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Case Studies: Whittle Laboratory NCPP Rotating Rig

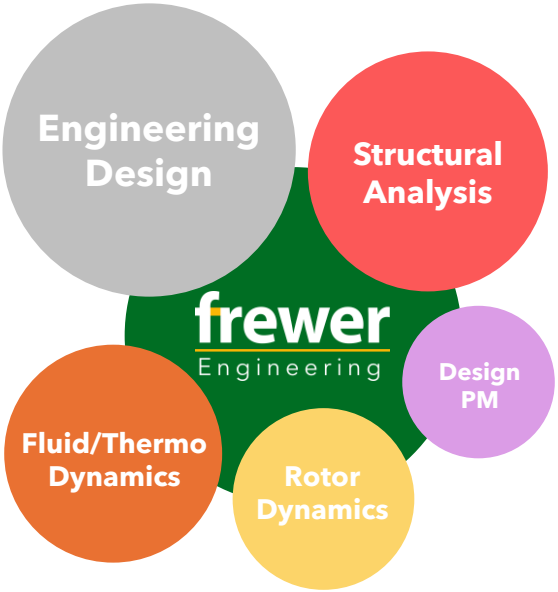
The new NCPP rotating rig is a multi-purpose, high-speed rig, capable of rapidly testing single gas turbine engine stages.

Novel Rig Design

Frewer designed the vertical high-speed rotor test vehicle from concept through to final design. Our engineers integrated a rapid build philosophy into solutions for highly stressed assemblies which withstood high pressures, temperatures & stresses for a range of fan, compressor & turbine conditions.

High-Pressure, High-Temperature

The rig test chamber is a single pressure vessel, which can be replaced in one lifting operation to rapidly access test components. The rig is therefore a Cat IV vessel, thanks to its large volume & closed loop architecture. Elastic-plastic FE methods were used to satisfy the essential safety requirements of ASME VIII division 2 to structurally qualify the vessel for PE(S)R certification.



Rapid Multi-Purpose Testing

The vertical rotor simplifies and accelerates test changeover. A range of operating speeds up to 13,500RPM are managed with a tuned squeeze-film damper in the upper bearing, that dampens vibrations from rotordynamic modes in the operating region. A two-way balance piston thrust compensation system also allows testing of both fans/compressors and turbines while maximising bearing life.

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