



# Clad Metals: Balancing the Economics of Crude Distillation

With over 50 years of experience, NobelClad is the proven leader in explosion welding and offers the largest collection of clad metals in the world and unmatched, local service in oil and gas markets.

## The Fundamentals of Sour Crude Distillation

Oil refineries are some of the most complex in the world<sup>1</sup>, and they are growing more dependent on corrosion-resistant alloys to process a wide range of crude oil as conventional crudes become more sour, with higher sulfur content.

Refining sour crude is a multi-step, highly corrosive, hot process. The first step, atmospheric distillation, separates crude oil into petroleum products, or cuts. Oil passes through a boiler, creating a hot mixture of liquid and gas. The mixture moves to a tower where gases rise, and residual molecules remain at the bottom. When the gases rise, different temperatures condense them to liquids, and throughout the distillation unit, trays pipe off distilled petroleum products, like kerosene, heavy fuel oil, and propane.

After atmospheric distillation, many refiners separate leftover oil residue to valuable products using vacuum distillation. Vacuum distillation passes the residue through a distillation unit, which is a highly corrosive, low-pressure, and stressful processing environment, that separates petroleum products into valuable blends like gasoline.

When operating these technologically sophisticated networks of crude oil furnaces, distillation towers, and heat exchangers cost revenue, using clad plates to modernize or build distillation units is smart business. That is why many end users switched to large Detaclad™ plates—plates that resist shear, tensile, bend, and fatigue stress, backed by NobelClad's over 15 years of research & development and over 50 years of clad metal expertise to balance the economics of modern-day distillation units and equipment.

<sup>1</sup>According to Nelson Complexity Index

## Large Plates for Crude Distillation Units

Large plates are at least 4.8 meters wide and more than 12 meters long, and typically are made from clad of stainless steel, nickel alloys and reactive metals. The high pressure and temperature environment combined with the variety of chemicals in distillation units makes them one of the most important pieces of equipment in the oil and gas industry.

Responding to sour crude's rise, several refiners along the Gulf Coast of the United States turned to explosion welded clad to add strength and corrosion-resistance to column designs in recent years, and at a fraction of the lifetime cost of traditional solid carbon steel columns.

Explosion welding is a solid-state, cold welding process that uses precise detonations to force, or bond, dissimilar metals together while preserving the physical, mechanical, and corrosion-resistant properties of each metal. Explosion welding is the only practical, cost-effective method to produce durable, high-strength bonds between large sheets of stainless steel and nickel alloys, cladding metals that add strength and corrosion-resistance, and carbon steel, a base metal that withstands high-pressure processing environments.

Many distillation units are constructed with different cladding metals, such as austenitic or ferritic stainless steel at the tower's bottom and middle, and nickel alloy at the tower's top. Each clad section helps the equipment meet the corrosion and temperature needs of every phase in the crude distillation process.

The functional benefits of using clad in these applications are many—from lifetime equipment savings to design flexibility, project continuity, and equipment reliability. The last benefit – equipment reliability – is profitable, too, because clad directly impacts the most controllable expense in manufacturing, maintenance. Clad metal's reliability is proven to reduce unplanned downtime and unscheduled maintenance, which improves oil refiners' bottom line.

However, these benefits are only fully realized with the right clad partner, a partner with quality processes and expertise to protect your investment, from specification to delivery and support.

### Choosing the Right Clad Manufacturer Matters

The clad supply chain has become highly globalized with a fast-growing number of providers in China—and to a lesser extent, in India and Japan. While these new vendors may attract buyers with deep discounts, few have experience producing the large clad plates modern companies need for fabricating reliable equipment.

As a result, there is a common misperception that all clad providers use the same standards. Unfortunately, some companies learn this the hard way. With mounting pressure to minimize project expenses, it can be tempting to choose less expensive providers on the front end. However, the lack of experience, standards, and quality processes may cost significantly more time and money in the end.

By choosing a trusted clad metals partner-expert to guide you throughout the design process—ideally from specification onward—you can avoid these pitfalls and protect your investment.

## Why NobelClad

For over 50 years, NobelClad has provided customers with innovative technologies to join dissimilar metals. Today, we remain the proven leader in explosive welding and offer the widest collection of customized clad metal products in the world—and more than products, we are solutions partners. When you choose NobelClad, you invest in our clad products and a partnership that ensures the long-term viability, safety, and reliability of your crude distillation unit, which translates to lower costs over the equipment's lifetime.

**Learn more about our use of explosion welded clad for crude distillation processing environments.**

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