Case Study

Internal Pipe Refurbishment for a Middle East Petroleum Company

PPG's SIGMALINE® 445 in situ application solves corrosion problems

The Customer
A national petroleum company

The Location
The Middle East

The Challenge
To keep an existing 21.4 km (13.3 mi.) 16 in. (41 cm), onshore, aboveground, pipeline from failing due to internal corrosion

The Solution
Wiper/Extrusion application of the *SIGMALINE* 445 phenolic epoxy coating

The Benefits
A pipeline brought back into service at costs and installation time significantly lower than replacement

The Result
In situ application with the *SIGMALINE* 445 coating for the internal refurbishment of crude oil pipes by extrusion/wiping will considerably postpone replacement costs

The Customer

A Middle East, state-owned corporation responsible for the oil and gas industry in the country.

The Challenge

The line is used to transport multiphase (oil/gas/water) sour raw crude to a degassing station and includes about forty expansion loops. The design pressure is 10,000 kPa at 80°C (1,450 PSIG at 176°F), the normal operating pressure is 1,500 kPa at 35°C (218 PSIG at 95°F).

The line had been nitrogen packed and not in service for a number of years. Intelligent pigging of the pipeline was carried out in and the following repair recommended: replacement of corrosion-affected sections (cut-off limit 40% wall thickness loss).

The fact that a parallel line had shown pinhole leaks (clamps were used as a temporary fix) and pitting corrosion, indicates that besides the original in-service exposure, sulfur-reducing bacteria may have been a partial cause of the corrosion.

PPG Protective & Marine Coatings
Bringing innovation to the surface.™

As with previous high-profile Middle East oil and gas customers, the requirement was to provide optimal protection and minimal disruption at an economical cost.

On this project, the challenge was not only to deliver an alternative to pipeline replacement but to do so during the hot summer months. The technical support was, therefore, aimed at close cooperation with the specialist applicators to ensure that the planning and application conditions could be met.

The Solution

PPG Protective & Marine Coatings (PPG) has a range of pipeline solutions using protective coatings that have been proven in the most demanding situations. The *SIGMALINE* 445 phenolic epoxy coating has been specially designed to support the internal refurbishment of pipelines by coating pigs and was identified as the ideal answer to the customer's needs.

In situ application with the *SIGMALINE* 445 coating for steel pipes is suitable for transporting (hot) sour crude oil, fresh- or seawater and many chemical solutions. Like many other PPG products, the *SIGMALINE* 445 coating helps customers solve specific problems and reduce downtime, thus reducing total operational costs.

The Benefits

PPG has a long track record of partnering with the leading global pipeline refurbishment applicators for in situ pipeline refurbishment.

The combination of PPG's established partnerships, experience, and specialized technical support staff enables customers to extend pipeline lifetimes along with significantly reduced costs.

Customers can improve their operational profitability with the unique benefits of in situ application:

- Postpones the need for pipeline renewal
- Allows for a quick and cost-effective lifetime extension for existing pipelines
- It can also be used for a change of liquid transportation (e.g. from oil to water)

Along with its innovative products, PPG goes beyond the benefits of its coating systems and adds further value by providing the best technical service and support in the market.

The overall aim for the pipeline was not simply a 'quick-fix' but to offer a long-lasting solution that would help reduce the total cost of ownership.

The Result

A total of almost 14,000 L (3,700 USG) was applied in two sections each approximately 10 km (6.2 mi.) from a launching station half way down the line.

After several weeks of preparation and in situ mechanical- and chemical cleaning, the coating application took less than one week by applying four to five coats, day after day. The achieved thickness was above the client specified 200 microns (8 mils) applied in four to five coats.

By executing the application at night it was possible to work while the substrate temperature dropped below 30°C (86°F) from above 50°C (122°F) during the day. This also extended the pot life of the mixed product. The material was stored in cooled containers on the site and operations for mixing and loading were well planned to ensure that the pot life would allow for the full length of the line to be travelled. The applicators had to ensure a paint temperature from 20 to 30°C (68 to 86°F) at the start of the coating process – the so-called 'launch'.

Customers can be assured that, when it comes to highly specialized pipeline solutions like the in situ application technique, PPG goes further than other competitors in the market. Our unrivaled experience and expertise in this field ensures that customers are satisfied by our ability to understand their needs and deliver the most efficient and effective solution for their specific project conditions.

Experience, innovation and integrity – that is what makes PPG the ideal coatings partner.

PPG Protective & Marine Coatings | P.O. Box 58034 | 1040 HA Amsterdam | The Netherlands | **Tel** +31 (0)20 407 5050 | **Fax** +31 (0)20 407 5059
Email pmc@ppg.com | **Website** ppgpmc.com | 00621101-EMEA | Created January 2016