Qualification of Exhaust Solutions

Large steps today-ITER-DEMO

- Full integrated prototypes difficult.
- Mechanisms, mix change.
- ➢ Qualification not conventional?
- ➢ Theory & models for final steps

Qualification:

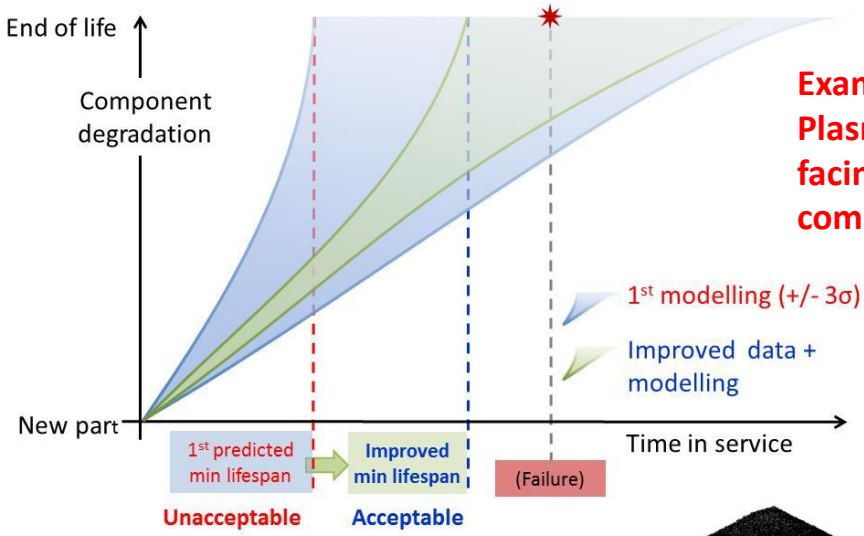
- Show performance +/- uncertainty fits requirements
- Consider qualification at start
- Develop qualification stepladder
- Guide R&D, improve design

Exhaust is an integrated system:

- Core, pedestal, SOL, divertor; cooled PFCs and materials
- Control key; accommodate uncertainties (f_{rad}, detachment...)

Use advanced theory & modelling

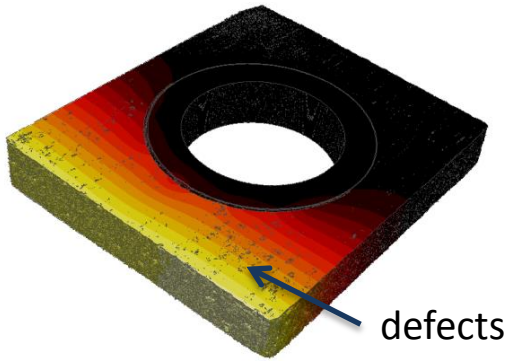
- Compensate partial data
- Uncertainty quantification (UQ)
- Simulate integration and control.



Example of uncertainty reduction

- Image-Based FEA to understand as-built performance in detail
- Optimise manufacture, reduce variations

Many more effects to be included later



Temperature distribution in a CFC-copper pipe monoblock. Defects visible (FEM uses fibre layout in actual monoblock). [Ll Evans 2016]