

Matthew Spencer



Matthew Spencer
MChem (Hons) Chemistry
Eng D Research Engineer

Sponsors: EPSRC and Rolls Royce

Rolls-Royce plc
PO Box 31
Derby
Derbyshire
DE24 8BJ

Tel: +44 1332 244852

Email: matthew.spencer@Rolls-Royce.com (<mailto:matthew.spencer@Rolls-Royce.com>)

Matt graduated with an MChem degree in chemistry in 2009, from The University of York. During his undergraduate degree he completed his final year research project on liquid crystalline and luminescent platinum(II) complexes of OLED application.

In March 2010 he commenced his EngD with Rolls-Royce. He is supervised academically by Dr. Mark Simmons and industrially by Tim Shepherd.

He is currently based at Rolls-Royce in Derby as a member of the Corporate Fluids Team. The team is responsible for fuel and lubricant performance within aviation, marine and industrial gas turbines including both current and emerging technologies.

Eng D Project Background

Fuels and lubricants are exposed to high temperatures within modern gas turbine engines. Each generation of engine is designed to have higher pressure ratios to improve efficiency and as a consequence generates increasing amounts of heat which have to be managed by complex heat management systems. Heat generated within the transmission system relies on the lubricant as coolant, which in turn relies on the fuel as coolant resulting in increasing thermal demands being placed on both the lubricant and fuel. The use of air-cooling is not desirable on the grounds of significant performance, weight and cost penalties. Operation at high temperatures can lead to fluid degradation and potential deposition, which can incur a significant maintenance burden. Fluid system design optimisation is therefore critical to engine performance, reliability and cost of ownership.

Improved understanding and prediction of fluid thermal degradation is required to support future aero gas turbine designs that will not only operate at higher temperatures, but also have novel system features designed to improve engine performance and efficiency.

Current Project Aims

- Develop laboratory scale simulators which mimic the degradation and deposition of lubricants within specific areas of the gas turbine
- Use these simulators to replicate the conditions a lubricants encounter during a flight cycle or a number flight cycles
- Gain a mechanistic and kinetic understanding of thermal oxidative degradation and deposition
- Understand the catalytic effect of the surfaces where degradation and deposition may occur
Investigate the effect of surface coatings on deposition
- Study the tribology of gas turbine lubricants

Other work

Outside of work Matt enjoys rugby and is a keen supporter of London Irish RFC he also enjoys real ale and listening to live music.