



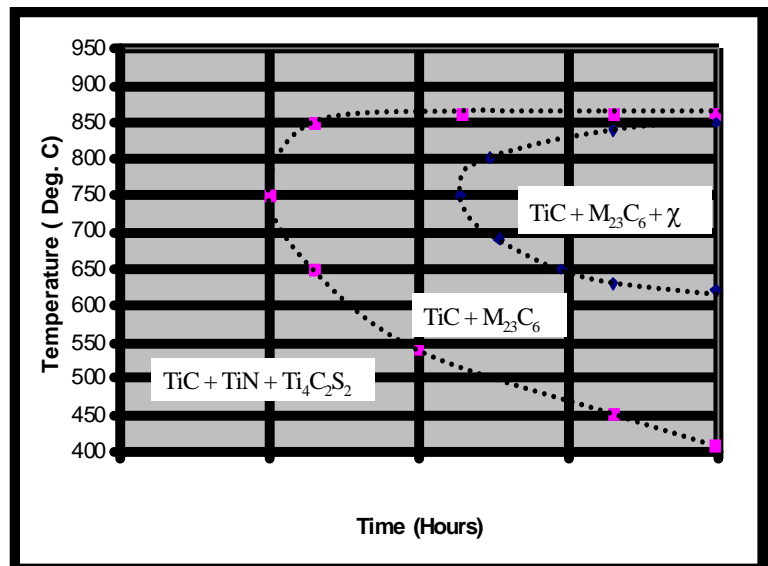
# European Technology Development Ltd

Working for Power, Petrochemical, and Process Plant Industries

## Life Assessment Methods for Stainless Steel Components

A Group Sponsored Project (GSP) to determine the best techniques for the *in-situ* evaluation of austenitic stainless steels materials properties

Austenitic stainless steels are used extensively in *Petrochemical* and *Power Plant* (including *Nuclear*) for their superior corrosion resistance and high temperature strength when compared with more conventional steels. Unfortunately, At higher operating temperatures, diffusion controlled processes occur in the austenitic stainless steels resulting in changes in the mechanical behaviour. The precipitation of carbides and other phases causes general deterioration in the material properties. Thermally aged stainless steels are known to suffer creep ductility and toughness loss with time. The consequences of the property changes can have serious impact on the continued serviceability of the material.



Time-temperature precipitation diagram for Type 321 SS

### The problem

There is currently no method of satisfactorily determining the remaining life of stainless steels in a non-destructive manner. Precipitation occurring in these steels at higher temperatures results in a change in mechanical properties that cannot currently be quantified non-destructively. Therefore, any remaining life activity normally involves sample removal, weld repairs and mechanical testing. This approach leads to extended down times and increased costs.

### Proposed Project

The intention of this two-year duration Group Sponsored Project is to develop and validate *practical non-destructive on-site test procedures* that give reliable results and allow semi-quantitative property prediction in terms of creep damage and strain capability.

### Project Approach

A full review of best practices - including interviews with operators - will be carried out to identify industry experience with the assessment of stainless steels. A variety of techniques exist to evaluate these materials, however, a systematic and full evaluation needs to be carried out and correlations need to be developed to allow these techniques to be used in the field.

## Benefits of Joining the Project

- Shared and thus significantly reduced costs using the group sponsorship approach to funding
- Potential to reduce inspection and shutdown costs
- Potential to extend the life of ageing plant
- Potential to reduce risk of failure
- Interactive participation and facility to influence the research program
- Access to results through regular reports feedback
- Service from a totally independent organisation
- Access to global industry best practice
- Reports and meetings

## Materials to be Assessed

The materials to be assessed will depend on the projects partners/ sponsors needs and will be agreed at the start of the project. However, to date there has been an expression of interest in developing assessment procedures for 304H and 321H materials.

## Proposed Programme of Work

A programme of impact, tensile and stress rupture testing is proposed together with non-destructive evaluation.

Correlations between the non-destructive results (replication, electrochemical, microscopy etc.) and the materials tests will be developed where they exist.

The project is scheduled to commence in 2007.



## CONTACT DETAILS

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