

CASE STUDY

Carbontech Case study 025
N3 Nozzle repair



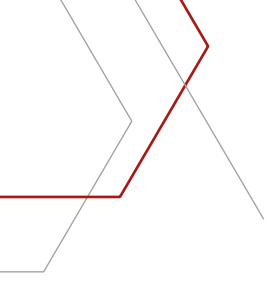


TABLE OF CONTENT

| PAGE | CONTENT |
|------|-------------------------------------------|
| 1 | Cover Page |
| 2 | Table of content |
| 3 | Anomaly Description Integrity concerns |
| 4 | The Carbontech Solution |
| 5 | Conclusion |
| 6 | Contact Details |

PROJECT DETAILS

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|------------------------------------------------------------------------------------|---------------------------------------|---------------------------------|---------------------------------------------------------------------------------------|
|  | Case Study Number CTCS:025 | Design Pressure 20.68 Bar |  |
|  | Repair Summary External corrosion | Operating Pressure 0.2 BAR |  |
|  | Client Linde Gas Singapore Pte Ltd | Design Temperature 93°C |  |
|  | Service Type N ₃ | Operating Temperature 15.5°C |  |
|  | Line Size 5" | Base Material Carbon steel |  |
|  | Line Class N/A | | |



ANOMALY DESCRIPTION

Pitting corrosion was observed on N3 nozzle piping. Pitting is observed to be 4mm deep. Remaining thickness (1.49mm) is less than the minimum requirement of 2.0mm thickness (see Figure 1).

Fig 4: N3 Nozzle

Circled in red is the extend of the pitting corrosion (+-2mm)



INTEGRITY CONCERNS

The occurrence of external corrosion in the straight pipe signifies compromised structural integrity. In consideration of the process service (N3), as well as the depth of the defect (approximately 2mm), this hazard poses a significant risk. Failure to resolve can potentially lead to loss of vital function.



THE CARBONTECH SOLUTION

To address the external corrosion (none through-wall defect), a carbon fibre composite laminate repair was applied to provide structural pressure containment as the wall loss experienced by the pipe negated the substrate's load-carrying capacity. The substrate surface preparation was done using the MBX bristle blaster to achieve a sufficient surface profile for adequate adhesion between the substrate and the laminate. The laminate was applied as a spiral wrap consisting of 4 layers for a total repair length of 380 mm and the appropriate cure cycle was executed. The installed Revowrap 110 composite repair system is fully qualified and compliant with ASME PCC-2 to meet the demands of petroleum, petrochemical and natural gas industries for various service types.

Surface Preparation achieved: SP3
Product used: Revowrap 110
Engineering calculations: ASME PCC2
Layers used: 4 layers
Post cured: Not Required



CONCLUSION

The composite repair system designed by Carbontech and satisfying the ASME PCC-2 standard was successfully installed. The corrosive nature of the process fluid and the length of the defect presented a challenge for the repair solution which was expertly addressed by Carbontech. As a non-through-wall defect repair, the laminate wrap provides structural integrity to the pipe in accordance with the required design specifications that will withstand the internal corrosion for the remainder of the required design lifetime



CARBONTECH

The place chemistry, engineering and global expertise are brought together to drive progressive innovation in advanced composite technologies for the emergency repair of critical assets "There is nothing generic about us" we don't just sell pipe wraps; we provide accurate engineering backing to deliver tailored solutions

Sound and responsible engineering is the basis on which we build our company, products and services. It is the core to our success and it is the foundation on which we have engineered and manufactured our innovative and bespoke products

We strive by a zero-failure philosophy and warrant our engineered composite solutions are tested, proven and validated. We vow to provide dependable, responsible and accurate information regarding the capabilities of our systems

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