OTD Operations Technology Development

Evaluation of Below-Ground, Pipe-Surface-Preparation Tools

In this project, researchers investigated and evaluated new pipe-surface-preparation tools with the potential to improve the surface-preparation process for below-ground piping applications.

Project Description

Current methods for preparing and cleaning underground gas-pipe surfaces can be time consuming and difficult to conduct.

Common techniques include the use of hand wraps, pneumatic de-scalers, wire wheels, and sand blasting. However, these surface-preparation methods are labor intensive, inefficient, and can create airborne particulates. They also require the operator to spend considerable time in the trench to clean the underside of the pipe in a uniform manner.

In this project, a research team investigated technologies with the potential to reduce operator trench time while providing more uniformly cleaned surfaces.

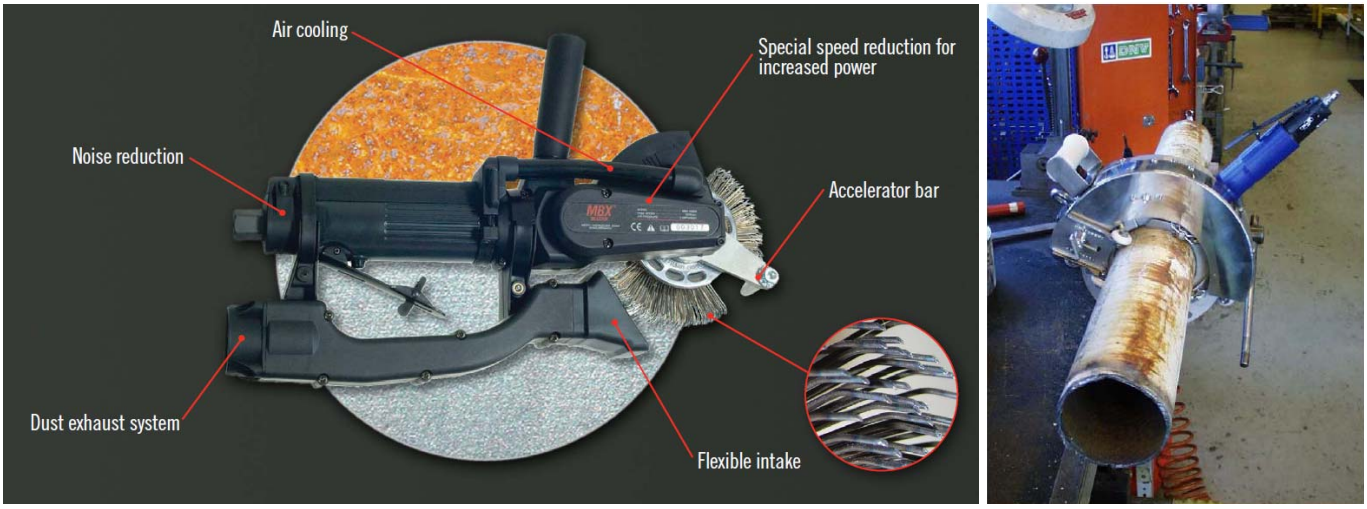
One of the products under investigation was the Rustibus® Pipe Tool, a new machine designed for de-scaling and cleaning outer pipe surface (360 degrees) in one operation. It has been used to clean horizontal steel pipes in refineries, ships, and on offshore installations. The cleaning process is executed with rotating hammers with an attached cemented carbide unit hammer to scrape off the coating and rust on the pipe surface. Rustibus is a clamp-on system and includes models designed for various pipe sizes ranging from 4-inch to 12-inch outside diameters. The system is driven by air and simple to operate, with no extra tools or skilled labor required. The Rustibus can hammer and scrape off coatings and rust at a capacity of up to 75 linear feet per hour.

Researchers also examined the MBX® Bristle Blaster® Technology from MONTI-Werkzeuge GmbH, based in Bonn, Germany. The MBX system is a new process that uses a specially designed rotary bristle tool for achieving both corrosion removal and an anchor profile. The rotating bristles are dynamically tuned to the power tool, which results in impact and immediate retraction of the bristle tips from the corroded surface. The bristle tips strike the corroded surface with kinetic energy that is equivalent to grit blast media, generating a texture and visual cleanliness that mimics the grit-blasting process. The tool has excellent mobility and eliminates the need for complex equipment, work suites, breathing apparatus, and grit-recovery systems that are commonly required for ordinary abrasive-blasting processes.

Other pipe-surface-preparation/cleaning tools were also reviewed. Depending on the results, a future phase may further develop and refine tools for wider applications.

Deliverables

Research results were presented in detailed reports to project sponsors.



The MBX Bristle Blaster (left) and the Rustibus Pipe Tool (right).

Benefits

The commercially available Rustibus pipe-cleaning tool, MBX hand tool, and possibly other pipe-preparation tools have recently been developed and may provide improved efficiencies when compared to currently used tooling.

Benefits of the new pipe-preparation tools include:

- Consistent, clean surfaces around the entire pipe circumference due to an automated, clamp-on system
- Improved pipe profiles
- Cost-effective and environmentally friendly operations
- No damage on existing neighboring pipelines, coatings, or valves during operation
- Ergonomically friendly operations.

Applying such power tools to clean or prepare pipe surfaces in support of repair and maintenance operations could provide an improved and uniform pipe surface with significantly reduced labor cost.

Technical Concept & Approach

Phase 1 of this project focused on the investigation of new, advanced, commercially available tools in comparison with surface-preparing tools that are currently used (e.g., wire wheels and/or de-scalers) and sand/grit blasting. The efficiency and the surface cleanness/ profiles performed by these new tools in both simulated and field conditions will be compared with those cleaned by manual tools.

Specific tasks included: an industry survey and review, laboratory testing, and field evaluations.

Results

In 2012, a survey questionnaire was prepared and sent to project sponsors. Survey results were summarized in a report.

According to survey respondents, hand tools (e.g., knives, water spray, hammers, metal files, pneumatic chippers, and wire brushes/wheels) were the most commonly used surface-preparation tools. However, grinders, de-scalers, and grit blasting were also used.

The coatings being removed with surface-preparation tools include fusion-bonded epoxy (FBE), wax tape, and coal tar.

Survey results show that surface-preparation tools are used for pipe leak repair, installation of service tees, and fitting-leak repair.

A variety of tools were reviewed, including:

- **Rustibus Tools (**products include the Walk Behind Series, Hand Series, and Pipe Series).
- **Pinovo Tools** (e.g., PiBlaster and PiCo) from Pipeline Solutions AS
- **The MBX Bristle Blasting System**
- **3M™ SandBlaster™Clean-N-Strip Discs**

The research team identified candidate pipe-preparation tools for testing: Rustibus® Pipe, PiCo Pipe, the MBX system, Rustibus® 20, and PiCo Midi.

Rustibus Pipe, PiCo Pipe, and MBX system were tested on straight pipes. MBX, Rustibus 20, and PiCo Midi were tested on the pipes with fittings. The wire brush and grinder with 40-80 grit paper disc were included in the laboratory test as benchmark tools for evaluating the new tools. A five-foot long straight pipe with FBE coating or thick scale/rust was tested with different tools for a comparison test. The new tools were also tested with bare pipe containing deep corrosion pits to evaluate their capabilities to clean the pitted pipe surface. Tests were conducted with barriers installed on the sides and bottom to simulate trench conditions in the field.

Testing at controlled ambient conditions was conducted in the laboratory, followed by tests at field sites that covered the potential field conditions mostly encountered for the utilities.

Status

The research team completed the laboratory and field evaluation of the candidate pipe tools. Results were summarized in a Final Report.

For more information:

Maureen Droessler
Program Administrator
Operations Technology Development, NFP
Phone: 847/768-0608
maureen.droessler@otd-co.org