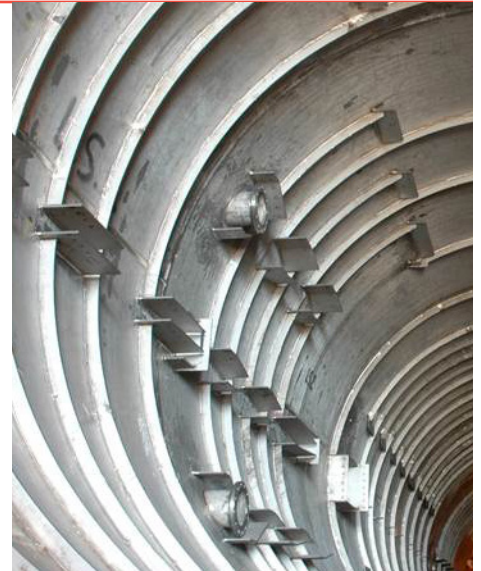


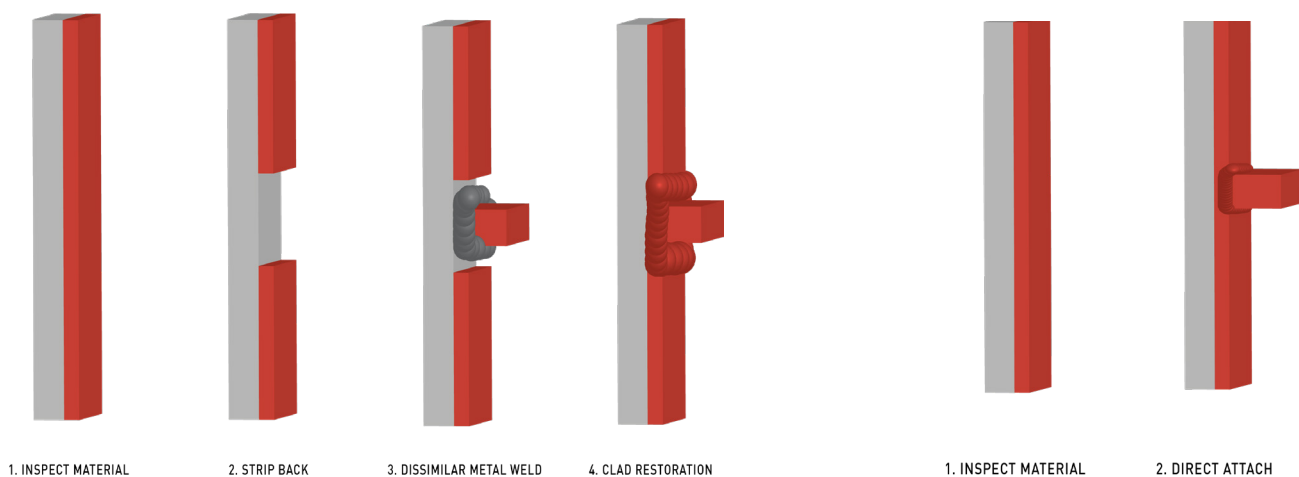


LOWER COSTS AND SHORTEN DELIVERY TIME FOR FABRICATED CLAD EQUIPMENT WITH DIRECT ATTACHMENT



Fabricated equipment is a 'long lead item' for most projects. When that fabricated equipment is made from clad, it can become the schedule bottleneck. Usin clad made from stock metal can save time but comes at a significant cost. Qualified clad from NobelClad allows fabricated equipment to accept direct attachment of internals, saving owner companies significant time and money.

Applying rigorous specification to clad metal can allow designers to weld internal attachments directly to the clad surface. Many of today's equipment specifications require the fabricator removes the cladding ('strip back'), replace it with overlay and then weld the attachments to the overlay (or make a dissimilar metal weld to the steel), finished with a clad restoration overlay. The process of stripping back and redepositing overlay is both time consuming and expensive. In cases where the integrity of the clad bond is uncertain, removing the clad is a prudent course of action, even if it is expensive. What if instead, the clad material can be 'qualified' to meet exacting standards? What if the bond could be proven to meet or exceed the strength of the base metals? Then attachments could be welded directly to the clad surface without any hesitation or concern.



**NOBELCLAD'S QUALIFIED CLAD METAL HELP OWNERS AND
ENGINEERS MEET DEMANDING TIMELINES AND BUDGETS**

QUALIFIED CLAD FOR DIRECT ATTACH

WHAT IS QUALIFIED CLAD?

When engineers demand clad be produced to a higher standard, it can allow designers to consider it qualified to handle the rigors of directly attaching internals. There are four main attributes that set qualified clad apart from regular clad material - shear strength, UT coverage, UT acceptance criteria and bondzone tensile testing.



Through bondzone, welded, z-direction tensile specimens. On the left is roll bond clad that isn't qualified – brittle failure in the bondzone at room temperature. On the right is Qualified Explosion Welded Clad from NobelClad – ductile failure in the base metal at elevated temperature after PWHT.

The quality of any clad metal bond is measured against four key requirements:

Requirement	Base Specification*	Qualified Clad
Shear Testing per ASTM	20 ksi (140 MPa) minimum, only if invoked	50 ksi (345 MPa) minimum
Ultrasonic Testing Coverage	'sufficient to provide the quality level'	100% coverage
Ultrasonic Testing Acceptance	Class 1, 3, or 5 can be selected with as much as 5% of the plate unbonded	Class 1
Through Bondzone Tensile	None Required	Per DMC 100 S12**

*Base specification ASTM A263, A264, or A265

**DMC 100 is available upon request

BONDZONE TENSILE SPECIMEN DESIGN

