Computer Modeling & Simulation | Computer Design | JULY 2025

DIE CASTING ENGINEER

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FEATURES

DEPARTMENTS

PUBLISHER
Mike Meyer

EDITOR
Andrew Ryzner

ADVERTISING & PROMOTIONS MANAGER
Athena Catlett, DES

EDUCATION & MEETINGS MANAGER
Melisa Ryzner, CMP, CMM

EXECUTIVE OFFICES
3250 N. Arlington Heights Rd., Suite 101
Arlington Heights, Illinois 60004

Phone: 847.279.0001
Fax: 847.279.0002
Email: dce@diecasting.org
Web site: www.diecasting.org/dce

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Chairman's Note

One Major Benefit of Membership

Mark Los, *Key Account Executive*
BuhlerPrince, Inc.
NADCA Chairman
mark.los@buhlergroup.com

Welcome to another informative issue of Die Casting Engineer.

In the last chairman's letter, the focus was on the increased investments being made in the North American die casting industry.

Over the past few months, I have had the opportunity to visit several NADCA member and non-member facilities and was reminded that major improvements in corporate performance do not always require a large investment in new plants or processing equipment.

Having the entire organization understand the corporate mission, with the team measured using a manageable number of shared, non-conflicting goals, supported by a limited number of clear, concise Key Performance Indicators (KPI's) can improve productivity and teamwork with minimal investment.

Video display screens or printed dashboards that display the organization's shared KPI's from the boardroom to the lunchroom communicate the same clear information to all team members, highlighting authority, responsibility and accountability for managing to meet the stated targets.

One of the challenges in today's manufacturing world is the tendency to be swamped with data.

Would finding a limited number of shared KPI's that drive your business toward your goal, with your entire team understanding the vision, direction, and methods, help your team to achieve shared success?

One of the benefits of being a North American Die Casting Association member is the opportunity to network with your peers. Take advantage of exchanging ideas, challenges, or successes with others in the industry. Certainly, there are competitive situations that may limit what should be disclosed, but there are members in this industry who can share best practices and gain knowledge from each other.

In this month's Die Casting Engineer issue, we are highlighting the exciting developments in Computer Modeling & Simulation, Computer Design, and Defect.

The expanding arsenal of tools available to die casters can enable us to design and manufacture products to be more competitive in the global marketplace.

"Take advantage of exchanging ideas, challenges, or successes with others in the industry."

Andrew Ryzner
Editor
North American Die Casting Association

"Come see what NADCA has to offer this October in Milwaukee, WI."

Come See Us in October!

Hello and welcome to the July 2025 issue of Die Casting Engineer magazine. Every year this issue contains both the Die Casting Congress & Tabletop (or Exposition depending on the year) Show Preview as well as NADCA's Research & Development Roadmap update.

From Tuesday October 7 - Thursday October 9, NADCA wil be hosting the 2025 Die Casting Congress & Tabletop in Milwaukee, Wisconsin. Join us once again this year to mingle with your peers and associates, attend some presentations regarding the latest and greatest technologies and ideas in the industry, and to attend events such as the Welcome Party on Tuesday and the Awards Luncheon on Wednesday. Those of you who have been with us before in Milwaukee will know that it is a fantastic host city with plenty of things to do after the hours of the exhibit hall. A QR code to register can be seen below, as well as on page 36 of this publication.

On page 38 of this month's magazine is an overview of NADCA's R&D projects. In it, you can find NADCA's involvement in projects with cooperation from various individuals, companies and universities. A lot of these research results end up being made into research papers regarding said results that are then presented each year during our congress sessions at the Die Casting Congress & Tabletop. NADCA's own Paul Brancelon is heavily involved in each of these in NADCA's effort to provide benefits from this research. Higher performance alloys, solder reduction, cycle time improvements, productivity improvements, scrap reduction, cost reduction and lead-time reduction are all among the ideals that NADCA strives to improve for its members each and every year. NADCA is here to help you, our members.

Thank you for reading and have a great summer! See you in-person in the fall!

Andrew Ryzner

NADCA Reports

UPCOMING EVENTS

Revolutionize Your Die Casting Process – Join Our Cladding Workshop

Die casting dies are one of the most significant investments in the industry—and protecting that investment is essential.

Join us on Thursday, July 10th from 8:00 AM – 4:00 PM Eastern Daylight Time at the Edison Welding Institute (EWI) in Columbus, Ohio, for a one-day workshop exploring an exciting innovation in die casting: cladding.

Cladding is the process of applying a thin, protective metal layer (such as tungsten) to die steel—improving performance, enhancing durability, and extending die life. EWI, a leader in welding, additive manufacturing, and cladding technologies, will share the latest research and applications, give a behind-the-scenes tour of their advanced labs, and lead discussions on the future of this promising technology.

Location: Edison Welding Institute 1250 Arthur E Adams Dr Columbus, OH 43221

Date: Thursday, July 10th

Time: 8:00 AM – 4:00 PM EDT

Pricing: Member: $100 Non-Member: $200

Important Instructions:

Due to EWI's facility protocols, all attendees must show proof of citizenship and sign a visitor waiver. After registering, a questionnaire will be emailed to you and must be completed and returned to NADCA by July 3rd. For hotel options near EWI, please refer to this link: https://ewi.org/hotel-information.

Reserve your spot today visit https://shorturl.at/YGzVT.

Fore the Love of Networking: NADCA Chapter Golf Events Are Here!

Arlington Heights, IL - Why did the golfer bring an extra pair of pants? Because he might get a hole in one.

Our NADCA Chapters are teeing up great events - check out the upcoming Golf Outings happening across the country and take advantage of these fantastic networking opportunities:

Chapter 3 – Michigan
Date: August 15
Location: Saskatoon Golf Club

Chapter 16 – Minnesota
Date: August 18
Location: Cannon Golf Club

Chapter 30 – California
Date: September 12
Location: Los Serranos Country Club

Chapter 17 – St. Louis Alan Loeffelman Memorial Golf Tournament
Date: September 12
Location: Birch Creek Golf Course

Chapter 5 – Chicago
Date: September 18
Location: St. Andrews

Get involved with your local chapter to build relationships and strengthen our industry. Have a question about what chapter you're affiliated with or how to participate? Please contact Athena Catlett at catlett@diecasting.org.

Registration Now Open for the 2025 Tabletop

Arlington Heights, IL - Register today for the Die Casting Congress & Tabletop. This premier event for die casting professionals is happening from October 7 - 9, 2025, at the Baird Center in Milwaukee, Wisconsin.

This three-day conference offers a unique opportunity to delve into the latest advancements in die casting technology, materials, and processes. Attendees can look forward to insightful Congress sessions led by global experts, an exposition featuring over 120 exhibitors, the International Die Casting Design Competition, and the prestigious Die Casting Industry Awards.

Whether you're aiming to enhance your technical knowledge, explore innovative solutions, or network with industry leaders, this event is a must-attend. Remember, NADCA members can enjoy free admission to the exhibits. Don't miss out. Visit www.diecasting.org/congress for more information or to register today!

Please note that if you are an exhibitor, you will NOT register through the link above. Your booth administrator has received exhibitor registration information. Not sure who to contact? Email expo@diecasting.org.

Dr. Die Cast

Simulation, Shot Process Monitoring, Thermal Imaging, Fluoroscopic X-ray, and Identifying Root Cause of Casting Defects

When we use all the tools at our disposal, we can identify casting problems before we cut steel.

How good is good? What does it take to satisfy the customer's customer. Not always the same standards.

What are the basics the simulation can show us?

- Finding the optimum gate entry or entries and overflow exit locations.
- Confirming an effective metal flow pattern.
- Identifying trapped gas, at non-vented locations.
- Determining the "Last location" to fill. Trapped air. (Place overflows and vents here).

What if the simulation is indicating it is time to break some Cardinal rule(s), (Practices that our "Design and Build Standards" would never allow us to do), such as…

- Runners across slides (one or more)
- Gating across slides. (one or more)
- Venting across slides. (one or more)
- Venting past the insert
- Perfectly air tight cavity (shut off between core bodies and core bearing surface.) (Vent flats on core bodies, venting to the insert pocket).

Unable to feed a shrinkage porosity area. Last to solidify areas in pressure tight castings, especially in castings that get machining in pressure tight areas. (Simulation shows the gates and runners start to solidify before the casting.

Additional Cooling to the hot spots is recommended. Increase the steel temperature under the gate entry.

Modify the part-design, if possible, to create a flow path for intensifier metal squeeze to an isolated feature.

Tip: When reviewing the simulation video, pause when something catches your eye. For example, on a two-cavity family die, the Right-hand casting was filling late and contained significantly more gas porosity than the left-hand casting. This was confirmed by the shot monitor profile as the head pressure surged and the fast shot stalled when the larger of the two casting completed its filling before then end of shot.

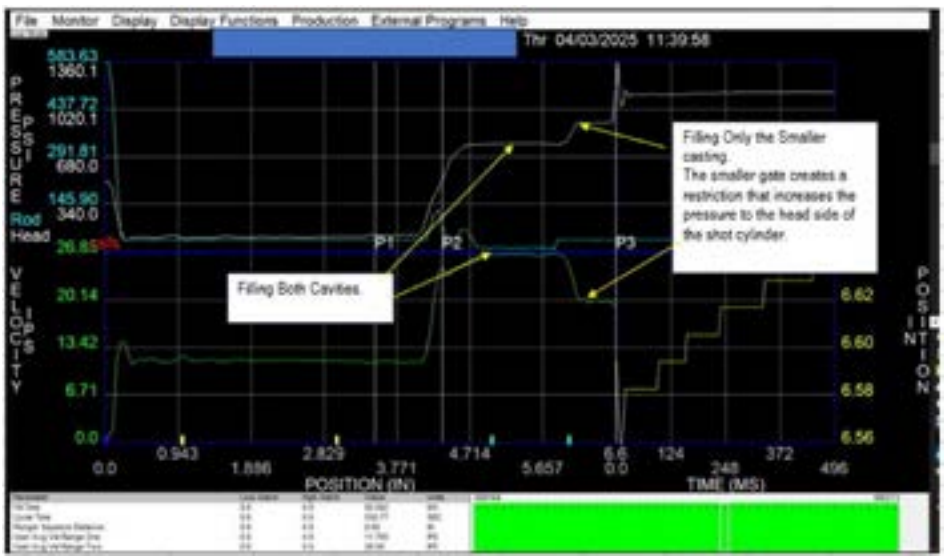


Figure 1 *– Two cavity family die, unequal fill time.*

Who's Dr. Die Cast?
Robert P. McClintic
Die Casting Consultant

Bob McClintic & Associates
523 Lincoln Lawns Dr. NW
Walker, MI 49534

RMcClintic@ameritech.net
www.drdiecast.com
616.292.0454

NADCA Government Affairs

Trump Administration Doubles Tariffs on Steel and Aluminum Imports

The Trump administration has officially doubled tariffs on imported steel and aluminum, raising them from 25% to 50%, in a move it says is necessary to protect American industry. The new rate, which took effect on June 4, 2025, applies to all imported steel and aluminum products, including derivative items, such as aluminum castings, which were subject to the original 2018 tariffs. The White House stated that the measure is intended to restore the long-term viability of the U.S. metals industry and address persistent threats to national security posed by global overcapacity, rising imports, and unfair foreign competition.

The decision comes after the Department of Commerce concluded that the original 25% tariffs, put in place under Section 232 of the Trade Expansion Act, were not strong enough to fix ongoing problems in the U.S. metals industry. These problems include a flood of cheap imports, global oversupply, and aggressive pricing by foreign producers. The administration argues that these challenges threaten national security by weakening the country's ability to maintain a strong manufacturing base.

The new tariff structure is designed not only to reduce reliance on foreign metals but also to recalibrate the way derivative products are taxed. Specifically, the 50 percent tariff will now apply only to the value of the steel or aluminum content within the imported product. The remaining non-metal portion will be subject to the Global Reciprocal tariff, which currently sits at a baseline 10 percent rate through July 9, 2025.

This refined valuation approach marks a departure from the flat-rate model previously applied to derivative goods classified under Chapters 73 and 76 of the Harmonized Tariff Schedule. Under the old framework, these products were taxed at 25 percent based on their total value. Now, only the metallic content is subject to the new higher rate, with the remainder facing other applicable duties.

The proclamation also adjusts how tariffs are layered when multiple trade measures are in play. Going forward, tariffs will be applied in the following priority order: Section 232 tariffs on autos and auto parts come first, followed by Section 232 tariffs on steel and aluminum, and finally, any tariffs imposed under the International Emergency Economic Powers Act (IEEPA), including those targeting imports from Canada and Mexico tied to border security and fentanyl-related concerns.

For now, the United Kingdom has been given a temporary break from the 50% tariff and will continue under the 25% rate until at least July 9, when the exemption will be reviewed. After that date, the administration will consider revising the rate or implementing quota-based restrictions. Other countries could see similar changes depending on future negotiations or policy shifts.

On Fly-in, NADCA Lobbies for Senate Action on House-Passed Tax Bill

In June 2025, nearly thirty NADCA members traveled to Washington, D.C. for meetings with their Senators and Representatives calling for action on tax legislation to make permanent R&D expensing, 100% bonus depreciation, and several other key provisions.

After a razor-thin 215-214 vote in the House on May 22, 2025, the Senate has begun action on the One Big Beautiful Bill Act (H.R. 1), a sweeping budget reconciliation package. Passed strictly along party lines—without any Democratic support and despite opposition from two Republicans—the bill combines tax and spending measures alongside a hefty $4 trillion boost to the federal debt ceiling.

This package revisits key elements from the 2017 Tax Cuts and Jobs Act (TCJA), many of which had expired or were close to expiring. It reinforces several tax policies critical to the manufacturing sector and aligned with priorities championed during the Trump administration, while also boosting funding for defense and border security.

Highlights of the House-Approved Tax Measures:

- Bonus Depreciation Extended: The 100% bonus depreciation allowance now runs through 2029, retroactive to January 1, 2025. This provision lets businesses immediately write off the full cost of qualifying capital investments—helping improve cash flow and encouraging long-term investment.
- R&D Expense Deductions Restored: Full expensing for research and development expenses is reinstated through 2029 by removing the previous requirement to amortize these costs over time. This is designed to accelerate innovation and help U.S. firms stay competitive in advanced tech sectors.
- Interest Deduction Rules Adjusted: The calculation for interest deductions shifts back to an EBITDA basis, effective retroactively from January 2025, while raising the gross receipts limit from $31 million to $100 million. This change is intended to lighten the tax load on businesses by better reflecting their operational realities.

- New Production Property Incentive: A landmark 100% depreciation benefit is introduced for qualified production property built between January 20, 2025, and December 31, 2028, with assets placed in service by the end of 2032. This targets manufacturers directly, encouraging investment in facilities and equipment.
- Pass-Through Deduction Made Permanent: The Section 199A deduction for pass-through businesses becomes permanent, with the maximum deduction increased to 23% of qualified business income—offering small and medium-sized businesses greater certainty.
- Expanded Small Business Benefits: Section 179 expensing limits rise to $2.5 million with phase-outs starting at $4 million, and the gross receipts threshold jumps from $25 million to $80 million—broadening eligibility for simplified expensing.
- Estate and Gift Tax Changes: Estate and gift tax exemptions are permanently raised to $15 million starting in 2026, adjusted for inflation, impacting wealth planning for high-net-worth families.
- Education and Workforce Support: Pell Grant eligibility expands in July 2026 to include short-term workforce credentials, 529 plans are widened to cover qualified postsecondary credentials, and Section 127 employer education assistance—including tax-free employer student loan payments—is permanently extended with inflation adjustments. These moves underscore a commitment to workforce development.

Senators are reportedly considering extending key provisions like bonus depreciation, R&D expensing, and the EBITDA interest deduction beyond the five-year window laid out by the House—potentially making them permanent or extending them for up to a decade. NADCA is calling on Congress to make those three provisions permanent and met with lawmakers and aids as part of the association's annual June fly-in event.

Trump Signs CRA Resolutions Rolling Back California Emission Waiver

On June 12, 2025, President Donald Trump signed three Congressional Review Act (CRA) resolutions nullifying key Environmental Protection Agency waivers that had granted California the authority to enforce its own vehicle emission standards. Among the policies overturned were California's Advanced Clean Cars II program, which mandated that all new passenger vehicles sold by 2035 be electric or hybrid, as well as regulations targeting emissions from trucks and heavy-duty vehicles. These state-level standards had also been adopted by 11 other states.

The Trump administration justified the move as a corrective action to support U.S. auto and trucking industries, which it argued were being unfairly burdened by having to comply with a fragmented regulatory environment. President Trump described the California waiver as a "disaster," asserting that automakers were being forced to manufacture vehicles for "two countries."

California, joined by ten other states, have already filed lawsuits arguing that CRA resolutions cannot be used to revoke Clean Air Act waivers, which are specifically authorized by statute and historically independent of Congressional disapproval processes.

Trump Administration Pulls Back Climate Considerations from Federal Environmental Reviews

On May 28, 2025, the Council on Environmental Quality (CEQ) officially rescinded its interim guidance on factoring greenhouse gas emissions and climate change into National Environmental Policy Act (NEPA) reviews. This guidance, first introduced in January 2023, aimed to help federal agencies evaluate the climate impacts of major government projects.

This step is part of the Trump administration's ongoing effort to reduce regulatory hurdles and speed up project approvals, under the banner of Executive Order 14154, titled Unleashing American Energy.

Earlier this year, on February 25, CEQ also repealed its NEPA regulations and told agencies to return to using their own NEPA procedures. Agencies now have until February 19, 2026, to update or create new processes that comply with the NEPA law and the new executive order. Until then, they'll continue operating under their existing rules, as long as those align with federal requirements.

The withdrawn guidance had suggested agencies focus only on "reasonably foreseeable" environmental impacts, which some critics say could narrow the scope of climate-related review. It also recommended that environmental justice analyses be excluded from NEPA reviews unless explicitly mandated by law.

Supreme Court Tightens Environmental Review Rules Under NEPA

On May 29, 2025, the U.S. Supreme Court delivered a unanimous decision reshaping how federal agencies evaluate environmental impacts under the National Environmental Policy Act (NEPA). The ruling clarifies that agencies must focus solely on the direct and immediate environmental effects of a project itself, rather than expanding their review to include related upstream or downstream activities.

This ruling arose from the case Seven County Infrastructure Coalition v. Eagle County, which involved a proposed 88-mile railroad intended to transport waxy crude oil from Utah's Uinta Basin to broader rail networks. The Court held that the Surface Transportation Board was not required

to assess the environmental consequences of oil extraction or refining connected to the rail line — limiting the scope strictly to the railroad project.

Justice Brett Kavanaugh, writing for the Court, emphasized NEPA's role as a procedural checkpoint rather than a broad environmental mandate: "NEPA requires agencies to focus on the environmental effects of the project at issue... the Board's environmental impact statement needed to address only the effects of the 88-mile railroad line — and it did."

He further noted that NEPA is designed to inform federal decisions, not to serve as a barrier. The ruling effectively narrows the environmental scrutiny required in NEPA reviews, potentially streamlining approvals for large infrastructure and energy projects moving forward.

EPA Pushes Back Deadline for PFAS Reporting, Giving Manufacturers More Time to Comply

The Environmental Protection Agency (EPA) has announced a delay in the deadline for manufacturers and importers to report information on Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) under the Toxic Substances Control Act (TSCA). This interim final rule, released on May 13, 2025, adjusts the timeline for data submissions to help companies meet the complex reporting requirements.

Originally introduced in October 2023, the rule requires businesses handling PFAS to provide detailed annual data from 2011 through 2022. This includes information on exposure risks, environmental effects, and potential health impacts. However, as the EPA prepared to roll out the reporting platform, it became clear that manufacturers and importers would benefit from more time to gather and submit comprehensive data. The agency also decided to reopen parts of the rule for public input to ensure thorough regulatory oversight.

With these considerations in mind, the EPA now sets the reporting window from April 13 to October 13, 2026. For small manufacturers who import PFAS contained in finished products (articles), the deadline is extended further to April 13, 2027. This extension aims to ease administrative pressures and promote full compliance across the industry.

The rule covers PFAS substances manufactured or imported for commercial use anytime between January 1, 2011, and December 31, 2022, including:

- PFAS intentionally made for industrial uses, consumer goods, or commercial products
- Byproducts and impurities containing PFAS, even if not deliberately produced
- PFAS incorporated into finished goods like textiles, coatings, and packaging
- Intermediates and maintenance chemicals involved in manufacturing but not necessarily found in the final product

To clarify what qualifies as PFAS, the EPA defined these substances by their molecular structure, focusing on chemicals containing at least one fully fluorinated carbon atom. This includes specific chemical arrangements such as:

- R-(CF2)-CF(R^{I})R^{II} (where both CF2 and CF are fully saturated carbons)
- R–CF2OCF2-R^{I} (with R and R^{I} being fluorine, oxygen, or saturated carbons)
- CF3C(CF3)$R^{I}R^{II}$ (where R^{I} and R^{II} can be fluorine or saturated carbons)

Common examples covered include perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), GenX substances, and fluoropolymers like polytetrafluoroethylene (PTFE), widely used in industrial coatings.

Under this rule, manufacturers and importers must disclose extensive details such as the identity and chemical structure of each PFAS, production volumes, processing methods, and how these substances are applied industrially or in consumer products. They also must report disposal practices and assess environmental impacts, including the persistence of PFAS in soil, water, and air. Furthermore, information about workplace exposure and potential health risks to employees is required to help regulators evaluate safety concerns.

The EPA is currently accepting public comments on these revised deadlines and the rule's provisions. The agency plans to review all feedback before the reporting period kicks off, allowing for any necessary adjustments to the requirements.

EPA Pushes Back Reporting Deadline for Key Chemicals Under TSCA

On June 9, 2025, the U.S. Environmental Protection Agency (EPA) announced it's giving manufacturers and importers more time to submit critical health and safety data on 16 high-priority chemicals. Originally, these reports were due in stages throughout 2025, but now all submissions must be in by May 22, 2026.

This reporting is part of the EPA's effort under the Toxic Substances Control Act (TSCA) to better understand and manage the risks these chemicals may pose. Back in December 2024, the agency finalized a rule requiring companies to provide unpublished studies covering health effects, safety, environmental impacts, and exposure information for certain industrial chemicals.

The list includes substances commonly used in manufacturing, such as benzene, styrene, hydrogen fluoride, vinyl chloride, and bisphenol A—chemicals often found in metalworking fluids, sealants, degreasers, and coatings.

Earlier this year, the EPA set separate deadlines to ease the reporting burden: vinyl chloride reports were due June 11, 2025, and the rest by September 9, 2025. But now, with this extension, all reporting deadlines are merged into one, giving companies more breathing room to gather and submit thorough information.

The EPA says this move is "prudent" and meant to ensure better quality data to support its chemical risk assessments and safety decisions. The agency is also working on finalizing guidance to help companies submit their reports correctly, especially when it comes to protecting confidential business information. That guidance is expected soon.

USTR Announces New Port Fees Targeting Chinese Shipping and Shipbuilding

On April 17, 2025, the Office of the U.S. Trade Representative (USTR) unveiled a new port fee structure aimed at addressing unfair trade practices in China's shipbuilding industry. The measures include tonnage-based fees on vessels owned or operated by Chinese entities, levies on ships constructed in China, and charges on certain foreign-built car carriers.

These actions follow the conclusion of a year-long investigation conducted under Section 301 of the Trade Act of 1974. The investigation found that China's shipbuilding policies and practices are "unreasonable" and place a burden on U.S. commerce. In response, USTR recommended countermeasures to mitigate the harm to the U.S. maritime and manufacturing sectors.

Beginning October 14, 2025, ships owned or operated by Chinese companies will be subject to a fee of $50 per net tonnage, with an annual increase of $30 per ton over the next three years. Separately, vessels built in China—regardless of ownership—will incur fees of $18 per net tonnage or $120 per container, with those rates also scheduled to rise each year for three years.

The new fee structure reflects a broader strategy by the administration to confront China's industrial overcapacity and protect U.S. strategic sectors from foreign subsidization and market distortion.

Study on the Use of Sensor-Derived Parameters on the Injection and on Other Components of an HPDC Machine for the Purpose of Predictive Maintenance

Paolo Catterina
Visi-Trak Worldwide LLC
Valley View, Ohio

Luca Metalli
Gefond srl
Milan, Italy

Tiziana Tronci
Gefond srl
Milan, Italy

Abstract

The production of constant quality castings on a HPDC machine is strongly determined by the state of efficiency of many components directly dependent from the full control of the injection parameters.

The maintenance activities that contribute to the repeatability of the injection parameters are crucial for this goal.

Among others, the state of the accumulator cylinders and of the injection cylinder, the tightness of the nitrogen pressure and the temperature of the hydraulic fluid are important indicators of the perfect hydraulic and mechanical efficiency of the injection system.

The presence of sensors on all these components allow to perform precise data collection, data that are used to feed special machine learning algorithms that are thus able to predict system drifts.

The research started from this assumption and allowed to structure algorithms that maintain real-time monitoring of some of these predefined parameters: 2nd-phase oil pressures, 3rd-phase oil pressures, 2nd-phase nitrogen pressure, 3rd-phase nitrogen pressure, hydraulic circuit oil pressure, hydraulic fluid temperature.

Using Artificial Intelligence models to identify abnormal behavior, through the Perpetuo system developed by Gefond, data collected from sensors installed on the equipment or from machine PLCs were transformed into meaningful information used for predictive maintenance of mechanical, electrical, hydraulic and pneumatic parts subject to wear and tear or failure. The same system, also feeded by parameters acquired from Visi-trak's monitoring software, provided additional and more accurate information with the purpose of ensuring repeatability and predictive control of machinery and process.

The analysis procedure was done directly on the field over a technically complex production.

This was useful to identify suitable sensors in terms of resolution and acquisition speed. The project also led to the definition of a network architecture for data collection and to the construction of the most suitable tools for the pre-analysis.

The collected data were used for training the analysis algorithms and detecting the false positives in the starting phase of the project.

At the end of the training, the predictive maintenance algorithms identified anomalies in the integrity of the hydraulic systems, which affected the injection parameters.

Predictive Maintenance & Industry 4.0

Predictive maintenance (PdM) is based on condition-related monitoring to optimize the performance and life of components by continuously evaluating their status in real time.

By collecting data from sensors and applying machine learning tools and processes, predictive maintenance can detect and identify problems as they occur, predicting the evolution of equipment failure and therefore reducing risks to quality and production.

The 4.0 factory develops thanks to innovative and technological systems, which collect and analyze data using Artificial Intelligence algorithms. Predictive maintenance is intelligent maintenance capable of predicting what will happen in the future, based on precise parameters coming from the machinery.

In the modern manufacturing industry, the maintenance of production plants is no longer limited to the scheduled replacement of worn components but becomes part of the production strategy supported by mathematical models that support maintainers in adopting a new data-based approach. The predictive business approach reduces the frequency of costly unexpected downtime, improve profitability, offer better service levels, improve safety and environmental performance.

With the appropriate IT systems, predictive maintenance allows, in fact, to make strategic choices also in terms of selection of spare parts, more appropriate technologies, more convenient production plans, effectively extending the life of the goods and systems themselves.

The presented project is tied to an artificial intelligence software (Perpetuo by Gefond) for predictive maintenance, intuitive and easy to use, created in the foundry for the foundry, capable of communicating with any machine and peripheral of the die casting cell.

PDM Applied to HPDC

How can PdM improve the die casting process?

***Figure 1** – Analysis was done on key parameters listed here.*

There are many applications in the monitoring of die casting systems, for this study we focused on the parameters, which most of all, influence the quality of the castings produced: the parameters linked to the injection of the press.

Specifically, the analysis was led on: 2nd phase nitrogen pressure, 3rd phase nitrogen pressure, 2nd phase oil pressure, 3rd phase oil pressure, hydraulic oil temperature, cooling water temperature, vibrations on the engine of the hydraulic pump and hydraulic circuit pressure.

Let's see specifically how the analysis was conducted and what results, in terms of predictions, we obtained.

2nd Phase Nitrogen Pressure

- ✓ 2 pressure transducers with full scale at 600 bar
- ✓ 10 Hz sampling rate
- ✓ Identify progressive leaks
- ✓ Spot Instant Leaks

For the predictive analysis on the nitrogen and 2nd phase oil pressure, 2 pressure transducers with a full scale of 600 bar were used to compensate any pressure peaks.

The sampling frequency was set at 10 Hz to compensate for the high rate of change of the parameters under analysis.

As you can see in the picture, the system correctly identified and reported 2 different, and important, anomalies but both the target of the analysis.

A progressive loss of nitrogen at point 1 and an instantaneous loss at point 2 are clearly visible.

The Machine Learning system reported the loss at point 1 in advance and identified the loss at point 2, it is obvious that the loss at point 2, being instantaneous, is not predictable.

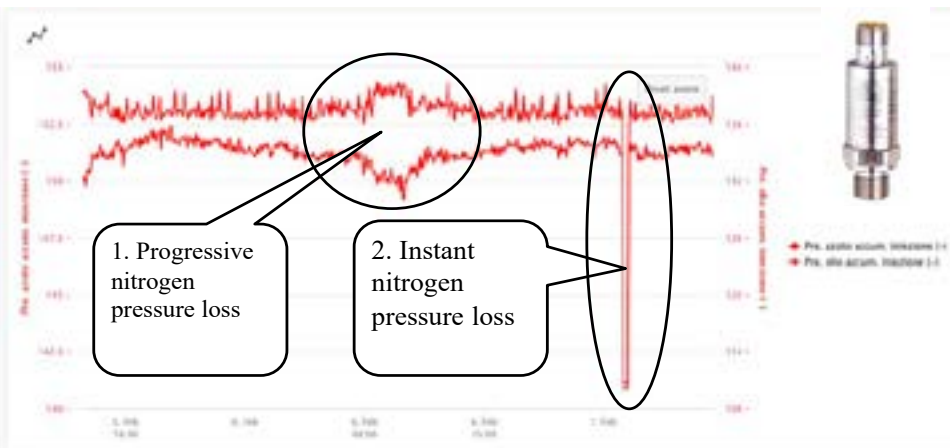


***Figure 2** – Nitrogen and 2nd phase oil pressure.*

3rd Phase Nitrogen and Oil Pressure

- ✓ 2 pressure transducers with full scale at 600 bar
- ✓ 10 Hz sampling rate

***Figure 3** – Nitrogen and 3rd phase oil pressure*

The sensors and analysis parameters are the same used for the analysis of the nitrogen and oil data of the 2nd phase.

Example 1 shows the data recorded following a hydraulic fault, the system has detected and reported a malfunction in the loading valve of the 3rd phase accumulator, a complex fault because it occurs in a non-continuous manner and therefore alternating waste pieces and compliant pieces.

In the highlighted case 1 we correlated the data coming from 4 identical presses so as to feed the Machine Learning systems with a greater number of data, in this case the system did not report the high temperature (always below 45° places as a limit) but that only one press had a higher temperature than the others for the same production.

Hydraulic fluid temperature

- ✓ Temperature sensors with a range from -10° to +100°
- ✓ 1 Hz sampling rate
- ✓ Avoid overtemperatures that lead to premature aging of the hydraulic oil

***Figure 4** – Analyzing hydraulic oil temperatures.*

For the analysis of hydraulic oil temperatures, sensors with a working range from -10° to +100° were used, values well above the normal accepted working temperatures and therefore capable of detecting anomalous values. The sampling frequency of the data was set to 1 Hz as the temperature variations on such high volumes occur rather slowly.

The problem was later identified as a loss of performance of the heat exchanger which was replaced before it triggered more serious problems.

Cooling Water Temperature

- ✓ Temperature sensors with range from 0° to +50°
- ✓ 1 Hz sampling rate
- ✓ Measures heat exchanger efficiency

***Figure 5** - Measuring the efficiency of the heat exchanger.*

Following the problem illustrated in the previous section we moved on to measure the efficiency of the heat exchanger by positioning a temperature sensor on the water and oil outlets. The temperature delta allowed us to identify and measure the efficiency of the heat exchange following blockages or deposits in the exchanger. At point 1 you can see the progressive increase in the temperature of the water leaving the heat exchanger due to limestone deposits on the first plate, the system signaled the exceeding of the maximum threshold with a 7-day warning.

The sensor also measures the external temperature so to compensate for seasonal thermal variations, which are very evident in die casting foundries.

The sampling rates used in this case are much higher than the previous examples because the frequency responses are very fast.

In the case shown we see the thermal behavior of the motors of 4 presses, here again we make use of the comparison of similar data between similar machines to accelerate the training of the Machine Learning systems, where one of the motors increased its temperature following the failure of the cooling fan, the system reported the anomalous value well in advance.

Engine and Hydraulic Pump Temperature

- ✓ Vibration & Temperature Sensors
- ✓ 100 Hz sampling rate
- ✓ Measuring Heat Stress

***Figure 6** - Engine and hydraulic pump temperatures.*

The electric motor, and the hydraulic pump connected to it, are 2 elements subjected to a strong operating stress. To keep its operation monitored, we have applied a vibration and temperature transducer in the motor area near the bearing connected to the pump.

The effect of the repair is also very evident in the graph, which brought the temperature values close to those of the other DCMs.

Hydraulic Circuit Pressure

- ✓ 1 pressure transducers with full scale at 250 bar
- ✓ 10 Hz sampling rate
- ✓ Identify pump and hydraulic anomalies

***Figure 7** - Hydraulic circuit pressure.*

Another relevant parameter is the general pressure of the hydraulic circuit; we know that the maintenance of the movement speeds of the DCM and the repeatability of the injection parameters depend on this pressure. For data collection, a pressure transducer with a full scale of 250 bar and an acquisition frequency of 10Hz was used. In the upper graph a progressive loss of pressure in the circuit is clearly put in evidence, the image clearly shows us a reduction in the pressure values coming out of the hydraulic pump unit. The system detected the variation identifying it as an anomaly, in this case the problem was not linked to a failure of the pump itself but to a hydraulic leakage on the mold locking cylinders which caused a generalized loss of the DCM's ability to finish the cycle within expected times and with non-constant injection parameters.

Case Study: Real Data from a Die Casting Foundry

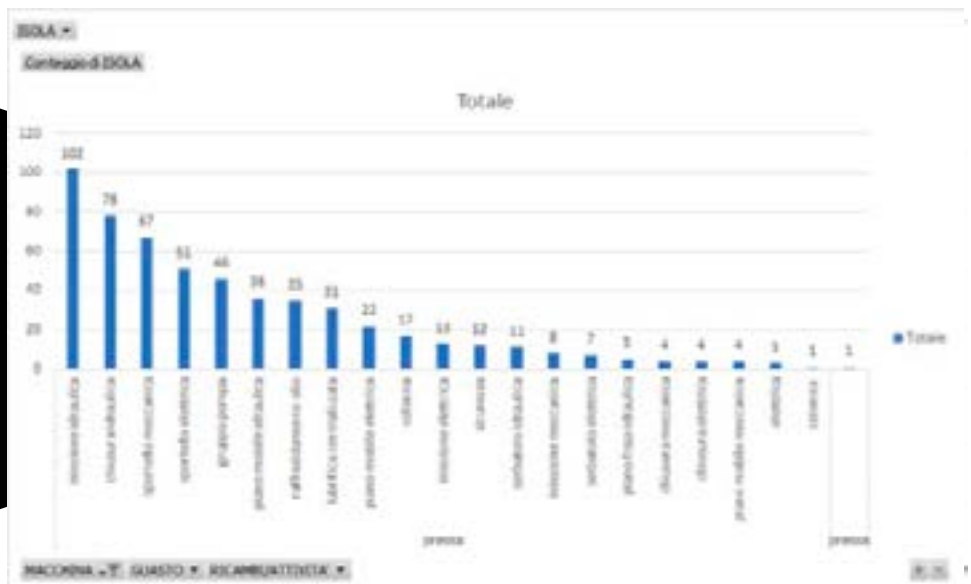
The case study we are going to present is the practical example of the application of a predictive maintenance project, the example refers to a die-casting foundry with 14 different tonnage presses and construction period, therefore very different technological levels from plant to plant.

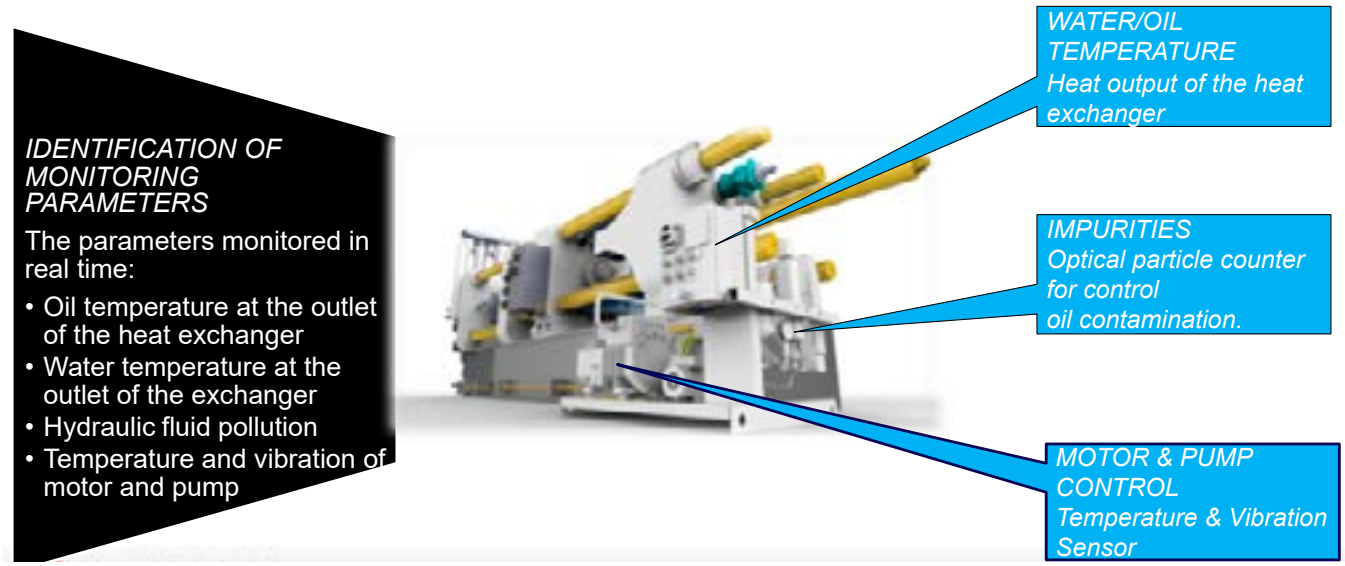
An initial analysis of faults over a period of 31 months revealed a large number of hydraulic problems: high-pressure hydraulic hoses, valves and o-rings were subject to numerous failures.

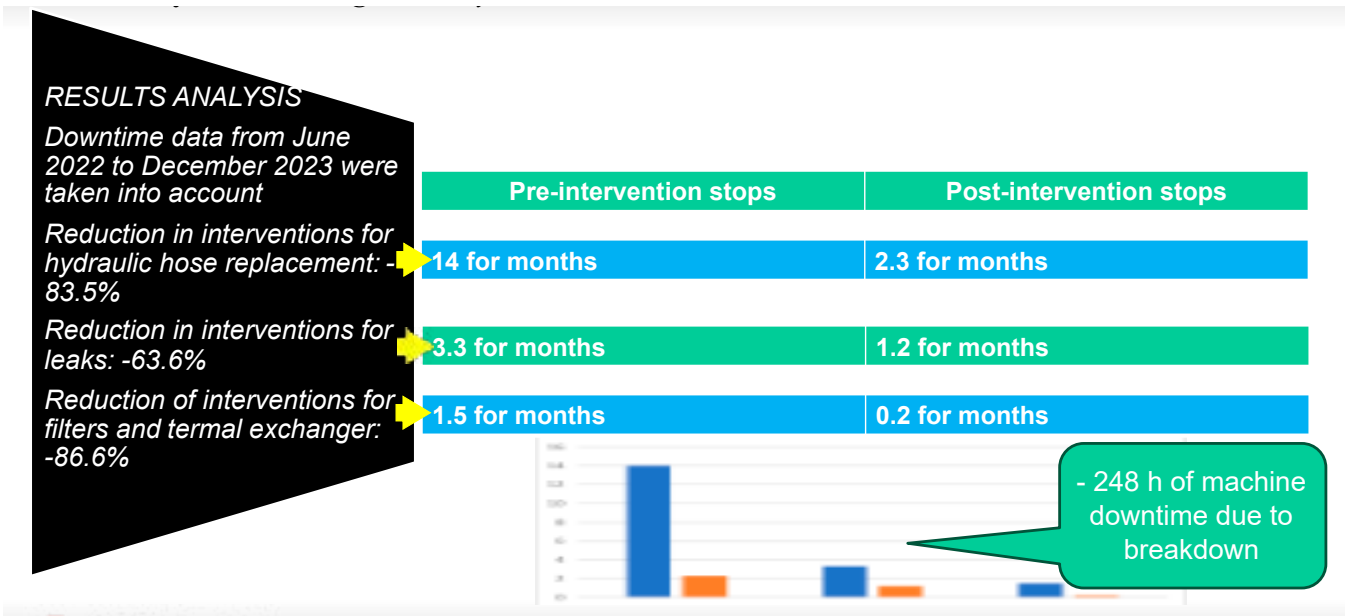
A technical analysis showed that the origin of these issues was related to the management of the hydraulic fluid, mostly related to the too high working temperature which, as this is well known, can lead to an increase in corrosion of the components.

ANALYSIS OF DOWNTIME FAILURES

- Presses 1 to 14, clamping force from 750 to 1650 tons, age of plants from 1995 to 2018 were taken into account
- For a period from May 2019 to December 2021.







The technical activity carried out consists in the installation of temperature sensors for oil and water on the heat exchangers, an optical sensor to evaluate the contamination of the oil (wear of pipes and o-rings could increase pollutants) and a temperature and vibration sensor on the hydraulic pump unit.

These 4 data are important for the analysis and for predicting the drifts of the parameters involved as the origin of the failures.

After 6 months, necessary for the training of the machine learning system, the software began to report the drifts in the controlled parameters, allowing us to organize the necessary interventions.

The upper diagrams show evidence of the the results of the activities carried out:

Summary of Numerical Results

- 83% reduction in pipe replacement interventions, going from 14 interventions per month to 2.3.
- 83% reduction in pipe replacement interventions, going from 14 interventions per month to 2.3.
- 83% reduction in pipe replacement interventions, going from 14 interventions per month to 2.3.
- 83% reduction in pipe replacement interventions, going from 14 interventions per month to 2.3.
- 63% reduction in oil leak interventions, from 3.3 interventions per month to 1.2.
- 86% reduction in interventions for the replacement of filters and heat exchangers, going from 1.5 interventions per month to 0.2.

The improvement in the management and prevention of breakdowns has resulted in a total saving of 248 hours of production.

Conclusions

The systematic application of predictive maintenance processes offers significant advantages in the die casting process, both in terms of reducing downtime and maintaining quality.

Economic investment has a short payback period if an initial analysis is carried out that can identify the real problems and have a greater impact on production.

On a technical level, the networks and sensors are suitable for the heavy work of the foundry, guaranteeing reliable and continuous data.

The sensors, which are often already present in die-casting cells, help understand the condition of the various components in real time. This makes it possible to arrange any measures and organize maintenance before the fault occurs. Analyzing data collected in real time has a strategic importance when it comes to identifying undesirable performance in mechanical, electrical, hydraulic and pneumatic parts subject to wear or faults.

In short, predictive maintenance is no longer a possibility, but a reality for die casting foundries.

References

1. *Bonollo F., Gramegna N., The MUSIC guide to key parameters in HPDC, Assomet, Milano, 2014.*
2. *Bruna M., Mednansky M., Matejka M., Podprocka R., Influence of HPDC Process Parameters on the Microstructure of EC Electromotor Housing, Metals, 2023.*
3. *Gramegna N., Bonollo F., Smart Control and Cognitive System applied to the HPDC Foundry 4.0, Assomet, Milano, 2014.*
4. *Gramegna N., Salata A., New developments in HPDC foundry digitalization focused on process control and ZDM, Futurities, 2022.*
5. *Herman E.A., Die Casting Process Control, NADCA, 2012.*
6. *Fanelli S., Piccininni A., Guglielmi P., Cafagna S.,Influence of the target data in the accurate prediction of the maintenance operation for a HPDC press machine, Procedia Computer Science, Volume 217,2023,*
7. *Roosefert Mohan, T., Preetha Roselyn, J., Annie Uthra, R., LSTM Based Predictive Maintenance Approach for Zero Breakdown in Foundry Line Through Industry 4.0. In: Kumar, H., Jain, P.K., Goel, S. (eds) Recent Advances in Intelligent Manufacturing. ICAME 2022. Lecture Notes in Mechanical Engineering. Springer, Singapore.*

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Predictive Die Casting Gating Using Geometric-Based Modeling

C.A. Monroe
Tuscaloosa, Alabama

Zhen Yeng
University of Alabama
Tuscaloosa, Alabama

Abstract

This study extends our previous work on geometric thickness identification using the CastView approach, focusing on developing a robust heuristic for automated gate generation in casting geometries. A Python script, accessible via Google Colab and built upon an open-source, lightweight code base, performs thorough geometric analysis on STL files to generate gate data. Leveraging libraries such as Open3D, SimpleITK, SciPy, and Blender's bpy, the script employs voxel meshing, 3D image processing, distance field calculations, watershed segmentation, parting line analysis, and gate analysis to facilitate predictive die casting gating. The generated gate data is then used to set up a fluid simulation in Blender, with sample results demonstrated. By implementing this process, engineers can optimize processing parameters to improve casting quality and reduce defects. Compared to traditional CastView solutions, which relied on manual gate identification and provided only qualitative feedback on filling problems, our enhanced approach closes the loop by automatically generating gates that can be fed into any flow solver, enabling a more comprehensive and quantitative assessment of casting performance. Moreover, this approach offers flexibility in exploring alternative gating options, guided by modifying the watershed segmentation method, minimum gate areas, and typical production estimates (e.g., gate speed, fill time), allowing designers to evaluate multiple gating scenarios and identify the most suitable solution for their specific needs.

Introduction

At the prior congress, an updated open-source Python solution for using a geometric approach to die casting part design was reviewed. The original CastView code, which had continued support until Windows 7, was developed using an integrated graphical user interface (GUI) that made it difficult to migrate to future code libraries. In fact, no option existed to run the original CastView code without also running the GUI system powering it. However, this limitation was overcome when the 3D image analysis approach was reimplemented in Matlab several years ago, utilizing image processing libraries and removing the need for a GUI. This change enabled easier maintainability and extensibility of the code. Moreover, an even better opportunity existed to port this code to Python, which would enable open-source platform compatibility as well as ties to the latest developments in machine learning and optimization routines. The basic logic and visualization of thick, thin, and die thin sections were showcased at the prior congress, demonstrating the potential of this approach for die casting part design. One significant limitation of the original CastView code was its inability to analyze gating systems, a critical aspect of die casting part design. While it could provide some qualitative information about filling patterns using ray tracing, identifying gates remains a heavily researched and discussed topic in the field. The approach presented below aims to address this limitation by developing an entirely geometrically driven method for locating gates that is also parametrically defined.

A well-designed gate in die casting is crucial for producing high-quality, defect-free parts. Key principles include positioning the gate to minimize the flow length of molten metal, ensuring uniform filling, and avoiding areas prone to rapid cooling or turbulence[1]. The gate's size and shape should balance smooth metal flow while avoiding flash and minimizing cycle time[2]. Furthermore, the gate must facilitate directional solidification from the thinnest to the thickest sections to mitigate shrinkage defects[3]. Proper venting is essential to prevent porosity, and the design should ensure easy part ejection to avoid damage[4]. Designing a gating system involves determining the parameters for gates, runners, runner-gates, and overflow wells based on established criteria. Traditionally, die designers rely on their expertise to manually calculate these parameters and create gating element geometries, resulting in lengthy lead times and heightened costs due to iterative modifications. Consequently, there's an increasing industry demand for computer-aided automated or semi-automated die-casting die design approaches to streamline processes and enhance efficiency. Recently, gating design has advanced through the utilization of computer-aided engineering software such as AnyCasting. This software optimizes gate and runner design by conducting filling analysis to determine gate size and location. Modifications to the gate and runner systems, alongside overflow configurations, aim to reduce internal porosities caused by air entrapments. Solidification analysis aids in predicting and addressing internal porosities resulting from solidification shrinkage[5].

A recent study explores simulating molten metal flow in the runner and gating system of pressure die casting using network analysis. This approach incorporates finite elements to analyze piece deformation, followed by an abductive network for deformation prediction, ultimately aiming to identify the optimal gate position[6]. In other research, gating design involves utilizing parametric design techniques. Pre-existing solid models of gating elements are stored in

a system database, then retrieved and adjusted based on specified parameters and locations. These adjusted models are then integrated with the die-casting part[7]. Alternatively, a system employs input information encompassing part details, process parameters, machine specifications, and material data. It utilizes this information to determine die-casting process parameters, calculate gating system parameters, and generate CAD models of the gating system[8]. In parallel, researchers explored computer-assisted geometric modeling techniques to improve the design and analysis of gating systems in castings. Addressing the limitations of existing computer programs, researchers aimed to develop improved methodologies to meet the requirements of effective gating system design[9].

In the realm of geometric-based modeling methods, geometric programming emerged as an innovative mathematical tool for riser design, providing generalized solutions that were previously unattainable. These solutions were found to be on par with existing methods while offering simplified approaches for dimensioning risers. Expanding on this development, further research utilized geometric programming to assess how solidification times affect riser shape[10]. By establishing mathematical relationships between riser height and diameter, these studies facilitated the easier determination of optimal riser dimensions[11]. The analysis of modern gating systems can be costly in terms of both engineers' time and software expenses, often leaving simple heuristics insufficient. This limitation restricts the consideration of all possible gating system options. Therefore, the proposed approach provides a faster and potentially automated solution for exploring new heuristics based on good gate design requirements, providing engineers with a wider range of gating system choices for in-depth examination.

Algorithm and Implementation

This study presents a Python script in Google Colab that leverages voxel meshing and 3D image processing techniques to perform comprehensive geometric analysis on STL files, a widely used format for 3D geometry representation. The script combines several libraries, including Open3D[12], SimpleITK[13], SciPy[14], and Blender's bpy[15] to enable tasks such as voxelization, distance field calculations, watershed segmentation, parting line analysis, gate analysis and injection flow simulation. The objective is to extract valuable information from geometry and generate gate of casting geometries.

The workflow depicted in the Figure 1 outlines the algorithm for designing gates in the die casting process. The process begins by loading an STL file of the geometry and converting it into a voxel representation, where the geometry outside is represented as 0 and the inside as 1. Through a projection method, the voxelized geometry facilitates the identification of the parting line in the mold's separation direction, which is defined in the z direction for this code. Following this, a distance field is generated based on the voxelized geometry to identify thick areas. Using this distance field, watershed segmentation is performed to delineate distinct regions of the geometry. The thick areas and watershed segmentation are then used to locate the injection plane. The injection plane is determined from one of the 4 remaining planes orthogonal to the mold separation direction. Continuing from the defined mold separation z direction, then the 4 remaining planes include the xz, -xz, yz, and -yz planes. This choice is not unique and other optimized injection directions could be fruitful future work. However, using a simple heuristic, the final choice of injection plane is narrowed to the plane which is parallel to the longest edge of the bounding box in this orientation and finally to the edge that is closest to the maximum thickest section of the geometry. Subsequently, the injection parting line is determined based on the geometry's overlapping area between parting line and the injection plane, ensuring optimal flow direction and location into the geometry. Gates are then created by evaluating the volume of the geometry. The objective of finding the geometry of the gate is to determine the area of the gate on these locations. Using assumed gate speed, filling time, and total volume the target volumetric flow rate and thus total gate area can be determined. Then the proportion of gate area that should be attributed to an identified location on the parting line is found by calculating the proportion of the connected segment volume. An injection flow simulation is conducted to predict and mitigate potential issues, culminating in a design ready for the high-pressure die casting process. The code for this project can be accessed through the link[16]. An overview of the code will be discussed below to explain the various code blocks that are given for the geometric analysis.

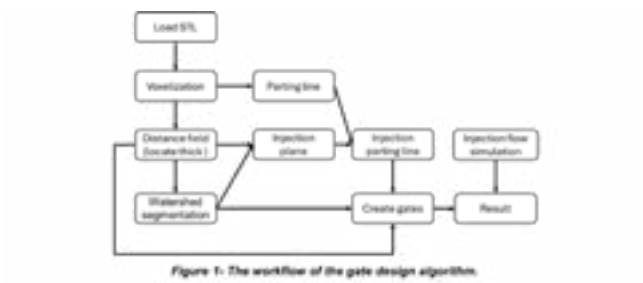

***Figure 1** – The workflow of the gate design algorithm.*

Voxelization of Geometry

Voxelization is the process of converting geometric shapes or continuous representations into a discrete grid of volumetric pixels called voxels. By dividing space into small, uniform voxels, voxelization enables efficient storage, manipulation, and rendering of complex 3D data. Each voxel usually denotes a small segment of the original object, facilitating precise spatial depiction and analysis, which is crucial for generating further distance fields. In geometry voxelization, the resolution of voxels is vital for achieving precise depiction. To establish the voxel resolution based on the demonstration of the I-beam geometry, as shown in Figure 2a, the size of the geometry's outermost structure is initially ascertained by evaluating its maximum and minimum coordinates. Following this, the most significant dimension of this outer structure is divided by the element count (referring to the quantity of elements partitioned in this direction), as illustrated in Figure 2b, thereby yielding the voxel resolution for the analysis.

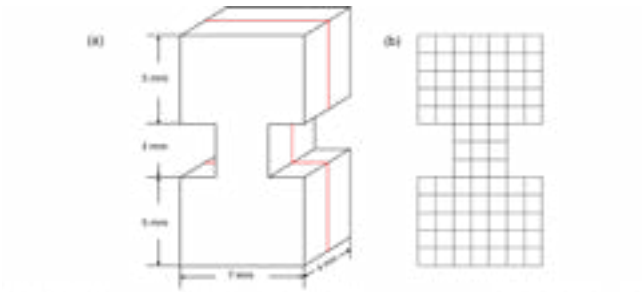

***Figure 2** – (a) I-beam geometry, (b) Voxelization of the I-beam center cross-section (red color plane, width = 2mm), utilizing section with element count set to 13, and employing a voxel size of 1mm by 1mm.*

Distance Field and Thick Area

In the realm of die casting solidification analysis, a comprehensive method involves employing the geometric approach. This technique leverages the Euclidean distance transform (EDT), which generates a distance field extending from the surface of the voxelated geometry all the way to its central point. This distance field, demonstrated by the demo I-beam cross-section in Figure 3a, captures the spatial relationships within the geometry. The distance field essentially serves as a visual representation of the solidification sequence across various regions within the casting[17]. Within this methodology, the maximum distance observed within the geometry corresponds to the last areas to solidify, commonly known as the "thick areas" in the die casting process, are depicted by the red area in Figure 3b. These regions represent the final stages of solidification, providing crucial insights into the overall cooling and solidification progression of the casting.

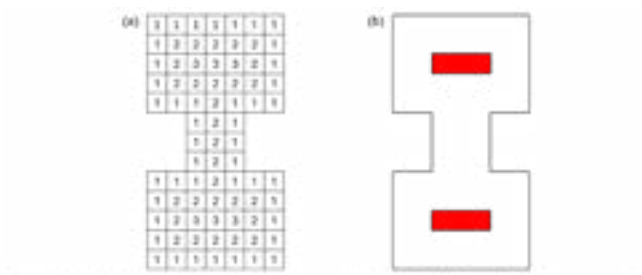

***Figure 3** – (a) The distance field of the I-beam cross-section, (b) The thick area of the I-beam cross-section.*

Watershed Segmentation

The watershed segmentation technique uses the distance field to partition the geometry by focusing on its thicker regions, akin to valleys in the distance field of the geometry. Commencing the segmentation process involves initiating floods from these localized valleys, effectively outlining boundaries, by applying a watershed transform to the distance field, as depicted in Figure 4a, and segmenting the volume into discrete regions that correspond to distinct objects within the geometry, he segmentations as illustrated in Figure 4b. Leveraging the watershed segmentation method enables the simulation of the solidification process and provides valuable insights for subsequent considerations in gate design[18].

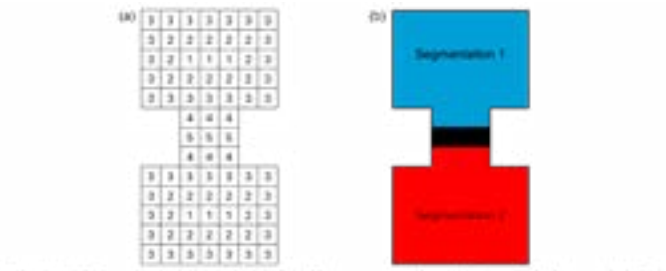

***Figure 4** – (a) The watershed distance field of the I-beam cross-section, (b) The watershed segmentation of the I-beam cross-section.*

The voxelization and distance field code has been reviewed before in the prior work19. However starting with the watershed analysis the code is new. This watershed segmentation function, as shown in Figure 5, utilizes the SimpleITK library to process medical image data. It begins by creating a binary threshold image to serve as a geometry mask. Then, it performs morphological watershed segmentation using a distance field image, marking watershed lines and setting a threshold level of 1. The pixel type of the watershed segmentation result is adjusted to match that of the geometry mask. Next, the geometry mask is applied to retain particular regions in the watershed segmentation output. Finally, the watershed segmentation image is converted into a NumPy array to facilitate subsequent gating analysis processing.

```
img_thresh = img_filled != 0
img_ws = sitk.MorphologicalWatershed(img_dist, markWatershedLine=True, level=1)
img_ws = sitk.Cast(img_ws, img_thresh.GetPixelID())
img_ws_mark = sitk.Mask(img_ws, img_thresh)
array_ws_mark = sitk.GetArrayFromImage(img_ws_mark)
```

***Figure 5** – Python code for distance field calculation in Google Colab.*

Injection Plane

In high-pressure die casting, positioning the gate near the thickest areas ensures efficient metal flow, heat retention, and proper filling under high pressure, reducing defects[20,21]. In this study, to determine the optimal injection direction, start from the biscuit location, ensuring it is positioned to create the shortest flow path and close to the thickest section. First, identify the boundary plane dividing the mold halves, then select the plane with the longest distance to guarantee a short injection path. The plane nearest to the thickest section will serve as the injection plane, as shown in Figure 6a. This plane, as illustrated in Figure 6b would locate on the biscuit and start injection process.

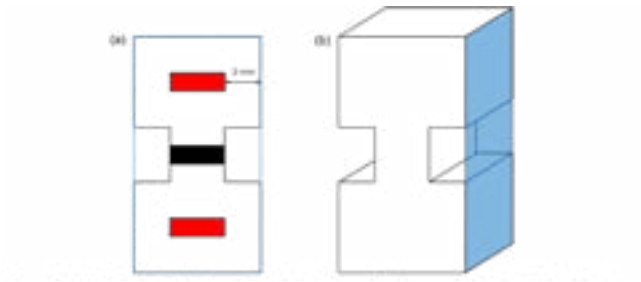

***Figure 6** – (a) Identifying the injection plane at the boundary of the I-beam cross-section. (b) The injection plane (highlighted in blue) of the I-beam geometry.*

Three functions are used to determine the injection plane. First, a function identifies the maximum thickness by analyzing both the input watershed segmentation and the distance field, as depicted in Figure 7. The function iterates through each segmentation, isolates it, and calculates the maximum value within the corresponding distance field, which represents the segmentation's thickness. For each segmentation, it records the segmentation identifier, the maximum thickness value, the count of non-zero elements within the segmentation, and the coordinates of the maximum thickness. After processing all segmentations, the function identifies the segmentation with the greatest thickness. It then filters these results to find the segmentation with the highest count of non-zero elements that also matches the maximum thickness value.

```
def find_max_thickness(array_ws_mark, array_dist):
    thick = []
    number_seg = np.max(array_ws_mark)
    for i in range(1, number_seg + 1):
        seg_i = np.where(array_ws_mark == i, array_ws_mark, 0)
        dis_i = np.where(seg_i == 0, 0, array_dist)
        thickness = dis_i[dis_i < 0].min()
        coords = np.argwhere(dis_i == thickness)[0]
        thick.append((i, -thickness, np.count_nonzero(seg_i), tuple(coords)))
    max_thickness = max(thick, key=lambda x: x[1])[1]
    max_thickness_arrays = [item for item in thick if item[1] == max_thickness]
    max_count_arrays = max(max_thickness_arrays, key=lambda x: x[2])
    return thick, max_count_arrays
thick_data, max_thickness = find_max_thickness(array_ws_mark, array_dist)
```

***Figure 7** – Python code for finding max thickness in Google Colab.*

Second, another function determines the injection plane based on the coordinates of maximum thickness in the x and y directions and the 3D geometry of the object, as illustrated in Figure 8. It first identifies the maximum indices for the y and x dimensions of the array. By comparing these dimensions, the function ascertains which axis is longer. This is the implementation of the heuristic described in the overview of the method. This is an arbitrary choice and could be replaced with other logic that is closer to the final value if known. The simplicity of this method also leads itself to optimization itself because the part geometry could be arbitrarily rotated to find the best orientation for the injection direction. Further research is required to validate this idea. If the y-dimension is longer, the function checks if the x-coordinate of the maximum thickness point exceeds half of the maximum x value to decide between the planes '-yz' and 'yz'. Conversely, if the x-dimension is longer, it verifies if the y-coordinate of the maximum thickness point is greater than half of the maximum y value to choose between the planes '-xz' and 'xz'. Finally, the function returns the appropriate plane name based on these evaluations.

```
def find_injection_plane(array, point):
    y_max, x_max = array.shape[0] - 1, array.shape[1] - 1
    if y_max > x_max:
        injection_plane_name = '-yz' if point[0] > 0.5 * x_max else 'yz'
    else:
        injection_plane_name = '-xz' if point[1] > 0.5 * y_max else 'xz'
    return injection_plane_name
injection_plane_name = find_injection_plane(array_initial, max_thickness[3][::2])
print(injection_plane_name)
```

***Figure 8** – Python code for finding injection plane in Google Colab.*

Third, in Figure 9, the function calculates the overlap area between 3D geometry and specified injection plane. The function employs predefined settings to generate a boundary mask for four possible planes: 'yz', '-yz', 'xz', and '-xz'. The mask is then iteratively shifted along its corresponding direction, and logical operations are performed to identify the overlapping regions between the shifted mask and the initial array. Subsequently, an erosion process is applied to the overlap area to ensure a minimum gate thickness, effectively removing regions that lack sufficient space for gate placement.

***Figure 9** – Python code for overlapping area finding in Google Colab.*

Injection Parting Line

In the casting process, the projection method is a fundamental technique used to identify the parting line, which separates the two mold halves. This method involves projecting the casting model onto a plane that is perpendicular to the direction of mold separation, as illustrated in Figure 10a. The intersection of the model with this plane creates a line that precisely marks the parting line on the casting, as shown in Figure 10b. By analyzing the injection plane and the parting line, the overlap area between the injection plane and its projection onto the parting line is identified as the injection parting line, as depicted in Figure 10c. This injection parting line is where the gates will be located. This approach enables a thorough assessment of the casting's geometry and ensures the accurate transfer of this critical boundary onto the mold halves, guaranteeing proper alignment and quality in the final product.

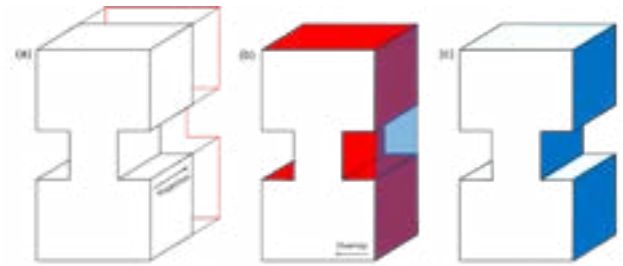

***Figure 10** – (a) The I-beam with the projection plane highlighted in red. (b) The parting line area of the I-beam, marked in red, overlaps with the injection plane. (c) The injection parting line of the I-beam.*

To analyze the object for potential parting lines, in the Figure 11, the code defines two functions to process a 3D geometry by identifying and marking the boundaries of parting lines. The "calculate_boundary_indicator" function flattens the 3D geometry along z-axis dimension into a 2D array where each element indicates the presence of a non-zero value in any layer. This 2D array is then padded in all directions, and a boundary indicator array is calculated to highlight the boundaries of the non-zero regions. The "find_parting_line" function leverages this boundary indicator to iteratively identify and mark parting lines. It initializes the boundary indicator and iteratively updates a mask until all boundaries are processed. In each iteration, the function identifies and marks the layer with the maximum boundary intersection, updating the mask array accordingly. Once the boundary processing is complete, unique identifiers are assigned to the parting lines based on their frequency of occurrence, ensuring that each unique boundary region is distinctly marked.

```
def calculate_boundary_indicator(array):
    flattened = np.sum(array, axis=2)
    pad_top = np.pad(flattened[:-1], ((1, 0), (0, 0)), 'constant')
    pad_bottom = np.pad(flattened[1:], ((0, 1), (0, 0)), 'constant')
    pad_left = np.pad(flattened[:, :-1], ((0, 0), (1, 0)), 'constant')
    pad_right = np.pad(flattened[:, 1:], ((0, 0), (0, 1)), 'constant')
    boundary_indicator = ((flattened != 0) & ((pad_top == 0) | (pad_bottom == 0) |
     (pad_left == 0) | (pad_right == 0)).astype(int)
    return boundary_indicator
def find_parting_line(array_initial):
    B = calculate_boundary_indicator(array_initial)
    N = np.logical_and(array_initial, B[:, :, np.newaxis]).astype(int)
    P = np.zeros_like(B)
    M = np.zeros_like(N)
    while True:
        U = B - P
        V = np.logical_and(N, U[:, :, np.newaxis]).astype(int)
        max_ones_count = np.max(np.sum(V, axis=(0, 1)))
        L = (V * (np.sum(V, axis=(0, 1)) == max_ones_count)).astype(int)
        M[L == 1] = 1
        I = calculate_boundary_indicator(L)
        P = np.maximum(P, I)
        if np.array_equal(P, B):
            break
    layer_counts = np.sum(M, axis=(0, 1))
    unique_counts, count_occurrences = np.unique(layer_counts, return_counts=True)
    sorted_indices = np.argsort(count_occurrences)[::-1]
    for i, count in enumerate(unique_counts[sorted_indices]):
        M[:, :, layer_counts == count] *= (i + 1)
    return M
```

***Figure 11** – Python code for parting line of geometry function in Google Colab.*

In Figure 12, the function identifies overlapping regions between the overall geometry parting line and the overlap area between the 3D geometry and the injection plane. It starts by calculating the logical conjunction of the entire geometry parting line and the overlap area to determine the parting line locations. Next, it extracts the segmentation order with non-zero elements from watershed segmentation at these parting line positions. Using these segmentations, it creates a mask to locate all instances of the parting line segmentations within the watershed segmentation. Finally, it identifies the elements where this mask overlaps with the geometry parting line and returns these overlapping elements, which constitute the injection parting line.

```
def find_injection_parting_overlap(M, erosion_updated_array, array_ws_mark):
    parting_line = np.logical_and(M, erosion_updated_array)
    values_at_locations = array_ws_mark[parting_line]
    parting_line_seg = np.unique(values_at_locations[values_at_locations != 0])
    mask = np.isin(array_ws_mark, parting_line_seg)
    equal_elements = np.logical_and(mask, M)
    return equal_elements, parting_line_seg
```

***Figure 12** – Python code for finding injection parting line in Google Colab.*

Gate Locating

Utilizing the distance field and segmentations of the geometry, the deepest value within each segmentation would be determined. Subsequently, the point nearest to the injection parting line is identified based on the location of the deepest value for each segmentation. This point serves as the location of the gate. The direction of the gate corresponds to the line connecting the deepest value of each segmentation to the gate's location, as illustrated in the Figure 13.

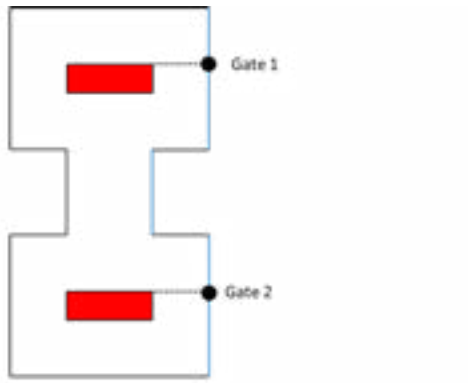

***Figure 13** – The gate location of the I-beam cross-section.*

The function, as shown in Figure 14, described in the provided text processes 3D geometry to identify gate coordinates and their corresponding injection directions. It accepts several parameters, including watershed segmentation of geometry, a distance field, an injection parting line, voxel resolution and origin for spatial resolution and origin adjustment, thickness information ("thick_data"), and a voxelated 3D geometry configuration. Its primary objective is to locate the closest boundary faces and coordinates where specific regions, referred to as gates, intersect with other marked regions.

The core of the function iterates through the "thick_data" to evaluate regions marked by watershed segmentation. For each segmentation, it determines boundaries and computes direction vectors to identify potential crossing points where regions of interest intersect. These intersections are identified by examining the overlap of non-zero elements in both the segmentation and the injection parting line. The closest coordinates where these intersections occur are noted as gate coordinates. The function then constructs a combined

gate line, which is a composite of all detected gate lines, to further refine the location of the intersections. Additionally, the function calculates overlap layers and identifies the maximum layer where the overlap is most prominent. It then determines the closest points in this layer to provide gate locations. The function also includes a subroutine to determine the direction of the closest face relative to the initial array center, aiding in the spatial orientation of the gate locations. The final output is a list of results, each containing region identifiers, directional information, and the calculated gate locations adjusted for voxel resolution and origin.

***Figure 14** – Python code for finding gate coordinate in Google Colab.*

Gate Size

The total gate area would be calculated by total volume of geometry, injection time and injection speed, which is shown in Equation 1. The total gate area, S_{total}, is

$$S_{total} = \frac{N_{mesh} \times V_{mesh}}{v_{inject} \times t_{inject}} \quad (1)$$

where the number of meshes in segmentation, N_mesh, the volume of mesh, V_mesh, the injection speed, v_{inject}, the injection time, t_{inject}, are used to calculate the total gate size. To determine the gate size for each injection segmentation, the size will be allocated based on the volume ratio of each injection segmentation in total injection segmentation. The gate size for each injection segment can be calculated using Equation 2.

$$S_{segmentation} = S_{total} \times \frac{V_{segmentation}}{V_{total\ segmentation}} \quad (2)$$

Where the volume of each segmentation in injection segmentation, $V_{segmentation}$, and the total volume of injection segmentation, $V_{(total\ segmentation)}$ are used to calculate the each gate size of injection segmentation. The length of the gate for each injection segmentation is determined using the provided Equation 3.

$$L_{segmentation} = \frac{S_{segmentation}}{t_{min}} \quad (3)$$

The generally accepted standard for the minimum thickness of the parting line area, denoted as t_{min}, is 0.06 inches (1.5 mm).

In Figure 15, the code calculates the gate sizes for each injection segmentation. It starts by summing the non-zero element count of the segmentation to determine the total geometry element count. With this count, along with the voxel resolution, unit, injection speed, and injection time, it computes the total gate size. The total gate length is then derived by dividing the gate size by the product of the minimum gate thickness. Subsequently, it sums the non-zero element count of the injection segmentation to obtain the injection element count. Finally, it generates a list of the minimum gate thicknesses and proportionally allocates the total gate length to each injection segmentation based on their contribution to the total injection element count.

***Figure 15** – Python code for calculating gate size in Google Colab.*

Gate Generated and Visualization

For the gate creation implementation, as depicted in Figure 16, determine the orientation from the thick region of the gating system towards the gate location based on the provided coordinates. Ensure that the projection direction of the injection plane is designated as zero to align the gate with the parting line plane. Leveraging this directional information along with gate coordinates and their respective sizes, the code constructs cuboid faces, generates STL meshes, consolidates them into a unified mesh representation, and ultimately saves the resultant mesh as an STL file.

***Figure 16** – Python code for gate creating on parting line in Google Colab.*

For visualization implementation, as shown in Figure 17, employing Blender's bpy library, the script imports STL files encompassing gates and geometry, applies slight transparency to the geometry, and colors the gates green within the Blender environment. Following this, it exports the modified scene as a GLB file format, facilitating visualization. The advantage of the GLB file lies in its ability to comprehensively include 3D model geometry and associated textures/materials within a single compact format, thereby streamlining sharing across a wide range of platforms and applications.

```
bpy.ops.wm.read_factory_settings(use_empty=True)
bpy.ops.import_mesh.stl(filepath=filename)
obj = bpy.context.object
obj.select_set(True)
bpy.context.view_layer.objects.active = obj
obj.color = (0,0,1,1)
mat = bpy.data.materials.new("0")
mat.use_nodes = True
principled = mat.node_tree.nodes["Principled BSDF"]
principled.inputs["Base Color"].default_value = (1,1,1,1)
principled.inputs["Alpha"].default_value = 0.7
obj.data.materials.append(mat)
bpy.context.object.active_material.blend_method = "BLEND"
bpy.ops.import_mesh.stl(filepath=os.path.join(os.getcwd(),"all_gates.stl"))
obj = bpy.context.object
obj.color = (0,0,1,1)
mat = bpy.data.materials.new("0")
mat.use_nodes = True
principled = mat.node_tree.nodes["Principled BSDF"]
principled.inputs["Base Color"].default_value = (0,1,0,1)
obj.data.materials.append(mat)
bpy.ops.export_scene.gltf(filepath=os.path.join(os.getcwd(),"colored_gating.glb"))
```

***Figure 17** – Python code for visualization of gates in Google Colab.*

Output Result

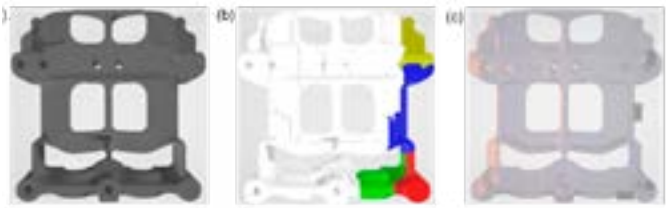

***Figure 18** – (a) The geometry of the balance shaft housing. (b) Injection segmentations of the balance shaft housing generated by implementation. (c) Gate designs for the balance shaft housing created through implementation.*

In this study, the example geometry used is the balance shaft housing designed by Mercury Marine[22], as shown in Figure 18a. Under 200 element counts, through implementation based on the injection parting line, four injection segmentations are identified for locating the gate. The injection speed is set at 60 m/s, with an injection time of 40 ms, and the gate thickness is 2.5 mm to ensure it can be knocked off in machining process. In Figure 18b and c, the lengths of each gate are as follows: 8.1 mm (red segmentation), 16.4 mm (green segmentation), 17.7 mm (blue segmentation), and 15.6 mm (yellow segmentation).

Injection Flow Simulation

In this study, the injection flow simulation is conducted using MantaFlow within Blender[23]. MantaFlow, an advanced fluid simulation framework integrated into Blender, enables realistic simulation of liquids and gases, making it ideal for accurately modeling the injection flow process. The process involves several key steps: first, constructing the mold, then setting the flow parameters for the simulation. Next, the data is baked as OBJ files for each frame of the simulation. Finally, these OBJ files are used to create an animation in GLB format[24], as shown in Figure 19.

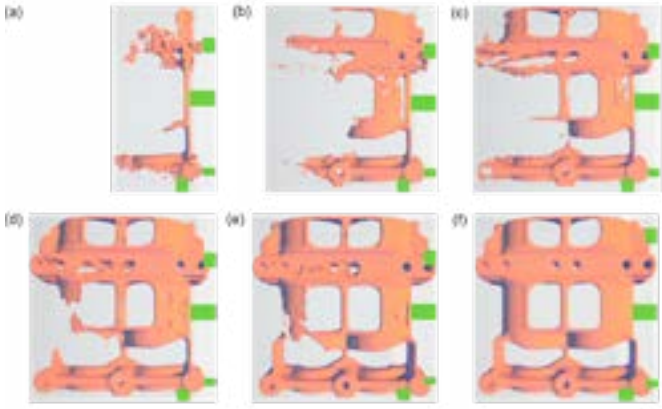

***Figure 19** – The gates, indicated by red marks, are the points where the liquid is injected. The results of the injection flow simulation using Blender's fluid function are shown at the following frame intervals: (a) 10, (b) 20, (c) 30, (d) 40, (e) 50, and (f) 60.*

In the initial stages of the die casting injection, the molten material begins to enter the mold. During these moments, the flow is highly turbulent and uneven. The material spreads from the injection point, creating an initial distribution pattern. At 10th frame (Figure 19a), the flow is primarily concentrated near the entry points, and the mold cavities are largely unfilled. By 20th frame (Figure 19b), the material starts to spread out more, though significant portions of the mold remain empty, indicating the beginning phase of cavity filling.

In the middle stage, the molten material continues to fill the mold, covering more area and beginning to form the rough shape of the intended part. At 30th frame (Figure 19c), there is a noticeable increase in material distribution compared to earlier stages, with more cavities being partially filled. By 40th frame (Figure 19d), the flow shows improved uniformity, with fewer voids and more areas of the mold being covered by the material. However, the flow is still not completely smooth, and some areas may show signs of turbulence or incomplete filling.

In the late stage, the mold becomes fully filled with the molten material. At 50th frame (Figure 19e), the distribution of the material is much more even, with most of the cavities being filled. Any remaining voids are significantly smaller and less frequent. By 60th frame (Figure 19f), the mold is entirely filled, showcasing a well-distributed flow pattern. The material has settled into the finer details of the mold, and the overall structure of the die-cast part is clearly visible.

Discussion

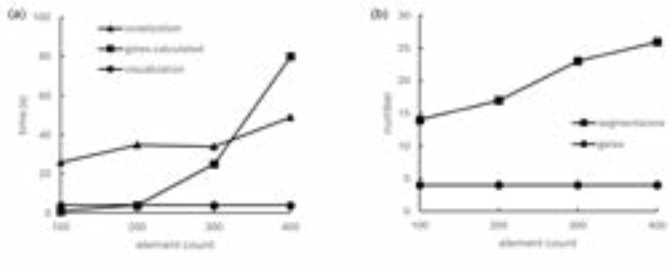

***Figure 20** - (a) The time taken for voxelization, gate calculations, and visualization for elements ranging from 100 to 400. (b) The number of segmentations and gates for element counts from 100 to 400.*

In Figure 20a, the time required for three computational processes—voxelization, gate calculations, and visualization—is depicted across a range of element counts from 100 to 400. The data reveals that voxelization time remains relatively stable, with a slight increase at the 300-element count before leveling off again. In contrast, gate calculation time shows a significant upward trend, especially at 400 elements, indicating a non-linear increase in computational effort as the element count rises. Conversely, visualization time remains consistently minimal across all element counts, suggesting that visualization efficiency is maintained regardless of the number of elements.

Figure 20b presents the relationship between the number of segmentations and gates and the element count within a specified range. The data indicate that the number of segmentations increases linearly, beginning at 14 for 100 elements and rising to approximately 26 for 400 elements. In contrast, the number of gates remains consistently at 4, regardless of the element count. This stability in the number of gates contributes to more consistent outcomes throughout the automatic gate design process.

Conclusion

In conclusion, this study emphasizes the importance of adopting a geometric approach for thick identification and gate generation in the context of casting geometries. By utilizing a Python script accessible via Google Colab, comprehensive geometric analysis on STL files is facilitated, leveraging voxel meshing and 3D image processing techniques. Through the utilization of libraries such as Open3D, SimpleITK, scipy, numpy and Blender's bpy the script enables tasks ranging from voxelization to injection flow analysis, ultimately supporting predictive die casting gating. Through this approach, engineers can optimize processing parameters to enhance casting quality, minimize defects, and save money.

Overall, this research highlights the significant role of geometric analysis in 3D modeling and manufacturing processes. The Python script presented here offers a practical solution for extracting valuable insights from geometry and generating gates for casting geometries. By providing a faster and potentially automated method for exploring new heuristics, the proposed approach expands the range of gating system choices available to engineers, thereby facilitating more informed decision-making, improved casting outcomes, and cost savings.

Acknowledgments

The authors express their gratitude to Adam Kopper and Eric Kessenich for providing data on the die casting process for the balance shaft housing. Additionally, they thank Paul Brancaleon and Beau Glim for sharing their expertise in die casting manufacturing.

References

1. *North American Die Casting Association. (2006). PQ2 & Gating Manual. NADCA. pp. 29-45.*
2. *Hu, B.H, et al. (2000). Design and Optimisation of Runner and Gating Systems for the Die Casting of Thin-Walled Magnesium Telecommunication Parts through Numerical Simulation. Journal of Materials Processing Technology, 105(1-2), 128–133. https://doi.org/10.1016/s0924-0136(00)00546-x.*
3. *Kwon, Hyuk-Jae, and Hong-Kyu Kwon. (2019). Computer Aided Engineering (CAE) Simulation for the Design Optimization of Gate System on High Pressure Die Casting (HPDC) Process. Robotics and Computer-Integrated Manufacturing, 55, 147–153. https://doi.org/10.1016/j.rcim.2018.01.003.*
4. *Niu, Zhichao, et al. (2022). Effect of High Pressure Die Casting on the Castability, Defects and Mechanical Properties of Aluminium Alloys in Extra-Large Thin-Wall Castings. Journal of Materials Processing Technology, 303, 117525, https://doi.org/10.1016/j.jmatprotec.2022.117525.*
5. *Singh, R., & Madan, J. (2018). A computer-aided system for multi-gate gating-system design for die-casting dies. The International Journal of Advanced Manufacturing Technology, 101(5-8), 1793–1806. https://doi.org/10.1007/s00170-018-2980-z*
6. *Sulaiman, S., & Chee Keen, T. (1997). Flow analysis along the runner and gating system of a casting process. Journal of Materials Processing Technology, 63(1-3), 690–695. https://doi.org/10.1016/s0924-0136(96)02708-2*
7. *Tai, C. C., & Lin, J. C. (1999). The optimal position for the injection gate of a die-casting die. Journal of Materials Processing Technology, 86(1-3), 87–100. https://doi.org/10.1016/s0924-0136(98)00238-6*
8. *Wu, S. H., Fuh, J. Y. H., & Lee, K. S. (2007). Semi-automated parametric design of gating systems for die-casting die. Computers & Industrial Engineering, 53(2), 222–232. https://doi.org/10.1016/j.cie.2007.06.013*
9. *Jordan, C., Hill, J. L. & Piwonka, T. S. Computer Designed Gating Systems Promises and Problems. Transactions of the American Foundry Society (1988).*
10. *Creese, R. C. OPTIMAL RISER DESIGN BY GEOMETRIC PROGRAMMING. AFS Cast Metals Research Journal 118–121 (1971).*
11. *Creese, R. C. AN EVALUATION OF CYLINDRICAL RISER DESIGNS WITH INSULATING MATERIALS. AN EVALUATION OF CYLINDRICAL*

RISER DESIGNS WITH INSULATING MATERIALS 665–668 (1979).
12. *Open3D. A Modern Library for 3D data processing. http://www.open3d.org/docs/release/*
13. *SimpleITK. https://simpleitk.org/doxygen/latest/html/*
14. *Skimage. skimage 0.24.0 documentation. https://scikit-image.org/docs/stable/api/skimage.html*
15. *Blender. Blender 4.2 Python API documentation. https://docs.blender.org/api/current/index.html*
16. *Gate_design_and_flow_simulation.ipynb. (2024). GitHub - zyang63/Gate_design. https://github.com/zyang63/Gate_design*
17. *Warriner, W. E. & Monroe, C. A. Locating Solidification Hot Spots and Feeder Positions in Casting Geometries by Image Analysis. International Journal of Metalcasting 40, 1–11 (2017).*
18. *Warriner, W. E. & Monroe, C. A. Open-Source MATLAB Code for Hotspot Identification and Feeder Generation. International Journal of Metalcasting 12, 1–24 (2019).*
19. *Yang, Z., Monroe, C., "Future possibilities of CastView" NADCA Die Casting Congress & Tabletop, Indianapolis, IN (2023).*
20. *Gourlay, C. M., Laukli, H. I., & Dahle, A. K. (2007). Feeding Mechanisms in High-Pressure Die Castings. Metallurgical and Materials Transactions A, 38(7), 1833-1844. https://doi.org/10.1007/s11661-007-9239-6*
21. *North American Die Casting Association. (2006). PQ2 & Gating Manual. NADCA. pp. 114-118.*
22. *Wang, B., Song J., Monroe, A., Korenyi-Both, A.L., Midson, S.P., Kaufman, M.J., "Results from a Series of Plant Trials to Evaluate the Impact of PVD Processed AlCrN Thin-Film Die Coatings to Minimize Die Lubrication" NADCA Die Casting Congress & Tabletop, Atlanta, GA, T17-083 (2017)*
23. *mantaflow. An extensible framework for fluid simulation. http://mantaflow.com/*
24. *glTF. (2013). Runtime 3D Asset Delivery. https://www.khronos.org/gltf/*

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NADCA Pleased to Award 10 Students with Laine Scholarships

NADCA is proud to announce that 10 students were recognized with David Laine Scholarships in 2024 totaling more than $25,000. The scholarship fund was established in 1975, and requires that students complete an internship or co-op at a die casting company or a supplier to the die casting industry prior to applying for the scholarship. The prerequisite allows students to experience hands-on training in the die casting industry, with the hope that the learning experience will encourage students to continue on in the field after graduation.

NADCA reaches out to over 250 professors each year, hoping they will share information about our program and industry, as well as the scholarship program. Laine applicants must include school and work recommendations as well as a summary of experiences learned during the student's internship in the die casting industry.

The scholarship program was established in 1975 as a tribute to David Laine, who served for 29 years as secretary of the American Die Casting Institute (ADCI), a forerunner of NADCA. Laine was instrumental in many advancements for the benefit of the die casting industry, including the development of a safety program, which was adopted by the institute in 1945. He also helped develop the Die Casting Research Foundation. Laine provided vigorous representation for the die casting industry in Washington, D.C., speaking out for the programs and legislation that would best serve not only the die casting industry, but the numerous industries it serves. His leadership and service to the industry were widely recognized. Among the many honors awarded him were ADCI's Doehler Award in 1952, a special citation from the institute in 1969 marking 25 years of dedicated service, and an Honorary Life Membership in the Society of Die Casting Engineers.

For more than 45 years, NADCA through the David Laine Memorial Scholarship program has encouraged college students to pursue studies in the many disciplines related to die casting. The main objectives of the scholarship program are:

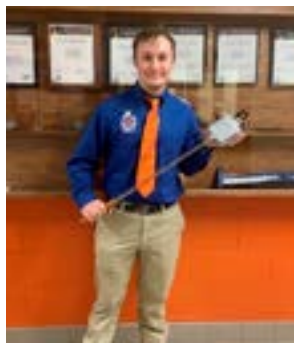
- To provide financial assistance and encouragement to students who are interested in careers in the die casting industry.
- To foster and improve engineering education in die casting technology.
- To stimulate awareness of and interest in the die casting process.

To be considered for a David Laine Scholarship, applicants must meet specific criteria, one of which is having worked at a die casting company or supplier to the die casting industry for at least three months within the past 12 months. Receiving a Laine Scholarship award encourages early undergraduate college students to continue to work in our industry (often with the same company) and consider die casting as a career path.

"Thank you to all of our businesses who support interns in their facilities. These interns learn just how important manufacturing is in North America," NADCA President Michael Meyer stated. "If your business is considering hiring an intern or two, I urge you to do so. Our youth in manufacturing is our future."

The Laine Scholarship applicants highlight the outstanding skills, energy and initiative of the next generation of die casting engineers. Our most recent Laine winners worked internships where they were able to gain die casting experience in the following areas: process engineering, quality control, die design and maintenance, machine maintenance, part design, automation, scrap reduction and research & development (and more!).

The association is pleased to recognize the following 2024 Laine Scholarship winners, their universities, and the companies that provided the the opportunity for these students to work in the die casting industry.



Connor Buchanan

University of Wisconsin-Platteville
Major: Engineering Technology Management
Interned at: Tri-State Industries

Connor Buchanan is a student at University of Wisconsin-Platteville who recently interned at Tri-State Industries (TSI), where he gained valuable exposure to the die casting industry. Initially expecting a fabrication shop, Buchanan quickly learned that TSI specializes in die casting, taking raw aluminum stock and transforming it into fully finished products. During his internship, Buchanan worked on robotic welding cells, machine maintenance, and running manual die cast machines. He operated the Lester Engineering machine, casting "caps" for oil tanker trucks, and also gained experience in post-processing, including trimming, machining, and assembly. Buchanan contributed to improving efficiency by developing a new fixture that streamlined the process of pressing roll pins into parts.

Erickson Carpenter

Grand Valley State University
Major: Mechanical Engineering
Interned at: BuhlerPrince, Inc.*

Erickson Carpenter is a student at Grand Valley State University and had a three-semester co-op rotation in Holland, Michigan with BühlerPrince. The opportunity provided him both technical and professional working experience. Carpenter is passionate about engineering and specializes in solving problems industry-wide. During his first rotation, he underwent safety and corporate training; later, he worked with a specialized design team using tools such as CAD to develop models for a variety of customer projects. He also helped devise a quality control system while adhering to ISO and ANSI standards.

Dakota Carter

Trine University
Major: Mechanical Engineering
Interned at: Aludyne Inc. – Auburn plant

Dakota Carter is currently attending Trine University and recently participated in his second engineering internship in Auburn, Indiana for Aludyne Inc. Carter had the opportunity to collaborate with engineers, machinists, process technicians, and other interns. Projects included analyzing data from a cooling sleeve design, designing and implementing a water pump unit, reverse-engineering robot gripper pads, and problem solving porosity issues in parts through adjustments to the pin intensifier. This was his second year working at the plant, and Carter said it reinforced his belief that the die casting industry is the right choice for his future engineering career.

Nichelas Dunmire

Penn State - Behrend
Major: Mechanical Engineering
Interned at: Pace Industries: Latrobe Division*

Nichelas Dunmire is a student at Penn State Behrend, majoring in Mechanical Engineering. He interned at Pace Industries: Latrobe Division, where he gained hands-on experience in die casting. During his internship, Dunmire focused on process audits, cycle time optimization, and thermal design calculations. He worked on improving efficiency and quality by analyzing key variables such as spray time and dwell time. His experience in thermal design deepened his understanding of the die casting process and sparked an interest in additive manufacturing.

Mitchell Hainstock

University of Wisconsin Platteville
Major: Mechanical Engineering
Interned at: Mercury Marine*

Mitchell Hainstock, a student at University of Wisconsin-Platteville, conducted an analysis on solder formation in die casting using various aluminum alloys as part of his internship. By studying alloys A380, A356, and A362, along with their magnesium variants, Mitchell identified that solder formation is influenced by both ejection temperature and ejection force. His research showed that higher ejection temperatures and lower ejection forces increase the likelihood of solder, with A362 and its magnesium variant being the most resistant to this issue. The findings provide valuable insights for optimizing die casting processes to reduce solder, improve part quality, and extend die life.

Eric Lindquist

University of Cincinnati
Interned at: Honda Transmission Manufacturing (HPDC)*
Major: Mechanical Engineering

Eric Lindquist is a co-op student at Honda Transmission, working in the high pressure diecasting (HPDC) department. Initially uncertain about the industry, he quickly adapted to the loud, high-pressure environment, where he worked on impactful projects like installing cameras in robot cells to improve diagnostic efficiency and mounting sensors to detect blockages in scrap chutes. Over his three semesters, Lindquist gained hands-on experience in problem-solving and improving production processes, all while embracing the physical, dirty work that defines the diecast industry. His journey taught him valuable lessons in humility, teamwork, and the pride that comes with making a tangible impact.

Brennan Neitzel

Grand Valley State University
Major: Electrical Engineering
Interned at: BuhlerPrince, Inc.*

Brennan Neitzel is a fourth-year electrical engineering student at Grand Valley State University. In the summer of 2024, he continued his co-op with Buhler, where he

had previously interned in 2023. With prior knowledge of the company, Neitzel dove into learning the intricacies of Buhler's control systems and die casting machines. He worked closely with the automation team, shadowing engineers and contributing to key projects like improving schematic page rules for die-casting cores and assisting in run-offs. His hands-on experiences, from troubleshooting machines to witnessing machine integration firsthand, have deepened his technical expertise and enhanced his communication and problem-solving skills. Through these experiences, Neitzel developed a holistic understanding of the die casting industry, making him a strong candidate for further opportunities like the David Lane Scholarship.

Zachariah Nelson

Wright State University
Major: Electrical Engineering
Interned at: The Schaefer Group*

Zachariah Nelson received an internship at The Schaefer Group Inc., a leader in the design and manufacturing of energy-efficient melting and holding furnaces. His internship has given him hands-on experience across various aspects of the die-casting and engineering industries. Nelson's primary focus has been on building and wiring electrical control panels for melting furnaces, which are essential for regulating the temperature of molten metal—a crucial aspect of producing high-quality castings. He has also gained practical experience in machining, operating equipment like vertical mills and lathes, and working with AutoCAD to revise blueprints. Working under a past Doehler award winner, Richard Schaefer, has been a major highlight, allowing Nelson to learn from a respected figure in the field. His time at Schaefer provided valuable insight into the real-world applications of his electrical engineering studies, furthering his development as an aspiring engineer in the die casting industry.

Wade Smith

Purdue University
Major: Aerospace Engineering
Interned at: Ryobi Die Casting*

Wade Smith is an Aerospace Engineering student at Purdue University. He interned at Ryobi Die Casting, where he gained valuable hands-on experience in aluminum die casting, particularly in the automotive industry. During his internship, Smith worked on process optimization, data analysis, and quality improvement projects. He developed a matrix gauge to ensure accurate part tracking on the production line, designed a fixture to machine PEEK in-house, and proposed cost-saving solutions by transitioning to 3D printing. His work improved both efficiency and quality, and deepened his understanding of manufacturing processes. Smith's experience at Ryobi also sparked his interest in how die casting can be applied to aerospace, especially in reducing costs for space travel.

Joshua Tubergen

University of Michigan
Major: Robotics
Interned at: BuhlerPrince, Inc.*

Joshua Tubergen is a Robotics Engineering student at the University of Michigan. He interned at BuhlerPrince, where he worked as a Materials Coordinator and later as a Quality Technician. Tubergen gained hands-on experience in the die casting industry, learning about machine parts, technical drawings, and precision measurement tools. As a Quality Technician, he honed his problem-solving skills, resolving issues like machine component misalignment and creating innovative solutions such as custom fixtures for disintegrating broken drill bits. His work in quality control deepened his understanding of the importance of precision, problem-solving, and workflow in die casting, which he connects directly to his current studies in robotics and engineering.

Scholarships provided by the Laine Scholarship Fund are supported entirely by contributions and pledges from the die casting community. Donations may be sent to NADCA at:
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The Laine Scholarship accepts applications for 2025 from August 1 - October 1. For more information on how to apply, please visit: www.diecasting.org/scholarship.

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Tuesday, October 7

Artificial Intelligence Revolution in Die Casting 8:00 - 10:00 am	Improving Die Casting with Automation 10:15 - 11:45 am	Discussion Panel on Current Risk / Reward of AI & Automation 1:00 - 3:00 pm
Utilizing Secondary Metal for Aluminum Alloys 8:30 - 9:45 am	Aluminum Alloys for Structural Castings 10:15 - 11:45 am	Young Professional Organization Mentor Lunch 12:00 - 1:30 pm
Exhibits Open 9:00 am - 4:00 pm	Welcome Party 3:00 - 4:00 pm	

Wednesday, October 8

Advancements in Additive Manufacturing 8:00 - 9:30 am	Extending the Life of the Die 9:45 - 11:15 am	Discussion Panel on Big Castings 2:30 - 4:30 pm
Government Affairs Report 8:00 - 9:00 am	Aluminum Skin Formation Effects in Die Casting 9:15 - 10:15 am	Understanding the Industry through Benchmarking 10:30 - 11:30 am
Exhibits Open 9:00 am - 4:00 pm	Awards Lunch 12:15 - 2:00 pm	

Thursday, October 9

Computer Simulation for Improved Casting Process 8:00 - 9:30 am	Innovations in Metal Injection 9:45 - 11:15 am
Exhibits Open 9:00 am - 1:00 pm	

S103 ABC
S103 D
Grand Ballroom
S102

SPECIAL COMPLIMENTARY EVENTS

Welcome Party

Tuesday, October 7
Show Floor
3:00 - 4:00 pm

Having such a good time meeting with exhibitors on the show floor that you wish you had more time? Now you do! Join us for After Hours with the Exhibitors. With more than 100 exhibitors we want to make sure that you have every opportunity to visit the show floor. Kick back and relax with a drink or two all while getting to spend a little extra time learning about all the new technologies and products that the exhibiting companies have to offer. No ticket required.

Die Casting Awards Lunch

Wednesday, October 8
Room: S102
12:15 - 2:00 pm

Take an afternoon break to converse and network with exhibitors and attendees alike. The following awards will be honored during this special event:

- Industry Awards
- Committee Member of the Year Award
- Best Congress Paper Award
- Industry Education Award
- International Die Casting Design Competition
- 2024 Safety Awards

GENERAL INFORMATION

Exhibit Hours

Tuesday, October 7: 9:00 am – 4:00 pm
Wednesday, October 8: 9:00 am – 4:00 pm
Thursday, October 9: 9:00 am – 1:00 pm

Registration Hours

Monday, October 6: 2:00 pm – 4:00 pm
Tuesday, October 7: 8:00 am – 4:00 pm
Wednesday, October 8: 8:00 am – 4:00 pm
Thursday, October 9: 8:00 am – 12:00 pm

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TRAVEL INFORMATION

AIRPORT

The Baird Center is conveniently located in the heart of Milwaukee. It is located 8 miles from Milwaukee Mitchell International Airport.

TAXI

Approximately $30.00 one way to/from airport.

TRANSPORTATION

Traveling from Milwaukee Mitchell International Airport to downtown Milwaukee is simple and convenient, thanks to a variety of accessible transportation options. Visitors can take advantage of the Milwaukee County Transit System (MCTS), which offers affordable bus service connecting the airport with key downtown locations.

For those preferring a more direct route, taxi services and rideshare options like Uber and Lyft are readily available, providing door-to-door convenience. Rental car facilities are also located on-site, perfect for travelers who want the freedom to explore Milwaukee and the surrounding areas at their own pace.

With these flexible and efficient options, getting from the airport to the heart of Milwaukee is quick and stress-free—setting the tone for a great visit to this welcoming lakeside city.

PARKING

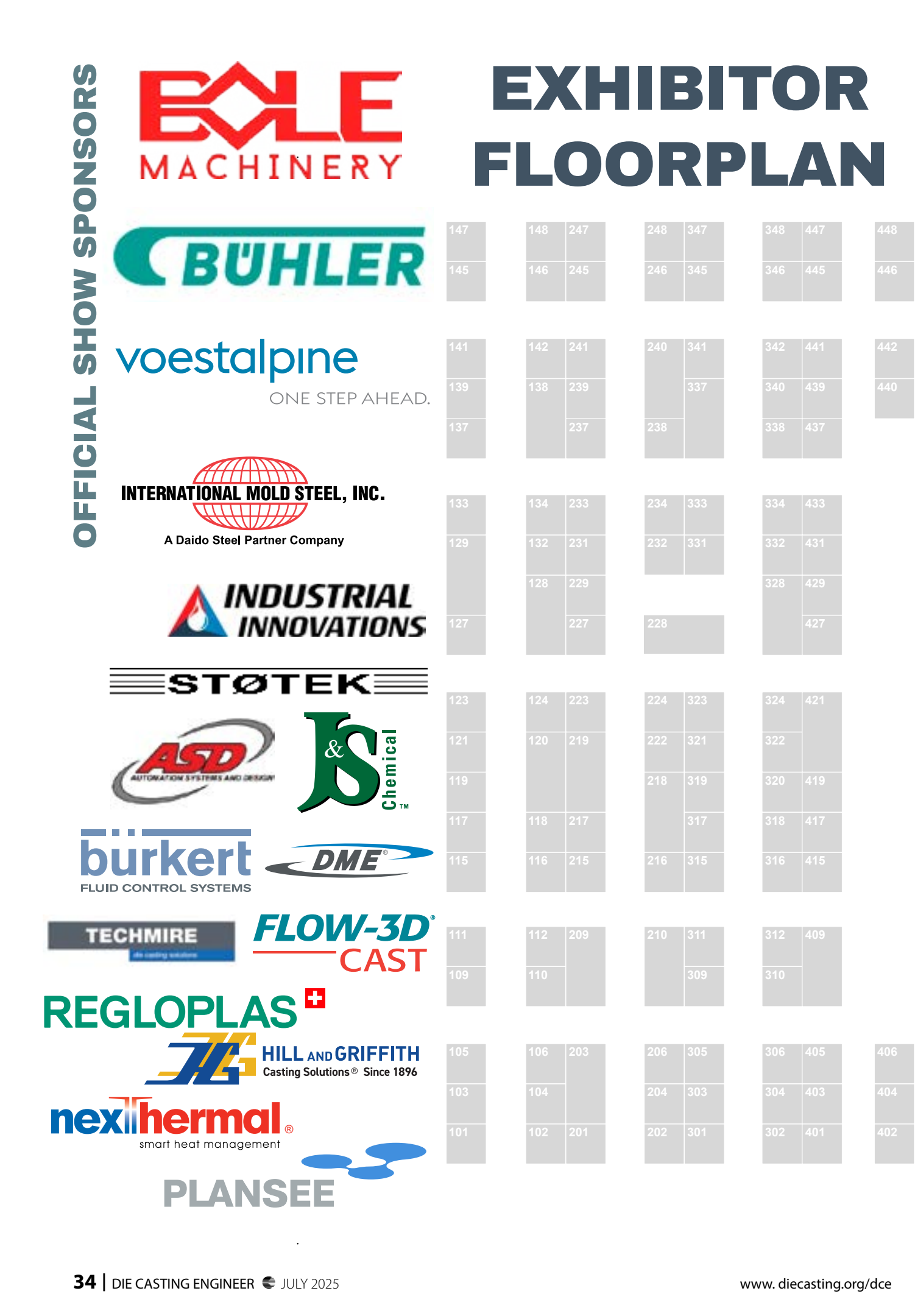
Baird Center offers convenient, indoor parking in its own dedicated garage, providing easy access to events at the Center itself as well as Miller High Life Theatre and UW-Milwaukee Panther Arena. You can enter the garage via either:

501 W Kilbourn Ave (Kilbourn Ave entrance)

500 W Wells St (Wells Street entrance)

EXHIBITOR FLOORPLAN

OFFICIAL SHOW SPONSORS



EXHIBITOR LIST

Company Name	Booth
Absolute Haitian Die Casting Systems	118
Alcoa	121
Allied Metal Company	202
Astaras Inc	446
Aulbach Automation GmbH abk Pressenbau	115
Aulbach Entgratungstechnik	117
Automation System & Design Inc.	337
Badger Metal Tech	320
Bedford Machine & Tool	123
Bholster Technologies	417
BOHLER	233
BOLE MACHINERY INC	421
Brondolin North America	103
BuhlerPrince, Inc.	203
Burkert Fluid Control Systems	315
Carrier Vibrating Equipment	318
Castec Corporation	102
Castool Tooling Systems	328
Chem-Trend, LP	402
COSTAMP GROUP SPA	222
Diehl Tool Steel	134
Die-Pro LLC	427
DME Company	304
Dynamo Inc	116
EcoShot Inc.	447
EGA Spectro Alloys	303
Ellwood Specialty Metals – USA	206
Exco Engineering	332
Fill USA, Inc	210
FLOW-3D CAST	415
Frech USA Inc.	218
G.H. Tool & Mold	204
General Kinematics	316
Godfrey & Wing LLC	302
Goff Inc	342
Hanson International	104
Hellebusch Tool and Die	209
Hill and Griffith Company	215
Hypertherm, Inc.	311
Idra North America Inc.	129
IECI SRL	239
Inductotherm Corp.	317
Industrial Innovations Inc.	409
International Mold Steel	224
J&S Chemical Corp	101
Kimura Foundry Co., Ltd.	406
Kind Special Alloys US	245
L.K Machinery Inc	119
Laubinger + Rickmann GmbH & Co. KG	217
Lethiguel USA	110
Lindberg/MPH	309
MAGMA Foundry Technologies Inc.	323
McDanel Advanced Material Technologies LLC	324
MetaLi LLC	334
Metropolitan Alloys Corp	127
Mo-Tech Corp	241
NCC Die Casting LLC	237
Nexthermal Corporation	340
NovaCast USA Inc.	338
OEE Companies	216
Pfeiffer Vacuum, Inc.	120
Phygen Coatings Inc	301
PLANSEE	124
Progressive Components	112
Prolong Surface Technologies	240
Proterial America, Ltd.	132
Pyrotek Inc	312
Quaker Houghton	305
Regloplas Corporation	223
SAPP Inc.	321
Sinto America	306
SIR ROBOTICS INC	138
Socitec US LLC	319
Sterling	133
STOTEK Inc.	322
StrikoWestofen	405
Stucchi USA	441
Swiss Steel USA	105
Techmire	128
Test Industry America Inc.	238
The Oilgear Company	437
The Schaefer Group Inc	109
The Wasmer Company	106
Tomorrow Technology	341
Transmet Corp	201
UBE Machinery Inc	246
Uddeholm USA	227
Valor Alloys, LLC	403
Visi-Trak Worldwide LLC	401
voestalpine Additive Manufacturing Centers – North America	231
voestalpine eifeler Coatings LLC	229
X-RIS USA Inc.	111
YIZUMI-HPM Corporation	219
Zitai USA - Die Casting Equipment Group	404

PRICING & REGISTRATION

NADCA MEMBER?

ADMITTANCE TO THE SHOW FLOOR IS **FREE**

Pass Type	Cost*
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**Pricing increases after August 22, 2025*

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NADCA
NORTH AMERICAN DIE CASTING ASSOCIATION

DID YOU KNOW?

NADCA's **in plant education** programs bring expert training directly to die casting facilities, offering a **convenient and tailored** approach to workforce development. NADCA ensures that the training is highly relevant and immediately applicable to the **specific challenges** and equipment used by the facility. This **hands-on** approach allows employees to engage with **practical demonstrations,** ask questions relevant to their processes, and explore real-world solutions alongside their peers, fostering collaboration and a **deeper understanding** of the material. NADCA ensures that participants not only grasp the concepts but can also implement them effectively to **improve productivity, quality, and efficiency** at their facility.

Overview of the 2026 R&D Strategic Plan & Roadmap

Paul Brancaleon, Executive Director of Research, Education & Marketing
North American Die Casting Association
Arlington Heights, Illinois

The NADCA Research & Development Strategic Plan and Roadmap provides guidance for the current and future direction of the NADCA R&D Program. This plan is updated on an annual basis. The NADCA Strategic Plan and Roadmap is in alignment with the most recent Metalcasting Industry Roadmap which was released in mid-2016. The development of the Metalcasting Industry Roadmap was managed by the American Metalcasting Consortium (AMC) for the entire metal casting. The research needs identified in the AMC Roadmap, as well as input from members of the NADCA Technical Committees and the die casting industry are considered for the NADCA Strategic Plan and Roadmap. To address the needs, specific research projects are defined. Based on the defined projects and level of available funding, the 2026 R&D Strategic Plan and Roadmap consists of 16 projects with a total leveraged value of these projects (funding plus cost share) of $4.89 million. Although this total leveraged value level is much lower than that required to conduct all of the defined projects simultaneously, it does support a portfolio of projects that addresses various needs within reasonable time periods. The following presents a general overview of the 2026 NADCA R&D Strategic Plan and Roadmap, a brief statement of objectives for each project in the portfolio, and key accomplishments of several projects.

The Research (or R&D) for NADCA is divided into 2 distinct Committees of Die Materials and Research and Development. For each committee there is a chairman and a set of projects that are being led by Principal Investigators and others involved in the specific projects.

Overview

The NADCA Strategic Plan identifies main topic areas that have been identified by industry as strategic. This plan also ensures that efforts are applied toward further development and advancement of the main topic areas. Several strategic areas have been identified and are targeted for technological advancement. The primary strategic areas are Process, Materials, Design, and Workforce. Each of these primary areas contain sub-categories such as cast materials development, computer modeling, die materials and die surface engineering, process technologies, additive manufacturing, and others. Process, Materials, and Design are covered in the Die Materials and Research and Development committees. Workforce, the fourth main topic, is covered in the NADCA Education Program. Process, Materials, and Design each have sub-topics or focus areas such as additive manufacturing, advanced casting technologies, cast materials, die and tooling materials, design tools for manufacturing, and design tools for casting. Within each of these focus areas there are more detailed research and actionable paths to advance a specific state of technology. It is these detailed areas that define the NADCA roadmap and specific R&D activities or research projects.

Technological advancement of the detailed focus areas is targeted to provide many benefits such as higher performance alloys, solder reduction, cycle time improvements, productivity improvements, scrap reduction, cost reduction and lead-time reduction.

Research Results

Additive Manufacturing

Project 234: Modeling Conformal Cooling of Additive Manufactured Die Cast Tooling. Dr. Xiaoming Wang, Purdue University

Research Objectives: The proposed research will model the fluid flow and thermal history of diecasting dies with conformal cooling channels. The objective is to design dies with proper thermal management for high quality diecasting products. Also, extending die life is an objective of the proposed research work.

Key Accomplishments: The project is examining the defects created during a 3D build of a steel component. From this review, the 3D printing normal process creates defects such as cracks and pores in the printed components. Using the CFD (Computational Fluid Dynamics) model that was developed, the project is simulating the pore formation during the AM printing process. (See Figure 1) The simulation used the CFD & Ansys Fluent to show pore formation.

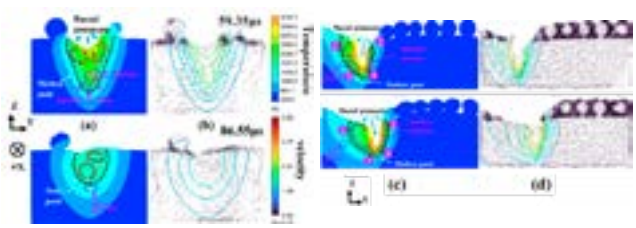

***Figure 1** – Formation of pores was observed in the simulation conducted using ANSYS FLUENT, which included analyses of temperature and velocity fields in XZ and YZ sections.*

Project 242: Surface Roughness on the Fatigue Resistance of Die Inserts Additively Manufactured die steel (A. Lausic, GM)

Research Objectives: Determine the effect of surface finish and alloy type on the fatigue resistance of Laser Powder Bed Fusion 3D fabricated steel samples containing internal holes.

Key Accomplishments: The overall objective is to perform a series of experiments to determine the effects of a range of parameters on the elevated temperature fatigue performance of steel alloy die inserts produced by Additive Manufacturing (AM) (3D Printing). Fatigue samples have been produced by additive manufacturing. (See Figure 2) The Specimens OD surfaces were machined and polished so that fatigue cracks would initiate at the rough interior surface of the center hole. Two types of steel were printed, Maraging 300 and AM Dievar. Two build directions, both horizontally and vertically. Two brands of AM Machines were used, EOS and Velo3D. Fatigue life varied from 23,491 to 46,142 cycles. The majority (approx. 90%) of fatigue initiation was at the internal rough hole. Some specimens were drilled out to a larger diameter and tested to over 193,000 cycles.

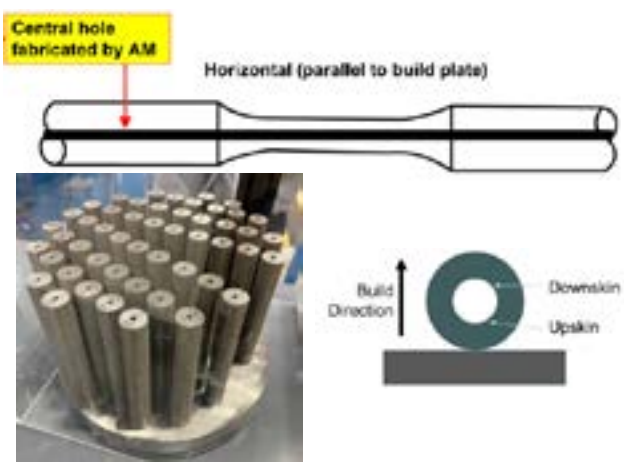

***Figure 2** – Printed tensile specimens with printed internal hole. Specimens were printed in the horizontal and vertical build directions.*

Project 246: Failure Analysis of Additively Manufactured Components (P. Ried, Ried & Associates, LLC)

Research Objectives: Characterization, non-destructive and destructive evaluation of up to 4 additively manufactured inserts. 1) Determine the damage/fracture initiation sites and mechanisms, 2) recommend possible design and material improvements, and 3) help other die casters apply the lessons learned.

Key Accomplishments: The project has reported on some of the past work and is obtaining 3D printed components made from maraging 300 that have completed 20,000 cycles in the Case Western Reserve, dunk test operation. These specimens will be evaluated to determine the level of defects after the 20,000 cycles.

Project #244: Externally Solidified Crystal (ESC) formation/control in die casting.

Research Objectives: The goal of this project is to Simulate the filling (including shot sleeve) during the high pressure die cast process (HPDC). The project will then develop new guidelines on both types of externally solidified crystals formation in HPDC. The guidelines will then be validated casting product in the HPDC machine located at The Ohio State University for both types of externally solidified crystals formation in HPDC.

Key Accomplishments: The project has examined the Externally Solidified Crystal (ESC) formation and has identified two potential sources of ESC formation. Die casting trials were conducted at different melt temperatures. The samples with the lower melt temperature showed Type II ESC's present on a fracture surface. A total of 194 samples were tested. The project showed that mechanical properties are compromised when ESCs are present in a die casting. ESC's form in the Cold chamber, are temperature dependent and form when velocities during injection are excessively slow. High turbulence in the Cold chamber will break up ESCs into smaller particles. Additional work on ESC formation and corrective actions to present the formation of ESCs

Project #245: Characterizing the microstructure, hardness, and aging response of nine compositions of steel die castings.

Research Objectives: The goal of this project is that this proposed work will focus on a characterization of the die castings produced during the five trials at Mercury Marine. The as-cast hardness, Aging, and microstructures were examined on the 115 castings that were produced from.

Key Accomplishments: The as-cast hardness, Aging, and microstructures were examined on the 115 castings that were produced from the 5 steel die cast trials. Two alloys, the S7 (Tool steel) and the 52100 (High Carbon Steel) showed Rockwell hardness between 60 Rc and 79 Rc on the as cast parts. For the other 7 steel alloys the Rc hardness ranged from 25 Rc to about 45 Rc. The microstructures examined showed a martensitic structure with fine grains near the surface and larger grains toward the center of the sectioned casting.

Project #249: Identifying and Controlling factors to improve the production of Thin-wall Ferrous, High Pressure Die Castings.

Research Objectives: The goal of this project is to design a complete process for the die casting of High Temperature Steel. This would encompass the die cast die material, control the quality of the steel material, evaluation of the castings produced, evaluation of the die life, with the project overall goal to produce commercial steel die castings.

Key Accomplishments: The project was released in the second quarter of 2024 and to date, two production steel parts have been selected. These parts are a boat cleat and pistol grip lever. The boat cleat is from a well-known manufacturer of outboard equipment and the pistol grip is from a well-known gun manufacturer. One casting will

demonstrate how the process performs on thick-walled castings and the other will demonstrate how the process will perform on a generally thin-walled steel casting. (See Figure 3).

Figure 3 – *Two steel parts to be die cast, new tooling is being constructed, the steel die cast process will be developed for each of these castings*

Project #250: Increase fluidity and increase the ductility of HPDC alloys. (Xiaoming Wang, Purdue University)

Research Objectives: Develop an alloy to be able to distribute the molten metal evenly across the mold cavity, ensuring that all sections are filled simultaneously. Modify the alloy by adding Si and Fe, Si lowers the melting point and Fe reduces the solidification interval, this makes the transitions from liquid to solid more quickly.

Key Accomplishments: The project was released in 2024 and to date, the literature research has been completed showing that fluidity is not intrinsically tied to the casting temperature of the alloy but is a combination of alloy chemistry and temperature. They have shown that increasing temperature on A380 does not increase the fluidity due to the higher silicon levels of the alloy. From this they have designed a new fluidity test mold that will show the average length of travel of the alloy and the fill fraction in a single pour. (see Figure 4).

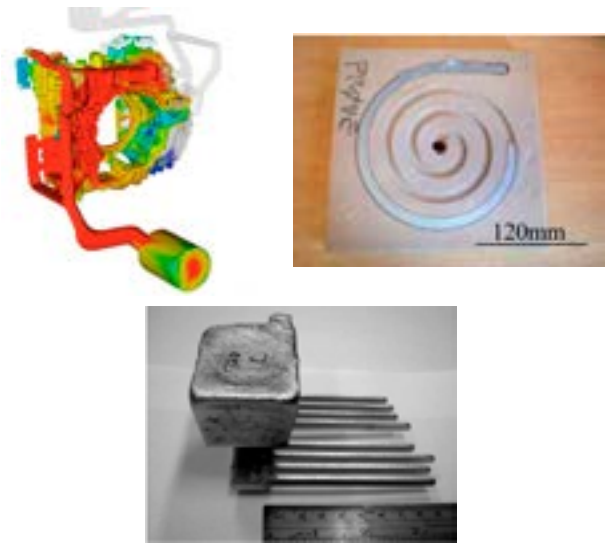

Figure 4 – *Shows the simulation of HPDC, the traditional spiral mold for alloy fluidity, &* the new design of eight channels to calculate the average fill length and fill fraction in a single pour.*

Die Materials & Die Surface Engineering

Project 239: High Thermal Conductivity PVD Coated Copper-Alloy Die Inserts – Steve Midson - CSM & Corey Vian – Stellantis.

Research Objectives: The objectives of this project are to use a PVD coating on copper cores to determine the viability of using a highly conductive material that is coated for protection from the molten aluminum alloys being cast

Key Accomplishments: The project is using a MoldMax V Copper Alloy with 7% Ni, 2% Si and 1% Cr. Due to the copper not being capable to directly be coated with a PVD coating, Phygen has developed an initial layer that can be coated on the copper and then a CrN - PVD coating can be deposited on the initial layer. Uncoated Copper cores dissolve in a matter of minutes in molten aluminum alloy. These CrN PVD cores were put in an RIT test in molten aluminum. The coares lasted from 24 minutes without any dissolution to starting to dissolve about 40 to 90 minutes submerged in molten aluminum.

Figure 5 – *Shows the coated and uncoated copper cores. The Figure to the right show the dissolution of an un-coated copper core after two minutes in molten aluminum*

Project 240: Enhancing performance & longevity of copper plungers for diecast applications through CVD graphene surface coating (Dr. Vikas Berry, UIC)

Research Objectives: The objectives of this project are extend the lifetime and performance of Beryllium-Copper alloy plunger tips used in diecasting by depositing layer/s of graphene on its surface to form a low friction, low adhesion, high thermal conductivity and high impermeability coating.

Key Accomplishments: This project has started by putting a 5 micron coating of graphene on copper cores. These cores were then tested at the Colorado School of Mines by Dr. Steve Midson. The graphene coated cores did perform better than uncoated cores while submerged in molten aluminum die cast alloy. The project is now moved on to coating of BeCu plunger tips provided by RCM Industries. These will be coated and then tested in the die cast process to inject molten aluminum into a die cast die. These results will be available mid to late summer of 2025.

Project 243: Modeling Steel High Pressure Die Casting – Danny Portillo – University of Alabama

Research Objectives: The objective of this project is to model and simulate the Steel High Pressure Die Casting Process. This project will also determine how to identify and control cost and quality factors to improve the production of high-quality steel die-castings. The project

will improve the high-pressure die-casting process for the production of higher melting temperature steel alloys. This project aims to assess the viability of using higher melting temperature steel alloys in this important process

Key Accomplishments: This project is currently determining the Heat Transfer Coefficients (HTC) for the Steel Die Casting process. The HTC is critical to provide accurate simulations, Determine the actual thermal load on the die cast die for proper thermal design and thermal balance of the die cast die, and to obtain correlation with the microstructure produced in HPDC and the mechanical properties of the steel die castings.

Project 248: Advanced Thermal Management – Carl Soderhjelm – University of California Irvine

Research Objectives: The objective of this project is to "Investigate the use of alternative cooling technologies enabled by additive manufacturing for tailored thermal management of casting dies.

Key Accomplishments: Project has explored many different 3D printed lattices to evaluate thermal transfer in the lattice with different cooling methods. (See Figure 6) The thermomechanical FEA modeling on lattice structures to determine redistribution of stresses from the surface of the cavity is being conducted to determine the optimum lattice structures

The Next steps are going to be experimental validation of modeling and determination of heat transfer coefficients via inverse approach.

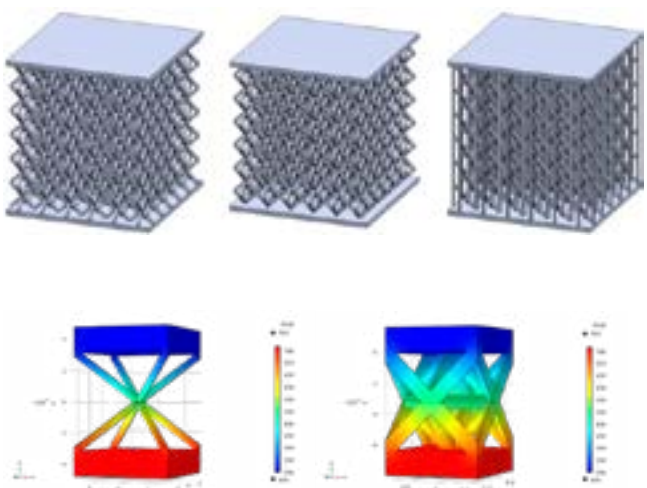

***Figure 6** - Shows the different lattice structures being simulated to determine the optimum design for thermal transfer. The stresses at the cavity surface are also being determined.*

Project 241: Dunk testing Steel Specimens, Paul Sanders – Michigan Technological University

Research Objectives: The objective of this project is to set up and test various steel specimens in a molten bath of liquid aluminum. This project will use A380 Alloy in a crucible furnace. This will also use a Collaborative Robot (Cobot) for the manipulation and dipping of the specimen and a spray application box to simulate the complete die cast process.

Key Accomplishments: This Project was released in the 2nd Quarter of 2025 and the purchase of equipment has started including the purchase of a Cobot

The Next steps are going to be complete setup of the testing cell and then start to test various steel specimens by dunking them for 20,000 cycles. The specimens will be evaluated every 5000 cycles for crack development and crack propagation on the surface corners of each specimen.

Design Tools / Computer Modeling

Project #226: Die Casting Manufacturing Analysis Tool (CastView update) (University of Alabama)

Research Objectives: The goal of this project is to use the initial CastView project and develop an updated version of CastView. This will update the cast view software to a current platform and improve the speed and abilities of the CastView software.

Key Accomplishments: The CastView approach is to load an STL file, then it automatically calculates the thick sections, Thin Sections of the die casting. The software will then start to determine the parting line of the die casting. With some basic gating into the casting then the CastView software will do some basic flow analysis and flow simulation. (See Figure 7) This is not meant to replace any simulation software but to give preliminary data from the initial STL files.

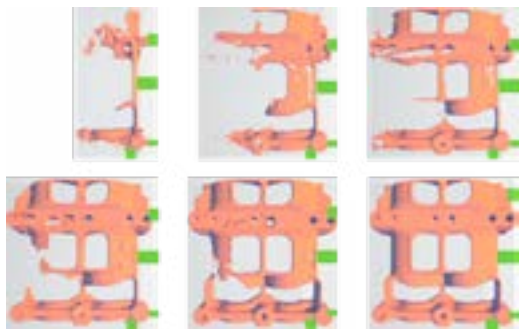

***Figure 7** - The gates, indicated by green marks, are the points where the liquid is injected. The results of the injection flow simulation using Blender's fluid function are shown at the following frame intervals: (a) 10, (b) 20, (c) 30, (d) 40, (e) 50, and (f) 60.*

Process Technologies

Project #223: Die Lube Splash test development – Sadie Beck – University of Alabama

Research Objectives: Evaluate Die Lubes' performance through casting/die interfacial heat transfer coefficient (IHTC) perspective during die filing stage and early solidification stage.

Key Accomplishments: The splash test is being upgraded to include additional lube testing such as gas generation lubes testing on the plate and possible electrostatic lubes. The gas generation lube has been tested and is currently being evaluated.

Project #241: Properties Versus Section Thickness – High Elongation Structural Alloys - Paul Brancaleon, North American Die Casting Association.

Research Objectives: The goal of this project is to establish typical properties for various section thicknesses of production die castings of Structural Alloys. The information gained will be added to the NADCA Product Specification Standards for High Integrity Die Cast Alloys

Key Accomplishments: The second alloy tested was the C611 structural alloy. Testing is still on going, The 2mm specimens were taken from castings produced on 6100 ton Giga/Mega die casting machines. The C611 Alloy is made by Alcoa and is used in the Structural High Pressure Aluminum Die Cast process. The castings being tested weigh between 87 lbs. and 150 lbs. as a single die casting. The data and results of the current testing can be found on the NADCA website.

Project #247: A.I. Vision System for Automated Casting Quality Inspection- Xiaoming Wang, Purdue University

Research Objectives: The goal of this project is to Automate the surface defect detection system using Artificial Intelligence Large Language models and Computer Vision systems. The Vision systems would be able to learn the required visual quality requirements and determine the quality level compared to the learned quality specifications.

Key Accomplishments: The AI Model was used to visually examine 73 images of a die cast part. 43 of those images were OK to the standard and 30 Images were Not OK to the standard. The image resolution was 3088x2064 pixels. The Defect size was 20 to 80 pixels. There were several challenges with this initial test, including the image quality, the defect size, the small data set. The Global and Local Adaptive Diffusion (GLAD) LLM Model was used to develop and determine the qualitative results from the individual scans of the die castings. The images were scanned and a defect heat map was developed for defect detection. This method showed success for detecting visual defects on this casting to the trained dataset. A fully automated process for defect detection was developed that is highly sensitive to small surface defects on the die casting. (See Figure 10)

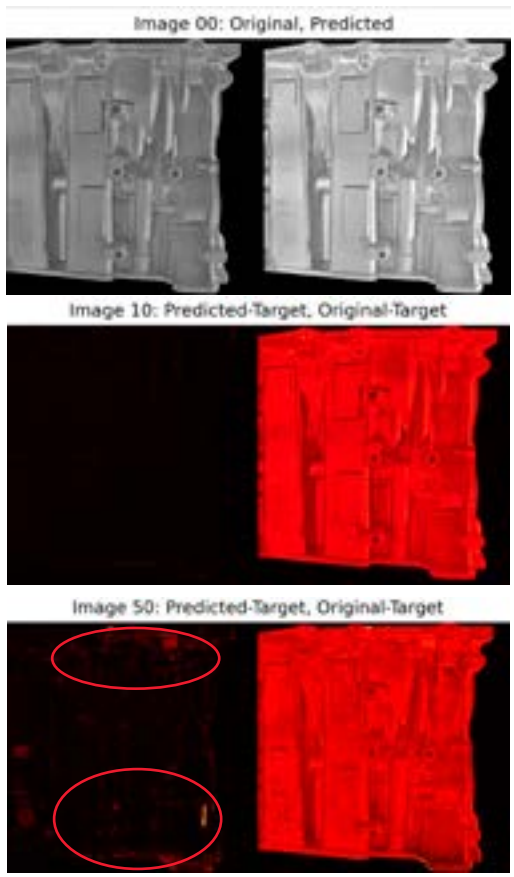

Figure 10 *– Shows the scanned image of an OK casting -0- , along with the second image of the heat map for casting -0-. The third image is the heat map of casting -50- with the defect areas shown in the red circles.*

The portfolio of projects remains balanced and has good support from external as well as NADCA funding. Results and technological advancements from the R&D Program provide many benefits to the die casting industry including enhanced cast part performance, higher productivity, improved process efficiencies, and lower operating costs.

Note: Future project ideas are included in the AMC Metalcasting Industry Roadmap and NADCA has an inventory of new project ideas. However, new project ideas are continually sought and can be submitted to research@diecasting.org for consideration. The AMC Metalcasting industry Roadmap can be found at www.diecasting.org/roadmap.

2025 Exhibitor Spotlight

Absolute Haitian Die Casting Systems 118

33 Southgate Street
Worcester, MA 01610
United States
P: (508) 792-4305
www.absolutehaitiandiecastingsystems.com

Haitian Die Casting is one of the industry leaders in cold chamber die casting and magnesium molding. Haitian Die Casting has the capacity to produce up to 4,000 machines annually from 180 to 8,800 tons of force. Absolute Haitian Die Casting Systems is the official distributer of Haitian Die Casting machinery for the United States and Canadian markets. As part of the Absolute Group of Companies, Absolute Haitian Die Casting Systems provides industry leading sales and support. Our headquarters is located in Worcester, MA and we have additional technical centers in Ohio and South Carolina.

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When the job is tough, customers turn to BÖHLER Steels – exclusively represented by EDRO in the USA. Böhler prides itself on providing complete solutions with industry leading grades W360 (highest thermal stability and wear-resistance), W350 (large deep cavities), W403 (heat checking resistance), and W302 (premium H-13). Additionally, we offer full additive manufacturing services from design to part, and superior eifeler coatings that include Crosal-plus and Duplex-Tigral. No matter what the situation calls for, BÖHLER is here.

Brondolin North America 103

1055 N Shore Drive
Benton Harbor, MI 49022
United States
P: (269) 208-3867
www.brondolin-na.com

Brondolin SRL , located near Milano, Italy is an industry leader in the manufacturing of Shot End Components for the Die Casting Industry and its products are distributed by Brondolin NA in North America. Established in 1968, Brondolin's state of the art machining factory also has its own Heat Treatment and Nitriding facility nearby, so they are able to produce the highest quality products by controlling the manufacturing process start to finish in house. Check us out for our latest technological advances at Brondolin.it.

BuhlerPrince, Inc. 203

670 Windcrest Dr
Holland, MI 49423-5410
United States
P: (616) 394-8248
www.buhlerprince.com

Die Casting Machines and systems made by BuhlerPrince are ideal for the most varied processes. Whether you are interested in aluminum, magnesium, zinc, vacuum, structural or engine block processes – BuhlerPrince has the right solution. BuhlerPrince supports customers throughout the life-cycle of their equipment with global services including process optimization, flow simulations, remanufacturing, retrofits and upgrades.

Castec Corporation 102

7640 Moller Road
Indianapolis, IN 46268
United States
P: (317) 872-3882
www.castec-inc.com

As a company, we specialize in the manufacturing of core pins, inserts, and other key components in die casting molds. Our latest technologies in additive manufacturing and our award winning surface coating to prolong your tool life.

Castool Tooling Systems 328

2 Parratt Road
Uxbridge, ON L9P 1R1
Canada
P: (905) 852-0121
www.castool.com

Any die caster knows how to produce large, thin , convoluted aluminum castings for the automotive industry. It is already being done quite satisfactorily and profitably in large quantities. There are no secrets. Knowing how to do it and actually doing it, however, are two very different things. When theory is finally replaced by reality, the most fundamental precept of die casting can be found in the old adage: a chain is only as strong as its weakest link.
All Castool products promote energy conservation and are environmentally friendly.

Chem-Trend, LP 402

1445 McPherson Park Dr
Howell, MI 48843-3947
United States
P: (517) 302-2962
www.chemtrend.com

At Chem-Trend, we are not simply a supplier. We are a visionary, working alongside you to create solutions that help you today, while forging the way to the future. It starts with our people, who begin each day focused on your business, your challenge, and your success. Die cast solutions have been a part of Chem-Trend since day one. As conditions continue to become more demanding, efficiency becomes more crucial, and materials become even more premium, we work alongside our customers to uncover every possibility.

Diehl Tool Steel 134

3475 Spring Grove Ave
Cincinnati, OH 45217
United States
P: (513) 242-8900
www.diehlsteel.com

Diehl Tool Steel is a fully integrated distributor of specialty tool steels, powder metals, aluminum, carbon and stainless alloys. Diehl Tool Steel is the largest distributor of Yasugi® Specialy Steel proprietary grades in North America and a wholly owned division of Proterial Business Group. Diehl Tool Steel processes orders to exact customer specifications.

Die-Pro LLC 427

315 Forest Ave
Sheboygan Falls, WI 53085
P: (920) 550-2333
www.die-pro.com

DME Company 304

29111 Stephenson Highway
Madison Heights, MI 48071
United States
P: (800) 626-6653
www. DME.net

For over 80 years, DME has been the backbone of the die casting industry, providing unparalleled support and innovation. Our commitment to die casters is stronger than ever, offering a wide range of standard and engineered products, along with cutting-edge aftermarket solutions.
Through our eSTORE, available 24/7, members gain access to a full catalog of innovative components and resources designed to enhance production capabilities. By registering for the DME eSTORE, you're not just getting products – you're partnering with a leader in the field. We make it easy to order what you need when you need it, ensuring you stay ahead in the ever-evolving world of die casting.
Experience the DME difference: expertise, reliability, and support at every step of your manufacturing journey.

Dynamo Inc 116

7-107 Kyoei Street
Seto, Aichi 489-0984
P: 708 261 6492
https://dynamoinc.us/

We are a leading Japanese manufacturer specializing in jet-cooled core pins and mold components for the high-pressure die-casting industry. We efficiently serve users worldwide with a global presence spanning plants in Japan and Vietnam, alongside sales offices in Germany, North America, Mexico, and China.
Our die-cast die components, including jet-cooled core pins, cascades, inserts, bore cores, and water jackets, exemplify our commitment to quality and innovation. Supported by sister companies Nihonseiki Co., LTD. and Tooling Innovation, Inc., we offer complete molds and additive manufacturing products. These utilize HTC45 die steel powder, boasting equivalence to SKD61 (H-13), high thermal conductivity, low thermal expansion, and improved component life through conformal cooling.

EcoShot Inc. 447

5524 Fortune Circle S, Suite F
Indianapolis, IN 46241
United States
P: (317) 912-4498
www.ecoshotinc.com

EcoShot (formerly RYOEI USA) is a full-service industrial automation provider specializing in die-casting that supplies state-of-the-art products and services for OEMs. Our automation systems include die spray systems, sorting equipment, pallet changers, material handling systems, equipment inspection, and much more.

Ellwood Specialty Metals – USA 206

499 Honey Bee Ln
New Castle, PA 16105
United States
P: (800) 932-2188
https://esmusa.elwd.com/

ELLWOOD Specialty Metals Group is the leading tool steel and aluminum distributor for use in die casting dies, plastic molds, forging dies, and many other tooling applications. Our steel and aluminum grades are used to produce parts for automobiles, trucks, aircraft, and consumer products across North America. The variety of our steel products include hot work tool steels, plastic mold steels, cold work tool steels, forging die steels, stainless grades, and heavy plates. We also offer a comprehensive portfolio of aluminum cast, rolled, forged, and extruded products for various industries.

Exco Engineering 332

1314 Ringwell Dr
Newmarket Ontario L3Y 9C6
Canada

Fill USA, Inc 210

44160 Plymouth Oaks Blvd
Plymouth, MI 48170
United States
P: (312) 973-9486
www.fill.co.at/en

Leading through innovation.
As the innovation leader in machining solutions for the aluminum die cast industry, Fill is internationally renowned for developing best-in-class solutions. Fill supports all production processes from the raw part to the machined, cleaned, tested and assembled finished part. Distinguished by many years of experience and technical proficiency, Fill takes overall responsibility for even the most complex automation processes. Working with Fill assures customers a decisive competitive advantage.
Fill your future.

FLOW-3D CAST 415

683 Harkle Rd
Santa Fe, NM 87505
United States
P: (505) 982-0088
www.flow3d.com/products/flow-3d-cast

Based in Santa Fe, New Mexico USA, Flow Science has been a pioneer in CFD software development for over 40 years. Our company mission is to provide our customers with best-in-class flow modeling software and exceptional technical training and support services. The FLOW-3D family of products offer highly accurate and versatile CFD solutions to meet the unique challenges of manufacturing in the 21st century.

Frech USA Inc. 218

6000 Ohio St
Michigan City, IN 46360-7757
United States
P: (219) 874-2812
www.frechusa.com

Die Casting Systems by the Frech Group offer customers improved productivity we the smart application of the die casting industries leading technologies. Die Casting cells are built to last and simple to operate with intuitive controls and flexible interfaces. The Frech Group also includes important market brands like Robamat, Meltec, VDS, Spesima, and Frech ZPF.

Godfrey & Wing 302

220 Campus Drive
Aurora, OH 44202
United States
P: (330) 562-1440
www.godfreywing.com

Godfrey & Wing vacuum impregnation technology is engineered to overcome your porosity challenges. We enable you to meet OEM requirements, ensure the quality of your components, and the integrity of your bottom line. As a U.S. based company with industry leading equipment options for in-house impregnation, mil-standard approved sealants for any application, and a vast network of service centers, make or buy, we have you covered. Casting impregnation done, Simply Better.

Hanson International 104

3500 Hollywood Road
Saint Joseph, MI 49085-9581
United States
P: (269) 429-5555
www.hansoninternational.com

Hanson International specializes in the design, build, sample, and inspection of precision molds and high pressure die cast dies - primarily for the automotive industry. Hanson's campus is located in Saint Joseph, Michigan, and provides the die cast industry with the finest, most efficiently designed and long-lasting tooling available. Hanson's single source assurance and single point of contact approach guarantees outstanding service and support from design to delivery.

Hill and Griffith Company 215

1085 Summer St
Cincinnati, OH 45204-2037
United States
P: (800) 543-0425
www.hillandgriffith.com

Since its inception in 1896, Hill & Griffith has maintained a top priority around quality and service, using these two fundamental aspects to reach customer satisfaction for 128 years. Investment in people, research, product development, and facilities will ensure we continue to be a leader with our customers and the industries we serve. The integrity of Hill & Griffith is represented in the products and services bearing our name, which is why product quality has been and will always be at the heart of the company. Hill & Griffith continues to make substantial investments in research and development to ensure new technologies and quality supplies are being developed to support our customers' needs, industry trends and compliance with environmental regulations.

IECI SRL 239

2301 Solona St
Haltom City, TX 76117
United States
P: +39 393 43 23 841
www.iecionline.com

IECI, leading company in the field of temperature control of molds, is an Italian manufacturing firm operating in the sector of aluminum die casting. Our organization was born in 1972 in Passirano, in the province of Brescia (Italy); in these almost 50 years of history it could establish itself as a brand of complete reliability, robustness and high precision.

Inductotherm Corp. 317

10 Indel Ave Po Box 157
Rancocas, NJ 08073
United States
P: (609) 267-9000
www.inductotherm.com

Induction can heat and melt aluminum at very high efficiency rates with very low metal losses as compared to gas or oil-fueled furnaces, which can emit a large amount of carbon dioxide. As we go green, we help our customers meet their decarbonization initiatives through our induction furnaces. With over 70 years of experience, we can be your answer to reducing your carbon footprint. Visit Inductotherm.com to learn more.

Industrial Innovations Inc 409

2936 Dormax St SW
Grandville, MI 49418
United States
P: (616) 249-1525
www.industrialinnovations.com

International Mold Steel 224

1155 Victory Place
Hebron, KY 41048
United States
P: (859) 342-6000
www.imsteel.com

International Mold Steel (IMS) supports the die casting community with NADCA certified grades DH31-EX™ and DHA™-World. These technologically advanced die steels can provide longer tool life, better part quality and lower total cost per part. IMS offers close collaboration with customers on steel selection, production process, machining, polishing, welding, coating and heat treatment.

J&S Chemical Corp 101

170 N Industrial Way
Canton, GA 30115-8217
United States
P: (770) 720-8100
www.jschemical.com

USA-based J&S Chemical is a leading manufacturer of specialty lubricants for the die casting industry. J&S Chemical's business philosophy is to create value for their customers by developing high quality, high performing, value added products. Substantial investment in R&D as well as their Technical Service Team, working on-site with their customers, is driving new product developments. Many of their brands are product leaders in the industry such as, TurboCast® (die release agents and liquid plunger lubricants), ShotBeads® (solid plunger lubricants) and TurboTrim™ (trimming fluids).

Lethiguel USA 110

14800 James Rd
Rogers, MN 55374-9361
United States
P: (763) 428-4229
www.lethiguelusa.com

Lethiguel USA, formerly Midland Technologies, designs/manufactures thermal and vacuum technology solutions. We offer a complete line of immersion heaters to melt/hold non-ferrous metals, jet cooling systems to reduce scrap/cycle time and vacuum systems that monitor die cavity vacuum levels during casting. The Midland name lives on as our brand for chill blocks and jet coolers – both standard and custom designs. We have Europe and US manufacturing facilities and technical staff supporting our solutions.

Lindberg/MPH 309

3827 Riverside Rd
Riverside, MI 49084-0131
United States
P: (269) 849-2700
www.lindbergmph.com

Lindberg/MPH is an industry leader in industrial melting and holding furnaces. Each furnace is designed to be low maintenance and energy efficient. Choose from a variety of custom options and sizes to meet your process and facility requirements. Available configurations include dry hearth, wet hearth, stack melter, and crucible or pot designs. Lindberg/MPH industrial melting furnaces are commonly used for aluminum or zinc and are also used for copper, lead, brass, bronze, and other materials. Our experienced engineers work closely with you to design industrial melting furnaces that meet your specifications.

MAGMA Foundry Technologies Inc. 323

10 N Martingale Rd Suite 425
Schaumburg, IL 60173
United States
P: (847) 252-1668
magmasoft.com

MAGMA stands for robust and innovative casting solutions as well as a strong partnership with the metal casting industry. MAGMA's product portfolio based on Autonomous Engineering™ leads to robust and cost effective solutions in component design, tooling lay-out and production. The application of the MAGMA APPROACH, combined with MAGMA's comprehensive commitment to customer support, competent engineering services and educational offerings through the MAGMAacademy, offers a unique and systematic methodology for optimization and problem-solving in metal casting processes. This allows our customers to effectively integrate and use MAGMA's tools to achieve significant technical benefits and cost savings in their organizations.

Nexthermal Corporation 340

1045 Harts Lake Road
Battle Creek, MI 49015
P: (269) 964-0271
www.nexthermal.com

Smart Heat Management: Solving challenges where heat is integral to your application and making it work as efficiently as possible through intelligent heater, sensor, and controller design and placement. Nexthermal is transitioning to be more than a heater company. We're committed to driving innovation and making a difference. As we strive to live our mission and vision, we help our customers develop new products, improve process efficiency, energy efficiency, elevate performance, and quality. What's more, we proudly give a portion of our proceeds back into our community, supporting the place we call home.

NovaCast USA Inc. 338

1952 McDowell RD
Naperville, IL 60563
United States
P: (630) 450-1647
www.novacastusa.com

The innovative casting process simulation tool that helps you work faster, easier and achieve more accurate castings. NovaFlow&Solid simulates mold filling and solidification and also contains much more than that and it really gives you the possibility to simulate the casting production that you dream to have. We want you to be able to find solutions faster and more accurate than before and it should be easy to learn to use the program.

OEE Companies 216

855 Village Center Drive #336
Saint Paul, MN 55127
United States
P: (612) 440-5714
www.oeecompanies.com

OEE Companies supplies tooling, tooling components and peripheral equipment for high pressure die casters.

- Chill vents
- Unit dies
- Conformally cooled inserts
- Custom shot end components
- Standard ejector pins, die springs and consumables
- Jet cool pins
- Small diameter cooling machines
- Vacuum systems

Phygen Coatings Inc 301

1400 Marshall St NE
Minneapolis, MN 55413-1040
United States
P: (612) 767-3242

Phygen's XVD surface enhancement reduces soldering, erosive die wear and minimizes heat checking on core pins and dies with a one-of-kind improved PVD process. Phygen solutions offer extended die life and improved ""as cast"" part quality for your most demanding needs and has been a leader in innovation and research advances the die casting industry. Phygen offers tailored solutions and personal customer service.

Progressive Components 112

235 Industrial Drive
Wauconda, IL 60084
United States
P: (800) 269-6653
www.procomps.com

Progressive Components is a leading source of high-performing standard products for the die-cast industry. With plant managers working to reduce unscheduled production stoppages, Pro has engineered our die-cast line to maximize performance and longevity, and our Black Nitride products are proven to outperform others exponentially. Unlike standard additive process treatments, Pro's Black Nitride is a high-hardness diffusion that won't wear like DLC and other surface coatings and is available on our Pins, Sleeves, Bushings, and more.

Prolong Surface Technologies 240

3840 Ohio Ave
Saint Charles, IL 60174
United States
P: (630) 762-6500
www.prolongtool.com

Prolong Surface Technologies is the exclusive provider of SOLVENITE & MAXXSHOT for Die Cast Tooling. Prolong's treatments are proven to increase Die-Life. Tools run longer, require less Maintenance and die lube, saving time and money! Owned and Operated by Die Cast Experts who understand how to handle precision tooling. Any block size, fastest turnaround. SOLVENITE & MAXXSHOT fight Heat Check, Solder & Washout. Increase Shot Count and Die-Life with Prolong!

Pyrotek Inc 312

705 West 1st Ave
Spokane, WA 99201
United States
P: (866) 797-6835
www.pyrotek.com

Pyrotek® is a global manufacturing leader and technology innovator, engineering advanced systems and delivering experienced consulting services to the aluminum industry. Pyrotek has global resources and dependable local support in more than 35 countries with over 80 locations. Pyrotek's foundry team helps aluminum die casters and foundries improve metal quality and overall operational safety and performance with integrated systems for melting, metal holding, transfer, treatment, and casting.

QuakerHoughton 305

901 Hector Street
Conshohocken, PA 19428-2380
United States
P: (610) 832-4000
www.quakerhoughton.com

With a comprehensive product range and unrivalled process expertise and experience, Quaker Houghton provides the complete solution to improving your die casting performance, including DieCast iQ, an end-to-end intelligent die casting solution. We cover all your die casting needs from die release agents, plunger lubricants, application equipment, quench agents, trim lubricants, and ladle coatings to porosity sealing, metal removal fluids, greases, and fire resistant hydraulic fluids.

Regloplas Corporation 223

4063 Tabor Rd.
Sodus, MI 49126
United States
P: (269) 769-6441
www.regloplas.com

REGLOPLAS is a global leader in the production of temperature control equipment and solutions for the plastics, die casting, food, and other temperature-critical industries. The company is a significant contributor to these industries' continued efficiency and quality advancements. Stringent and diverse customer requirements are met by highly specialized teams in development, production, and international sales. Regloplas owns and runs plants in Switzerland, Germany, France, the United States, and China. Additionally, the company collaborates with a global network of independent representatives in over 50 countries. The company, which was founded in 1961, is family-owned and employs 200 employees worldwide.

SAPP Inc. **321**

600 S Kyle St
Edinburgh, IN 46124
United States
P: 00393348108947
WWW.SAPPGROUP.COM

Established in Brescia, Italy in 1957, SAPP manufactures large to ultra large die-casting dies and components for leading powertrain and structural aluminum and magnesium foundries around the world. SAPP has manufacturing facilities worldwide with sites located in Northern Italy, Eastern Europe and the United States. With a dedicated sampling center with die cast machines from 1,600 to 4,000 tons and a vast understanding of die cast process, SAPP is your optimum choice as a casting project development partner for you next large die cast part program.

Sinto America **306**

150 Orchard St.
Grand Ledge, MI 48837
United States
P: (517) 371-2460
sintoamerica.com

Sinto America, Inc. is the North American group of companies of Sintokogio, Ltd., a worldwide family of companies with an international reputation for excellence in the manufacturing industry. Sinto offers innovative, top-class solutions to meet the various needs of customers and industries all over the globe. Sinto America, Inc. and its operating companies are dedicated to providing superior customer service by offering practical, cost effective and technologically advanced equipment and service solutions to a variety of industries throughout North America.

SIR Robotics Inc **306**

8351 Luzon Ave
Sacramento, CA 95828
(682) 269-1456
http://www.sir-robotics.com

SIR Robotics is a Global Robotic System Integrator with more than 3,000 applications installed worldwide, providing robotic solutions to the foundry industry since 1984. From simple tending and handling units up to grinding / cutting /degating systems, SIR's unique aim is to identify the idea, the solution and the technology needed to ROBOTIZE your technological process.

Societec US LLC **319**

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Broadview, IL 60155
United States
P: (800) 84H35:J35
www.vibro-dynamics.com

Shock and Vibration isolating mounting systems.

EGA Spectro Alloys **303**

13220 Doyle Path East
Rosemount, MN 55068-2510
United States
P: (612) 480-6124
www.spectroalloys.com

If it's aluminum in Minnesota and it's not a used beverage container, it's likely recycled by Spectro Alloys. Founded in 1973, Spectro uses industry leading technology to turn what's used into what's new by recycling aluminum for regional die casters and foundries. The recycled material is then made into new products people use every day in the automotive, power sports, home, turf and snow maintenance, and many other industries. Learn more about Recycling for Life and the benefits our aluminum recycling delivers.

StrikoWestofen **405**

1606 Executive Drive
Lagrange, GA 30240
United States
P: (248) 790-9364

For 60+ years, StrikoWestofen has been a global leader in manufacturing melting furnaces for the light metal casting industry. Providing energy-efficient solutions for die-, gravity, sand, and low-pressure casting. Our flagship products including the StrikoMelter PurEfficiency® is the most energy efficient solution on the market while the Westomat® Duo delivers higher productivity in less space. Additionally, our IIoT solution, Monitizer® maximizes casting line uptime by gathering historical to real-time data and improves metal supply productivity.

Swiss Steel USA, Inc. 105

365 Village Dr
Carol Stream, IL 60188-1828
United States
P: (800) 323-1233
www.swisssteel-group.com/en/group/locations/usa/swiss-steel-usa

Swiss Steel Group with headquarters in Lucerne (Switzerland) is one of the world's leading producers of special steel long products. Thanks to the exclusive use of steel scrap in electric arc furnaces, the Group is one of the most relevant companies in Europe in the circular economy and is among the market leaders in the field of sustainably produced steel - Green Steel. Swiss Steel Group has its own production and distribution entities in over 30 countries and, through its strong local presence, offers a wide range of individual solutions in the fields of engineering steel, stainless steel, and tool steel.

Techmire 128

185 Voyageur
Pointe-Claire, QC H9R6B2
Canada
P: (514) 694-4110
www.techmire.com

TECHMIRE is the world leader in the design and manufacture of multiple-slide die-casting systems for precision components in zinc, lead and magnesium alloys, including:
- design, manufacture and testing of die-casting machines and tooling
- training of customers' operators and maintenance personnel
- full after-sales service
- machine retrofitting and refurbishing
- annual maintenance & support program

Techmire provides cost-effective solutions to manufacturers of die cast components to cast complex parts with faster cycle speed, higher material utilization and superior part quality.

The Schaefer Group Inc 109

1300 Grange Hall Road
Dayton, OH 45430
United States
P: (937) 253-3342
www.theschaefergroup.com

Uddeholm USA 227

2505 Millennium Drive
Elgin, IL 60124
United States
www.uddeholm.com/us

Uddeholm specializes in innovative die-casting solutions, prioritizing our clients' productivity. Our flagship product, Uddeholm Dievar, is now available as AM powder or a fully 3D printed insert, boasting exceptional toughness and ductility. Our comprehensive offerings encompass tool and die Steels, PVD coatings, Powders for AM, and 3D Printing, coupled with trusted Technical and Engineering Support. Focal steel options include Uddeholm Dievar® (≥18.4 ft-lbs. toughness value) and Uddeholm Orvar Supreme® (≥12 ft-lbs. toughness value), complemented by advanced PVD Coatings (Duplex-TIGRAL®) and innovative Additive Manufacturing solutions.

Valor Alloys, LLC 403

11250 Charles Road
Houston, TX 77041
United States
(713) 896-8585
http://www.valorrenewables.com

luminum Alloy Secondary Ingot and SOW producer of custom material to speciation. Delivering secondary alloys like prime. All metal is filtered and degassed for maximum conversion. Common alloys produced but not limited to: A304, A356, A2, A5, A360, A365, A380, A383, A319, A374, B390, ADC12, and many other custom alloys. Tier 1 Automotive Supplier and ISO 9001 Certified. Please call for any other custom alloys at 713-896-8585. Also capable of processing dross. Facilities include a rotary and reverb furnace with two ingot lines. Purchasing many types of aluminum scrap loose and baled. Contact us at sale@valorrenewables.com or 713-896-8585.

Visi-Trak Worldwide LLC 401

8400 Sweet Valley Dr Ste 406
Valley View, OH 44125-4244
United States
P: (216) 524-2363
www.visi-trak.com

Great process with relentless repeatability is the cornerstone of successful die casters. Visi-Trak has been building rugged, upgradable, process monitoring and closed loop hydraulic control systems for 50 years so you can access the process insight you need to control your toughest die casting problems. Today we continue to innovate with human-machine interface (HMI) software (process/casting traceability and production reporting), non-contact die temperature monitoring and web-based access to critical production data. Bring us your biggest challenges today!

voestalpine Additive Manufacturing Centers – North America **231**

11869 Cutten Road
Houston, TX 77066
United States
P: (800) 638-2520
www.voestalpine.com/highperformancemetals/canada/en/services/additive-manufacturing

voestalpine Additive Manufacturing Centers (vAMC) are your premier destination for comprehensive Additive Manufacturing (AM) services specializing in die-cast tooling. We collaborate closely with clients to deliver personalized solutions, employing our optimized design, powder, and printing methods complemented by enhanced services like heat treatment and coating. Merging cutting-edge AM expertise with a wealth of die-casting experience, we offer the optimal tooling solution. Our services encompass conformal cooling design, process simulation & consultation, turn-key tooling manufacturing, and efficient spare management.

voestalpine eifeler Coatings LLC **229**

2505 Millennium Drive
Elgin, IL 60124
United States
P: (800) 638-2520
www.eifeler.com/nam

eifeler, part of voestalpine High Performance Metals, has provided advanced PVD coatings since 1983. With eight sites in North America, we enhance tool performance, durability, and productivity. Known for reliable job coating services, we prioritize customer satisfaction with superior surface engineering solutions and cutting-edge technology. Our expertise extends across different industries, delivering innovative coatings that maximize efficiency and lifetime while reducing wear, friction, and maintenance costs for high-performance applications.

YIZUMI-HPM Corporation **219**

3424 State Rt 309 PO Box 210
Iberia, OH 43325
United States
P: (740) 382-5600
www.yizumi-hpm.com

Yizumi and Yizumi-HPM are world wide suppliers of high pressure die casting machines and Thixomolding machines. Yizumi-HPM provides Sales, Service, Parts and Engineering in North America. Both Hot Chamber and Cold Chamber Die Castings Machines. Machines range from 100 Ton to 9000 Ton (Metric) for Die Casting Machines and Thixomolding Machines up to 5000 ton (Metric) Complete turn-key solutions are provided. Sales / Parts and Service are provided thru the Iberia, Ohio plant site for both the HPM Legacy Machines and the Yizumi built machines.

Zitai USA - Die Casting Equipment Group **404**

1191 Hilary Lane
Highland Park, IL 60035
United States
(847) 441-8500
https://www.zitai.com/en

NADCA Welcomes Its Newest Corporate Members

Kinetic Die Casting Company

6918 Beck Avenue
North Hollywood,
California USA 91605
Phone: 818.982.9200
Email: sales@kineticdc.com
Website: www.kineticdc.com

For over 30 years, Kinetic Die Casting Company has been making die cast parts for our manufacturing customers. Primarily we produce parts in aluminum alloys like A380, A383, A360, A413, and K-Alloy for die castings, but we also make die casting parts in zinc alloy #3 and ZA27 die casting alloys.

- "Short Run" Die Castings Production. 100 parts or less, if necessary.
- High Quantity Die Casting Production. 5,000 parts or more each delivery.
- Free setup on new die casting tooling and die casting parts.
- Die casting die holders in many sizes to fit customer's inserts, dies or unit dies.
- Aluminum die castings delivered on time, shipped to every state in the USA.
- AS9100 compliant and ITAR Compliant Die Casting Parts.

OEM manufacturers sometimes need over 100,000 die casting parts a year or as few as 100 die casting parts a year. KDC focuses on low quantity production, our typical production order quantity is from 300 parts to 5,000 parts and we can frequently ship in less than two (2) weeks.

NCC Die Casting LLC

2301 Solona Street
Haltom City, TX 76117
Phone: 682.703.1058
Email: info@ncc-diecasting.com
Website: www.ncc-diecasting.com

NCC Die Casting, LLC provides all PATENTED technology for the injection system in the high pressure die casting field: plunger tips with rings, lubricated rods, thermoregulated shot sleeves, lubricants and more.

Thanks to high-quality products, deep know-how, and a long experience in the die casting sector, NCC Die Casting, LLC guarantees good performances, a better quality of the casted parts, and a longer lifetime of each component.

In addition to this, NCC's proprietary ring-based technology enables the complete absorption of any deformation occurring on the shot sleeve directly through the rings. This design allows the rings to dynamically adapt to thermal expansions, mechanical stress, and structural imperfections, thereby maintaining an optimal seal during all injection phases. As a result, the injection process becomes significantly more stable and consistent, with smoother velocity profiles and reduced fluctuations. These results gain in time as well as cost savings and productivity.

NCC Die Casting, LLC has joined NADCA as a Corporate Member to stay connected with others in the die casting industry and keep up with the latest trends, technologies and best practices in the industry. Being a Corporate Member is a great way for us to learn, improve and be a part of a community that supports the future of the die casting industry.

SURKUT Machine Technology Inc.

7980 Longwoods Road
Mount Brydges, ON N0L 1W0
Phone: 519.264.9241
W: www.surkut.com
Email: info@surkut.com
Website: www surkut.com

A leading tier one supplier of high-pressure die cast replacement tooling, with a focus on engine block and transmission dies, SURKUT Machine Technology Inc. provides high-precision, tight tolerance tooling backed by an impressive lineup of several YASDA CNC Jig Borers, a large capacity GF Wire EDM and an array of other equipment coupled with industry experience. In its 20th year, the company is well positioned to serve the industry.

In joining NADCA, SURKUT Machine looks to expand its reach while diversifying within the die casting industry by continuing to provide top quality tooling to support new and existing customers requiring better surface finishes and increased accuracy in their demanding die casting applications.

Thixocast, Inc.

5567 W 6th Avenue
Lakewood, CO 80214-2537
Phone: 303.781.0234
Email: info@thixocast.com
Website: www.thixocast.com

Thixocast, Inc. serves as a contract manufacturer specializing in semi-solid casting and machining for high integrity, structural, and near-net shape aluminum parts. Utilizing a 65% fraction-solid billet material prepared onsite at its Colorado facility, the company offers a range of alloys and heat treatments designed to provide material advantages for demanding applications in the aerospace, automotive, medical, industrial, and recreational sectors.

As an AS9100/ISO9001 certified supplier, Thixocast brings 25+ years of production experience and a portfolio of >300 unique semi-solid castings to its role as a new Corporate Member in the global NADCA Die Casting Marketplace. The company aligns its mission with NADCA's commitment to industry growth, innovation, and problem-solving, aiming to lead in "production ready" semi-solid metal (SSM) casting. Learn more at thixocast.com.

Chapter News & New Members

Chapter 3 - Michigan

New Members: *Matt Bailey, Frech USA; Jason Balzer, Shape Corporation; Paul Boone, General Motors Corporation – R&D Technical Center; Paul Cook, Troy Design & Manufacturing; James Delisle, Zach Deming, both with Metal Mechanics Inc.; David Guaresimo, Shape Corporation; Troy Harig, New GLDC LLC; Raymond Jeske, Nexthermal Corporation; John Kison, Metal Mechanics Inc.; James Charles McPherson, Qin'an; John Miller, Lindberg MPH; Katie Ososki, Nexthermal Corporation; Ed Pleet, Joseph R. Ruder, both with Shape Corporation; Marcus Scherler, BuhlerPrince, Inc.; Spencer Schultze, Cascade Die Casting Group – Group Services/Corporate Headquarters; Madankumar Sivaji, Arcelor Mittal; Steven M. Swope, MANN+HUMMEL; Alex Turnbull, Maria Vanhaverbeck, both with Industrial Innovations Inc.; Chris Westra, Frech USA; Mark White, Shape Corporation; Brent J. Williams; Ben Woodrum, Cascade Die Casting Group – Great Lakes*

Chapter 5 - Chicago

New Members: *Jennifer Ciecierski, Voestalpine High Performance Metals – USA; Jim Clay, Voestalpine Eifeler Coatings; Jose De La Rosa, Dynamo Inc.; Jay Fine, CompX Security Products; Axel Franco, Voestalpine Eifeler Coatings; Caleb Giovannucci, Frech USA; Orlando Hernandez, Fisa North America Inc.; John Karras, PM Mold Company; Keith Leatherwood, Jerry Rewerts, both with Socitec US LLC; Sergio Rodrigues, Voestalpine Eifeler Coatings; Helen Salata, retired!; Paul Szymanski, PM Mold Company; Kilian Wagner, BOHLER Special Steels, EDRO Specialty Steels*

Chapter 6 - Cleveland

New Members: *Scott Hayduk, Luke Engineering & Manufacturing Co.; Aimen Huang, BOLE Machinery; Cory John, Hypertherm, Inc.; Jared A. Leese, Lutron Electronics Co., Inc.; Michael Rizzo, Jr., PIAD Precision Casting Corporation; Ed Scheid, Dixon Bayco*

Chapter 7 - New York

New Members: *Daniel Healy, Mokon; Audra Hier, PIAD Precision Casting Corporation; Andrzej Kalata, Keith L. Marden, both with Miniature Casting Corporation; Victor Ivan Miranda, Asco LP, a Division of Emerson; Ryan Oder, Quaker Houghton; Stephen Pontarelli, Paul Pontarelli, both with Brach Machine; Angela Toljan, Miniature Casting Corporation*

Chapter 10 - Ontario

New Members: *Jennifer Ciecierski, Voestalpine Additive Manufacturing Centre Ltd.; Nicolas Colantoni, Promatek Research Center – a Division of Cosma Part of Magna International; Mike Kaufman, Keegan Noxell, both with SURKUT Machine Technology Inc.; Roger Pascoa, Gnutti Carlo Canada Ltd. Light Metals Division (Ljunghall Canada); Brett White, FCA Canada Inc. – Etobicoke Casting Plant; Weijia Zheng, Voestalpine Additive Manufacturing Centre Ltd.*

Chapter 12 - Wisconsin

In June, Chapter 12 hosted the 2025 Annual Dave Williams Classic Golf Outing at Broadlands Golf Club in North Prairie, Wisconsin. The event had a good turnout with 50 people attending. Although no one was lucky enough to win the $10,000 hole-in-one challenge, it was a beautiful summer day, and everyone had lots of fun on the course with great networking opportunities!

The golf outing is a way to fundraise Chapter 12's scholarships for students interested in pursuing or advancing the die casting industry. The meeting after golfing included announcing these annual scholarship winners. Three students were selected and awarded a total of $3,500 in scholarships. Mehran Zare of UW-Milwaukee, John Davis of UW-Madison, and Garrett Lange of Missouri University of Science and Technology were all selected. Congratulations to the 2025 NADCA Chapter 12 scholarship recipients!

Chapter 12 – Swinging into summer! The full crew at this year's Annual Dave Williams Classic Golf Outing.

Details for this and all our events can be found at: www.nadca12.org

New Members: *John Cleary, Fall River Die Cast, A Division of The Fall River Group, Inc.; Allan Cottingim, Aludyne - Pleasant Prairie; Edward Hydukovich, General Motors Corporation - Bedford Casting Operations; Don Johnson, Aludyne - Pleasant Prairie; Tyler Newman, Badger Metal Tech Inc.; Darrell Sheets, Boyd Allenton, LLC; Daniel E. Skinner, Aludyne - Pleasant Prairie; Nick Sugars, Fall River Die Cast, A Division of The Fall River Group, Inc.; Meenakshi Sundaresan Muthuswamy, Johnson Outdoors; Mike Thompson, Madison-Kipp Corp.; Joshua West, Fall River Die Cast, A Division of The Fall River Group, Inc. Chapter 14 Louis Farchione, Worthington Enterprises; Tommy Lacey, Diehl Tool Steel; Eric Stelter, Stellantis - Kokomo Casting Plant*

Chapter 14 - S. Ohio

Please visit www.diecasting.org and click on Chapters under the Become a Member tab for details on upcoming events.

Chapter 15 - Southeastern

New Members: *Troy Cain, Whitehead Die Casting Inc.; Simon Prinoth, Alupress LLC; Venkatesh Rajagopalan, Sundaram Clayton USA LLC*

Chapter 16 - Minnesota

Minnesota Chapter 16 will be hosting its Annual Golf Outing on Monday, August 18, 2025. Once again, this event will take place at the beautiful Cannon Golf Club in Cannon Falls, MN. The annual event features a four person, 18-hole scramble. It begins with lunch at noon, and a shot gun start at 1 pm. We will return to the clubhouse for a buffet dinner and distribution of awards following golf. For more information and to find out how you can participate, contact Andrea Mudrey at andream@tcdcinc.com.

New Members: *Jim Gibbs, Nick Schadler, Tate Trenkamp, all with Dyersville Die Cast; David Kozman, Larry Winkler, both with Lethiguel USA Chapter 17 Ettore Comini, Jad Samra, Chiara Schivalocchi, Mattia Vezzola, all with NCC Die Casting LLC; Robert Gary Feagain, Jr., Bocar US, Inc.; Isaac Speckhart, Spartan Light Metal Products LLC*

Chapter 17 - St. Louis

Greetings from St. Louis, and we hope everyone is enjoying a wonderful summer. A reminder to those on the academic scholarship hunt, applications for the Chapter 17 Scholarship are available at www.nadcachapter17.org/scholarship and the deadline for submission is August 31, 2025.

The Chapter 17 Board has a nice slate of activities lined up for the Fall. The Alan Loeffelman Memorial Golf Outing is on Friday, September 12 at Birch Creek Golf Club in Union, MO. On October 14-15, Chapter 17 will sponsor Education Seminar EC-506: Engineering Die Cast Dies; with a Membership meeting featuring Swiss Steel the evening of October 14. The Board is excited by what awaits in the Fall so please plan to join us. Additional information is available at www.nadcachapter17.org.

Chapter 25 - Indiana

New Members: *Mark Arnold, Travis Coy, Temma Deguchi, Enrique Merelles Perez, Taishi Tsuwano, all with Ryobi Die Casting USA Inc.; Michael Baldwin, Dustin T. Dodds, Erin VanDusen, all with General Motors Corporation - Bedford Casting Operations; Cari Morrison Bear, Madison Precision Products; Henry Noll, Madison-Kipp Corp. - Richmond; Scott Smith, Frech USA; Steve Veteto, Madison-Kipp Corp. - Richmond*

Chapter 30 - Los Angeles

New Members: *Michael Beer, Martina Colasanti, Adam Hendey, all with SIR Robotics; Jennifer Ciecierski, BOHLER Special Steels, EDRO Specialty Steels Sage Frontella, Troy Pasko, Chris Rice, Jon Young, all with Thixocast, Inc.; Luis Jair Landeros P rez, Hyundai Wia Mexico S De R L De CV; Gabriel Leyva, Hyatt Die Cast & Engineering Corporation; Kris Welch, Voestalpine High Performance Metals - USA*

International Members: *Carlos Alberto Costa, University of Caxias Do Sul; Aron De La Torre, Jesus Garcia, Alejandro Mendoza, all with Asco LP, a Division of Emerson; Diego Figueroa, Samuel Zapata, both with Hyundai Wia Mexico S De R L De CV; Li LUNG HSU, Fu Chia Metal Casting; Zoltan Keri, K ri Technology Kft; Krishna Kumar Chandran, EKO Metal Industries SDN BHD*

2025 Corporate Members

CORPORATE DIE CASTERS

A

A & B Die Casting, a division of Benda Tool & Model Works, Inc.
Hercules, CA

ABCO Die Casters Inc.
Newark, NJ

ACE Precision International, LLC
Marshalltown, IA

Acme Alliance LLC
Northbrook, IL

ADC Aerospace
Buena Park, CA

Advance Die Cast LLC
Milwaukee, WI

Ahresty Wilmington Corp.
Wilmington, OH

Aludyne - Pierceton Plant
Pierceton, IN

Aludyne - Pleasant Prairie
Pleasant Prairie, WI

Alupress LLC
Laurens, SC

Anderson Die Casting Co.
Englewood, CO

Anderton Castings De Monterrey
Apodaca NL

Apex Aluminum Die Casting Co.
Piqua, OH

Asco LP, a Division of Emerson
Florham Park, NJ

Astronics PECO Inc.
Clackamas, OR

Auto Cast Inc.
Grandville, MI

B

Blue Ridge Pressure Castings
Lehighton, PA

Bocar US, Inc.
Huntsville, AL

Boyd Allenton, LLC
Allenton, WI

Bridgeport Fittings, LLC a Division of NSI Industries
Stratford, CT

C

C Palmer Die Casting Inc.
Oakland, MD

Caldwell Casting Company
Cambridge, MD

California Die Casting Inc.
Ontario, CA

Canimex Incorporated
Drummondville, QC, Canada

Cascade Die Casting Group - Atlantic
High Point, NC

Cascade Die Casting Group - Great Lakes
Sparta, MI

Cascade Die Casting Group - Group Services/ Corp. HQ
Grand Rapids, MI

Cascade Die Casting Group Inc. - Mid-State
Grand Rapids, MI

Cast Products Inc.
Norridge, IL

Cast Specialties Inc.
Warrensville Heights, OH

Centracore de Mexico
Guanjuato, Mexico

Centrifugal Castings*
Milwaukee, WI

Chicago White Metal Casting Inc.
Bensenville, IL

CMP Group Ltd.
Delta, BC, Canada

CompX Security Products
Grayslake, IL

Consolidated Metco Inc.
Clackamas, OR

Cosma Casting Michigan, Cosma International, Magna International
Battle Creek, MI

Craft Die Casting Corporation*
Chicago, IL

D

Dart Casting, Inc.
Alsip, IL

DeCardy Diecasting Co.
Chicago, IL

Deco Products Co.
Decorah, IA

DyCast Specialties Corp.
Starbuck, MN

Dyersville Die Cast
Dyersville, IA

Dynacast International, LLC - Elgin Plant
Elgin, IL

Dynacast International, LLC - Germantown Plant
Germantown, WI

Dynacast International, LLC - Global Headquarters
Charlotte, NC

Dynacast International, LLC - Lake Forest Plant
Lake Forest, CA

Dynacast Limited
Peterborough, ON, Canada

Dynacast Mexico SA De CV
Obispo, Cuautitlan, Mexico

E

Empire Die Casting
Macedonia, OH

F

FabCast Solutions SRL De CV*
San Luis Potosí Mexico

Falcon Lakeside Manufacturing
Eau Claire, MI

Fall River Die Cast
Germantown, WI

FCA Canada, Inc. - Etobicoke Casting Plant
Toronto, ON, Canada

Fielding Mfg.-Zinc Diecasting Inc.
Cranston, RI

Fort Recovery Industries Inc.
Fort Recovery, OH

FT Precision
Fredericktown, OH

G

G & M Die Casting Co. Inc.
Wood Dale, IL

General Die Casters Inc.
Twinsburg, OH

General Motors Corporation - Bedford Casting Operations
Bedford, IN

General Motors Corporation - R&D Technical Center
Warren, MI

GF Casting Solutions*
Augusta, GA

Gibbs Die Casting Corporation
Henderson, KY

Gnutti Carlo Canada Ltd. Light Metals Division
Huron Park, ON, Canada

Greenfield Industries Inc.
Freeport, NY

H

Heritage Die Casting Co.
Denver, CO

HF Manufacturing*
Union, MO

Honda De Mexico - Celaya Engine Plant
Celaya, Mexico

Honda De Mexico - Transmissions
Celaya, Mexico

Honda Development Manufacturing of America - Alabama Auto Plant - ALDC
Lincoln, AL

Honda Development Manufacturing of America - Anna Engine Plant: ALDC
Anna, OH

Honda Development Manufacturing of America - Auto Development Center: Aluminum Division
Raymond, OH

Honda Development Manufacturing of America - Production Engineering
Anna, OH

Honda Development Manufacturing of America - TMPG: ALDC
Tallapoosa, GA

Honda Development Manufacturing of America - TMPO: ALDC
Russells Point, OH

Honda North America - Purchasing
Marysville, OH

Honda of Canada Mfg. Inc. - Engine Plant: ALDC
Alliston, ON, Canada

Honda Power Equipment - Aluminum Die Cast
Swepsonville, NC

Hyatt Die Cast & Engineering Corporation
Cypress, CA

Hyundai Wia Mexico S De R L De CV
Nuevo Leon, Mexico

J

J&M Precision Die Casting
Elyria, OH

K

Kamtek Casting, Inc. - a Division of Magna International
Birmingham, AL

Kason Industries Inc.
Shenandoah, GA

Kinetic Die Casting Inc.*
North Hollywood, CA

Kobelt Manufacturing Company Limited
Surrey, BC, Canada

L

Lakeside Casting Solutions
Monroe City, MO

Lamar Tool & Die Casting Inc.*
Modesto, CA

Le Sueur Incorporated
Le Sueur, MN

Leech Industries - Division of Leech Holdings, LLC*
Meadville, PA

Linamar Light Metals - Mills River (LLM-MR)
Arden, NC

M

Madison Precision Products
Madison, IN

Madison-Kipp Corp.
Madison, WI

Madison-Kipp Corp. - Richmond
Richmond, IN

Mag-Tec Casting Corp.
Jackson, MI

Mercury Castings - Div. of Mercury Marine, WI
Fond Du Lac, WI

Meridian Lightweight Technologies Corporate Head Office
Plymouth, MI

Meridian Lightweight Technologies Inc. - GTC
Strathroy, ON, Canada

Meridian Technologies Inc. - Magnesium Products of America
Eaton Rapids, MI

Meridian Technologies Mexico
Ramos Arizpe, Coahuila, Mexico

Michigan Automotive Compressor, Inc.
Parma, MI

Michigan Die Casting LLC
Dowagiac, MI

Midwest Die Casting Corp.
Milwaukee, WI

Millison Casting Technology LLC*
Sallisaw, OK

Miniature Casting Corp.
Cranston, RI

Mumford Companies - Metal Casting Division
Chicago, IL

N

Nebraska Aluminum Castings Inc.
Hastings, NE

New GLDC LLC
Muskegon, MI

O

Omni Die Casting Inc.
Massillon, OH

Ozark Die Casting Co.
Saint Clair, MO

P

Pace Industries, Cambridge
North Billerica, MA

Pace Industries, Chihuahua
Chihuahua, Mexico

Pace Industries, Corporate Headquarters
Rochester, MI

Pace Industries, Grafton
Grafton, WI

Pace Industries, Harrison Aluminum
Harrison, AR

Pace Industries, Harrison Zinc
Harrison, AR

Pace Industries, Jackson
Jackson, TN

Pace Industries, Latrobe
Loyalhanna, PA

Pace Industries, Maple Lake
Maple Lake, MN

Pace Industries, Port City
Muskegon, MI

Pace Industries, Saltillo
Saltillo, Mexico

Pacific Die Casting Corporation
Vancouver, WA

PHB - Die Casting Div.
Fairview, PA

PIAD Precision Casting Corporation*
Greensburg, PA

Polaris Inc. *
Monticello, MN

Prestige Casting Inc.
Englewood, CO

Production Castings Inc.
Fenton, MO

Promatek Research Center - a Division of Cosma Part of Magna Intl.
Brampton, ON Canada

R

RCM Industries Inc. - Aallied Die Casting Co. of Franklin Park
Franklin Park, IL

RCM Industries Inc. - Aallied Die Casting Co. of NC
Rutherfordton, NC

RCM Industries Inc. -Corporate Headquarters
Franklin Park, IL

RCM Industries Inc. - Imperial Die Casting Co.
Liberty, SC

RCM Industries Inc. - Inland Die Casting Co.
Wheeling, IL

Ryobi Die Casting Mexico
Irapuato, Guanajuato, Mexico

Ryobi Die Casting USA Inc.
Shelbyville, IN

S

Schlage De Mexico
Baja California, Mexico

SDC Incorporated
Sullivan, MO

Shape Corporation
Grand Haven, MI

Shawnee Specialties Incorporated
Eau Claire, MI

Simalex Manufacturing Company Ltd.
Langley, BC, Canada

SKS Die Casting & Machining Inc.
Alameda, CA

Soldy Manufacturing Company
Schiller Park, IL

SpaceX
Hawthorne, CA

Spartan Light Metal Products Inc.
Sparta, IL

Spartan Light Metal Products LLC
Hannibal, MO

Spartan Light Metal Products -Corporate Office
Hannibal, MO

Spartan Light Metal Products LLC
Mexico, MO

Spartan Light Metal Products - LMP Plant
Mexico, MO

Stellantis - Kokomo Casting Plant
Yorktown, IN

STRATTEC Component Solutions
Milwaukee, WI

Sundaram - Clayton Limited
Deerfield, IN

T

TAC Manufacturing Incorporated
Jackson, MI

Team Industries - Detroit Lakes
Detroit Lakes, MN

Technical Die-Casting Inc.
Winona, MN

TESLA Motors
Lathrop, CA

Thixocast, Inc.
Lakewood, CO

Top Die Casting Company
South Beloit, IL

TRU Die Cast Corp.
New Troy, MI

Twin City Die Castings Co.
Minneapolis, MN

Twin City Die Castings Co.
Monticello, MN

Twin City Die Castings Co.
Watertown, SD

Twinsburg Manufacturing Facility, a Division of AAM
Twinsburg, OH

W

Walker Die Casting
Lewisburg, TN

Whitehead Die Casting Inc.
Gainesville, GA

Y

Yamada North America
South Charleston, OH

CORPORATE OEM

H

Humanscale Corporation *
Piscataway, NJ

R

Robert Bosch *
Guadalajara, Jalisco, Mexico

CORPORATE SUPPLIERS

A

AarKel Tool & Die Inc.
Wallaceburg, ON, Canada

Absolute Machinery Corporation
Worcester, MA

Alcoa USA Corp.
Alcoa, TN

Allied Metal Co.
Chicago, IL

Anviloy By Astaras Inc.
Largo, FL

Audubon Metals LLC
Henderson, KY

Automation Systems & Design
Dayton, OH

B

B & L Information Systems Inc.
Bridgman, MI

Badger Metal Tech Inc.
Jackson, WI

Bedford Machine & Tool Inc.
Bedford, IN

BGH Specialty Steel*
Macedonia, OH

Bholster Tech*
Toronto, ON, Canada

BOLE Machinery *
Stow, OH

BOHLER
Walnut, CA

Brach Machine
Batavia, NY

Brondolin North America
Benton Harbor, MI

BuhlerPrince Inc.
Holland, MI

C

Cal-Miser Aluminum Systems Inc.
Rock Island, IL

Castec Corporation
Indianapolis, IN

Castool Heat Treat
Newmarket, ON, Canada

Castool Tooling Systems
Uxbridge, ON, Canada

Chem-Trend Ltd. Partnership
Howell, MI

Colosio Die-Casting Machines & Accessories
Minneapolis, MN

Conticast Hormesa LLC
Weston, FL

Cottingham & Butler
Dubuque, IA

Custom Alloy Sales, Inc.
City of Industry, CA

D

Daido Steel Co. Ltd.
Hebron, KY

Daiichi Jitsugyo (America) Inc.
Wood Dale, IL

Delaware Dynamics LLC*
Muncie, IN

Die Cast Press Manufacturing Co.
Paw Paw, MI

Diehl Tool Steel
Cincinnati, OH

Die-Pro LLC
Sheboygan Falls, WI

DieTech & Engineering Inc.
Grand Rapids, MI

DISA Group
LaGrange, GA

DME Company
Madison Heights, MI

DTP Diecast Solutions LLC
Florence, AL

Dynamo Inc.
LaGrange, IL

E

Eastern Alloys Inc.
Maybrook, NY

EcoShot, Inc.
Indianapolis, IN

EGA Spectro Alloys
Rosemount, MN

EKK, Inc.
Farmington Hills, MI

Ellwood Specialty Steel
New Castle, PA

Exco Engineering
Newmarket, ON, Canada

F

Fill USA, Inc. *
Plymouth, MI

Fisa North America Inc.
Elk Grove Village, IL

Flow Science
Santa Fe, NM

FONDAREX USA
Schoolcraft, MI

Frech USA Inc.
Michigan City, IN

Fremar Industries
Brunswick, OH

G

General Die & Engineering Inc.*
Grand Rapids, MI

Godfrey & Wing Inc.
Aurora, OH

H

HA International, LLC
Westmont, IL

Hanson International *
Saint Joseph, MI

H Gerber Consulting
Evanston, IL

Henkel Corporation
Madison Heights, MI

Herco, LLC
Auburn Hills, MI

High Temperature Systems Inc.
Chagrin Falls, OH

Hildreth Mfg LLC
Marion, OH

Hill & Griffith Co.
Cincinnati, OH

HTS International Corporation
Knoxville, TN

I

IDRA North America
Kokomo, IN

IECI Srl
Haltom City, TX

Imperial Zinc Corp. & Imperial Aluminum Corp.
Chicago, IL

Inductotherm Corp.
Rancocas, NJ

Industrial Innovations
Grandville, MI

Italpresse Gauss
Lagrange, GA

J

J&S Chemical Corp.
Canton, GA

K

Kind Specialty Alloys LLC
Youngstown, OH

L

LaFrance Manufacturing Co.
Maryland Heights, MO

LK World
Edinburgh, IN

Lethiguel USA
Rogers, MN

LIFT - American Lightweight Materials Manufacturing Innovation Institute*
Detroit, MI

Lincoln Electric Automation
Columbus, OH

Lindberg MPH
Riverside, MI

Luke Engineering & Manufacturing Co.
Wadsworth, OH

M

M & I Machine
Benton Harbor, MI

MAGMA Foundry Technologies Inc.
Schaumburg, IL

Mangas-AarKel Tool and Engineering Inc.
Muscle Shoals, AL

Meitler Consulting Inc.
Tonganoxie, KS

Metal Conversions Ltd.
Mansfield, OH

Metal Mechanics Inc.
Schoolcraft, MI

Metalworks Recycle-Reload, LLC
Bowling Green, KY

Mokon
Buffalo, NY

MORESCO USA Inc.
Fountain Inn, SC

N

NCC Die Casting LLC
Haltom City, TX

New Brunswick Plating Inc.
New Brunswick, NJ

Nexthermal Corporation
Battle Creek, MI

Norican Group
LaGrange, GA

Novacast Solutions USA Inc.
Naperville, IL

O

OEE Companies
North Oaks, MN

Oerlikon Balzers Coating USA
Rock Hill, SC

The Oilgear Company*
Traverse City, MI

P

Patterson Mold & Tool
Saint Charles, MO

Paulo
Saint Louis, MO

PCS Company
Fraser, MI

Phygen Coatings Inc.
Minneapolis, MN

PremierMetals *
Highland Park, IL

Progressive Components
Wauconda, IL

Prolong Surface Technologies
West Chicago, IL

Pyrotek Inc.
Columbia City, IN

Q

Quaker Houghton
Dayton, OH

R

Regloplas Corporation
Sodus, MI

Rochester Aluminum Smelting Canada Ltd.
Concord, ON, Canada

Rohde Brothers, Inc.*
Plymouth, WI

Rosler Metal Finishing USA LLC*
Battle Creek, MI

S

Sandvik Machining Solutions AB*
Mebane, NC

Sanji Industries
Celina, OH

Sanyo Special Steel USA Inc.
New York, NY

SAPP Inc.
Edinburgh, IN

The Schaefer Group Inc.
Dayton, OH

Shibaura Machine Company, America
Elk Grove Village, IL

SIJ Metal Ravne - SIJ Americas
Hazlet, NJ

SIR Robotics, Inc.*
Sacramento, CA

Socitec US LLC*
Broadview, IL

Storvik Group*
Tempe, AZ

Stotek Inc. *
Pewaukee, WI

StrikoWestofen America
Kalamazoo, MI

Sun Metalon
Cambridge, MA

Sun Steel Treating, Inc.
South Lyon, MI

Superior Aluminum Alloys
New Haven, IN

SURKUT Machine Technology, Inc.
Mount Brydges, ON, Canada

Swiss Steel Canada, Inc.
Mississauga, ON, Canada

Swiss Steel USA, Inc.
Carol Stream, IL

T

Techmire
Pointe-Claire, QC, Canada

Therm-Tech of Waukesha
Waukesha, WI

Titus Group / Titus Technologies*
Columbia City, IN

TOYO Machine America, LLC
The Villages, FL

Transmet Corporation*
Columbus, OH

Trebi North America Inc.*
Muncie, IN

Tvarit GmbH *
Ottawa, IL

2025 CORPORATE MEMBERS

U

UBE Machinery Inc.
Ann Arbor, MI

Uddeholm USA
Elgin, IL

Ultraseal America Inc.
Ann Arbor, MI

United Tool and Mold*
Liberty, SC

V

Valor Alloys, LLC
Houston, TX

Visi-Trak Worldwide LLC
Valley View, OH

voestalpine Additive Manufacturing Centre Ltd.
Mississauga, ON, Canada

voestalpine Eifeler Coatings Technology
Saint Charles, IL

voestalpine High Performance Metals Corp.
Elgin, IL

W

The Wasmer Company*
Sheboygan, WI

Wheelabrator Group
LaGrange, GA

Y

YIZUMI-HPM Corp.
Iberia, OH

Yushiro Manufacturing America, Inc.
Shelbyville, IN

Z

Zeman Tool & MFG*
Waukesha, WI

Zitai USA - Die Casting Equipment Group
Highland Park, IL

*New Corporate Member Companies

New Products, Services & Solutions

J&S Announces TurboCast 8795, TurboCast 8795GR, TurboCast 8797

J&S is thrilled to introduce our latest innovation, a line of patent-pending, liquid polymer based plunger lubricants, formulated to extend plunger tip and sleeve life by greater than 65%. After extensive laboratory research and rigorous customer testing, we've developed a solution that not only improves the life of plunger tips & sleeves, but also significantly reduces machine downtime by lowering the frequency of replacements.

Key Benefits:
- Over 65% Increase in Plunger Tip & Sleeve Life
- Patent-Pending Technology: Unique, cutting-edge formulas that's set to revolutionize the die casting industry
- Cost Savings: Fewer replacements needed, leading to reduced maintenance expenses
- Improved Efficiency: less downtime, reduced scrap, and more productivity
- Easy to Implement: Use on copper beryllium or steel tips with or without ring systems. It can be applied inside the shot sleeve or over the plunger tip.

Case Study:

CHALLENGE:

A well-known die casting factory casting a structural alloy was trying to increase plunger tip and plunger sleeve life. The structural alloy has a strong affinity to stick to the steel plunger sleeve causing excessive wear and friction to the tip. This aluminum soldering in the plunger sleeve contributed toward reducing the life of the plunger tip and sleeve.

SOLUTION:

J&S Chemical introduced their new patent-pending synthetic polymer-based plunger lubricant which provides superior boundary lubrication between the molten aluminum and steel. The lubrication characteristics reduced friction between the plunger tip and plunger sleeve providing enormous cost savings to their customers.

RESULTS:
- 18 tips/month -> 5 tips/month
- Annual tip savings: ~$360,000 (direct costs)
- 72% + increase in plunger tip life
- 1,470 cycles per tip -> 4,410 cycles per tip
- 60% decrease in annual plunger tip cost
- 66% decrease in machine downtime
- Reduced scrap due to less cold startups

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Industry News

RYOBI DIE CASTING (USA) CELEBRATES 40TH ANNIVERSARY

Shelbyville, IN - Ryobi Die Casting (USA), Inc. observed its 40-year anniversary with a ceremony at their Shelbyville campus. Ryobi was founded in June 1985 with a small group of associates and has seen that number grow to more than 950, with a considerable number who have been a part of the team for more than 30 years.

This monumental celebration included two days of events. The observance began with a formal ceremony that includes Indiana Lt. Governor Micah Beckwith, Mr. Masashi Mizobuchi, Consul General of Japan in Chicago as well as local officials on Friday, June 13, and concluded with an employee-family festival on Saturday, June 14.

"This occasion is a true testament to the devoted men and women who are the foundation of our success," said Ryan Willhelm, President and COO, of Ryobi Die Casting. "We have always strived to make the highest quality products, and we look forward to continuing to serve our customers with the best years to come."

To read more about Ryobi visit http://ryobidiecasting.com/.

ITALPRESSEGAUSS EMBARKS ON A NEW JOURNEY - MOVES FORWARD INDEPENDENTLY

Italy - Following a recent strategic review of Norican Group's various businesses, it was decided to streamline its technology portfolio with a different organizational setup. Consequently, ItalPresseGauss will separate from the rest of Norican Group and transition to independence through a management buyout (MBO).

While the company will now be independently managed, it will continue to benefit from the backing of Altor - the same owners that have supported the company this far through Norican Group.

This strategic move will give IPG more agility, flexibility, and autonomy to drive innovation, accelerate decision-making, and better serve its customers.

The company's operation on its new and independent journey offers several key advantages for customers:

Increased Agility and Flexibility

IPG can move faster and more decisively in response to market changes, ensuring that customers receive timely and innovative solutions tailored to their requirements.

Enhanced Decision-Making Power

With a streamlined leadership structure, IPG can make even more business focused and faster decisions, allowing for a more responsive and dynamic approach to customer needs and industry trends.

Focus on Innovation

As a standalone entity, IPG can allocate and focus its resources and efforts on continuous innovation on products and solutions. Customers will benefit from cutting-edge products and services that push the boundaries of what's possible in die casting.

Stronger Customer-Centric Approach

The move allows IPG to closely align with its clients' expectations, providing even more tailored solutions and offering a personalized experience that meets the demands of today's market with advanced and uniquely configured die casting solutions.

Improved Financial Performance

Operating independently provides ItalPresseGauss with greater financial freedom to allocate resources effectively, resulting in enhanced efficiency and potential for long-term growth.

Die Casting Technology Center in Italy

IPG will continue to serve customers globally and will now re-center the core of its technological innovation and customer support within the IPG Technology Center in Italy with full responsibility of product technology, application development and sales and service processes. This facility, located where the company has always been based, will serve as a hub for the development and execution of advanced technological solutions, technical support, service activities and spare part logistics.

"We are excited about this new chapter for IPG," said Marco Gandini, CEO of ItalPresseGauss. "This move is all about being more responsive to our customers and market needs. We believe that by becoming more independent, and with a simplified organization setup, we can continue to innovate and deliver the best possible value to our stakeholders. Together with our Chairman, Peter Holm Larsen, we are extremely committed to succeed in this new challenge and opportunity, supported by a strong team of motivated professionals and young talents."

As part of its new journey, IPG remains committed to its core values of excellence, integrity, and customer satisfaction. The company is confident that this strategic move will enable it to effectively respond to market challenges and seize new opportunities for growth.

TRAXYS, PURE ALUMINUM, CONSORTIUM METALS LAUNCH SUSTAINABILITY-FOCUSED PARTNERSHIP

New York, NY, and Saranac, MI – Traxys, a global leader in the physical trading of metals and natural resources, Pure Aluminum, a fast-growing aluminum processor based outside Grand Rapids Michigan and Consortium Metals, a sales and marketing specialist in the secondary aluminum industry, today announced a strategic partner-

ship to recycle aluminum scrap and manufacture value-added aluminum products. The collaboration is designed to supply critical materials to sectors including the steel, aluminum die casting, and primary aluminum industries, with a focus on producing Secondary Aluminum Spec Alloys, Recycled Secondary Ingot (RSI), Wrought Alloys, and Aluminum Deoxidizers.

Under the terms of the partnership, Traxys will manage global sourcing and finance, marketing, logistics, and customer relationships, while Pure Aluminum will operate and expand its state-of- the-art production facility in Saranac, Michigan. The plant is currently undergoing a multi-phase capacity expansion, with installations including rotary and reverberatory furnaces. At full capacity, the facility is expected to process over 30 million pounds of aluminum scrap per month.

"This partnership supports our mission to serve the circular economy and deliver critical metals to our global customer base," said Mark Kristoff, CEO of Traxys. "We're proud to combine Traxys' market reach and financing capabilities with Pure Aluminum's operational strength and decades of experience in the secondary markets, to scale up a domestic and sustainable aluminum production."

"Pure Aluminum was conceived by my desire to build a state-of-the-art secondary aluminum plant that incorporates the latest ultra-efficient furnaces and automation to enhance efficiencies and safety" according to Mark Clark, CEO/Owner of Pure Aluminum and Franklin Metals. "It was also really important to me that our Greenfield plant's sustainability platform is an industry leader ensuring the highest environmental standards and carbon footprint reduction initiatives, so our customers do not have to worry about legacy issues."

The venture will serve growing demand for recycled and specialty aluminum products, driven by increasing regulatory pressure for low-carbon materials and rising consumption across North America's manufacturing base. All products will be customized to meet tight chemical and dimensional specifications and delivered through a streamlined, customer-focused supply chain.

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