

HEATED SULPHUR PIPELINES IN MIDDLE EAST

PROJECT DETAILS

Location: Abu Dhabi, UAE

Completion Date: November 2014 & July 2015

Contract Scope: Design, Engineering, Procurement, Construction QA & Commissioning

Applications: Molten Sulphur Pipelines

Technology: Skin-Effect Heat Tracing System (STS); Fiber Optic Distributed Temperature Sensing (DTS); Pre-insulated Pipe (PIP)



KEY CHALLENGES

A Heat Management System for these Sulphur pipelines presented the following challenges:

- A tight range of allowable temperature from 125°C to 145°C for molten Sulphur with an operating set point of 135°C along the entire length of the pipelines.
- Large elevation changes that resulted in entrapped air or "empty" sections in the lines, which caused high and low localized temperature regions during stagnant conditions and/or re-melt.
- Absence of pressure relief devices, vents and drains.
- Requirement to re-melt and heat-up solidified Sulphur without causing overheating or over-expansion of the pipeline.

SOLUTION

nVent RAYCHEM Skin-Effect Heat-Tracing System (STS) combined with Fiber Optic based Distributed Temperature Sensing (DTS) to deliver and continuously monitor heat for pipelines located in extreme environments. The result: a world-class, safe, reliable and efficient electrically traced heated and insulated Sulphur pipeline designed with the operator in mind.



Pre-insulated Pipe Facilitated Construction



Engineered "Thermally Isolated" Pipe Supports and Anchors

PRODUCTS

To meet the needs of this challenging application, nVent offered a Heat Management System that included the following products:

- An inherently safe RAYCHEM Skin-Effect Heat-Tracing System, which minimized the number of circuits. It also delivered better heat transfer, and a lower temperature differential between the pipe and cable sheath. This resulted in a safer design.
- A state-of-the-art RAYCHEM control and monitoring system with vacuum contactors and a multi-power heat delivery mechanism that reduced the total operating costs for the system. Reduced power is used for normal operating conditions and full power is available for heat-up/re-melt conditions.
- A fiber-optic based Distributed Temperature Sensing (DTS) system that provides a continuously monitored dynamic pipeline temperature profile at each meter with 1°C accuracy for the entire length of the pipeline. It also provides invaluable information which Operations and Maintenance utilizes for improving performance, and any troubleshooting of the heating and insulation systems.
- Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) 3D modeling to determine the anticipated temperature profile of Sulphur across the cross-section of the pipe during normal flow, no-flow and re-melt conditions.

BENEFITS

nVent's introduction of "intelligent pipelines" with state-of-the-art integrated technologies in 2012 has resulted in a dramatic and significant development in the electrically heated pipeline transportation of liquid Sulphur, especially for long pipeline applications.

	Technology	Benefit
1	Skin-Effect Heat-Tracing (STS)	Robust & Reliable and Fit-For-Purpose Heating
2	Pre-Insulated Piping (PIP)	Uniform Thermal Envelope for Peak Performance
3	Fiber-Optic Distributed Temperature Sensing (DTS)	Optical "Stethoscope" Continuously Monitors the Entire Pipeline Temperature
4	Engineered Pipe Supports & Anchors	Minimizes/Eliminates Localized Heat Sinks That Can Cause Cold Spots
5	Thermal Finite Element Analysis (FEA) & Computational Fluid Dynamics (CFD)	Validates Thermal Design and Predicts Performance

nVent was fully responsible for design engineering, procurement, and start-up of the STS and FO DTS systems. Working closely with the Engineering & Construction contractor, nVent supplied materials, project management, construction, QA, and commissioning for both projects.

By assuming the Quality Assurance and Commissioning responsibility for the entire heat management system, nVent TRACER Turnkey Solutions team ensured that these projects were completed on time, safely and to the satisfaction of both facility end users.

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