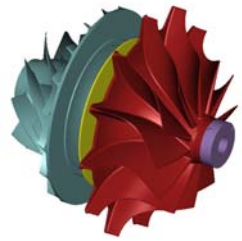
Microturbine Developments at GE

Advanced Integrated Microturbine System



Compressor/Turbine Assembly

Improve Efficiency, Cost, and Emissions

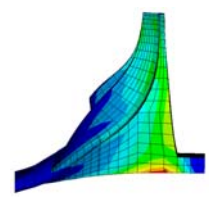
- 35% Efficient Design w/ Growth to 40%
- 175 kW Output with growth to +250 kW
- ≤ 10 ppm NOx on Natural Gas
- ≤ 10 ppm CO on Natural Gas
- ≤ $500/kW unit cost
- 11,000 hour maintenance interval
- 45,000 hour life

Microturbine Opportunities:

- Opportunistic Fuels
- Multi-Source PE
- Advanced Recuperation
- SOFC Hybrid System
- Advanced Materials
- CHP/CCHP Systems
- MT DG Applications

Technology Demonstration (Metallic Unit)

- Benchmark System Performance
- Test Advanced Components
- Develop Required Manufacturing Techniques
- Identification of Path to a 40% MT
- Advanced Material Screening



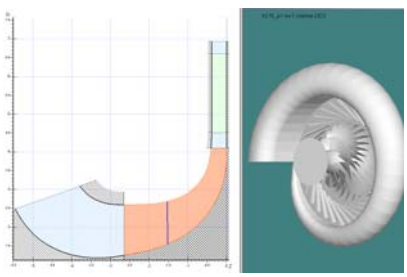
3D Structural Design

Ceramic Material Evaluation

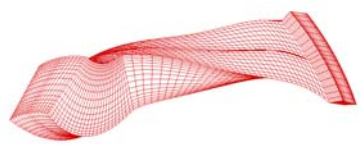
- Material Analysis at MT Conditions
- Attachments to Metallic Components
- Surface Recession due to Water Vapor
- Probabilistic Design Code for Life Requirements

Microturbine Technology Impact

- Low Emissions Combustion
- Improved Power Electronics
- Efficient High Speed Alternator
- Advanced Aero Components (Centrifugal)
- New Manufacturing Techniques
- Super-alloy Strength Characterization
- Control and Characterization of Unstable Systems



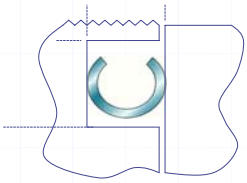
Prelim Aero Design



3D Aero Inlet Design

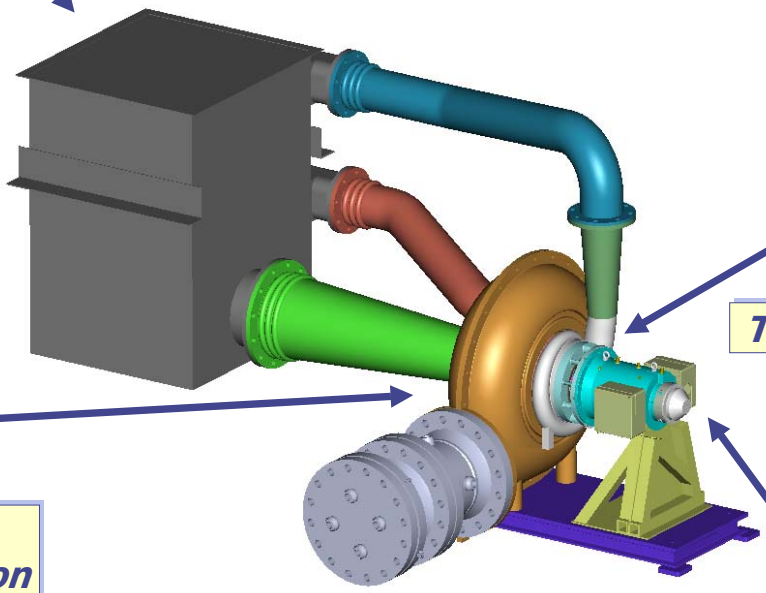
Microturbine Developments at GE

High Efficiency Recuperator



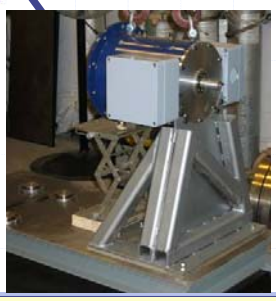
Advanced Seals Designs

Demanding Tolerance Specifications

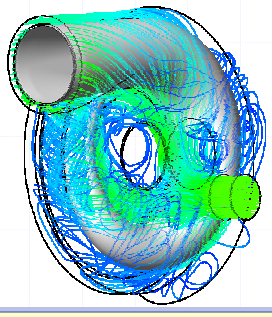


True Radial Inflow

Twin Scroll Cooling Configuration



Efficient High Speed Alternator



Minimized Aero Losses

High Firing Temperature

Combustor Performance:

NOx (15% O_2) = 3.4 ppm

CO (15% O_2) = 8.4 ppm

Low Acoustics (2 psi p-p)

Performance Driven Design