

第148回構材ゼミ

演題：“Material Challenges and Solutions for Modern Gas Turbines”

講師：Dr. Mark Hardy (Rolls-Royce Plc)

Abstract:

There is increasing pressure on the aviation industry to prioritise investment in green technologies that firstly produce reductions in CO₂ emissions, and secondly, reduce noise. Modern gas turbines, notably high bypass ratio turbofan aircraft engines are continuously evolving to provide improved efficiencies for reducing fuel consumption and consequently, CO₂ emissions. This presentation will focus on new advanced material and manufacturing technologies that enable efficiency improvements across a wide range of components for current and future large civil engines. One critical aspect is the use of high temperature materials and coatings for improvements in thermal efficiency. However, higher temperature operation, particularly for fast climb cycles can have adverse effects of component durability. The balance between efficiency and durability will be discussed with reference to intelligent cooling systems, robust component design and a full understanding of material behaviour. Other efficiency improvements will be highlighted such as those gained from advanced component manufacture, improved factory efficiency and a greater emphasis on sustainability through reduced material usage, improved material manufacturing yields, waste elimination, material recycling and component repair. Finally, a view of future green technologies for powering aviation will be shown.

Biography:



Dr Mark C Hardy PhD BSc (Hons) CEng FIMMM

Mark is a Rolls-Royce Engineering Fellow, specialising in Nickel Alloys. He has been at R-R for 25 years, working on all aspects of Ni alloys for disc rotor applications, from definition of alloy composition and material manufacture, through to characterising material behaviour for life assessment. Mark is a Fellow of the UK Institute of Minerals, Metals and Materials (IOM3) and a member of The Minerals, Metals and Materials Society in the United States. He has authored/co-authored over 100 technical publications, is an inventor in 22 patent applications/patents and has been industrial supervisor to over 50 PhD students. Mark was awarded the IOM3 Ivor Jenkins Medal for contributions to powder metallurgy in 2013.