



**SIEMENS**

*Ingenuity for life*

## EcoClean

### Major automotive manufacturers avoid costly downtime by using industrial washers equipped with Siemens SIRIUS 3RR Monitoring Relays.

Cleaning and surface processing are important production stages in many manufacturing industries, especially automotive. For example, machined parts and sub-assemblies must be thoroughly clean before they move into subsequent stages of assembly or coating. Metal burrs, filings and dust from machining, plus oils and other surface contaminants caused by previous production steps must be removed. And surface processing is a critical adherence requirement for any component that will have a specialized coating or paint applied or be subject to some sort of surface conditioning.

EcoClean is a global leader in providing the kind of industrial robotic washers these industries need. Its automotive customers include car and truck manufacturers as well as engine makers for those vehicles.

In particular, they use the company's EcoCFlex and EcoCAgile systems to clean powertrain, engine and transmission parts with heated, water-based soap solutions, including cycles with pressures of up to 10,000 psi before they move to assembly lines for installation. Downtime for this equipment can disrupt those assembly lines, costing hundreds of thousands, if not millions, of dollars in lost production.

#### EcoClean

**Customer:** EcoClean is a leading global supplier of robotic washers for industry.

**Challenge:** Find a simple way to monitor the health of heating elements in the EcoClean robotic washers.

**Solution:** Install a series of Siemens SIRIUS 3RR Current Monitoring Relays for improved operating visibility.

**Results:** Gained operating insights to help provide predictive and condition-based maintenance and help prevent costly production bottlenecks and disruptions.



Durr EcoClean Eco Flex Robotic Washer

### Challenge

#### **Find a simple way to monitor the health of heating elements in the Ecoclean robotic washers.**

Unfortunately, early versions of the EcoCFlex Classic robotic washers were having sporadic problems heating water. That's the job of up to two large immersion heaters located in the bottom of a tank holding as much as 1,000 gallons of water. Ecoclean uses various size heaters in its washers, from 8kW to 90kW, drawing three-phase 480 VAC. Each heater comprises several heating elements connected with a fuse and a simple on-and-off contactor to energize them. The washer tank water can take from 1.5 to 2 hours to heat, depending on the washer model's tank size.

The main symptom of a heating problem was excessive heating times. Due to the heaters consisting of several heating elements, the issue might have been a blown fuse or an open element pulling less current than it should. But operators were finding it hard to identify the offending element, forcing a technician to go inside the tank, draining all the water, forcing a refill, and do the needed troubleshooting and repair. The task could take the better part of an entire work shift, slowing down production, if not stopping it altogether.

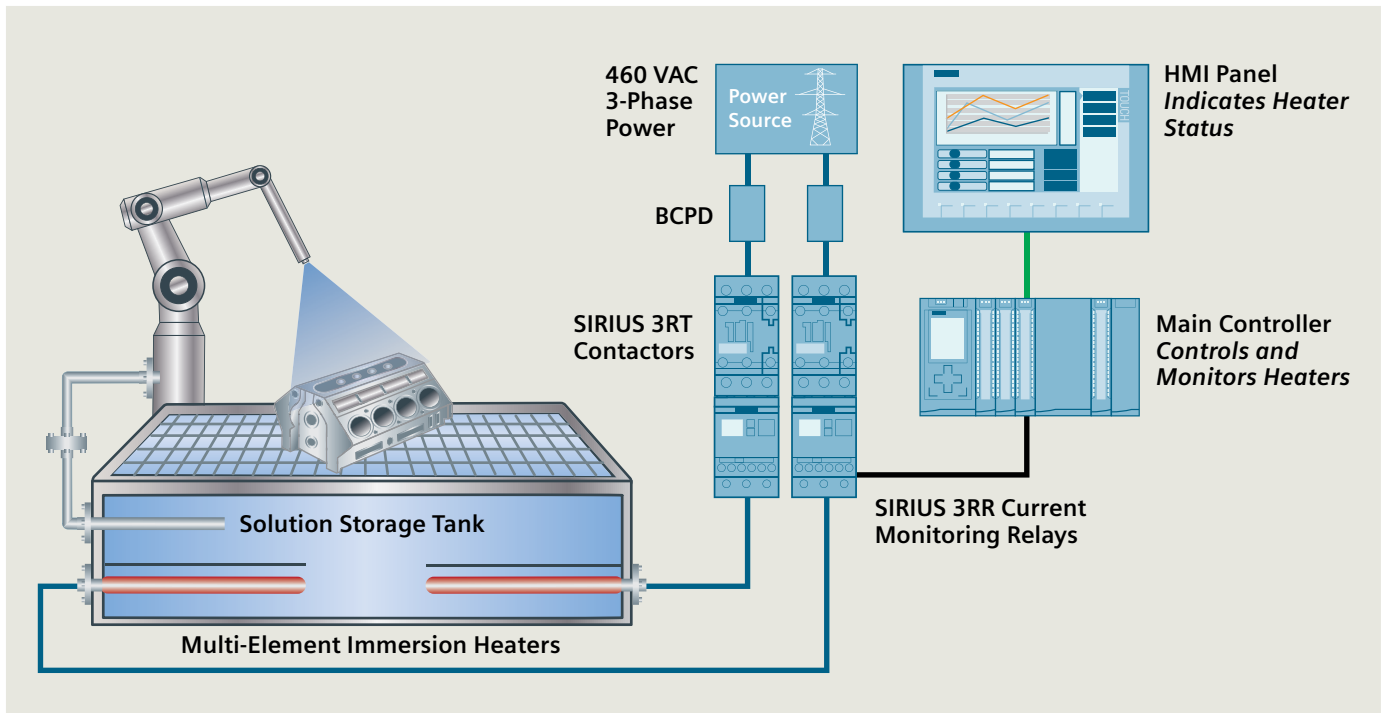
According to Les Brumar, Ecoclean's manager of Controls Engineering, the heater failures were occurring often due to damage from the coarse debris that would accumulate at the bottom of the tanks on top of the water heaters. "Our customers typically put two washers on a line," he explains. "The first is a primary wash, which cleans a lot of large refuse, such as aluminum or cast-iron shavings, from rough broaching and drilling operations. The second provides more thorough cleaning at the end of the line, but also accumulates debris."

While the Ecoclean washers have a pump and filter to remove suspended particle matter, heavier debris from objects like 500-pound engine blocks and cylinder heads fall through a grate to the bottom of the tank. The heavy debris is then cleared every few months as part of the washer's maintenance schedule.

"One or two workers enter an empty tank, remove the grate and shovel out the debris," Brumar says. "But in doing that, they can inadvertently damage the heaters. Even a small pin-hole in their housings can cause trouble, so we installed shields. But, sometimes, too, a combination of soaps and oils or coolants from prior operations would create a tar-like sludge on top of the heater elements, causing excessive heat at the elements and damaging them.

Clearly, Ecoclean needed a better indication of heater performance in their industrial washers. "Because the elements heat such a large tank of water, we initially just monitored the water temperature and when it reached the desired set point, the heaters automatically turned off," Brumar says.

"Since we expect it would take a pre-determined amount of time to heat a given volume of water, timers were the only way back then that we had to know the heaters were working properly," he adds. "But we realized we had to figure out how to alert operators to an impending heater failure, so they can manage the heating process with the other heaters inside a tank. That way, they could schedule preventive maintenance and repairs before an under-temperature situation slows down or shuts down an assembly line."



Industrial Washer Application with Multi-Element Heater Monitoring

### Solution

#### Install a series of Siemens SIRIUS 3RR Current Monitoring Relays for improved operating visibility.

Seeking a solution, Brumar first contacted Ecoclean’s heater supplier. They suggested that the thermocouple in each heating unit be connected to a temperature controller for monitoring. An alarm contact on the controller could then alert an EcoCFlex operator as to whether a heater was working or not. Brumar and his team tried this approach but found it didn’t work.

“The problem was that the thermocouple device was mounted to only one of many elements inside each heater,” Brumar recalls. “So, while one element might be fine, others might not be, resulting in the heaters pulling less current and causing long heat-up times again. This delay would then create a bottleneck on the production line, causing customers to lose throughput.”

After finding the thermocouple solution insufficient, Brumar shared his vexing issue with his local Siemens representative, who suggested trying a Siemens SIRIUS 3RR Current Monitoring Relay to monitor the power drawn by each heater. “It worked,” he says. “After all we had gone through to fix this issue, we were elated to find a reliable way for our customers to tell if the heaters in our washers were working properly.”

Ecoclean’s industrial washers are now using a three-phase standard version of the SIRIUS 3RR current monitoring relay. In addition to motor loads this relay can monitor multi-element heater loads and detect single element failures and alert maintenance prior to subsequent failures which lead to extensive downtime and repair. It provides a visual display for operating and diagnostic messages. The relays are directly mounted to a Siemens 3RT contactor and can also be mounted on DIN rail when using third-party contactors. In turn, they can communicate with the washer’s third-party PLCs. If analog current monitoring is desired the 3RR Current Monitor Relay with IO Link can be used.

“We chose the size of the SIRIUS 3RR relay that’s appropriate for a washer heater’s current range, then set the minimum amps, and if a heating element falls under that, we alert the operator to a problem,” Brumar says. “Take, for example, our 45kW heater. It should pull 52 to 54 amps, so we set the monitored limit at between 48 and 50 amps and if while operating the heater current falls below 50, we alert the operator.”

## Results

**Gained operating insights to help provide predictive and conditioned-based maintenance preventing costly production bottlenecks and disruptions.**

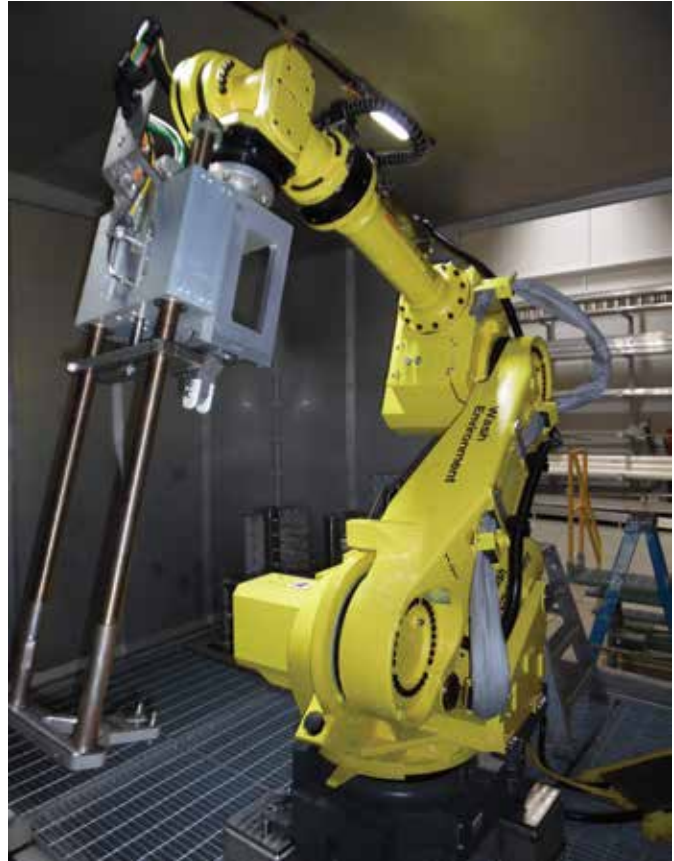
Today, Ecoclean uses the Siemens SIRIUS 3RR Current Monitoring Relays as standard components in all its robotic washers to keep operators informed of their unit's water heating performance.

But the big benefit of the Siemens SIRIUS 3RR relays goes to Ecoclean's customers. "Now, if the Siemens 3RR relays show diminished or no amps being drawn, a plant electrician can check for blown fuses or open elements that are operating at reduced power and therefore causing long heat-up times," Brumar says.

By adding this capability, Ecoclean's washers can help a factory support condition-based and predictive maintenance models. That's because each washer can have up to two large immersion heaters and heat-up times are proportional to how many heating elements are working at any given time.

"If a tank heater loses a few elements, it might extend heat-up times by several minutes or even hours," Brumar says. "But at least the operators are aware that those heaters will need repair soon or that sludge might be building up. They can then schedule interim maintenance inside of our washers' required maintenance windows."

Brumar points out the value that the added visibility provides: "By knowing some heaters have failed or are failing because their drawn amps are dropping, operators can then choose to nurse it along until a time when production is slack and doing maintenance and repair won't impact the production line. That can save the plant a small fortune in lost output."



Robot inside of washer enclosure

### Siemens Industry, Inc.

100 Technology Drive  
Alpharetta, GA 30005

1-800-365-8766

info.us@siemens.com

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