MODERN CASTING

MODERNCASTING.COM

A PUBLICATION OF THE AMERICAN FOUNDRY SOCIETY | AUGUST 2012

OLSON'S CAPACITY BOOSTER

P.20

+

AUSTIN FOUNDRY RECLAIMS BURIED TREASURE

SEAN GIRDAUKAS, V. P., AUSTIN FOUNDRY CORP.

AUSTIN FOUNDRY CORP., of Sheboygan WI, is a gray and ductile iron jobbing shop that has been producing quality castings ranging in size from one pound to 5,000 pounds for a wide variety of industries since 1946. Their molds are chemically bonded with Furan and some Pepset binders.

"We first considered a sand reclamation system a few years back, but with the recent downturn in the economy and our ever-increasing costs, becoming even more cost efficient became a priority. The cost savings potential of a DIDION® Sand Reclamation System became obvious", says Sean Girdaukas, Vice President of AUSTIN FOUNDRY CORP.

"We sent sand samples to DIDION for testing, using their Rotary Lump Crusher/Sand Reclaimer System. DIDION'S patented design crushed the hard lumps, scrubbed the binder off the sand grains, screened the sand twice, recirculated the screen overs, and separated tramp metal. After evaluating the test results and their proposal, we purchased and installed a DIDION® Sand Reclamation System. Installation was fast and easy. We are very pleased with the quality of the reclaimed sand and the system is extremely reliable."

"In the first eight months of use, we reclaimed over four million pounds of spent sand which would previously have been sent to a landfill. We were able to dramatically reduce our new sand purchases and disposal costs. In addition, we have been able to cut back on binder and catalyst usage with no ill effect. We anticipate saving a quarter million dollars annually. Helping the environment is saving us money", concludes Girdaukas.

The team at Austin Foundry was excited to reclaim a buried treasure. Turn a waste stream into a revenue stream and keep the EPA and DNR inspectors happy. Contact DIDION to help you become more efficient and more profitable.

DIDION
INTERNATIONAL, INC.

DIDION INTERNATIONAL INC.
Riverside Industrial Centre
7000 West Geneva Drive
St. Peters, MO 63376

phone, 636.278.8700
fax, 636.278.3155
email, info@ didion.com
web, www.didion.com

INNOVATION
DYNAMIC SOLUTIONS

CONVEYOR DYNAMICS
NOBODY DOES IT BETTER

Dynamic design turns slag waste into money

If you have a material handling problem, please contact our innovative engineering team.

Take our new ***Slag Quenching Conveyor System***. **Conveyor Dynamics** developed a dynamic solution to the high costs associated with slag handling and slag disposal costs by turning unwanted slag into a useable / sellable product.

The dynamic design brings immediate and significant savings. Foundries can now sell popcorn slag that is consistent in size to Landscapers and other beneficial reuse customers.

Special features include our Dyna Sync Dynamic Drive System™ which is the best technology worldwide.

Conveyor Dynamics offers a full range of sizes. The systems are dynamically balanced and isolated to isolate vibration and lower foundation and installation costs. Each system is completely assembled and thoroughly tested prior to shipment to ensure a fast and easy start–up.

The design is Extra Heavy Duty for continuous operations and the easy service access is the best in the industry. Variable speed allows our customers to easily adjust the process / feed rate.

Conveyor Dynamics is serious about saving our customers money with innovative and proven designs. Taking waste streams and turning them into profit centers is great for our customers as well as the environment.

Contact us for other dynamic solutions to your material handling needs.

CONVEYOR DYNAMICS CORPORATION
Riverside Industrial Centre
7000 West Geneva Drive
St. Peters, MO 63376
phone, 636.279.1111 fax, 636.279.1121
www.conveyordynamicscorp.com
info@conveyordynamicscorp.com

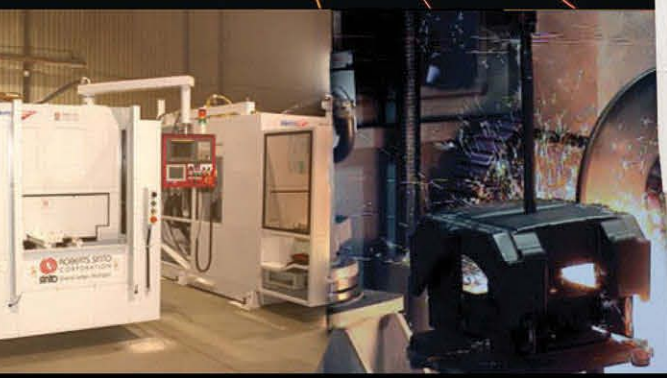
SAFE, ACCURATE, RELIABLE

The Barinder Automatic Grinder is the safest and most efficient way for grinding Iron, Brass and Aluminum castings. The Barinder is completely enclosed, creating a safe environment for your employees and eliminating costly operator injuries that are typical with manual grinding. This creates a more productive finishing department, provides consistent quality to your customers and shows immediate return on your bottom line.

BARINDER
AUTOMATIC GRINDING

Other Features Include:

- Fast Installation & Start Up
- Easy to Learn, Program & Operate
- Quick Part and Tooling Changeover
- Excellent Quality, Reliability & Repeatability



sinto

New Harmony » New Solutions™

ROBERTS SINTO CORPORATION
SINTOKOGIO GROUP
3001 West Main Street, P.O. Box 40760
Lansing, MI 48901-7960
Tel 517 371 2460 Fax 517 371 4930
www.robertssinto.com

www.sinto.com

MODERN CASTING .com

LINKEDIN DISCUSSION

On the Foundry and Diecaster Network on LinkedIn, a member asked: "Does your foundry do an audit of its energy consumption? What are the advantages of this for your company?" Below are excerpts of some of the discussion points:

"This audit is necessary. Our metalcasting facility keeps an eye on energy consumption and data is discussed in high level review meetings. However, no audit has been seen yet."
-Rub'Nawaz Ansari, Bolan Castings Ltd.

"There are many low cost activities that can significantly improve the cost of electricity in the metalcasting industries. These audits can identify these opportunities. "
-Roberto Seabra da Costa, Consultant

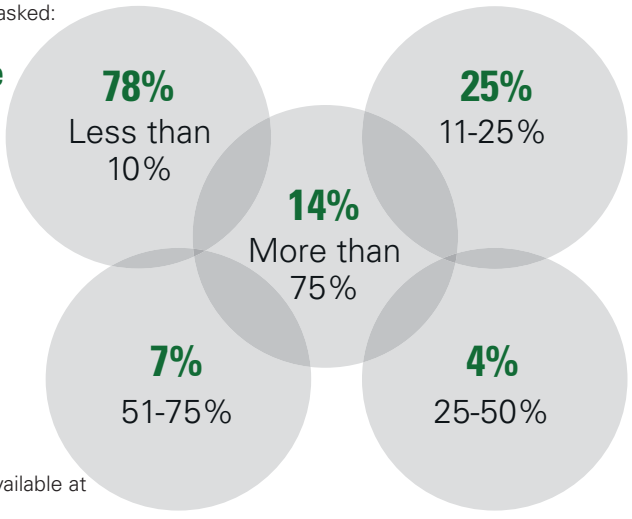
"There is a lot of help out there to be able to do this internally. Join EnergyStar, work with DOE ITP, use ASME Energy Assessment for Process Heating System, TMS and AFS can all help you do this work. It's well worth doing. Most plants can improve energy efficiency by 3-5% each year with projects that are fairly easy to justify their cost. After a few years, that can be major savings! "
-Cindy Belt , Management Consulting

Editor's Note: *MODERN CASTING* does not necessarily endorse the views expressed in the LinkedIn discussion. Visit moderncasting.com for a link to the Foundry and Diecaster Network.

POLL QUESTION

The July website question asked:

What percentage of your cast goods do you export?



This month's question is available at www.moderncasting.com.

CONNECT WITH US

Like: American Foundry Society

Follow: @AmerFoundrySoc

Download: Metalcasting Newsstand app

Join: Foundry and Diecaster Network

BLOG ROLL

Editor's Note: After a six-year run with *MODERN CASTING*, managing editor Shea Gibbs has left to pursue other opportunities. We wish him luck. These are his last blogs.

A Tale of Two Economies

When the economy topic comes up these days, it seems I'm living in two worlds. In the world reported by the popular press, it is still struggling.

In the manufacturing world, many reports indicate it's recovering.

The latest sign in this case is the story of rapid casting producer Clinkenbeard, featured on a local news channel as a company that has grown despite the flagging economy.

"We have a strategy that should work in any economy," company Vice President Reg Gustafson told the Rockford, Ill., CBS affiliate. "We're investing in people. People are the hardest thing to get."

Gustafson said Clinkenbeard added four full-time employees since October. We can only hope the trend will continue and our two economic worlds will realign in the near future.

Dear Metalcasting Industry

I've had a nice time getting to know you over the past six and a half years.

When I first walked into the AFS offices in February 2006, I didn't know slag from silica or cores from copes. What a long way we've come.

I have completed my last day with *MODERN CASTING*, my work with you feels anything but done.

After all this time exploring the ins and outs, I know one thing is certain—metalcasting is everywhere. When my family climbs into our car, you'll be there. When I cook, you'll be there.

I know more about manufacturing today than I ever thought I would, and I am a better person for it.

Visit moderncasting.com to read full blogs and additional entries.

MOLTEN METAL

Headquarters For:

INDUCTION MELTING

- Coreless Induction Furnaces
- Channel Induction Furnaces
- Melting
- Holding
- Duplexing
- Ferrous
- Non-Ferrous
- High Power Jet Flow Inductors

Ajax TOCCO Magnethermic

THE GLOBAL FORCE IN INDUCTION TECHNOLOGY

Ajax TOCCO Magnethermic® Corporation

1745 Overland Ave

Warren, OH U.S.A. 44483

Tel: **800-547-1527**

Tel: +1-330-372-8511

Fax: +1-330-372-8608

www.ajaxtocco.com

MODERN CASTING
A PUBLICATION OF THE AMERICAN FOUNDRY SOCIETY

AUGUST 2012
VOLUME 102 | NUMBER 8


P. 25


P. 30

P. 20

COLUMNS

DEPARTMENTS

moderncasting.com

Cover: Photo provided by Palmer Manufacturing. Design by Michael Berrafato, art director

MODERN CASTING

A PUBLICATION OF THE AMERICAN FOUNDRY SOCIETY

1695 N. Penny Lane
Schaumburg, IL 60173-4555
847-824-0181 • 800-537-4237
Fax: 847-824-7848
www.moderncasting.com

Published monthly by the American Foundry Society, ***MODERN CASTING*** *magazine presents the North American metalcasting industry with technical and management information for operational and business decisionmaking. The information and ideas presented in* ***MODERN CASTING*** *do not necessarily reflect the position of its staff, advisors or advertisers, nor that of the American Foundry Society.*

STAFF

PRODUCTION

CONSULTING EDITORS

BPA INTERNATIONAL® **PRINTED IN USA**

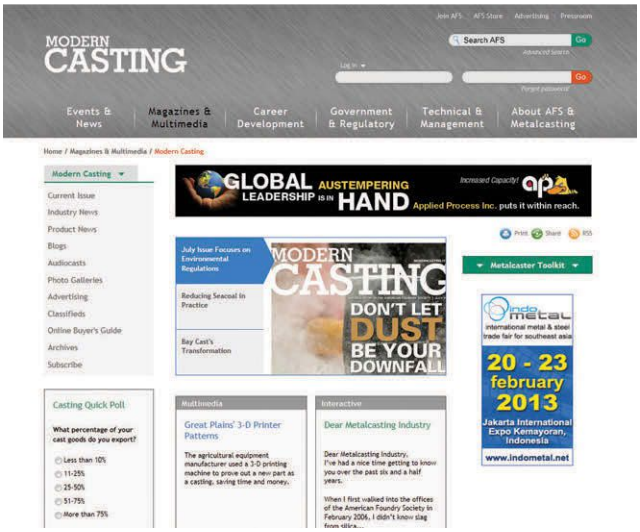
MODERN CASTING (ISSN-0026-7562) is published monthly by the American Foundry Society Inc. Editorial, executive and subscription offices: 1695 N. Penny Lane, Schaumburg, IL 60173-4555, 847-824-0181. Subscription price: $79.00 per year U.S., Canada and Mexico; all other countries $139.00 per year. Single copies: U.S., Canada and Mexico $10.00 (+S&H), foreign $10.00 (+S&H). November Buyer's Guide: U.S., Canada and Mexico $30.00 (+S&H), foreign $30.00 (+S&H). Office of Publication: 1695 N. Penny Lane, Schaumburg, IL 60173-4555. Periodicals postage paid at Schaumburg, IL, and additional entry offices. Canada Post Corp. Return Undeliverables to: American Foundry Society, 2835 Kew Drive, Windsor, ON N8T 3 B7, Pub. Agreement No. 40036409, Printed in U.S.A. The American Foundry Society is not responsible for statements or opinions advanced by authors of papers or articles printed in its publications. MODERN CASTING is indexed by Engineering Index Inc., 345 E. 47th St., New York, NY 10017, and microfilmed by University Microfilms, 300 N. Zeeb St., Ann Arbor, MI 48106. POSTMASTER: Send address changes to MODERN CASTING at 1695 N. Penny Lane, Schaumburg, IL 60173-4555.

New Channels for Communication

We are always looking for new ways to deliver information to the metalcasting industry. You know our main channel—the monthly print magazine you are currently reading. But how familiar are you with our website? How about our e-newsletter, digital magazine, webinars, social media pages, and apps for Android or i-devices?

We have learned how important it is to communicate with our audience in as many different channels as possible because we aren't always sure what you are tuned in to and/or will catch your interest. Lately, we have been focused on social media (primarily LinkedIN, Facebook and Twitter) as we have seen continued growth and activity. This growth has even launched recurring editorial on p. 3 of our print magazine each month as we recap a popular discussion.

We have learned how important it is to communicate with our audience in as many different channels as possible.



Our most recent venture was the launch of redesigned and reorganized websites. With the continual growth of our online-only activity including blogs, audiocasts, video, photo galleries, news feeds, etc., we needed to develop magazine web pages that incorporated all of these features in an easy to use format. We also wanted to intertwine our collection of titles (*MODERN CASTING, Metal Casting Design & Purchasing* and *Global Casting*) for all of our audiences together with the American Foundry Society to provide a single, vast resource of metalcasting information. The new website launch is just a first step, but we know it is a step in the right direction for us and the industry.

While our industry is grounded in the more traditional channels of communication, today's casting buyers and designers are not. They probably turn to the web first for help, but not necessarily for a simple Google search. They may look for a video on YouTube to explain a casting process they don't understand. They may post a question to a discussion group to secure a recommendation for a casting supplier. They may tweet out a question to a network of engineering friends in search of a solution.

The key for our industry is to be in all those channels, pushing out the correct information to our customers. While the methods have changed, the goal is still to be the resource for our customers.

Alfred T. Spada, Publisher/Editor-in-Chief

If you have any comments about this editorial or any other item that appears in MODERN CASTING, *email me at aspada@afsinc.org.*

TOP TEN FOUNDRY MUST-HAVES!

1. FURNACE
2. POWER SUPPLY
3. ARMS® SYSTEM
4. HOLDING SYSTEM
5. PREHEATING SYSTEM
6. CHARGING SYSTEM
7. AUTOPOUR SYSTEM
8. COMPUTER CONTROL
9. EMISSIONS CONTROL
10. SAFETY TRAINING

INDUCTOTHERM
An Inductotherm Group Company

Inductotherm builds induction melting, holding, heating and pouring systems for virtually all metals, including gray and ductile iron, steel, copper and copper-based alloys, aluminum, zinc, reactive metals and precious metals.

As the world's largest manufacturer of the induction equipment shown here, only Inductotherm can offer ***proven*** efficient, reliable and effective systems for all your melt shop needs.

Call 1.888.INDUCTO or scan the QR code for direct access to www.inductotherm.com.
Need a QR code reader? For iPhone - use iNigma, Blackberry & Android - use BeeTagg.

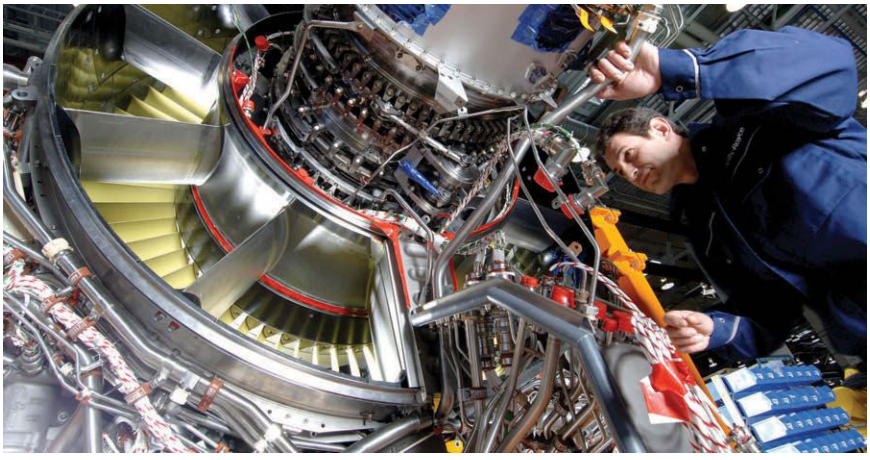
Inductotherm Corp. - USA
10 Indel Ave., PO Box 157
Rancocas, NJ 08073-0157

INDUCTOTHERM GROUP

Leading Manufacturers of Melting, Thermal Processing & Production Systems for the Metals & Materials Industry Worldwide.

Important: Appropriate Personal Protective Equipment (PPE) must be worn by anyone in proximity to molten metal.

Rolls-Royce Launching Investment Plant



Rolls-Royce manufactures aircraft engines like the IAE V2500 for the Airbus A320.

Power systems provider Rolls-Royce, London, announced it has begun construction on a new turbine blade casting facility in Rotherham, U.K.

The 150,700 sq.ft. investment casting facility will manufacture single crystal blades for large civil aircraft engines and will employ about 150.

"Rolls-Royce invests in world class technology and infrastructure to expand the scale and efficiency of our operations and to deliver our promises to our customers," said Mike Mosley, the company's executive vice president for turbines. "In the last five years, we have invested over [$1.5 billion] on infrastructure in the U.K. alone."

The investment casting plant is expected to produce its first blades in late 2014, with the facility capable of manufacturing 100,000 blades per year when fully operational.

According to a statement issued by Rolls-Royce, one single crystal turbine blade extracts around 1,000 hp from the gas flow towards the rear of the engine, which is equivalent to the power of an F1 race car. Single crystal turbine blades operate in temperatures well above the alloy's melting point and sit in a disc that rotates at more than 12,000 rpm.

With more than 40,000 employees in offices, manufacturing and service facilities in more than 50 countries, Rolls-Royce serves the civil aerospace, defense aerospace, marine and energy markets. Its annual revenues were $17.6 billion in 2011. MC

Hyundai Launching Diecasting Plant in Mexico

Automaker Hyundai announced it will invest $131 million to build a new aluminum diecasting plant in Tijuana, Mexico.

According to a statement issued by Tijuana EDC, a nonprofit corporation that helps companies establish manufacturing operations in Mexico, construction on the diecasting facility will begin in July, and it is expected to reach full capacity in January 2014. Hyundai forecasts the facility will produce 900,000 units of engine blocks, engine cylinder heads and transmission cases per year and create 300 jobs.

Hyundai CEO Kenny Lee said Tijuana won the competition for the plant over Monterrey, Mexico, and Montgomery, Ala. Lee said Hyundai's experience working in Tijuana, competitive costs and the support received from local governments were the deciding factors.

David Mayagoitia, president of Tijuana EDC, said the new project will represent almost half of Hyundai's actual investment in Tijuana.

Mayagoitia said during the launch that, according to the Mexican Association of Automotive Industry, Mexico exported more than 2 million units in 2011, 68% of which went to the U.S. MC

TPR Federal-Mogul to Establish New Casting Operation

TPR Federal-Mogul Tennessee Inc., Lawrenceburg, Tenn., announced it is launching a new manufacturing facility with metalcasting capabilities.

TPR Federal-Mogul Tennessee Inc. is a joint venture of automotive powertrain components provider TPR Co Ltd. and diversified parts manufacturer Federal-Mogul Corp. According to the Tennessee Department of Economic and Community Development, the facility will serve the North American automobile manufacturing industry and create 72 jobs.

TPR Federal-Mogul Tennessee is the third U.S.-based joint venture between TPR and Federal-Mogul. The group also has operations in Minnesota and Wisconsin. The companies' new facility will produce cylinder liners for aluminum engine blocks and will house machining and warehousing functions, in addition to metalcasting. The facility is projected to begin operations in May 2013.

"TPR is excited about the opportunity to grow its business and invest in Tennessee," a spokesperson for TPR America said in a statement. "We were attracted to the area due to the business friendly climate, skilled workforce, and proximity to our customers and suppliers."

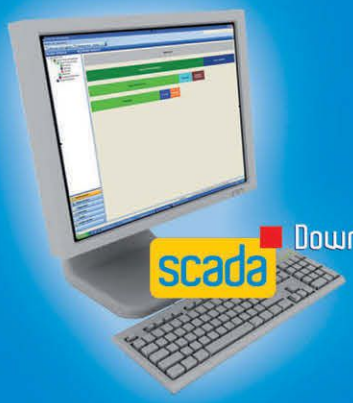
TPR manufactures a number of powertrain products for the automotive industry, including piston rings, cylinder liners, valve seats, and aluminum, alloy and resin products. Federal-Mogul primarily designs, engineers, manufactures and distributes technologies to improve fuel economy, reduce emissions and enhance vehicle safety. The company serves OEMs in the automotive, commercial, transport and industrial equipment markets. MC

Total performance in foundry

Vertical Molding Technology

Remote Connection Service — rcs

Production data
Umm diagnosis — hmi



Downtime Monitor

Core Making

LORAMENDI

Loramendi S.Coop
Alibarra 26, Ali-Gobeo
P.O. Box 614
01010 Vitoria-SPAIN
Tel.: +34 945 18 43 00
Fax: +34 945 18 43 04
info@loramendi.com

Loramendi Inc.
250 South Fenway Drive
FENTON, MI 48430 - USA
Tel.: +1 810 629 0850
Fax: +1 810 629 0886
loramendi@loramendi-usa.com

Precision Castparts Purchases Klune Industries, Others

Precision Castparts Corp., Portland, Ore., has agreed to acquire Klune Industries, North Hollywood, Calif., a manufacturer of complex aluminum, nickel, titanium and steel aircraft structures.

Klune focuses on casting, forming, machining and assembly of aerostructure parts and offers a range of cold-formed sheet metal components. In addition to its investment casting facility in Spanish Fork, Utah, the company operates facilities in North Hollywood and Kent, Wash.

Klune employs approximately 740. The company is the latest in a number of acquisitions Precision Castparts has completed in the past 12 months.

"Like Centra and Primus before, Klune expands our reach into the widely fragmented aerostructures market," said Mark Donegan, chairman and chief executive officer of Precision Castparts. "From a top-line perspective, Klune's product line will significantly increase our dollar content on the Boeing 787, and [it has] solid positions on other major aircraft platforms, such as the Boeing 737 and Gulfstream G650."

Precision Castparts' most recent acquisitions were aerostructures business units and McSwain Manufacturing from Heroux-Devtek Inc. The aerostructures operations produce a variety of components and assemblies from aluminum, aluminum-lithium, and titanium, such as bulkheads, wing ribs, spars, frames and engine mounts. McSwain specializes in turning, milling, and drilling and has a presence in the gas turbine and mining markets.

Precision Castparts said in a statement the Klune acquisition was made with cash and is expected to be completed during the second quarter of FY2013. When the transaction is final, Klune's financial results will be reported as part of Precision Castparts' fastener products segment.

Precision Castparts is a diversified manufacturer of metal components for the aerospace, power and general industrial markets. The company is a market leader in large structural investment castings, airfoil castings, forged components and critical fasteners for aerospace applications. It also produces airfoil castings for the industrial gas turbine market. MC

SwRI's Ceramic-Sand Core Casting Wins Research Award

Hybrid Ceramic-Sand Core Casting Technology, developed by the Southwest Research Institute (SwRI), San Antonio, Texas, and Grainger and Worrall Ltd., Bridgnorth, U.K., has won a 2012 R&D 100 Award from *R&D Magazine*.

The technology combines aerospace ceramic and automotive sand core casting processes for precision casting of automotive cast iron/steel components. According to a statement from *R&D Magazine*, which gives the R&D 100 Award to the 100 most significant technological achievements of the year, the process can produce extremely small passages in metal castings.

The process was developed during a three-year, multi-phase research and development program and designed to enable the production of heavy-duty diesel engines with a higher peak cylinder pressure capability than current engines. The new architecture is reported to enable future exhaust emissions-reducing and high-efficiency combustion technologies without sacrificing engine performance, size or weight.

"Ceramic cores, such as those used in the aerospace industry to cast cooling passages in turbine blades, do not break down in the presence of molten metal, even at very small sizes," said Marc Megel, assistant director of the Design Development Department in SwRI's Engine, Emissions and Vehicle Research Division. MC

Hunter Completes Buyout Agreement

Hunter Automated Machinery, Schaumburg, Ill., has announced the completion of an asset buyout of the company and all its foreign subsidiaries by current President Bill Hunter.

"We have successfully crossed the bridge of generational transition with this arrangement." Hunter said.

The new sole owner bought the assets of the molding machine company held by his three sisters, Dianne, Linda and Heather. Hunter Automated was founded by Al Hunter in 1964 and today operates plants in the USA, Brazil and China. The company has European headquarters in Italy and regional offices in India.

"I am very thankful to my sisters, who worked closely with me on this agreement, allowing us to keep the company in the family," Bill Hunter said in a letter to the company's employees. "We fully intend to continue and build on the company's long-standing traditions of technology, quality and service to the industry."

The agreement was finalized on June 27. MC

German Alliance Focuses on Liquid Metals Technology

Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany, and the Karlsruhe Institute of Technology, Karlsruhe, Germany, have established an alliance to study the applications of liquid metal technologies, particularly for the steel and light metal castings industries.

The new Helmholtz Alliance LIMTECH (Liquid Metal Technologies), which will work with other Helmholtz centers and universities in Germany, has secured almost $25 million for the five-year project.

According to the alliance, liquid metals are becoming increasingly significant for liquid metal batteries for energy storage, carbon dioxide-free hydrogen production and solar cells because of their ability to store energy in large quantities and dissipate heat effectively. Their thermal conductivity is 50 to 100 times higher than the that of water, and they continue to stay liquid in a broad range of temperatures. Two subprojects of the alliance are dedicated to the use of liquid metals in solar power plants. MC

Alcoa Develops Anodized Diecasting

Alcoa, Pittsburgh, recently announced the first commercial success of a new technology that will allow aluminum diec astings to take on the look and feel of an anodized part.

The first use of the new ColorKast technology appears on Samsung's new digital camera NX210.

According to a press release by Alcoa, ColorKast allows electronics makers to create cosmetically high-end, lightweight and cost-effective components for portable electronic devices. Parts produced in the process will combine the appearance of anodized aluminum and the high productivity and cost advantages of diecasting. MC

NEWSCAST

The **Bühler Technology Group** has announced the acquisition of the Revisions and Retrofits business of the Italian company Brescia Presse S.r.l.

Fairmount Minerals' Wedron Silica sand-mining facility has earned the Community Relations Award from the Illinois Association of Aggregate Producers (IAAP) for its "outstanding community involvement" in the region, according to the IAAP.

Flow Science, Inc. announced it has entered into a new international association agreement with Don Computing to sell and support Flow Science's FLOW-3D software in Australia, New Zealand and Papua New Guinea. MC

LETTERBOX

Clearing Romney's Record

Although I appreciate the coverage and picture in the July 2012 issue of *Modern Casting* (Shakeout, p. 56), specific details should be properly corrected for the record.

Governor Romney arrived on a bus, to and from our facility. I never stated he sped away in an SUV. For security reasons, the secret service had Governor Romney and I travel approximately 100 yards in an SUV from our foundry tour to our machine shop (all on our property and where the event took place). We travelled the 100 yards at about 5 mph.

Governor Romney did not deliver a typical "stump" speech and he certainly did not use a teleprompter. The Governor spoke eloquently about energy policy and, in particular, carbon based energy policy (Keystone XL pipeline). He discussed the importance of maintaining a low cost, electrical energy edge over foreign competition that is so vital to the foundry industry's survival in this country. He spoke of specific items that were discussed in our business roundtable discussion that immediately preceded the tour and his speech, such as over regulation of small business. This was a group of 10 local business people, mostly connected to the shale gas industry, including myself, former Minnesota Gov. Tim Pawlenty, and the medical doctor who spoke of the 37-page "change of address" form from Medicare/Medicaid to receive payment that took five months for approval. The doctor had moved across town—same post office, same zip code. Gov Romney used this to contrast leviathan government inefficiency versus small business, competitiveness, efficiency and innovation.

Image courtesy of Alison Dryfoos-Mazzie, Sassafras Photography.

Letter writer Michael Leib (right) with U.S. Presidential candidate Gov. Mitt Romney

Michael J. Leib, P.E.
President
Weatherly Casting & Machine
Hazleton Casting Company

LETTERBOX

Policy People Don't Get It

In the June 2012 issue, the Washington Alert article (p. 15) reports the U.S. Environmental Protection Agency proposed a rule that restricts carbon dioxide emissions to not more than 1,000 lb. per megawatt hour for new coal-fired power plants. It appears once again we have policy makers who appear clueless regarding physics, the first and second laws of thermodynamics, and other unavoidable facts—enacting impossible and ridiculous policies.

To wit: the energy content of one pound of coal is in the range of 13,000 Btu, with a typical carbon content in the range of 75-90%. So, every pound of coal burned yields between 0.75 and almost 1 lb. of carbon.

To figure out how much carbon dioxide that generates, you multiply by the ratio of the molecular weights (44 for carbon dioxide/12 for carbon) to arrive at a rough figure of 3 lbs. of carbon dioxide for every pound of coal burned. A little more fancy math reveals that we must therefore burn less than 333 lbs. of coal to get our megawatt-hour. Problem is, that 333 lbs. of coal is only capable of converting into 1.268 megawatt hours of thermal energy. So, the proposed new coal plant needs to achieve at least 79% thermodynamic efficiency to meet the new rule. Trouble is, the most efficient supercritical coal plants can only achieve about 50-55% efficiency on their best days. The new rule is basically impossible to achieve and is just an end-run way of preventing the construction of any new coal-fired power plants. Yet another stroke in the federal government's unrelenting assault on U.S. manufacturing capability.

Mark Schreiber
General Motors

CALENDAR OF EVENTS

SEPTEMBER 10-12

AFS Conference on Sand Casting Technology and Materials
SHERATON INDIANAPOLIS HOTEL, INDIANAPOLIS

SEPTEMBER 10-13

Steel Founders' Society of America Annual Meeting
PARK CITY, UTAH

SEPTEMBER 16-18

AFS Foundry Executive Conference
EDEN ROC RENAISSANCE, MIAMI BEACH, FLA.

SEPTEMBER 25-27

AFS and CMI Investment Casting Defect Analysis & Gating Design Course
AFS HEADQUARTERS, SCHAUMBURG, ILL.

SEPTEMBER 27-28

AFS East Coast Regional Conference
HERITAGE HILLS GOLF RESORT, YORK, PA.

OCTOBER 1-3

NADCA Die Casting Congress & Expo
INDIANA CONVENTION CENTER, INDIANAPOLIS

OCTOBER 7-12

Investment Casting Institute 59th Annual Technical Conference and Expo
GAYLORD OPRYLAND RESORT & CONVENTION CENTER, NASHVILLE, TENN.

OCTOBER 10-12

AFS International Ferrous Melting Conference
HILTON GARDEN INN NASHVILLE VANDERBILT, NASHVILLE, TENN.

OCTOBER 12-15

Nonferrous Founders' Society Annual Meeting
GREEN VALLEY RANCH RESORT, HENDERSON, NEV.

OCTOBER 24-26

Ductile Iron Society T&O Meeting
EMBASSY SUITES, EAST PEORIA, ILL.

NOVEMBER 7-8

Casting Industry Suppliers Association Fall Business Meeting
WESTIN O'HARE, ROSEMONT, ILL.

States Are Making Breakfast, Lunch and Dinner

Artist Alisa Toninato has been creating castings to cook with since her days as a student at the Milwaukee Institute of Art and Design, Milwaukee, Wis.

"As an art student learning foundry processes, I was attracted to the design and utility of old castings, machine parts, and the social opportunities around certain objects in everyday life," Toninato said.

So she created the "Breakfast of Champions," a series of waffle iron designs portraying historical characters from Jesus to Annie Oakley.

Four years after graduating, Toninato pooled her resources and collaborated with her newly-found casting community in Wisconsin to build her first iron cupola. On Thanksgiving Day 2009, she ran her own cupola for the first time.

"We were pretty much just seeing if it melted iron at that point," Toninato said. "It was not until Valentine's Day of the following year that I prepared my first pattern and sand mold since college."

It was not until the following summer in 2011 when Toninato really found a project she could sink her teeth into—the 48 contingent U.S. states as cast iron skillets.

Photo courtesy Rob Tannenbaum/The Martha Stewart Show

"Immediately after we cast the first skillet, we opened it up right after the cup became solid and out rolled this glowing Wisconsin pan," Toninato said.

From there, Toninato assembled her first geographic region of state-shaped skillets for a small show at the Layton Galley in the Milwaukee Institute of Art and Design.

She cast the entire Midwest and displayed it pieced together with magnet hangers at a show at the Harley Davidson Museum, Milwaukee.

After she secured funding to cast each state, Toninato found herself on a deadline. She wanted to display the finished product at ArtPrize, an open art contest in Grand Rapids, Mich. So, with one month before the show date in August 2011 and 28 states to go, she turned to a professional metalcasting facility to ensure each state met quality standards.

Once complete, "Made in America" was a 9.5 ft. X 6 ft. functional work of art.

Wisconsin has become the most popular skillet with its hometown advantage, but New York, New Hampshire, New Jersey, Missouri and California are all close seconds. Texas is popular and huge in every way, weighing in at 30 lbs. MC

PERSONALS

Matt Aboud, vice president and managing director of Hydro Aluminum's Metal Markets in North America**, Anthony Farraj,** commercial vice president of global packaging for Alcoa Global Rolled Products, and **Tom Walpole,** senior vice president of Novelis and president of Novelis North America, will join the **Aluminum Association's** Board of Directors..

Bob Puhakka has resigned from his position at Alloy Casting to start **Cast Differently**, a company that will provide training, consulting and project work for metalcasting facilities.

Linda Beckett joined the accounts department at **Synchro ERP**. MC

OBITUARIES

Walker Hubbard, Sylacauga, Ala., a long-time employee of Southern Alloy Corporation, Sylacauga, Ala., died May 8 at the age of 79. Walker melted steel for Eagle Iron & Brass, which became Southern Alloy Corp., for more than 57 years. He worked there until five days before his death.

At the age of 84, **Arthur (Gordon) Gledhill**, passed away on May 29. Gledhill was an AFS life member, beginning his metalcasting career at David Brown's Foundry, England, in 1927. He retired as President of Miller and Co., Rosement, Ill., in 1993 after 20 years of service.

At the age of 89, **Harlen Joseph**, Tulas, Okla., passed away on May 4. After attending Illinois Wesleyan and Bradley universities, Joseph graduated from Caterpillar Tractor's Cast Metal School. In 1967, he and his wife partnered with the another couple in expanding their current business and created Canfield & Joseph Inc., Kansas City, Kan. Joseph was a longtime AFS member. MC

Stephanie Salmon, Artemis Strategies; Jeff Hannapel & Christian Richter, The Policy Group, Washington, D.C.

Regulatory and Red Tape Act Brought to U.S. House

A PACKAGE OF REGULATORY BILLS AWAITS APPROVAL BY THE U.S. HOUSE.

The *Red Tape Reduction and Small Business Job Creation Act* was brought to the U.S. House of Representatives floor for consideration. The act is a package of bills aimed at reducing the regulatory burden on manufacturers and businesses.

The measure would reform the regulatory process by preventing any federal agency from taking a significant regulatory action until unemployment has reached 6% or less, improving transparency of sue and settle transactions that compel regulatory action where it has been delayed, streamlining permitting for environmental projects, and auditing the Federal Reserve. The following bills were considered as part of the package:

- *Responsibly and Professionally Invigorating Development (RAPID) Act of 2012*: Permits streamlining legislation.
- *Sunshine for Regulatory Decrees and Settlements Act of 2012:* Addresses sue and settle tactics used by agencies to initiate new regulations.

The U.S. House considered a pagackage of regulatory bills late in July.

- *Midnight Rule Relief Act of 2012*: Prohibits new rules between Election Day and inauguration.
- *Regulatory Freeze for Jobs Act of 2012*: Prohibits new, economically significant rules until unemployment is below 6%.
- *Unfunded Mandates Information and Transparency Act of 2012*: Provides Congress with information on the cost of unfunded mandates.

AFS signed a coalition letter along with other organizations urging House members to support this package. The House considered the package of bills late in July. MC

ON THE HILL

China Stockpiling Rare Earths

According to a state-backed newspaper, China has started stockpiling rare earths for strategic reserves. *The China Securities Journal* said China has started to purchase and store the materials using state funds.

Currently, the country produces more than 90% of the world's materials, which are mainly used in high-tech products from iPods to missiles, as well as in metalcasting melt additives.

According to the *Journal*, rare earths are currently priced low and account for the start of the strategic buying. China had previously announced intentions to begin building a reserve of rare earths, but did not announce a timeline of when they would begin.

The stockpile could lead to lower quantities available for export. This year, China has said companies can export 21,226 tons of the materials this year. Last year, the government granted 30,200 tons, and 18,600 tons were exported.

U.S. Committee Slashes EPA Funding

The U.S. House Appropriations Committee approved in late June the Fiscal Year 2013 (FY2013) Interior and Environment bill, which, as passed by the committee, would provide $7.05 billion to the U.S. Environmental Protection Agency (EPA), $1.4 billion less than in 2012. The following key riders are of interest to the metalcasting industry:

- EPA would be restricted from using any FY2013 funds "to develop, adopt, implement, administer, or enforce" its guidance "pertaining to the definition of waters under the jurisdiction" of the federal *Clean Water Act.*
- The bill would require the administration to provide a detailed report to Congress on all federal spending on climate change-related programs and activities in FY2012.

Congress has not announced a date for when the legislation will be considered by the full House, and due to the contentious nature of the bill and environmental policy riders, the appropriations detailed in the bill may be rolled together with other appropriation measures in an omnibus bill later this year. MC

Would Water Travel?

1664, Chateau de Versailles, France

King Louis XIV ordered construction of a cast iron pipe main to supply water to the fountains and towns. The pipe, extending 15 miles, began at a pumping station in Marly and connected to Seine and then to Versailles. Water was distributed throughout the extensive gardens of Versailles, amounting to 22 miles (35km) of piping, becoming an early form of sprinker system. As the oldest form of cast iron pipes still in existence, they were refurbished in 2008 and remain 80% original. MC

Olson Expands With Nobake

The aluminum green sand caster decided to add capacity and flexibility with a new nobake line in 2011. **SHANNON WETZEL, SENIOR EDITOR**

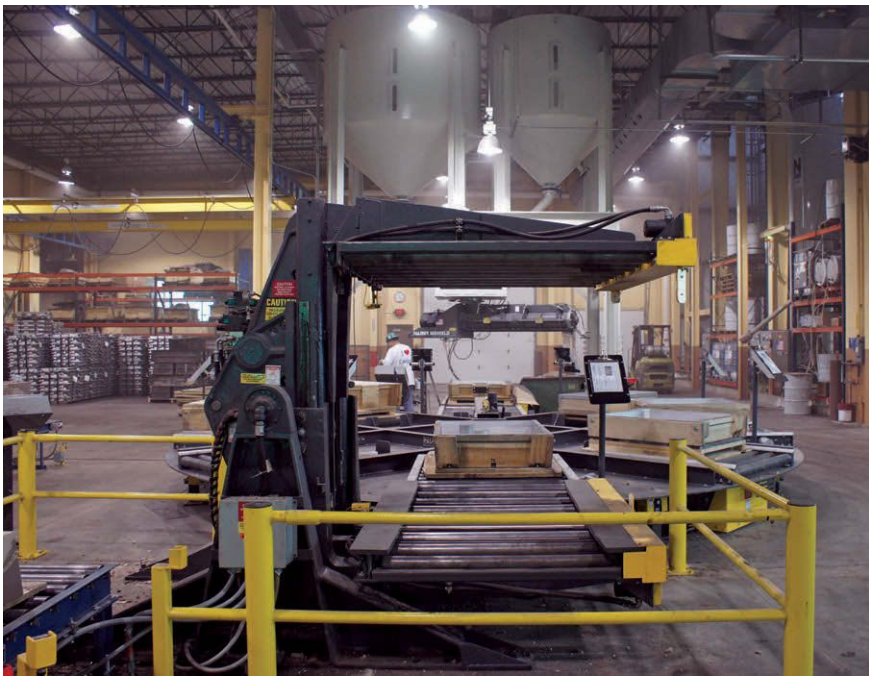
Olson Aluminum Castings Rockford, Ill.

Metals Cast:	356 and 319 aluminum.
Casting Process:	Green sand and nobake.
Size:	56,000 sq.ft.
Employees:	50.
Primary Markets Served:	Prototypes, hydraulics, pneumatics, fluid control and handling, motors, gear boxes, actuators, power transmission, machine tool, packaging, medical and laboratory.

Olson Aluminum Castings' 16,000-sq.-ft. addition in Rockford, Ill., was a long analytical process for the sand casting facility. The company spent the mid-2000s building on its reputation for quality and delivery, increasing throughput capacity, bringing in new customers, improving its competitiveness and raising the necessary capital to add more capacity. The recession in 2009 only delayed the inevitable, and in early 2011, Olson Aluminum pushed forward.

"In 2008, we were approaching capacity and had a successful climb up to that point," said Olson Aluminum President Tad Olson. "We could have used much of the additional capacity in 2011."

Olson Aluminum, which operates one shift with 50 employees, was considering adding a second shift. Now, with its completed nobake casting facility addition, the com-



Olson utilizes a mold turntable in its new nobake line at its facility in Rockford, Ill.

pany has the ability to significantly increase its total production. A new cleaning room and associated equipment is in the process of installation and additional heat treat capacity is planned at the end of this year.

The added capacity comes at an advantageous time for many of Olson Aluminum's customers recovering from the recession.

"We had a handful of customers who had projections of rapid growth and were wondering if we would be ready," said Mike Stahl, Olson Aluminum sales manager. "Our top 10 customers thought it was encouraging [that we were expanding]."

Nobake or Green Sand?

Olson Aluminum's big decision surrounding the investment was not so much whether to add another molding line but whether to add another green sand line. The metalcaster already operated seven green sand cope and drag and matchplate lines, and gained some experience working with nobake cores for larger castings in its prototype work.

"It was a big question for us," Stahl said. "Do we go for higher automation and high volume or higher complexity and increased flexibility? We had to determine where our core competency was."

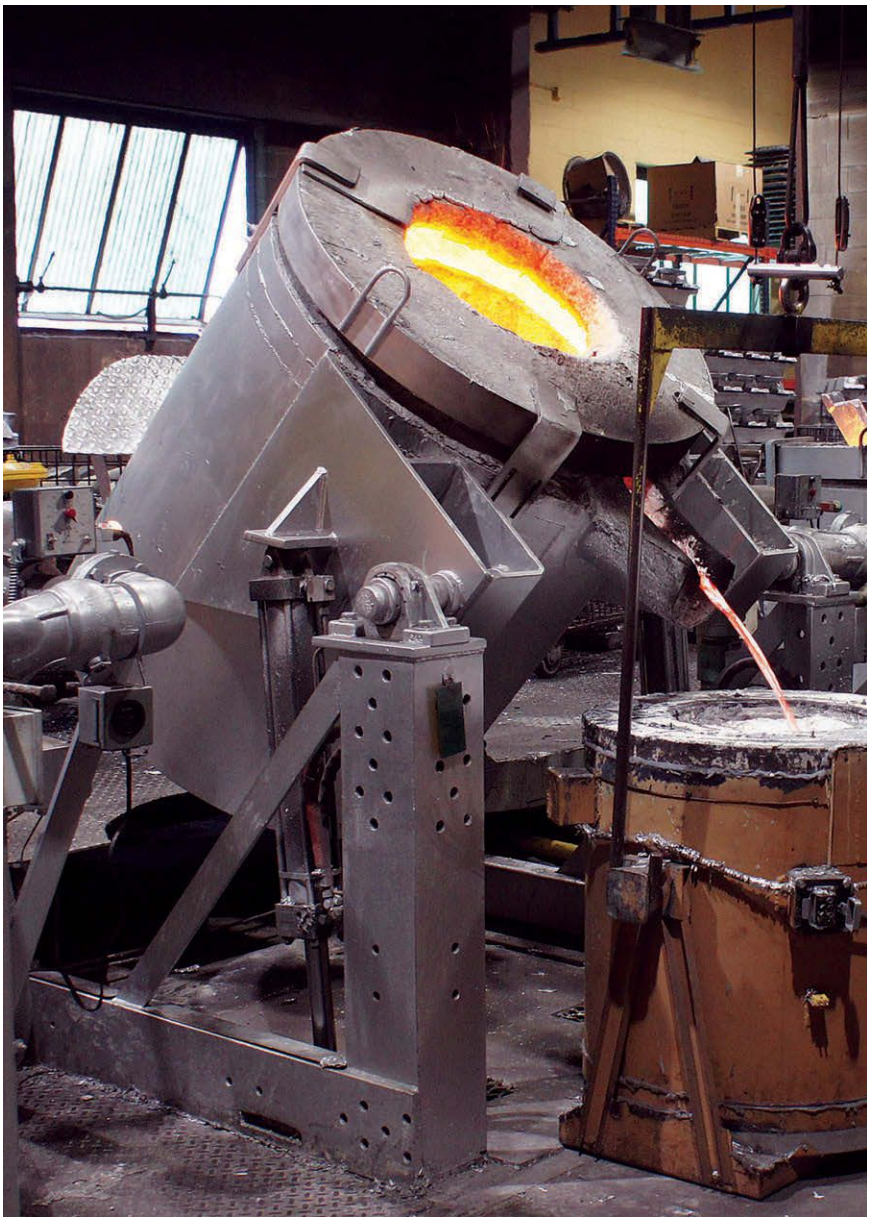
Olson Aluminum's green sand lines offered tried and true production for its historic casting types and customers. Combined with the metalcasting facility's gating techniques and melting methods, the green sand lines provide consistent, quality parts with pressure tight and leak free characteristics, along with superior surface finishes and metallurgical properties, according to Stahl.

"The company has been run conservatively in finances and with how the processes and patterns are designed," he said. "That tends to bring the type of customer who demands leak-free, pressure-tight qualities to our program. We have stayed on that path, producing components needing a high degree of engineering, exceptional machinability and superior surface finishes."

Olson Aluminum concentrates on moderate volume jobs spanning a wide mix of products. Its emphasis on a high mix of castings eventually

"We don't want to paint our customers in a corner. Our goal is to design casting programs that will work the first time."

—Mike Stahl, sales manager



Olson Aluminum melts two alloys and uses careful degassing techniques to ensure melt quality.

became the deciding factor to branch out into nobake casting.

"We learned we could do more in the cope in nobake molds," Stahl said. "Nobake allows us to get a better range of part size, provide more detail and incorporate deeper draws."

After branching into prototyping (which makes up 15% of the business) in the 2000s, Olson Aluminum is making another push to diversify by producing more complex, larger castings, and taking on more secondary operations responsibility, such as machining and coating.

"It's what customers are asking for," Stahl said. Customers now can have their different needs met at Olson Aluminum. The new line also will take on overflow from the green sand lines when needed.

"The nobake line should take some pressure off the green sand lines for many jobs," Olson said. "So we now have added flexibility between the two processes."

Matching Process Flow

Olson Aluminum's green sand lines are positioned well between the pattern shop and the melting room and make use of every square foot; however the facility was challenged by existing real estate.

Fortunately, over the years Olson Aluminum acquired plenty of land surrounding the facilities with the foresight of expanding, as well as keeping a polite buffer between the facility and its neighbors. The extra land afforded the opportunity to add on the 16,000-sq.ft. building, which houses the nobake molding line, including a 500-lb./minute Palmer mixer and turntable, a new sand system, and eventually, cleaning and heat treating space.

One of the company's main concerns was to have it flow efficiently with the existing melting and shakeout areas.

"We had a fixed endpoint and a constrained beginning point, and we had to fit the project into the envelope," Olson said. "We wanted to minimize the complexity of the layout and improve foundry maintenance. It had to fit the job shop environment."

Olson, Zach Utsinger, vice-president of engineering, and Wayne Carr, vice president of manufacturing, visited a number of metalcasting facilities to see what worked and what didn't to form a plan for the facility's expansion.

"We talked with other foundries, suppliers and consultants to choose the pieces we thought would work and integrate them into the facility," Utsinger said.

Eventually, the team came up with a design that positioned the sand system, mixer and turntable toward the back of the building, with the mold pouring and cooling lines toward the center and a clear path from the adjoining melting room and shakeout.

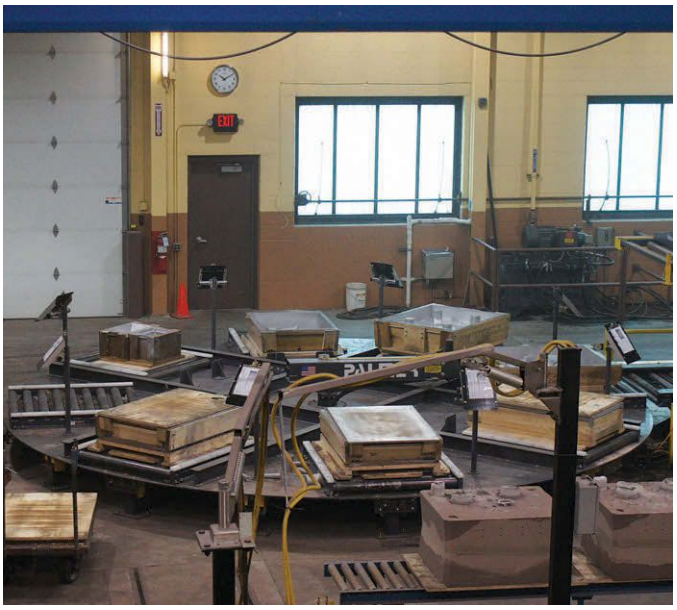
The new cleaning area was installed conveniently at the front of the addition, just off the shakeout area of the existing facility.

"We wanted to increase product variability with a smooth and efficient material flow without zigzagging through the shop," Olson said.

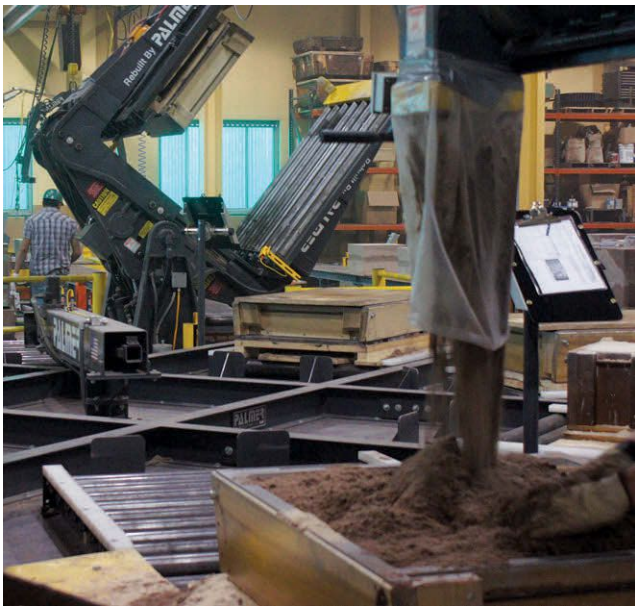
The need for the nobake shop grew before it was ready to go into production.

"We were waiting for the most vulnerable time in the recession, and that was the point at which we wanted to start building." Olson said.

The metalcasting facility set up a



Olson Aluminum's expansion will boost its casting capacity.



After nobake cope and drag molds are made, they are transferred via turntable to a machine that pairs the halves together.

lab to test different mold mediums and equipment and eventually began making production molds in the lab to meet customer demands.

Now, that the expansion is online and in full production, Olson anticipates an increase in plant capacity.

Building on Reputation

In 2006, after decades of running the metalcasting facility together, brothers Don and Ray Olson began their exit strategy and ownership transition to Tad Olson. Then the recession hit.

"We fell off about 40%," Tad Olson said. "All our customers across the board fell off, but we didn't lose a single customer."

Olson Aluminum continued to bring new work into the casting facility, although not enough


The nobake line will take on new jobs requiring larger dimensions, as well as function as overflow capacity for the Olson Aluminum's original green sand casting lines.

to make up for the 40% drop-off in existing customer sales. Still, it kept the company in a good position to come out of the recession quickly and regain lost ground. By 2011, Olson had survived his first industry crisis as sole owner, and Olson Aluminum was earning a significant sales volume annually—more than pre-recession levels.

"The only reason we've been able to [improve the performance of the company] is that we stand on the shoulders of giants," Olson said. "I attribute much of our success to our previous generations."

Additionally, Stahl points out Olson Aluminum's lead time and metal quality have been critical in expanding and maintaining its customer base. The company has been providing four-week lead times for existing jobs since 1990, he said, regardless of the business cycle.

"Lead time is four weeks now, and it was four weeks when we were close to capacity," Stahl said. "The 90s was a decade of speed, and we had to step up to be a competitive player."

The company's reputation for metal quality stems earlier, from Olson's conservative patternmaking philosophy. Since the company's start as a pattern shop in 1945, it has performed its own gating and riser design, pattern and layout work.

"Our mold riser layouts continue to be designed conservatively," Stahl said. "Don and Ray always said the business doesn't have to be risky. After machining is when you really see the quality of the castings."

To ensure the quality of the metal running through the gating, Olson Aluminum degasses the melt. Every heat is tested to monitor for variations in the metal, and the facility pours primarily 356 and 319 aluminum and keeps the melts simple and consistent.

"We don't want to paint our customers in a corner. Our goal is to design casting programs that will work the first time," Stahl said. "We, along with our customers, have much invested in the design process. We consider issues such as machining, datum targets, finish stock requirements and final grinding."

Now Olson Aluminum is pushing to further tighten lead times to match customer inventory requirements and increase its production flexibility.

According to Olson, the new nobake line offers its customers additional diversification and opportunities in product design. MC

ONLINE RESOURCE

Visit **www.moderncasting.com** to see additional multimedia of Olson Aluminum's new nobake line.

Dos and Don'ts in Melt Deck Safety

Here is a safety list of dos and don'ts to protect you from hazardous situations when working on the melt deck. JILLIAN KNUERR, ASSISTANT EDITOR,

FRED KOHLOFF, AFS DIRECTOR OF ENVIRONMENTAL, HEALTH AND SAFETY AND THE AFS SAFETY & HEALTH COMMITTEE (10-Q)

To some, handling and melting metal is a normal, everyday part of their job. It may even be easy to forget that the tasks performed present risks and hazards when not carried out using proper safety equipment. But, what safety equipment is required in what areas?

For starters, it's important to know what areas are considered hazardous in and around the melt deck. Proper hazard identification needs to be in place to alert users that they have entered a zone where hazards, such as a molten metal, heat, sparks or splash can exist.

Workers must be prepared for possible dangerrous situations or hazards when working on the melt deck. After working in that area for an extended time, the situations may seem less dangerous, but workers cannot overlook the potential for danger to arise.

Certain PPE is required to protect the body from head to toe in melting operations.

When working melt deck operations, certain personal protective equipment (PPE) is required. Employers must perform a hazard assessment to determine the correct PPE to wear for each operation. Workers must know the correct PPE to wear and how to properly wear it; the equipment is designed to be effective when worn properly.

What Areas Around the Melt Deck Present a Hazard?

According to the American Society for Testing and Materials (ASTM) Standard 2349-12, the hazard

zone in melting operations includes areas where there is a possibility of a molten metal splash. ASTM describes the zone as extending from the edge of the induction melting furnace to a distance of either 20 ft. or five times the crucible inner diameter, whichever of the two is greater. Metalcasters know this area as the melt deck.

ASTM requires hazard zones to be identified properly, including the following:

- The employer shall identify the extent of the hazard zone and mark it with color coding or post signs warning of the hazard.
- Signs must be posted at each point of entrance identifying it as a hazardous area.
- The flooring in the hazardous area entrances must be marked with a yellow line spanning the entire entrance.
- Only authorized personnel (supervisors, lab technicians and approved visitors dressed in appropriate PPE) should be allowed within the hazard zone and only to perform authorized tasks and keep their time within the zone to a minimum.

Seeing the above notifications should immediately alert you that PPE is required.

What Hazards Exist on the Melt Deck?

Workers in the identified hazard zone or melt deck area are likely to be affected by the following types of hazards, which would again be considered during the PPE assessment:

- Burns from physical contact with molten metal splashes, run-out, spills, sparks, flames, hot surfaces, cold tools or liquid introduction into the metal (explosion hazard). When molten metal comes into contact with a liquid in such a way that it entraps the liquid/moisture, a violent explosion can occur by the rapid production of steam or vapor. Physical explosions occur through an initiation mechanism whereby hot particles of molten metal are finely dispersed in a small volume of water resulting in rapid heat transfer from the hot particles to the water. This initiating event may cause severe damage to property and life.
- Burns and heat stress from exposure to radiant heat.
- Airborne contaminants such as dust and fumes.

What Should Melt Deck Workers Wear?

There are two types of PPE: primary and secondary. Secondary or basic PPE refers to clothing or PPE designed as basic protection for continuous use in areas where exposure to hazards is possible. The following are all examples of appropriate secondary protection:

- 100% cotton or wool socks.
- 100% cotton undergarments.
- 100% cotton or wool outer garments.
- Safety glasses with side protection.
- Leather safety shoes with toe protection and a smooth toe.
- Hearing and respiratory protection, depending on the degree of exposure.

Workers performing melting operations and working inside the identified hazard zone or melt deck area require primary PPE. Primary PPE is clothing or PPE designed for activities where significant exposure to hazards such as molten metal splash, radiant heat, flame, noise or flying particles are likely to occur. Types of primary PPE include coats, jackets, aprons, cape, sleeve(s) and bib, leggings, chaps and spats. The appropriate PPE may vary from facility to facility as operations are set up and operate differently (i.e., type of metal poured, casting size, position of worker to the pour and the furnace, condition of charge materials, engineering controls, etc.). Appropriate PPE can be determined by a hazard assessment, required by the Occupational Safety and Health Administration (OSHA) standard 1910.132(d).

Hazard zones must be properly identified, including yellow railing.

Now that the types of PPE have been properly identified, let's take a look at how to properly wear the required PPE.

Dos and Don'ts in Melt Deck Basic Protection and PPE

Do:

- Wear pants or leggings.
- Wear spats or leggings that cover the lacings of boots (if wearing laced boots). Molten metal or sparks can lodge in the tongue area of the boot.
- Maintain all protective clothing to keep it in serviceable condition.
- Repair fabric in a way that maintains its flame resistant properties.

Proper melting gear can include boots, coats, face masks and hard hats.

- Wear types of PPE in any combination as needed to protect exposed body parts to heat or metal splatter, as determined by the hazard assessment for each work activity.
- Consider aluminized PPE when exposed to high heat and spark producing operations such as lancing, tapping, slagging or activities where molten metal splash is possible.

Don't:

- Tuck pant legs inside boots or spats.
- Wear Nomex, as molten metal tends to stick to the fabric.
- Wear polyester, nylon or other man-made materials that can melt and possibly ignite.
- Wear phosphorus-treated cotton (for nonferrous metals) because molten metal sticks to the fabric. Many flame resistant cotton fabrics use a phosphorus-based treatment.
- Wear clothing that may trap molten metal or sparks, such as cuffs, open pockets, loose legging tops, etc.
- Wear any sort of metal jewelry.

Eye and Face Protection in Pouring Operations

PPE items are available to protect you from head to toe. Identify the type of equipment that is available and required. For protection of the face and eyes, potential hazards are eye and face injuries from foreign bodies, molten metal splash and chemicals, and damage from infrared and/or ultraviolet radiation.

Safety glasses with side shields are minimum secondary protection that should be used for all metalcasting operations, especially melting. The following types of additional PPE should be used for the eyes and face:

- Full face shield, thermal/infrared with a gold tint/wire mesh.
- Full face shield, polycarbonate or #40 steel wire mesh.
- Tinted glasses specific to the type of metal (iron—shade #3–#5 green; steel—shade #8 green or #6 cobalt blue; brass/bronze—shade #3–#5 green or shade #3 green with #3 aluminized face shield or shade #6 cobalt blue (half lenses); aluminum and magnesium—clear, no tint.

Dos and Don'ts in Melting Face and Eye Protection

Do:

- Use appropriate darker shades of glasses for intense radiant energy.
- Switch to a lower shade number of un-tinted lenses when leaving the molten metal area or during extended periods when no molten metal viewing is required.
- Choose a lower shade number for glasses when molten metal viewing is momentary or incidental.
- Use a full face shield (such as polycarbonate or #40 steel mesh) when exposed to a potential hazard of molten metal splash such as furnace charging, tapping or ladle pouring.

Don't:

- Forget to wear safety glasses with side protection when face protection is worn.
- Choose eye protection that is too dark as it may reduce visibility and create hazards such as tripping.

Protection in Pouring Operations for Head, Hands and Feet

The hazard assessment should consider potential head, hand and foot hazards found on the melt deck, including head injuries from falling objects, moving equipment and/or overhead obstructions, burns from physical contact with molten metal splash, sparks, flames and/or hot surfaces, foot injuries from falling or rolling objects and scrapes, cuts and abrasions.

These molten metal handlers are protected with full face shields, gloves, and coats.

When head protection is needed, workers should utilize a thermal rated hard hat, with a cotton or wool cap or an aluminized hood.

For hand protection, workers should use the following materials for mitts, cover mitts, cover pads or gloves: leather, cotton, wool, Kevlar, wool-lined Kevlar, aluminized fabric or other heat resistant materials.

For primary protection of the feet, workers should use metatarsal safety shoes or shoes with heat resistant soles.

Dos and Don'ts in Head, Hand and Foot Protection

Do:

- Use a thermal rated hard hat with a cotton or wool cap to provide protection from minor metal splatter.
- Consider the need for dexterity and grip security while operating equipment when choosing safety gloves.

Metatarsal safety shoes or engineer boots offer protection.

Protective footware is important to keep molten metal and sparks from lodging in boots.

- Have sleeves that cover the end of gloves, unless reaching overhead.
- Wear smooth toe safety shoes such as metatarsal safety shoes or engineer boots.
- Wear spats or leggings that cover the lacings to prevent molten metal or sparks from lodging in the tongue area of the boot when wearing lace boots.
- Wear pants or leggings that cover the top of the boot to prevent molten metal and sparks from entering the boot.

Don't:

- Use gauntlet-type gloves unless there is no chance of metal being spilled into the glove.
- Wear Nomex gloves, as molten metal tends to stick to the fabric.
- Wear phosphorus-treated cotton (for nonferrous metals) because molten metal sticks to the fabric. Many flame resistant (FR) cotton fabrics use a phosphorus-based treatment.
- Tuck pant legs inside the boot or spat.
- Use shoes with exposed zippers or elastic materials that can melt or ignite.

Hearing Protection in Melting and Pouring Operations

Potential hazards involving hearing include hearing loss due to noise exposure and an inability to hear warnings. Consider primary protection for hearing, including ear plugs, ear muffs and ear caps.

Dos and Don'ts in Hearing Protection

Do:

- Select hearing protection that provides sufficient noise reduction for the exposure.
- Calculate noise reduction and the noise reduction rating

for the hazard when selecting proper protection.

Don't:

- Select hearing protection that does not properly fit.
- Select hearing protection that is not appropriate for the workplace noise level.

Melt Deck Respiratory Protection

Workers in ferrous melting operations risk exposure to toxic metals such as lead, cadmium, arsenic, chromium (either as part of the alloy or as a contaminant of the scrap being melted) and toxic gases such as carbon monoxide. Crystalline silica may be present from handling refractory materials such as furnace and ladle tear-out, relining and from other metalcasting areas. For magnesium, consider acid gases when sludging, and for aluminum, consider chlorine or fluorides used for degassing.

The below respiratory protection can be used when needed:

- Half mask respirator
- Full facepiece respirator
- Filtering or air purifying facepiece respirator
- Powered air-purifying respirator
- Air supplied helmet or hood.

In certain situations, a respiratory mask is required.

Dos and Don'ts in Respiratory Protection

Do:

- Choose a respirator that is part of an effective respiratory protection program.

Don't:

- Ignore industrial hygiene monitoring of noise, dusts, metal fumes, gases and vapors when performing your hazard assessment. MC

ONLINE RESOURCE

Visit **www.moderncasting.com** for additional safety and protective equipment articles.

Great Plains' Pattern Experiment

The agricultural equipment manufacturer used a 3-D printing machine to prove out a new part as a casting, saving time and money. **SHANNON WETZEL, SENIOR EDITOR**

Larry Spaeny, shop manager for the product development team at Great Plains Manufacturing, Salina, Kan., was frustrated by missed opportunities for casting product launches. Throughout the shop floor, he saw multiple-piece weldments that would work better as castings but remained unconverted because time wasn't available to accomplish the redesign, re-tooling and re-testing.

When Great Plains launches new farm machinery product, the company is on a timetable to have it ready for the next growing season. Often, that means the products are designed and prototyped as fabrications and weldments because they can be produced in-house without any tooling investment. Even when the intention may be to convert to a casting further down the road, resources are often not available.

"The biggest issue here is if we welded it up and did the testing first, we would never get around to doing the casting later on, because the testing takes forever," Spaeny said. "If you test it as a weldment and it is a structural piece, there is no going backwards to test it as a casting."

Earlier this year, Great Plains purchased a 3-D printer to produce prototype plastic parts. It had Spaeny thinking. Perhaps the company could use the equipment to make investment casting shells to prototype its iron components. Designing parts as castings from the prototype stage would help Great Plains take better advantage of the reduced inventory and part numbers inherent in the casting process. Unfortunately, a search for an investment caster pouring ductile iron came up empty.

"We were down in the mouth about it," Spaeny said.

Eventually, the tooling and engineering staff at Great Plains wondered if it would be feasible to produce a sand mold pattern out of the ABS plastic produced by the 3-D printer.

Great Plains' Guinea Pig

The first component Great Plains experimented with was a quick-attach mount for the NP4000 NutriPro Liquid coulter assembly. The mount holds a large disc, or coulter, to the farm machinery. The coulter assembly is designed to be removable so the farmer can use the NP4000 to pre-apply nitrogen fertilizer to the soil, as well as reapply fertilizer between the planted rows, using the same equipment.

"If this wasn't an option, the farmer would need two implements," said Kevin Reade, an engineer for Great Plains. "It's basically two machines in one, and when the first version came out, it was very difficult to take the assembly on and off."

The basic idea for the mount was


8430T

to facilitate easier removal by reducing the amount of hardware used. Great Plains needed the mount in time for its dealers' meetings, a three-week period in July during which farm equipment dealers from across the country visit the facility to check out its latest products. Most familiar with weldments, Reade first sketched out a model of the part as a fabrication requiring four bolt holes.

"Four bolts per row, with between 11 and 17 rows per machine, would be too tedious," Reade said. The part was a prime candidate for casting.

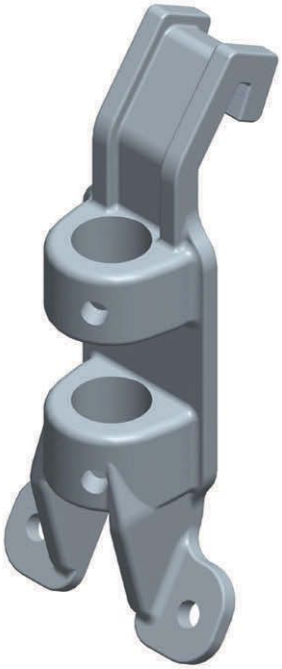
Reade worked with Spaeny and tool designer Erik Thorsell, who have experience designing castings, to refine the mount's shape and structure. They eliminated two bolt holes by incorporating a loop that hooks onto the equipment, instead of being bolted on, before creating the first plastic pattern on the 3-D printer.

Great Plains partnered with Kansas Castings, Belle Plaine, Kan., a nobake and green sand casting facility two hours south of Salina, to pour the prototype castings.

"This was the first time I had ever seen patterns made of that material," said Don Hibbs, Kansas Castings plant manager. "The material was a little rough and fragile, but we were able to make good castings from the first pattern."

According to Spaeny, the first plastic pattern printed for the mount

The initial quick-attach mount model was designed with four bolt holes.



The first casting design replaced the top bolt holes with a hook.

The final casting design replaced bosses and gusseting with a long cylindrical tube.

castings took 50 hours on the 3-D machine, but those weren't man-hours. "We just pushed a button and let it run, 24 hours a day," he said.

Great Plains personnel performed some body work on the pattern in the shop to smooth out the rough edges, which Spaeny estimated took seven man-hours. If the company had prototyped and tested the part as a weldment, it would have taken considerably more labor.

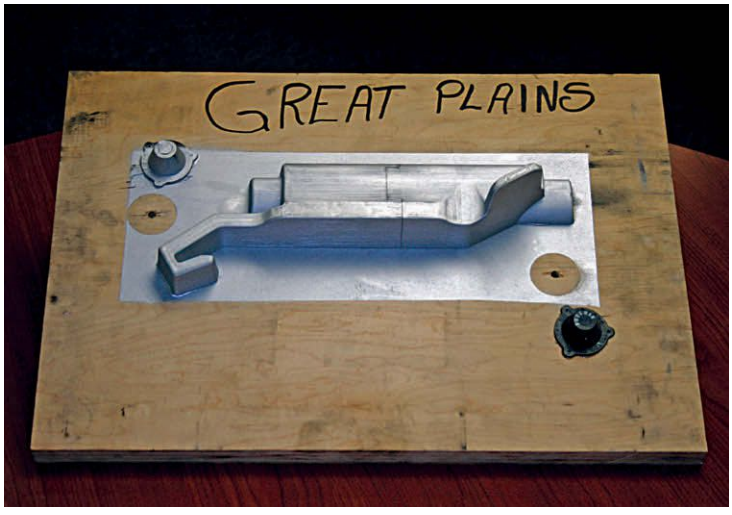
"To make this part as a weldment, it would have taken about 13 individual parts welded together," Reade said. "And you wouldn't get what you really wanted. The weldment would give you functionality and that is it."

As a visible piece on the assembled fertilizing equipment, the cast mount improved the appearance of the assembly and gave it a cleaner look, according to Spaeny.

Kansas Castings used the first pattern to produce four of the castings on its nobake line.

"We didn't make any process adjustments other than to be sure we didn't abuse the tooling," Hibbs said. "We used a direct pour sleeve for the first pour to reduce rigging time and cost."

Spaeny and company were pleased with the results but saw more improvements could be made.



Kansas Castings produced 40 castings using the plastic pattern Great Plains produced on its 3D printing machine.

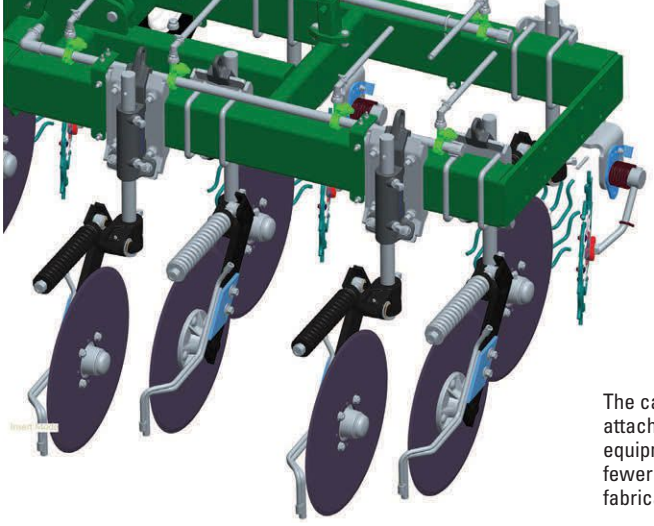
Design Changes on the Fly

As an assembly a farmer would physically remove and reattach, Great Plains wanted to keep the quick-attach mount light. The whole assembly was already nearing 70 lbs.

"We wanted to take some weight off of this thing," Spaeny said. "You pay for extra weight, no doubt, and it was heavy enough as it was."

To reduce weight and improve castability, Great Plains replaced two bosses and some gusseting with one long cylinder down the outer side of the part. The designers also added a loop so farmers could use a hoist to pick up the component.

"I had the concept,



The cast mount is easier to attach and unattach from the equipment since it requires fewer bolts than the original fabrication design.

and [Thorsell] took it and made it a casting," Reade said.

Thorsell determined two slab cores would be needed to produce the long cylinder due to the location of the parting line.

"With three cores, we went through some effort to make it work like we wanted it to," Spaeny said. "We still had some doubts." Great Plains, which produces most of its own metalcasting patterns and coreboxes, checked in with Kansas Castings for input on the castability of the part, since the new features required some additional coring. Hibbs and Ron Pomeroy, Kansas Castings owner, said the final design would not cause any problems at the casting facility.

After all the design changes, Great Plains printed its second pattern, this time for test castings to be produced on Kansas Castings' green sand line.

"Great Plains does a great job of sending us drawings for our input so that once the tooling is in our door, we can run the thing straight away," Hibbs said. "For the coreboxes, we had enough information communicated back and forth so that when they were delivered, we did not have to add any venting. They made good cores without a problem."

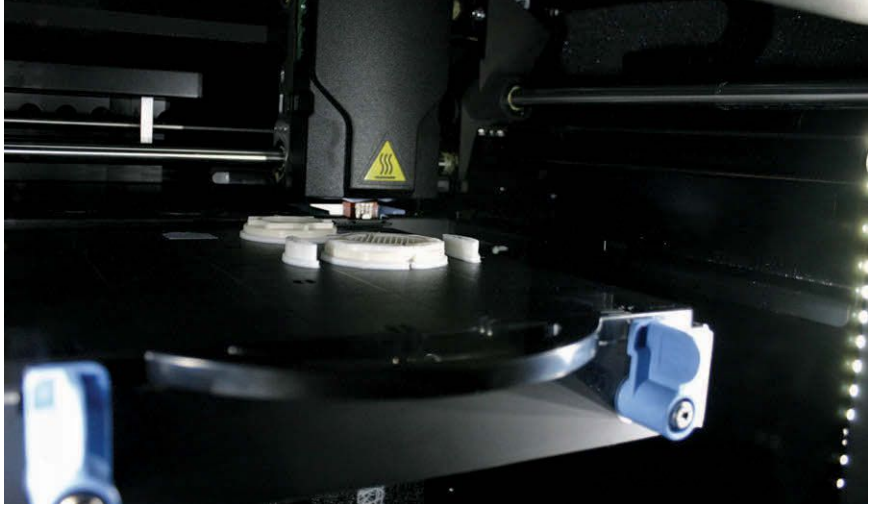
With the second set of patterns, Kansas Castings produced 40 total cast ductile iron mounts, enough to showcase the final assembled equipment during Great Plains' dealers' meetings in July. Before the showcase, the 9.7-lb. castings also passed testing for functionality and durability.

"Initial testing looked at whether [the part] hooked the way we wanted it to and if we had any clearance issues," Reade said. "Then we performed repetitive impact testing. The whole testing process took between two and three weeks before we were satisfied with the cast design."

Full production for the castings—with production aluminum patterns—is expected to begin in the fall.

Future Plans

Pleased with the results of the first sand casting prototype project,



Great Plains used a 3-D printer to produce plastic patterns capable of making sand molds.

Spaeny said Great Plains already has another component in the works for design and testing.

"It was kind of fun to try something new. I don't think it could have gone any better," he said. "This will help us get to casting testing much quicker. And in the ag business, if we miss a season of testing, we may miss the whole year."

Spaeny said building a weldment in the shop for new product development may be simple and easy, but in the long run, many components would benefit from being designed as a casting. The process would eliminate multiple pieces, save man-hours in the weld shop and often produce a cleaner-looking part. Finding a way around casting's drawbacks, such as tooling costs and slower ramp-up speeds, with the use of 3-D-printed plastic patterns is an exciting prospect for Spaeny, who also pointed out how quickly Great Plains was able to make changes to the initial model for the second pattern. The whole prototype stage, from concept to casting-in-hand for the dealer showcase, took three months.

"This is a big deal for us. There's a lot of money that can be saved in castings," Spaeny said. "It's really hard to go back and save X amount of dollars. It's easier to do it [as a casting] right off the bat."

Hibbs is glad Kansas Castings was along for the experiment.

"This is what makes the foundry business fun—being involved close enough at the beginning to see what works with the foundry," he said. "It's a lot more satisfying and interesting to be involved." MC

ONLINE RESOURCE

Visit **www.moderncasting.com** to see more photos of Great Plains' new prototyping method.

Which Molten Aluminum Transfer System Is For You?

The best method for moving molten metal from the furnace to the mold is different in each shop and depends on a number of variables.

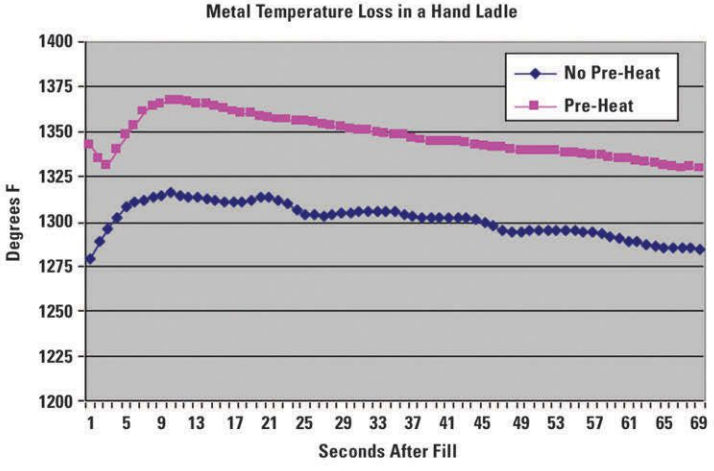
RANDY OEHRLEIN, CARLEY FOUNDRY INC., BLAINE, MINN.; JOHN HALL, CMH MANUFACTURING CO., LUBBOCK, TEXAS; AFS PERMANENT MOLD CASTING COMMITTEE (2E).

The use of rotary impeller degassing with flux injection, hydrogen gas level detection equipment, and evaluation techniques for grain refining or silicon modification can put high quality metal within reach of nearly every aluminum metalcasting facility. Furnace temperature control technology has become increasingly efficient and accurate, as has mold and gating design through computer simulation. However, these advancements can be ineffective if the molten metal transfer process (the step between melting and pouring) is not effectively controlled.

It is a common assumption that hand ladling is the most cost-efficient and flexible way to transfer molten aluminum and automated transfer is too expensive for small-to-medium sized aluminum facilities.

A recent survey of the aluminum casting industry revealed a wide variety of methods used to transfer molten metal from the furnace to the mold. The responses came from a wide cross-section of the industry and provide a snap-shot of aluminum metalcasting processes as well as practical advice from individuals within the field—what they like and dislike about aluminum molten metal transfer systems and how they rate them in terms of cost, safety, process controls, ease of use and flexibility.

The survey respondents represent workers in job shops and captive shops with anywhere from 25-250 employees in industry sectors such as automotive, aerospace, defense, cookware, internal combustion engines, pumps, construction, office equipment, lighting and medical. Of the respondents, 31% use the gravity permanent mold process, 25% use green sand and 28% use chemically bonded sand. Investment and die casting each are used by 8% of respondents.



The chart depicts temperature lost when the metal is and isn't pre-heated.

Hand Ladles

Hand ladles provide considerable flexibility, offer a wide range of sizes and can be used to pour various alloys with an ease of change. Hand ladles also provide low purchase cost, are relatively easy to maintain, are considered highly reliable and allow for a variable pour rate. These perceived benefits, however, come with some less than desirable issues.

One of the most commonly cited

Automation can provide improved process controls, reduced worker fatigue and improved productivity.

A bull ladle and crane system can be utilized to move large volumes of metal from the primary melting furnace to the casting furnace.

complications in using hand pouring ladles is the variable pour rate. Different pourers have different pour techniques, leading to inconsistency and poor process controls. The typical metal hand ladle is prone to excessive heat loss in transfer, pouring volume limitations in large pours, worker fatigue and safety related issues. Metalcasting facilities that have moved away from hand pouring indicate automation provides improved process controls, reduced worker fatigue, and improved productivity, as well as better metal quality and metal temperature control.

Bull Ladles & Cranes

Twelve percent of those surveyed used an "other" primary method, which included either low pressure or a bull ladle and crane system. Large transfer ladles (moved by fork truck or overhead cranes) can be used to move large quantities of metal from a primary melting furnace to the casting furnace. They also can be used as direct pouring ladles for large molds.

Large ladles provide the benefit of being used in a separate melt treatment unit, where the metal can be degassed and treated with additives in batches. However, they can be prone to turbulence when pouring. Steps also are required to provide adequate safety while these large vessels are moving through the plant.

Automated Ladles

Many metalcasting facilities consider automatic ladles the next logical step. Of those surveyed, 12% currently employ automated ladles as their primary melt transfer method. Automatic ladles provide a repeatable pouring rate, and the systems typically offer

Table 1: An engineer's method in considering each metal transfer factor in the decision making process.

Possible Methods	Weighting Factor	Pump		Dosing Furnace		Bottom Pour Stopper Rod		Power Assist		Robotics		Auto Ladling	
Direct Costs	10	4	40	1	10	2	20	3	30	1	10	2	20
Estimated Install Costs	7	3	21	3	21	2	14	2	14	1	7	2	14
Energy Costs	3	4	12	4	12	4	12	4	12	4	12	4	12
Ladle Size Flexibility	5	4	20	3	15	2	10	3	15	3	15	3	15
Heat Size	8	1	8	4	32	3	24	3	24	3	24	3	24
Complexity	3	1	3	4	12	3	9	3	9	3	9	3	9
Portability	7	3	21	2	14	3	21	3	21	1	7	2	14
Guarding Requirements	7	4	28	4	28	3	21	3	21	1	7	2	14
Maintenance Considerations	5	2	10	2	10	4	20	3	15	2	10	2	10
Set-Up	5	4	20	3	15	4	20	4	20	1	5	2	10
Reach	7	2	14	1	7	3	21	3	21	4	28	3	21
Ability to Use Two Furnaces	8	2	16	2	16	4	32	4	32	4	32	3	24
Free-up Worker	9	4	36	4	36	3	27	3	27	4	36	4	36
Increase in Technology	6	3	18	3	18	3	18	3	18	4	24	3	18
Unweighted Score		**41**		**40**		**43**		**44**		**36**		**38**	
Unweighted Rank		**3**		**4**		**2**		**1**		**6**		**5**	
Weighted Score			**267**		**246**		**269**		**279**		**226**		**241**
Weighted Rank			**3**		**4**		**2**		**1**		**6**		**5**

A mechanical pump delivers metal to the pouring cup for a permanent mold tilt pour machine.

simple designs suitable for a wide variety of applications and shop floor designs, such as in a linear operation or with mounted rotary bases. They do not require as much guarding as robots. However, they are limited in shot size and range of motions for different heights.

Robotic Pouring

Robotic pouring is flexible and highly repeatable. Eighteen percent of those surveyed utilize robotic pouring as a primary method. Robots have the ability to multi-task with several functions and different pour weights, heights and speeds. On the down-side, robots are typically more expensive than automatic ladlers, and greater versatility means greater complexity, which requires more maintenance and elaborate guarding.

Mechanical Metal Pumps

Mechanically assisted melting methods are most highly used among those surveyed, accounting for 35% of respondents. Pumps can move large volumes of metal continuously and are useful in high volume operations, with an ability to be fitted with a variety of filtering options. Pumps can be used to circulate metal in large furnaces, which provides more efficient and uniform heat control while staying comparatively inexpensive. Although some models can circulate bath and discharge metal, mechanical pumps are typically not used for filling molds. They must be kept immersed to reduce maintenance issues.

Electro-magnetic pumps provide good control of the pour profile, are versatile and typically are used as a low-pressure method.

Electro-Magnetic Pumps

Electro-magnetic (EM) pumps were indicated as a primary melting method by 6% of survey respondents. They provide good control of the pour profile and are versatile. The pumps are often used as a low-pressure method of supplying metal into the mold. EM pumps offer a vast shot size potential. They do not have moving parts and offer better metal control, easier metal access and better furnace size advantages over standard low pressure systems. However, EM pumps are relatively expensive.

Dosing Furnaces & Pumps

Though it was indicated that dosing furnaces and pumps are used in some shops, none of the respon-

A robot performes pouring into a permanent mold using an offset end tool ladle.

Dosing furnaces can deliver repeatable temperature and shot control while dosing pumps are versatile and provide good shot control.

A covered launder system serves several casting machines.

dents indicated it was a primary melt transfer method. Dosing furnaces can deliver highly repeatable temperature and shot profile control and are closed systems, making them energy efficient. These benefits come at a higher initial purchase cost. Like many of the other melt transfer systems, they can be engineered for specific shop floor layouts and applications.

Pumps are versatile and provide good shot profile control. They can be adapted to a variety of furnace styles and metal filtering options. Constraints include a limited shot size and difficulty accommodating longer reach applications.

Launder Systems

Nine percent of survey respondents indicated launder systems were used, but none said it was their facility's primary melt transfer method. Molten aluminum can be moved a great distance in a facility through launder systems. The systems do not require any moving parts, provide excellent temperature control (when used with covers) and incorporate in-line filtering and metal treatment options. They are relatively low maintenance and can provide a safe and comfortable working environment. Launders take up a lot of floor space and can restrict floor movement. They are typically applicable to single alloy shops.

Bottom Pour Stopper Rod

Among the surveyed respondents, the bottom pour stopper rod method was not indicated as a primary melt transfer method. The units come in a wide variety of styles, sizes, capacities and uses. Because they are closed to the atmosphere, the ladles help minimize oxide formation and provide cleaner metal with minimal temperature loss. It can be difficult to control the pour profile using a stopper rod, and the unit occasionally drips metal. The refractory ladle material is somewhat fragile. Stopper rods also can be used with automatic ladle equipment, robots or mounted to an overhead powered bridge crane. MC

SELECTING EQUIPMENT

Some questions to consider when choosing automation melt transfer technologies include:

- What volume of castings will be poured? Is the volume consistent job to job, or will it vary?
- What is the part weight? How much metal is needed? Does the part size and pour weight vary significantly?
- How far is the mold or pour location from the furnace? What is the time and distance of travel?
- Is flexibility in alloy, fill rate, and shot size an issue? What is the required time of change between different molds or alloys?
- What is the effect of the equipment on metal quality?
- Will the guarding on the most automated system inhibit core placement or mold maintenance?
- What are the cost factors (equipment and installation) of consumables such as ladles?
- What is required for maintenance and operating technical requirements?
- What safety requirements are involved?
- What is the speed of the method?
- What type of metal quality is expected from using the chosen method? MC

Preventing Cracks in Large Investment Shells

The ability to predict shell crack formation could facilitate the use of plastic foam patterns to produce large investment castings. A *MODERN CASTING* STAFF REPORT

Using rigid plastic foam instead of the typical wax material for large investment casting patterns can improve dimensional tolerances and casting surface quality. However, plastic foam promotes crack formation in investment casting shells during pattern removal using standard firing procedures.

Researchers at the Missouri Univ. of Science and Technology, Rolla, Mo., set out to accurately predict the occurrence of shell cracking during pattern removal by examining the aging strain of the pattern. The team, including Wesley Everhart, Simon Lekakh, Von Richards, Jeff Smith, Haifeng Li, K. Chandrashekhara, Hongfang Zhao and Paul Nam, used ASTM standard tests and independently developed experimental methods combined with finite element modeling to predict stress development in the shell. The model takes into consideration the thermal properties of the pattern and the shell materials to determine the heat transfer to establish a thermal gradient within the materials.

In their study, the researchers investigated the ability to combine the known thermal gradient with mechanical properties to determine the thermal expansion stresses in the shell during firing.

Question

How does pattern aging affect a shell's tendency to produce crack formations?

1 Background

The investment casting process generally is used to produce small, thin-walled castings with high detail. Traditionally, the process entails using a wax pattern (although sometimes polymeric foam is used) dipped into a ceramic slurry. Stucco is applied to the wet slurry coating to form layers of what eventually becomes the pattern's ceramic shell.

In cases where larger patterns are required, wax often proves too weak to hold the shape due to the higher weight. Polymeric foams, such as expanded polystyrene (EPS), have been considered for large pattern production, but the buoyancy of EPS causes problems when the pattern is initially dipped into the slurry. EPS foam and wax patterns also show some dimensional change when they are cooled after production.

Polyurethane foams are stronger, higher density foams that can be made into complicated shapes with high surface quality and dimensional accuracy. However, they have high coefficients of thermal expansion and high decomposition temperatures, which can cause the pattern to expand and break the shell when it's being removed.

The idea of using aging to prevent shell cracking during pattern removal is based on the change in pattern dimensions over time after the shell was built. The polymeric foam aging mechanism relates to the development of crystallinity. Preliminary aging of polymeric foam inside the shell before heating may increase the ordered domain and crystallinity of the pattern during firing, leading to volume reduction and possibly reducing the overall thermal expansion of the polyurethane pattern.

ADDING IT ALL UP

Breaking down the industry's latest research papers is as easy as 1-2-3:

"Foam Pattern Aging and Its Effect on Crack Formation in Investment Casting Ceramic Shells"

W.A. Everhart, S.N. Lekakh, V.L. Richards, J.D. Smith, H. Li, K. Chandrashekhara, H. Zhao and P.S. Nam, Missouri Univ. of Science and Technology, Rolla, Mo.

1 **Background**—Plastic foam has been considered as a wax replacement in large investment casting patterns for added strength, but the material is prone to forming cracks in the ceramic shells.

2 **Procedure**—Researchers tested for shell cracking on polyurethane foam patterns to produce a finite element model to predict crack formation during pattern removal.

3 **Results and Conclusions**—To effectively prevent shell cracking, the researchers recommend aging above the glass transition temperature (140-213F [60C-100C]) for at least 24 hours. MC

2 Procedure

The researchers focused their study on polyurethane foam with 170 kg/cu.m density. Samples had a cross section of 4 sq.in. (2,580 sq.mm) and a thickness of 1 in. (25.4 mm) or 2 in. (50.8 mm). They subjected the foam to compression testing to determine the elastic modulus after aging at 212F (100C) for 24 hours. Thermal dilation during aging was measured with a laser-assisted dilatometer.

Foam samples were cut into 1.97-in. (50-mm) long, 0.71-in. (18-mm) diameter cylinders, and two thin aluminum disks were placed on both ends of the foam and inserted into a quartz glass tube submerged in an oil bath. The end of the tube had a small hole through which oil could flow for improved heating of the sample. Another quartz tube was placed on the upper aluminum disk.

The researchers monitored the expansion of the foam sample through the linear movement of the upper tube using a laser proximity probe and determined the average temperature of the foam samples. The heating rate of the foam was approximately 33.8F (1C)/minute.

Samples were held at various aging temperatures and times, cooled back to room temperature and heated again until softening. One sample was heated and held at different temperatures in a stepped fashion. The samples were stabilized by first heating from room temperature to 356F (180C) and then quenching in liquid nitrogen and held for one minute. The quenched sample also was tested.

To study shell construction and its properties, the researchers used simple patterns (2 x 2.5 x 2.5 in. [50.8 x 63.5 x 63.5 mm]) to test shell cracking during burnout (Fig. 1). The patterns were submerged into the slurry coating until completely covered and then removed and suspended over the slurry for approximately 50 seconds. During this time, the pattern was rotated to promote even coating. The lab technicians then applied a uniform distribution of stucco using the rainfall method.

Shells were fabricated with one prime coat, three or five backup coats, and one seal coat. After the seal coat was applied, the samples dried for another 24 hours. Half of the patterns were aged. After sample preparation, the shells were fired in an electrical resistance box furnace using flash firing in a furnace preheated to 1,112F (600C).

Researchers determined the maximum stress at rupture and elastic modulus of the five- and seven-layer shells using three-point bend testing of shells at room temperature.

A nonlinear finite element model was developed to study the crack formation in the shell during pattern removal. The model accounts for both mechanical and thermal loadings and assumes a fixed interface between the pattern and shell. The mesh of the finite element model for the shell and foam pattern is shown in Fig. 2.

The researchers used a smeared crack model to describe the response of the ceramic material when a crack initiates. Cracking is assumed to occur when the stress reaches a crack detection criterion surface. When a crack has been detected, its orientation is stored for subsequent calculations.

Fig. 1. This investment casting shell was built around a foam pattern.

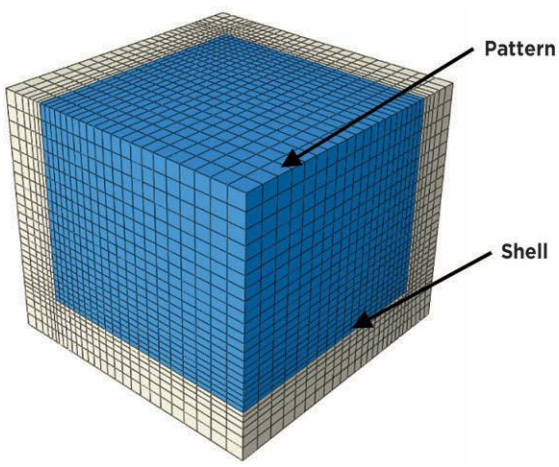


Fig. 2. The finite element model for the foam pattern and ceramic shell used the mesh shown here.

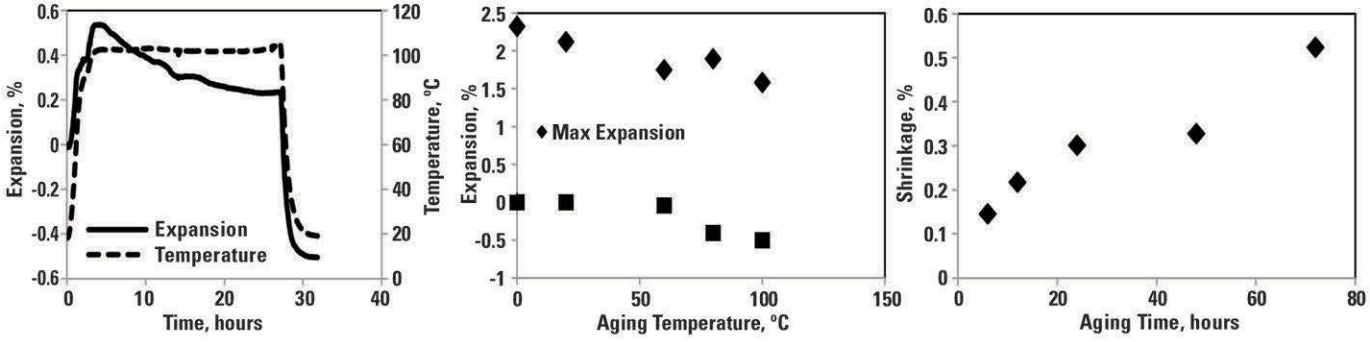


Fig. 3. These graphs show an example of an aging test of polyurethane foam at 212F (left), a maximum expansion/shrinkage of polyurethane foam after aging 24 hours at various temperatures (middle), and the final shrinkage of polyurethane foam after aging for various amounts of time at 212F (right).

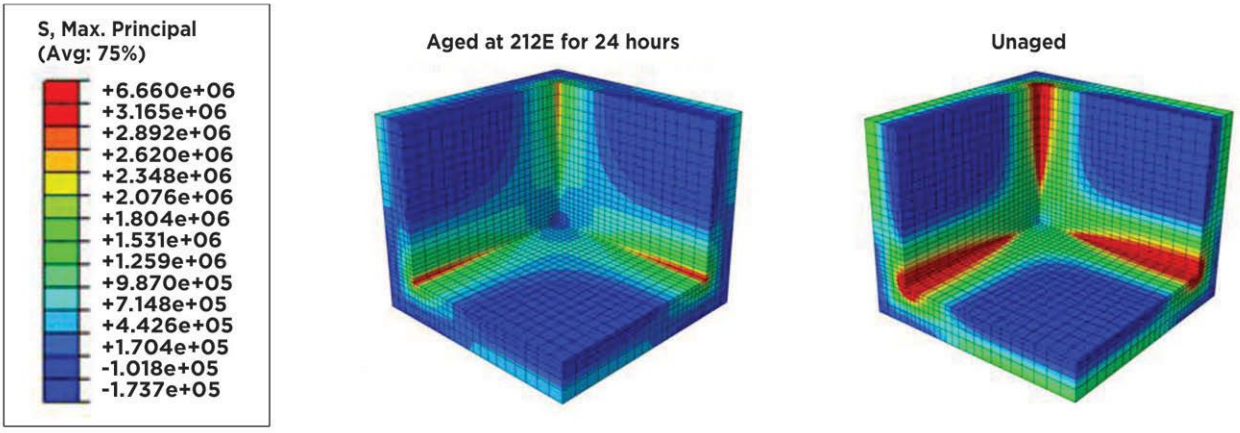


Fig 4. The maximum principal stress distribution of the shell at the end of flash firing and for aged and unaged foam patterns shows maximum stress in the shell occurs when the boundary temperature reaches the foam softening temperature.

3 Results and Conclusions

During the study, the researchers discovered crack formation during rigid foam pattern removal by heat treatment depends on multiple groups of parameters:

Foam Properties—elastic modulus, thermal expansion, softening temperature and aging.

Shell Properties—failure stress, elastic modulus and shell wall thickness.

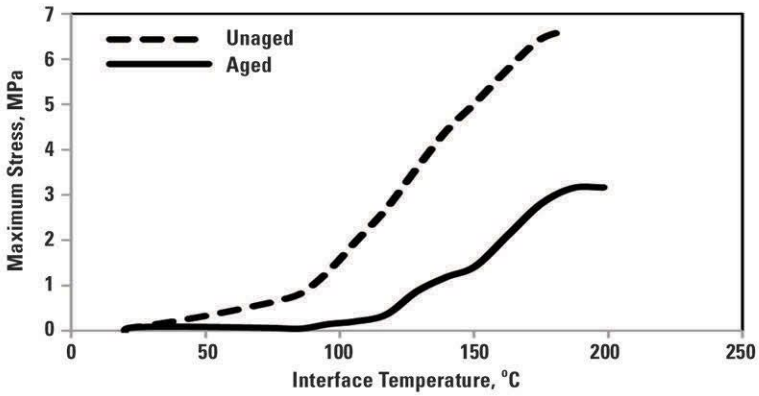
Firing Regime—continuous heating vs. flash firing in a high temperature, preheated furnace.

Table 1. Comparison of Simulation Results and Experimental Results

Case #	Shell Thickness (in.)	Aging	Shell Fail (Simulation)	Shell Fail (Experiment)
1	0.25	Not aged	No	No
2	0.15	Not aged	Yes	Yes
3	0.25	Aged 212F	No	No
4	0.15	Aged 212F	No	No

The authors concluded that aging

Fig. 5. A comparison of stress development in 0.25-in. thick shells shows significantly higher stress occurred in the un-aged patterns.



performed above the glass transition temperature for at least 24 hours will effectively prevent shell cracking when using foam patterns. According to the authors, longer aging times increased shrinkage, especially for times less than 24 hours. After approximately 20 hours, the shrinkage for a pattern aged at 212F (100C) subsided as it neared the completion of its transformation from an amorphous structure to a crystalline structure (Fig. 3).

When the aging temperature was above the glass transition temperature, the amount of shrinkage increased from 0 to 0.5%, which supported the idea that the aging mechanism is the foam's transformation from amorphous to crystalline. The researchers determined the activation energy for aging from the shrinkage.

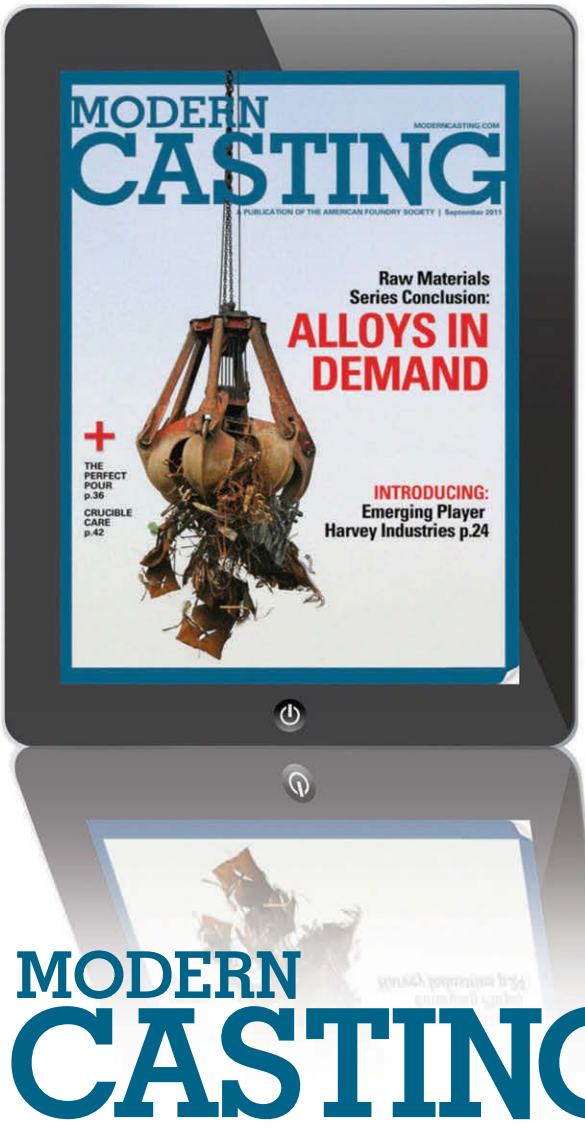
The study showed that during pattern removal, the strain in the pattern consisted of aging, thermal and elastic strain. The strain in the shell consisted of thermal and elastic strain. Foam aging induced a negative strain or pattern shrinkage. This negative strain reduced the overall pattern expansion in the shell, thus lowering the stress developed in the shell during pattern removal (Fig. 4-5).

The researchers applied this concept to a shell cracking model to show aging's effect on the stress developed in the shell during pattern removal. Specific cases were experimentally verified in the lab shell cracking test (Fig. 6). Experimental results were consistent with the predicted crack formation from the model (Table 1). Aging prevented cracking of the 0.15-in. (3.8-mm) thick shells and lowered stress development in the 0.25-in. (6.4-mm) shells. MC

ONLINE RESOURCE
To read the full paper on which this article was based, visit **www.moderncasting.com.**

THE WORLD OF CASTING IN YOUR HAND

Wecome to Metalcasting Newsstand!



Modern Casting **invites you to join us in the mobile world. The newly-developed Metalcasting Newsstand app for the iPad, iPhone and Android devices is now available for download at no charge. Along with the current issue of *Modern Casting*, you can browse these other publications:**

- *Metal Casting Design & Purchasing* offers solutions to the casting end-use community bimonthly.
- *The International Journal of Metalcasting* includes the best in peer-reviewed technical research every quarter.
- *Global Casting* brings you news and information from three continents.

MODERN
CASTING

www.moderncasting.com

The Vision Thing

DAN MARCUS, TDC CONSULTING INC., AMHERST, WISCONSIN

Please help me make a point by participating in a brief thought experiment.

Imagine I am sitting opposite you in your office and ask to visit the maintenance shop. Since I've never been in your office and have no idea how to get from there to anywhere, much less the maintenance shop, you'll need to give me directions. Now, imagine you are mapping in your head the route from your office to the maintenance shop and thinking through how you will explain it to me. You'll need to keep the explanation clear and simple so I am not confused (and lost), but not so simple that my intelligence is insulted and I cease to care about your explanation. You'll also need to be sure to communicate in a way I'll understand, which means figuring out whether you should draw me a map, explain how to get from point A to point B in words, or take me there yourself.

This simple exercise illustrates one of the most fundamental and important attributes of effective CEOs and managers in general: vision. This essential skill is required to visualize and describe a path from a starting point (your office) to a pre-determined destination (the maintenance shop). In the real world of management, vision is the ability to see beyond the moment and through the fog of battle that is our daily reality to what your employees need to be doing to accomplish as yet unmet individual, department and company objectives.

Vision in the business world is more than just having an imagination; it is the marriage of imagination and improvement. It is the ability to transform high level company goals into individual and team improvement objectives and projects. And it is the proactive ability to direct personal activities and those of your team and other colleagues toward pre-determined improvement objectives.

Vision is the ability to imagine and visualize a desired future state and act to continuously move people toward it. Unfortunately, this essential management skill has been given a bad rap, causing us to appreciate it less than we should. For example, consider the grief President George Bush Sr. took during his failed reelection campaign because of his comment about "the vision thing." Consider also that many among us perceive "the vision thing" to be little more than unproductive navel contemplation, fit only for a framed list of platitudes and destined to molder on a dark, obscure wall.

Vision is the ability to imagine and visualize a desired future state and act to continuously move people toward it.

But nothing could be farther from the truth. Vision has great utility, and organizations undervalue it at their peril. In my view, vision is the essential starting point for highly effective management and the one skill which unifies the efforts of an entire organization toward a desired future state. Profit maximization, quantum improvement, or process improvement of any kind cannot be achieved without vision.

Vision's first imperative is to enable CEOs to create a vision statement for their company. In two succinct pages, vision statements define the products to be manufactured and the customers to be served, set out competitive advantages and major strategic and functional directives, highlight important commitments and the ways in which business is to be conducted going forward, and describe the business's current reality as well as its desired future state. In a well-crafted vision statement, CEOs and their top management teams have everything they need to identify high level business improvement objectives and define functional and departmental strategies to achieve them.

Vision becomes an everyday, all-the-time business preoccupation as CEOs and managers collaborate with their reports to identify the individual and team micro-improvement work needed to obtain the macro-improvement agenda represented in the vision statement and made real in functional strategies, organizational charts and job descriptions. This continuous micro-improvement work is best guided by a weekly projects and priorities (P&P) planning process, which centers around one-hour conferences between managers and each of their direct reports. The focal point of the conference is the P&P plan. This one-page document is a simple list of prioritized personal improvement activities that the employee should be working on in addition to his or her regular job for continuous improvement along the lines suggested by the vision statement and his or her job description.

An organization-wide web of P&P plans—all derived from the vision statement—creates a stream of directed improvement work that goes on continuously at the micro level and ultimately combines to change the culture, achieve competitive advantage, and drive quantum improvement. Indeed, such work is the engine of profit maximization, and there is no more important facet of the manager's job than keeping his or her part of that engine running at full speed. And that statement is equally true for all managers, from the maintenance manager to the CEO. MC

Keep the conversation going. Reach the author at tdcmetal@wi-net.com to comment on this or any CEO Journal column or to suggest future topics.

EAST COAST REGIONAL
CONFERENCE

September 27-28, 2012 • Heritage Hills Resort • York, PA

Embrace Your Heritage

Join us as we celebrate the 27th East Coast Regional Conference. By educating the attendees with the latest innovations and technologies, we hope they will return to their metalcasting facilities with ideas to compete globally. The fourteen technical presentations, plant tours and networking opportunities will be an invaluable resource. Register now and reserve your spot for this special event.

Selected Speakers

Ferrous

Hazardous Air Pollutant (MACT) Standards Review
Nicole Collett, August Mack Environmental, Inc.

Building a Smarter Foundry
Curtis Beene, TB Wood's, Inc.

Cast Iron Machining
Dr. Robert Evans, Quaker Chemical Corporation

Melt Shop Automation
Robert Keshecki, Inductotherm, Inc.

Nonferrous

Safe Drinking Water Act Compliance and Low Lead Copper Alloys
Sylvia Canino, Colonial Metals Co.

Improvements In Metal Casting Practices
Robert P. Pischel, FOSECO, Inc.

Melt, Treatment and Transfer of Aluminum
Martin Hartlieb, Rio Tinto-Alcan

Hazardous Air Pollutant (MACT) Standards Review
Susan Burkett, August Mack Environmental, Inc.

Joint Sessions

Understanding the Drivers for Industrial Sand Demand in the U.S.
Mo Lynn, Fairmount Minerals

Legislative Update
Chris Moyer, Pennsylvania Foundry Association (PFA)

What a Casting User is Looking For
Timothy A. Dorn, Amerequip Corporation

Mismatch of Supplier Tendencies to Customer Expectations
Chris Witt, Dotson Iron Castings

Management Responsibility for Product Capability
Larry Smeltzer, Littlestown Foundry, Inc.

Effective Use of Foundry Suppliers for Foundry Process
Dr. Robert Voigt, Penn State University

Schedule

Thursday, September 27

Plant Tours

Golf Outing

Welcome Reception

Friday, September 28

Technical Presentations

Lunch with Guest Speakers

Two plant tours are available for this event. Register today.

Space is limited.

For more information, contact Greg Barber, Chairman, East Coast Regional Committee, at 856-912-1941 or gbarber@inductotherm.com.
To download a registration form, visit http://www.keystoneafs.org

AFS
AMERICAN FOUNDRY SOCIETY

Delay, Don't Act Now

SHANNON WETZEL, SENIOR EDITOR

How many times have you pounded out a knee-jerk email response you've regretted later when more information became available, tempers cooled or a situation resolved itself? According to Frank Partnoy, author of *Wait: The Art and Science of Delay*, our decision-making skills, from email responses to investment strategies, could benefit from avoiding taking action until the last possible moment.

"In most situations, we should take more time than we do. The longer we can wait, the better," Partnoy writes. "If we have an hour, we should wait fifty-nine minutes before responding. If we have a year, we should wait 364 days."

In an instant-gratification world, where we are used to receiving and providing information with a couple of mouse clicks, it's tempting and easy to rush into decisions. In his book, Partnoy explains the role of time and delay in decision making, starting with professional baseball hitters' millisecond-decisions and ending with government think tanks' recommendations on global sustainability. Partnoy says every decision, large or small, should consist of three steps: observing the issue, processing the information, and finally acting—"at the last possible moment." This extends the amount of time you have to gather data and mull it over before coming to a conclusion.

Wait lays out various decision theories in simple language and includes several real-world examples. Although Partnoy uses no specific metalcasting references, it is easy to see how his ideas could be applied in your business, including daily metallurgical adjustments, casting defect analysis, equipment purchases and growth strategies.

For decisions made based on gut instincts (such as a gating choice), Partnoy says experts can tap a deep pool of experience to access the right choice swiftly and confidently. The safest bet for non-experts, he writes, may be to do nothing. Rather than risk submitting a quoting package that is too low to even cover operation costs, for instance, it may be better for the new sales engineer to sit out that request-for-quote.

Partnoy doesn't provide several quick tips for making the right choice; he shares insight on when to make that choice. His advice to delay decisions to provide more time for information gathering and thought seems like common sense, but it is logic worth revisiting. MC

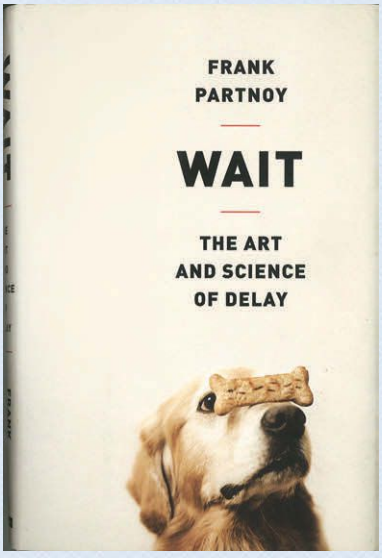
ABRIDGED

Relevance to Metalcasters

Technical Difficulty

Self-Help Fluff

Profit Booster



"It is important for us to think about the relevant time period of our decisions and then ask what is the maximum amount of time we can take within that period to observe and process information about possible outcomes."

Metalcasters' Translation: It is important to meet your customer's deadlines, such as turning in a quote for a potential job. But beware of handing in a hastily-calculated quote in the interest of providing a prompt response. If you are given a week to turn in the quote, take every one of those days to consider how the job fits in your shop and the true cost of production for a better-researched estimate. MC

ANTICIPATING

CONFERENCE ON SAND CASTING TECHNOLOGY AND MATERIALS

September 10-12, 2012 • Indianapolis, IN

This program will cover all areas of sand casting, including the latest technologies, new research and best practices from major sand casting facilities. The program will include both ferrous and nonferrous applications. A plant tour also is included. Presentation topics:

- Advances in Green Sand Molding Processes & Materials
- Chemically Bonded Mold and Core Production and Binders
- Emissions, Health & Safety Control

AFS INTERNATIONAL FERROUS MELTING CONFERENCE

October 10-12, 2012 • Nashville, TN

Participants will be able to listen to and network with the leading minds in ferrous melting practice and research. Topics include:

- Specialized presentations for coreless, channel and cupola furnaces
- Analysis of supplied raw material quality
- Practical tips to improve inoculation and iron pouring
- Details on maintenance to improve furnace performance and efficiency

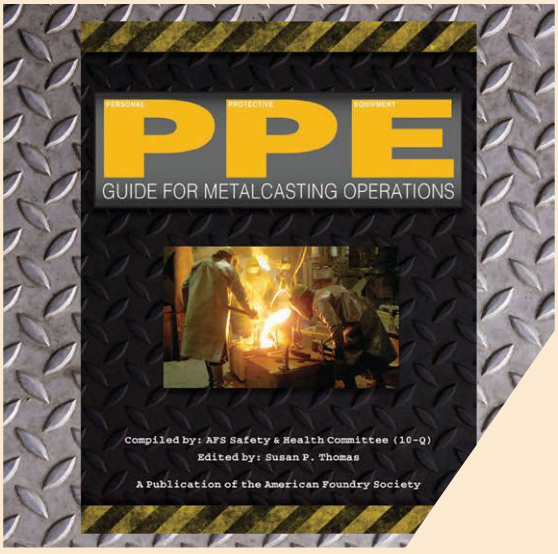
YOUR NEEDS

TRANSFORMATION AWAITS AT THE FOUNDRY EXECUTIVE CONFERENCE

September 16-18, 2012 • Miami Beach, FL

Globalization, social media and technology have redefined leadership. Learn how to leverage this transformation at the premier metalcasting networking event. Attend this conference and you will experience:

- Expert discussion on redefined leadership roles
- Perspectives from metalcasting's new class of CEOs
- Sessions on the industry's changing image
- Government outlook for manufacturing
- Numerous networking opportunities with your peers



PPE GUIDE FOR METALCASTING OPERATIONS—NEW PUBLICATION

This updated third edition describes the special considerations for the selection and use of personal protective equipment (PPE) and special clothing for work situations that present a risk of exposure to metalcasting hazards. This guide is intended to:

- Aid the metalcaster in completion of the required job hazard assessment for PPE Selection
- Identify the potential hazard areas within your facility, such as: melting & pouring, molding & coremaking, cleaning and secondary processing
- Provide useful sample "Hazard Assessment Forms" and a "Flame Resistant Clothing Options Matrix"

LEADING THE METALCASTING INDUSTRY

www.afsinc.org • 800/537-4237

AFS
AMERICAN FOUNDRY SOCIETY

AFS Has Updated Its Look

The new AFS website offers a more user-friendly experience with resources readily availble to its users.

The American Foundry Society (AFS) has launched a redesigned website including easier navigation with a cleaner, more progressive appearance.

Improvements to the site include the user’s ability to move from one AFS brand to the other (i.e. magazine, education, etc.) rather than having to switch from site to site. Users can also tailor the site to their needs, whether they are a metalcaster, OEM buyer/designer, or supplier to the metalcasting industry. In addition, enhanced search capabilities allow users to find and pull the most relevant content and information available.

AFS members can login to view and download members-only content and easily register for events or purchase materials without having to enter passwords multiple times. Corporate members-only content includes recorded webinars, survey results and forecast reports.

The new website also unveils the Castingpedia, a continuously expanding collection of resources and articles that aid in the production, designing and purchasing of castings. The archive includes industry statistics, metallurgical and process advancements, best practices and a directory of metalcasters.

AFS has always worked to keep informational resources readily at hand, and continues to do so by placing the most widely-used tools within easy reach on the homepage as Resource Tools. These tools include:

- AFS E-Store
- Beneficial Reuse Directory
- Buyer’s Guide
- Casting Alloy Data Search
- Directory of Metalcasting Suppliers
- Metalcasting Library
- Metalcasting Career Center
- Metalcasting Newsstand App for Apple devices
- Metalcasting Process Selector
- Regulatory Compliance Calendar MC

CMI Announces Chapter Competition Winners

The American Foundry Society Keystone and Chesapeake Chapters co-sponsored a gating and riser design course that attracted 59 attendees, 29 from AFS chapters, earning them first place in the AFS and its Cast Metals Institute Chapter Competition 2011-2012. The British Columbia chapter won second place with the Texas Chapter taking third, each sponsoring a nobake and coldbox molding course with more than 20 chapter attendees.

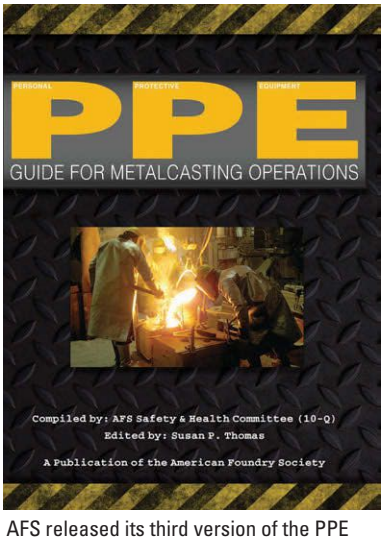
Chapters involved in co-sponsoring CMI courses participate in a competition each year to see which chapter can attract the highest number of chapter attendees to their sponsored course. First place wins $1,000 and three complimentary registration certificates good for one year, second place wins $500 and two certificates, and third place wins $250 and one certificate. A minimum of 10 chapter attendees is required for eligibility. MC

Updated PPE Guide Now Available

AFS released its third edition of Personal Protective Equipment (PPE) Guides in July.

The updated edition describes special considerations for the selection and use of PPE and proper work clothing for situations with risk of exposure to metalcasting hazards. The guide is intended to aid the individual facility's completion of the required job hazard assessment for PPE selection. It can be used as a tool in completing the hazard assessment using the sample two-page "Hazard Assessment Form" and a three-page "Flame Resistant Clothing Options Matrix" located in the identifying potential hazards of the job section under evaluation.

The guide is available to corporate members for $12.50, personal/individual members for $18.75 and non-members for $25.



AFS released its third version of the PPE guidelines in July.

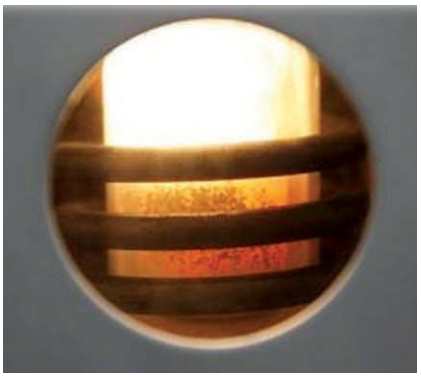
The original version of this guide, (Guide for the Selection & Use of Personal Protective Equipment & Special Clothing for Foundry Operations), was created and developed by the AFS Safety & Health Committee (10-Q) in September 1998 and revised as an AFS/OSHA Alliance product in September 2005. The 2012 version supersedes all of the previous versions. MC

Bruker's Carbon and Sulfur Analyzer Now Features Auto Cleaning

Bruker AXS, Billerica, Mass., has added an auto cleaning feature to its G4 ICARUS CS HF carbon and sulfur analyzer, which is used by metalcasting facilities to assess and control the carbon and sulfur content in metal.

Over time and after many sample analyses, byproducts such as metal oxide dust accumulate in the combustion furnace area of the analyzer, resulting in erratic results or even component failure. Prior to this upgrade, cleaning the instrument required disassembly and cumbersome manual cleaning that ate up lab time.

While other self-cleaning analyzers require abrasive cleaning of the quartz tube by brushes and a vacuum cleaner, Bruker designed a pneumatically assisted cleaning assembly to scrub and dispose of the interfering combustion properties automatically in the G4 ICARUS. A pneumatically-driven piston with integrated components cleans the furnace area, including a metal dust filter and the extraction nozzle with a downward stroke after each analysis.



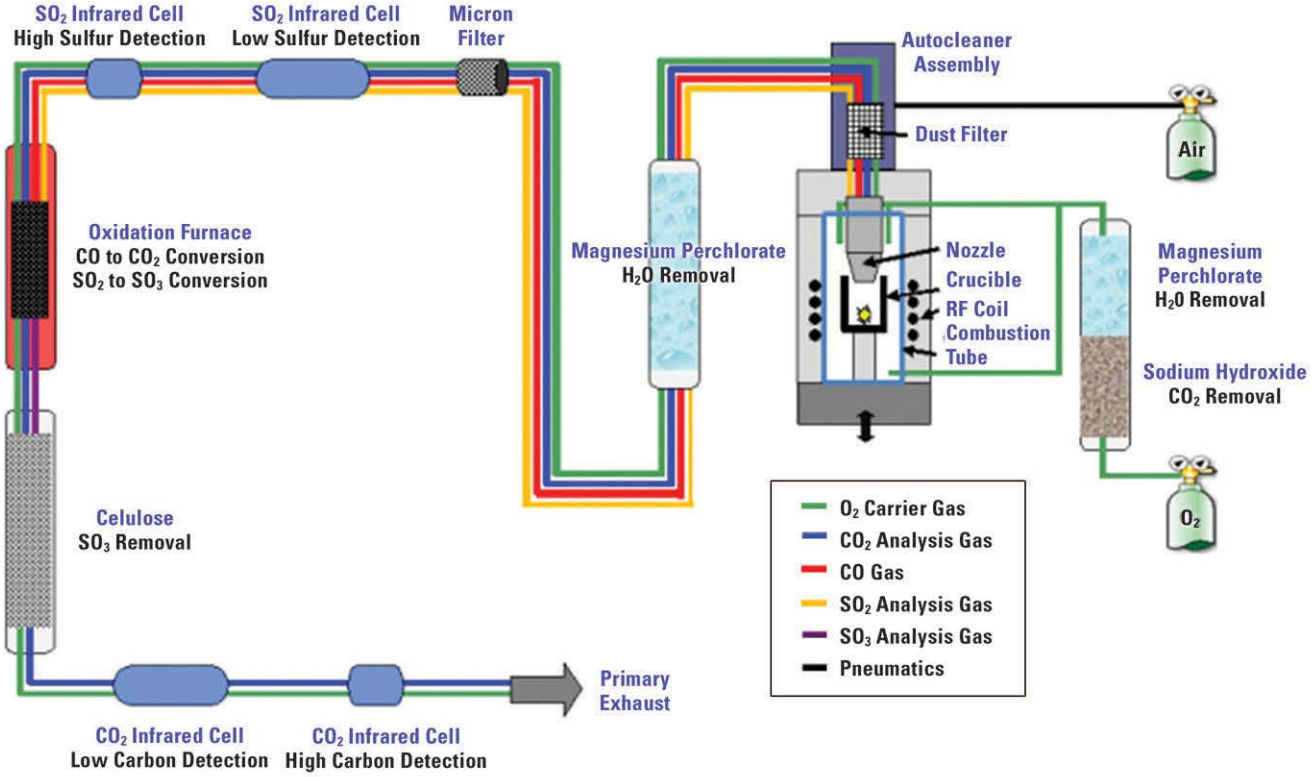
A combustion viewing port on the front of the analyzer allows users to monitor the process in real-time.

Dust is wiped from the metallic filter, and various blades on the cleaning mechanism's plunger remove splattering particles from the inner rim of the extraction nozzle. A small pulse of oxygen flow transports the liberated particulates into the spent crucible, to be disposed along with the combusted sample material.

According to Bruker, this new auto cleaning feature allows the user to perform hundreds of analyses, depending on the application, before disassembly and manual cleaning is required.

Using a high frequency induction furnace, the G4 ICARUS converts solid samples into gaseous components, which are measured by infrared detectors and processed into tangible carbon and sulfur concentrations. By providing a high pressure, oxygen-rich environment in the furnace, the sample material and accelerator combust, reaching temperatures above 1,500C, while liberated carbon and sulfur compounds are oxidized to form carbon dioxide and sulfur dioxide.

The G4 ICARUS features a viewing port on the front of the furnace to allow users to monitor the combustion process in real-time. The extraction nozzle directly above the furnace removes the gaseous components from the furnace to be transported downstream for eventual detection. Destructive byproducts that can splatter against the surrounding quartz combustion tube also are extracted by the nozzle. According to Bruker, users benefit from limited dust contamination with improved analytical results



This block diagram depicts the primary components of the G4 ICARUS CS HF and the analytical flow path.

and extended quartz tube lifetimes.

The combusted gas stream exiting the furnace area is directed through a drying reagent to remove any moisture that may have been produced or released during combustion. Pressure and flow regulating components ensure consistent combustion, transport and detection from one analysis to the next.

The Bruker G4 ICARUS CS HF carbon and sulfur analyzer features automatic cleaning.

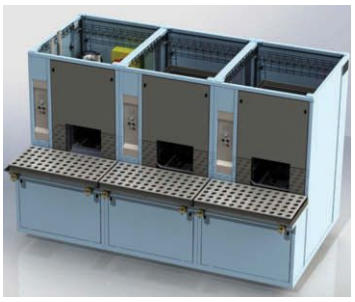
The purified gas stream is quantified using selective and stable non-dispersive infrared detectors, which respond exclusively to the amount of carbon dioxide and sulfur dioxide in the stream. After sulfur is detected, the gas stream flows through a heated oxidation furnace to catalytically oxidize carbon monoxide to carbon dioxide and convert some of the sulfur dioxide to sulfur trioxide. Sulfur compounds, which are no longer needed, are removed by passing the gas stream through cellulose. The gas stream comprised of oxygen, carbon dioxide and possibly a small amount of non-oxidized sulfur dioxide, flows through a selective carbon dioxide cell to measure the carbon content before exiting through the exhaust.

The analysis time for a single analysis with the Bruker GH ICARUS is nominally 40 seconds, depending on the sample application, sample mass and carbon/sulfur concentration. MC

Visit www.bruker-axs.com for more information.

The new furnace autocleaning feature is found standard with the G4 ICARUS.

High Value / Low Volume Impregnation System



The latest innovation in vacuum impregnation provides state-of-the-art impregnation technology in the smallest possible footprint and in an affordable way. The high value / low volume (HVLV) system utilizes dry vacuum and pressure processing (DVP), the most robust impregnation process available, and is capable of processing up to 15 cycles per hour. Godfrey & Wing's HVLV system conserves resources and provides repeatable, precise and clean impregnation processing.

Visit www.www.godfreywing.com for more information.

Portable Foundry Wheels

Norton, a brand of Saint-Gobain Abrasives, Worchester, Mass., introduced Norton BlueFire zirconia aluminum portable foundry wheels. BlueFire Portable Cup Snagging

Wheels provide performance improvements over conventional zirconia products in metalcasting facilities, with a reduction in grind time of over 40% and an increase of almost 130% in G-ratio. The friable zirconia alumina grain and durable resin bond technology provide higher metal removal rates and enable the grain to stay sharper and free-cutting longer, for increased wheel life in high- and medium-pressure applications.

Visit www.nortonindustrial.com/metalfab/muscle.aspx for more information.

Sand Elevator Alternative

Olds Elevator LLC, Hudson, N.H., announced a new Model 7 elevator for sand and dense abrasives. The elevator is inexpensive, easy to maintain, simple and clean. It was invented in a metalcasting facility to lift sand, shake-out sand and shot blast and was an immediate improvement over traditional bucket elevators and pneumatic systems. It also ifits well in a crowded metalcasting facility. The Model 7 ships on a pallet so it can be delivered to the location with a forklift and assembled in a few hours. Maintenance is limited to accessible, long-lasting, low-cost parts.

Visit www.oldsusa.com for more information.

Position Wanted: Minimum charge for 30 words or less: $30.00. Additional words 70¢ each. All other ads: Minimum charge 30 words or less $50.00. Additional words: 70¢ each. Box number, care of MODERN CASTING, counts as 10 words. Display Classified rates and color rates on request. FORMS CLOSE 10th of month preceding date of issue.

Additionally, MODERN CASTING features an online career center for help wanted ads. Separate from the typical Classifieds, the Metalcasting Career Center is an interactive network of job seekers and employers, geared toward the metalcasting industry. Online Help Wanted Ads must be posted through the Metalcasting Career Center at www.moderncasting.com. 30-day job postings are $125 for members of the American Foundry Society and $250 for nonmembers. You can also purchase resumes of qualified candidates for $70 each ($35 for members).

HELP WANTED

CAREER OPPORTUNITIES

CORED WIRE
Sales Engineer

ODERMATH (USA) based in Spartanburg, South Carolina has an opening for a CORED WIRE Sales Engineer for selling our line of TRIMTEC® CORED WIRE to the Foundry and Steel Industry.

Responsibilities:
- Regular visits to customers to furnish technical advice
- Establishes professional customer relationships
- Travel throughout the US, Canada and Mexico

Qualifications:
- Preferable metallurgical background
- Outside sales experience
- Knowledge of customers and markets
- Excellent written and verbal communications skills, self motivated and organized

The applicant will work out of company's corporate office. This is an outstanding opportunity for a bright, self-starter who has flexible hours. We offer an attractive salary / benefits package.

Please reply with resume and salary history to Dirk Odermath
e-mail: dirk.odermath@odermath.com

ODERMATH (USA) INC.

2751 New Cut Road • Spartanburg, SC. 29303 • www.odermath.com
Tel: (864) 574 0001 • Fax: (864) 574 0777

An equal opportunity employer M/ F/ D/ V www.odermath.com

HELP WANTED

FOUNDRY PROCESS ENGINEER—Omaha Steel Castings Company is searching for a Foundry Process Engineer with 2 + years of applicable experience. BS degree preferred. Successful candidate will be responsible for originating, developing & improving foundry production methods and processes. Increase foundry production efficiency, reduce scrap, rework, and waste. Must have good computer skills & experience in pattern construction, mold making, gating, risering, pouring, cleaning, & CAD software. Will assist in all aspects of control, measurement, and monitoring of foundry casting production. Continuous improvement of processes throughout the operation will be a major focus. **Email resumes to: youvani@omahasteel.com with salary requirements.**

Jensen International, Inc. has an immediate opening for a **Methods & Standards manager (manufacturing cost accountant)** for its iron casting and machining operations. The ideal candidate must have a Bachelor's Degree in accounting or finance, have at least three years experience in a manufacturing environment, and possess proficiency in standard costing. Since Jensen's compensates its production employees through an incentive system, skills must include knowledge about time studies on the production floor. Also, only self-motivated individuals who can work without supervision, are detail oriented, and have the ability to work with a team in a strategic planning capacity would be considered for this position. Essential duties would include, but not limited to, creation and upkeep of standards for pricing and the incentive system; updating standard material, labor, variable overhead, and fixed costs for setup and run for all shops; and to monitor the accuracy of these systems by examining variances to actual costs. **Interested candidates may email your resume' to: maryn@jencast.com or fax to: 918-255-6327. Equal Opportunity Employer.**

Careers in Metalcasting? We Have Them!

MODERN CASTING has launched a new, interactive online career center where job seekers can post resumes and browse thousands of metalcasting-related jobs and employers can post their jobs and browse resumes.

Visit www.moderncasting.com and look for our new **Marketplace** section.

We've also updated our online Classifieds section, which features equipment and professional services listings. Online help wanted ads can be posted separately at the Metalcasting Career Center.

Technical Sales

Well established large carbon producer for the foundry and steel industry seeks a highly motivated technical sales representative.

Responsibilities

- Regular visits to customers to offer technical advice
- Establish professional and personal customer relationships
- Travel throughout North America

Qualifications

- Metallurgical degree
- 3-5 years experience in the foundry or steel industry
- Preferable melt and sales experience
- Knowledge of customers and markets
- Excellent written and verbal communication skills

We offer an attractive salary and benefits package.

Please reply with resume and salary history in confidence to:

foundryandsteel@yahoo.com

Interested in Shaping Minds? Become a CMI Instructor.

Have technical expertise in the field of metalcasting? Want to share that knowledge to help others become more effective in their jobs? Teaching a CMI course may be for you. CMI is currently accepting applications for instructors in all areas of metalcasting. Candidates should:

- Have teaching and/or coaching experience
- Possess 5 years of hands-on experience in the metalcasting industry
- Feel comfortable with speaking to large groups
- Be willing to teach at least twice per year and travel
- Wish to participate in a train-the-trainer program, and a yearly evaluation and improvement process

For more information or to view an application, visit www.castmetals.com/instructors.

CMI
CAST METALS INSTITUTE, INC.

GREDE
Casting Integrity®
Grede Reedsburg

Maintenance Superintendent
Melt Superintendent

Privately-held with headquarters in Southfield, Mich., Grede Holdings LLC has 5,400 employees and operates 17 foundries and four machining operations in North America serving the transportation and industrial markets globally.

Candidates will have demonstrated leadership abilities with change agent experience. A BS degree or similar work experience in a high volume, non-union production environment is required. A strong background in Continuous Improvement activities is preferred.

GREDE
Attention: HR Manager
700 Ash Street
Reedsburg, WI 53959-2134
Phone: (608) 524-6424
Fax: (608) 524-9403
E-mail: Merickson@grede.com
EOE

PATTERN MAKER—Small aluminum sand casting foundry located in the heart of the scenic Ouachita Mountains. Seeking an experienced self-motivator that is knowledgeable about all types of patterns, coreboxes, and modern materials. Salary based on experience and knowledge of profession. Relocation assistance may be possible. Abundant hunting and fishing as well as low crime and minimal traffic are trademarks of the area. **Please email resume with salary history to: jobs@brodix.com or mail to: Greg Brotherton, Brodix Cylinder Heads, PO Box 1347, Mena, AR 71953, Ph: 479-394-1075, Fax: 479-394-1996, www.brodix.com**

PRODUCTION METALLURGIST—A well-established facility in the Ohio Valley region is seeking a Metallurgist to join our team. Excellent benefit package includes 401(k), medical, dental, basic & optional life. **REQUIREMENTS:** Requires an individual with strong leadership skills, excellent attention to detail and ability to handle multiple projects; Responsible for working in conjunction with the Production Manager and the Plant Manager to monitor, maintain, measure, and manage the metallurgical needs of the plant; Utilize data analysis and metallurgical engineering practices to solve problems and develop solutions in support of manufacturing processes; Provide cost/benefit analysis to process improvements; Foster, maintain, and offer guidance toward continuous product & process improvements; Selection of raw materials; Bachelor's Degree in Metallurgy; 5 – 7 years' experience in a Ferro Alloy, Ferro Silico Manganese, or Silicon Metal Production; Organization & time management skills. **Send resumes by August 23rd to: Box 2366, c/o MODERN CASTING, 1695 Penny Ln., Schaumburg, IL 60173-4555.**

HELP WANTED

DOMET
Dominion Metallurgical

QUALITY ASSURANCE MANAGER

Are you a unique individual that understands the principles of quality systems? Do you have experience investigating and correcting quality issues in the foundry environment? Due to a recent promotion, Dominion Metallurgical, a growth oriented company with a unique business model, has an opportunity to put those skills to work. The successful candidate will utilize their knowledge and understanding of foundry and quality systems to assist our customers and suppliers on quality issues, launching new projects and continuous improvement.

Highlights:

- Work with our team of Account Managers as a facilitator and resource in resolving customer generated quality concerns.
- Work with suppliers to help develop meaningful and permanent corrective actions and process improvements.
- Responsible for Advanced Product and Quality Planning and maintaining all quality related documentation.
- Track customer satisfaction on regular basis and report findings to Management Team.

Please submit cover letter, resume, and salary requirements to mcooper@dom-met.com. For more information about Dominion Metallurgical visit www.dom-met.com

---

PLANT TECHNICAL MANAGER—Metal Castings Company, a division of Electro-Mechanical Corporation, located in Bristol, Virginia, has an immediate opening for a Plant Technical Manager. This position will be responsible for the overall product quality of the castings shipped as well as the development of product cost and customer quotations. Candidates should have strong people skills and be able to function well in a job-shop environment. A team player with a high level of multi-tasking skills is a must. A strong background in quality is also a plus. Position requires a minimum of a B.S. in Engineering, preferably in Materials or Metallurgy and a minimum of five years of foundry experience (preferably Aluminum). Prior experience with gating and risering (especially Aluminum) and casting layout is a definite plus. **Qualified applicants should send resume with salary history and references to: Human Resource Manager, 15331 Industrial Park Road, Bristol, VA 24202, shuggins@electro-mechanical.com**

HELP WANTED

Foundry Product / Process Engineers—Reports to Engineering Manager–General description: Performs a variety of engineering assignments in developing and implementing production / processing methods and controls to meet quality standards in the most cost efficient manner. Design gating, riser and chilling system for aluminum and magnesium aerospace castings to ensure compliance with all customers' specifications; In conjunction with tooling engineer and pattern shop personnel, determine the optimum tool design for the manufacturing processes; Design and determine development samples and trial castings or programs, process and review through all manufacturing, inspection and dimensional departments; Interpret inspection results, investigate nonconforming castings and institute corrective action, sample and confirm corrective measures, document and amend process procedures; Investigate and resolve production problems; Responsible for creating and maintaining part number work instructions for all casting process areas. Engineering degree or equivalent college degree. 5 years light alloy aerospace foundry experience. **Contact: Amy Reed, HR Supervisor, 641-782-0330.**

Foundry Engineering Technicians—Reports to Engineering Manager-General description: This position requires that the individual have good communication skills, both written and oral, be able to multi-task, and have general computer knowledge, including Microsoft Office. Responsible for working with the Engineer to maintain routings to meet specification requirements for specific parts; Responsible for reading and interpreting customer specifications as assigned; Responsible for working with the Engineer and creating and submitting Fixed Process Documents to the specified customer; Responsible for working with the engineer and creating and submitting Drawing Alteration Requests, as assigned; As assigned, responsible for recording deviation details working with manufacturing as well as the Project Engineer; Assisting Engineers with various tasks, such as data entry, taking photos of specific operations, inserting them into forms as assigned and writing process work instructions in clear concise language, as assigned. Associates Degree or Equivalent. Proficient in Microsoft Office. **Contact: Amy Reed, HR Supervisor, 641-782-0330.**

Quality Engineer—Specific duties: Investigate non-conformance issues, both internally generated and as a result of customer reported non-conformance issues to determine the root cause of the non-conformance and initial corrective action; Prepare corrective action responses to customers reporting non-conformance; Preparation of inspection procedures; Participating in customer surveys and audits including the preparation of all check sheets required by the customer prior to the survey or audit; Preparation of submissions made to customers for waivers, deviations and concessions; MRB Quality Representative; Evaluate and process customer returns; Quality member for PPAP, PFMEA and Control Plans. These job duties are not all inclusive. The company, from time to time, may require the incumbent to perform additional duties as assigned. **Contact: Amy Reed, HR Supervisor, 641-782-0330.**

TOOL DESIGN ENGINEER—Anderson Express Inc., Located on the Anderson Global campus, Anderson Express offers cost-efficient, competitive tooling for small and medium tooling projects with all the advantages of large tooling shop technology and services on site. We are seeking someone with at least 10 years foundry tool design and build knowledge. Duties will include design of coreboxes, patterns, and molds using NX 7.5. Knowledge of free form surfacing, solid modeling, wave linked assemblies, and gating design required. Must have the ability to take job from concept to complete 3-D tooling design. **Send resume to: hr@andersonexpressinc.com**

FOR SALE

FOR SALE

FOR SALE

Our Website is updated Daily, please visit:
FOUNDRY-EQPT.COM for all our latest equipment inventory.

- **Office and Warehouse located at same location, over 100,000 sq ft of space, with Loading Docks**
- **Certified Appraiser on Staff**
- **World Wide Equipment Search**
- **Reconditioning Services available**

FOR IMMEDIATE SALE

B&P Speedmullers, (2) 85-B, (1) 85-B Heavy Duty, 100-B
Inductotherm Vacuum Induction Melting Furnace, 125 Kw, Complete
1993 DISAmatic Line, 2013 MK5-B, AMC, SBC, Didion MD-80 Media Drum
Disamatic 2110 Mk2 Molding Line, with AMC, SBC, SSU, Core Setter, Mold Dump, 1995
GK Fluidized Bed Sand Cooler, Up to 115 TPH, with Blower and Magnetic Belt
1996 Disamatic Line, 2013 Mk5-B, QPC, CSE, AMC, SBC, with Spares
1996 ABB Twin Power Induction Furnace, 6000 Kw, 240 Hz, (2) 12T, With Spectrometer
1997 GOFF Shot Blast Machine, 6BB, 6 Cu Ft, Rubber Belt, with Dust Collector
Late Model Wheelabrator Tumblast, 6 Cu. Ft Steel Belt, With Loader, August Removal
2004 Inductotherm 2250 Kw, 500 Hz, (2) 5T Duraline Boxes, India Mfg
2005 Inductotherm 2750 Kw, 500 Hz, (2) 7T Duraline Boxes, India Mfg
Year 2007 Spectromaxx Spectrometer, With PC, Keyboard, Printer
Simpson Mullers, 1.5G, 2G, 22-G, 23-G, Also Spare Simpson Gear Boxes
CE Cast High Speed Mixer, CEL-1000, Upgraded with Tinker Pumps (3)

****Much more available, check our website or call us.**

www.foundry-eqpt.com

World Equipment & Machine Sales Co.

WORLD EQUIPMENT & MACHINE SALES, CO.
6111 Cochran Road, Solon, Ohio 44139, TEL: 440-519-1745 FAX: 440-519-1748
mike@foundry-eqpt.com or marty@foundry-eqpt.com

PROFESSIONAL SERVICES

PILLAR INDUCTION

Aftermarket Services

- Coil Repair, Design, and Replacement
- Retrofits of Existing Systems
- Replacement Parts for most OEM's
- Preventative Maintenance Service
- Complete Systems
- Water cooled cables, repair and new
- Used / Rebuilt Furnace Systems and Power Supplies
- Water Cooling and Recirculating Systems
- All Induction OEM's Serviced

Pillar Induction
21905 Gateway Rd • Brookfield, WI 53045
1-800-558-7733
www.pillar.com • service@pillar.com

REPS WANTED

REPS WANTED—Contract manufacturing plant with "casting intensive" assemblies, looking for experienced sales representatives to expand our product base. **Contact: rhonda@drmetals.com**

VESTAL

MANUFACTURERS REPRESENTATION/ FOUNDRY CAPACITY—Vestal Manufacturing is a gray iron foundry located in Sweetwater, TN seeking established independent sales representatives to fill excess capacity. Established in 1946, foundry pours Class 30 to 35 gray iron and desires additional OEM casting work on an account basis. Molding machines include FBO-3 Roberts Sinto 20" x 26" and Herman Mold Master 34" x 44". **Contact Foundry Sales Manager at 423-337-6125 Ext. 116 or Vestal Manufacturing, PO Box 420, Sweetwater, TN 37874.**

BMM Industries

Your only factory authorized source for
CT BT CK QSF QJS
Molding Machines
New & Reconditioned with warranty
Phone: 248-328-0040 Fax: 248-328-0043
www.bmmindustries.com

BMM Industries

TIGHT FLASKS
CAST OR FABRICATED
Phone: 248-328-0040 Fax: 248-328-0043
www.bmmindustries.com

REPS WANTED

MANUFACTURERS REPRESENTATION—Castalloy, Inc. is a manufacturer of steel components with Investment Casting as the base casting process. Utilizing Lean Manufacturing Principles, we have reduced lead time and added capacity for new opportunities. We are seeking representation to help us fill the added capacity on account basis in most territories: **Contact: Rudy Koishor @ 216-961-7990 ext. 241 or rkoishor@castalloy.com**

CASTING SALES REPRESENATIVES—J&L Precision Castings, a Precision Castparts Corporation company, is a major supplier of corrosion and wear resistant castings to the Pulp and Paper industry. Recent application on Six Sigma principles has opened up significant foundry capacity. J&L utilizes a unique, near net shape molding process that provides excellent dimensional stability and surface finish. Alloys developed to resist the tough wood fiber refining applications have the potential to for differentiated performance in other industries. J&L is seeking representatives with access to wear resistant casting markets such as agriculture, mining, and aggregate processing in all territories. **Interested parties should contact: Paul Wasikowski at 262-547-6886 ext. 2170 or plwasikowski@jlfiberservices.com**

MANUFACTURERS REPRESENTATION—Minncast Inc., Steel Sand Foundry, produces Low Carbon Steel, Alloy Steel, Stainless Steel, Duplex Steel, Nickel Based Alloys and Ni-Resist Iron Castings. From 5# up to 2400#. We utilize a flaskless no-bake sand system. We are ISO 9001 certified. We have recently expanded our production capacity and have short lead times. We are seeking self motivated Representatives or organizations with a strong desire to succeed and assist with further expansion. This opportunity may be account or territory based dependent upon experience, size and customer base. **Contact: Pete Schlener @ 763-571-2747 or pete@minncast.com**

EMPLOYMENT

Borchert Associates
(817) 424-3193

Executive Search and Recruiting
For The Foundry Industry Since 1977

General Management
Operations Management
Sales/Marketing
Engineering - All Areas
Process/Metallurgy
Supervision
Quality Assurance
Finance / Administration

Greg Borchert - greg@glborchert.com
Colin Borchert - colin@glborchert.com

31 Years of Professional and Confidential Service to Metalcasters Worldwide

www.glborchert.com

THE NAGLE COMPANY
RECRUITING SERVICE

Prompt, professional, discreet, effective recruiting and referral service to many of America's most respected foundries.

Proud to Represent the Best

All fees paid by employer
Call, write, or FAX in confidence to Jim Nagle at:
11514 N. Port Washington Rd. Suite 104
Mequon, WI 53092
(262) 241-5350 FAX (262) 241-5713
nagleco@sbcglobal.net
www.nagleco.com

PAUL S PELLAND,PC
Mid to upper-level position search specialists In all SAND and PERMANENT MOLD disciplines. Enjoying over 25 years of ethical, aggressive, Yet professional recruitment and referral service to the global foundry industry's top firms.
51 Charlotte Street, Charleston, SC 29403
843-853-2757
Fax: 843-853-2290
pelland@bellsouth.net

FOUNDRY OPPORTUNITIES
All Levels • Nationwide • No Fees

General Managers	Metallurgical Engineers
Plant Manager	Quality Engineers
Foundry Managers	Maintenance Engineers
Maintenance Managers	Electrical Engineers
Melt Supervisors	Project Engineers
Maintenance Supervisors	Plant Engineers
Foundry Supervisors	Product Engineers
Mold Supervisors	Sales Managers
Quality Supervisors	Sales Representatives

UNITED EMPLOYMENT GROUP, INC.

John Wright
610-351-8070 Fax: 610-437-9650
John@UnitedEmploymentGroup.com
www.UnitedEmploymentGroup.com

Careers in Metalcasting? We Have Them!

MODERN CASTING has launched a new, interactive online career center where job seekers can post resumes and browse thousands of metalcasting-related jobs and employers can post their jobs and browse resumes.

Visit www.moderncasting.com and look for our new **Marketplace** section.

We've also updated our online Classifieds section, which features equipment and professional services listings. Online help wanted ads can be posted separately at the Metalcasting Career Center.

CHECK OUT MODERN CASTING'S WEBSITE
www.moderncasting.com

EQUIPMENT FOR SALE

USED—CECast 2500 PPM High Speed Mixer, IMF 6000# Mold Handler, B&P 25,000# Rol-a-Draw, VM27 and VM64 Vibramill, Coreco Thermal Sand Reclaimers, Pangborn 15GN Tumblast, Wheelabrator 96" Swing Table Blast, Simpson 2G and 215G Mullers, B&P 85B Muller, Gearboxes, Gaylord SATB30 Core Machine, Dust Control , LOOKING FOR GOOD SURPLUS MACHINERY/ Lease-Financing available. **Please Call John Peters @ 540-297-8884 or Website at "www.nobakefoundry.com"**

Real time process control
GSPC
Laboratory Information Management

Lab and shop floor process data collection, sharing, and analysis
www.meltlab.com
email info@meltlab.com

BUSINESS FOR SALE

PATTERN SHOP FOR SALE—Midwest location-A modern facility equipped with CNC machining centers and sinker EDM. Able to produce permanent molds and all aspects of sand tooling. Large envelope capacity. **Contact: Box 2364, c/o MODERN CASTING, 1695 Penny Ln., Schaumburg, IL 60173-4555.**

FOUNDRY FOR SALE—Midwest location-Low volume nonferrous production and prototype foundry. Air set molding and core process. **Contact: Box 2365, c/o MODERN CASTING, 1695 Penny Ln., Schaumburg, IL 60173-4555.**

EQUIPMENT FOR SALE

Thermal analysis of all metals—
MeltLab Systems www.meltlab.com
email info@meltlab.com
phone 765-521-3181

USE MODERN CASTING CLASSIFIEDS

FOR SALE—B & P Lab Mulbaro, Simpson 18" & 24" Lab Mullers. Simpson #05 Porto-Muller, Simpson #1 1/2F Mix-Muller, Simpson #3G-125 Mix-Muller, Falk Reducers for Simpson #2UD, #3UD, #1 1/2G, #2G and others. Miscellaneous new parts for Whirl-Air-Flow, Wheelabrator & Pangborn units. **Additional information & pricing upon request – Korco Mfg. Inc. 724-758-5020**

See the Buyer's Guide online at:
http://buyersguide.moderncasting.com

CONSULTANTS

PERMANENT MOLD TECHNOLOGIES—Consulting engineers and metallurgists, specializing in copper-based and aluminum alloys metallurgy, sand, permanent mold, low pressure die casting, vacuum die-casting and semi-continuous casting processes. Feasibility study, market research, plant layout, tooling and casting design, training and troubl shooting. **Contact: Kirit Dave at Ph: 630-699-9239 or E-mail: info@permanentmoldtech.com**

CONSULTANTS

BERNER FOUNDRY CONSULTANTS—Installing new equipment? High scrap percentages? Sand out of control? Environment regulations worrying you? With 40 years specializing in Foundry Set-Up, Scrap Reduction, Sand Control, and Environmental Concerns, Berner Foundry Consultants can solve your problems. **C. A. Bud Berner, PO Box 176, Sauk City, WI 53583. Ph: 608-643-0449 Fax: 608-644-1100. E-mail: bernerfdryconsultants@charter.net**

CONSULTANTS

Cervellero Shows Missouri Steel Foundry How to Quickly Replace a Melting System

Stewart Pinsof, chairman of Monett Metals, was faced with a serious problem. The foundry's primary induction melt power supply was found to have reliability and safety issues at a time when high levels of production were needed. His immediate response was to replace the equipment.

Pinsof noted that the urgent time constraints precluded a normal investigation of replacement options. He explained in a letter, "We opted to expedite the process by bringing in a consultant experienced in the induction melting industry. We interviewed three consultants and selected Paul Cervellero as being the most qualified for our project. The decision proved to be pivotal. Without the formality of proposals, time lines, charts and programs, Paul immediately understood our needs and provided invaluable guidance in the technology, sources, economics and timing aspects of our project. While a past president of Inductotherm, we found Paul's input to be very even handed among all potential suppliers." The letter concluded, "With Paul's assistance, the project grew from a simple replacement into two larger and more efficient units. Availability, technical competence, economic pragmatism and the rare talent to confine contribution to essentials proved to be Paul's formula for excellence."

Contact: Paul B. Cervellero, Induction Melting & Holding Systems LLC
16 Laurel Lane, Feasterville, PA 19053
Tel: 215-357-9169 Mobile: 215-431-3144 Email: p.cervellero@verizon.net

OPEN CAPACITY

SAVE $'S ON PATTERN COST—52 sizes of round stock cores. We ship countrywide. Also pouring cups, lost foam support cores and custom coremaking. **Shell Core Specialties, Inc. 800-599-6637.**

PATTERNS & CORE BOXES: Prototypes/Production Casting Tooling. Cope and Drag, Dry Sand Boxes, Blow Core Boxes, Aluminum Matchplates, Shell Core Boxes. Cylinder Heads, Blocks, Manifolds, Pumps, Impellers, Oil Field. **RFQ: EMI, 13451 Montana Ave., El Paso, TX, 79938, USA, Ph: 915-856-9607, Fax: 915-856-9607, E-Mail: info@empiremotorsinc.com**

AD INDEX

Company	Page#	Email/Website	Phone#	FAX#	Contact Name
ABP Induction	13	david.decker@abpinduction.com	732-932-6252	732-828-7274	Dave Decker
Ajax TOCCO Magnethermic Corp.	4	tkeenan@ajaxtocco.com	800-547-1527	330-372-8608	Tim Keenan
ASK Chemicals	16	info.usa@ask-chemicals.com	614-790-3657	614-790-3941	Dan Salak
B & L Information Systems	28	info@blinfo.com	269-465-6207	269-465-6686	Customer Service
Bruker Elemental	54	info@bruker-elemental.com	800-234-9729	978-667-3945	Customer Service
Can-Eng Furnaces Ltd.	39	tdonofrio@can-eng.com	905-356-1327	905-356-1817	Tim Donofrio
Castec Inc.	35	www.castecinc.com	724-258-8700	724-258-8793	Customer Service
Conveyor Dynamics Corp.,	1	www.conveyordynamics.com	636-279-1111	636-279-1121	Art Grillo
Core-Tech Inc.	42	www.core-tech-inc.com	440-946-8324		Customer Service
Didion International, Inc.	Cover 2	info@didion.com	636-278-8700	636-278-3155	Art Grillo
Foseco	Cover 3	www.foseco.com	440-826-4548	440-243-4694	Customer Service
GDF Suez	43	www.suezna.com	713-636-1531	713-636-1601	Customer Service
General Kinematics Corp.	Cover 4	mail@generalkinematics.com	815-455-3222	815-455-2285	Customer Service
Gradient Lens	12	info@gradientlens.com	800-536-0790	585-235-6645	Customer Service
Heraeus Electro-Nite	15	www.electro-nite.com	215-944-9000	215-860-6657	Customer Service
Inductotherm Corp.	8	www.inductotherm.com	609-267-9000	609-267-3537	Customer Service
Loramendi Inc.	10	www.loramendi.com	810-629-0850	810-629-0886	Customer Service
Modern Equipment Co. Inc.	11	www.moderneq.com	262-284-9431	262-284-9433	Customer Service
Morgan Molten Metal Systems	29	www.morganmms.com	203-697-0808	203-265-6267	Customer Service
Palmer Mfg. & Supply	14	www.palmermfg.com	937-323-6339	937-323-2709	Customer Service
Pillar Induction	34	www.pillar.com	262-317-5300	262-317-5300	Customer Service
Roberts Sinto Corp.	2	info@robertssinto.com	517-371-2460	517-371-4930	Customer Service
Schaefer Furnaces	53	www.theschaefergroup.com	937-253-3342	937-253-2306	Customer Service
Viking Technologies	24	goran.lowback@vikingtechnologies.com	586-914-0819	248-564-0857	Goran Lowback

Every effort has been made to ensure that this ad index is accurate. However, the publisher cannot be responsible for errors or omissions.

BUSINESS STAFF/ADVERTISING SALES REPRESENTATIVE

MODERN CASTING
A PUBLICATION OF THE AMERICAN FOUNDRY SOCIETY
moderncasting.com

WEST COAST AND TEXAS
Jim Beckwith
1695 N. Penny Ln., Schaumburg,
IL 60173-4555
847-824-0181 800-537-4237
Fax: 847-824-7848
jbeckwith@afsinc.org

EAST, OHIO AND INTERNATIONAL
Joe Murphy
P.O. Box 1422
Fairfield, CT 06825
203-254-9595
Fax: 203-259-4447
AdSales25@aol.com

SHAKEOUT

Giving It Their Best Shot

The ancient Greeks might have used large stones to test their brute strength, but today's modern competition shot put weights are typically solid cast iron and often precision turned for balance. Shot putting has been a part of the Summer Olympics since their inception in 1896, and this year, 41 men and 33 women hurled the iron ball at the Games in London. MC

COATINGS

FILTRATION

FEEDING SYSTEMS

MELT SHOP REFRACTORIES

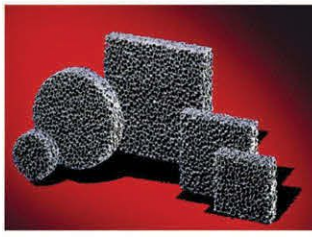
METAL TREATMENT

BINDERS

CRUCIBLES

STELEX* PrO FILTERS: MAXIMIZE, DON'T COMPROMISE

Improve quality, productivity and profitability



STELEX PrO filters were specifically developed to provide optimal priming and liquid metal filtration characteristics for steel castings. Their unique composition eliminates the chilling problems inherent in zirconia-based ceramic filters, as well as the strength and capacity limitations caused by high temperature creep.

When applied in a runner system, STELEX PrO filters remove inclusions from the metal stream, control flow rate and minimize turbulence during mold filling. As a result, mold erosion and reoxidation defects are greatly reduced. Ultimately, STELEX PrO filters improve the surface finish of steel castings, reduce scrap rates and minimize cleaning room costs.

Incorporating our new, unique and innovative ProBond carbon bonding technology, STELEX PrO filters now offer improved filter strength, reduced filter friability and an improved filter structure to further optimize metal flow properties. Because they effectively prime at temperatures within 30°F of liquidous, their superior priming properties allow much greater flexibility in filter placement in the mold. The result? They allow filtration applications to be maximized, rather than compromised.

Now, that's a smart business decision!

FOSECO

VESUVIUS

20200 Sheldon Rd. | Brook Park, Ohio 44142 | Phone: 440-826-4548 | www.foseco.com

GO GREEN
with GK foundry solutions

From reclamation of waste materials to reduction in energy consumption, GK continues to create new ways for you to efficiently process materials.

Learn more about GK's green foundry intiatives at

www.generalkinematics.com/gogreen

GENERAL KINEMATICS®

Maximize uptime and Increase Performance
Innovative Vibratory and Rotary Processing Solutions

General Kinematics 5050 Rickert Rd. Crystal Lake, IL 60014 Ph. 815-455-3222

Visit GK with QR