Honeywell | Connected Industrial

TurbinScope®

Condition Monitoring and Diagnostics for Turbine Gas Meters

What are the benefits of using diagnostics on turbine meters?

Performance of any rotating equipment is highly dependent on the health of bearings that make drive shafts and other parts move smoothly with limited friction. As an example bearings in every car ensure that power from the drive train is transferred with high efficiency to the wheels that bring power to the road. In case of damaged bearings power is lost and fuel economy goes down which must be prevented. For that reason vehicles undergo a thorough inspection every other year. The principle for turbine gas meters is similar, bearings must be in a perfect state to maintain high levels of accuracy and increase the asset lifetime.

TurbinScope® is a high-tech industrial offering that let's gas transmission, distribution companies and large industrial gas consumers do online, in the field inspections of their turbine gas meters and get an indication of the health and performance of the meter. This can either lead to the realization that the instrument needs to be installed differently, be repaired or in the best case scenario gives peace of mind that everything is in order.

TurbinScope® - how is it unique?

Meanwhile Online Diagnostics are seen as a standard for Ultrasonic Gas Meters and users benefit from the advantages including reduction in maintenance time, preventive service and extended calibration times. TurbinScope brings these advantages to turbine gas meters and gives users confidence in the meter readings. This is important as the installed base of turbine meters is exponentially higher than that of ultrasonic flow meters. TurbinScope is the only offering available on the market that offers diagnostics for turbine gas meters and it can be used for Honeywell Elster® turbine meters and third party meters equipped with an HF sensor at the rotor.

How does TurbinScope® work?

The TurbinScope® hardware is connected to the high frequency output of a turbine meter which detects the revolutions of the turbine rotor at a very high resolution. TurbinScope® registers the data over a certain period of time which is the basis for detailed analysis. Making sense of the data is key to understanding the health of the meter. As part of the TurbinScope offering Honeywell provides detailed analysis and reports in written and graphical form so you do not have to been an expert to get the benefits of TurbinScope. The hardware is connected by Honeywell or customer service engineers. The data is displayed locally on a laptop or remotely through the internet to reduce the overall time of the analysis.

FEATURES & BENEFITS

- Health monitoring of Turbine Gas Meters
- Preventive Maintenance
- Detection of:
  - Wear and tear to meter
  - Bearing and rotor defects
  - Measurement errors
  - Installation effects
- No additional hardware cost
- Available for all turbine meters with HF-output
- Connection of up to 2 meters in parallel
- Diagnostics during operation
- Leverage decades of experience at low cost
- Root cause analysis for damaged meters

Product Details

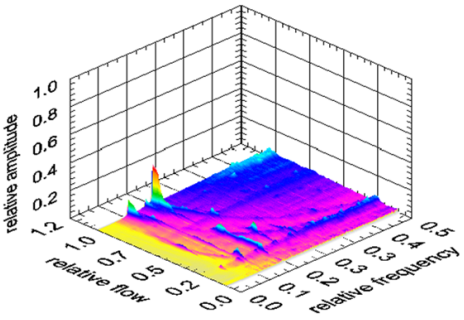
TurbinScope is made up of 4 modules:

Footprint: gives an indication of the rotor condition, e.g. damaged rotor blades are detected

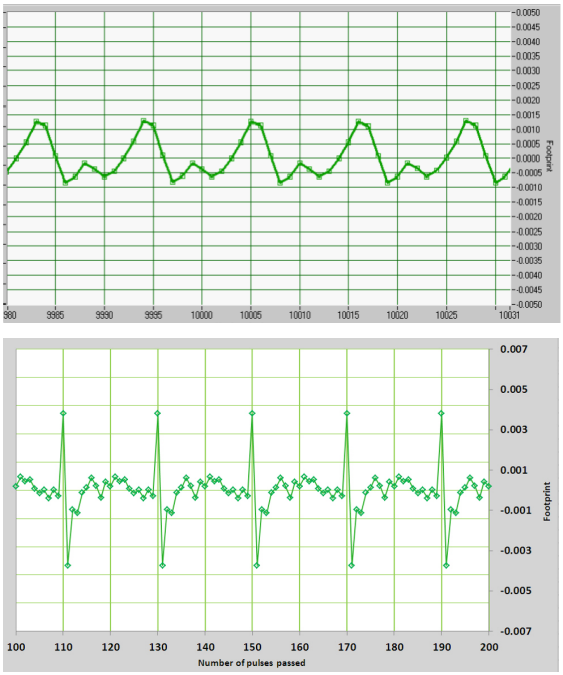
Spin Down: mechanical friction is calculated which gives an indication of the accuracy at Q_{min}

Real Flow:calculates the difference between actual flow and the flow registered by the meter

3D FTT: detects bearing damages before their impact can be seen in the error curve



3D FTT analysis showing bearing frequencies



Footprint analysis of undamaged (top) vs. damaged (bottom) rotor

Some real life examples

Problem not visible at first sight

A meter was dropped during transport to site, although external damage was minimal the customer decided to take it back to a calibration lab for recalibration. The calibration curve before and after the incident didn't show any deviations. TurbinScope analysis on the other hand clearly showed that the rotor and bearings were damaged which would have led to misreading and possibly complete meter failure in the future. Without the TurbinScope analysis this issue would have gone undetected.

Misreading due to wrong installation

A glass manufacturing site was experiencing a deviation of up to 0.3% between the gas consumption of one furnace compared to the others in its factory although in theory they should have been the same. Health indicators of the meter proved that bearings and the rotor were in good condition. But the Real Flow analysis showed that for this particular meter the flow changes were faster, causing lag in the turbine meter rotor. The flow changes were caused by an incorrectly set pressure regulator. After overhauling the regulator the deviation between the meters went away.

Meter failure due to wrong start-up procedure

A turbine meter failed shortly after initial commissioning although all standard flow parameters didn't give any indication of incorrect usage. During repair of the meter critical bearing damage was determined to be the reason for the meter failure. To better understand where this issue occurred TurbinScope was connected during start-up of the meter following the repair. The data showed that very fast but short flow changes occurred that could not be detected without TurbinScope. During these short times the rotor and bearings were exposed to extreme forces exceeding the maximum parameters by a factor of four. Changing the start-up procedure helped to not only save this meter but also multiple meters in the future.

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