Jason Madge CEng MIMechE

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PROFILE

Chartered Mechanical Engineer with over 18 years of experience in gas turbine transmissions and structures, gained at Rolls-Royce Defence. A background spanning stress analysis, safety investigation, and technical leadership of complex aerospace programmes — including serving as Technical Lead on the UltraFan Power Gearbox demonstrator, the world's most powerful civil aeroengine gearbox. Holder of eight granted patents. Co-founder of Elemeca Ltd. Available to accept instructions as an independent expert witness in mechanical engineering, rotating machinery, aerospace, and gas turbine disputes.

EXPERT WITNESS PRACTICE AREAS

- **Gas turbine transmission and gearbox systems —** failure analysis, fatigue life assessment, design defect versus manufacturing defect, fitness for purpose, bearing failure investigation, design standard of care.
- **Fretting wear and fretting fatigue —** causation analysis at safety-critical interfaces (blade roots, dovetail joints, bolted connections, bearing seats); quantitative life prediction; distinguishing manufacturing-induced from operationally-induced fretting damage. Tribology & lubrication. PhD specialism.
- **Safety-critical rotating machinery —** formal failure investigation methodology, root cause analysis, competing hypothesis assessment, secondary damage interpretation, load case reconstruction, FEA-supported structural assessment. Airworthiness implications, certification e.g. EASA CS-E.
- **Structural integrity and stress analysis —** gas turbine discs, blades, drums, bearing housings and engine structures; fatigue and fracture mechanics; fitness for purpose assessment.
- **Aerospace gearbox and power transmission design —** design authority standard of care, technical governance, feasibility assessment, novel power gearbox systems.
- **MRO and maintenance standard of care —** departure from approved maintenance data, maintenance-induced damage causation.

EXPERT WITNESS TRAINING

Bond Solon Expert Witness Report Writing — completed

CPR Part 35, Practice Direction 35, and the Guidance for the Instruction of Experts in Civil Claims 2014 — studied independently in preparation for expert witness practice.

CAREER HISTORY

Co-Founder & Director | Elemeca Ltd *Sep 2025 – Present*

- Founded Elemeca with business partner Lorenzo Baietta, bringing aerospace and Formula 1 engineering heritage to a mechanical engineering consultancy.
- Services span mechanical design, FEA/CFD simulation, composites engineering, prototyping, AI-augmented engineering workflows, and component supply.
- Active business development across aerospace, defence, and advanced industrial sectors.

UK Transmissions Business Specialist | Rolls-Royce *2022 – 2025*

- Technical authority for all UK Defence aerospace transmissions work; steered the research strategy and led research projects across the discipline.
- Managed safety issues, provided technical governance, and guided programme teams on transmission design philosophy and risk.
- Led feasibility study for Reaction Engines, assessing the viability of a power gearbox within the SABRE hybrid air-breathing rocket engine concept.

Transmissions Specialist | Rolls-Royce *2017 – 2022*

- Promoted to specialist grade in recognition of depth of expertise in aerospace transmission systems.
- Subsequent work following UltraFan included power gearbox studies on eFan-X (Airbus electric aircraft demonstrator) and Transmissions System design for an experimental engine programme.

Technical Lead — UltraFan Power Gearbox | Rolls-Royce *2013 – 2017*

- Technical lead on the first power gearbox demonstrator for the UltraFan programme — the world's most powerful civil aero-engine gearbox.
- Responsible for integrating the output of a multi-disciplinary team comprising ~5 designers, 5 detailers, and 3 stress engineers, working to a novel supply chain in a joint venture environment; gearbox achieved first run in 2017.
- Awarded group prizes for technical innovation and programme management on the UltraFan programme.

Structures & Dynamics Engineer — Defence Transmissions | Rolls-Royce *2010 – 2013*

- Responsible for a formal safety investigation (Red Top) associated with a safety-critical transmission system.
- Extensive root cause analysis combining FEA, rig test design, design of experiments, automated load case combinations, and individual ball kinematic modelling.

Mechanical Technology Engineer | Rolls-Royce *2007 – 2010*

- Structural integrity and stress analysis across a range of gas turbine components: discs, drums, turbine blades, bearings, bearing housings, and engine structures.
- Methods encompassing FEA and classical hand calculations; focus on safety-critical rotating parts.

E D U C A T I O N

PhD — Fretting Wear and Fretting Fatigue | University of Nottingham *2004 – 2007*

Numerical modelling of the effect of fretting wear on fretting fatigue life. Supervised by Dr Sean Leen and Professor Phil Shipway.

MEng Mechanical Engineering | University of Nottingham *2000 – 2004*

First Class with Honours

P R O F E S S I O N A L R E G I S T R A T I O N & R E C O G N I T I O N

- Chartered Engineer (CEng), Engineering Council — registered c. 2013
- Member, Institution of Mechanical Engineers (MIMechE)
- 8 granted patents (Rolls-Royce Defence) — titles withheld for commercial confidentiality
- Group prizes for technical innovation and programme management, UltraFan programme
- Finalist for the Royal Academy of Engineering MacRobert award for engineering innovation