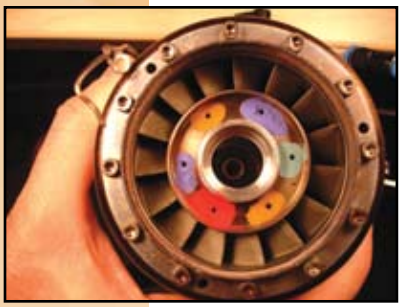
VEXTEC

Small-Scale Engine Testing Delivers Full-Scale Results – at a Fraction of the Cost.

Full scale gas turbine engine testing is expensive and time consuming. But now VEXTEC offers an efficient and cost-effective alternative: subscale engine testing that simulates the conditions of a full-scale engine and its failure mechanisms. VEXTEC developed its scaled turbine engine testing as a platform to quickly gather probabilistic data on multiple material failure mechanisms such as thermal mechanical fatigue, biaxial crack growth, creep and foreign object damage. These tests are far more efficient in terms of cost and schedule than full-scale testing, yet offer many of the same accurate insights into full-scale engine behavior. VEXTEC's small-scale engines naturally reproduce the complex multi-axial stress fields and thermal environment typically observed in gas turbine engines. VEXTEC's small-scale testing option means that potential problems can be identified earlier in the design cycle, long before the full-scale engine is ever built. Our scaled engine test results will tell you what your full-scale testing priorities should be – making more effective use of your testing dollars.

At 1/10th scale, VEXTEC's small-scale engines accurately simulate operating conditions of their full-size counterparts.

VEXTEC has a fleet of small-scale engines designed to meet full-scale testing needs.



VEXTEC has developed a comprehensive testing approach, and operates a dedicated test facility in Terre Haute, Indiana. The engines used by VEXTEC are commercially available and range in size from 2 to 5 inches in diameter. They feature annular burners with secondary cooling flow and axial flow turbines, and some have a single stage turbine while others have an additional power turbine.

Full-size engines are too valuable and cost too much to be tested to failure. (Military jet engines can easily consume 2,000 gallons per hour of operation, whereas scaled turbine engines only consume between two to four gallons per hour.) However, this inability to test to failure is a critical limitation in fully ascertaining component and system durability.

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The *typical* alternatives in specimen and full-scale testing have a number of significant drawbacks:

Specimen Testing Disadvantages	Full-Scale Engine Testing Disadvantages
• Unrealistic environment • Compromised microstructure • Incorrect component geometry • Tests single failure issues only • Repetitive testing cycles	• Occurs at the end of design cycle • Limited test repetitions • Expensive & time consuming

VEXTEC's small-scale engine testing offers advantages full-scale testing, or even specimen testing, can't match.

Scaled Turbine Engine Testing Advantages	
• Accurate microstructure • Utilizes true geometries • Realistic engine operating environment • Early identification of failure issues	• Typical engine stress & temperatures • Simultaneous evaluation of multiple failure issues • Engine sensors can also be evaluated

VEXTEC's small-scale engine testing has been used to conduct accurate operational simulations of a broad range of failure mechanisms, including:

- Cracking Fatigue
- Creep Fatigue
- High Cycle Fatigue (HCF)
- Low Cycle Fatigue (LCF)
- Surface Corrosion
- Foreign Object Damage (FOD)
- Weld Repair
- Thermomechanical Fatigue (TMF)

About VEXTEC

VEXTEC is the only company in the world that can accurately predict the performance, durability and true lifetime cost of a single component or an entire fleet—before they're ever built. Founded in 2000, VEXTEC has pioneered and patented innovations in material science and probability theory to form the foundation of its Virtual Life Management (VLM) technology. Manufacturing companies from such diverse industries as aerospace, heavy equipment, automotive, electronics and medical implants can all benefit from VEXTEC's unique ability to predict product life cycles and failure, and most importantly, their financial consequences. To learn more, visit www.vextec.com.

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