GE Energy

Application Overview

Delayed Coker Monitoring

Introduction

GE's Bently Nevada Delayed Coker Monitoring package provides customers with a selection of hardware and typical installation service options to instrument one delayed coke drum. Themonitoring packages provide operators with real-time status updating of the drum cleaning process. This can reduce cleaning cycle time, thus providing energy savings and a dramatic reduction in the operator's exposure time to the environment surrounding a coke drum.

Process overview

Petroleum coke is a by-product of the oil refining process. The most widely used process is delayed coking, which uses heavy residual oil as feedstock. During this process the residual feedstock is superheated and then moved into an insulated and vertically mounted pressure container known as a coke drum. After the vapors from the residual crude material are extracted and further refined into various petroleum byproducts, a high-density hydrocarbon material known as petroleum coke is left behind in the drum. A cutting process is then used to remove the coke from the drum for use in additional carbon-based byproducts.

Due to the extreme heat and pressures introduced during the process, delayed coking units require more maintenance than other process units in a refinery. By increasing the availability of this unit, customers can improve the long-term profitability of a refinery. A key element of increasing plant profits and reducing EHS impacts is to ensure that these coke-cutting assets operate as efficiently as possible.

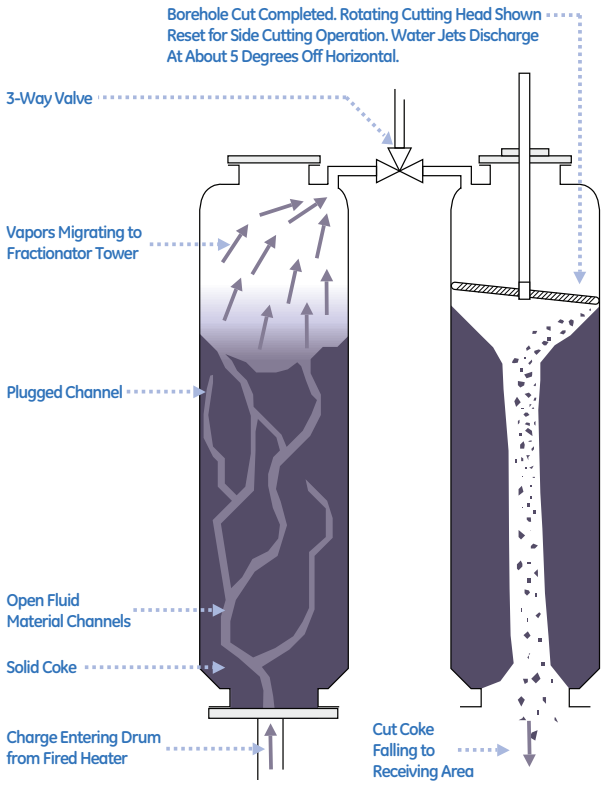
Current decoking methods and some of their deficiencies

Many customers rely on the individual experience of their cutting operators who often use unconfirmed sensory methods (such as sight, touch, and sound). This method is prone to inconsistent cutting and can result in inefficient practices, such as:

- Inconsistent drill effectiveness in coke-cutting operation
- Excessive energy used due to unnecessary cutting operations

These issues are addressed by our Delayed Coker Monitoring solution.

Delayed Coker Monitoring Process



Delayed Coker Monitoring

The GE Solution

To enable the cutting operator to accurately and easily determine if the coke has been cut from the walls of the vessel, GE's Delayed Coker Monitoring package provides you with a Bently Nevada 1900/65A monitoring system, or extends your existing Bently Nevada 3500 rack system—whichever best meets the needs of your plant. Both of these options include our high-temperature accelerometers to ensure robust performance. Some key benefits of this GE Solution include:

- Standard hardware used without costly modifications
- Simple, fast installation
- Scalable solution

How we monitor

Our Delayed Coker Monitoring package incorporates stud-mounted accelerometers (seismic transducers) that are designed to operate accurately and reliably in high temperature environments. These accelerometers are permanently installed with brackets on either the outside wall of the drum or on both the top and bottom drum flange necks. During coke cutting operation, this allows the coke drill operator to monitor the overall vibration amplitude to determine the coke cutting effectiveness and verify when the cutting process is complete in that area of the drum.

Value of monitoring coke cutting

- **Reduce cost.** Save energy by reducing unnecessary cutting operations due to higher predictability of cutting completion.
- **Minimize downtime.** Reduce wear and unnecessary usage of assets in the coker unit.
- **Increase productivity of cutting operations.** Achieve consistent procedural quality in the coke-cutting process with repeatable results across multiple shifts and operators.
- **Reduce exposure to the coke drum hazardous environment.** More certainty of cutting operations completion reduces operator inclinations to exit the protective cab with the potential exposures to hot steam, H_2S gas and high decibel noise.

Required Condition Monitoring Equipment for Coke Drums

Solution 1 – 1900/65A General Purpose Machinery Monitor

Description	Part No.	Qty	Remarks/qualifier
General Purpose Machinery Vibration and Temperature Monitor	1900/65A-01-04-03-01-01	1	Per coker drum: • 110-220 Vac power • Display with 10-foot extension cable • NEMA 4X/IP 68 housing with window and door, with Haz Area approvals • Modbus/TCP and 100BaseT/100BaseTx Ethernet connections
High Temperature Velocity and Accelerometer Sensor	350900-A394	2	394-inch length cable
Field Interconnect Cable	350901-A040	2	40-foot length
Water-Resistant Housing	72381-00-02-02	2	No mounting hardware in the housing.

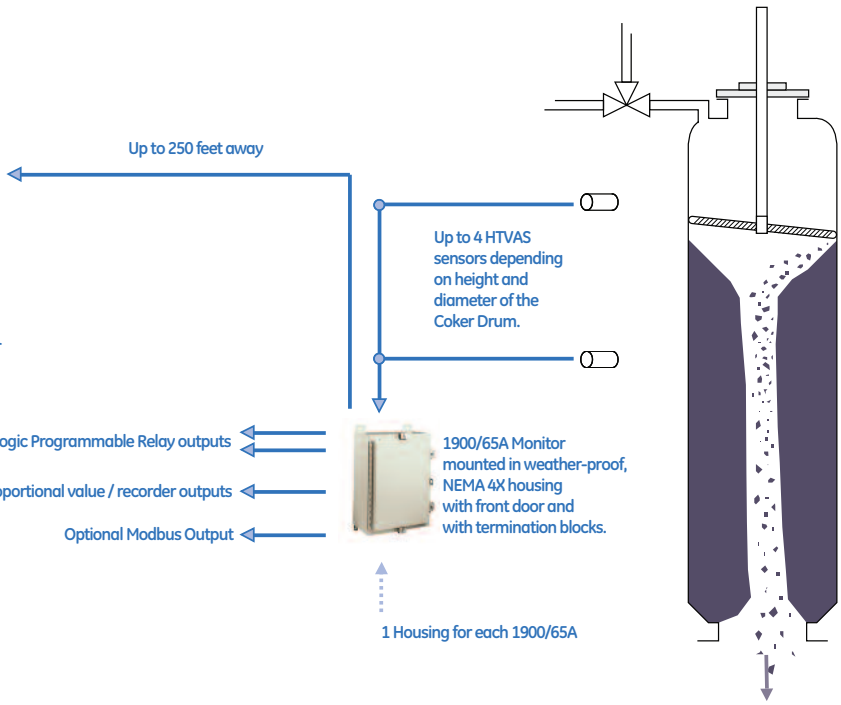
Solution 2 – 3500/42 Card Added to an Existing 3500 Rack

Description	Part No.	Qty	Remarks/qualifier
3500 Prox/Velomitor Vibration Monitor	3500/42-09–01: • AA option 10 for ext. term. • B Option 02 for CSA/ATEX approvals	1	4-channel card to be added to an existing rack
High Temperature Velocity and Accelerometer Sensor	350900-A394	2	394-inch length cable
Field Interconnect Cable	350901-A040	2	40-foot length
Water-Resistant Housing	72381-00-02-02	2	No mounting hardware in the housing. 1 per sensor

Solution 1

1900/65A Monitor

1900/65A Display for Operator mounted in weather-proof, NEMA 4X housing with front door



Solution 2

3500 Card Added to Existing Rack

3500/93 for single 3500 rack
or 3500/94 display for single/multiple 3500 racks.
Optionally use 3rd party modbus display from 3500.

*Requires power supply.

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Application Overview

Hardware

Solution 1: 1900/65A Monitor

- 1900/65A General Purpose Equipment Monitor (Qty 1)
- 350900 Accelerometer and stud-mounting base (Qty 2)
- 350901 Armored Interconnect Cable w/rubber splash-proof boot (Qty 1)

Solution 2: Extend existing 3500 rack system

- 350900 Accelerometer and stud-mounting base (Qty 2)
- 3500/42 M monitor card. 1 needed for every 4 sensors
- 350901 Armored Interconnect Cable w/rubber splash-proof boot (Qty 1)

Services

GE Energy delivers its trusted Bently Nevada technical expertise with services and/or technical support as required for each installation.We recommend that typically two days of on-site support services is required depending on site conditions to provide:

- Installation of HTVAS transducers
- System configuration
- System checkout
- Loop checks
- A cycle run-through of the cutting process with the cutting operator for system optimization
- System HWreport
- Optional digital display recorder; 1 channel per sensor

GE Energy welcomes all questions and comments from our customers. Visit us at www.ge-energy.com/bently

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