Clad tidings

Engineered Materials Solutions uses cladding to develop alternative metals that offer better value, Gary Toushek discovers

Above
In-house labs carry out a full range of materials testing and characterization procedures

In today's metals market, with increased demand causing soaring prices and growing shortages, having the option of using a clad alternative to a traditional single metal can be a cost-effective solution. Cladding is the process of roll bonding two or more dissimilar metals to create a layered composite, much like a metal "sandwich." For example, to reduce costs while still meeting the performance requirements of coin machines and maintaining critical appearance

standards, the US Mint uses metals clad from lower-cost alloys to produce coins that once were made using high-priced silver.

The company that invented clad coinage for the mint in 1964 was founded 90 years ago as General Plate Company to meet the needs of the jewelry industry; its products offered surfaces of precious metal for appearance but used less-expensive metals below the surface level to add strength and reduce cost. In 1931 it merged with Spencer Thermostat Company, becoming Metals & Controls Corporation (M&C) and offering customers expertise in bonding dissimilar metals and applying these materials in electrical and thermal control markets. In 1952 M&C invented pressure temperature (PT) bonding, which led the US government to choose the company as the first commercial fabricator of uranium fuel rods for nuclear plants. In 1959 M&C merged with Texas Instruments, and in 2000 private equity firm Blue Point Capital Partners purchased the Clad Metals division of TI and renamed it Engineered Materials Solutions (EMS).

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Today EMS occupies a 450,000-square-foot facility (ISO 9001:2000 and QS certified, also adding TS 16949 for automotive) in Attleboro, MA, and is the largest producer of clad metals in North America. The company has two business divisions:

Above
Surface abrading prior to bonding

"Our manufacturing engineers work with customers to design products and work through the transition from old to new"

Above
Clad metal coils can be up to 60 inches in diameter and weigh up to 12,000 pounds

specialty clads, produced from a broad range of dissimilar metals selected to meet specific application requirements, and thermostat metals, which are clad combinations chosen primarily for coefficient of expansion characteristics, making them uniquely useful in thermal control applications. Major customer categories include automotive and transportation, electrical distribution, HVAC, appliance and industrial thermal and electrical control, and telecommunications. EMS clad metals are used in a wide variety of products such as heat exchangers for automotive and industrial applications; Class 8 truck bumpers for tractor trailers; cable shielding for the telecom industry; aircraft, home, office, and factory circuit breakers; button cell batteries and cookware for consumer markets; ballasts for fluorescent lighting; and metal substrate catalytic converter materials for automotive and industrial emissions control. EMS currently serves the Americas, Europe, Asia, and Australia. A greenfield manufacturing facility is opening in China before the end of the year to better service Asian customers, primarily with thermal control products.

Eric Olson is president and chief operating officer. He says more companies are substituting clad metals for more expensive single metals and finding they can have the same or better performance. "For example, if they have traditionally used copper (which has gone from 80 cents to $3.50 per pound) or nickel (from $3 to $14) in their products, we can provide a clad of low-

Above left
Thermostat metals provide high-reliability, low-cost thermal control

Above right
Clad metal cookware offers even heat conduction, light weight, and easy clean-up

carbon steel (about 50 cents per pound) between two thin layers of copper. They still get the strength and appearance properties of copper and a much more cost-efficient solution. In transportation we make a Class 8 truck bumper material, a two-layer stainless clad to aluminum that's more durable and has a longer warranty than a single metal or plated bumper." About 90 percent of EMS's clad production is high-volume coils of metal (100 to 10,000 pounds); the rest is make-to-order (stamped parts and component assemblies).

Key suppliers provide weekly deliveries of coils of semi-finished metals. "We're an important customer to these suppliers," he says, "which gives us some reliability in quality, service, and flexibility." Although EMS is affected by the price increases of metals, "the incentive is to move product through the factory quicker, so when we pay for our raw material we're not sitting on it for a long time, and inventory turns become more important." For the customer end of the supply chain, it has some vendor-managed inventory programs and some consignment programs with customers in Mexico and Europe. "A major automotive customer considers us an extension of his purchasing department in terms of working together like partners, which is a nice compliment. We keep his warehouse stocked with sufficient inventory that he can pull as he needs it." In 2004 EMS was named Supplier of the Year by BorgWarner Emissions/Thermal Systems Division, and this year it's receiving Delphi's Pinnacle Award (which recognizes suppliers for outstanding quality performance or improvement).

To Olson, lean manufacturing means a steady flow of material and product through the supply chain. Consultants Future State Solutions helped EMS introduce lean techniques to the 360 employees and implemented improvements in various processes. It categorized products into families and sub-families and used the "pacemaker operation" to determine what dictates the flow of product through the shop and what kind of supermarket levels were necessary. Current state

value stream maps were created, looking at process flow, inventory levels, and cycle times for each product family, and future state maps demonstrate decreases in cycle time and inventory. Four years ago it implemented Sales and Operations Planning (a program for supply and demand planning) and Total Productive Manufacturing.

The company's ERP system integrates forecasting into its planning, which aligns suppliers and manufacturing with customer needs. For a customer buying a million pounds of metal per year, EMS's schedule tells it to produce 20,000 pounds per week; resources, including supplies, staffing, and equipment, are arranged to produce that amount. If the customer uses less than 20,000 pounds one week, the surplus goes into supermarket inventory, which means if they need more than 20,000 another week, the inventory covers it over time, and the manufacturing flow doesn't need adjustment. "That flow maintains manufacturing efficiency and keeps costs down. Lean provides a high volume of products every interval and ensures an uninterrupted supply of product to our customers," Olson says.

In terms of innovative product development, previously anyone from product engineers to marketing managers allocated up to 15 percent of their time working on new products; two years ago they initiated a Product Development Group—product engineer, product manager, and business development manager—whose responsibility is to create new products, markets, and customers. "Our mandate as a company now is to provide solutions, not just clad metal products," Olson summarizes. "Our manufacturing engineers work with customers to design new products and work through the transition from old to new. One market we're looking hard at is the energy industry, which has opportunities in metal substitution, energy alternatives such as fuel cells, and environmental regulations such as exhaust scrubbing." M