To meet growing power demand in the area, the John R. Kelly Generating Station in Gainesville, Fla. (Figure 1) repowered an existing 48 MW steam unit by constructing a combined cycle facility. It uses a General Electric gas turbine and an ATS heat recovery steam generator to drive the existing steam turbine.

The gas turbine produces about 74 MW and the old steam unit now generates about 38 MW for a total output of 112 MW at full power during summer operation. The engineering firm of Burns and McDonnell performed the design engineering for the combined cycle unit, which went into commercial operation in May 2001.

An asset management system was not included in the original design, but we felt it would be a good fit for this plant with the new instrumentation and a relatively small staff.

We selected the asset management system based on its ability to track the performance of smart field devices plus the ability to add more devices as needed in other areas of the station. When we first proposed this software, Doug Beck, engineering manager for our power plants, said we would have to "prove the need to spend this money." With the help of representatives of Emerson Process Management, which supplies the asset management system software, we were able to demonstrate its time saving potential, and he approved the purchase.

Proof Before Approval

A Bailey Symphony distributed control system manages the entire facility using smart Rosemount 3051 transmitters, Micro Motion flowmeters, and valves equipped with Fieldvue digital valve controllers. The asset management system was installed during the plant start-up, interfacing the control network through multiplexer boards in the DCS marshalling cabinets. The field-based information is accessed through the HART communications protocol without interfering with the control system's 4-20 mA I/O signals.

Without question, our asset management software allows us to manage instrument maintenance, calibrate, and troubleshoot in an efficient manner with a limited number of individuals.

For example, the condition and operational status of instruments on top of the seven-story heat recovery steam generator or other inaccessible points can be verified from one central location (Figure 2) in just a few moments, whereas it would take a technician 30 minutes to an hour to go into the plant and do that same job. With a small staff and 150 field devices to look after, every minute we save is valuable.

Problem diagnosis is one of the most important responsibilities of any maintenance technician, but it can consume great amounts of time. With the asset management software, we save as much as half of our total diagnostic time by attacking many process problems right from a PC in the engineering workroom.

By using this method to check out transmitters that seem to be acting strangely, some potentially serious conditions within the process have been identified. For example, if an operator suspects that a transmitter is not zeroing out, the asset management system can be used to investigate that suspicion. If we find a difference of as much as 5%, we know a problem exists. More often than not, the problem is a valve that is not closing, and it's discovered long before the consequences can become serious.

The useful life of a smart field instrument can be predicted based on diagnostic information provided by that device, and plans can be made to replace it before it causes an unwanted shutdown. Because of the newness of the plant, we rarely have a problem with a transmitter. As a result, it has not been necessary to employ this predictive maintenance strategy, but the system is in place to do so.

Management insisted on a strong training program. Beck said, "We won't buy something we can't use. I refuse
to buy new technology unless good training accompanies the purchase. We have to give our people the skills they need, and if that isn’t part of the package, then it isn’t a package.”

One of the reasons for our success with this system is that all of the personnel who use it are well trained. The local Emerson representative, Key Controls Inc., headquartered in Tampa, conducted on-site training for the technicians, and one of the authors (Terry Gordon) was sent for factory training at Eden Prairie, Minn.

Quick Commissioning and Calibration

Speedy commissioning of new instrumentation is another key attribute of the asset management software. All of the information required to commission the field devices is contained in the software’s instrument database. From one central location, technicians are able to communicate directly with their instruments and configure each one using drag-and-drop techniques in a fraction of the time required for conventional commissioning of instrumentation.

Although the instruments in the new combined cycle generating system were commissioned before the asset management system software was online, instruments added since then are checked out easily and quickly from the engineering workroom by our own personnel. New smart instruments to be installed during an upgrade project on three combustion turbines at the station will be tied in with the asset management software.

The asset management database also contains the specifications needed to calibrate all of the HART devices. This information is easily downloaded into handheld calibrators versus having to look up the information from printed records and key it in manually. The software also provides a routine to guide technicians once they enter the plant to calibrate a group of instruments. After the calibrations have been completed, all changes are automatically uploaded from the portable equipment to the database where it becomes part of the permanent record on each instrument.

Twenty-three control valves equipped with digital positioners can be calibrated from the engineering workroom without a technician ever setting foot in the plant, saving additional time with those devices. If a positioner will not calibrate, we know the valve has a mechanical problem, which we check out immediately.

All instrument events and maintenance activities are automatically recorded by the software’s Audit Trail application, eliminating handwritten reports and the errors that are bound to creep into technicians’ notes. Suspected problems are recorded along with all corrective work on each piece of field equipment, providing a complete maintenance history on every device. This information is very useful in troubleshooting, because a technician can first look to see if a device has exhibited the same symptoms previously. It is then easy to determine whether the cause lies in the transmitter or in the process.

We use this tool at least once a week to verify the condition of a field device and assure control room personnel that the measurements they are receiving from those instruments are accurate.

Beck now agrees that “it was money well spent,” and the software exceeds his expectations. “From a management perspective,” he says, “this software certainly increases productivity.

“It allows us to do instrumentation checks without having to run out to the field, which can be very time-consuming. Perhaps more importantly, it allows much quicker response time if there is a problem or a perceived problem in the plant,” he continues. “The techs can check very quickly on anything where instrumentation is involved, which includes most of our steam production and power generation processes. There are a lot of pieces of equipment out there, and that is where they sold me on the system. For the price, I don’t think you can beat it.”

After nearly a year of working with the HART analog instrumentation, our reliance on the unit’s asset management software package continues to grow. It enables us to be more productive with a limited staff than by following conventional instrument maintenance practices.

Terry Gordon (gordontm@gru.com) is an instrumentation supervisor and Donny Thompson is a senior control systems engineer at Gainesville Regional Utility, Gainesville, Fla.