IT'S ALL IN THE METHOD

Thomas Keadle, Denso North America, and Sebastian Paus, Sulzer Mixpac Ltd, Switzerland, **explore the use of cartridge-applied dual-component coatings for corrosion protection.**

The pipeline network that connects the regions of the earth is the arterial system for the oil and gas industry, and corrosion protection is key to increasing the lifetime of this network. The cartridge is a standard application method for two-component adhesives in a variety of markets such as automotive, construction, and dental. Reliability, safety, cost, and ease of use are the main reasons why cartridges are used. Cartridge systems also offer some significant advantages for the application of dual-component protective coatings for pipelines in the field.

A cartridge system shows its strengths in small applications. The cartridge is a technology that enables the applicator to use fast-setting coatings with cure times as quick as 10 sec. This gives applicators an alternative or complement to plural component spray equipment. The Denso Protal® Air Cartridge Dispenser – based on the Mixcoat system developed and manufactured by Sulzer Mixpac – is designed for fast and easy set-up, minimal material waste, and minimal equipment maintenance. The dispenser is also designed to provide precise airflow and fluid pressure control. Additionally, the spray gun includes a swivel handle and optional shoulder strap for the operator's comfort.

Figure 1. Spray application of an in-service 20 in. gate valve.

Figure 2. Spray application of a 36 in. ball valve.

On several recent pipeline construction and rehabilitation projects in Arkansas and Texas (US), the Denso Protal Air Cartridge Dispenser has been used in the spray application of Denso's Protal® 7200. The projects included: rehabilitation of an in-service 20 in. gate valve (Figure 1), coating of a 36 in. ball valve in a shop facility (Figure 2), and fabrication coating of several bends and tees for a pipeline construction project (Figure 3). The advantages over brush application included speed of application, less equipment, less wasted material, and a more uniform dry film thickness (DFT).

For these projects, the substrate to be coated was first blasted to a near-white finish, SSPC-SP 10/NACE No. 2, while achieving a 2.5 - 5.0 mil anchor profile. Then, the Denso Protal 7200 Air Cartridge (1000 ml 1:1 including spray tip, also part of the Mixcoat system) was heated in a 1000 W microwave to approximately 120°F - 135°F (49°C - 57°C). Next, the cartridge was placed in a paint shaker for approximately 30 sec. The air-mixing tip was then tightened securely to the top of the air cartridge. Following this, the cartridge was installed into the gun while connecting the quick-lock air coupling to the air-mixing tip. The cartridge was then purged slightly to achieve a uniform mix, before proceeding with the spray application. Each cartridge was spray-applied in approximately 1 min., covering approximately 15 ft^2 at 25 - 30 mils.

Health

Cartridge systems offer a number of other benefits for pipeline coating applications. Unmixed components are often hazardous, skin-irritating, and pose a threat to the

Figure 3. Spray application of pipe.

Figure 4. A coated weld joint.

environment. Using a cartridge system, the applicator does not come in contact with unmixed materials at any stage of the application process. The chance of environmental contamination is significantly reduced. Additionally, use of thinners for cleaning purposes is not required, since the system's cartridge and mixer are disposed of after use. Since the system reduces the amount of time required to complete an application and equipment is light, the cartridge system causes less applicator fatigue. Furthermore, because the system operates at 100 psi, there is no risk of pierced skin or other injuries that can be caused by high-pressure spray fans.

Reliability

It is very difficult to control manual mixing and dosing of two-component coatings in the field, and these processes present risks and disadvantages. It is time-consuming and difficult to achieve a consistent ratio and mixing quality. Alternatively, the cartridge is a stable packaging and metering unit that guarantees ratio stability. In combination with a static mixer, the time-consuming and unreliable manual processes of dosing and mixing are eliminated. As a result, coatings cartridges enable the applicator to spray material on the substrate to achieve a more consistent layer thickness than using a brush or roller.

Cost out

Cartridges are 'mixing at the point of application' systems, meaning that only the material that is used will be mixed. There is no waste of material that has been mixed but is unneeded for the application. The cartridge can be closed again, and the rest of the unmixed material is available for the next application. All the well-known preparation processes associated with other systems are no longer needed. Available brush and spray systems save up to 50% of man-hours spent compared to the manual process. Additionally, the initial investment in a portable cartridge-spray system is low compared to the initial investment required for other spray technologies.

In the pipeline industry, the application of liquid coatings in the field is critical to pipeline lifetime. Specifically, weld joints need to be coated in the same quality as the rest of the pipe. The methods currently used range from a heavy and difficult-to-handle airless unit to various manual methods, such as manually mixing two cans or manually mixing a squish pack. Depending on pipe diameter, 1 - 10 l of coating is needed for a weld joint. This is not enough to justify setting up a large spray unit. However, all methods that include manual mixing and dosing risk human failure, with the result of a negative impact on coating functionality prior to application. With the use of a cartridge and static mixer, these failures can be avoided. Additionally, damaged areas, pin holes, and fittings can be sprayed with no extra effort. By using flexible hose attachments, even areas that are very difficult to access can be coated quickly. Required quality demands safe and reliable preparation and application of a coating. With set-up time almost completely eliminated, the cartridge system is designed to suit both demands.