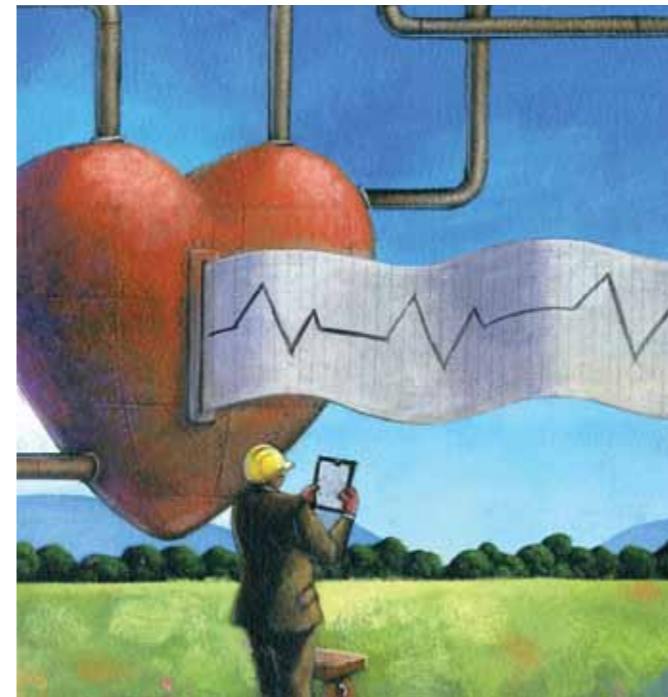


The HFL Risk Services Approach

HFL Risk Services has a wealth of experience in evaluating plant and equipment for the risks associated with ageing plant. Our highly-competent staff possess a thorough understanding of which areas are most vulnerable to loss of containment events and the likely impact should such events occur.

We have developed effective Mechanical Integrity Programmes for many high hazard sites. Our thorough approach examines the entire plant lifecycle from design to decommissioning and makes sure that appropriate standards, processes and systems are put in place to maintain the original design intent and ensure continued safe operation.

Our consultants are fully-versed in all aspects of legislation relating to the storage, handling and processing of hazardous substances and most have held senior positions at operational sites within the industry.



Mechanical Integrity Are you doing enough?

It is irresponsible to assume that plant and equipment will continue to be safe by virtue of the fact that it has been built for the environment in which it has been designed to operate.

We would not dream of flying in an aircraft or sailing in a ship if we knew it never underwent routine inspection and yet many companies are risking loss of containment events through lack of appropriate mechanical integrity programmes.

What is mechanical integrity?

Sometimes referred to as 'asset integrity', mechanical integrity is ensuring that any hazardous fluids are always contained within the vessels, pipes and equipment as intended. With increasing pressure being placed on existing machinery and equipment to deliver competitively-priced products in a declining marketplace, it is more vital than ever that companies are able to demonstrate the mechanical integrity of their ageing plant.

We can help by:

- Developing risk-based inspection strategies that are fit for purpose
- Assessing ageing plant for likelihood of loss of containment
- Assessing maintenance procedures for breaking into plant handling dangerous substances

The Problem of Ageing Plant

The issues surrounding plant ageing are well catalogued and the HSE is now placing increased emphasis on the subject. Ageing is often associated with time in service, but this is not always the case. Even new plant and equipment can exhibit signs of ageing if the design is not suited to the process or environmental conditions. Ageing in this context refers to the accumulation of damage and the increasing likelihood of failure over time.

Assessing plant and equipment degradation has historically relied upon a combination of 'number crunching' and intrusive inspection, however the process is both time consuming and expensive. We have therefore developed a streamlined and efficient methodology designed to deliver all the benefits of traditional 'numbers based' RBI using a more pragmatic approach, thus saving time and money and resulting in a sustainable inspection programme.

Typical examples of degradation include internal and external corrosion, wall thinning and under lagging corrosion as well as other stress-related damage. Within industry it has long since been recognised that the substances contained within reactors, storage vessels and pipework can be responsible for degradation, especially if these are variable. Other frequently ignored but equally important factors impacting on mechanical integrity include pressure cycles, changes in temperature, changes in concentration, maintenance and even cleaning.

Statistically, a loss of containment event is most likely to occur through failures in piping or pipework elements. Surprisingly these systems are often excluded from Written Schemes of Examination.



Some common causes of loss of containment in pipework

- Failure of supports
- Leakages at bolted flanged joints
- Corrosion under lagging
- Steam trap failure
- Failure of vulnerable in-line items
- Over pressure
- Modifications which are not as per the design intent
- Leakage where pipes meet other instrumentation
- Leakage brought on by fatigue, vibration or loss of insulation
- Loose fittings
- Erosion
- Mechanical damage

What, when, where, how?

A tank containing toxic material which fails could kill or injure people or cause significant damage to the environment.

But what is the likelihood of this happening?

How do you know when an item of plant requires replacement?

How do you determine what type of testing regime is required?

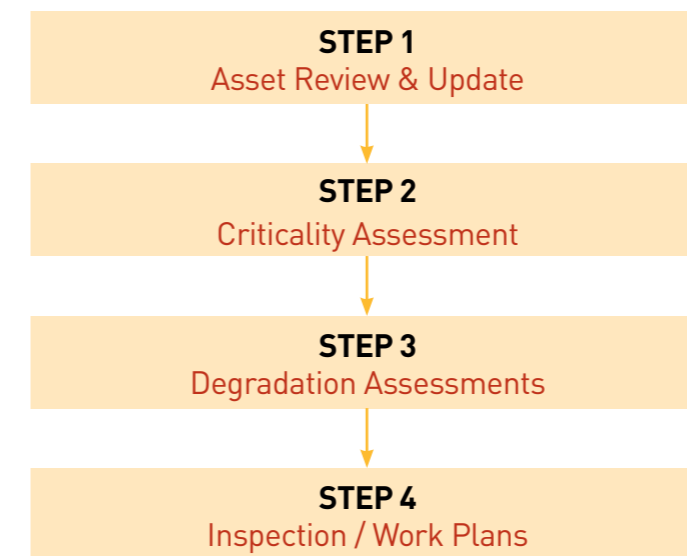
How often should it be done?

Knowing what, when, where and how plant should be inspected is the key to an effective Mechanical Integrity Programme (MIP). Many companies fall into the trap of assuming that they already undertake an effective inspection and maintenance programme. However, more often than not they are doing sufficient to comply with regulations such as the Pressure Systems Safety Regulations, but are falling short in areas not covered by other legislation and only fix things when they break (reactive rather than proactive).

Core principles of an effective MIP should be:

- A system which is tailored to the process fluids and materials of construction in use
- A system designed to ensure that all foreseeable risks/ failure modes are identified, assessed and – where necessary – maintenance plans developed
- A programme which is sustainable in terms of resource and competency
- A system robust enough to reassure the operator and regulator that the asset remains safe to operate

The process can be broken down into four discrete steps...



One of the key deliverables from the MIP is the generation of a Written Scheme of Examination (WSE) similar in nature to those most operators already have in place for their pressure systems however, the MIP WSE provide a holistic, living document that can and should be used as the foundation of any ongoing inspection / maintenance regime.

The final element of the MIP is the introduction of detailed inspection / maintenance plans. In many cases much of the necessary inspection is already being undertaken but not formally recorded. Therefore this stage of the process focuses on the development of documented management systems, training of site based inspectors, generation of detailed item specific maintenance plans as well as the identification of specialist third party inspection companies.

