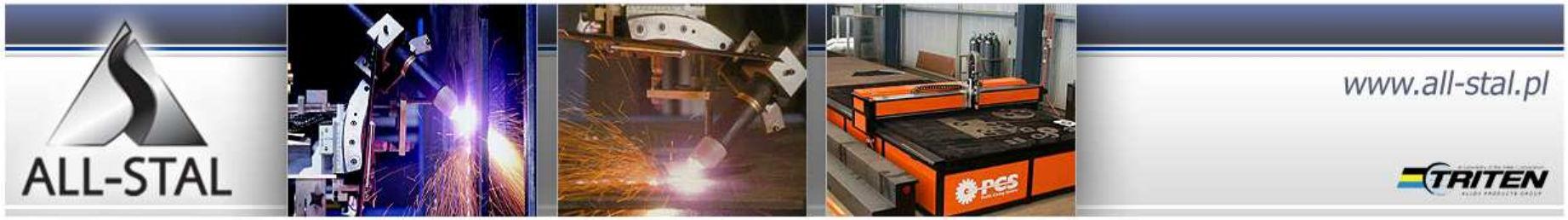

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CAPITAN
The Professional Weld Overlay Specialists

" Weld Surfacing of Small Pipe Interiors

Two SAW systems were developed to facilitate the technical

requirements of weld surfacing the interior of small-diameter pipe.

A 15-ft-diameter, 100-ft-long (4,5 x 30,5-m) vessel of Cr-Mo base material clad with a 300-series type of stainless steel will normally display a considerable number of nozzles, ranging from 2 to 36 in. in diameter (50 to 915mm) and 8 to 100 in. long (200 to 2500mm). As a general practice, the majority of users of such vessels will ask the engineers to design the nozzles with an internally welded surface to match or to be compatible with the cladding of the vessel.

When a number of the above-described nozzles must be internally weld surfaced and the weld deposit must meet very specific requirement, it is clear that special welding equipment must be custom developed, built and technically suited to the project. Such equipment has been developed in Calgary, Alberta, Canada; the machinery can deposit weld cladding inside of pipes of the dimensions described above.

SAW System for Long Lengths of Pipe

This system (known as Giraffe SAW) is capable of using the submerged arc welding (SAW) process to internally surface pipes with a minimum 4-in. (100mm) ID and a maximum length of 200in. (5000mm). The system is designed to drive a 5/64-to-3/32-in. (2-to 2,4-mm) diameter filler metal through a body 215 in. (5500 mm) long, along with a pressurized line of flux and a welding power cable.

The Small-Diameter SAW System

This system (known as Mosquito SAW) is a miniaturization of the one designed for longer pipe lengths, but with a more complicated construction.

It can internally perform SAW surfacing of pipes from 2- to 4-in. ID, with a maximum length of 40-in. (1000 mm). The equipment is a water-cooled SAW system working in the push mode only.

Due to its unique design, a 0,045- to 0,065-in. (1,2- to 1,6-mm) diameter filler metal can be pushed through its main body length of 47 in. (1200mm), even though at the end of it, because of the very reduced dimensions of the welding head, the filler metal must be bent nearly 90 deg.

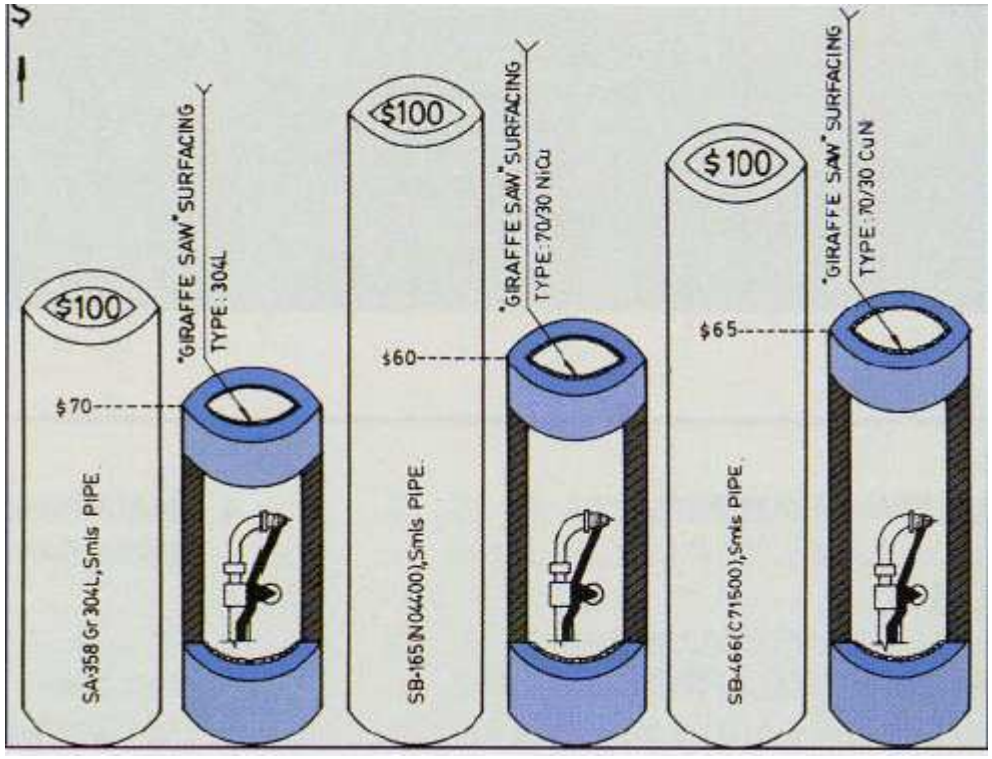

Fig. 1. Cost comparison chart of solid pipe versus SAW internal weld surfacing.

Technical, Productivity and Weld Quality Considerations

The SAW system, in general, is well known for its high productivity, weld quality and its easy applicability.

No other weling process (GMAW, SMAW or GTAW) can compare to the SAW process when 100% quality weld surfacing is require, yet none of the mentioned welding processes (including SAW) will be feasible to surface pipe interiors when conventional equipment is used. From a productivity point of view, the SAW process is a high performer.

Economical Aspects of Weld Surfacing of Pipe Interiors

Besides the suitability of the SAW system for long pipe system for long pipe lengths from a strictly technical point of view, it is also an economically feasible process, as documented by the number of projects already completed with it.

Because the system allows internal weld surfacing of carbon or low-alloyed pipes with different types of cladding, the only proper way to test the quality of the process is to compare an internally weld-surfaced pipe to a solid pipe of the same material as the weld surfacing. In a job-site cost study, three composition types of weld surfacing deposit (304L, 70/30 NiCu, 70/30CuNi) inside of a SA-105 pipe (6-in. diameter, 120 in. long) were compared with a matching solid-wall (dimensionally identical) pipe of SA 358 Gr. 304L, SB-165 and SB-446 (70/30 CuNi). The results are shown in. Fig. 1.

Conclusions

1) From a functional point of view, the SAW systems developed in Calgary, Alberta, Canada are completely feasible and reliable.

2) From a technical point of view, the two SAW systems proved to be suitable for special projects with specification requirements otherwise difficult to meet.

3) Economical, the two systems allow the manufacturing of very sophisticated equipment at a lower cost.