

TITANIUM

The Wonder Metal

Titanium tubing was installed in the surface condenser at Arthur Kill generating station in Staten Island, NY in 1971. Today, almost 40 years later, those same tubes are still in operation. Not only that, but in those 40 years, there have been **zero corrosion** events associated with these titanium condenser tubes.

Titanium was first discovered in the late 1700's, but it wasn't until 1940 that a metallurgist, Dr. William Kroll, was successful in developing a commercially viable process that could extract the metal from its raw ore. This process, known as the Kroll process, is still the basis for the production of titanium metal used today.

Titanium's first commercial applications took advantage of the material's excellent strength to weight ratio. Because of its high strength and light weight, titanium quickly became the material of choice in many aerospace applications. Most notably, the SR-71 Blackbird, developed and built in the 60's at Lockheed's Skunk Works, was designed with a full skin of a specially-designed titanium alloy.

Soon after titanium uses began to flourish in the aerospace market, this wonder metal was also recognized for its excellent corrosion resistance. This spawned the beginning of a new era where titanium would become the material of choice where seawater corrosion was of concern. Today, titanium has become a household name because of its use in golf clubs and other sports equipment, again, being recognized for its one-of-a-kind synergy of mechanical and physical properties.

CORROSION IMMUNITY OF TITANIUM Why Condenser Tubing?

Titanium has earned its reputation as the tubing of choice in power plant surface condensers, especially where



water quality is a concern, because of its immunity to seawater corrosion.

How does it work?

When titanium metal is exposed to air or moisture, ambient or otherwise, an oxide film forms on the surface. This film is transparent in its normal state and is usually thin and not visually detectable. At higher temperatures, or by means of electrolysis, this film can be increased to various thicknesses causing light refraction that creates a rainbow of colors. (Yet another use...because of this, titanium has found its way in various art forms such as "paintings" and jewelry.)

The oxide film on titanium is very stable and will heal itself almost instantly in any environment where a trace of oxygen or moisture is present. Seawater, along with many other corrosive substances, will not attack this oxide film. Hence, the perfect material for condenser tubing is born. *Nothing is equivalent.*



Need we also mention the other benefits of using titanium tubing in power plant surface condensers under normal operating conditions?

- No corrosion allowance
- Thinner walls and increased heat transfer efficiency
- Higher flow rates
- No pitting
- No crevice corrosion
- No MIC
- No SCC
- Almost 40 years with zero corrosion events in condenser service

Why choose anything else?

WHY VALTIMET?

World Leader in Specialty Welded Tubing

As with all equipment in a power plant, the condenser is important to the operation of the plant and must be reliable. An integral component in the condenser is the tubes. Valmet has supplied welded titanium tubing for over 700 power plants worldwide. This includes coal-fired, combined-cycle, as well as nuclear plants. This doesn't even include still more power plants using Valmet stainless steel welded tubing in condensers. Valmet welded tubing products are not limited to condensers. Valmet's reference list also includes other specialty welded tubing used in feedwater heaters and MSRs.

Valmet manufacturing facilities cover the globe. There are 8 plants on 3 continents.

Plants are ISO 9001:2000 certified. Customer service is world class.

When looking for a product that will meet or exceed all of your expectations in a nuclear power plant surface condenser...

Choose **titanium**.

Choose **Valmet titanium welded tubing for nuclear power plant surface condensers**.