Service provider tracks valve health, makes expert repairs, cuts maintenance cost

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Combined-cycle O&M personnel typically focus their attention on major equipment—gas and steam turbine/generators and HRSGs. Today's manpower-constrained staffs often do not have the time available to provide the same level of attentiveness to valves and auxiliaries. Adding to the challenge is the general lack of on-staff expertise concerning the maintenance of balance-of-plant (BOP) equipment. Discussions at user-group meetings remind that poorly maintained valves can negatively impact plant performance—in the extreme, cause or contribute to a forced outage.

The O&M manager for a 3 × 1 501G-powered combined cycle presenting at the 2021 virtual conference of the Combined Cycle Users Group offered his colleagues a solution: Partner with a qualified third-party services firm having the capability to inspect, monitor, and repair valves as part of an ongoing maintenance program.

This plant's formal valve inspection and maintenance program was a long time coming. The facility ran for years following COD in 2003 without an "official" valve maintenance tracking sheet. The only records were a group of reports from different vendors. MP2, an enterprise asset management software application familiar to many readers, was used to generate work orders for valve inspections and maintenance.

Thus, the historical information available for decision-making was inadequate, consisting only of work-order records and comments operators and I&C technicians included with them when the valves had visible issues, noise, leaks, etc. Plant management spent years trying to establish a valve maintenance program with manufacturers but that goal proved elusive.

The lack of a formal maintenance plan was costly, resulting in unplanned maintenance and, at times, outages. Millennium Power Services (MPS), which had done some valve work at the plant over the years and had significantly expanded its capabilities in the last decade, was selected as the site's preferred service provider for valves. A couple of small suppliers also are involved in the plant's valve activities.

1. Individual TrimKit suitcases, supplied by Millennium Power Services, contain all the parts necessary for the repair of specific valves (left); multiple kits arrive onsite by pallet for outage work (right)

2. Outage complete, trim kits and reusable parts are returned to the Millennium shop for restocking and repair

MPS worked closely with plant personnel to track and prioritize valve maintenance, thereby bringing the facility up to industry standards. Millennium maintains the records of more than 200 major valves and has identified maintenance requirements for each through 2030, according to a chart shared with users. The result is an experience-based, proactive approach to valve maintenance with

3. Final machining of a large valve cage is done by lathe

the capability to review, prioritize, and coordinate inspections and repairs with the service provider based on plant needs, budget, and experience.

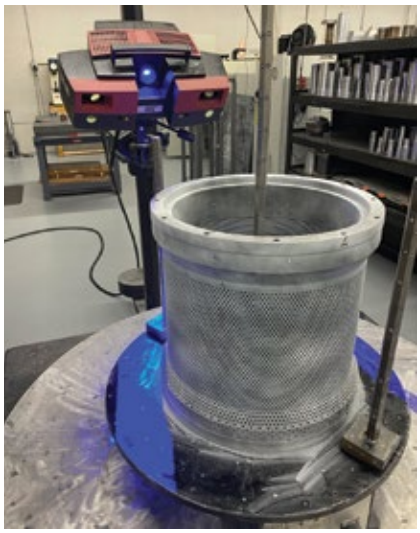
Millennium adheres to industry valve standards in its repairs, keeps the plant informed of ongoing work, transmits photos of damage found in timely fashion, and issues reports within 30 days of an outage. Reports then are reviewed/discussed by MPS and plant personnel during a sit-down.

Among the program features discussed by the plant's O&M manager at the CCUG meeting is Millennium's TrimKit program, designed to reduce costs and labor by having all new parts for specific valves arrive in dedicated "suitcases" (Fig 1). Only the parts needed are removed from the kits, which are returned to MPS after the outage for restocking. Used parts also are returned—for refurbishment or replacement (Fig 2).

Note that TrimKits are provided only for valves with parts difficult to replace on a timely basis during an outage. For example, drain valves are not included in the program. Neither are turbine valves, which are procured from the OEM.

Excerpts from the presentation and follow-on discussion included the following:

- Safety and relief valves undergo annual testing. Those results determine what maintenance, if any, must be performed.
- Most valves in an advanced-class combined cycle are inspected over a five-year period, sometimes more often.
- Valve work, typically scheduled over a three-week period during both the spring and fall outages, requires five or six MPS mechanics onsite until work is complete (Fig 3).
- Millennium encourages customers to share their budgets with it to facilitate planning and prioritize work. The company says it now serves about a dozen plants with the same type of agreement described in this article; plus another two to three dozen customers with less robust requirements.
- MPS typically plans its work by plant area, thereby keeping tools and people in the same vicinity to improve efficiency.
- Millennium says manufacturing of its reverse-engineered valve parts typically takes about a week on a rush basis (Fig 4). The company's research shows its spare parts for critical valves are about one-third to one-half the cost of new parts from their respective manufacturers. Normal time interval from order submittal to delivery is about one-quarter to one-third of the time required by valve OEMs.
- Attemperator spray and block valves are overhauled or replaced annually. CCJ



4. 3D scanner is a vital component in the MPS reverse engineering program