

# CRACKED GAS COMPRESSORS

## **Application Solutions Guide**

#### THE CHALLENGE

An ethylene plant's most critical pieces of equipment are its cracked gas compressor and turbine. If the compressor or turbine trips, whether due to excess vibration, malfunctioning instruments or surge, it can bring the entire operation to a halt for up to five working days. Since this valuable turbomachinery doesn't have a backup, it must run reliably for two to seven years so operators can efficiently and safely maximize production to meet market demands.

### The path to improved cracked gas compressor performance.

Emerson's PlantWeb® digital architecture and related technologies help you know what's happening at every level of your operation – so you can keep your compressor and turbine up and running at their best.

The predictive capabilities of our smart digital instruments and asset management software can alert you to potential problems while there's still time to take corrective action.

Our Machinery Health Management technologies provide both continuous online monitoring and API 670-compliant protection of compressors, turbines, and other rotating equipment.

And our valves and instruments are engineered to provide accurate, reliable measurement and control in demanding conditions like yours. Combined with our DeltaV automation system, they enable you to run close to the surge line – consistently, safely, and reliably.

Performance Challenges	Business Consequence	Improvement Opportunities
Compressor Train Availability impacted by:  • Mechanical and instrument failure  • Surge  • Unreliable mechanical overspeed protection	Reduced Unit Availability	Prevent shutdowns by leveraging accurate process and machinery health data, reliable antisurge devices, and online electronic overspeed protection.
<ul> <li>Machinery Health impacted by:</li> <li>Fouling</li> <li>Surge</li> <li>Seal or impeller failure, excess vibration, shaft cracks, and misalignment and imbalance issues</li> <li>Poor operator visibility to asset health</li> <li>Inability to hold control setpoint</li> </ul>	Increased Maintenance Costs	Minimize maintenance, avoid compressor trips, and extend asset life with devices that alert operators to problems before they occur.
<ul> <li>Optimized Production impacted by:</li> <li>Instrument drift</li> <li>Underperforming antisurge valve</li> <li>Turbine control instability</li> <li>Complex manual startup procedures</li> </ul>	Reduced Production	Maximize your plant's performance efficiently and safely with reliable process data that pinpoints your actual operating zone.
Energy Management impacted by:  • Instrument drift  • Fouling  • High gas recycle rates	Increased Energy Costs	Reduce energy waste and optimize antisurge valve use by leveraging reliable, real-time intelligence about asset health and your process.
<ul><li>Flaring impacted by:</li><li>Underperforming antisurge valve</li><li>Unexpected compressor failure</li></ul>	Increased Environmental Costs	Avoid environmental releases and enable orderly shutdowns with fast, accurate antisurge valves and predictive diagnostics.

Chemical Application Solutions Guides are available on the following applications:

Furnace Cracked Gas Compressors Recovery Section



## **SERVICES & SUPPORT**

Emerson's global service and support network of experts can help keep your cracked gas compressor and turbine running at peak performance.

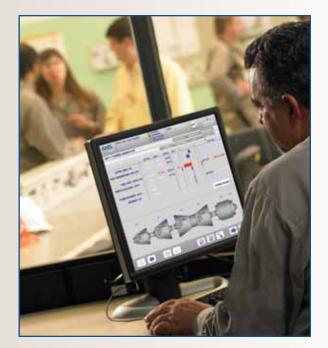
Our skilled technicians can lead or assist with installation, tuning, and commissioning of antisurge valves, as well as perform in-service inspections and report on performance.

With Machinery Health Monitoring, we can ensure that critical alarm tuning, backup, and maintenance services are performed regularly. Our field engineering experts will help implement changes or assist during outages or normal operations, or even help you prepare for planned outages. And our experts can perform accumulated maintenance tasks on your Machinery Health Monitoring system without diverting essential staff from other important tasks.

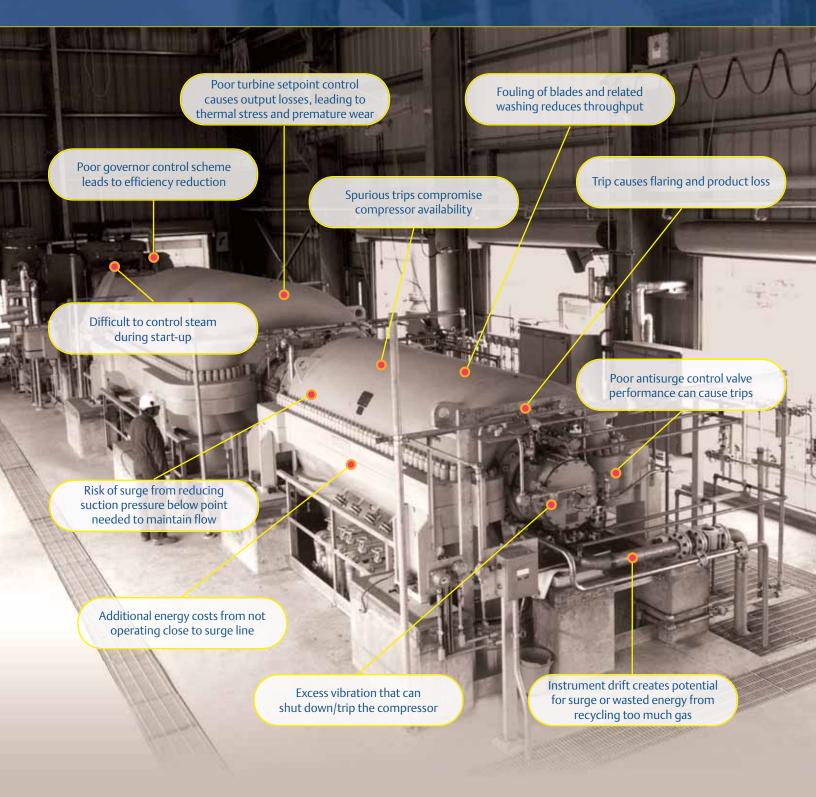
During each site visit, our engineers will resolve any pre-identified issues, update/back-up software, inspect the integrity of network communications, perform file clean-up, inspect the integrity of sensors and signals, and perform other necessary maintenance tasks.

For users of AMS Performance Advisor, an experienced engineer can be scheduled for periodic tuning of the software to accommodate seasonal or operational variations in optimization requirements.

Around the corner or around the globe, we're there to help you make the most of your automation investment.



## **CRACKED GAS COMPRESSOR CHALLENGES**



You can achieve an optimally controlled and more reliable cracked gas compressor train.

Emerson Process Management has the technology and expertise to make it happen.

## **PLANTWEB IN ACTION**



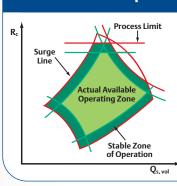
### Predictive Intelligence and the Power to Use It

Emerson's PlantWeb digital Smart Cracked Gas Compressor architecture enables you to harness the power of predictive intelligence to operate more efficiently, safely, and effectively.

With PlantWeb you gain unmatched capabilities to improve profitability through reduced cost and improved output.



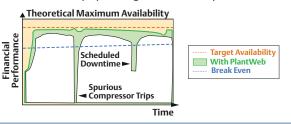
### **Improved Control**

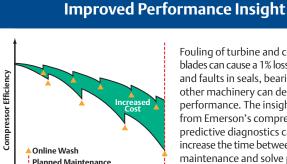


Operate confidently close to your compressor's surge line with real-time process and asset data delivered through Emerson's smart field devices. Reliable information enables you to tighten control over your operations to safely increase throughput and maximize efficiency.

### **Improved Availability**

Vibration analysis, checks on instrument drift, reliable antisurge technology, and other Emerson diagnostics help you increase up-time by avoiding spurious trips. In the event of a trip, quick diagnosis ensures a quick restart.





Time in Months

Fouling of turbine and compressor blades can cause a 1% loss in efficiency, and faults in seals, bearings, and other machinery can degrade performance. The insights gained from Emerson's comprehensive predictive diagnostics can help you increase the time between scheduled maintenance and solve problems before they occur.

## **Protection, Control, and Asset Optimization**



Smart digital control and asset management systems power PlantWeb by enabling operations and maintenance staff to optimize production and availability as well as run their plants safely.

Fed by rich and reliable process information from intelligent field devices, you are empowered to raise performance, improving overall yield and profitability.

At the same time, asset health diagnostics give you clear direction on which assets – including automation, electrical, process and rotating equipment – are in most need of attention, and how to avoid operational interrupts.

#### **SMART DIGITAL CONTROL**

DeltaV's embedded advanced process control tools:

- Allow for high speed, redundant control of key variables such as suction pressure which impacts plant yield and energy efficiency.
- Safely adjust setpoints to maintain the process within all constraints with model predictive control.
- Utilize DeltaV Insight to continuously monitor loop variability, identify underperforming control valves, and perform online, adaptive tuning of key loops.
- Achieve fast and accurate PID governor control with SmartProcess® Turbine.



#### **SMART ASSET OPTIMIZATION**

Monitor equipment condition and performance so you can optimize operations and identify potential problems before they grow.

- Avoid excess energy usage by using AMS® Performance Advisor to check compressor blade fouling and compare actual to expected efficiency.
- Predict mechanical degradation and avoid unplanned shutdown using AMS Machinery Manager diagnostics and analysis.
- Anticipate antisurge valve problems with online diagnostics in AMS ValveLink® SNAP-ON™.



www.EmersonProcess.com/Optimize

**Health Diagnostics** 

## Field Intelligence

What makes PlantWeb better?

• It's networked, not centralized.

optimized operations.

other systems.

With the right intelligence, your field assets not only provide more precise and reliable information on the process, but they also self-diagnose their health and alert you to potential problems.

• It's the only digital architecture with proven success in thousands of projects.

• Predictive intelligence enables detection and avoidance of potential problems.

• It's engineered to seamlessly gather and manage information to enable highly

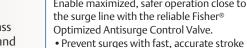
• It provides process control, plus asset optimization and integration with

• It uses open standards at every level of the architecture.



Devices, instruments, and software designed with best-in-class intelligence power PlantWeb by enabling you to extract rich and reliable data from your process to optimize control.

### Enable maximized, safer operation close to



vww.EasyDeltaV.com

- response and online tuning.
- Protect valve and actuator components with an air-cushioned actuator that tightly controls deceleration.
- Reduce vibration and cut noise up to 40 dBA with multipath, multistage WhisperFlo® valve trim.
- Ensure continued safe performance with online partial-stroke testing and diagnostics using the FIELDVUE® digital valve controller and AMS ValveLink software.

**SMART FINAL CONTROL** 

 Achieve remote commissioning in minutes with AMS ValveLink software – and half the usual actuation accessories.

> Featured Technologies: Fisher Digital Valves

## **SMART MACHINERY HEALTH**



**Process Variables** 



With CSI 6500 Machinery Health® Monitor:

- Provide API 670-compliant protection against vibrationrelated trips and failures.
- Predict problems like shaft misalignment and coupling failure using FFT Spectral Analysis.

#### Using AMS Device Manager:

- Detect instrument drift before it causes a compressor trip.
- Poll selected devices and highlight potential problems with Alert Monitor so maintenance staff can quickly take corrective action.

Featured Technologies: CSI Monitoring Technology and AMS Suite

www.mhm.assetweb.com

### **SMART MEASUREMENT**





- Enable precise surge line proximity calculation by accurately and reliably measuring discharge pressure with the Rosemount 3051S Pressure Transmitter.
- Gain rapid insight into surge line proximity using the 22 hertz pressure measurement and standard deviation calculations of the 3051S with Statistical Process Monitoring.
- Enhance control with differential pressure calculation and correction built into the Rosemount 3051SMV integrated flowmeter with conditioning orifice plate.
- Detect instrument drift in time to prevent a compressor trip with the 3144 temperature transmitter's hot backup and onboard diagnostics.

Featured Technologies: Rosemount® Pressure and Temperature Transmitters



- Enable wireless measurements easily and cost-effectively for remote or highly obstructed areas.
- Gain better visibility to the process through the addition of wireless monitoring points for vibration or temperature monitoring.
- Access rich diagnostic data available within existing HART devices wirelessly with the Smart Wireless THUM adapter.

Featured Technologies: Emerson's Smart Wireless Solutions

www.EmersonProcess.com/SmartWireless

www.EmersonProcess.com www.EmersonProcess.com/Fisher

www.FmersonProcess.com/Rosemount

With over 600 major sales, project execution, and support locations in more than 85 countries, we are here for you.

Please contact your local Emerson Process Management sales office or representative, or visit our website at www.EmersonProcess.com

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