



f Mutual Interest

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Helping Our Service Center Marketing Partners Activate Their Ideas in Stainless

Stainless Pumps Up Oil & Gas Industry

Despite the rush that is on to develop alternative sources of energy around the world, oil and gas companies are taking steps to evolve—and in some cases expand—the core of their business. Greater competition coupled with an economic downturn has the industry focusing on production efficiencies and environmental improvements. Both of these areas are well suited for stainless

steels, particularly duplex grades with their superior strength along with ease and stability of welding.

Duplex Replaces Leaking Pipes

As one example of duplex grades providing an environmental impact; when British Petroleum's carbon steel pipeline in the

Alaskan Prudhoe Bay oil field suffered much publicized leaks in 2006, the pipes were replaced with Outokumpu's duplex stainless steel 2205 Code Plus Two®. Some of the large diameter pipe in 2205 Code Plus Two for the project was provided by Outokumpu's Wildwood, Florida mill.

"2205 Code Plus Two is an extremely strong material that is far more

resistant to all types of corrosion (general corrosion, pitting and crevice corrosion, and microbiologically induced corrosion), than carbon steel," explained Elisabeth Torsner, Outokumpu VP, Market Development. "The Arctic creates a very special type of corrosive environment with dry air and moisture that condenses on any metal surface. Warm oil pipe and even a little moisture is creating a favorable environment for pitting," she added.

Stainless from Ocean to Shore

Arctic cold isn't the only hostile environment in which the gas and oil industry operates. Offshore oil and gas rigs are also exposed to some tough weather conditions, and Outokumpu's stainless steel grades are proving essential for these highly corrosive locales. The enhanced corrosion resistance provided by 254 SMO® and Outokumpu 2507, for example, are making these grades ideal for tube heat exchangers in oil and gas coolers which use seawater as a coolant. In high-pressure environments, 2205 Code Plus Two and Outokumpu 2507 are increasingly being specified.

Stainless steel grades can be used in the entire chain of offshore oil and gas exploration. "Drill holes are now going deeper into the ocean which requires a higher strength, yet still corrosion resistant, material. Super



Outokumpu's mill in Wildwood, Florida provided 2,500 tons of stainless pipe for the Motiva Port Arthur Refinery, including this large diameter pipe seen in the middle of the heat-treating process.

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duplex Outokumpu 2507 fulfills this requirement so some companies are using this grade for tubing operations and subsea pipes,” noted Torsner. “The subsea tubes and pipes transport the oil or gas to platform storage tanks, many of which are made of Outokumpu 2507 or 254 SMO. Liquids or gas stored in the tanks are then transported through flexible flow lines—of LDX 2101®—to on-shore storage tanks, which are also made of LDX 2101.”

Duplex Aids Construction

The Outokumpu family of duplex grades—consisting of lean duplexes Outokumpu 2304 and LDX 2101; duplex 2205 Code Plus Two; and super duplex Outokumpu 2507—are now supported by the American Petroleum Institute (API) API 650, *Welded Tanks for Oil Storage*, 10th edition, Addendum 1, November 2008, Appendix X, which covers construction of terminals and tanks. These duplex grades—available from Outokumpu in almost all product forms—are reducing costs for the storage terminals and tanks used in the oil and gas industry. “Because of the superior strength of duplex stainless (nearly twice as strong as austenitic grades), designers can now down-gauge tank thicknesses for material and fabrication savings of 20 to 30 percent or more in some cases,” cited Torsner. “And like all stainless steels, duplex grades are virtually maintenance-free. So tanks and other storage terminals don’t have to be continually re-painted, as is

required with carbon steels. This has the added benefit of not only reducing the cost of labor and paint, but it lessens the likelihood of releasing paints (and their volatile organic compounds) into the surrounding environment.” One additional environmental benefit of stainless steel, including duplex grades, is its 100% recyclable.

Refinery Expansion in U.S.

After decades of stagnation in which no new refineries were built in the U.S., the first major expansion of a domestic oil refinery is taking place in Port Arthur, Texas, at the Motiva Port Arthur Refinery. The expansion, when completed in 2012, will add 325,000 barrels to the refinery’s daily capacity, resulting in a total crude oil throughput capacity of 600,000 barrels per day, making it the largest refinery in the U.S. and approximately the fifth largest in the world. The refinery produces gasoline, diesel, aviation fuels and high-quality base oils. Outokumpu’s Wildwood, Florida mill has supplied some 2,500 tons of pipe for the expansion ranging from 1” to 36” in diameter and in grades 304L, 316L, 321, 347, 2205 Code Plus Two, and some nickel alloys. “Outokumpu’s ability to take the steel from melt to finished pipe and to make the complete size and alloy range required for the project was very important,” noted Joe Avento, Outokumpu’s Key Account Manager, Pipe. ■

Climate Change Competition Yields Working Ideas

As part of our corporate responsibility theme in 2008, Outokumpu launched a competition among employees worldwide for proposals to combat climate change.



Outokumpu also pledged to invest 5 million euros (US \$7.13 million) in an environmental target

through this group-wide competition.

The competition supports Outokumpu’s long-term goal of energy

and material efficiency and specific company goals set for 2009 to reduce energy consumption and waste. It was anticipated that through the competition, innovations would be identified to reduce direct or indirect carbon dioxide emissions caused by the use of fuels or to facilitate the recycling and utilization of our by-products instead of virgin natural resources.

Wind Turbines a Winner

The competition’s winning proposal related to increasing the amount of electricity from renewable sources by investing in power generation by wind turbines to reduce carbon dioxide

emissions, with Outokumpu providing the stainless steel for the turbines. The second prize was given for detailed engineering of recycling hydroxide sludge at the Outokumpu mill in Avesta, Sweden to produce a useful product instead of sending the material to landfill. The third prize was given for creating a virtual meeting room to reduce the amount of travel group-wide and to enable more efficient ways of working. The \$5 million euros will be divided between these initiatives. ■



Stainless Star Spangled Banner

If you had to design and fabricate a 38 ft. long and 19 ft. tall artistic replica in steel and glittering polymer of the flag that inspired our National Anthem—that flag had better *wave!*

That was the challenge for the structural engineers at Robert Silman Associates and the engineers/fabricators at TriPyramid Structures, Inc. of Westford, Massachusetts in creating the eye-catching sculpture designed by Skidmore, Owing & Merrill now installed at the entrance to the new permanent exhibit displaying the remnant of the historic 'Star Spangled Banner' at the Smithsonian's National Museum of American History. The solution was a breath-taking wall-mounted sculpture including an elaborate framing system made of lean duplex stainless steel LDX 2101® from Outokumpu.



The undulating frame of the 38' x 19' sculpture at the Smithsonian's new Star Spangled Banner exhibit is made entirely of Outokumpu's LDX 2101® stainless bar. The sculpture (shown here mid-fabrication) was fabricated at TriPyramid Structures, Inc. *Photo courtesy of TriPyramid Structures, Inc.*

LDX 2101® for Strength and Stability

The frame of the stainless steel support system is mounted to the wall at only one location, with almost all of the flag's weight supported on what appears to be its flagpole side from which four undulating arms splay out, then taper at their endpoints. The result: the impression of a massive waving flag.



Some 900 glistening plastic pixels are mounted on the stainless surface of the sculpture, forming the flag's stars and stripes. "To pull off the waving effect, the entire structure had to be sufficiently rigid to hold the horizontal lines—the flag elements had to provide stiffness and strength," reported Michael Mulhern, a Partner at TriPyramid. "One of the nice things about LDX 2101 is its higher yield strength, which allowed us to use a smaller amount of material to make the frame more discrete and visually lighter."

Outokumpu's LDX 2101 round bar was selected for the framing fabrication and ground to a mirror finish, where the superior machinability properties of LDX 2101 were revealed. Because the sculpture was

intended to look like a single rolled piece with sections interconnecting at precise locations, and with only fractions of an inch in tolerances, stability of welding was essential. "When you're doing a large fabrication, if the material isn't stable you flat out can't do it," Mulhern explained. "No point on the flag is out of its proper location by more than 1/16th of an inch over the entire 38-foot by 19-foot installation," he added proudly.

Some of the design elements TriPyramid integrated into the Star Spangled Banner display were initially used by the company's partners back in the 1980s when they created metallic rigging products for high-end sailing boats, including the America's Cup yacht rigging. "This sculpture uses the same cold headed rod technology we used for years in the marine industry," Mulhern noted. TriPyramid previously used LDX 2101 for hardware to support low profile glass curtain walls for retail applications in New York City. The end-result of that project: the exterior of the structure looks like it is made entirely of glass. ■

The “Art” of Low-Sulfur Stainless



The stainless steel used to achieve the high reflectivity in Chicago’s Cloud Gate, was the result of low-sulfur stainless 316L from Outokumpu.

The Cloud Gate sculpture in Chicago’s Millennium Park has become one of the world’s most recognized works of public art. The stainless steel plate used for the sculpture was produced by Outokumpu at our New Castle, Indiana mill.

Central to the artwork’s success was fulfilling the vision of artist Anish Kapoor in obtaining exactly the right degree of reflection to imitate a droplet of mercury. Kapoor wanted to create a perfect mirror finish that would reflect Chicago’s cityscape, the passing clouds, and the up-close visitors. Key to the mirror finish was Outokumpu’s low-sulfur stainless steel.

The stainless grade used on Cloud Gate was Type 316L specified with 0.002 percent maximum sulfur, which was essential for the perfect, blemish-free, mirrored finish desired. “Low-sulfur stainless is regularly specified for clean-

rooms and other applications where surface imperfections are unacceptable,” noted Catherine Houska, senior development manager of TMR

Consulting, in an article for *The Construction Specifier* (April

2008). For the

Cloud Gate project, Type 316L stainless was identified for its corrosion resistance to de-icing salts from nearby roads and walkways. A low-carbon 316L was needed to facilitate welding the 2,500 lineal feet of seam welds required in the 110-ton, 66-foot long by 33-foot high elliptical sculpture. “Many specifiers and fabricators are unaware of the importance of sulfur specification,” Houska noted. “If there is no requirement, a high sulfur stainless steel could be supplied.” She added that a 0.005 percent sulfur content is suitable for most architectural and other aesthetic applications. ■



Outokumpu in the News

The September 2009 issue of *Modern Metals* features a story on the use of Outokumpu’s proprietary stainless LDX 2101® in helping automakers comply with

a new U.S. Environmental Protection Agency mandate reducing nitrogen oxide in diesel exhaust fluid. (The story was reported in *Of Mutual Interest*, in March 2009).



to market together

The article’s author, Abbe Miller, notes the regulation equates to big opportunities for service centers that carry the appropriate material, as well as the big improvements that it offers the environment. ■



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Outokumpu is a global leader in stainless steel. Our vision is to be the undisputed number one in stainless, with success based on operational excellence. Customers in a wide range of industries use our stainless steel and services worldwide. Being fully recyclable, maintenance-free, as well as very strong and durable material, stainless steel is one of the key building blocks for sustainable future.

What makes Outokumpu special is total customer focus – all the way, from R&D to delivery. You have the idea. We offer world-class stainless steel, technical know-how and support. We activate your ideas.

Outokumpu Webinar Series

Upcoming Webinar

Topic: Stainless Steel for Water Treatment

Date: October 28, 2009

Technical experts from Outokumpu will host a free webinar on desalination.

**To sign up, visit
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