MeltingPoint

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What Puts the Chop in Your Chips?

Inside This Issue

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Why Metalcasting?... Metalcasting produces engineered metal components for use in all facets of our world, including what you drive, where you live, what you eat, and how you work. The metalcasting industry maintains its traditions while embracing advanced manufacturing techniques. But the key to metalcasting is what is illustrated in Melting Point magazine—the diverse ways metalcasting helps propel society forward. If you are interested in joining this forward-thinking industry, look to the sections of the magazine dedicated to Metalcasting Universities & Scholarships and Career Opportunities on pages 20-23.

CHECK OUT THESE VIDEOS ONLINE.
VISIT MELTINGPOINT.SQUARESPACE.COM
OR USE THE QR CODES BELOW.

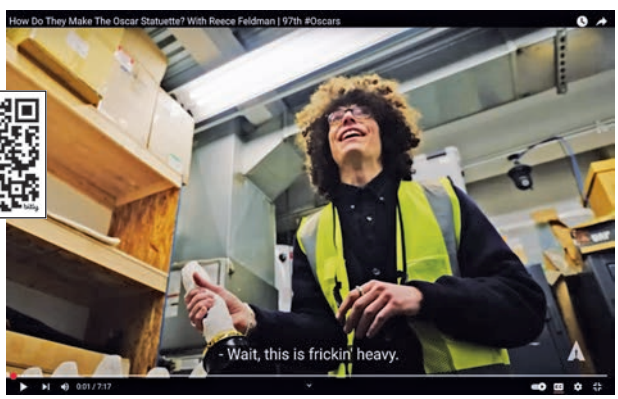
LIGHTS. CAMERA. CASTING.

FOUNDRY FEATURED ON TV SERIES

National TV show "World's Greatest!" visited Lawton Standard Company's De Pere, Wisconsin, location to film a segment on the foundry's innovation and leadership in the metalcasting industry. The episode documents the foundry's evolution of iron and steel casting from its origin in 1879 to today. It aired on Bloomberg in February and is now available for viewing online at **worldsgreatesttelevision.com**. Watch a preview here.

THE MOST COVETED CASTING IN HOLLYWOOD

Hollywood might not know it, but they're crazy for castings––those known as Oscars! Since 2016, a fine arts foundry in New York state has produced the 13.5-in., 8.5-lb. statuettes using 3D printed molds and the lost wax casting process. It takes them about three months to produce each annual batch of 50.



BEEP BEEP—WHAT'S ON THAT JEEP?!

With Jeep Wrangler prices starting north of $50,000, plastic door handles seem like an odd choice, right? "It stuck out to me that this super expensive car that you can get custom wheels, tires, light bars, paint match, all of the details, and it comes with black plastic door, said Nate Creamer, who recently started a new foundry called Cope & Drag Kustoms based in Chicago. So, he is making metal casting handles in bright, awesome colors and selling them to Jeep owners. Watch this TikTok video that tells the story.

What Puts the Chop in Your Chips?

MOHSIN / STOCK.ADOBE.COM

METAL CASTINGS KEEP CUTTING MACHINES SLICING AND DICING ALL KINDS OF FOODS YOU LOVE. AND A CAREER IN METAL MANUFACTURING AT URSCHEL LABS IS BOTH FUN AND FINANCIALLY REWARDING.

From potatoes and other veggies to cheese, meat and seafood, the packaged foods we eat everyday get sliced, diced, shredded, crumbled, and chopped by food-cutting machines manufactured at Urschel Labs in a small Indiana town about an hour east of Chicago. And inside those many different cutting machines are dozens of metal casting parts that are made by two foundries operating inside the huge factory—which is about the size of 15 football fields.

Melting Point magazine went for a two-hour tour at Urschel, and this article tells you what we learned.

Urschel is highly respected by the local community: [1] People say the factory is so clean and bright you could eat off the floors, and [2] people love working here because Urschel takes very good care of its employees.

Thanks to a generous profit-sharing program, one manager told us he plans to retire by the time he's 55 ... more than 10 years before most people do. Plus, Urschel throws amazing company parties with expensive raffle gifts every year for employees and their families. And if you like to work out, Urschel has a big new 24x7 gym called "Cross Cut" so employees can exercise on their lunch breaks or before and after work.

Any way you slice it, this company offers young people great careers in manufacturing and metalcasting.

Apart from machine engines it buys from other sources, practically everything that goes into an Urschel

cutting machine is produced inside their own factory—that includes castings.

TWO FOUNDRIES POURING MELTED METAL

Urschel has two different kinds of foundries at its sprawling modern factory:

1. In the investment casting foundry, layers of slushy white ceramic are coated over a wax pattern (usually by robots); then the wax is burned off in a furnace, leaving a ceramic mold—they pour melted metal (about 2,000 degrees hot) into those molds, and when the mold cools, out comes a perfect, smooth metal part that will be used in a cutting machine. One casting they make this way is a highly-intricate, 40,000th-inch cutting head casting used to puree food.
2. In the green sand foundry, the Urshel team uses the nobake process—they mix chemical binders with sand, which hardens at room temperature to form a mold, into which hot liquid metal is poured. And they pour almost 300,000 pounds of bronze and stainless steel metal per year!

Foundry Supervisor Travis Rogriguez demonstrates a robotic saw for cutting loose ends off castings.

This robot is used in the investment casting foundry.

The foundries also run high-tech machines for making patterns, sand molds, and cores (a piece of formed sand placed into a mold to create shapes and passageways in a casting). Plus they've got robotic grinding and sawing machines, and machines that clean castings.

Skilled operators control these complex technologies, and skilled technicians make sure they're always up and running. Other skilled people operate furnaces, pour molten metal, manage robots, and scientifically test metals and castings for quality.

Everyone we met enjoys working here, because everything about Urschel's foundries is clean, bright, safe, and modern.

ALWAYS IN DEMAND

The nice thing about making their own metal castings: These parts not only go inside new food-cutting machines—they're also needed for millions of Urschel machines in use all over the world.

That means Urschel is continuously making replacement castings for its customers who are always going to need to buy more parts! Some knives they make wear out in 90 minutes, so that's a lot of replacement parts ... and a lot of money earned producing millions of parts per year.

Urschel's customers include major, multibillion-dollar food producers—such as Kraft and Frito Lay. They produce 15–20 finished cutting machines a week on average, and they ship to their own distribution facilities in 14 countries and regions: Argentina, China, France, Germany, Greece, India, Italy, Netherlands, Nordic (Denmark, Finland, Iceland, Norway, and Sweden), Poland, Portugal, Singapore, Spain, and, most recently, Canada.

PROUD TO WORK AT URSCHEL

Urschel Labs employs about 500 people in Chesterton, Indiana, and from its beginning, family ownership maintained a business approach that has put its people-first mindset into action. One example: In its entire 100-year history, even during the Great Depression of the 1930s and the Great Recession of the mid-2000s, they've never had a layoff.

A foundry operator in full protective gear pours melted metal into molds to make castings.

A simmering mold containing molten metal gets a time out to cool off.

But the biggest demonstration of the company's respect and care for employees: In 2015, the Urschel family owners made Urschel Labs an employee-owned company (called an ESOP).

Today, every employee is fully "vested" in the ESOP from their first day on the job, and the company's shares have become quite valuable.

"If you work at Urschel, it's something you're proud of," said Travis Rodriguez, the foundry manager who gave us a tour. "My dad worked here before me, and it's always meant something; you work at a great place. Even before the ESOP, you already felt like it was yours because of the way they treat and respect you." MP

Hey Computer Kid: THE METALCASTING INDUSTRY NEEDS SOFTWARE EXPERTS

SOPHISTICATED SOFTWARE IS USED IN TODAY'S MODERN FOUNDRY TO MAKE QUALITY METAL CASTINGS—AND HELP FOUNDRY EXPERTS PREDICT POTENTIAL DEFECTS THAT WOULD TURN A CASTING INTO SCRAP.

Manufacturing software is incredibly advanced today. The metalcasting industry needs young, skilled professionals to use software skills to help design castings and understand how molten metal will flow into a mold—and thus prevent casting defects and rejects!

DESIGN SOFTWARE

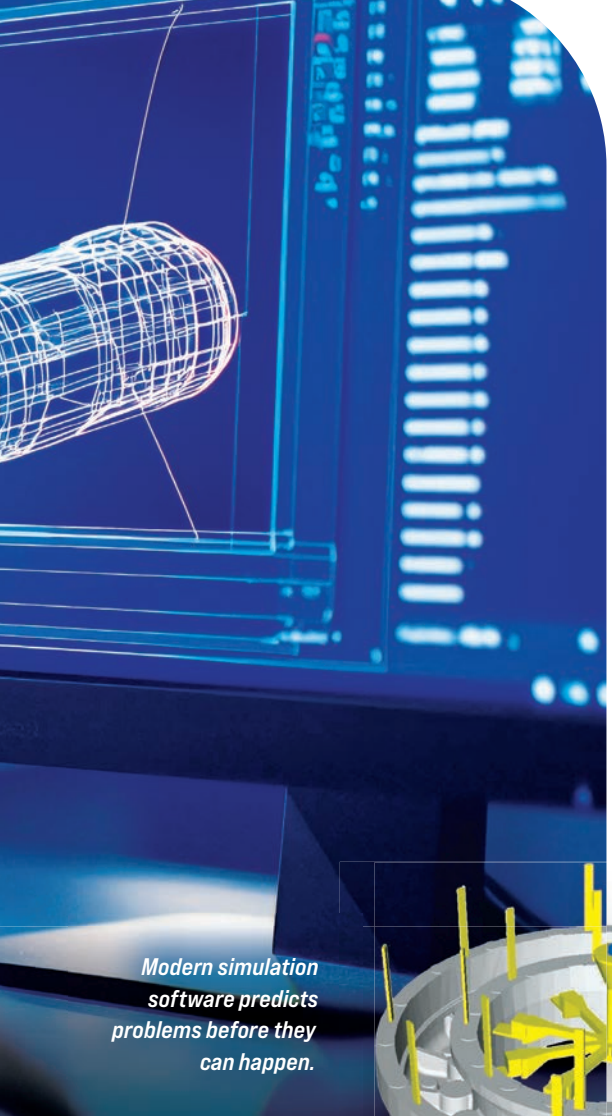
In the current digital era, almost all casting designs are created in a 3D CAD system.

To provide value-added engineering support to their customers, today's progressive foundries are equipped with the CAD capabilities, enabling engineers from a manufacturer (like a car maker, for example) and a foundry engineer to share CAD files and collaborate on casting design.

A CAD tool helps the foundry develop an accurate and timely cost quote that will cover all the processes involved in creating their customer's casting.

CAM software is also required to generate the tool path for milling with 3–5 axis CNC machines. Most of the CAD software tools have CAM extensions.

"At a bare minimum, the foundry needs a CAD package so they can read electronic 2D and 3D drawings, estimate the volume, estimate the tooling costs, and then provide a bid to the client," said casting expert Jiten Shah, president of Product Development & Analysis LLC in Naperville, Illinois. "Without CAD, they won't get that opportunity. Our customers, the OEMs, don't deal with paper



Modern simulation software predicts problems before they can happen.

drawings—nobody sends you hard copies; that's not going to happen. They just email you the CAD file to get the quotation."

SIMULATION SOFTWARE

Modeling and simulation technology have matured tremendously in the casting industry and is used widely not only by progressive foundries but also by complex-casting designers and end users.

Simulation software tools are capable of showing mold filling, solidification, and cooling, as well as predicting microstructure and mechanical properties. They also show engineers possible flaws that could occur, giving them opportunity to fix problems before they ever occur.

These are very effective tools for not only for validating the casting design but also for assisting, validating, and optimizing the systems through which molten metal enters the mold (risering and gating), as well as evaluating and planning other process parameters.

Top tools today include MagmaSoft, Pro-Cast, Finite Solutions, Flow3D, CAPCast, Novacast, and SolidCast.

SOLVING PROBLEMS

One foundry tried seven times to feed molten metal into molds for an iron casting —and each time the quality got worse instead of better. Finally, they used SOLIDCast simulation software and discovered the solution. Instead of 36 "riser" holes in the mold, the software showed them they only needed one!

When the new design was adopted in the foundry, the result was a defect-free casting. And producing the correct riser design only took 15 minutes. Quick and simple analysis is available to help the foundry engineers design the production process correctly at the beginning of production, thus avoiding major costs involved in producing defective castings.

EVERYBODY'S DOING IT

Software for the foundry operation is more important than ever—in fact it's a must. Foundries need curious and well-trained minds to choose the best software and apply it to the casting process.

"Our industry is truly migrating into the digital manufacturing age, called Industry 4.0 and smart manufacturing, where software and electronic devices are integrated and communicating with each other seamlessly," said Shah. "It's coming, and in fact it's already here. Foundries need to soak it in and be ready to adopt and embrace this digital manufacturing wave. Those who are not part of it will be left behind." MP

PARKPOOM / STOCK.ADOBE.COM

If You Dig High-Tech...
Guess What You Can Bury

COLLEGE-AGE RESEARCHERS ARE BURYING FIBER OPTIC SENSORS INSIDE MOLDS TO DETECT CASTING DEFECTS. AS A MATERIAL SCIENCES COLLEGE STUDENT, YOU COULD HELP DEVELOP BREAKTHROUGH TECHNIQUES THAT SOLVE REAL-WORLD PROBLEMS FOR METAL PRODUCTS USED EVERYWHERE.

A new tool is set to transform how temperature and strain (stress) is measured in metal castings. Researchers at Missouri University of Science & Technology (Missouri S&T) in Rolla, Missouri, have found success using fiber optic sensing technologies to accurately measure distributed temperature and strain in a wide variety of applications in the industry.

This breakthrough could represent the beginning of a significant shift in industry methods to provide real-time process control and automation. Fiber optic sensors work great because they can withstand super high temperatures––inside a mold where melted metal is poured! These sensors can tolerate heat up to 3,272 degrees Fahrenheit.

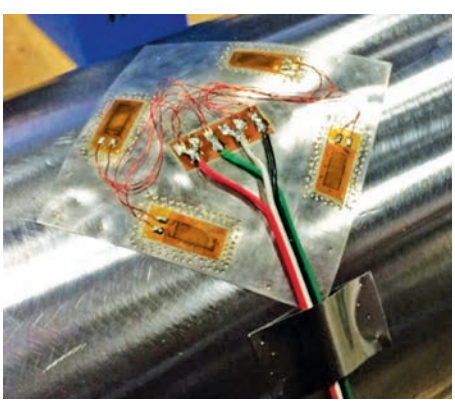
Research takes place at the Robert V. Wolf Foundry at Missouri S&T, which is equipped with advanced solidification and thermodynamic modeling software, 3D sand printing capabilities, and pilot-scale production equipment. The foundry is able to melt up to 500 pounds of metal, and it has the ability to melt, cast, and process aluminum, copper, nickel, and other technically important alloys.

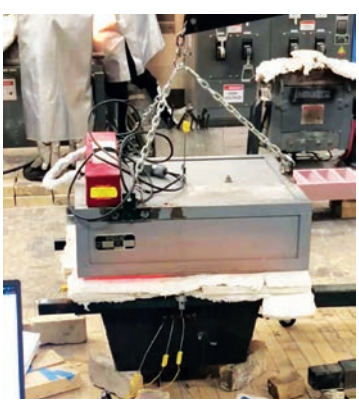
KIN OF A BIG DEAL

Leading the research is Laura Bartlett, Ph.D., who's in charge of the Metallurgical Engineering program at Missouri S&T––she is also the Foundry Educational Foundation (FEF) key professor at the school.

According to Bartlett, research using fiber optic sensors began about five years ago, through a the Peaslee Steel Manufacturing Research Center (PSMRC), a collaborative group made up of steel companies, foundries, suppliers and university researchers working together to address several steel casting and manufacturing issues.

Using fiber optics for temperature and strain measurements will play a critical role in advancing





Left: A steel beam instrumented with four strain gauges. Right: A box furnace is lifted before molten steel is poured into a container embedded with fiber optic sensors.

In a Casting Mold?!

Dr. Laura Bartlett is in charge of the research at Missouri S&T, which is a Foundry Education Foundation school.

Foundry 4.0. It will provide the big data needed to help moderate, monitor, and make corrections to foundry processes in real time.

FIBER OPTICS EVEN OUTPERFORM SIMULATION TOOLS

"There's no solidification software or modeling tool that can accurately model that right now," said Bartlett. "With this technology, the steel mills will be able to adjust their process parameters in real time to eliminate potential defects (like shell buckling) and improve efficiency."

"We had a project involving using the fiber optic sensors to sense the temperature of continuous casting steel molds," said Bartlett. "We found the fiber optic sensors gave very good temperature resolution, which allowed us to develop a heat map of the whole mold." This success led to expanded research into aluminum casting, 3D printing technologies, and other applications in industry and defense, supported by approximately $11 million in total funding from the U.S. Department of Energy and the Department of Defense.

INVESTMENT CASTING EXAMPLE

Bartlett identified investment casting as a major opportunity for fiber optics. "Ninety percent of the defects in shell castings are the result of improper de-waxing," she said. "It's very hard to measure strain and temperature during the dewaxing process, and current technologies only provide localized point measurements.

Working with AFS, researchers at Missouri S&T are embedding fiber optic sensors into the wax and the shell itself to better understand and model both the temperature and the strain that might lead to shell cracking. "This could be a cost-effective method that would allow for more accurate modeling of the process," said Bartlett.

HERE TO STAY

While Bartlett understands the industry is just getting started with foundry applications, she also thinks fiber optic sensors are here to stay, given the significant benefits they offer. "We're getting very close to a commercial solution that we can supply to foundry producers," said Bartlett. MP

Tiny But Mighty

CHICAGO FOUNDRY OWNER IS ROCKIN' THE COMPANY SHE INHERITED FROM HER DAD

Girls: Metalcasting has many, many opportunities for you, no matter what your interests, talents, and goals may be. This woman-owned casting business is making metal parts for use by the Department of Defense, as well as other vital industries. It's hard but rewarding work, and she (like most foundries) is always looking to hire.

If you're not sure where you're going when you pull into the parking lot at Silver Dollar Castings (SDC), you might begin to doubt if you're in the right place. A plain, small brick factory sits humbly at the dead end of a street that's more like a long driveway. You've arrived inside a manufacturing district in the "Lower West End" neighborhood of Chicago that's safe by day but dicey by night, hence the bars on doors and windows.

Could this boring-looking building be a well-respected, aluminum nobake foundry that produces high-quality, complex parts for the military, as well as the microchip, aerospace, automotive, mining, construction/agriculture, and other demanding industries?

As if in disguise, SDC is a "Clark Kent" of foundries—plain and ordinary on the outside; Superman on the inside. Here, a tiny but mighty team of talented metalcasters is turning out a wide range of critical castings that weigh from under 1 pound to 375 pounds.

Its location is actually a blessing that's also in disguise. Their central, Midwest geography gives the foundry access to many different customers

from Indiana, Michigan, Wisconsin, Iowa, and beyond, according to Southsider Jill Clement, SDC's hands-on owner who is the heart and soul of the business today. And even though she's the owner, she is 100% hands-on, performing every aspect of the casting process right alongside her employees.

REPLACING THE IRREPLACEABLE

SDC was founded by Jill Clement's dad, Richard Clement. A former race car driver, he was an inventor, tinkerer, and successful entrepreneur. Among many accomplishments, he created the first magnesium air-set Indy wheel sold in the U.S. After retiring, he became consumed with making drag wheels, and in fact kept the foundry business going for the purpose of funding that work, his daughter remembers.

As much as she loved her dad, Jill was adamant that she would never join SDC. A successful accountant with abundant private clients, Clement said her father gradually whittled her will down, first persuading her to look at the books, then reeling her in to learn all facets of the casting business.

Jill Clement

Eventually, Clement quit accounting and began co-managing SDC. When her father's health started to fail, she moved him in to her own house, and the pair spent every waking hour together, and most dinners turned into board meetings, she recalls with laughter. She became his caregiver and he received hospice at her home.

When Richard Clement died in 2015, Jill said she was devasted and could barely drag herself to work. With the support of old friends and special mentors, she pulled through and found her own identity in the company.

"I finally told myself, 'Here's the reality: He's not coming back," she said. "I have to get my act together. The guys are pulling so much more than I am, and I'm not being the leader they need. I either need to shut it down, or I need to figure it out fast.'

"And I had an epiphany: I don't need to walk in my dad's boots and follow his path. I can create my own path and walk beside him, and that's going to be ok, too," she continued. "We're not going to make wheels anymore, I decided. We're going to make castings ... and today, I am so hungry and excited about this business."

INTO THE LIMELIGHT

Clement's foundry recently won a prestigious small business award in a national Casting of the Year competition.

The part SDC manufactured is a critical component for a jet engine. It was originally supposed to be made in India, but after a whole year, the Indian foundry couldn't figure out how to make it. So, it was eventually turned over to Clement, and she solved the difficult design problems and successfully delivered the 24-pound casting to a very surprise and elated customer!

HEALTHY BACKLOG

Repeat business and word of mouth play a big role in foundry's business backlog, that they do almost no marketing or advertising.

Fortunately for them, they get a lot of business through a large partner in Wisconsin. "Because of their contacts, we have access to a lot of very big-name companies," said Clement. "To respect our clients' confidentiality I can't share names, but we are really making magnificent parts—very difficult castings that are complicated and require a lot of cores.

"We are focused on extremely high quality projects. We really put a lot of effort into engineering and design so we can give our best to every part going out the door.

"We also become a one-stop shop for our customers, which is a strong value in today's busy world," Clement said. MP

THINKING OUTSIDE THE LANDFILL

FOUNDRIES ARE SOME OF THE BEST RECYCLERS IN THE WORLD

Foundries are finding ways to turn their used sand into in-demand products ... instead of pitching it all into a landfill. Environmental, health, and safety (EHS) professionals are in high demand, too, in the metalcasting industry to help advance environmental stewardship.

After recycling their sand over and over again, eventually foundries have to get rid of thousands of pounds of sand they've used to make sand molds and cores for castings.

However, the metalcasting industry is seizing an opportunity to send their sand to beneficial use projects instead of local landfills.

MANY CHOICES

A wide range of beneficial-use applications are well suited for foundry spent sand. Common projects include use as a sub-base for asphalt and as an ingredient in cement for things like roadbuilding and parking lots.

It can also be used as daily cover in landfills. Agriculture applications include feed pad construction, barn expansions, and manure pits.

Sand also works well in a variety of backfill applications for excavation businesses. Mine reclamation is another example. Many states have rules that legacy mines (that aren't in use anymore) must be reclaimed so they're safe and look nice—local communities are always happy to have the land restored and looking beautiful again, says Bryant Esch, corporate sustainability manager at AFS Corporate Member Waupaca Foundry.

He says some foundries find projects with a "value-add element" such as brick-making or using sand as an ingredient in manufactured soil like the bags of dirt sold at garden centers.

MANY BENEFITS

Believe it or not, taking sand to a landfill isn't free. Foundries are charged dumping fees and taxes, plus it costs

Spent foundry sand can be used as a sub-base for asphalt and as an ingredient in cement for things like roadbuilding and parking lots.

LASTFURIANEC / STOCK.ADOBE.COM

them money to haul it—paying a driver and buying truck fuel, for example. And while they're not exactly making money when they supply their used sand to a beneficial-use project, it's usually a lot cheaper than the alternative.

Plus, they're giving a second life to a material that is still very usable.

A foundry in Minnesota has been recycling their used sand for about 10 years, and they're currently sending 75% or more to beneficial-use sites. The environment project engineer there says he's hoping to increase that to 100% in the future.

"I think there are many opportunities to reuse foundry sands, Scheele added. "The only obstacle to finding ways to manage spent foundry sand is a lack of imagination."

GOOD FOR THE ENVIRONMENT?!

EPA says reusing foundry sands from iron, steel and aluminum foundries is a good thing.

This government agency asserts, "The beneficial use of spent foundry sand, when conducted in an environmentally sound manner, can have positive environmental and economic benefits, particularly in the area of reducing impacts associated with food production and in the construction of roads and other infrastructure.

"Environmental benefits include energy savings, reduction in greenhouse gas emissions, and water savings. Economic benefits include job creations in the beneficial-use industry, reduced costs associated with spent foundry sand disposal, increased revenue from the sale of spent foundry sand, and savings from using spent foundry sands in place of more costly materials."

Based on one EPA analysis, environmental benefits from using spent foundry sand in soil-related applications and road base include:

- The energy savings equivalent to the annual electricity consumption of 800 homes;
- Water savings equivalent to the amount of water to fill 12 Olympic swimming pools; and
- Carbon dioxide emissions reductions equivalent to removing 840 cars from the road from one year.

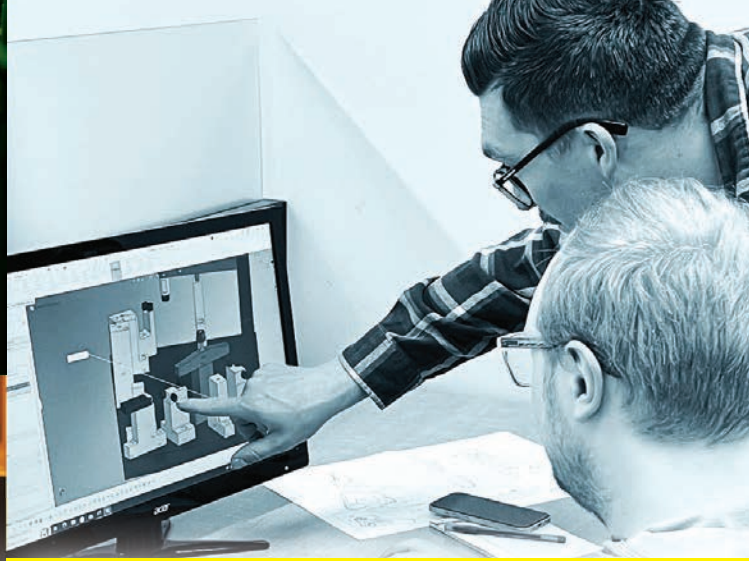
DON'T ASSUME THE WORST ABOUT MANUFACTURING

Manufacturing in America is something to be proud of. If you join the metalcasting industry, you'll be part of making things that are used in every facet of life—and a business that is tech-savvy and environmentally responsible.

"Some people—especially those just starting out in life—make the assumption that if it's a byproduct generated by manufacturing, it's probably bad," said sand expert Mike Lenahan at Badger Mining Co. "But with regard to foundry sands, the data really tells a different story.

"Somebody once told me, 'The only reason you're repurposing sand is because it's going to save the businesses money.' And I said, 'Yeah, that's kind of true. It is going to save the business money, and that is really a key driver, because we're taking something that's being thrown away that shouldn't be thrown away.'" MP

TRY BEFORE YOU APPLY: Manufacturing Internships Are a Win-Win



Interns get to experience work in every department at Eagle CNC.

ONE COMPANY'S INTERNSHIP PROGRAM GIVES STUDENTS THE OPPORTUNITY TO LEARN ABOUT SKILLED MANUFACTURING CAREERS—AND OFTEN, IT TURNS INTO A TERRIFIC FULL-TIME JOB.

In the hands-on world of manufacturing, textbooks alone can't provide the full picture—real-world experience is essential for developing expertise and encouraging innovation. For both students and manufacturing companies hoping to hire talented employees in the future, internships bridge the gap between classroom and hands-on application.

Eagle CNC is a Michigan manufacturer that's committed to shaping the next generation of manufacturing professionals by providing practical experience—and teaching essential, real-world skills through its internship program.

LEARN, WORK, STAY

Eagle CNC's approach to internships is designed for long-term development, allowing interns to build their experience gradually and later specialize in their area of choice.

The goal is for interns to stay with the company throughout their college education. Typically, they begin after their second year and work during summer breaks for 3-4 years. This long-term commitment provides interns with exposure to all aspects of the real work environment and a gradual transition to focused departments and actual projects, which complements what they're learning in school.

YOU CAN TRY IT ALL

"For my first month-and-a-half to two months, I spent a week in each department learning and getting to know the people and doing the job," said Rob Norton, an engineering student entering his junior year of college. "I started off at production, and then I went to the quality lab, then to the tool room, maintenance, and engineering ... "It was originally a plan to end up in engineering because that's what I'm going to school for. It worked out because that's also what I enjoy."

Eagle CNC aims to ensure that interns not only gain valuable skills, but also that they enjoy the process.

"Interns step through all of the plant processes so they get a chance for exposure to everything, said the company's president, Jason Clark. "That way, they know whether they like it or don't like it. A lot of times, I've seen students actually change their fields based on what they learn."

What happens at the end of the internship program?

"The goal is to hire them," says Clark.

Do you like:

- Science?
- Building things?
- Designing things?
- Being creative?
- Working with people?
- Solving problems?

You might love metals manufacturing—and there's a great metalcasting career waiting for you. To find out about metalcasting summer camps and programs for high schoolers, please email the editor of Melting Point at kphelan@afsinc.org. **MC**

DID SOMEONE SAY FREE MONEY?

Companies 'Pour It Forward' with Scholarships

NUMEROUS SCHOLARSHIPS ARE AVAILABLE TO STUDENTS WHO WANT TO PURSUE A CAREER IN THE METALCASTING INDUSTRY.

At a ceremony earlier this year, 26 students received College Industry Conference scholarships made possible by the generosity of individuals, companies, and AFS local chapter groups that have set up endowments with the Foundry Educational Foundation. Here's what some of the winners had to say.

SEAN MCCARTHY

University of Wisconsin-Platteville, winner of The Gary and Jeanne Gigante Scholarship.

"Without this scholarship, I would have to miss opportunities for learning more about metalcasting and advancing my knowledge to further my career."

MICHAEL JONES

Georgia Southern University, winner of The Loper Award.

"Knowing how much FEF has helped me in my career, I hope to one day have the same opportunity to assist and mentor the next generation of foundry engineers."

MARGARET LEE

Texas State University, winner of The Dr. Katherine E. Mortimer Scholarship For Women In Metal Casting.

"I am deeply grateful to those in my life, especially the women, who have come before me and paved the way. This scholarship inspires me to continue improving myself and pursuing the best opportunities. After graduation, I am excited to work in a foundry where I can further hone my metal casting skills and contribute to this dynamic industry," she said.

EMMA LEWIS

University of Alabama, winner of The Linda Steele Memorial Scholarship.

"Receiving this scholarship represents more than just financial support; it is a testament to the value that women bring to the industry through their ambition, innovation, and persistence. This scholarship will allow me to invest more time in my academics and research."

JESTIN YOUNG

Texas State University, winner of The AFS Texas Chapter/Robert Habingreither Scholarship.

"I am eager to continue to expand the family of the metalcasting industry and 'pour it forward' throughout my career." MP

WANT TO EXPLORE SOURCES FOR METALCASTING SCHOLARSHIPS?

- Email Pam Lechner at the Foundry Educational Foundation: **pam@fefinc.org.**
- Check out **afsinc.org/college-scholarships**
- Find a local chapter of the American Foundry Society near you—many offer scholarships: **afsinc.org/regional-chapters**

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PROFILE

Livin' the Dream

MEET MATTHEW ADAMS, A 25-YEAR-OLD TECHNICAL DIRECTOR AT AN OHIO FOUNDRY. HE'S GOT A GREAT JOB THAT HE LOVES … AND IT ALL STARTED AT AN ANNUAL SCOUTS WORKSHOP, WHERE HE STILL VOLUNTEERS TO HELP MORE KIDS DISCOVER THE AMAZING WORLD OF METAL CASTING.

Matthew Adams was a 10-year-old Cub Scout when his dad, Andy, brought him to their first Scout metalwork merit badge day at Kent State University in Kent, Ohio, in 2010. It proved to be a foundational day in Adams' life.

By the age of 12, he was assisting and then teaching various segments of the hands-on workshop that sells out every year. In high school, he attended a summer foundry camp at Western Michigan University, and he graduated with a Bachelor of Science degree in material science and engineering from Michigan State University. Adams, who is 25 now, entered the foundry industry in 2022 as metallurgist at Quality Castings Co. in Orrville, Ohio, and then got promoted to technical director.

LIFE IS GOOD IN METALCASTING

Adams, who is also working on a master's degree in materials science and engineering has been a homeowner since 2023 and got married last fall. Money is never a problem for him.

At the foundry, he's involved in new, hands-on responsibilities every day. Currently, he says he's focused on introducing Internet of Things technology at Quality Castings with a quality monitoring system that ties into foundry equipment. He said he hopes to install software that will bring data visualization out to the plant floor where operators and supervisors alike can see and understand what's happening.

FIND SOMETHING YOU LOVE

To middle schoolers and high schoolers, Adams sends a message: Find something you love to do when it comes to choosing a career path. He said he finds great satisfaction knowing the metal castings that leave with his stamp of approval are out in the world serving meaningful uses in many different industries. He also loves the hands-on aspects of his job.

"I'm probably in my office just 20% of my time," he said. "I'm frequently out talking with the guys on the shop floor to see how everything's going. There are days where, if I'm working with our sand technician and we're having complications, I'll come home just covered in green sand. Those days are some of the most fun I have.

"Kids need to get out there and experience more opportunities––this metalworking merit badge is a great example," Adams continued. "I found metalcasting and I never feel like I'm going to work. I feel like my company just pays me to go play in a foundry every day."

SCOUTS MERIT BADGE EVENT

This spring, Adams and his dad, now retired, returned for yet another merit badge day as counselors for 22 teens, mostly 13- to 15-year-olds––18 boys and 4 girls––who came ready to discover the amazing world of shaping metal.

As of this year, 366 kids have completed the workshop since 2008.

"It's always fun to hear the scout attendees asking questions," said Brian Began from the American Foundry Society, who is one of the workshop's founders, "especially when they're trying to decide which of the counselors they've learned from have the most desirable jobs!" MP

Blessed Bells

PHOTOS: FABIO CAVALIERI

FUN FACT:

The Vatican bestowed the title of "pontifical foundry" upon the Marinelli's operations in 1924, which allows the family to portray the Papal Coat of Arms in their designs. The Catholic Church accounts for the vast majority of the foundry's orders today.

Earlier this year, bells across Rome tolled in celebration after the college of cardinals elected Pope Leo XIV to lead the Catholic Church. Many of those bells, including the one that sits atop St. Peter's Basilica, are part of a thousand-year legacy created by the oldest family-owned foundry in Italy: Marinelli Pontifical Bell Foundry. *Melting Point's* staffer, Fabio Cavalieri, went to meet the father-son owners and took photos while in Italy this May.

The foundry is currently headed by the 27th generation of the Marinelli family, who have been making bells in Agnone since at least 1339. The company still uses the lost wax technique to create the works of art, the same method it has used for centuries.

For each bell, foundry artisans create a brick core to shape the inside of the bell. According to Marinelli's website, this core is then covered with clay "until a smooth profile is obtained, on which the molten wax shapes" that decorate the exterior of the bell are applied. This creates a "false bell," to which crafters apply more clay until the bell reaches the desired thickness.

Eventually, that wax bell will be destroyed, and the clay mantle will be positioned with the brick core for the casting. Molten bronze is poured into the mold and left to cool. The final casting is "birthed" by hammering off the clay mantle. A maestro campanero—or master bell ring—tests each bell's acoustics as well. MP

Visit the Foundry Educational Foundation at: **www.fefinc.org**

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Blacksburg, VA

Wentworth Institute of Technology
Boston

Western Michigan University
Kalamazoo, MI

Youngstown State
Youngstown, OH

DO YOU LIKE:

- Science?
- Building things?
- Designing things?
- Being creative?
- Working with people?
- Solving problems?

CONSIDER METALCASTING. WE NEED:

- Business Managers
- Chemical Engineers
- Computer Engineers
- Electrical Engineers
- HR Professionals
- Safety Managers
- Accountants
- Quality Control Technicians
- Marketing & Salespeople
- Mechanical Engineers
- Metallurgists
- Skilled Tradespeople

CAREERS: POST HIGH SCHOOL

- Molder, Machine Operator, Pourer, Crane Operator
- Lab Technician, Quality Assurance, Welder, Furnace Operator
- Patternmaker, Maintenance Mechanic
- Electrician

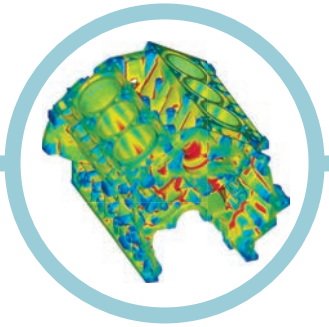
CAREERS: POST COLLEGE

- Metallurgist, Quality Assurance Manager, Facilities Manager
- Engineering Manager, Plant Manager, HR Manager, Controller, Computer Programmer, IT Manager
- Sales Manager, Technical Director
- VP, President

How Castings Are Made

1

OEM DESIGNS THE CASTING



4

MOLDS ARE CREATED WITH A PATTERN

DID YOU KNOW?

75% are small businesses with less than 100 employees

490,000 people work in the metalcasting industry

DID YOU KNOW?

The U.S. has over 1,700 foundries

7

THE CASTING IS DELIVERED TO THE OEM TO BE ASSEMBLED WITH OTHER PARTS

METALCASTING SUPPLY CHAIN

Metalcasters Everywhere!

2

A PATTERN IS MADE

DID YOU KNOW?

90% of all manufactured goods contain a metal casting.

3

METAL IS MELTED

FREEPROD / STOCK.ADOBE.COM

5

METAL IS POURED INTO THE MOLD

People have made castings for over 5,000 years

6

THE METAL CASTING IS REMOVED FROM THE MOLD AND CLEANED

DID YOU KNOW?

In 2024, the metalcasting industry produced $50 billion in sales

MeltingPoint

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