CASE STUDY
CUP-BB2 HOL CONFORMACLAD COATING

12 x 16 x 21 HOL Conformacald Drop-In

Industry:	Oil + Gas - downstream oil
Region:	Americas
Territory:	USA
Category:	Drop-In replacement
API Type:	BB2

ClydeUnion Pumps Aftermarket Technical Services team has experience across a range of services on critical rotating and reciprocating equipment to improve operational safety, reliability and efficiency. The drop-in replacement of two original Bryron Jackson pumps for the oil and gas market is one of our success stories documented in our library of case studies. These case studies highlight the requirement from the customer, how we achieved the goal and the process we followed to deliver the improvements.

Image left: Casing with wear plate

Situation

This project expands upon a previous replacement pump project where two original Byron Jackson pumps were replaced with ClydeUnion HOL “drop-in” replacements provided with TMT coated internal wetted parts. The service life of TMT coating proved acceptable however, the customer maintenance engineering had experienced better service life in abrasive services utilising the Conformaclad coating over the TMT coating.

Based on the expected increase in service life, design changes to the pump were made to accommodate testing prior to and after the addition of the Conformaclad coating. In addition, the replaceable wear plates were eliminated from the design, traditional wear parts including case and impeller wear rings were made integral with the covers and impeller, also coated with Conformaclad.

The FCC catalyst slurry contains approximately .1 to .3 percent solids by weight. The design capacity of the pump is

Erosion at cutwater

5,000 USgpm, with a normal pumping temperature of 680 °F. Typical service life of the TMT coated parts was approximately 2 years. Retired TMT coated casings were severely damaged by erosion caused by catalyst fines.

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Challenge

The request by the customer to utilise Conformaclad coating presented many challenges in the re-design and manufacturing phases of the project.

The first requirement was to select materials that were suitable for cladding. The initial request was for a CA6NM casing and impeller. This material was determined to be unsuitable as the current process for cladding includes a (TIG) welding process which adds Conformaclad material to cover bare metal where cladding was incomplete. The inability to perform a post weld heat treat process after cladding would result in the presence of untempered martensite, which could lead to cracking of the casing. ASTM A216 WCB was selected for the casing.

The next challenge was to design the casing, covers and impeller such that hydrostatic and performance testing could be performed prior to and after coating. The final thickness of the coating is approximately .030", and with integral wear rings, allowances in the design were made to minimise weld build-up of case, cover and other fits after initial testing. In addition, a step-by-step manufacturing process was developed due to the necessity to alter dimensions for cladding after initial testing.

The final challenge included prediction of shrinkage of casing and cover fits after processing/cladding at 1,900 °F.

The technical specifications on the Conformaclad coating are as follows:

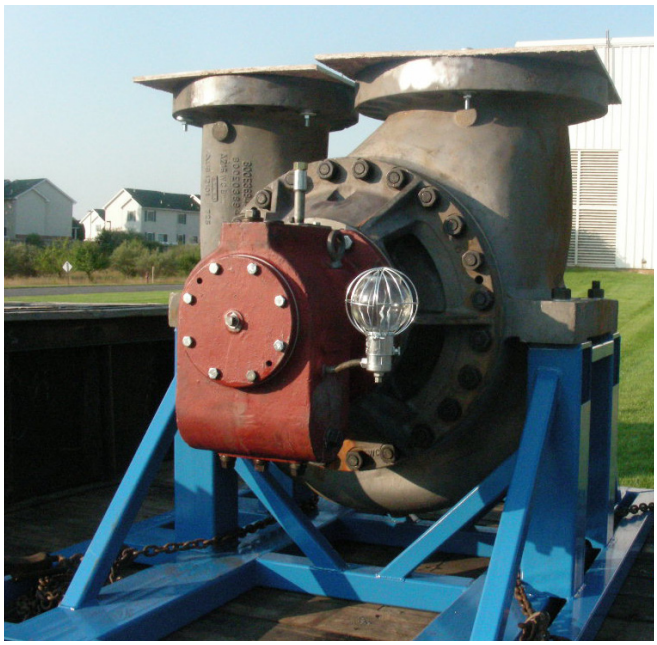
- **Formula:** WC 100P
- **Composition:** 48% Tungsten Carbide with Cobalt Binder
  38% Nickel
  8% Chrome
  6% Other
- **Temperature rating:** 1,700 °F max
- **Hardness:** 56 to 62 RC
- **Application thickness:** .020" - .060"

Solution

- Redesign existing drop-in HOL for application of Conformaclad coating
- Manufacture and test pump

Financial illustration

- Service life of original HVOF coated pump – 3 years
- Service life of TMT coated pump – 4 years
- Expected service life with Conformaclad coating – 6 years
- Estimated pump cost - $250,000
  (TMT or Conformaclad coating)
- Estimated cost savings of Conformaclad pumpover TMT coated pump - $125,000
- Routine maintenance cost estimated at $20,000 per year



Completed pump

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