

# Monitor Protects Rotating Machinery

## Vibration, Axial Position, Temperature and Speed Checked on Raw Gas Compressor

Rohm and Haas Texas Inc., in Deer Park, Texas, is a specialty chemicals plant that processes base materials for acrylics and other industry feedstocks. Compressed acetylene raw gas is essential to the production of primary feedstock. A key piece of equipment in the operation is a two-case acetylene compressor driven by a 4 500 hp, 1 790 r/min motor through a double helical speed-increasing gearbox.

### Stand-alone protection

To ensure optimum operation of the compressor, engineers purchased a rotating machinery monitoring system. The SKF M800A programmable system monitors radial vibration, axial position (thrust), temperature and speed. It offers stand-alone machinery protection that is simple to use, is easily expandable and can be integrated directly into plant-wide control or monitoring systems. At Rohm and Haas Texas, the monitor interfaces simultaneously with a Honeywell TDC 3,000 using Modbus protocol with a machinery analysis software-based console.

The system at Rohm and Haas Texas provides continuous on-line monitoring and protection as defined by API 670. The five API-specified relays are: pre-shutdown alert for the auxiliary bus, pre-shutdown alert for the main bus, shutdown for the auxiliary bus, shutdown for the main bus and circuit fault relay. These relays are programmable to be either latching or non-latching. Jumpers set normal operating state to energized or de-energized.

The machine monitoring system consists of a keypad and information display, four channel monitoring modules, system control module and power supply. All are mounted in a 19-inch housing that fits standard instrument racks.



*Fig. 1. The SKF M800A programmable machinery monitoring system monitors radial vibration, axial position, temperature and speed on an acetylene screw compressor driven by a 4 500 hp motor.*



## Monitoring modules

The programmable monitoring modules are stand-alone units. Each has its own microprocessor with non-volatile memory, DC proportional outputs and relay trip signals. Monitoring parameters are permanently stored in memory regardless of power failure or monitoring card removal. Each module transmits its measured parameters and channel status to accessory systems in three ways:

- Analog output proportional to detected levels; 0 to 10 V DC or 4 to 20 mA can be selected
- Digital values to the SCI bus for use by the controller for display or data transmission or other processors
- Relay actuation signals provided by each channel to reduce separate alert and danger relays when programmed setpoints are exceeded

On-line programmability avoids disabling any channels and loss of protection while changes are being made. Monitoring parameters can be set with the system on-line. The programming can be accomplished locally through a handheld programmer or remotely from a computer. Several four-channel modules are available for use with the machine monitoring system, including:

- A vibration module that accepts inputs from any conventional vibration transducer offers four channels of vibration monitoring
- An axial position (thrust) module accepts signals from up to four non-contracting eddy probes or other position transducers
- A temperature module that can be configured for either thermocouple or RTD inputs

Each channel has its own individual status light to indicate the monitored function's condition:

- Green for OK
- Yellow for alert
- Red for danger

The 18 dedicated function keys allow the operator to easily perform the monitoring and display functions. Operational status of the rotating machinery can be displayed on a two-line, 20-character-per-line, high-intensity display with scroll features. When a channel alarm occurs, the unit automatically displays the affected channel's current value, channel number, channel mnemonic and alarm/relay status.

The plant is using 65 channels to monitor compressor, bearing and motor winding temperatures, gearbox shaft and compressor rotor axial position and machine vibration at all bearing locations.

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PUB CM1005 EN · February 2012

