



ROBOTIC CORROSION PREVENTION



Internal Field Joint Protection Benefits

For over 30 years, CRTS Global robotic technology has strengthened typical corrosion prevention methods by cleaning, coating and inspecting internal field joints in new pipelines. Applying corrosion prevention coatings helps provide end-to-end corrosion protection for all types of pipelines including natural gas, crude oil, potable water and salt water.

After cleaning and coating the internal field joints, CRTS Global provides state of the art visual, high-voltage holiday and dry film thickness inspection services that incorporate real-time video. As an ISO 9001:2008 certified company, CRTS Global maintains strict quality standards on all robotic machinery and coating services to meet and exceed customer expectations.

- Increased pipeline longevity
- Reduced internal corrosion
- Reduced pipeline friction
- Reduced pipe wall thickness requirements
- Diminished or eliminated pipeline leaks
- Protected environment

Crawlers and battery carts are the prime movers for the entire train of robotic equipment. CRTS Global robotic machinery is used in pipe diameters ranging from 8-inches in diameter and larger according to our customer's specifications. Onshore, offshore S-lay, mainline and tie-in pipelines are accessible.

Crawler

The crawler hosts communication devices that enable the operator to control the equipment and receive live video. It also provides battery power to the train of equipment.

Battery Cart

The battery cart duplicates the battery and drive system on the crawler while passing the necessary power and control connections to the subsequent equipment in the train.

Cleaner and Vacuum

The cleaner and vacuum robots work in tandem to provide the foundation of seamless internal corrosion prevention.

Cleaning each weld before applying protective coating material is essential for the protective coating to properly adhere. The cleaner prepares the bare metal surface of the internal field joint and the cutback area that is formed when two pipe sections are welded together. After cleaning, the internal field joint has the proper anchor profile for the protective coating to adhere to.

Each vacuum has a custom vacuum head contoured to the internal radius of the pipe. During the vacuuming process, the debris passes through a series of filters that separate the debris from the abrasive used for cleaning. The abrasive is then returned to a hopper for reuse by the cleaner on the next internal field joint. After cleaning and vacuuming the internal field joint, it is inspected by an onboard camera to ensure the proper level of cleanliness has been achieved and no debris remains. The internal field joint surface is then ready to receive the protective coating specified by the customer.

Fusion-Bonded Epoxy Coater

The fusion-bonded epoxy (FBE) coater applies a powder epoxy coating to internal field joints in new pipelines.

It is an integral part of the internal corrosion prevention process and uses onboard cameras and real-time video to enable the operator to remotely send the FBE coater to each internal field joint for coating. After heating, the coating is applied according to the manufacturers recommendations.

After each weld has been coated, the operator uses the onboard camera to visually inspect the coating for defects, voids and pinholes. When requested, a separate inspection machine measures the dry film thickness and performs a high-voltage holiday inspection. All inspection services are recorded and shared with our customers.

Liquid Coater

The liquid coater applies a two-part liquid epoxy coating to internal field joints and is an integral part of the internal corrosion prevention process.

Heated tanks are filled with activator and base material. The coating is applied according to the manufacturer's recommendations. Using the onboard cameras and real-time video, the operator remotely guides the liquid coater to the internal field joint for coating.

After each weld has been coated, the operator uses the onboard cameras to visually inspect the coating for defects, voids and pinholes. When requested, a separate inspection machine will measure the dry film thickness and perform a high-voltage holiday inspection. All inspection services are recorded and provided to our customers.

Inspection Robot

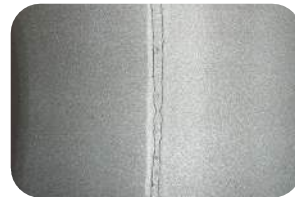
The primary purpose of the inspection robot is to detect flaws in pipeline coatings before any product enters the pipeline.

It is part of a robotic system that cleans, coats and inspects internal field joints by measuring dry film thicknesses and locating holidays. It can also locate holidays along factory-coated pipes using a circumferential brush.

The inspection robot also contains technology to view and record the radial location of any coating holidays and can also display parent-coating damage, debris, failed field-applied couplings and other anomalies. Visual and high-voltage inspection of the internal field joint adds a quality control aspect that is unmatched by other inspection processes.



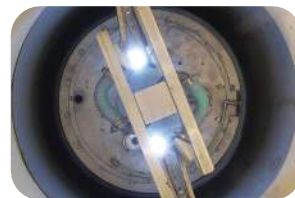
A full train of robotic equipment can apply corrosion prevention coatings to internal field joints.



A cleaned and vacuumed weld ready for coating.



The cleaner and vacuum work in tandem to blast clean, vacuum and recycle grit on each internal field joint.



FBE coatings are applied to internal field joints to provide protection from internal corrosion.



The Inspection Robot features a laser beam that detects unacceptable weld bead contours.

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