



Asset Care Counts

December 2015

## RemLife™ – A new age in understanding high temperature components

High temperature components are typically critical assets, no more so than in power stations but often also in other major processing plants.

To be inspected effectively they require plant shutdown, with every moment of down time leading to lost production and associated planning, preparation and third party contractor costs. As we are all aware, the pressure is on to minimise these downtime costs.

Adding to the complexity of managing high temperature assets, production sites are increasingly managing dynamic operating cycles resulting from fluctuating demand and increased competition.

This environment has led to significant load cycling, compromising component life and further complicating decision making around how to manage these assets to meet the market conditions and maintain plant integrity.

To assist plant managers, ALS Industrial offers **RemLife™**, a cutting edge high temperature creep & creep-fatigue life assessment software. The software is developed from years of research and brought to the market to create increased confidence and efficiency in making these critical decisions.

### Effective Decision Making in Real Time

A recent example of RemLife in use was assisting the decision as to whether or not to repair cracks found in a power station main steam line. Cracks were found by traditional NDT and confirmed by ALS metallurgists to

be caused by creep. The extent of creep was such that traditional thinking recommended weld repair, which would have extended the plant shutdown significantly.

Calculations made by Remlife however showed that the component could be returned to service with enough time to plan a future repair with minimised associated down time.

In the absence of RemLife, decisions could not be made in 'real time' due to lengthy, labour intensive processes associated with manual life calculations.

For this reason, RemLife represents a far more cost effective approach to life assessment when compared to traditional methods.

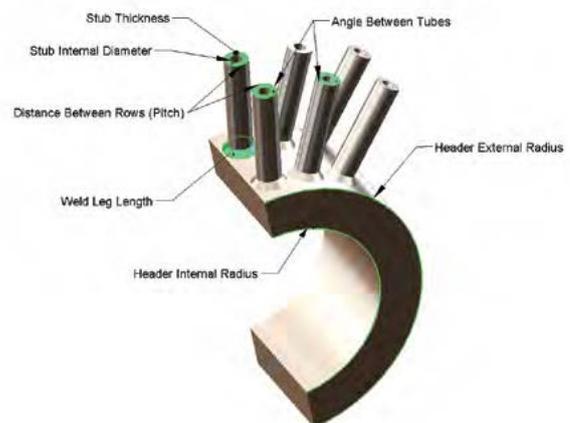


Figure 1 – Example of some of the many Parameters recorded in RemLife™ to allow effective complex life assessment.

## Effective Shutdown Planning by RemLife™ (i.e. What should I really inspect?)

A second application of RemLife is its ability to predict areas of plant that are at risk and allow tailoring of the shutdown work scope accordingly.

Remlife was recently used to conduct a stage 2+ (as per EPRI guidelines) assessment of various boiler components to determine areas of highest risk. These were then targeted in the next shutdown.

### The assessment created a two- fold benefit:

- It avoided inspecting areas that were low risk, reducing plant shutdown time.
- It highlighted areas that traditionally had been overlooked as high risk. Inspection during the shutdown found cracking in these areas, which was able to be effectively managed to avoid unexpected catastrophic failure.

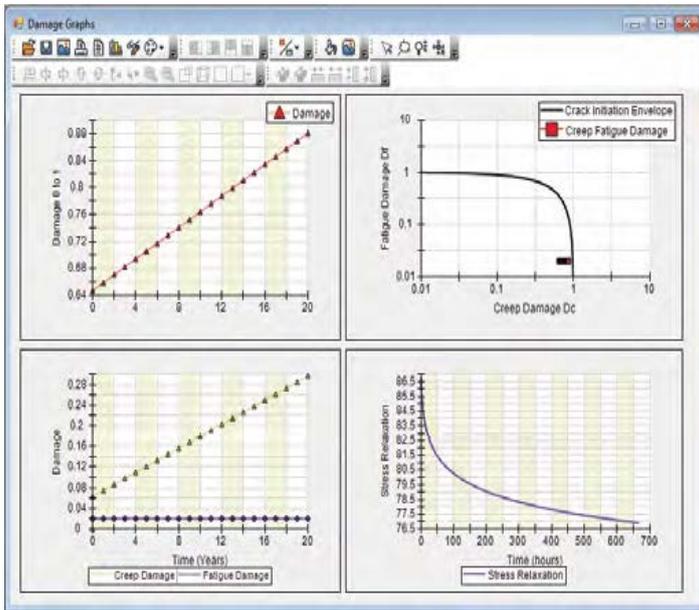


Figure 2 – The RemLife interface showing calculated stress profiles across a high temperature component.

## The Principles of RemLife – How it gives you confidence to make effective decisions.

RemLife software uses algorithms based on the codes below and/or finite element analysis to determine **primary and second stresses**.

- AS 4041
- BS 5500
- EN 13445
- ASME B31.1
- TRD 301
- AS 1228, BS 113
- EN 12952
- ASME III NB- NC
- ASME VIII

It makes **creep rupture** and **creep fatigue calculations** in line with the guidelines and codes:

- R5- R6, API579 and RCC- MR

Utilising the following approaches

- Time Fraction Approach
- Ductility Exhaustion
- Energy Exhaustion

Calculations are utilising **our extensive materials library** which records all significant materials parameters.

This approach allows us to perform the following calculations for operating plant:

- Determination of the loading history
- Calculate metastable thermal stresses
- Determination the cyclic stress-strain deformation loops
- Obtain creep-fatigue endurance
- Calculate the total creep-fatigue damage
- Assess whether crack initiation will occur.
- The Economic consequences of cyclic damage.

## Backing Up RemLife – Our Power team

ALS Industrial has a dedicated Power team to perform and interpret RemLife™ calculations and assist you in making the best decision for your critical high temperature assets.

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