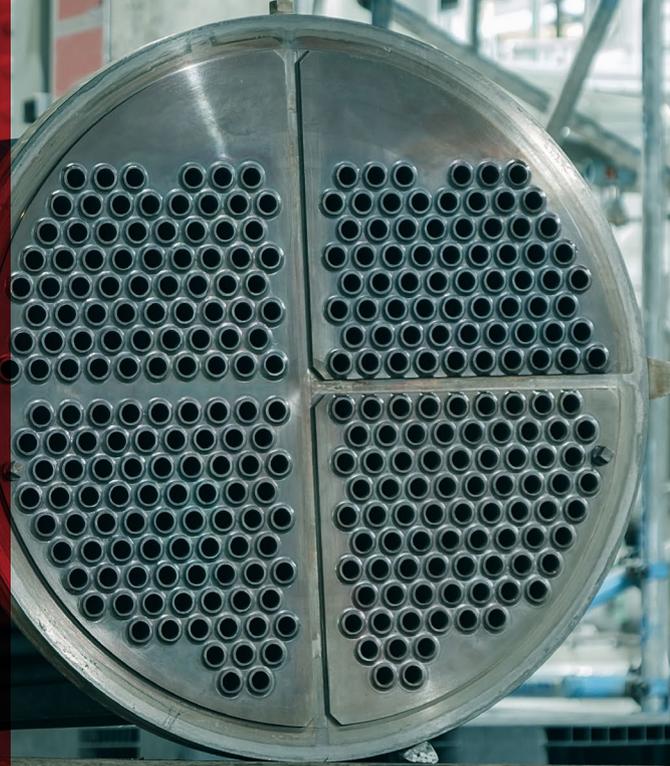




Explosion Clad Titanium Meets Debutanizer Condenser Challenges

With its roots going back to the early 1900's, Therco-Serck produces an array of heat transfer equipment in the heart of UK's high-tech manufacturing industry. The company combines holistic design activity with cutting edge manufacturing techniques to deliver world class heat exchangers to the marine, power generation, petrochemical, oil & gas markets.



EXECUTIVE SUMMARY

Due to its high strength to weight ratio and excellent corrosion resistance, titanium is a common material of construction for heat exchangers in chemical, petrochemical, oil & gas environments. Titanium to carbon steel explosion clad heat exchangers have proven to be a reliable and cost effective alternative to solid titanium. For Therco–Serck’s price sensitive, critical project NobelClad explosion clad met all the requirements:

- Cost effectiveness
- Strength and corrosion resistance
- Long term processing reliability

CHALLENGE

Therco–Serck was called to replace two bundles for large, TEMA type AES debutanizer condensers in a highly corrosive process environment. Maintaining thermal performance and key plant interfaces while increasing the assets life expectancy was of paramount importance to the oil refining end user.

In TEMA type AES heat exchangers, the floating head is internal to the shell. Usually the heat exchanger is designed with the corrosive fluid on the tube side. In this case, both the shell and tube side media were corrosive. While remaining focused on delivering operating expenditure reductions for the client, the usual pressure on capital expenditures (CAPEX) meant that deploying solid titanium would challenge the commercial viability of this project.



Early project collaborations with market leaders such as NobelClad really enhances Therco–Serck’s overall value proposition for its clients. Being able to deploy corrosion resistant alloys using explosion clad plate, in a timely manner was a big win for our end-user.”

– Rob Sawtell
Managing Director
Therco–Serck

SOLUTIONS

In order to address these parameters, Therco–Serck and the end user agreed upon titanium dual clad tube sheets, titanium tubes and baffles, along with a titanium loose lined, carbon steel floating head.

Explosion cladding is used to bond two dissimilar metals while retaining the mechanical, electrical and corrosion properties of both. The use of clad materials offers corrosion resistance of alloys while allowing the use of lower cost carbon or stainless steels to meet pressure requirements. All clad plates are 100% automated ultrasonic tested for bond quality. Shear strength must be no less than 20,000 psi in order to meet ASTM B898 — 20: Standard Specification for Reactive and Refractory Metal Clad Plate. Due to the high quality of the bond, the clad plate may be treated as a solid plate during manufacturing and operation.

RESULTS

NobelClad's explosion clad plates were an important ingredient in meeting the demanding nature of this project. Timely delivery of the high integrity dual bonded plate— along with the requisite certification and Non-Destructive Examination (NDE) reports— meant that Therco–Serck's machining and drilling could be completed ahead of receiving the titanium tubes and commencing bundle fabrication.

With further extensive NDE performed during fabrication, particularly on the tube to tubesheet welds, the finished bundles (with floating heads) were subjected to shop based, tubeside pressure testing prior to dispatch. With performance maintained and a reduction in ongoing plant interventions due to the deployment of Corrosion Resistant Alloys (CRAs) in these condensers, the subsequent, albeit undisclosed return on investment on this project is expected to be significant.