



Scar-Guard
Protect Your Mainline Pipecoating, Avoid Re-Pull

A large yellow pipe is being installed at a construction site. Several workers in white protective suits and hard hats are visible. The background shows a large pile of dirt and some construction equipment.

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Who is Shawcor?



Shawcor is a global integrated supplier of pipeline solutions to the oil and gas industry

World-wide organisation and capability

Pipeline Performance



- Bredero Shaw
- Socotherm
- Canusa-CPS
- Dhatec

Composite Production Systems



- Flexpipe Systems

Integrity Management



- SPS
- Desert NDT
- Zedi
- Vintri
- Lake Superior

Oilfield Asset Management



- Guardian
- CSI

Connectivity



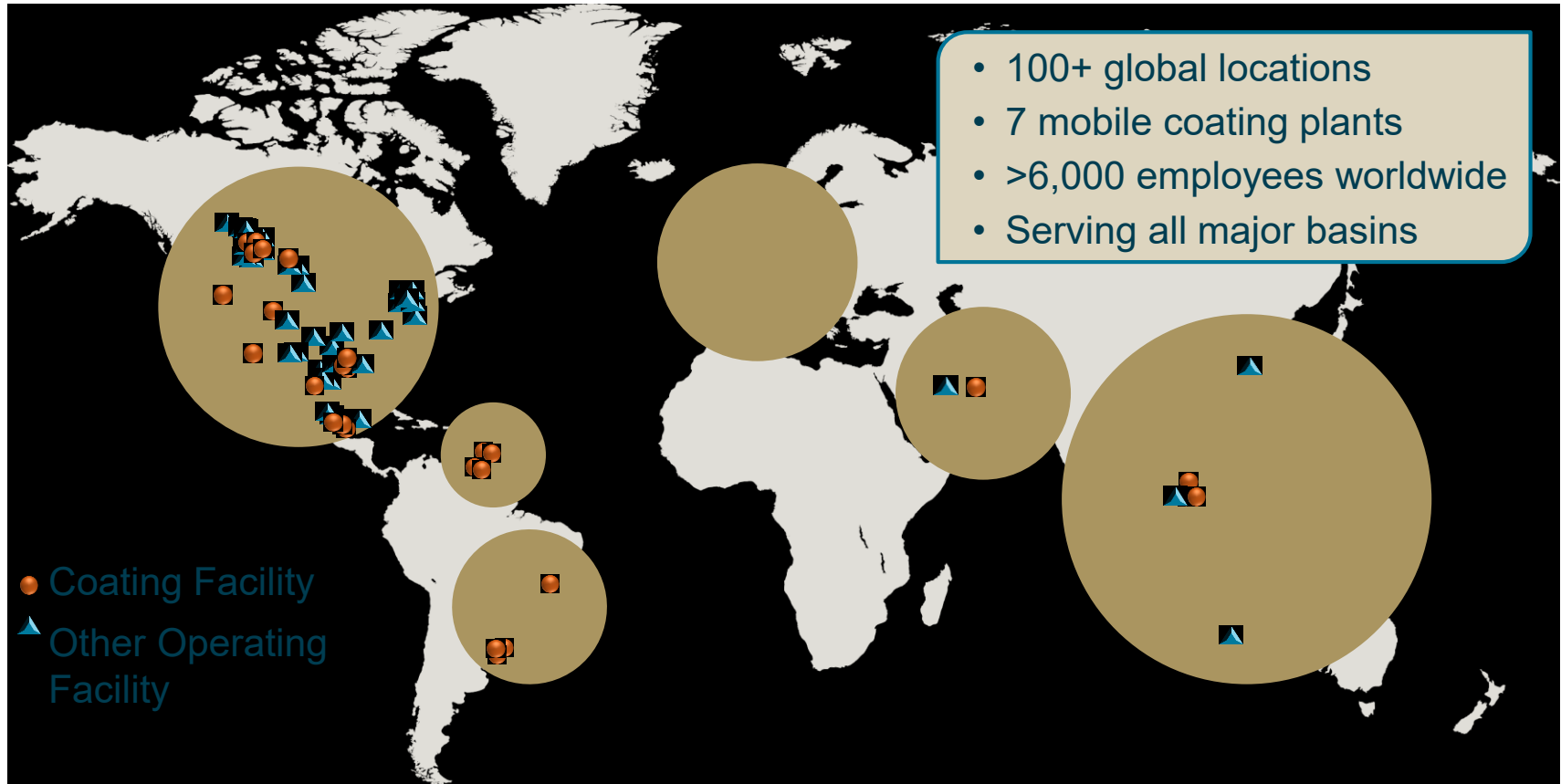
- ShawFlex
- DSG-Canusa
- PFT Systems & Connectors

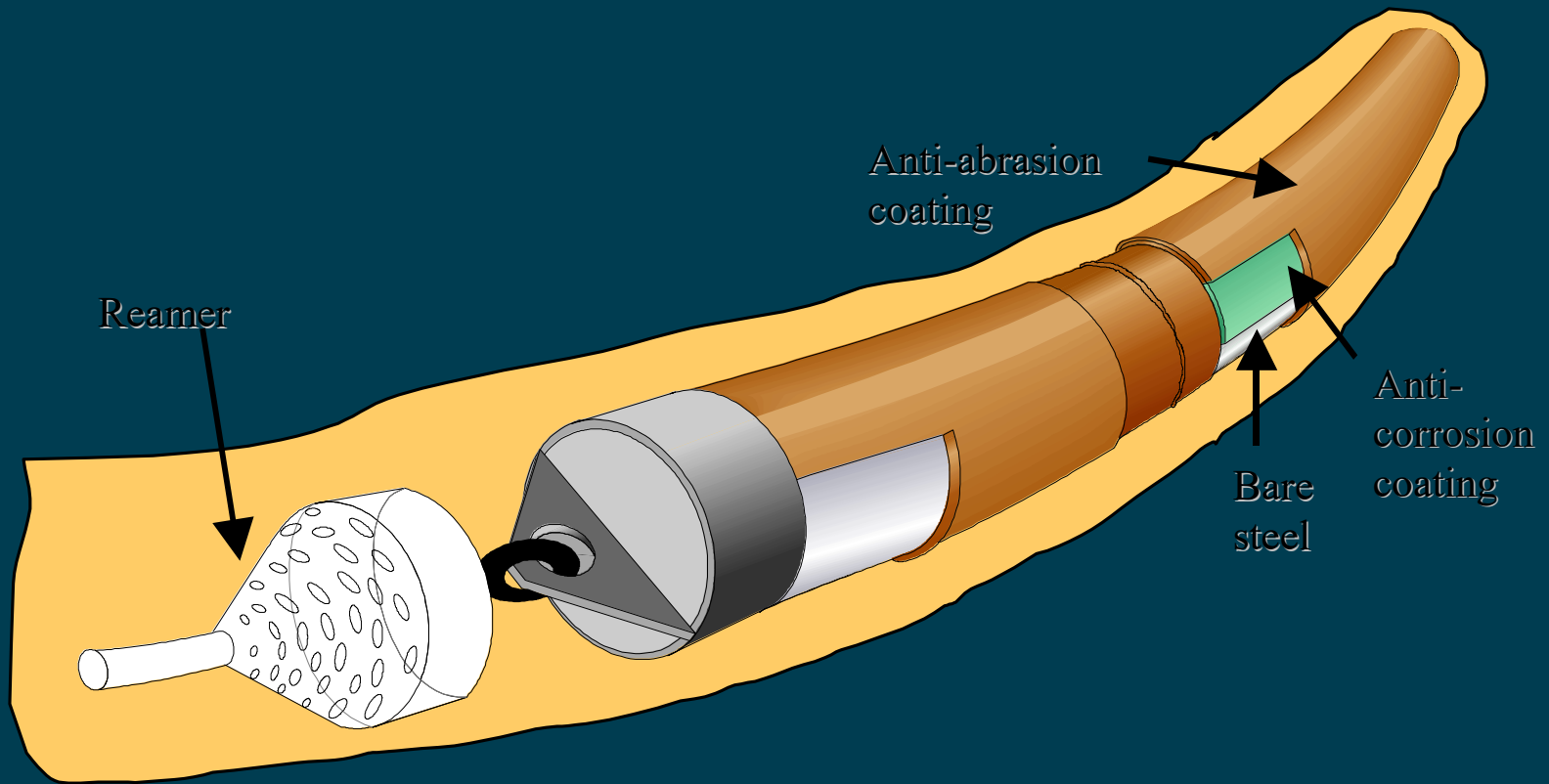
Technology

Execution

Integrity

Unmatched scale, diversity and global reach





HDD – Horizontal Directional Drilling

NO EXCAVATION PROCESS

- Trenchless technology for laying pipelines
- Inaccessible area for trenching
 - Structure, geographical, population impact
- Used at river crossings, under roadways, railroad tracks, etc.
- Most of the areas are what is known as HCAs (high consequence areas)

DIRECTIONAL DRILL



COMMON COATINGS

Main line Coatings:

- FBE
- 3LPE & 3LPP

Field Joint Coatings:

- Field Applied FBE
- 2 part liquid Epoxy Systems
- Hot or Cold Applied Tapes
- Heat Shrink Sleeves

Lack of codes for ARO systems

CURRENT PRACTICE IN HDD: 3LPE COATED MAINLINE PIPE & HEAT SHRINK SLEEVE WITH FIBER REINFORCED IN PE BACKING

COATING DAMAGES

Main Factors

- ◆ Installation
- ◆ Abrasion
- ◆ Impact & Gouge
- ◆ Bending load
- ◆ Jobsite hazards



Suitability of purpose?

FIBREGLASS ABSORBS WATER



Guaranteed water absorption = Guaranteed decrease in tensile strength***

***Kouadio, Kouassi Serge P. "Durability of fiberglass composite sheet piles in water", McGill University, Copyright 2001

SCAR-GUARD SYSTEM

Proven Abrasion Resistance Overlay System

- A hard top sacrificial composite wrapping system for protection of the main corrosion coating of the pipeline section undergoing a trenchless construction.
- Scar-guard is available in 2 different forms:

- **Scar-Guard E:** A high performance Epoxy site impregnated bidirectional fiberglass wraps

Impact Resistance	Abrasion Resistance	Gouge Resistance
21.7J (192 in-lb)	3,333	Pass

- **Scar-Guard MCU:** PU Pre-impregnated Bidirectional fiberglass wraps.

Impact Resistance	Abrasion Resistance	Gouge Resistance
47.6 J (421 in-lb)	1,667	Pass



ADVANTAGES -

- On site application with domestic tools
- Fast installation, curing, and turn into service
- Protect the mainline coating from abrasion
- Sacrificial behavior in case of any possible damage while anticorrosion coating is intact.
- 2 grades for harsh and harsher terrain.
- Big saving against re-pull and casing requirement.
- Big project references

Case History – 24” Diameter pipe in HDD

ARO IN KSA

Saudi Aramco needed to protect hundreds of feet of new 24” pipeline during the HDD pull back which would pass through aggressively rocky terrain that could possibly damage the pipe’s coated surface and cause premature coating failure.

The owners turned to Scar-Guard to protect the pipeline, not only during the pull and the installation process wasn’t the only harsh condition on the job work was mainly performed at night when temperatures typically only reached 110°F (43°C). Mobile tents were also erected to protect the freshly coated and wrapped pipes from the dust and sand blown by the heavy desert winds.

- pipe’s surface was prepped with a sweep blast.
- The joint welds were grit blasted to to SA2.5 and coated with Syntho-Poxy HC, a two-component, anti-corrosion epoxy filler.
- Then the primer-coat of Scar-Guard Epoxy
- Scar-Guard composite system in a clockwise manner and quickly covered with compression film.
- After curing, the film was removed and thickness and hardness tests performed.

Approximately 12 hours after the composite system application, the pipe was ready for pull back. The new pipeline was successfully installed without scarring and is now protected, thanks to Scar-Guard.



CASE HISTORY: OMAN

PROJECT: EPC WORKS FOR MODIFICATION OF SOHAR & NEW IBRI GSS

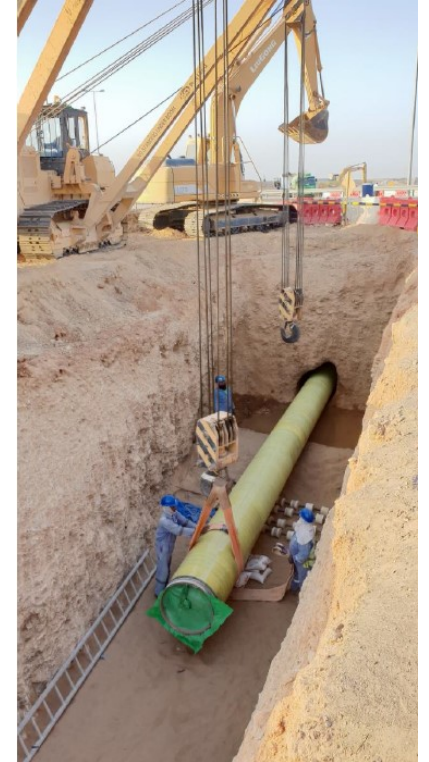
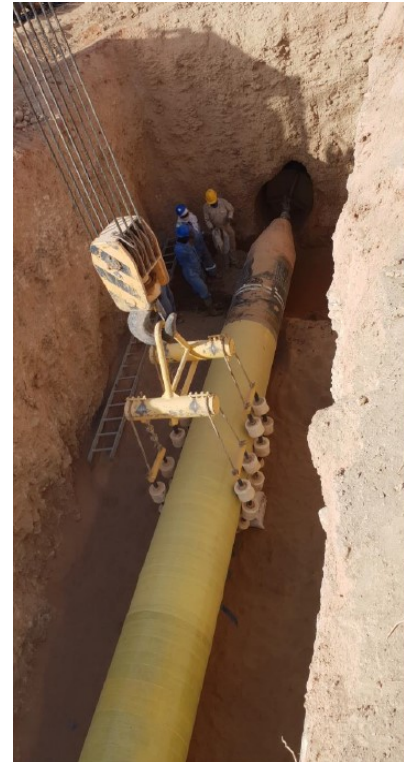
Product	Description
	‘Canusa-CPS’ Scar Guard E
	31 Style 24oz 10’’ x 300’ composite Fiberglass Cloth
	Thermo-Poxy
	Comp Film Blue 12’’ x 700’
	Resinator 2-12’’ combo welded aluminum design
	Resinator mixing tray <12’’ for use with welded aluminum resinator
Pipe Size	28’’ Diameter & 12’’ Diameter
Pipe Length	28’’ = 48, 24 & 24 meters & 12’’ =32 meters
Type of Coating	3 Layer Polyethylene
Type of Field Joint Coating	Heat Shrink Sleeves



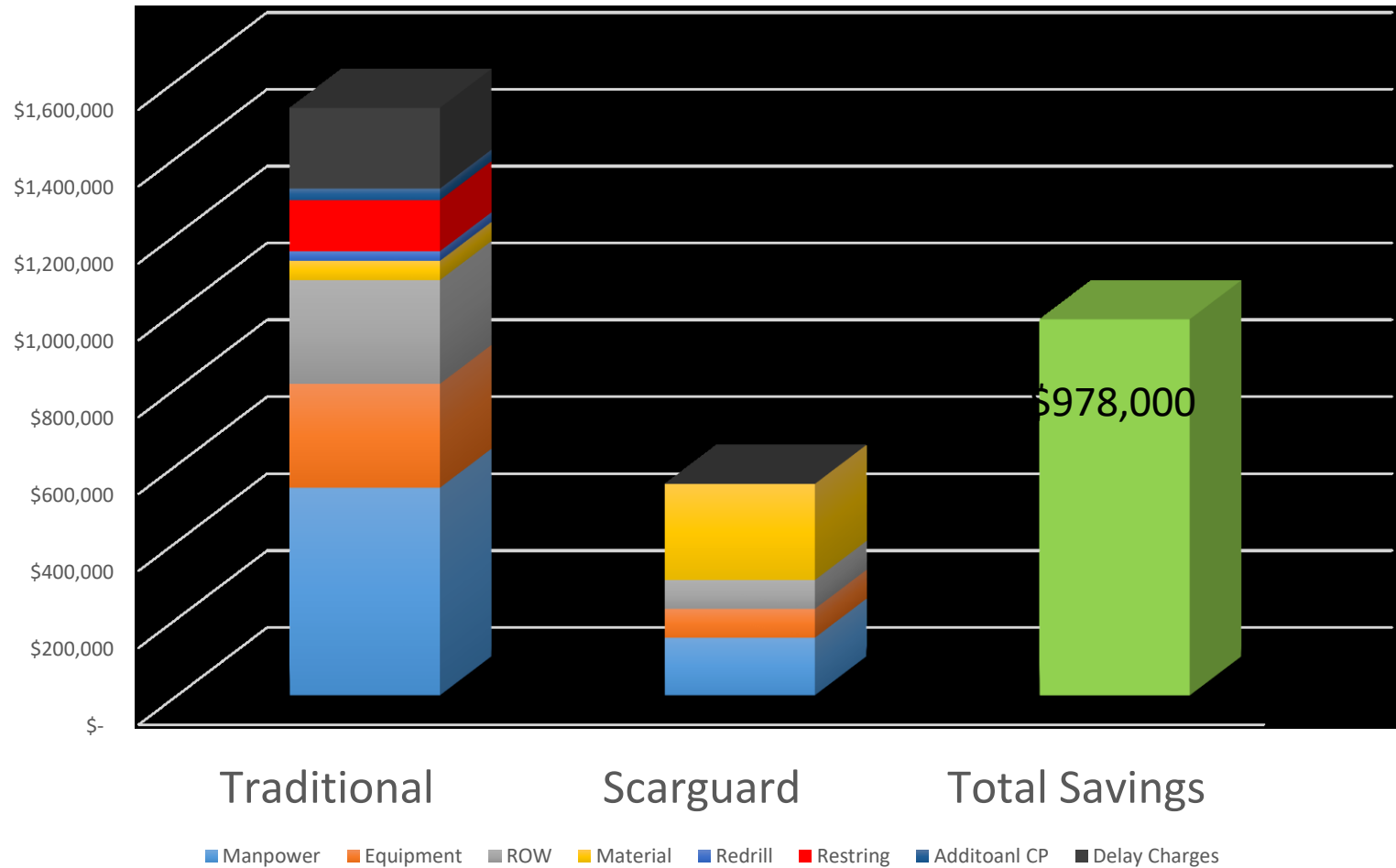
CASE HISTORY: OMAN

PROJECT: LIPIC-EPC4 NGL PIPELINE AND OGC/ORPIC 32” GAS LOOPLINE

Product	Description
	‘Canusa-CPS’ ScaSubjectr Guard E
	31 Style 24oz 10” x 300’ composite Fiberglass Cloth
	Thermo-Poxy
	Comp Film Blue 12” x 700’
	Resinator 2-12” combo welded aluminum design
	Resinator mixing tray <12” for use with welded aluminum resinator
Pipe Size	32” Diameter
Pipe Length	1800 Sqmtr
Type of Coating	3 Layer Polyethylene
Type of Field Joint Coating	Heat Shrink Sleeves



Cost of a 1160 meters Re-Pull 20" OD Pipe



SUMMARY

- HDD installations are numerous and vary greatly in type, size, and conditions
- Ordinary pipeline coatings do not hold up well to HDD installations, must use special system
- Selection of coating dependent upon specific HDD project
- Coating failures are **expected** so CP systems must be adequate to protect pipe
- Accurate assessment of coating condition after installation is difficult
- HDD installations are now commonplace and are part of every major pipeline

CONCLUSION

- ◆ When aggressive soil conditions are expected – wrap your pipe.
- ◆ It's like insurance; increased layers equals increased protection

SCAR◆GUARD™

MANY THANKS FOR YOUR TIME.

ANY FURTHER QUESTIONS?