

COLUMN SHELL CORROSION PROTECTION VERIFIED

External inspection during operation confirms critical process asset integrity, preventing forced shutdown and saving \$millions.



PROBLEM: Pitting corrosion identified inside a process column in an area below the stainless steel cladding.

SOLUTION: IGS HVTS alloy cladding was applied to protect the damaged area from further metal wastage.

PROBLEM? Asset owner's external inspection after 2 years in service suggested further internal metal wastage.

SOLUTION! IGS proprietary external inspection confirmed the integrity of the internal HVTS corrosion barrier, avoiding an unplanned forced shutdown.

Serving the World's Most Profitable Company

IGS began servicing this Middle Eastern Oil and Gas giant's mission critical equipment in 2013 with an HVTS alloy cladding application on a large De-ethanizer column.

Soon after, came the first applications for this asset owner's gas plants, where stripper columns (also known as the regenerators) have been protected from aggressive internal pitting corrosion. In 2015, applications at three more gas plants were performed.

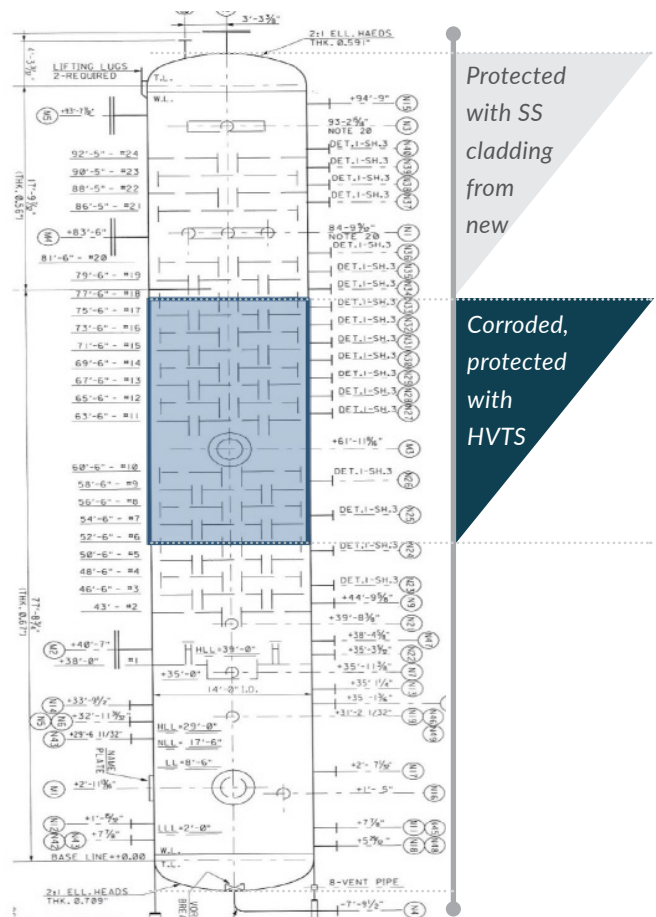
Corrosion Coming Down the Column

Pitting corrosion within these vessels typically appears in similar locations, e.g. below the original stainless steel cladding protection.

Condensation typically occurs only above the trays in the top dome, however, operating conditions can lead to corrosion coming down the column. This leads to metal wastage problems below the clad section, or where the feed comes in from the reboiler.

HVTS Alloy Cladding Application

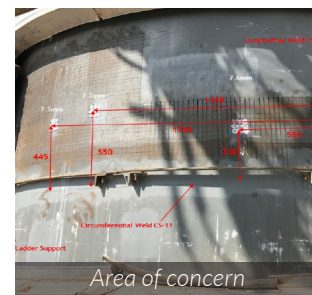
This case study focuses on the HVTS alloy cladding application performed on one of the two trains at this asset owner's gas plant in 2016. Corrosion in that train (Train 2) was more aggressive than in its companion (Train 1) where the same scope was completed a year before. IGS HVTS was applied on a 140m² area between trays 6 and 18.



GA drawing of the Train 2 Stripper Column

Ongoing Standard NDT UT Inspection | Startling Results

The plant operator continued to perform regular external NDT/UT inspections to monitor the column shell thickness. In 2018, two years after the HVTS application and two years before the next scheduled shutdown in 2020, they started recording readings between trays 15 and 17 that seemed to indicate a loss of shell thickness. An emergency forced shutdown was being considered to allow for an internal inspection to verify the corrosion barrier's (IGS HVTS cladding) integrity.

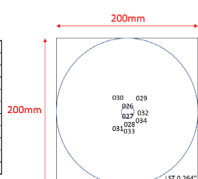


IGS Proprietary NDT Inspection Performed

The IGS Senior Inspection Specialist together with the Senior Materials & Corrosion Engineer of the asset owner and the gas plant Inspector, assessed the HVTS cladding condition using a proprietary inspection technique developed by IGS. This external inspection technique uses a device that has been specifically calibrated so that the inspector can identify not only the shell thickness but also the integrity of the IGS HVTS cladding on the internal vessel surface with advanced waveform analysis.

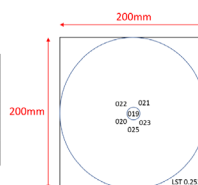
The plant inspection results were concerning as some wall thickness readings were lower than the recorded minimum thickness' in 2016. The IGS external inspection confirmed the integrity of the internal HVTS cladding, demonstrating that the lower wall thickness existed prior to the application in 2016 and that no further internal metal wastage had indeed occurred. The shell was still protected.

Area	Location	Signal	Readings
B	026	CI	16 mils; 406 um
B	027	CI	20 mils; 508 um
B	028	CI	13 mils; 330 um
B	029	CI	15 mils; 381 um
B	030	UI	-
B	031	CI	13 mils; 330 um
B	032	CI	13 mils; 330 um
B	033	CI	20 mils; 508 um
B	034	CI	18 mils; 457 um
B	Center	CI	0.264 inches; 6.7 mm



Area A measurement

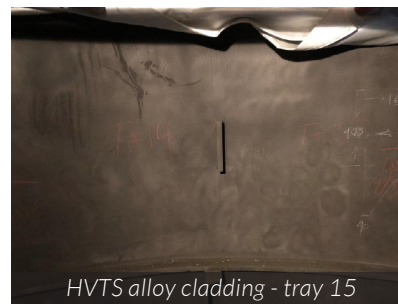
Area	Location	Signal	Readings
A	019	CI	14 mils; 356 um
A	020	CI	14 mils; 356 um
A	021	CI	20 mils; 508 um
A	022	CI	20 mils; 508 um
A	023	CI	19 mils; 483 um
A	024	CI	15 mils; 380 um
A	025	CI	18 mils; 457 um
A	Center	CI	0.253 inches; 6.4 mm



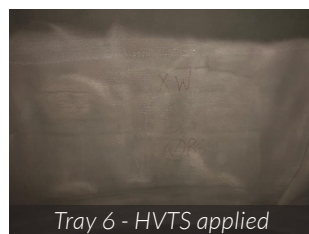
Area D measurement

2018 Actions and 2020 Shutdown

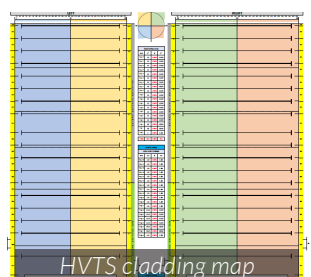
The internal IGS HVTS cladding integrity was accepted by the asset owner, who canceled the emergency shutdown, keeping the train in operation. A forced shutdown would have cost millions of dollars, halting production for several days, if not weeks. The column was ultimately opened during a planned shutdown in 2020. The internal inspection results confirmed the findings of the external IGS inspection. The IGS HVTS alloy cladding applied in 2016 has not corroded or worn away, it is still protecting the column from aggressive operating conditions and no further internal metal wastage had occurred.



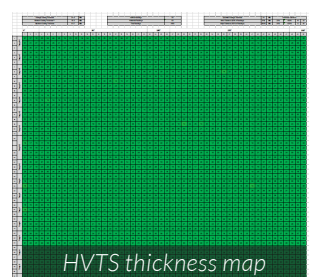
Tray 6 - before blasting



Tray 6 - HVTS applied



HVTS cladding map



HVTS thickness map

Executing Extended Scope

During the internal inspection of the column it was discovered that the area below Tray 6, which did not have any existing internal protection, was found to be severely corroded requiring urgent mechanical repair to rebuild wall thickness.

After completing the weld repairs, IGS HVTS cladding was applied to the area to further protect the column from internal corrosion, stopping metal wastage in this critical process asset and avoiding future forced outages.