



# OptiComp\* BN

## *An integrated turbine and compressor control solution with vibration monitoring*

### Overview

OptiComp BN is an enhanced option to GE's existing OptiComp compressor control software suite. It combines OptiComp features with Bently Nevada\* (BN) vibration monitoring for improved surge prevention and detection. OptiComp BN integrates axial and radial vibration characteristics into GE's surge protection strategy.

Drawing on 25+ years of accumulated domain knowledge in vibration monitoring and compressor controls, GE offers a solution for detecting compressor rotating stall and other areas of instability. We do this by using a fully integrated solution that combines mechanical characteristics as measured by a Bently Nevada 3500 condition monitoring solution (CMS) with the OptiComp compressor control system—to alert operators of impending surge—enabling them to move the compressor operating point to a safer region of the compressor performance map.



### A Different Approach

Current surge control and detection methods rely solely on process measurements. Problems associated with this technique include:

- Compressor must be surged for accurate field mapping of surge points
- Compressor surge detected *after* full surge event
- Operator cannot detect surge precursor (stall)
- Compressor Control can give false indication and response to surge event
- Compressor Control cannot be analyzed for severity of internal damage

OptiComp BN provides a means of detecting incipient surge using radial vibration measurements automatically where no such method existed before. By applying this method, OptiComp BN may provide substantial benefits in correctly identifying Surge Line Limit (SLL) and Surge Control Line (SCL) during commissioning. It increases the operating envelope of the unit by enhancing turbomachinery protection.

### Benefits

- More reliable surge detection using mechanical and process monitoring to avoid unnecessary process interruption
- Reduced risk of surging compressor and process shutdown through rotating stall detection and early operator alarms that include real-time manual or automatic response
- No need to cause compressor surge to establish field mapping of surge points leading to a lower risk of compressor damage during commissioning
- Determine potential mechanical damage resulting from compressor surge risk in continued operation

## OptiComp BN Mechanical Enhancements

OptiComp BN uses two mechanical indications to enhance compressor control, Radial Vibration Measurements and Axial Displacement. The process measurements are readily available in most compressor installations meaning no additional instrumentation is required.

In Radial Vibration Measurements, vibration frequency is filtered to detect onset of rotating stall (incipient surge) which typically precedes a full surge. Some compressors show a clear signature that the compressor is operating close to its operating envelope. Site testing is required to determine if the compressor of interest manifests the stall signature. In addition, operating a compressor in a stall condition for long periods can fatigue compressor internals, thus detecting the mechanical effects of stall adds confidence to the operator about the condition of the machine.

Axial displacement is a reliable indication of the compressor surging. Using this measurement makes it more possible to gauge the severity of the surge. Ideally, the compressor is tested with its full downstream process volume as the downstream volume in operation is often quite larger than the downstream volume while in full recycle.

The use of axial and radial vibration to identify surge also enhances the ability to differentiate between surge and process disturbances or signal failures. This added feature allows the anti-surge system to prevent continuous surging and subsequent machine damage in case of failures in the overall compression system, incorrect SLL settings, or compressor performance degradation

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