

## The diagnostic tool – a solution much in demand for Elster-Instromet turbine gas meters:

# Prevention is better than cure!

We can look back on a successful year for the new diagnostic tool. Since the initial testing carried out in a laboratory environment, the diagnostic tool has evolved from an unwieldy prototype made up of many separate components to emerge as a compact, portable professional solution carried in a flight case. Representing a “fair and square” solution, it can be put into use at any time and any place. A year ago the analysis software included only a few algorithms, however now it contains more than 15 to guarantee sound and reliable diagnosis of the turbine gas meter and its operating conditions within the gas metering station.

The diagnostic tool uses innovative hardware and software to assess Elster-Instromet turbine gas meters. Optimal operational reliability is ensured by rapid and reliable analysis of the conditions at the installed meter. The following can give rise to incorrect readings, with these being identified and recorded as a precautionary measure:

- Installation effects such as pulsating flow
- Unstable flow
- Unbalanced turbine wheel
- Bent turbine wheel blades
- Mechanical bearing damage
- Measurement errors due to bearing friction
- Indicating error at  $Q_{min}$

This means that the data acquisition system is capable of measuring the high frequency pulse period times picked up from the turbine wheel blades under operating conditions at a very high resolution (80 MHz). The data saved is then analysed off-line by Elster-Instromet’s experts at Silvolde in the Netherlands.

All of these functions are guaranteed by the high frequency pulse generator on the turbine wheel. Ideally, the system should be subjected to a complete run through from  $Q_{min}$  to  $Q_{max}$ , to obtain a comprehensive picture of the meter during the measurement process, and to be able to detect different frequencies.

A live spin-down measurement from about 50%  $Q_{max}$  to full shut-down provides information about the working condition of the bearings and makes it possible to predict the indicating error at  $Q_{min}$ . The diagnostic tool requires a 220 V power supply to power the internal PC.

### Hardware

Initially, the diagnostic tool consisted of an EX-interface box and a desktop PC for data acquisition and a separate laptop for analysing the results.

### 1st generation

This system was very suitable for the laboratory situation, however the requirement for a portable configuration called for a more manageable solution and led to the development of the 2nd generation.



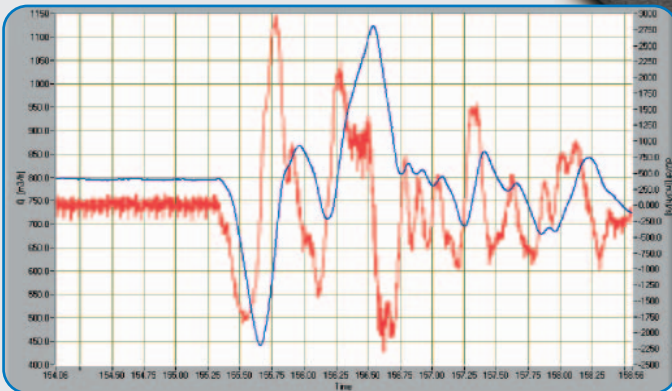
The 3rd and actual generation: full-size with a 30 m cable.

A footprint can clearly be identified on screen.

## 2nd generation

For this, a flight case was developed to hold the EX-interface box and an industrial PC with a 60 m connection cable. This made it possible to use it in large-scale gas installations in the field. For domestic use this system was completely adequate, but a more rugged configuration was necessary if it was to be transported for use abroad. So the 3rd generation was born.

In both its full-size and compact versions, the flight case to military specifications



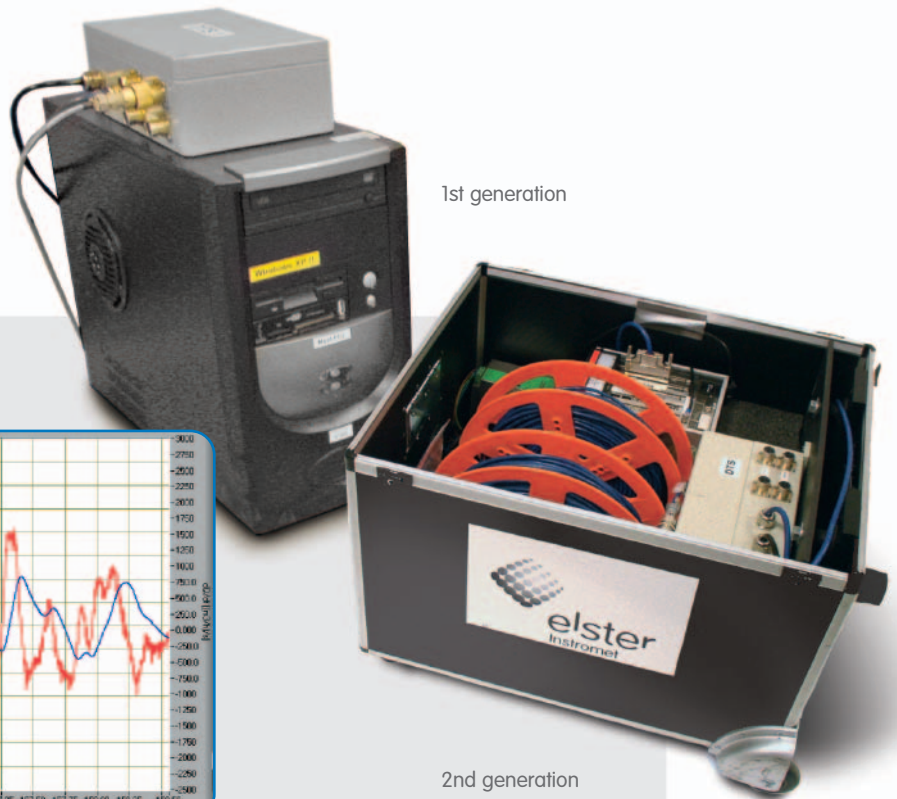
Acceleration or deceleration can be detected very accurately.

contains an EX-interface box and an industrial PC based on solid-state components, making the whole system extremely rugged (forces of up to 10 G can be withstood). Two channels can be connected simultaneously. This means that the turbine gas meters can be located at a distance of up to 30 m from the diagnostic tool.

We also offer an even more compact version with a 15 m connection cable. These variants cater for every requirement, providing great flexibility for the customer. In the meantime, the service provided with the diagnostic tool has come to be greatly appreciated. Operating conditions provide the main reason for the use of our diagnostic tool as a supporting measure. The causes of incorrect measurements have been, for example, incorrect parameter settings for the flow computer, an incorrectly set regulator and damage caused by the installation being contaminated.

### Validation testing by NMI

The diagnostic tool was validated by NMI on a certified test rig. In this process, an ultrasonic gas meter and a turbine gas meter were connected in series with the



diagnostic tool and operated under different flow patterns. It emerged that the Elster analysis software could calculate the flow patterns on the basis of the test data from the diagnostic tool with the same response time and accuracy as the ultrasonic gas meter.

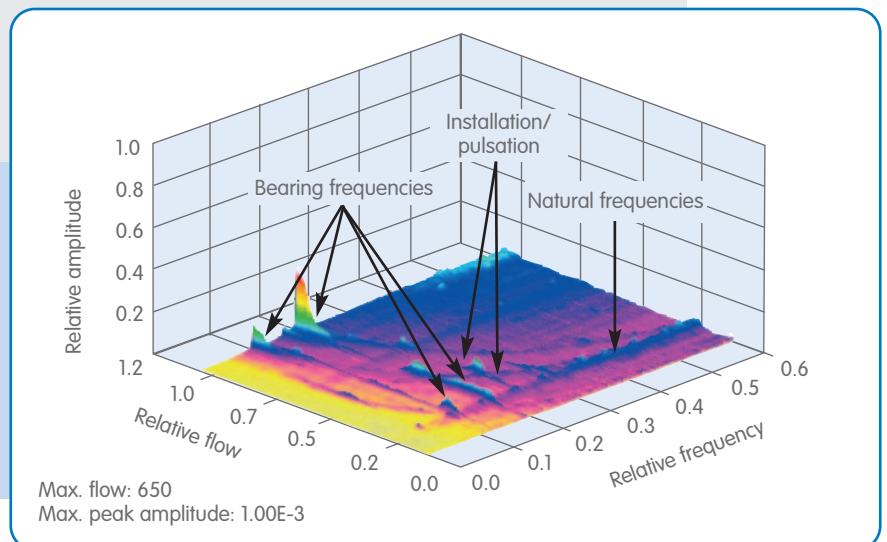
### Conclusion

Thanks to the existing diagnostic functions provided by ultrasonic gas meters and the new facility of equipping turbine gas

meters with the diagnostic tool, the tandem configuration combining the two measuring methods now offers even more advantages. The two diagnostic functions make it possible for energy suppliers to monitor the working condition of their measuring equipment and therefore safeguard the quality of the installation. What more can the gas professional ask for?

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Different frequencies can be clearly identified.