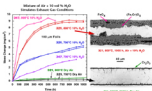


Recuperator Materials Testing

Higher-temperature recuperator materials are being developed, screened, and evaluated for use in today's microturbines and industrial gas turbines as well as in higher-temperature, more efficient microturbines being developed by Capstone, Ingersoll Rand, GE, and UTRC.

Water Vapor Present in Turbine Environments Causes Accelerated Attack



• Cr₂O₃ scales on 347 and 321 alloys that are protective in dry air are attacked by water vapor present in turbine environments

Oxidation Testing of Model Fe-Cr-Ni Alloys Indicate That Type 347 and 321 Stainless Steels Need Higher Cr and Ni Contents for Enhanced Oxidation Resistance at 700°C

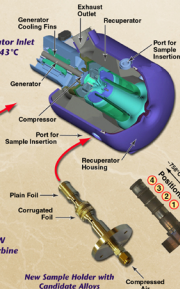
		Ni Content					
		wt %	10	15	20	25	30
O Content	16	X	X	X	X	X	X
	18	X	347	X	X	X	X
	20	X	X	X	X	X	X

X = Alloy Composition Tested

- Model alloys cast and rolled at ORNL (~10 μm grain size, 1 mm thick)
- Tested in 1-h cycles at 700°C in air + 10 vol % H₂O

Candidate alloys are screened and evaluated in ORNL's Recuperator Materials Test Facility. The effects of stress, temperature, and environment are determined on test specimens positioned at the entrance of the recuperator.

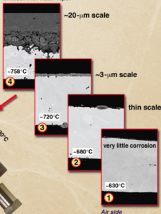
Maximum Recuperator Inlet Temperature: 843°C



Water vapor present in the microturbine exhaust causes enhanced oxidation of 347SS foils.

Note: Little or no corrosion on the air side without water vapor.

Exhaust with water vapor



Modified 60-kW Capstone Microturbine

New Sample Holder with Candidate Alloys

Exposed Sample Holder with 347SS Specimens at 500 h

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Materials Suppliers



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