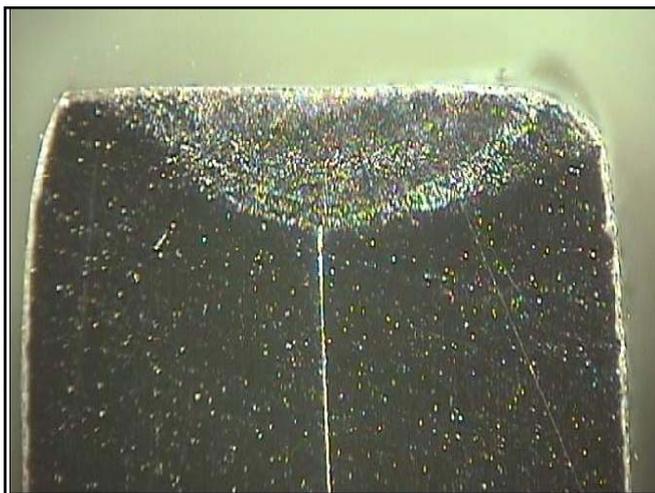


LASER SEALING

In the last decade , Flexider invested significant resources in the R&D of new processes and technical solutions applicable to double plies bellows with monitoring system.

Recently , Flexider successfully completed and tested an innovative sealing method applicable to double ply bellows manufacturing , this new method - based on the employ of laser technology - has been patented and is called F.L.W. .

This solution has been successfully applied on various jobs as expansion joints for FCC , LNG and Styrene service.



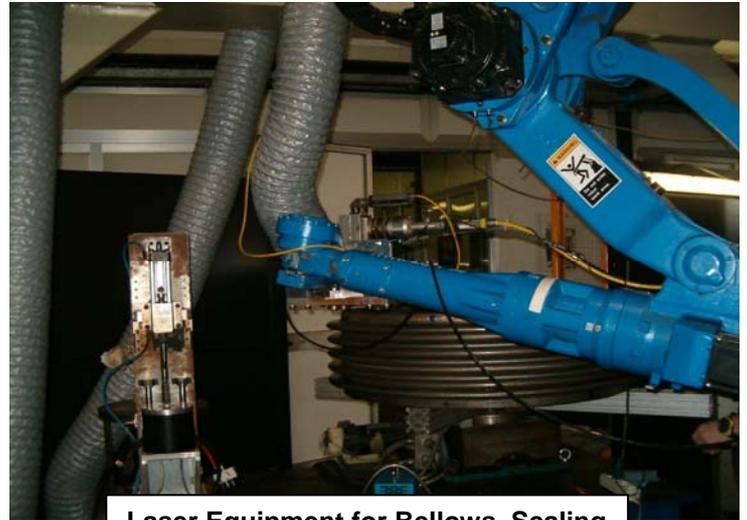
Manual Tig : sealing cross section

IMPORTANT

Even if ,both of the methods (TIG and ERW) comply with the minimum specs requirements, they can show mechanical defects resulting in a decreased Bellows cycle life

In particular , the ERW sealing method can generate micro-cracks located in the heat effected zone , these cracks have the tendency to spread from the ERW area into the base material.

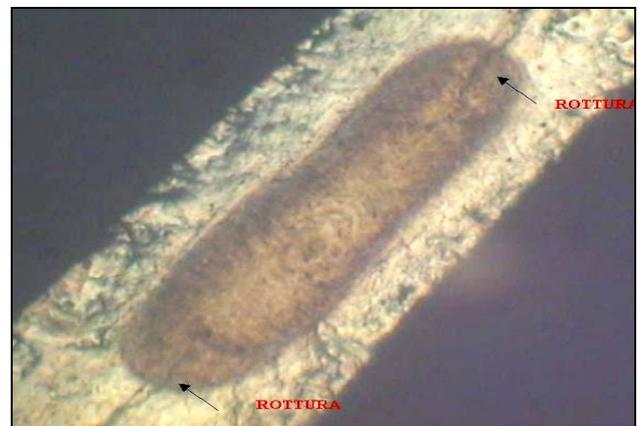
- Reliability and Innovation -



Laser Equipment for Bellows Sealing

Current sealing methods used by Flexider are:

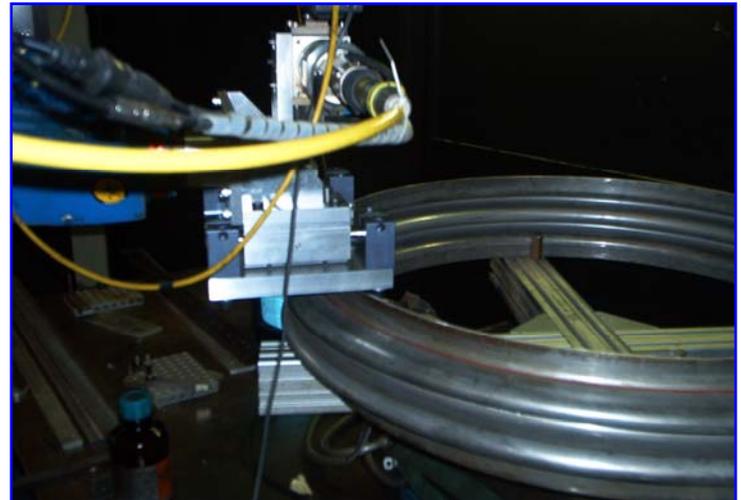
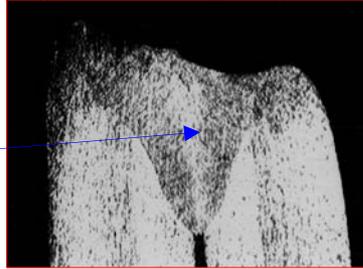
- Manual TIG welding with or without filler material (it depends on the walls thickness)
- Resistance welding (ERW) . This method implies that after sealing the monolithic core is cut with mechanical equipments .



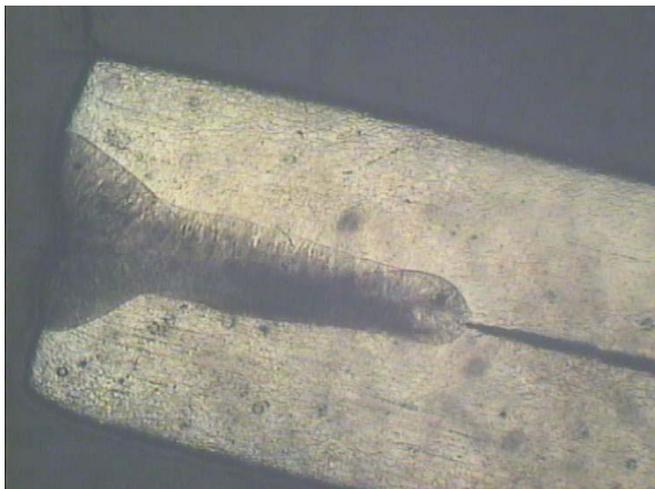
ERW : core before cutting - Microcracks

The new sealing process employed on the bellows tangent of double ply bellows gave excellent results in terms of reliability, quality and process's reproducibility. This new method represents a significant improvement in the manufacturing of the expansion joints as the results are widely above what can be obtained with the traditional sealing methods.

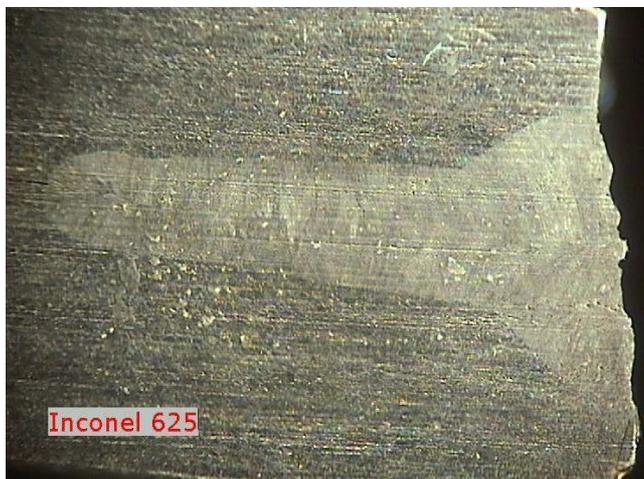
F.F.L.W. :
Cross section
Micrography



F.L.W.: laser welding in progress



F.L.W. : austenitic stainless steel



F.L.W.: Inconel 625

The reliability of the laser sealing has been tested and carried out both on austenitic steels as well as nickel alloys as : inconel 625 , Incoloy 800,825,etc.

F.L.W. : KEY ADVANTAGES

The laser sealing gives remarkable advantages both metallurgical and qualitative resulting in a product which has increased reliability in comparison with the traditional methods currently used by all expansion joints manufacturers .
 Aside pictures can give clear evidence of the main important peculiar characteristics of this method:

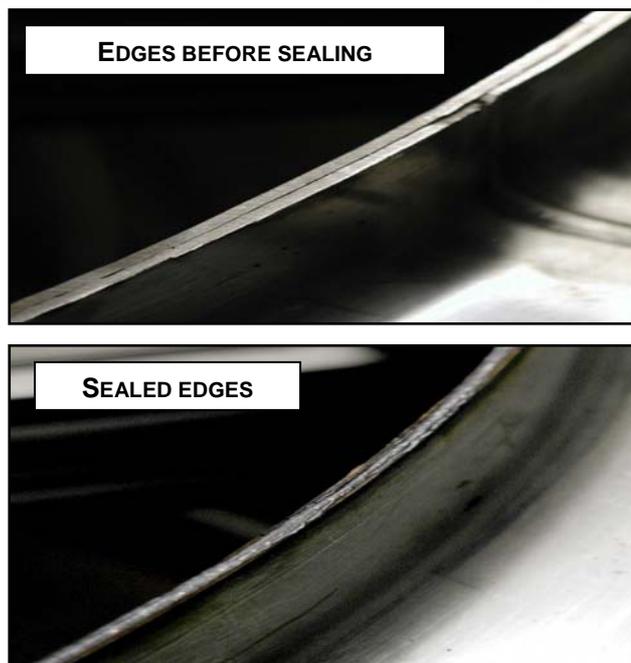
- Regular Melted Area and free of defects
- Heat Effected Zone extremely narrow
- Sealing Maximum Depth around 3 mm, minimum depth 1,8 mm
- Area Totally free of microcracks and initiations
- Sealing costs comparable with traditional sealing methods

The correct process has been completed after a severe sequence of tests aimed to optimize the process parameters and define the best conditions for the key factors as constant gap between walls , edges misalignment , specific cleaning procedures etc. .

The F.L.W. gives an additional advantage as the weld between bellows and pipe-ends is free from leakages due to excessive or uncontrolled melting of the edges, this is possible because the laser sealing can reach high sealing depth (up to 3 mm).

The F.L.W. method consents the use of high heat input together with an high welding material speed efficiency.

In manufacturing, tests after laser sealing are the same tests used for the other traditional methods as: vacuum tests with Helium Mass spectrometry, pressure leak tests, testing with sniffer probe.



For information about Expansion Joints for STYRENE, R/FCC service or other critical application, contact our Sales Engineers at the following co-ordinates:

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