

# THE MOBILE OPTION

Raphael Moscarello and Paul Kleinen, Bredero Shaw, Canada and USA, and Sean Haberer, ShawCor, Canada, present a new, innovative modular mobile plant for pipe coatings in this month's cover story.

**W**ith oil and gas exploration migrating to developing countries, remote locations, and deep offshore environments, there is an increased demand for state-of-the-art, mobile facilities that reduce logistics costs, mitigate risk and improve safety. This article describes the new Brigden™ coating plant – a novel way of coating pipe. Brigden is a completely modular mobile plant capable of manufacturing a full range of anti-corrosion and flow assurance pipe coating systems with the same quality and output as the most advanced fixed plants.

Brigden incorporates innovative system designs; from pipe preheating through to end finishing using advanced robotics. This mobile facility enables delivery of high quality pipe coating systems at any location in the world. This concept is based on the successful mobile concrete coating solution offered globally to all Bredero Shaw customers.

### Mobile solution

The Brigden mobile plant can be located in-county, near a pipe mill or close to an oil and gas field to streamline logistics,



Figure 1. Quench tunnel.

improve safety and reduce costs of handling and transporting pipe. To meet aggressive installation schedules, the plant is shipped in standard ISO containers, eliminating break bulk cargo delays and special handling requirements. Steel pipe can also be shipped directly to the project site, which further improves scheduling. The mobile plant can be strategically located to reduce transportation and handling costs, which may result in lower import duties for bare pipe when compared to coated pipe.

Brigden's modular concept is based on standard designs and proven process technologies that have a successful track record in the pipe coating industry. The modular plant can be transported via ship, truck or rail to the manufacturing location and takes only six weeks to assemble and be fully operational. Demobilisation is expected to take only 30 days. This modularity represents a significant time savings compared to conventional mobilisation for a permanent coating plant. The compressed mobilisation/demobilisation period allows for rapid response to client needs.

### Game changing engineering

Brigden is a turnkey operating facility assembled from contents supplied in 50 standard and specifically designed shipping containers that are ISO certified. Depending upon the geometry of the yard or building, Brigden's modular design can be configured in an S-shape or a U-shape. Modular compressors are part of the integrated system.



Figure 2. Bredero Shaw's new Brigden modular facility.

Table 1. Manufacturing capability – current platform				
	Diameter (mm)		Length (m)	
	Min.	Max.	Min.	Max.
<b>Anti-corrosion</b>				
3LPE (multi-layer PE)	219 (8)	1066 (42)	10.4 (34)	24.4 (80)
3LPP (multi-layer PP)	219 (8)	1066 (42)	10.4 (34)	24.4 (80)
FBE	219 (8)	1066 (42)	10.4 (34)	24.4 (80)
Dual layer FBE	219 (8)	1066 (42)	10.4 (34)	24.4 (80)
<b>Flow assurance</b>				
Thermotite®	219 (8)	600 (24)*	10.4 (34)	24.4 (80)
Thermotite® ULTRA™	219 (8)	600 (24)*	10.4 (34)	24.4 (80)

\*The diameter reflected in this section refers to the diameter of pipe and coating if cutback roots are used.



Figure 3. Robotic cutback machines.

Adding more modules to the baseline layout expands the plant capability to accommodate 80 ft (24.4 m) pipe and large 42 in. (1066 mm) diameter pipe. New modules are added to accommodate various pipe coating technologies and processes including the manufacturing of syntactic polypropylene insulation, robotic cutback, different extruder requirements and production of novel, proprietary coatings. Plants can also be adapted to regional and client specific needs such as small diameter pipe, internal coatings and large manufacturing volumes.

Electrical power can be provided from utility grid sources, or site generated as necessary by project requirements. Even the absence of an appropriate building structure is not a limitation as the modularity allows for a complete steel frame fabric building rated for coastal wind standards.

A dedicated team of application experts leads the Brigden operation. This team is trained in continuous improvement practices supported by regional operations resources for safe and timely manufacturing and delivery. The plant set-up and execution are based on standard operating practices that are an integral part of the ShawCor manufacturing system. Office facilities, rolling stock for pipe handling and raw material processing are sourced locally.

## Plant capabilities

The Brigden mobile plant has been designed with the same production capacity as a fixed plant. Brigden is capable of coating pipe with an outside diameter of 8 – 42 in. (220 to 1066 mm), lengths of 34 – 80 ft (10.4 – 24.4 m) and weight up to 325 lbs/ft (484 kg/m). The plant comes fully equipped with integrated facilities for raw materials storage, facility maintenance, and quality control and testing. In addition to standard parameters, the plant has built in flexibility to accommodate project-specific requirements dependent upon client needs.

All phases of the Brigden coating operation, including surface preparation, pre-heat, coating application and final inspection can be conducted in an enclosed area of 18 000 ft<sup>2</sup> (1700 m<sup>2</sup>). A total area of 2.8 acres (1.2 ha.) is needed to set up the entire facility excluding pipe storage requirements.

## Safety and reliability

Bredero Shaw is an industry leader in providing a safe and healthy workplace. Demonstrating leadership in HSE performance, Brigden incorporates not only leading process technologies, but also extensive hazard elimination and safe work procedures, including integrated closed loop control systems and process automation to ensure safety, reliability, and quality of the process.

## Installed mobile facility

Brigden engineering began in January 2009 with all equipment designs finalised by December 2009. The initial deployment of Brigden has been completed at the Port of Beaumont, Texas for a world class five layer Syntactic Polypropylene insulation project to be installed in over 7200 ft (2200 m) water depth in the Gulf of Mexico. The Brigden assembly crews arrived at Beaumont in mid-March, with the initial modules. Complete installation of the coating facilities, including a fabric building, coating equipment, end cutback robotics, laboratory, and management/administrative facilities, was completed in mid-May.

The Brigden facility will compress the overall project schedule and reduce risk as the steel pipe is received directly from ocean cargo vessels within the Port of Beaumont and the plant location allows direct deepwater access to berths with water depths of 40 ft (13 m). Coated pipe is loaded and shipped directly to the installation vessel or welding facility, reducing costs and minimising fatigue due to double handling and associated transportation. Public road transit is eliminated for both bare and coated pipe, mitigating all exposure to liabilities arising from traffic accidents or damage.

## Unique benefits

Brigden incorporates the latest in capable, safe, and reliable pipe coating technology and employs Bredero Shaw's industry leading processes to deliver superior products in locations not served by fixed plants. But perhaps the most significant benefit Brigden offers to customers is the essential role of Bredero Shaw's engineering, mobile technology, and operations personnel and their ability to deliver an end to end solution option wherever and whenever it is needed. The industry now has a new option. 