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CASE STUDY

Bauer monitors facility test equipment to save energy, time and wear using Siemens automated test controls

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Customer: Bauer, Inc., a leading aircraft testing equipment and services provider www.bauerct.com

Challenge: Limited visibility across up to 20 testing platforms operating simultaneously

Solution: An automated facility services monitoring system, using Siemens components

Results: Greater operational visibility, avoidance of peak utility surcharges, and a foundation for additional functionality

Founded in 1916, the Bauer company isn't a household name. But chances are, anyone who's flown commercially just about anywhere owes their safe journey in part to its wide range of test, wheel, brake, and support equipment the aviation industry depends on to keep their aircraft flightworthy.

Based in Bristol, Connecticut, Bauer's customers include the world's top airlines, the military aviation operations of many nations, OEMs, and third-party maintenance repair organizations that perform overhauls. All of Bauer's equipment is designed, assembled, and tested within a 75,000-square-foot facility at its headquarters. The company also has offices in other parts of the world to support customers in those regions.

Challenge: Limited visibility across up to 20 testing platforms operating simultaneously

According to Bauer Engineering Fellow Joel Kuczenski, who has more than 35 years experience in aircraft component testing, the company's facility can have as many as 20 test stands evaluating various aircraft component systems for different customers.

"Problems arose when our engineers would leave for the day," he says. "They might turn off the process cooling water, compressors, or our 50 and 400 cycle test generators, not knowing that one or more test stations were still operating. Conversely, they might leave the various services running but none of the test stations would be operating. We had no easy way, all in one place, to view what equipment was operating."

Kuczenski explains that Bauer's process cooling water is required for most all its hydraulic equipment: An electric-powered, hydraulic pump modules that can use up to 500 horsepower to supply temperature-controlled fluids to flight hardware on test. The fluids are normally required to be cooled to 80°F. Bauer uses a large process water chiller rated at 150 tons that delivers 50°F process water at 400 gallons per minute into a 1000-gallon buffer tank.

"The buffer tank supplies a facility-wide manifold of test stand stations that return the heated process water back to the buffer tank," Kuczenski says. "At any one time, we'll be using "cooling water" in testing as many as five large pieces of equipment plus up to 10 medium-sized ones, so it's critical to our operations."

He further explains that if an engineer turns off any of the facility services, not knowing one or more tests are being run by other engineers, the tests would have to be re-run. "This would cost us time, and if the equipment being tested is damaged for lack of facility services, it could an expensive mistake," Kuczenski says, noting those costs could run as high as $150,000 or more. "And, if our process water or other support equipment is left on, we're consuming unnecessary energy, especially if it happens over a weekend, causing us to incur costly and unbudgeted peak-load charges from our utility."

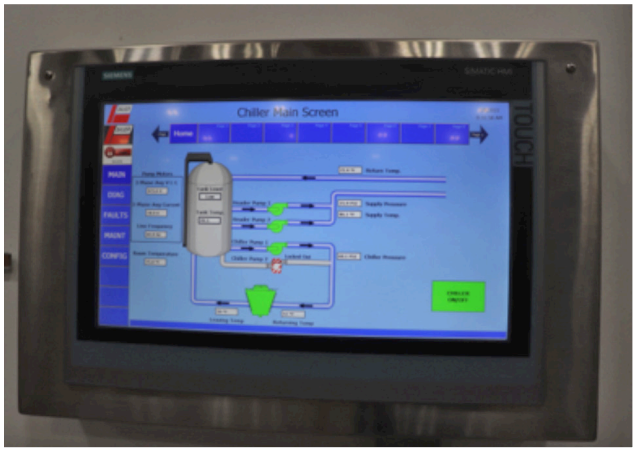
Solution: An automated facility services monitoring system, using Siemens components

To address these issues, Kuczenski and the electrical engineering group designed and engineered an automation and control solution that monitors and manages the process water chiller performance as well as the facility's peak and continuous power usage. "The system can alert management to operational changes that we can make to our production testing to shed peak energy loads when possible," he says.

The automation package also monitors systems usage during and after normal business hours. "In a predetermined sequence, it can either idle a test-stand service or shut it down until testing is resumed and an engineer requests it to run again," Kuczenski says.

To build the system, Bauer used components from the Siemens Totally Integrated Automation (TIA) portfolio, including a SIMATIC S7-1500 programmable logic controller (PLC), SIRIUS soft starters for the process water chiller system's four pump motors, plus a 19-inch SIMATIC HMI Comfort color, touch-screen panel. He also added two manually operated safety switches on the chiller system—one an E-stop; the other a controlled stop switch.

The system uses industry-standard Modbus for direct digital communications between the PLC and the chiller. He used the Siemens TIA Portal, an all-in-one software engineering platform, to program the system. "The easy integration of all the Siemens components plus their programming saved many hours and possibly even days in developing this solution, including its design, engineering, testing, and commissioning."



The 19-inch SIMATIC HMI Comfort panel is mounted outside the Bauer engineering office door, so staff can easily check the status of various testing stations.

The SIMATIC S7-1500 PLC, SIRIUS soft starters, and other system components are located in a nearby utility room.

Results: Greater operational visibility, avoidance of peak utility surcharges, and a foundation for additional functionality

The Bauer automated facility services monitoring system is now operational, Kuczenski reports. He and his team mounted the large SIMATIC HMI Comfort Panel display on the wall outside the engineering office. "Our staff can quickly check the operational status of their own equipment on test and those of their colleagues before leaving, so they don't inadvertently shut down the chiller system and interrupt a testing operation," he says.

Also, because the SIMATIC S7-1500 has a built-in web server, the system can be operated remotely and also issue alerts to Kuczenski or others in Bauer's management team if a human intervention is needed.

Today, the Bauer engineering staff has much more visibility into the operating status of its test-stand services, which can number a dozen or more at any time across nearly two acres of floor space. Kuczenski hasn't yet compared the facility's utility expenses this year with prior years, but he's confident that the system has helped company to avoid unnecessary peak-load surcharges.

In the next phase of the system's evolution, Kuczenski and the electrical engineering group plans to add much more functionality to the system. For example, individual test cells will be able to sign in and out of various facility services, either onsite or remotely. These would include access to process water; test generators; and high-flow and high-pressure compressors. The services will shut down automatically, if left unattended after-hours. "We'll also look to add building HVAC monitoring and peak-load energy reporting," he says. "Additional opportunities to may include solar system monitoring and facility lighting control. The SIMATIC S7-1500 gives us options in how we use our system."

Kuczenski notes that Bauer is using the automated facility services monitoring system to showcase its engineering capabilities when customers come to visit, adding that it also offers an opportunity to mention and demonstrate Siemens automation and control solutions.

"We work with many different suppliers of automation and controls, but we see Siemens not only as one of our top suppliers but also as a partner in our success," he says.

> *"Wherever they are in the world, our customers can count on the reliability that comes from the quality engineering and manufacturing that are Siemens hallmarks, plus Siemens global service and support can backstop our own, if necessary."*
>
> **Joel Kuczenski**
> **Bauer Engineering**

Below are two products from Bauer that are representative of the company's comprehensive line of aircraft testing equipment and solutions. Most use Siemens SIMATIC and other TIA components for their easy integration, engineering and manufacturing quality, and superior reliability.

High cycle advanced brake test stand

Dual Configuration

Tire inflator and safety cage

The Bauer Model 6076 series Brake Test Stands (left) provide a quick and reliable means of performing operational testing, leak checks, and static pressure testing of brake assemblies up to 5000 PSIG.

The standard structure and functional assembly are designed to withstand the effects of Skydrol. The all stainless steel functional system contains a fluid reservoir, filtration, pumping, and control system all packaged in a sliding assembly for easy maintenance access. The operator control screen is adjustable for an optimum viewing angle. The control system allows users to pre-select pressure set points and auto cycling sequences.

The Model 5871 Tire Inflator and Safety Cage (right) is a reliable means to inflate tires safely, quickly, and accurately.

The basic Tire Inflator uses traditional buttons, controls, and digital indicators for operation. The HMI version uses a touch-screen user interface.

The Inflator is mounted on the side of the reinforced steel safety cage and inflates aircraft tires precisely. The Safety Cage has one or more compartments with reinforced steel safety doors.

For more information about Bauer products, visit: bauerct.com

Legal Manufacturer

Siemens Industry, Inc.
100 Technology Drive
Alpharetta, GA 30005
United States of America

Telephone: 1-800-241-4453
usa.siemens.com