

Ensuring coating integrity for HDD applications

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Horizontal directional drilling (HDD) is increasingly being used to install sections of pipe across many spans that are considered high consequence areas (HCAs). While regulation currently calls for extra consideration to be given to the coatings used to protect these sections of pipe from corrosion, the systems currently being employed may be insufficient. Cathodic protection systems and



casings should not be a substitute for an intact coating system. Fibre-reinforced urethane abrasion-resistant overcoat systems can be employed to ensure the damage to the coating done by these types of installations is reduced or eliminated.

In our modern world, new pipeline installation is a constant, and nearly every pipeline being constructed has some portion which will be installed using HDD. HDD



Figure 1. Superior directional drilling protection with Scar-Guard.



Figure 2. McIntyre Street expansion.

has become a vital part of new pipeline construction and there are many reasons for its acceptance. When a pipeline is installed by HDD or micro-tunnelling, it is done so because an obstruction is in the way that must remain undisturbed, such as a road, lake, building, railroad or river. HDD has gained popularity because the pipe cannot be trenched into the ground in these areas the same way it is over stretches of open land. While HDD-installed pipe accounts for <10% of new construction, it could possibly represent the most crucial 10% which should be protected. The very reasons why these vital sections should be protected are the same reasons that trenchless technology is used – the pipes run beneath our roads, lakes, railroads and rivers. Typically, these are classified as HCAs.

What is being done to ensure these pipelines are as safe as possible in these HCAs? While investigating that question, many discussions were held with integrity engineers and pipeline operators to evaluate their methods and decision-making criteria. Nearly all the respondents, at some point, reference the guidelines provided by the US Code of Federal Regulations (CFR) Title 49, Parts 192 and 195 as they relate to their field. The objective was to determine if enough was being done to ensure the primary corrosion barrier was in place after the pipe was installed. Because HDD installation methods expose pipeline coatings to the most aggressive situations a coating might experience, it is imperative that all methods are utilised to ensure the coating is protected during installation. Conducting inspections or performing repairs that would typically require unearthing the pipe are not possible. Implementing the most proven technology available ensures a coating will remain intact in these inaccessible areas where spot repairs are not reasonably feasible.

Fibre-reinforced composite mechanical protection

Canusa-CPS Scar-Guard® is a new composite Abrasion Resistant Overcoat (ARO) comprised of fibreglass cloth and pre-impregnated flexible resin which is activated by water and cures within minutes. This sacrificial outer laminate system protects pre-approved anti-corrosion field joint coatings such as fusion bonded epoxy (FBE), liquid epoxies and shrink sleeves and can also be applied over mainline coatings. The Scar-Guard line of products reduces the likelihood of damage to the anti-corrosion coating, which minimises the need for costly repairs after pullback and provides long-term protection of the underlying pipeline coating (US Patent #8522827).

Superior mechanical protection

Liquid epoxies and FBEs are the most popular types of weld coating systems in North America; however, they are not ideal for uneven surfaces. Elevated profiles such as a girth weld do not stand up well against the impact and abrasion which a borehole can present when pulling heavy pipe. The weld seam, due to its raised profile, is a tough area to apply

Table 1. Project success stories						
Project	Year	Market	Location	Scope	Diameter	Product
Louisiana Marsh	2017	Offshore	USA	Offshore to shore approach	22 in. OD	Scar-Guard
Colorado River Bore	2017	Onshore, oil and gas	USA	1600 ft of pipe for HDD, full encapsulation	18 in. OD	Scar-Guard
McIntyre Street Expansion	2016	Onshore, oil and gas	USA	214 field joints for HDD	20 in. OD	Scar-Guard

directional drilling, rough handling, native backfills or severe in-service conditions.

Simple application with unrivalled performance

The simple application

of the product allows for quick coating protection and reduced pullback times, while also giving the most effective results of any ARO on the market today. Utilising Scar-Guard allows pipeline operators to apply girth weld coatings at their ideal thickness to achieve the best performance with their anti-corrosion barrier, rather than increasing those thicknesses and losing properties such as flexibility or impact resistance – which is a common problem seen with epoxies. On average, it takes 30 min. to apply the Scar-Guard product and start pulling pipe.

Benefits

The patented Scar-Guard fibreglass system is designed to protect field joints and mainline coatings from the mechanical stresses and scarring associated with HDD, boring and micro-tunnelling of pipelines. Custom woven fibres and quick curing urethane give Scar-Guard strength and an advantage over the most difficult soil conditions.

- Bury, bore or drill with confidence: provides outstanding protection against impact, abrasion, gouge, punctures and tears that may result from directional drilling, rough handling, native backfills or severe in-service conditions.
- Cure options for any environment: fast cure, slow cure, UV-curable, UV-resistant – all available options to suit a wide range of project cycle time requirements and construction conditions.
- Non-shielding: multiple tests have been completed that show how CP current will pass through the Scar-Guard to ensure the anti-corrosion coating can be tested for integrity after pull-through and protected for the lifetime of the asset.
- Fast, easy installation: Scar-Guard products are simply wrapped onto the existing coating's surface and activated by water. Pre-impregnated moisture cured polyurethane resin means that no field mixing or saturation is required.

Maximum impact and gouge resistance


Fracture Toughness is the measure of the energy required to crack a material and is a critical performance characteristic for materials that will suffer impacts and gouge. Composite materials such as Scar-Guard have a fracture toughness value that is 20 - 60× greater than standalone epoxies, making them the ideal product to provide maximum protection of the pipeline coating in HDD applications. 



Figure 3. Louisiana Marsh.

a uniform thickness of FBE or liquid epoxy, and at the same time receives the most abuse during pullback.

For most HDD installations, owners typically specify a mainline coating consisting of a corrosion layer along with an ARO. Field joint specifications for these projects normally call for a standalone epoxy, even though the girth weld experiences the most extreme conditions on the pipeline. It is common for these girth weld coatings to be ground down to the bare steel during HDD installations. Many owners are now recognising the need for a field-applied ARO at this critical location.

To minimise the need for costly girth weld repairs after pullback and to provide long-term protection of the underlying pipeline coating, the field-applied Scar-Guard system provides unparalleled protection against impact, abrasion, gouge, punctures and tears resulting from