Monthly UpDate

Industries of the Future-West Virginia

Industrial Technology Partnerships

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Continuous Galvanized Steel Sheet and the American Steel Industry – Current Status and Future Challenges

By Frank Goodwin, Vice President, Materials Science, International Lead Zinc Research Organization

For many years, flat rolled surface coated steel, including galvanized sheet, has been one of the fastest growing, most profitable sectors of the U.S. steel industry. The automotive industry has been a technological driver for this sector through its demands for higher strength steels for use in lighter weight, safer vehicles.

In the past, very high surface quality galvanized sheet could only be produced by the electrogalvanizing process, however in the last fifteen years, a great many continuous galvanizing lines have been constructed in the U.S. to serve the automotive market. Today, galvanizing capacity in North America devoted to automotive applications is 13 million tons, nearly half of the more than 27 million tons of total galvanizing capacity. Many of these galvanizing lines can now produce surface qualities, at least on lower strength steels, equal to that of electrogalvanized steels and capable of use on outer surfaces of vehicle bodies. Hot dip galvanized production tonnage now greatly exceeds the 4 million tons of electrogalvanized and is expected to continue growth. This North American trend is consistent with global trends, as shown in the accompanying bar chart.

A continuing challenge for the galvanizer is to maintain a profitable production yield rate on products produced on these new automotive galvanizing lines. Products with low surface qualities end up being sold to lower value markets. Therefore, great effort is being devoted to improving all aspects of the galvanizing line that affect surface quality. Key to these efforts is the galvanizing pot hardware that guides the strip through the galvanizing bath. This is a hostile environment for many materials. For example, bearings that support the rollers around which the steel strip is guided through the zinc bath in many cases have lifetimes of less than four weeks. Bearing instabilities such as chatter and seizing can occur, causing surface problems on the produced steel strip. Dross (intermetallic particles) can also build up on many types of pot hardware thus potentially causing surface defects on the steel sheet.

In 2002, a team including West Virginia University (WVU), Oak Ridge National Laboratory (ORNL), ILZRO, and 17 private sector partners won a competitive grant through the U.S. DOE's Steel Industries of the Future (IOF) program to develop a new generation of bath hardware materials. This program, which was enthusiastically subscribed to by the steel industry in view of the above issues, has met its goals of producing galvanizing bath hardware with corrosion resistance in the zinc bath of ten times that found in currently available materials. This new generation of bath hardware includes several entirely new materials, such as an iron-aluminum-cobalt alloy capable of forming a very tough and protective oxide film, and also several industrially available materials that have been processed in novel ways to give desired properties. Some of these are now beginning to be applied in commercial galvanizing lines.

Based on the significance of this work, the DOE recently awarded co-funding through its Industrial Materials for the Future (IMF) program for a new project that broadens participation to include the Southeast Center for Aluminum Technology, Energy Industries of Ohio, the University of Missouri-Rolla, and private sector partners from the refractory, aluminum, metal casting, and super alloy industries. The new expanded project addresses development of improved metallic and refractory materials for energy efficient handling and containment of molten metals. The IMF project also continues development of materials highly resistant to attack of zinc and zinc alloys used in the galvanizing bath, and that provide good bearing and surface properties that will allow prolonged production campaigns. These partnership projects contribute to "win-win" solutions that enable steel producers, suppliers, and automotive customers to meet productivity, quality, profitability, and energy efficiency goals.

EVENTS

West Virginia Manufacturer's Association's Environmental Conference will be held on September 27-28 2004 at the Embassy Suites Hotel in Charleston, WV. For more information visit **www.wvma.com**.

Doing Business with the Government Seminar will be held August 17, 2004 at the Caperton Center 501 West Main Street, Clarksburg, WV. For more information contact Sharon Stratton, at (304) 293-5839 or email her at sstratton@mail.fscwv.edu. Visit the Small Business Development Center website at **www.sbdcwv.org**.

2004 West Virginia Coal Association Annual Meeting will be held August 5 - 7 2004 at The Greenbrier Hotel, White Sulphur Springs, WV. For more information contact the WV Coal Association at (304) 342-4153 or visit **www.wvcoal.com**.

2004 West Virginia Chamber of Commerce Annual Meeting will be held September 1 - 3, 2004 at The Greenbrier Hotel, White Sulphur Springs, WV. For more information contact the WV Chamber of Commerce at (304) 342-1115 or visit **www.wvchamber.com**.

West Virginia Manufacturer's Association's Environmental conference will be held on September 27-28 2004 at the Embassy Suites Hotel in Charleston, WV. For more information send an email to **wvma@wvma.com**.

Energy Roadmap Workshop on Coal Utilization Technologies will be held Spetember 22, 2004 for more information visit **www.wvenergyroadmapworkshops.org**.

IOF-WV Contacts

Carl Irwin
West Virginia University
NRCCE
(304) 293-2867 ext. 5403
Carl.Irwin@mail.wvu.edu

Jeff Herholdt
WV Development Office
(304) 558-2234
jherholdt@wvdo.org

Kathleen Cullen
West Virginia University
NRCCE
(304) 293-2867 ext. 5426
Kathleen.Cullen@mail.wvu.edu

Bill Johnson
West Virginia University
NRCCE
(304) 293-2867 ext. 5530
William.Johnson@mail.wvu.edu

If you prefer to receive this newsletter electronically, please email Kathleen Cullen

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Co-Funding Opportunities for IOF–WV Research Teams

Announcement	Due Dates	Funding
U.S EPA SBIR/STTR www.reeusda.gov/sbir/	Currently open August 31, 2004 (Proposals due)	Phase I: $100,000 Phase II: $750,000
USDA SBIR www.reeusda.gov/sbir	Opens July 1, 2004 (Request for Proposals) August 31, 2004 (Proposals due)	Phase I: $100,000 Phase II: $100,000-$750,000
NASA SBIR/STTR http://www.sbir.nasa.gov	Opens July 7, 2004 (Request for Proposals) September 9, 2004 (Proposals due)	Phase I: $100,000 Phase II: $100,000-$750,000
Materials Theory http://ww.nsf.gov	Now Open (Request for Proposals) November 1, 2004 (Proposals due)	TBD
(EERE) High Efficiency Clean Combustion and Waste Heat Recovery for Internal Combustion Engines http://e-center.doe.gov	Now Open (Request for Proposals) August 9, 2004 (Proposals due)	$30 million to $60 million
Ceramics http://www.nsf.gov	Now Open (Request for Proposals) November 1, 2004 (Proposals due)	TBD
NSF Advanced Material SBIR/STTR www.eng.nsf.gov/sbir/	Opens October 1, 2004 (Request for Proposals) January 18, 2005 (Proposals due)	Phase I: $100,000 Phase II: $100,000-$750,000
Research in Nanoscale Science Engineering and Technology www.epa.gov	Currently Open October 14, 2004 (Proposals due)	Total funding: $1,200,000 Per Project: Up to $150,000/ yr for 3 yrs
DOD SBIR http://www.acq.osd.mil/sadbu/sbir	Now Open August 12, 2004 (Proposals Due)	Phase I: $100,000 Phase II: $100,000-$750,000

Mark Your Calendar!

The eighth Annual IOF-WV Symposium will be held Wednesday and Thursday, October 27, 28 in Morgantown, West Virginia at the new Radisson Hotel and Conference Center located in the Waterfront Development on the Caperton Trail. The Symposium program includes sessions on Critical Industrial Energy Issues, On-Going and Proposed R&D that will Impact WV Companies, Tax Incentives for R&D and Investment in New Technologies, and Business Development Opportunities with WVU. You are cordially invited to join with other industry, university, and government colleagues in developing meaningful solutions and strategies for West Virginia's and the nation's industrial future.

National Research Center for Coal & Energy
Industries of the Future - West Virginia
Program
PO Box 6064
Morgantown, WV 26506-6064

West Virginia USA
West Virginia Development Office

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