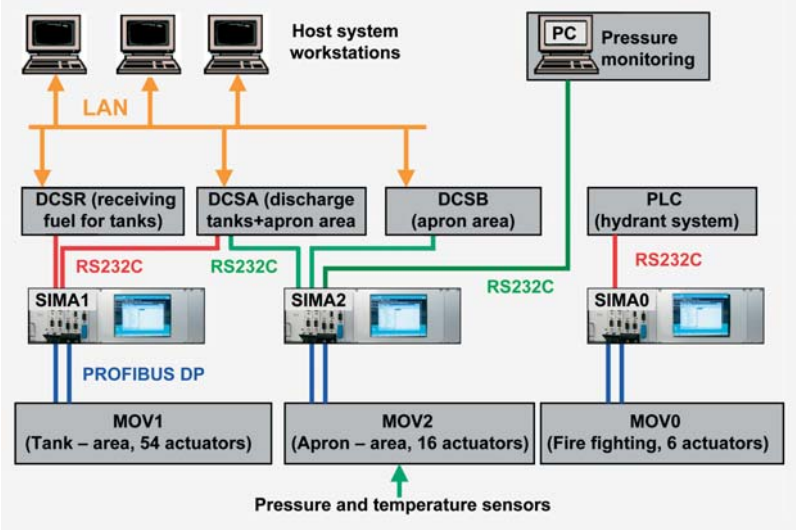
Kerosene distribution at Chubu Airport

Today, actuators are often expected to do much more than simply open or close valves. At Chubu Airport, for example, an actuator network controls the transport of kerosene as well as guaranteeing the water supply required for fire-fighting.

By Werner Längin, AUMA Riester GmbH & Co KG.

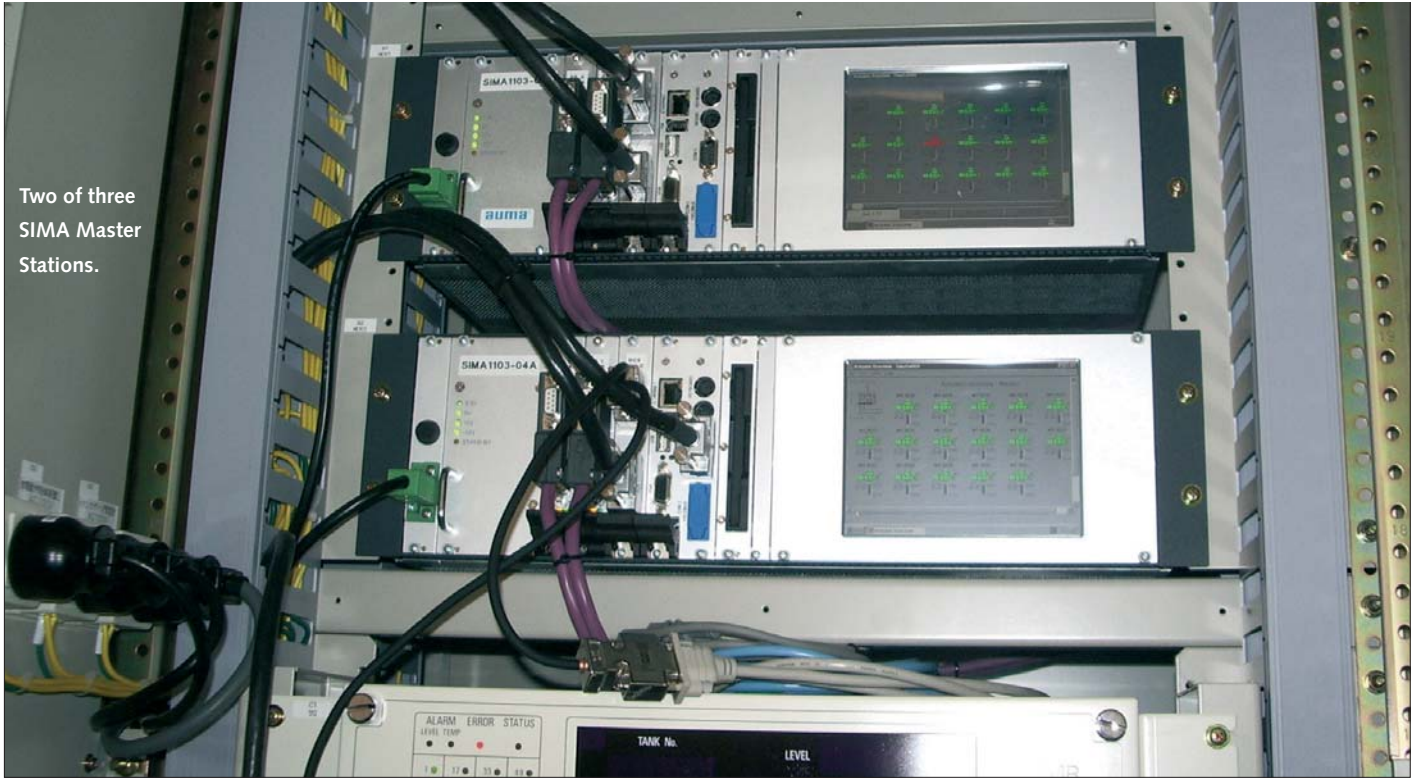
The newly-built Chubu International Airport in Japan uses AUMA actuators in its kerosene distribution network.

"The global actuator market is characterised by the most diverse requirements for projects and customer-specific project solutions. These projects include the newly-built international Chubu airport in Japan. One of the main tasks was to control the transport of the aircraft fuel. The environmental conditions make this project so special, as the airport has been built on an artificial island offshore Nagoya which was specifically made for that purpose only.
The kerosene is transported by oil tanker to an unloading terminal, provisionally stored in a tank farm and then pumped via miles of pipelines to the apron section. This is where the connections for the aircraft refuelling vehicles are located. The task consisted in setting up a suitable infrastructure for implementing the efficient, reliable and safe transport of the kerosene – from the delivery at the unloading terminal right through to the refuelling of the aircrafts. Apart from the valve actuators required to unload the vessels, store the kerosene in the tank farm, transport it to the apron section, and transfer to the fuelling vehicles, some of the actuators were set up to ensure the water supply required for fire-fighting in the unloading terminal area in case of an emergency. In addition, various sensor signals had to be evaluated within the tank farm area. They were to provide important data for efficient tank management.



Serial protocol

All actuator commands and actuator feedback signals as well as the sensor signals had to use a simple serial protocol for ▶



Two of three SIMA Master Stations.

transmission to the DCS. Different plant sections were to be controlled with different distributed control systems. Since increased availability of the DCS is required for a certain plant section, the DCS should be designed as redundant version. At the same time, the wiring between actuators and the control room should generally be realised as redundant fieldbus system.
These requirements, which may appear rather contradictory at first sight (simple protocol for the DCS and redundant fieldbus protocol for the field devices), can both be met when using a device for the conversion of protocols.
This device had to be equipped with various functions:

- master function for the fieldbus system,
- ensured fieldbus communication even in case of faults by focussed control of the redundant fieldbus communication to the actuators,
- protocol conversion between the fieldbus data of the actuators and the serial protocol to the DCS,
- support of the different DCS and the required DCS redundancy.

In addition to the DCS requirements, the actuators had to meet the following requirements:

- uniform actuator concept for all available valves having the most diverse torque ranges from 10 Nm to 8,000 Nm,
- explosion-proof specifications.

Finally the actuators, the infrastructure for the fieldbus communication and the protocol converter should be from a single manufacturer to be able to use an optimally matching system.
AUMA was selected as supplier: not only was this company able to provide actuators meeting the technical requirements such as redundant fieldbus connections in compliance with international standards, analogue sensor inputs and the required enclosure protections and approvals, but they were also able to provide the Master Station required for the protocol conversion. In addition, AUMA committed themselves to providing the pertaining fieldbus technology together with the necessary know-how.
The special project requirements on the system were specified and approved early on during the project. The modular and flexible design of the SIMA Master Station enabled a quick and efficient implementation of the requirements as well as on-schedule commissioning on site.
Whilst many passengers may not be aware how their aircraft are refuelled, AUMA is proud of its contribution to the highly efficient new international airport at Chubu. ■

Explosion proof multi-turn actuators have also been specified for the fire fighting system.

Explosion proof multi-turn actuators SAExC in the kerosene distribution system.