

Fail safe actuators increase availability at Volvo press plant

Volvo Personvagnar AB Karosskomponenter factory, Olofström, Sweden



INDUSTRY

APPLICATION

Automotive industry

AUMA SOLUTION

- > SQ actuators with intelligent AC 01.2 actuator controls
- > FQM fail safe units

CUSTOMER BENEFITS

- > Reliable operation in case of power failures

AUMA fail safe actuators help to avoid lost production and equipment damage at Volvo Car Group's bodywork plant in Olofström, Sweden. They ensure a continuous supply of cooling water even in the event of a power failure.

EMERGENCY COOLING FOR HIGH TEMPERATURE PROCESSES

At the heart of the Volvo Personvagnar AB Karosskomponenter factory are state-of-the-art press lines that manufacture body panels and other components for Volvo cars. Sheets of special steel are heated to temperatures of 850–950°C before being pressed into shape and quickly cooled. The ovens used to heat the panels rely on water cooling to protect parts exposed to the full furnace temperature.

A continuous supply of cooling water to the ovens is vital to maintain production and avoid costly damage. Panels are loaded into the ovens through hatches that cannot be fully protected by refractory linings. Without cooling, the hinges on the hatch doors soften and sag to the point that the doors will no longer open. If that happens, the oven has to be shut down for repairs.

In normal operation, the plant's cooling water is pumped around a closed loop. This arrangement can fail in various ways, however, including blocked pipes, a pump breakdown, or a power outage. An emergency backup cooling supply that is available instantly and automatically is therefore essential.

For emergency cooling, the Olofström plant uses water from the municipal supply in a once-through arrangement. The pressure in the water main is high enough that pumps are not needed. However, changing over to emergency cooling requires valves to be opened and closed, possibly without electrical power being available.

MECHANICAL ENERGY BUFFER FOR UTMOST SAFETY

To make certain emergency cooling water is available even in the event of a power failure, AUMA provided SQ electric actuators fitted with FQM fail safe units for the cooling system valves. The FQM fail safe unit uses mechanical energy, in the form of a constant-force spring motor, to open or close the valve when electrical power is not available.

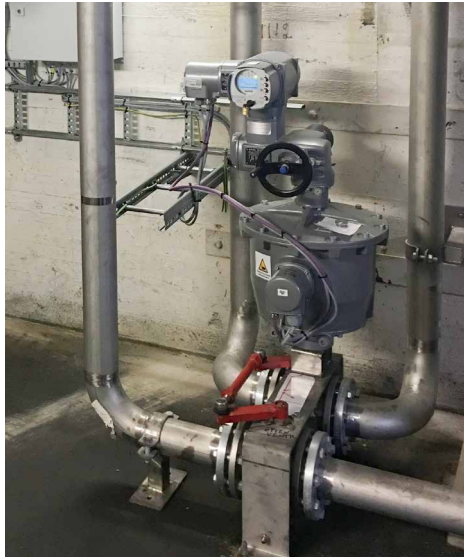
Project responsibility:
AUMA Scandinavia, Sweden

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AUMA's fail safe solution consists of an SQ 07.2 part-turn actuator with AC 01.2 controls and an FQM 07.1 fail safe unit.



Each of the two AUMA fail safe actuators drives a pair of cooling water valves in tandem.

EMERGENCY COOLING SYSTEM DESIGN

Two AUMA SQ 07.2 part-turn actuators with AC 01.2 controls and FQM 07.1 fail safe units are installed at the plant. The first unit (A1 in illustration below) powers valves in the normal cooling system, while the second (A2 in illustration below) serves the emergency system.

Both fail safe units are connected to an external safety PLC via an emergency shutdown (ESD) input that is separate from the normal control signal. If cooling water flow is lost for whatever reason, the PLC issues an emergency signal to both fail safe units in sequence.

First, the normal cooling circuit closes, to minimize the loss of treated cooling water. The FQM unit here drives two valves in tandem: one on the supply side of the pump, and the other on the return side. Since it is configured for the Fail Safe Close function, the FQM unit will close the valves even in the event of a total loss of power.

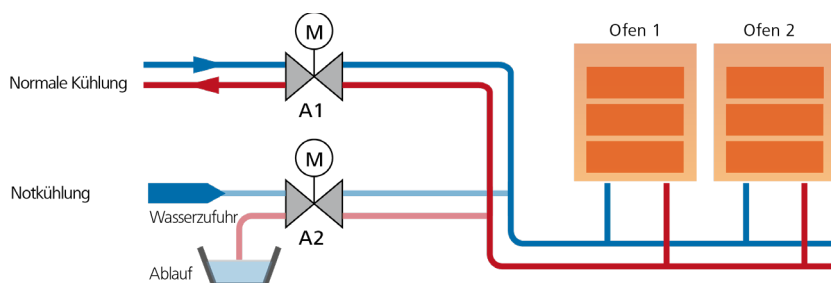
The second step in the emergency sequence is to open the valves that connect the cooling system to the municipal water supply. The second FQM unit again drives two valves in tandem: one on the supply side, and the other to divert the water to drain after it has passed through the cooling system. This unit is configured with the Fail Safe Open function, so again it will do its job even if power is lost.

To make sure both actuators and all four valves are always ready for action, the safety PLC periodically carries out automated partial valve stroke tests.

REAL EMERGENCY PROVES SYSTEM PERFORMANCE

The AUMA fail safe actuators were successfully installed during a short planned shutdown of the plant, so the time schedule was very tight. But local AUMA staff managed to get everything in place and test all the sequences on time.

Since the installation, the emergency cooling system has already been needed once. The AUMA fail safe actuators worked exactly according to plan, thus avoiding a costly shut-down of the production line.



One AUMA fail safe actuator in the normal cooling system (A1) and a second one in the emergency cooling system (A2) ensure a continuous supply of cooling water even in the event of a power failure.