



European Technology Development Ltd

Working for Power, Petrochemical, and Process Plant Industries

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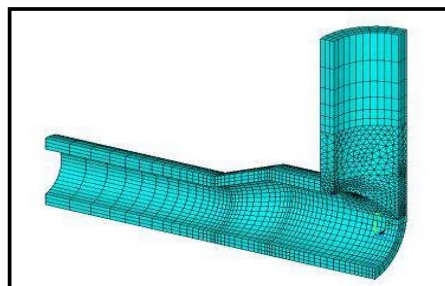
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Asset Integrity Services

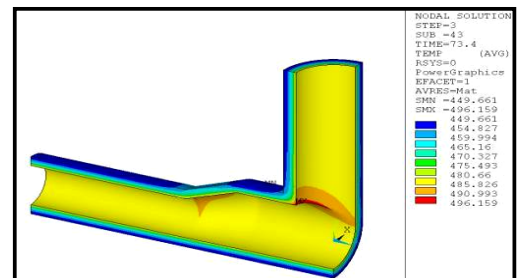
The pressures being placed on industry to 'sweat the assets' puts ever more stringent demands on the plant and components and on the people responsible for continued safe and reliable operation. Conservatism in design frequently allows life to be extended beyond that originally intended and careful husbandry of components can in many cases provide significant life extension.

ETD Services

- Plant Life Assessment/ Extension
- Stress Analysis
- Training Courses
- Technology Development
- Plant cycling
- Crack Assessment
- Risk Based Maintenance
- Consultancy



a/ HP Outlet T-Piece - Detail of the mesh



b/ Temperature Distribution during start up

ETD's **Asset Integrity Services** assist clients in making informed decisions on the operation and maintenance of their plant and to manage the risks their operations place upon the assets they own or operate. The benefits can include:

- improved safety and reliability
- reduced downtime
- scheduled repair or replacement
- cost savings

During the life cycle of an engineering structure or component, it is not unusual for the operating conditions to alter. This may be a result of a planned or scheduled change; or it may be due unforeseen changes in the environment or process, or as a result of deterioration in the general condition of the component. When this occurs, the original design criteria no longer provides a reliable indication of performance and longevity.

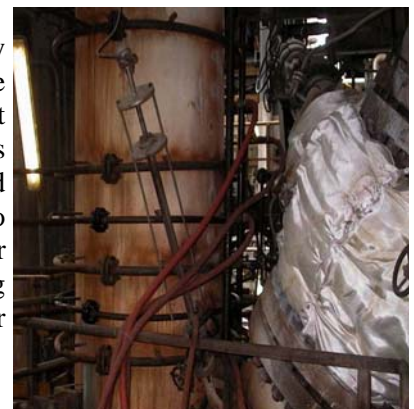
Asset Integrity Services provides information on the **condition of a component** under 'current' and 'planned' future operating conditions enabling the operator to plan for the remaining life of that component.

Asset Integrity Services offers an array of tools, skills and techniques for assessment and analysis of component integrity in:

- Structural integrity
 - ✓ Design and life assessment
 - ✓ Defect assessment
 - ✓ On-line monitoring
 - ✓ Life extension
- Failure Analysis

STRUCTURAL INTEGRITY

Structural integrity covers a broad range of services aimed at assessing the fitness for service of plant and equipment subject to thermal and/or mechanical loading under steady state or transient conditions.

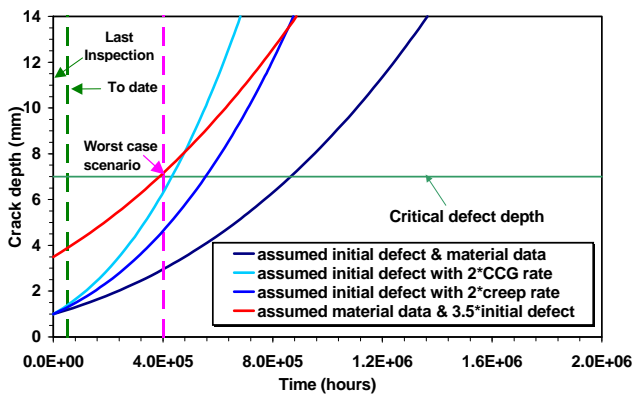


Design code and life assessment: A key activity of Asset Integrity Services is in the area of fitness-for-service assessments of a range of plant and equipment. Assessments of this type may be performed on new plant entering service or on existing plant where changes in service are planned or as a result of degradation of the component.

ETD are familiar with British, European and ASME

standards and can provide assessments for:

- Temperature distributions
- Mechanical & thermal stress levels and distributions in structures subjected to transient and/or steady state loading
- Dynamic response of components, including natural frequencies & mode shapes
- Stress concentration factors, particularly used for assessing grind-out repair of small defects
- Life prediction under creep and/or fatigue conditions.



Typical fatigue crack growth assessment & Sensitivity analysis

DEFECT ASSESSMENT

ETD are internationally recognised in the field of defect assessment both at ambient and elevated temperatures. ETD has developed a range of effective and robust in-house tools that incorporate the widely accepted fracture assessment procedures (BS 7910, BS 5500, R6, R5 and A16) and our own practical field experience. These special purpose tools, which are based on both deterministic and probabilistic methods, enable the assessment of known defects and determine maximum acceptable defect sizes to assist in identifying suitable inspection methods and inspection intervals.

Asset Integrity Services performs fracture mechanics assessments by means of *classical stress analysis* or *finite element technique* as appropriate, including the 'Leak-Before-Break' methodology. The defect assessments are used to underwrite many aspects of structural integrity, including but not limited to:

- Remaining or remnant life prediction
- Fitness-for-purpose assessment
- Life extension of ageing equipment
- Assessment of required/allowable inspection intervals
- Compliance to regulatory requirements

ON-LINE MONITORING

This represents an economic means of practically assessing the true conditions plant or equipment experience in-service. The information obtained may be used to justify extended use of the plant, increase in inspection and maintenance intervals or operation under more demanding conditions. Asset Integrity Services provides a complete range of consultancy services, from identifying critical locations and appropriate measurements through installation of sensors (thermocouples, strain gauges, etc...), data acquisition and data analysis.

FAILURE INVESTIGATION

ETD's Asset Integrity Services has many years experience in carrying out failure investigation and root cause analysis on equipment from a range of industries. Mechanical testing may be used in conjunction with optical and scanning electron microscopy for assessment purposes.

PLANT LIFE ASSESSMENT / EXTENSION

Many industries are faced with an increasing array of ageing plant and equipment, in many cases close to or even beyond original design life. Asset Integrity Services can provide technical evidence to support the continued safe and reliable use of plant and equipment, providing evidence to satisfy the insurers and the regulator.

