PERFORMANCE TESTING FOR GAS TURBOCOMPRESSORS

What is Performance Testing?

When you acquire a compression unit, the manufacturer generally supplies an operating map for the unit, showing what the efficiency and gas power should be at various operating conditions.

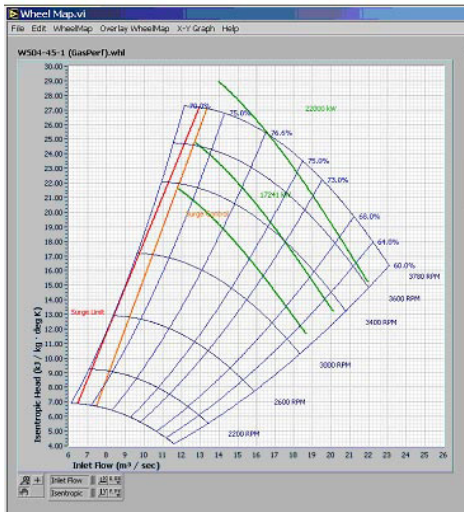
What you don't get, is a clear picture of how the unit actually behaves in your own pipeline environment.

Andromeda's Performance Testing software gives you the tools to accurately measure the current performance of each of your units, and each of the stages in multi-stage units.

You can build operating (wheel) maps, measure the onset of surge, and predict seasonal operating characteristics.

We also give you tools to measure anti-surge valve performance.

It's common to use calibrated pressure and temperature transducers for Performance Testing, along with a portable data acquisition system. This will often give better accuracy than the station instrumentation. However, you can use either dedicated instrumentation, or the station instrumentation. Either way, remote operation is generally possible (but not recommended for surge testing!).



Performance Testing Benefits

Performance Testing has both financial and operational benefits, including:

- Reducing fuel costs, by operating compression units at their peak efficiency
- Maximizing capacity at every unit
- Predictable system operation
- Effective capacity planning
- Measuring anti-surge (recycle) valve performance
- Diagnosing system problems

Fuel Efficiency

By knowing the actual characteristics of compression units, rather than just the manufacturer's claims, it's possible to predict exactly where the units will operate at given flow conditions. By incorporating "as installed" wheel maps into a model of the pipeline, your Gas Controllers can choose to operate the combinations of units which will give the highest fuel efficiency.

Fuel costs

In a typical natural gas pipeline, the percentage of gas transported which is used as fuel gas is around 2%. On a major pipeline, improving the efficiency by a few percentages points (of that 2%) translates into multi-million dollar fuel savings.

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(see over...)

Capacity planning

Predict how much capacity will be available during different seasons. Predict how much capacity will be available under different operating conditions.

Predictability

Like most pipelines, your organization probably follows a predictive maintenance program. In determining when and were to perform preventative maintenance, it's helpful to know where the unit is actually running at any given flow and head.

Diagnosis

Do units make their rated power? The folks in one of our client companies suspected that some units weren't making their rated power, and using our system, were able to prove that they weren't.

Find recycle leaks, which increase fuel consumption.

Undetected loss of capacity could translate into:

- not being able to meet nominations
- not getting the power you paid for

It's helpful to compare characteristics over time, to see if something has happened to affect unit efficiency (eg: line blockages). Here's an area in which routine Performance Testing, along with our software, can help your pipeline to meet it's goals.

Doesn't our SCADA system do this?

The better SCADA systems do give you part of the story. In most cases though, not enough pressure & temperature information is transmitted to the SCADA system to be able to accurately measure performance, or to build accurate operating maps.

The best results are obtained with calibrated instrumentation, and on-site testing.

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Getting Started with Performance Testing

Performance Testing has some immediate benefits, but you'll get the most value from an ongoing Performance Testing program. So we encourage you to look at it as an ongoing process. In order to obtain the most benefit, you'll want to integrate the process with Gas Operations, and with system capacity planning.

People	Think about whether you want to create a knowledge center in your own company, or whether it's better for you to bring in the necessary expertise as needed.
Hardware	If you don't already have a data acquisition system, we recommend National Instruments PXI hardware. If you already have a data acquisition system for Performance Testing, we can generally create drivers for your current-generation hardware
Transducers	You will need to accurately measure temperatures, pressures, and differential pressures at a number of places in your system. It's common to use a combination of dedicated testing transducers, and the station instrumentation. We directly support most measurement devices.
Software	Our primary product for Performance Testing is our software. We use the latest AGA-10 Equations of State to predict performance over the entire range of your compression units. Check out our User's Guide for details on: • Setting up tests • Importing data values • Operational Testing • Generating Operating Maps • Determining compressor surge limits • Measuring compressor efficiency • Measuring anti-surge valve performance • Re-calculating test results with updated data, such as a new gas analysis

National Instruments and Andromeda

Our Performance Testing system was developed with National Instruments technology.

We've been using LabVIEW since 1988, when LabVIEW 2.0 was still in beta testing. Since then, we've used LabVIEW to develop applications for data acquisition and data visualization in fields ranging from:

- Magnetic bearing control
- Electronic Flow Measurement validation
- Performance testing
- Software for Musicians
- Torsional vibration analysis
- Commodity trading & risk analysis
- Airborne LIDAR and camera control

We recommend National Instruments PXI hardware for performance testing.