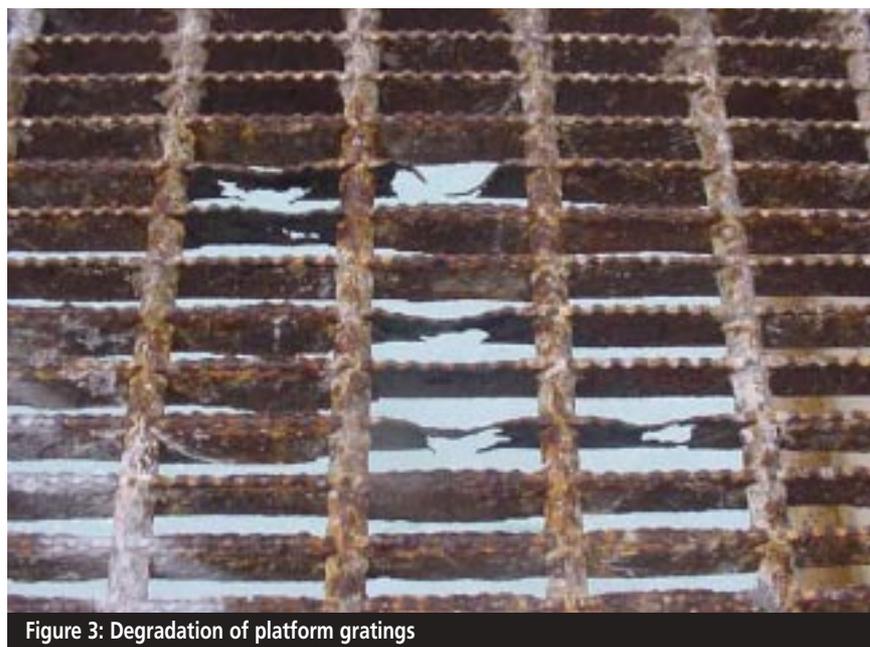


Figure 3: Degradation of platform gratings

Targetted inspection

As an independent inspection authority, the Lloyd's Register group is instrumental in providing integrity services to many operators worldwide. Part of that job involves providing solutions to ongoing integrity problems.

With the relatively recent increase in oil prices and the intention of many operators to extend the working life of a number of platforms, the Lloyd's Register group has started to focus on the problems associated with ageing assets. In the human body, old age targets certain areas. Arteries, hearts and lungs are of primary concern. Muscles, tendons and skin can largely be ignored. On ageing platforms, it is the hydrocarbon lines that should receive the lion's share of the inspection resources. Produced water and drains may show as much degradation, but the impact of failure on the environment, platform integrity and, more importantly, people's lives, will be much less. Given limited inspection budgets and resources for older assets, the focus has to be not just inspection and maintenance, but targetted, prioritised and smart inspection and maintenance.

Ultimately, old platforms are like old people. The amount of care and looking after they need depends on how they have been looked after all their lives. The old saying applies to both – 'Prevention is better than cure'. ●

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