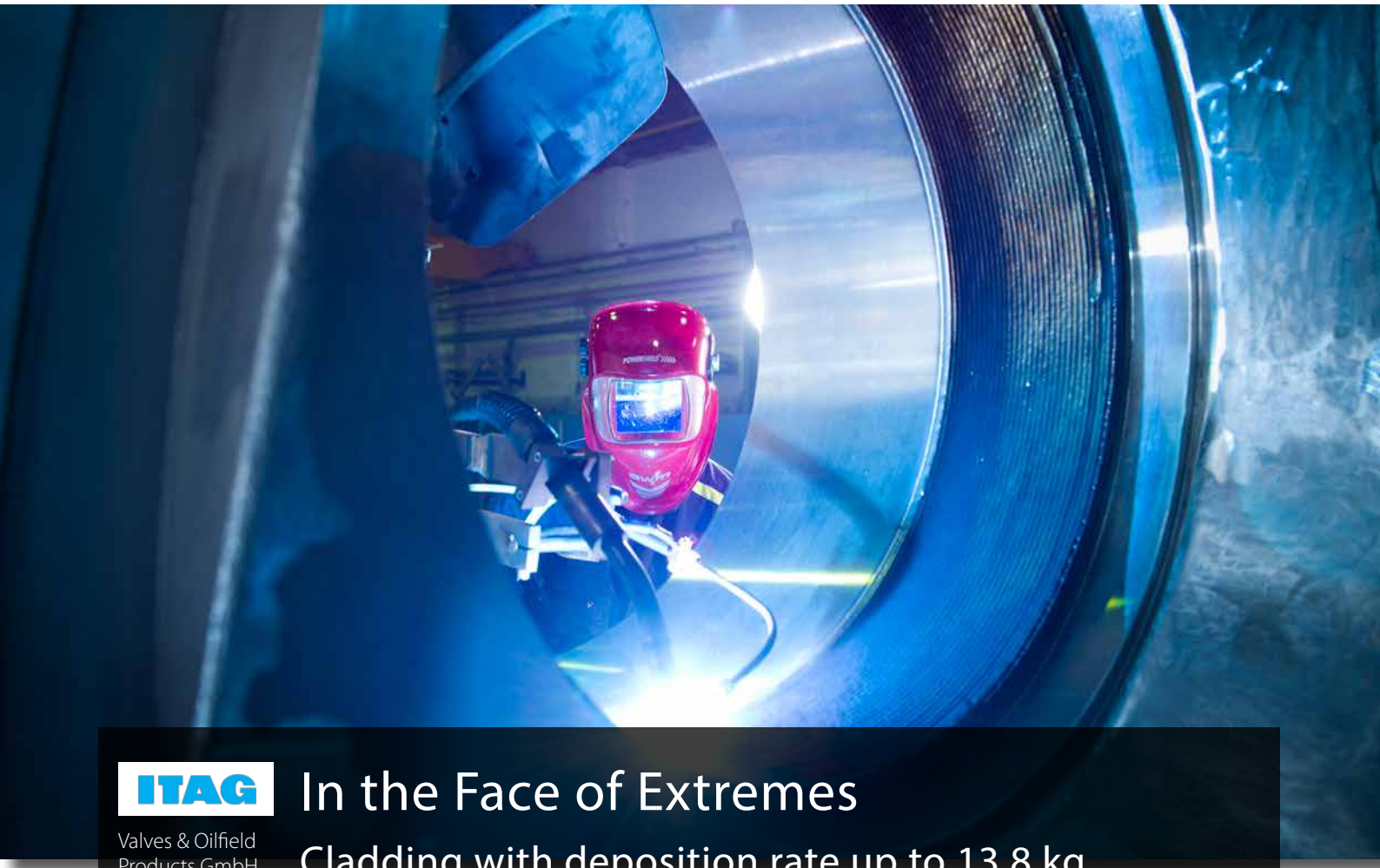
ewm®
WE ARE WELDING

CustomerStory



ITAG
Valves & Oilfield Products GmbH

In the Face of Extremes

Cladding with deposition rate up to 13.8 kg

Driven by pressures up to 250 bar, black fluid flows through the pipes. It has done so for at least a quarter of a century. Day and night. Buried deep beneath the earth or exposed to the relentless moods of nature, be they the heat of the Saudi Arabian deserts or the extreme cold of Siberia.

As long as the fluid keeps flowing through the pipes, there is very little danger. But at every shut-off valve and every ball valve there are recesses that disrupt the flow. The crude oil collects at these points in the valves, giving its more aggressive components the chance to attack the surface unimpeded. As a result of the corrosion process, ions are released from the material that make the fluid still more acidic and aggressive. This means that a valve with an expected service life of 25 years can be practically eaten away within just six months.

Withstanding aggressive media

ITAG, a German company based in the Lower Saxony town of Celle, manufactures, among other things, ball valves and shut-off valves for the natural gas and crude oil supply sector. To ensure that the valves can safely withstand conditions over the full required service life, the carbon steel cast and forging blanks have a nickel-based corrosion-resistant layer applied to the inside.

A ball valve clamped in a positioner. On the right is the Phoenix 551 MIG/MAG power source with the drive 4X wire feeder and the additional tigSpeed drive wire feeder.

Special requirements for a special layer

NBA 625 is a nickel-based alloy with excellent corrosion resistance. The cladding is applied to the at-risk areas or, when particularly aggressive media are involved, across the whole surface of the valve. The dilution at the surface is limited to an iron content of five percent in order to maintain the corrosion resistance.
ITAG employs a procedure that ensures this requirement is safely met.

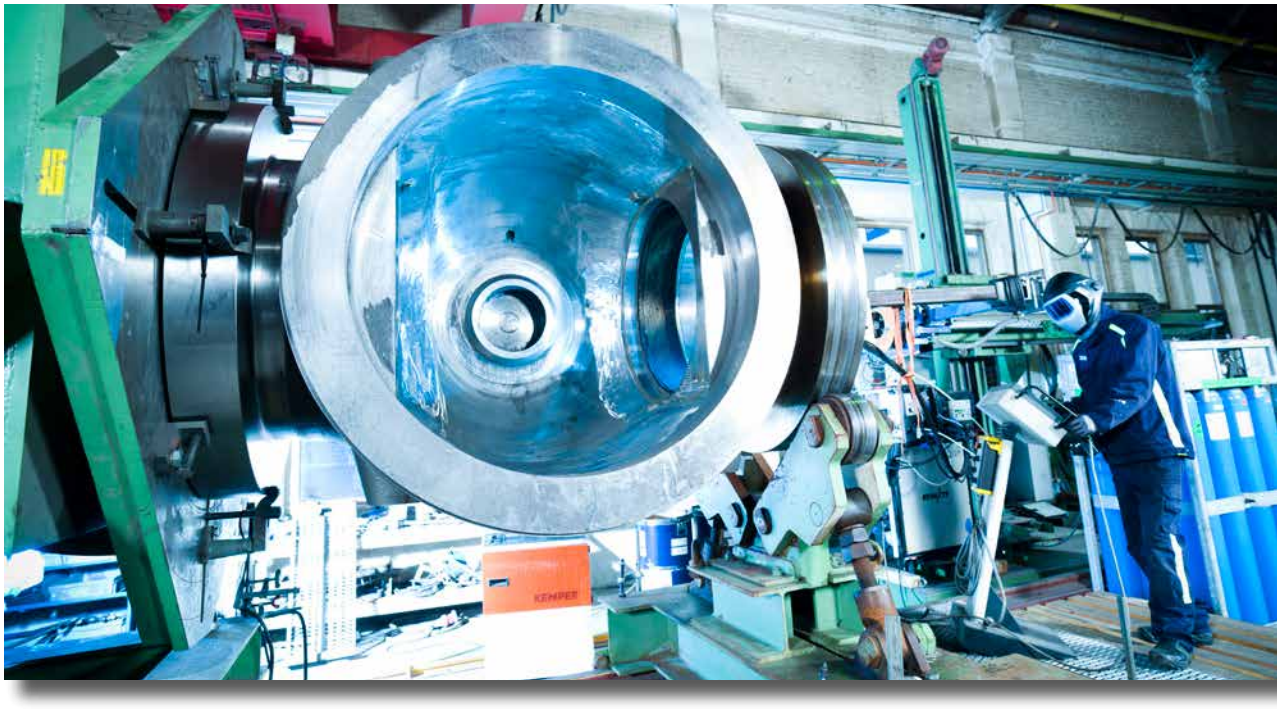
Quadruple deposition rates

TIG hot wire welding is typically used for cladding. With this method, a mechanised wire feed system continuously transports pre-heated welding consumables to the arc. At around 2.5–3 kg per hour, the deposition rate is substantially higher than with manual TIG welding.
MAG cladding is quicker still. With deposition rates of around 5 kg per hour, this technique is roughly twice as fast as TIG welding.
The requirements that had to be met for the corrosion-resistant cladding were clear: maximum deposition rate with minimum dilution.
ITAG has many years' experience with both TIG hot wire welding and MAG cladding. So it was only natural that they would combine the two. They use the Phoenix 551 MAG power source from welding machine manufacturer EWM in parallel with the tigSpeed hot wire feeder from the same manufacturer. The result is that the cladding process is not only fed with 12 metres of Inconel wire per minute, but also 12 metres per minute of hot wire from the tigSpeed wire feeder.

This doubles the feed rate, and therefore the deposition rate, in a single stroke. "We saw good results right from the first tests," reports Hans-Joachim Studte, a specialist welding engineer at ITAG.

Depending on the properties of the components, the deposition rates achieved with the combined EWM MAG hot wire welding system are between 10 and 13.8 kilogrammes per hour. This is more than double the rate of MAG welding and over four times higher than TIG hot wire welding.

The ball valve from inside showing the cover hole. The diameter is approximately 1300 millimetres.



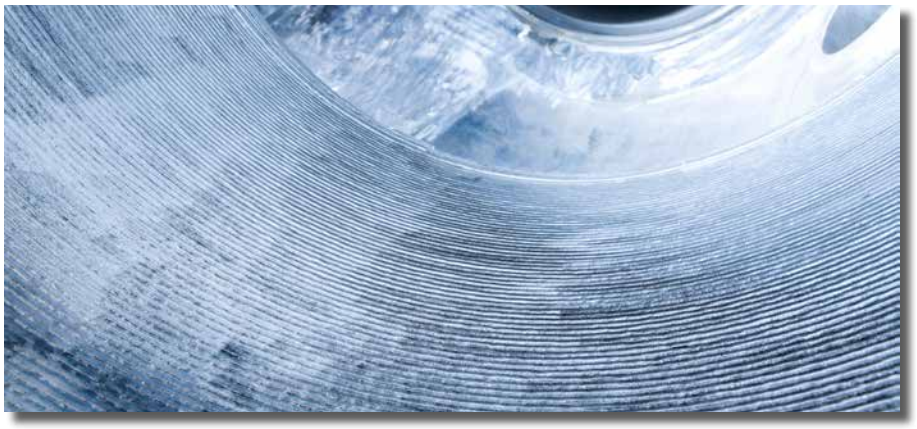
Low rippling – high productivity

The cladding is characterised by tightly packed weld beads. Each bead has a height of about 5 millimetres. The difference in height between the individual runs is only around 0.5 millimetres. By comparison, other cladding methods, such as electroslag, produce ripples measuring around 2 to 2.5 millimetres.
A second layer of cladding is applied to complete the workpiece. To achieve the required surface quality, the workpiece must be finished by machining to remove excess material. This means that larger ripples would result in more expensive material having to be removed later. With EWM MAG hot wire welding, it is enough to apply cladding that forms a layer about 1 millimetre higher than the required depth of the final layer. „It's a quick, clean and stable process – simply elegant. Just reshape the weld, and that's it, finished!" explains Studte, summarising the complete process.

Mechanised welding procedure

ITAG processes the central areas of the valve using EWM MAG hot wire welding. They achieve this using a mechanised process. The welding parameters are still set manually, but the process runs automatically after configuration. The valve is clamped into a positioner which rotates continuously. The welding torch moves in the longitudinal axis and applies one weld bead after the other until the whole area has been covered.

A second wire is fed into the arc in addition to the one from the MAG welding torch's wire feeding.



The completed welding process. Cladding is applied approximately one millimetre higher than the required depth of the final layer. This layer is then reshaped to produce the final surface finish.

High demands on the welding process and the welding machines

A very high-performance welding process is needed for this application. It must be powerful and efficient to apply large quantities of welding consumable. It must be extremely quiet and uniform to keep the dilution in the molten metal to a minimum. And it must be reliable enough to produce a uniform weld bead across the entire surface during the mechanised process.
The EWM machines, produced in Mündersbach, Germany, are ideally suited to these requirements and guarantee maximum process reliability. Because even small deviations in parameters can cause marked changes to the welding process, it is substantively important that all parameters remain constant. Consistent arc energy performance and precise, reliable wire feeding are crucial here. This applies to both drive 4X (for the Phoenix 551 MIG/MAG power source) and the tigSpeed drive45 hot wire feeding system. Such a high degree of reproducibility could only be achieved with such a delicate process thanks to the high reliability and substantial power reserves of the machines used, combined with the ability to mechanise the process.

Studte is convinced there is another factor too, "We also rate EWM highly because of their astoundingly good service." In particular, he is referring to Siegfried Lieske of Lieske & Zydra Schweisstechnik, a subsidiary of Linde Schweisstechnik GmbH in Hanover, Germany. "We just call the service centre, and half an hour later somebody is there. I have never known anything like it!"

More than happy with the high deposition rate:

specialist welding engineer Hans-Joachim Studte, Head of Specialist Welding at ITAG; Siegfried Lieske, Branch Manager at Lieske & Zydra Schweisstechnik, a subsidiary of Linde Schweisstechnik GmbH in Hanover, Germany; and welding expert Norbert Stempniewicz, Deputy Welding and Testing Supervisor at ITAG.

Kindly supported by

ITAG

ITAG Valves & Oilfield Products GmbH
Itagstraße 5-17
29221 Celle

EWM AG / Dr. Günter-Henle-Straße 8 / 56271 Mündersbach
Tel: +49 2680 181-0 / info@ewm-group.com / www.ewm-group.com

Photos:
EWM AG / ITAG GmbH