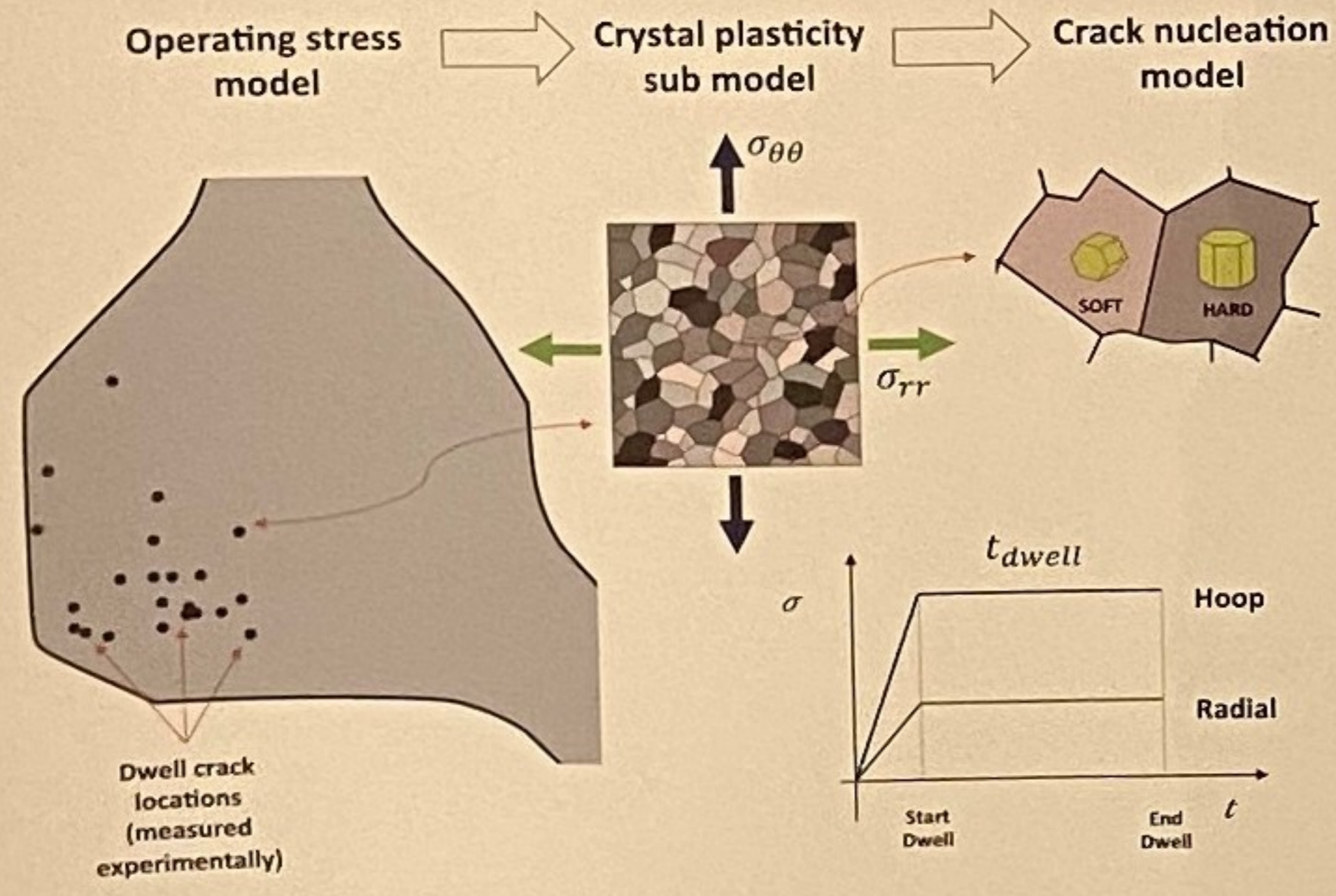
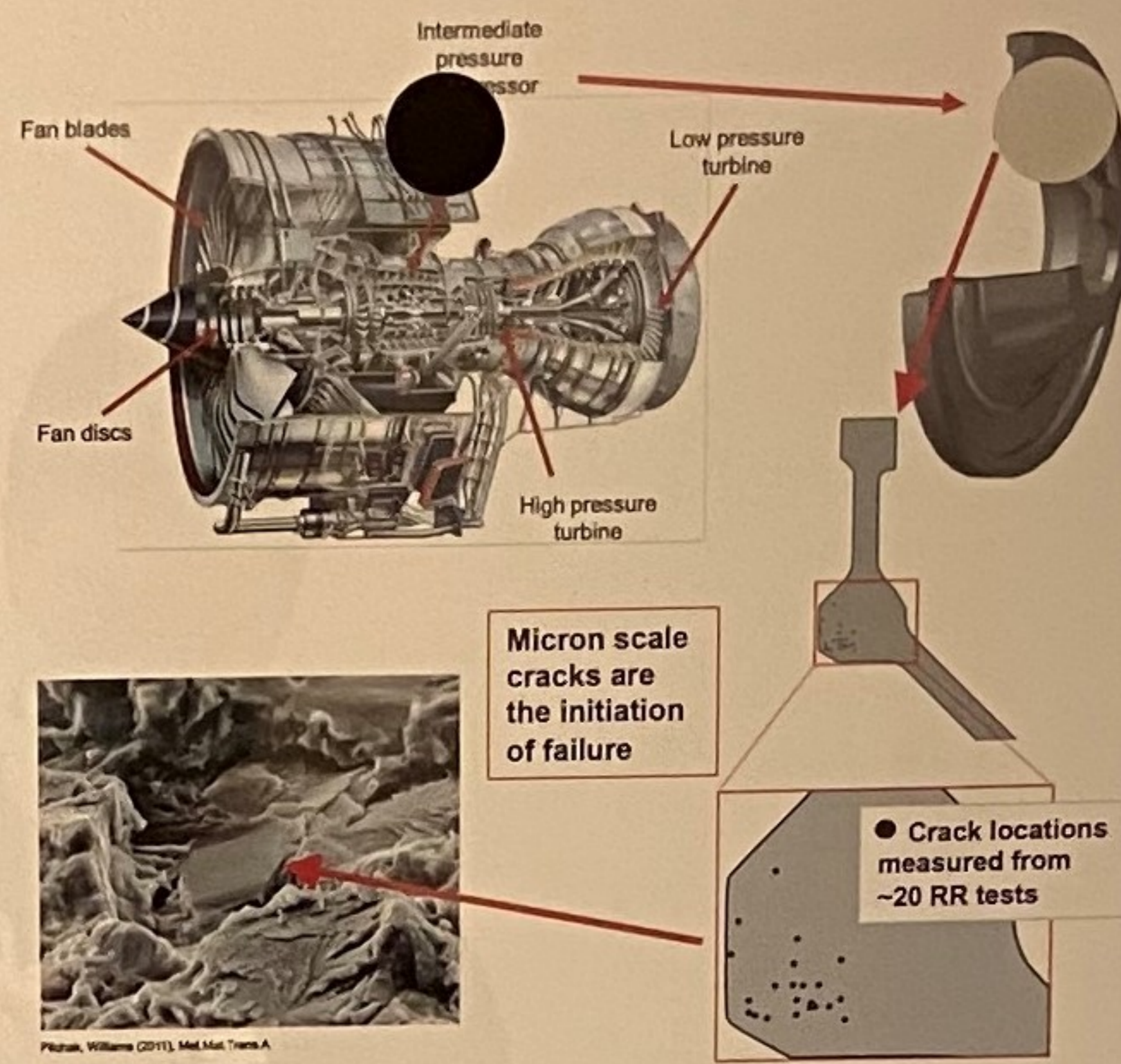


Sir Henry Royce Awards for Technical Innovation 2017

Cold dwell facet fatigue in titanium alloy components

Challenge

- Cold dwell fatigue is a failure mode evident in titanium alloys in core jet engine components, and is a substantial industrial concern.
- First discovered in the 1970s, its non-destructive evaluation management is hugely costly and it remains a safety-critical issue.



Solution

- Established a methodology to utilise microstructure-level modelling to predict engineering component behaviour in cold dwell fatigue.
- Analyse the inter-grain region where dwell facets are known to originate and measure the applied stresses required to generate local stresses high enough to nucleate a facet.

Benefits

- Provides a persuasive mechanistic basis and quantitative predictive methodology for cold dwell fatigue.
- The new methodology demonstrated that it is now possible to predict cold dwell facet nucleation sites in Rolls-Royce aero-engine discs and to establish the lower bounds on operating conditions necessary for them to occur.

