During its celebrated 40-year history, the annual design competition staged for the North American die casting industry has evolved to keep pace with the latest manufacturing trends. In 2013, the emergence of “re-shoring”—with OEM companies returning to the U.S. for die casting production because of rising energy, tooling and related business costs was on everyone’s radar. Each year, the Die Casting Design Competition sponsored by the North American Die Casting Association (NADCA) showcases cutting-edge developments by many of the industry’s pre-eminent companies.

“This year’s winning castings exemplify the continued advancement in die casting capabilities,” said NADCA President Daniel Twarog. “There are advances not only in geometric complexity, quality and cost savings, but in structural applications as well. The entries in this year’s casting competition had a broad array of applications, from rugged heavy section components to delicate ultra-thin section components for various markets. There was also a shift toward more structural die castings among the 2013 entries.”

New Award Categories Added
Categories in the competition are grouped by material and include aluminum, magnesium, zinc and other alloy families. New categories have been added, including squeeze casting and aluminum structural die casting. Both custom and captive casters are eligible. For each category, there are four equally weighted criteria: ingenuity of casting and/or product design, overall quality, cost savings as compared to other manufacturing processes and the part’s contribution to expanding the market for die castings. A panel of independent judges, acknowledged experts, with no ties to eligible casters, choose the winners.

“The design competition is an excellent forum for companies to showcase their capabilities,” said President Twarog. “The recognition a company receives from this awards competition is a unique opportunity to attract more customers and greater market share.”

NADCA will honor this year’s award winners at its 2013 Die Casting Design Competition Luncheon on Monday, September 16 at 12:15 pm - 2 pm during the Die Casting Congress & Tabletop programming in Louisville, KY. The luncheon is an exceptional opportunity to meet this year’s winners and learn more about their innovations. You can register to attend the luncheon (for only $25) at www.diecasting.org/congress/registration.

To Compete in 2014
Innovative die casting design entries may be entered in the 2014 Die Casting Design Competition. All award-winning castings will be displayed next year at NADCA’s Die Casting Congress, September 22-24, in Milwaukee, WI.

The competition is open to die castings from aluminum, magnesium, zinc, semi-solid & squeeze, and other alloy families. Within each category, there are more specific levels: aluminum under 1 pound; aluminum 1-to-10 pounds; aluminum over 10 pounds; aluminum squeeze/semi-solid; zinc under 6 ounces/ non-electroplated; zinc over 6 ounces/non-electroplated; zinc any size with decorative finish; magnesium over 0.5 pound; and magnesium under 0.5 pound.

Any number of die castings may be entered in the awards competition. Complete and submit a separate entry form for each casting or assembly of castings. As-cast entries are required. The metal surface cannot be improved or concealed by tumbling, shot blasting, coating or other surface treatments. NADCA encourages sending secondary processed samples, but these must be in addition to the as-cast parts.

Castings submitted for the competition MUST have approval in writing from the customer allowing NADCA to use the casting(s) in exhibitions and magazine articles. When possible, information and photographs describing the design process will be published in Die Casting Engineer magazine, but because of proprietary reasons, not all information can be shared. Such exceptions should be noted on your entry form.

You can download the entry form at www.diecasting.org/castings/competition. All entries must be postmarked by June 30, 2014. For more information, contact: Dan Twarog at twarog@diecasting.org. Send entries, along with sample castings and descriptions, to:

NADCA - 2014 Casting Competition
241 Holbrook Drive • Wheeling, IL 60090
Aluminum Die Casting Under 1 lb.

Caster: Aallied Die Casting Company of Illinois
3021 Cullerton Drive
Franklin Park, IL 60131

Caster Award Nominees: Ryan Quinn, Sales & Marketing Engineer

Customer: Name withheld

Customer Award Nominees: Name withheld
Caster’s Comments: “The work conducted by our engineering team has created a success story of re-shoring by providing quality and cost benefits through cooperative engineering. Aallied inherited a part from overseas with many existing defects and drastically improved the castability of the part.”

Challenge: The strip cut stripper strips the shredded strips of paper in paper shredders. The customer is in the office supplies industry and was producing paper shredders in China, but started running into quality problems there. The customer wanted high-end quality and cost benefits and asked Aallied Die Casting for a solution. The strip cut stripper’s main defect was poor fill in the ribs, causing premature cracking and part failure. The design also had a parting line around the arms, necessitating an expensive trim die or an added hand operation to remove the flash line.

Solution: To improve quality, feeder overflows were added between the ribs to keep more heat in the rib area of the die and improve fill. The cooling system design utilized hot oil in the rib area to maintain heat in the ribs while cooling the thick sections with water. The caster also worked with the customer to space the arms so that the flash out between them could be trimmed with a conventional trim die, helping to lower casting cost.

About the Die Caster: Aallied Die Casting Company of Illinois is a division of RCM Industries, Inc., located in Franklin Park, IL. They serve diverse industries including automotive, computer/electronics, industrial, furniture, lawn and garden, and others. Beyond conventional high-pressure die casting and squeeze-casting capabilities, they also offer numerous post-casting processes such as CNC machining, light-assembly, heat treating (artificial aging), sanding/polishing/buffing, painting (wet/powder/e-coat), anodizing, and plating (decorative and hard chrome finishes).
Magnesium Over .5 lb.

**Caster:** Chicago White Metal Casting, Inc.
649 N. Route 83
Bensenville, IL  60106

**Caster Award Nominees:** Rob Malarky, Engineering Project Manager

**Customer:** Christie Digital

**Customer Award Nominees:** Eric Voss, Advanced Product Developer, Mechanical
Caster’s Comments: “We die cast the enclosure as a single piece. The design was optimized for the customer for easier manufacturing.”

Challenge: The light engine enclosure is used for internal light production and focusing in a projector and includes components such as prisms, mirrors, and boards, etc. It was originally produced by a Thixomold process in two separate pieces and needed assembly, which increased manufacturing and assembly time and cost.

Solution: The project team designed a die casting part using magnesium for the enclosure as a single piece. This single-piece design significantly reduced the cost of assembly.

About the Die Caster: Established in 1937, Chicago White Metal Casting (CWM) is located in Bensenville, IL, a Chicago suburb within close proximity to O’Hare Airport. The company specializes in aluminum, magnesium, zinc and miniature Zn and ZA die castings. CWM is committed to defect prevention in all departments, with a unified approach to improve design and production. CWM is the only U.S. custom die caster to receive National Environmental Achievement recognition from the EPA.
Zinc, Any Size with Decorative Finish

**Caster:** Brillcast, Inc.
3400 Wentworth Drive, SW
Grand Rapids, MI 49519

**Caster Award Nominees:** Brad Doornbos, V.P. of Sales & Marketing

**Customer:** Konami Gaming Las Vegas

**Customer Award Nominees:** Rich Johnson
Caster’s Comments: “Brillcast, Inc. was able to reduce the tooling cost and the piece price of the base cab cover, eliminating any need for assembly.”

Challenge: This part is the main front door on the bottom half of a slot machine. It gives lower section belly access for the largest volume slot machine. Previously, several pieces were welded together to create this part. Tooling and piece price were too costly and assembly was required.

Solution: To eliminate assembly and reduce costs, Brillcast, Inc. created a single die casting part using zinc die casting with a decorative finish.

About the Die Caster: Brillcast, Inc., based in Grand Rapids, Michigan, is a leader in the zinc die casting industry, with TS certification from Intertek. The company manufactures small precision zinc castings and very large decorative zinc die cast components used by the most demanding customers in their industry. Brillcast is one of the few zinc die casting companies with machines (35 machines) ranging from 8 to 900 tons.
Zinc Over 6 oz. Non-Electroplated

Caster: Cast Products, Inc.
4200 N. Nordica Avenue
Norridge, IL  60706

Caster Award Nominees: David Haener, Engineering Manager

Customer: The Dometic Corp.

Customer Award Nominees: Dometic Engineering Team
Caster’s Comments: “Our customer had a 622% cost savings with this zinc component over the previous steel weldment. The product now has the industry’s longest product life expectancy.”

Challenge: This casting is a gear housing for a new, state-of-the-art RV awning. The previous housing was a multi-piece steel weldment, which had unwanted welding and machining costs. The objective was to lower production costs while improving the product’s safety features and durability.

Solution: Joint-engineering teams designed a new awning to eliminate welding. At the same time, their component design met a long list of requirements of OEMs and end-users. The new awning component has solid locking features to prevent accidental deployment, allows easy retrofitting, and reduces the overall awning weight to meet government-mandated GVW requirements.

About the Die Caster: Cast Products, Inc., located in Norridge, IL, provides design, engineering and production of zinc and aluminum components. Committed to casting innovation, Cast Products has been a frequent winner of the NADCA International Design Competition.
Magnesium Die Casting Over .5 lb.

Caster: Twin City Die Castings Company
1070 SE 33rd Avenue
Minneapolis, MN  55414

Caster Award Nominees: Scott Braaten, Program Manager, Engineering Team

Customer: Fujifilm Sonosite, Inc.

Customer Award Nominees: Keith Williams, Manager, Mechanical Systems
Caster’s Comments: “The thin wall design minimizes the overall product weight. Most importantly, this enclosure makes the product highly durable. It comes with an industry-leading five-year warranty.”

Challenge: The customer was seeking a lighter weight enclosure for a new design of their ultrasound system. It was extremely important that the housing provides protection of internal electronic components, and appropriate thermal properties, EMI shielding, and stability.

Solution: For the new design, the benefits of magnesium die casting were compared to Thixomolding. It was determined that die cast magnesium would provide the required properties. Castings were designed with thin walls to minimize weight. A cross-hatched, rib-like pattern was added to improve flow and fill.

About the Die Caster: Twin City Die Castings Company (TCDC) is a full-service provider of precision aluminum and magnesium die castings. Family owned since its founding in 1919, TCDC has three U.S. locations and a joint venture in India. TCDC continually invests in technology and modernization initiatives. The company’s high pressure die casting machines range in size from 350 to 1000 tons.
Aluminum Die Casting Over 10 lb.  
(Squeeze Casting)

Caster:  Aallied Die Casting Co. of North Carolina  
401 Aallied Drive  
Rutherfordton, NC 28139

Caster Award Nominees:  Aaron Nowak, Engineer

Customer:  Name withheld

Customer Award Nominees:  Name withheld
Caster’s Comments: “By having the confidence to design outside the conventional box, the Aallied team pushed the envelope of typical high-pressure die casting, and designed a successful process, which benefited all companies involved. The quality of castings was greatly enhanced and with the higher production rates and a reduced piece price to the customer, this made for an even more attractive and successful project.”

Challenge: This part is the bellhousing mount from the engine to transmission that houses the clutch. It was originally made from cast iron. The heavy-duty truck market looks for any advantage of reduced weight for fuel economy and greater cargo capacity, so a lighter weight material was needed. The customer was also having quality issues with their supplier, such as porosity and leakers. They were also dealing with rapidly increasing volumes.

Solution: The Aallied team saw the project in a different light from conventional die casting. A typical design using a fan gate into the outer perimeter of bellhousing would have been a larger die, requiring a bigger die cast machine. A fan gate scenario also did not address the critical area of the transmission face mount and issues with supplying oil to the bearings. Instead, a three-plate sprue design was the solution. Massively thick gates and optimal flow, including a very slow fill time, and a higher than usual metal pressure produced a sound casting to solve the previous porosity and leaker problems.

About the Die Caster: Aallied Die Casting Company of North Carolina is a division of RCM Industries, Inc. Located in Rutherfordton, NC, Aallied offers conventional high pressure die casting and squeeze-casting capabilities, with machine tonnage of 800 to 2000 tons. Aallied also provides its customers with numerous post-casting operations.

Part: Clutch Housing
Material: 380 AL
Weight: 28 lbs.
End Market: Heavy Duty Trucks (Semi Trucks)
Aluminum Die Casting Over 10 lb.

Caster: Microcast Technologies Corp.
1611 West Elizabeth Ave.
Linden, NJ 07036

Caster Award Nominees: Edward Wasowski, Engineering Manager

Customer: H.E. Williams, Inc.

Customer Award Nominees: Owen VandeVelde, Chris Papa
Customer’s Comments: “LED lighting has a substantial advantage over standard lighting systems in that it requires far less electricity (50% of standard) and 60% longer life. The tools designed by Microcast Technologies allow the inserts to be changed out to make four versions of the casting using one mold base set-up.”

Challenge: Traditionally the large overhead lights used on roadways or large parking areas have been made up of a combination of weldments and castings or metal fabrications. Typical bulbs are incandescent, fluorescent, metal halide, or high-pressure sodium. LED lighting has a superior life and uses less electricity. This project involved producing superior LED housing castings.

Solution: LED lighting systems create a great amount of heat, so cooling is essential. By die casting the complete housing in a two-piece assembly, combining all of the LED mounting, access and maintenance features in a single set of parts, the company produces a unit that lowers the system cost and provides long maintenance-free operation.

About the Die Caster: Microcast Technologies, located in Linden, NJ, specializes in aluminum and zinc die casting, machining, assembly and plating services for the military, telecommunications and LED lighting industries.
Aluminum Die Casting Over 10 lb.
(Aluminum Structural Die Casting)

Caster: JVM Castings Limited
Lichfield Road Industrial Estate
Tamworth
Staffordshire B79 7TA UK

Caster Award Nominees: Wayne Murcott, Joint Managing Director

Customer: Jaguar Landrover, Ltd.

Customer Award Nominees: Mark Rowley, Project Engineer
Caster’s Comments: “The finalized design reduced the aluminum assembly weight alone by 41%. The total assembly weight was reduced by more than 50%. The new ‘lean’ design reduced the carbon footprint of the new F-type Jaguar.”

Challenge: The B Pillar castings are an integral part of the Jaguar’s sub-frame. They are important for rear end crash performance and dynamic stiffness. The previous design consisted of two separate castings—the B Post and the Swan Neck—and seven pressed panel parts. The challenge was to re-design the B Pillar structure to make it mass efficient and to eliminate sub-assembly.

Solution: The design team’s goal was to create one die set from the two castings. To create one die set, each casting needed its own gate. The design team developed a feed and runner system to make the two castings at the same time. This led the team to design a balanced, 90-degree, tangential runner system. The B Pillar now requires only one die set, with no need for seven steel pressings and sub-assembly.

About the Die Caster: JVM Castings (Tamworth) has more than 50 die casting machines ranging from 300 to 2700 ton capacity, and specializes in aluminum castings, finished products in a wide variety of sizes, weights and complexities. Along with JVM Castings (Worchester), JVM Castings forms the largest aluminum pressure die casting company in the UK.
Aluminum Die Casting 1 to 10 lbs.

Caster: Shiloh Industries
1200 Power Drive
Auburn, IN 46706

Caster Award Nominees: Don Carter, Director of Engineering

Customer: Chrysler Group, LLC

Customer Award Nominees: Doris Dauost, Supplier Quality Engineer
Caster’s Comments: “The advantages of using a one-piece aluminum component are reduced manufacturing costs due to the reduced number of complex manufacturing methods, reduced assembly, and lower overall weight and rotational mass for greater fuel economy.”

Challenge: The clutch retainer annulus houses the friction (clutch) plates and planetary gears in the automatic transmission that transmit torque from the engine to the rear driveline. Clutch retainers have been traditionally manufactured from a series (typically three or more) of steel stampings welded together. Customer sought weight savings options and reduced rotational mass to improve transmission efficiency and fuel savings.

Solution: The part was produced in secondary 383 alloy using the ThinTech™ process because of the 2 to 3 mm typical wall section and the need for near zero porosity. The part’s splines are cast in to eliminate broaching and assembly operations.

About the Die Caster: Shiloh Industries of Auburn, IN, is part of the Revstone Industries family, which engineers, designs, and manufactures components for the transportation and heavy truck industries. Shiloh Industries offers high-pressure die casting of aluminum parts.