ditioned space.

- The servers are neatly organized and labeled.
- All machines have KVM switches that are installed in a way to enable easy replacement, if required.
- Initial planning of cable pulls allowed color coding to segregate the DCS KVM cables, Mark VI KVM cables, PLC KVM cables, and ethernet cables.
- Easier HMI troubleshooting and maintenance.
- Increased reliability and efficiency.

Duct balloons sustain proper temperature for turbine disks in cold weather

ManChief Generating Station

Owned by ManChief Power Company LLC and Capital Power Corp

Operated by Colorado Energy Management LLC

Challenge. The gas-turbine OEM at our plant recently issued a technical advisory (TA) to alert plant owners and operators of a potential issue with GT disk embrittlement. To reduce the risk of disk embrittlement, turbine starts in cold weather are now temperature-limited.

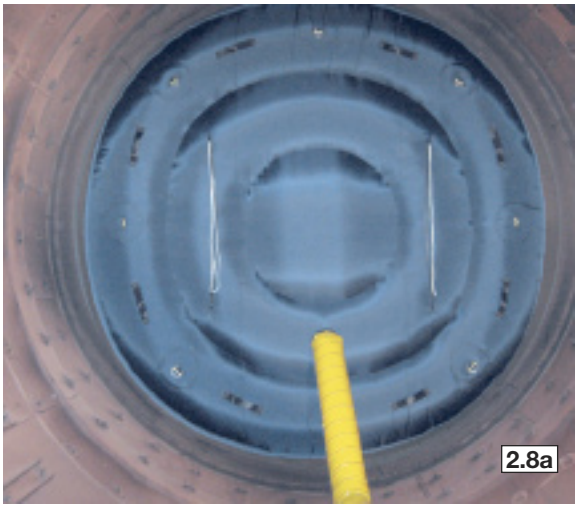
In accordance with the advisory, the turbine disks must be above the specific temperature listed before a start can be initiated. Because of the geographical location and peaking application of these simple-cycle units, the heating options to maintain the turbine disks above the minimum temperature were very costly if not impractical.

Solution. The plant O&M team researched available options and to find a solution to keep the turbine disks warm and the units ready to start without spending an exorbitant amount of money.

One option available to us was to disassemble the GTs, inspect the

ManChief Generating Station

300-MW, gas-fired, two-unit peaking facility located in Brush, Colo
Plant manager: Joe Keefe
Key project participants:
Gene Jinkens, Assistant plant manager
Sam Moots, Production manager
Kyle Frick, Electrical maintenance manager
Jon Kaper, Material control administrator



2.8a

2.8b

turbine disks, and either replace or requalify the disks. This option, however, was not feasible because of the length of the outage required, the availability of replacement turbine disks, and scheduling downtime with our energy customer. Another, more feasible, option was to install 450-kW heaters to bring the turbine disks to the proper temperature, but operating costs were prohibitive.

Plant management decided to purchase and install exhaust duct balloons (Fig 2.8a) in the turbine exhaust plenum to prevent cold ambient air from entering the turbine case through the exhaust stack (Fig 2.8b). The balloons were supplied by G R Werth & Associates Inc and manufactured by Scherba Industries Inc.

The duct balloons are installed by plant personnel after the required turbine cool-down period. This allows us to use the residual heat in the unit as well as the existing enclosure heating to keep the disk temperature above the minimum temperature listed in the TA.

Results. The balloons have proven to be a great success at a fraction of the cost to disassemble the units and requalify the disks, and approximately 20% less than installing 450-kW electric heaters (parts and installation only).

In addition to the capital savings, the electrical cost savings by not installing electric heaters is estimated at $30,000 per year, based on operating the heaters 33% of the time throughout the shoulder and winter months. We plan to continue using the duct balloons until the next scheduled major inspection where the turbine disks will be inspected and either requalified or replaced.