

CORROSION PROTECTION

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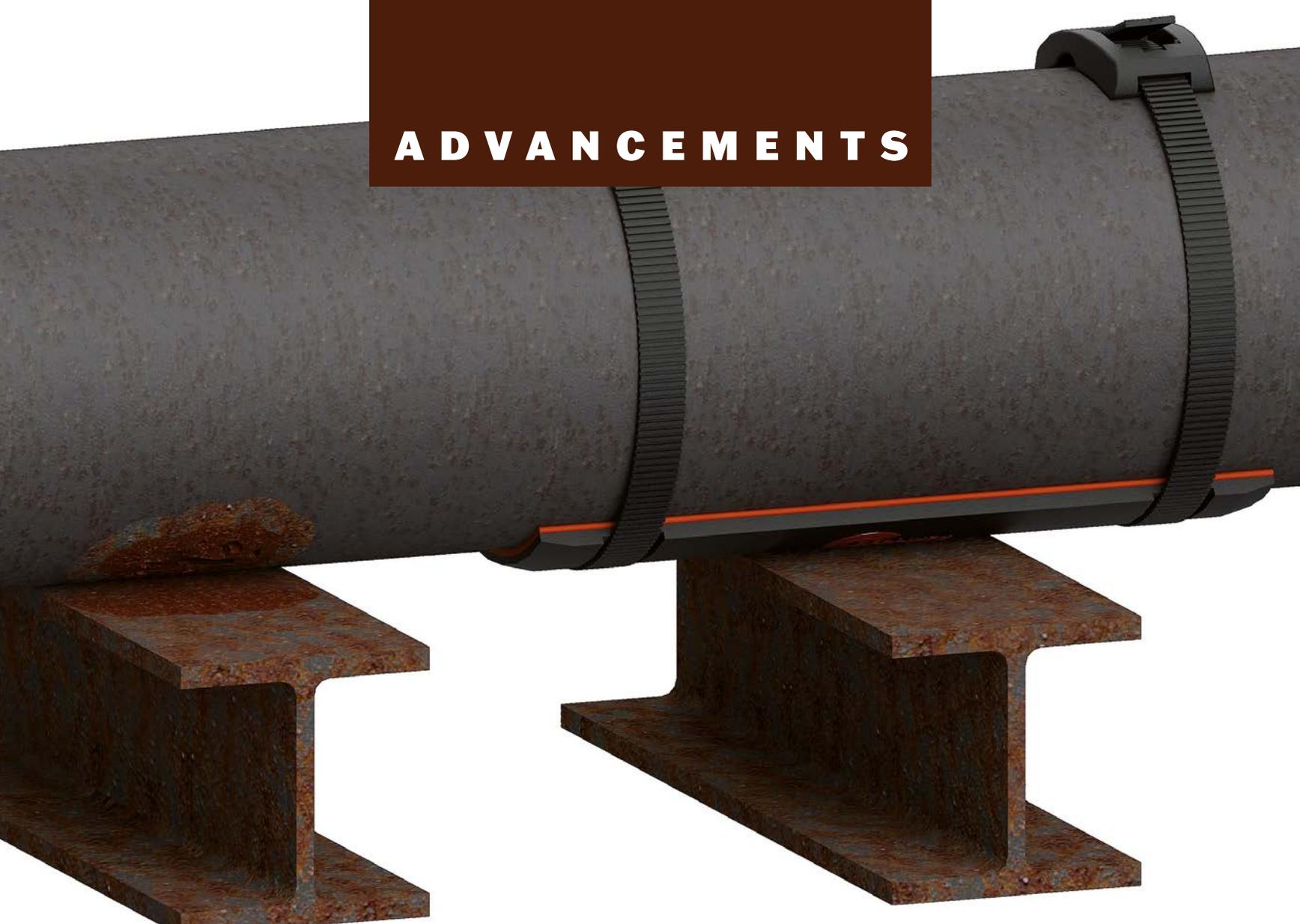
ISSUE 12
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Restoring steel with a gentle touch:
why bristle blasting is a smart
alternative for grit blasting before coating
page 22

A mechanical department integrated
with high-efficiency shot blasting
systems: LTC's choice to ensure
the durability of its magnetic cores
page 42

IRON PROBE DESERT: a new, patented
probe for high-resistivity soils
page 66



ADVANCEMENTS

SmartPad System VS corrosion under pipe supports

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Industrial, petrochemical, offshore, and coastal facilities rely on closely spaced supports such as beams, saddles, and clamps, to carry the weight of above-ground piping. Those support points are where corrosion often starts. Coatings are scuffed, crevices hold thin films of salty water, and direct metal-to-metal contact can set up galvanic cells. By the time the damage is obvious, you may already be looking at metal loss, leak risk, and costly repairs.

Common countermeasures, such as weld-on metallic wear pads, epoxied FRP wear pads, thermoplastic half-rounds, wraps, or simply more paint, can help, but they don't always address the combination of sealing, electrical isolation, and coating protection needed at the interface, and many are slow or awkward to install in tight or offshore locations.

The SmartPad System was designed to prevent corrosion at the support locations by breaking the electrical path, sealing the pipe/pad contact region against moisture, and shielding the coating—while also allowing the pad to be installed, opened for a visual check, and reinstalled, all in mere minutes.

Pipe supports are frequent trouble spots for pipe external corrosion, often called CUPS (Corrosion Under Pipe Supports). Moisture that lingers at the contact surface, metal-to-metal contact, narrow crevices, and damaged coatings all play a part. The SmartPad System (by RedLineIPS/Cogbill) is a non-metallic, FRP-based interface that tackles those root causes. Its components: an FRP saddle, a factory-bonded closed-cell Hydroseal gasket, composite polymer SmartBands with buckles, and a tensioning tool, all work together to electrically isolate the pipe from the support, seal out moisture at the contact surface, protect coatings, and make quick visual inspections practical. This article outlines the corrosion mechanisms involved, explains how the SmartPad is built and why it helps, and details its capabilities and advantages.

Corrosion mechanisms at support interfaces

Crevice corrosion

A narrow, shielded gap under a support can trap a thin electrolyte film. Oxygen inside the gap is depleted while the surrounding surface remains aerated, creating an anode-cathode difference. Repeated wet-dry cycles concentrate chlorides and drop local pH, undermining the coating and driving localized corrosion.

The SmartPad effect: The closed-cell Hydroseal gasket is factory-bonded to the saddle and compressed by band tension and pipe weight to make a continuous, conformal contact. That seal denies the tiny voids where films persist, while the FRP saddle spreads load so contact pressure stays more uniform through temperature fluctuations—both of which work against the creation of corrosion cells.

Galvanic corrosion

When the pipe and support are in electrical contact and share an electrolyte, the anodic surface corrodes. Small-anode/large-cathode geometry at the support locations can intensify the effect. The SmartPad effect: The load path is fully dielectric--FRP saddle, Hydroseal gasket, and FRP bands/buckles--so metal-to-metal continuity at the interface is interrupted. At the same time, the sealed contact limits the shared electrolyte. Breaking the circuit and removing the film address both causes for galvanic corrosion.



Photograph of the RedLineIPS SmartPad with bonded Hydroseal gasket, designed to eliminate corrosion under pipe supports.

Microbiologically Influenced Corrosion (MIC)

Intermittently wet crevices can host biofilms (e.g., sulfate-reducing bacteria) that create sulfides, acidity, and local oxygen differentials, accelerating corrosion under deposits or within gaps. The SmartPad effect: The closed-cell Hydroseal gasket prevents water ingress between pipe and pad. This disrupts the conditions required for a corrosion cell under the pad. If needed, the banded pad can be opened quickly for a look and reinstated, supporting routine housekeeping and quick visual inspection.

Fretting-assisted corrosion

Minute relative movement at a hard contact, often from thermal cycling and support compliance, abrades paint coatings and passive films. Fresh steel then corrodes between slips, creating a wear-corrosion feedback loop concentrated at the support location. The SmartPad effect: The gasket cushions micro-irregularities and helps stabilize the pipe/pad contact, while the saddle's broad bearing reduces local shear at the pipe wall. Thermal movement is managed at a controlled surface away from the coating, limiting the abrasion that seeds the loop.

Under-deposit / Capillary thin-film corrosion

Dirt, salts, or capillary-held moisture can behave like a hidden crevice beneath the footprint, keeping chloride-rich water in contact with steel components, which promotes corrosion. The SmartPad effect: A bonded, continuous gasket interface leaves no open seam for solids to wedge, and the closed-cell elastomer resists wicking. Moisture and debris stay on exposed, cleanable surfaces instead of migrating under the contact where you can't see or reach them.

The SmartPad System

What it is and why it's different

SmartPad is a fully non-metallic support interface designed to stop corrosion where it most often starts - at the pipe/support interface. It installs without welding, drilling, or epoxy; crews wrap composite SmartBands, tension them with the SmartTool, and they're done. In practice, installs are measured in minutes because there's no surface prep, welding, drilling, or epoxy application and cure time.

Why it seals when epoxied pads don't

A factory-bonded, closed-cell Hydroseal gasket is compressed between the FRP saddle and the pipe to create a NEMA 4-level watertight seal at the contact surface. That seal excludes the thin electrolyte films that drive CUPS. Because the gasket conforms like memory foam, it also seats cleanly on pipes with minor



Close-up photograph of the Hydroseal gasket used in the RedLineIPS SmartPad System, showing its closed-cell elastomer structure designed to prevent moisture ingress.

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unevenness or repairs from earlier corrosion work, conditions that often defeat epoxy-bonded FRP pads, which expect a uniform, bond-ready surface and long cure windows.

Open, look, and re-band

For pipe corrosion visual inspection, bands are cut, the pad is lifted for a quick visual, and new bands are tensioned back on. This reduces reliance on methods such as ultrasound, EMAT, or radiography for routine checks.

FRP SmartPad (the saddle)

What it is: a molded, saddle-shaped FRP wear pad matched to the outer diameter of standard pipe sizes, with recessed grooves that keep the bands low-profile and anchored. The composite body is dielectric, so it breaks the galvanic path between a steel pipe and a steel support while spreading bearing load so the paint isn't crushed along a narrow line.

Why it matters for corrosion: breaking metal-to-metal continuity removes one leg of a galvanic cell, and broad bearing helps preserve coatings that otherwise become moisture traps and crevice starters at the support locations.

Hydroseal gasket

What it is: a closed-cell elastomer sheet factory-bonded to the pipe side of the saddle. When the bands are tensioned and the line is set down, the gasket compresses into a continuous,



Photograph of a SmartBand used in the RedLineIPS SmartPad System. Made from continuous-strand fiber-reinforced polymer with a square-tooth locking mechanism, it provides long-term strength and corrosion resistance in harsh environments.

conformal contact. What it does against CUPS: compressed Hydroseal gasket creates a NEMA 4-level seal at the pipe/pad interface, excluding moisture that enables crevice/differential aeration, galvanic coupling, MIC niches, and under-deposit corrosion. Because it conforms, it seats over minor pits, filler, or profile left by earlier remediation, places where epoxied pads struggle to bond reliably.

MECHANISM	MITIGATION PROCESS
Crevice / Differential Aeration	Factory-bonded Hydroseal gasket compresses to a continuous, conformal contact, leaving virtually no voids for moisture ingress. The FRP saddle spreads load, keeping contact more uniform through temperature swings; the sealed interface blocks water droplets from invading the pipe/pad interface.
Galvanic	Fully non-metallic load path, FRP saddle, Hydroseal, non-metallic bands/buckles—interrupts metal-to-metal continuity. With electrical contact broken and moisture excluded, a galvanic cell is far less likely to form.
MIC Corrosion	A dry, sealed, non-porous interface gives biofilms fewer places to establish. Rapid “lift-look-re-band” makes preventive cleaning and inspection practical.
Fretting-Assisted	The gasket cushions micro-irregularities and helps stabilize the contact; broad bearing reduces local shear at the pipe wall, limiting abrasion that exposes fresh steel.
Under-Deposit / Thin-Film	A bonded, continuous gasket leaves no seam for solids to wedge or capillary films to linger; moisture and debris remain on exposed, cleanable surfaces.

SmartBands, buckles & SmartTool

What they are: long-strand composite polymer bands and matching buckles with square-tooth engagement. Loop them through the pad's grooves and tension with the SmartTool. The clamping path is fully non-metallic, so you don't re-create a galvanic bridge while you're trying to prevent corrosion. The SmartTool is available in manual, mechanical, and pneumatic versions.

Why they matter for corrosion and uptime: The square-tooth profile is designed to hold tension over the service life of the pads (20-30 years or more, in typical environments), keeping the gasket properly compressed so the NEMA 4-level watertight seal at the pipe/pad interface persists. For corrosion inspections, cut the bands, lift and look, then re-band—no welding, drilling, or epoxy removal—which keeps visual inspections fast and realistic in the field, especially in confined spaces or at heights.

SmartPad System corrosion mitigation

Since corrosion mitigation at pipe support locations is the SmartPad System's primary function, the table below offers a concise map from each corrosion driver to the specific SmartPad component that addresses it; use it as a quick, field-ready reference for design reviews, retrofit planning, and inspection briefings.

System capabilities & practical advantages

What it does at the interface

- Seals out the films that start corrosion. The closed-cell Hydroseal layer compresses against the pipe to form a tight, NEMA 4-level seal that blocks electrolyte films tied to crevice, under-deposit, and MIC-type corrosion.
- Keeps the circuit from completing. The entire load path is non-metallic, so there's no metal-to-metal bridge at the support to

enable galvanic attack.

- Protects the coating you already paid for. A contoured FRP saddle with broad bearing and smooth, radiused edges spreads load instead of pinching it along a knife-line, helping the coating survive at the support.

What it does for installation and access

- No welding, drilling, or epoxy and cure time. Wrap the bands, tension with a handheld tool, and you're done—hot work permits not required, no cure windows. Typical installs take minutes, not hours.
- Works on imperfect pipe surfaces. If a line was blasted, filled, or spot-repaired after earlier corrosion, the closed-cell gasket conforms and seals; it doesn't demand a perfectly smooth, bond-ready surface.
- Made for real inspections. To check underneath, cut the bands, lift and look, then re-band. Because that takes minutes, routine visual inspections actually happen—before corrosion has time to hide and grow. This reduces the reliance on costly corrosion inspection methods such as EMAT, ultrasound, X-Ray, etc.

What it does for reliability

- Holds preload. Composite polymer bands and matching square-tooth buckles are designed to maintain tension so the gasket stays compressed and the seal persists.
- Stays non-conductive. Every path through the assembly is dielectric by design; you don't short-circuit the isolation while securing the pad.
- Handles the environment. The vinyl-ester FRP saddle and closed-cell elastomer are suited for outdoor service in wet, salty, and UV-exposed locations, with a broad temperature window typical of process facilities. The SmartPad System was designed for offshore and coastal plants and platforms.



Example of CUPS (Corrosion Under Pipe Supports), where trapped moisture and crevice conditions have led to rust and coating breakdown.



Field view of the SmartPad System on parallel process lines—FRP saddle with bonded closed-cell gasket secured by fiber-reinforced thermoplastic SmartBand straps.

What it does for schedules and costs

- Fewer delays. No hot work or permits, no adhesive cure time, and no grinding off old epoxies, all mean fewer reasons to push a small support job into the next outage.
- Less specialized gear. A hand tool sets tension; crews don't need welding rigs or costly skilled welders, curing tents, or surface-prep stations at every support.
- Re-use where it makes sense. Saddles and buckles are durable; bands are low-cost consumables. Keeping spare band stock on hand makes "lift-look-re-band" a quick, routine task.

Conclusion

Corrosion at supports starts where the pipe meets the steel. SmartPad tackles that contact directly: an all-composite load path breaks electrical continuity, a compressed closed-cell interface keeps moisture out, and the contoured FRP saddle protects the coating. It installs in minutes—no welding, drilling, or epoxy—and seats reliably even on slightly uneven or previously repaired pipe. Just as important, it makes inspection practical: cut the bands, lift-look-re-band, and move on.

On turnarounds or tight offshore decks, those practicalities keep the interface clean, dry, and isolated. The result is a straightforward, scalable way to reduce CUPS risk across large piping systems. **■**

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