

# Low-pressure test rig with technical innovations

## A challenge in the Far East

Over the years Elster-Instromet has built up a good reputation for designing and manufacturing low-pressure test rigs. At the same time, it has been able to deliver to one or two "exotic" countries, but up until now, Thailand has remained unknown to us - at least in terms of gas meter test rigs.

In the summer of 2006, Elster received an enquiry from PTT Thailand, the authority responsible for gas metrology in Thailand, concerning the construction of a low-pressure gas test rig with the following key data:

- Measurable flow range: 0.5 to 6,500 m<sup>3</sup>/h
- Testing turbine and rotary gas meters
- Fully automatic control with process data archiving
- Automatic clamping devices for turbines and rotary meters
- Compact design
- Factory Acceptance Test carried out by the customer at the Elster factory in Mainz-Kastel, in the presence of the PTB (Physikalisch-Technische Bundesanstalt, Brunswick – German National Metrological Institute)
- Approval of the test system on site by the PTB

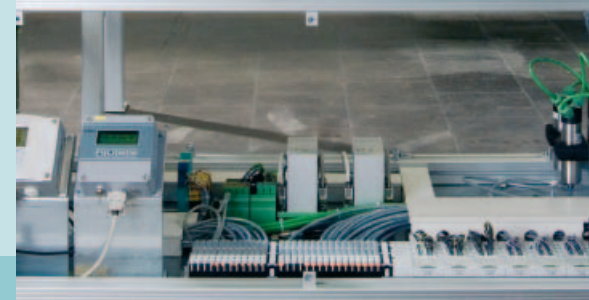
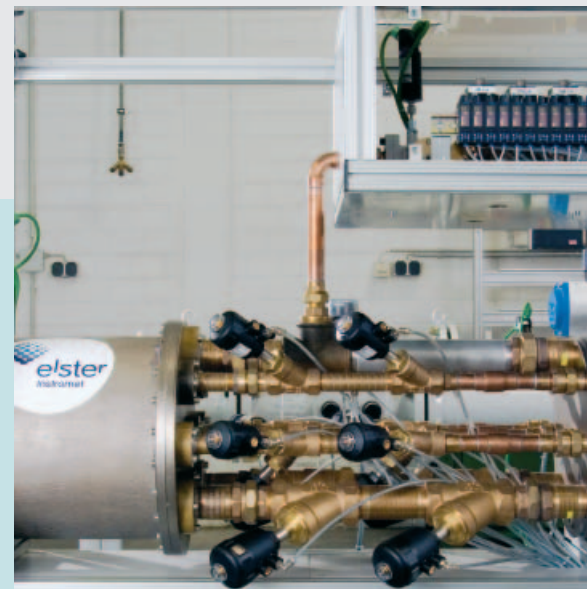
For this purpose, special technical innovations were used:

- Design of a special scaled nozzle system for the low flow range requested with compact external dimensions
- Use of novel vacuum pumps to generate the necessary negative pressures in the case of low load
- Use of specially staged pressure switches for determining the critical pressure ratios with sonic nozzles and for tightness control



Signal processing

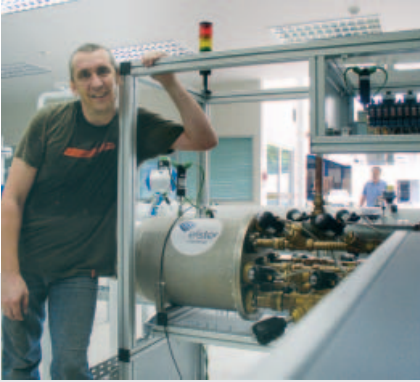
The test rig was designed to suit the customer's requirements.



Compact reference sonic nozzle measuring unit



Installation at the customer's premises



Exhausted: Relief after completing the commissioning

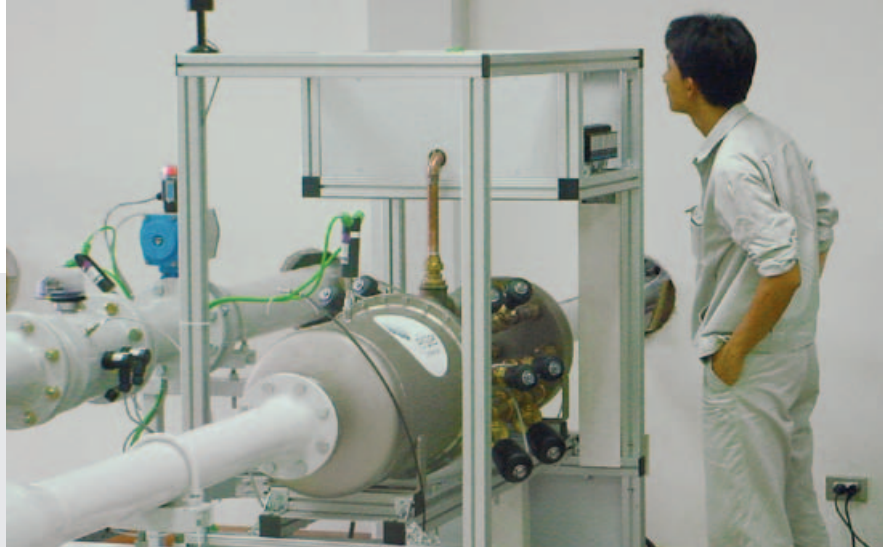
- Special clamping systems for turbines and rotary gas meters

The following meters were provided as reference meters:

- SM-RI turbine (G 4000 DN 300) with a measuring range between 650 and 6,500 m<sup>3</sup>/h
- TRZ 2 turbine (G 650 DN 150) with a measuring range between 100 and 1,000 m<sup>3</sup>/h
- Reference sonic nozzle measuring unit with 12 nozzles with a measuring range between 0.5 and 130 m<sup>3</sup>/h

Following the invitation to tender sent to well-known manufacturers, Elster was awarded the contract in January 2007 with a fixed delivery date of 3 August 2007. The large scope of the project, the many detailed requirements and the prescribed Factory Acceptance Test in May 2007 meant that this deadline was very tight. It was a real challenge but the Factory Acceptance Test was carried out on time at the end of May. Under the supervision of the PTB, the acceptance test for phase 1 of the test rig could be carried out together with the customer.

Dispatch from Mainz took place at the beginning of June, so that the delivery left Hamburg harbour three days later in a ten ton heavyweight overseas container and was scheduled to reach the port of Bangkok after five weeks at sea. Commissioning by 3 August 2007 shouldn't have been a problem but then... "in theory, theory works perfectly in practice; in practice,



Inspection by an expert commissioned by the customer

not so much!" Due to adverse conditions during the voyage, the container only reached the port of Bangkok on 19 July, in other words, two weeks later than expected. The task therefore was to streamline the plan for commissioning to the extreme, in order to meet the deadline. The flight to Bangkok was booked straightaway.

During the system's installation and commissioning, the temperature in the test room was a constant 30°C with air humidity of more than 65%, since there was no air conditioning system. However, the long sea voyage and the high humidity and temperature brought about a premature failure of some of the electronic components. So replacements had to be organised quickly on site. After the week-long commissioning under sometimes difficult conditions, the test rig was finished in time for the delivery date of 3 August.

Finally the test rig was inspected by the PTB. The total uncertainty of the test rig was confirmed as having an excellent value – lower than 0.25%. So all that hard work in these extreme temperatures finally paid off.



On-site temperature and humidity

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Jürgen Decker training employees in Thailand