

OVERHAULING SOME HEAVY IRON!

By Robert J. Klova, PE

A major North American utility recently awarded RMS a contract to inspect and overhaul a large Worthington ER-224 Expander. In modern terminology, these units would be classified as aero-derivative power turbines, as each expander-turbine is driven by two Pratt & Whitney GG4 gas generators. Expander shaft output is approximately 40 MW (54,000 hp). These turbines are typically installed in peaking power service, and have been in operation since the late 1960's. Two turbines were shipped to RMS with the goal of combining the most serviceable components (after repair) to assemble one machine suitable for long-term, reliable operation.

As can be seen in the accompanying photograph, these units are quite large by power turbine standards, and weigh over 70,000 lbs. Construction is also very unique. A GG4 gas generator is mounted to each side of the large annular casing at the center of the machine, and feeds the power turbine with high temperature, pressurized (1190 degF, 44.5 psia) gas. The annulus routes the inlet gas around a radial array of inlet guide vanes (stators), which direct the gas into a cavity feeding the center of a double-flow, two-stage (four stages total) rotor. The radial stator and the rotor can be seen in the second photograph. Gas then exits from a diffuser at both ends of the turbine and into a single exhaust plenum (not shown) and stack to atmosphere.

RMS' disassembly and inspection work scope included the following steps:

- Complete disassembly of the turbine
- Rotor check balance
- Rotor runout and dimensional inspection
- Complete disassembly of the rotor
- Contact check of the curvics couplings
- NDT inspection of all rotor components

- Casing dimensional inspection
- NDT inspection of all hot casing components
- Stator throat checks
- NDT inspection of the stators
- Bearing and seal inspection



Based upon the results of our inspection, the following work is planned for a completion date in the second quarter of 2011:

- Weld repair rotor blade foreign object damage (FOD).
- Weld repair stator foreign object damage.
- Weld repair or blend casing cracks and re-heat treat.
- Remachine casing
- Replace all high temperature fasteners
- Replace bearings
- Replace shaft seals
- Replace honeycomb tip shrouds
- Reassemble rotor and balance
- Reassemble complete unit, reestablishing all critical fits and clearances



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