



European Technology Development

**P91: INSPECTION, MONITORING,
INTEGRITY & LIFE ASSESSMENT**

Project Acronym: 'P91 Integrity'

ETD Project No: 1088-gsp-prop06

Contact

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SUMMARY

The use of P91 steel in high temperature plant is now reaching mid-life stage in many plants and component cracking/failures have been experienced, including violent failures, in a number of plants. Although the failure rate increases with plant life, cracking and failures have been experienced after a service duration of couple of years or less. There is thus an urgent need to develop and use reliable inspection and monitoring techniques to manage P91 component life. In terms of inspection and monitoring, P91 and other high strength martensitic steels differ from the traditional low alloy steels in that the microstructural damage in these new steels is not as obvious as that in the traditional steels where, for example, spheroidisation can be easily observed and recognized even under an optical microscope. Similarly creep cavitation appears later in life in P91 than in low alloy steels making it difficult to detect damage early in life. Thus the use of replication and optical microscopy, used extensively in the life management and extension of the traditional low alloy steel components, are a challenge in the case of the new steels. In a quest to find appropriate inspection and monitoring systems a number of researchers in Europe and Japan have been more recently studying potential systems and, in some cases, have applied them to feature size specimens with some degree of success.

This *project aims* to systematically test and validate the NDE techniques found to show promise for early detection, monitoring and assessment of service induced damage in P91 components. As most of the failures to date in thick section P91 components have been in fine grain HAZ (Type IV position) related to the weldments the main emphasis on the validation of these techniques will be on the component weldments and the Type IV region. Tests both in laboratory and in plant will be carried out using a number of NDE techniques on aged welded components and findings related to the actual damage determined by destructive methods where possible. *The results of this work will be used to relate plant component inspection and monitoring to the integrity and life assessment of P91 components.* Benefit will also be gained from the voluntary input of the experience of the sponsors worldwide and the aim will be to meet the sponsors' specified requirements and need of plant component inspection, monitoring and life assessment/extension.

In this *18-month duration project* significant results will be reported to the sponsors at regular intervals to maximize the project benefits. The major *deliverables* will be the Mid-Term and the Final Reports containing a review of the techniques being validated in the project, their validation and use elsewhere, findings from this project, recommendations of the best techniques for use on P91 in-service component inspection and monitoring, and their use for component integrity and life assessment.

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Project start date: Early 2007

Project Duration: 18 months

Principal Investigators

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