For the last 41 years NADCA has sponsored its International Die Casting Design Competition to showcase outstanding die cast designs while acknowledging the continuous contribution die casters provide to the manufacturing industry.

“The winning castings are a snapshot of the advancements made in die casting capabilities,” said NADCA President Daniel Twarog. “Every die caster has pushed the limits of the process and demonstrated that geometric complexity, quality and cost savings can be accomplished. Structural applications are growing and further market applications are being opened. 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.”

Categories in the competition are grouped by material and include aluminum, magnesium, zinc and other alloy families, 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 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 2014 Die Casting Design Competition Luncheon on Tuesday, September 23 at 12:00 - 2:00 pm during the Die Casting Congress & Tabletop programming in Milwaukee, WI. The luncheon is an exceptional opportunity to meet this year’s winners and learn more about their innovations. The luncheon is complimentary with your registration. You can register online at www.diecasting.org/congress/registration.

To Compete in 2015
Innovative die casting design entries may be entered in the 2015 Die Casting Design Competition. All award-winning castings will be displayed next year at NADCA’s Die Casting Congress & Exposition, October 5-7, in Indianapolis, IN.

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 July 11, 2015. For more information, contact: Beau Glim at glim@diecasting.org. Send entries, along with sample castings and descriptions, to:

NADCA - 2015 Casting Competition
3250 N. Arlington Heights Rd., Ste. 101
Arlington Heights, IL 60004

www.diecasting.org/congress
Aluminum Die Casting 1 to 5 lbs

Caster: Briggs & Stratton Corporation - Poplar Bluff Plant
731 Hwy 142
Poplar Bluff, MO 63901

Caster Award Nominees: Gary Greenlees, Chad Gartzke, Mike Schultz - Milwaukee and Ron Rowland, Kenny Doublin, Jeff Calhoun, Bill Peterson - Poplar Bluff

Customer: Briggs & Stratton
**Part:** Engine Base  
**Material:** Aluminum 384 (Briggs 51K)  
**Weight:** 1.35 lbs  
**End Market:** Small engine/ Lawn mower engine

**Challenge/Method Used to Produce:** Briggs & Stratton was seeking a lighter weight design for a new engine base and a means to increase productivity. Taking on the same function and same basic shape this casting is nearly 39% lighter than base on the previous engine due to thinner walls. Many ribs were also removed based on FEA analysis. Typically, bases are made in two-cavity dies. This new thinner wall design moved to a 3-cavity die which required additional engineering to ensure equal fill times and hold projected area to a minimum so as to not exceed the machine limitations.

**Solutions/Advantages:** For a new thinner wall and lighter weight engine base design with the same function and same basic shape, FEA analysis was utilized. This casting is nearly 39% lighter than base on the previous engine due to thinner walls. Many ribs were also removed based on FEA analysis. Typically, bases are made in two-cavity dies. This new thinner wall design moved to a 3-cavity die which required additional engineering to ensure equal fill times and hold projected area to a minimum so as to not exceed the machine limitations. Narrowing gasket surfaces resulted in higher gasket sealing forces between mounting bolts.

**Die Caster’s Comments:** This part holds engine oil and includes the mounts that hold the engine to equipment, predominantly lawn mowers. It also holds the engine firing loads and contains a crankshaft bearing.
Aluminum Die Casting 5 to 10 lbs

Caster: Inland Die Casting Co. - A Division of RCM Industries
161 Carpenter Ave.
Wheeling, IL 60090

Caster Award Nominees: Robert Marconi, Roger Mucci, Steven Villalon, Matt Ruh, Bill Rein-herz

Customer: Alliance Laundry Systems

Customer Award Nominees: Andy Huerth, Andy Kegler, Sarah Engel, Justen Niemuth, Jerry Brotz, Karl Schwengel, Nick Bober
Part: Washing Machine Trunion  
Material: 380 Aluminum  
Weight: 5.13 lbs  
End Market: Washing Machine

Challenge/Method Used to Produce: A more rigid design, as compared to previous designs, requires the metal to take twelve 90 degree bends/turns to get from one end of the casting to the other. This causes fill issues that needed to be resolved.

Solutions/Advantages: A die design was established through much computer modeling simulation, flow distance prediction, and gating calculations. After the die was built, the part design was validated experimentally. Initial warm-up shots showed some areas of poor fill as predicted by the simulation. However, once the die reached steady temperature and was run to the calculated shot parameters, the die filled well and acceptable castings were produced.

Die Caster’s Comments: This is a washing machine trunnion with a cast-in steel shaft insert. It is used to align and support the tub and agitation system. Successful up-front engineering with the customer contributed to good castability and success of the design.
Aluminum Die Casting Over 10 lbs

Caster: Chrysler - KCP
1001 East Boulevard
Kokomo, IN 46902

Caster Award Nominees: David Sucese, Corey Beechboard, Shawn Glass

Customer: Chrysler - KCP
Part: RWD Transmission
Material: AL380 Aluminum
Weight: 37.4 lbs
End Market: Automobile Industry

Challenge/Method Used to Produce: When the die arrived at KCP in Kokomo, it was found that the desired fill time could not be achieved on the 3,000 ton machines at Chrysler, but was achieved on the 3,000 ton machine at Laukotter. This resulted in leakers due to porosity in the labyrinth area of the housing. Internal leaker scrap was running 73% and return material scrap was running 50%.

Solutions/Advantages: After attempts to decrease fill time with various gating changes were unsuccessful, the mass of aluminum in the labyrinth area was reduced to increase solidification rate. Changes in labyrinth design, including internal cooling coupled with the decreased mass reduced the return material scrap to 6.3%. The cost savings over the period of time was estimated at $146.7K and the annual cost avoidance was estimated to be $2.37M.

Die Caster’s Comments: A process for this new 8-speed rear wheel drive transmission housing was initially established at Laukotter Die Casting in Germany. It is unique because it has two cast-in steel tubes which have to be inserted into the ejector die and maintain location.
**Structural Casting: Aluminum Under 1 lb**

**Caster:** AMT Die Casting  
106 Cote Street  
St-Cyprien, QC G0L 2P0

**Caster Award Nominees:** Stephane Beaulieu, Simon Desrosiers

**Customer:** BRP

**Customer Award Nominees:** Sebastien Vezina
Part: Right/Left Hand Bracket  
Material: No part (Aural-2)  
Weight: 0.75lbs  
End Market: BRP Skidoo

**Challenge/Method Used to Produce:** The challenge for this casting was to eliminate extensive machining that was required for a low pressure permanent mold (LPPM) casting to reach the final shape and tolerance requirements. The alloy that was being used in the LPPM process was 356-T6.

**Solutions/Advantages:** AMT’s high vacuum process was used to cast a heat-treatable and weldable component. Aural 2 in the T5 heat treat condition provided the required mechanical properties and the dimensional capability of the high pressure die casting process virtually eliminated the need for machining. Only minor adjustment was required for the robotized TIG welding process for the change of aluminum alloy. Overall piece price reduction was on the order of 40%.

**Die Caster’s Comments:** This bracket is part of the pyramid shaped Rev chassis of BRP’s Skidoo. It links the front end to the steering position as well as the front right and left shock absorbers.
Caster: Shiloh Industries
8200 100th Street
Pleasant Prairie, WI 53158

Caster Award Nominees: Eric Kind, Alex Reikher

Customer: Tesla Motors

Customer Award Nominees: David Mastalerz, Luis Alanis
**Challenge/Method Used to Produce:** The customer wanted to move from a sand cast hollow form low pressure casting to a high integrity die casting. Targeted benefits were enhanced properties, lower weight, and cost reduction.

**Solutions/Advantages:** Concurrent FEA, distortion, simulation and thermal design analyses by Shiloh and Tesla Motors arrived at a design for a high vacuum Aural 2 casting that offered the following in the T7 heat treat condition: a 5 pound weight reduction, elongation greater than 10%, integral as-cast and machining mounting features, a 50% reduction in machining time, and related cost savings.

**Die Caster’s Comments:** The auxiliary node casting is for BIW framing on a new aluminum intensive automobile frame. A structural die casting was required not only for structural integrity, but also for weld, adhesive, and rivet attachment strategies. Strong customer collaboration was critical to the success of this casting.
Zinc Die Casting Under 6 oz Non-Electroplated

Caster: Dynacast Elgin
195 Corporation Drive
Elgin, IL 60123

Caster Award Nominees: Dynacast Engineering

Customer: TE Connectivity

Customer Award Nominees: Gary Marpoe
Part: Auto Connector
Material: Zamak 3
Weight: .046 oz
End Market: Automotive Connector Assembly

Challenge/Method Used to Produce: The customer was seeking a less expensive part with less variability than brass screw-machined parts.

Solutions/Advantages: Dynacast designed a 4-slide zinc die casting that meet or exceeded the customer requirements and won the business, thereby converting a screw-machined part to a die casting. Requirements included: dimensional accuracy, repeatability, quality of the knurl, and cost savings. The cost savings is 30% providing for a short return on investment for the die casting tooling.

Die Caster’s Comments: The automotive connector is used in a connector assembly for high speed data communication and requires thin walls (0.013 inch) and tight tolerances. Features include external knurls and the ability to be cold-formed or staked.
Zinc Die Casting with Decorative Finish

Caster: Wilkast Inc.
8025 S. Division Ave.
Grand Rapids, MI

Caster Award Nominees: Ronald L. Holland, Dean Phillips

Customer: Harley-Davidson

Customer Award Nominees: Joe Konshak
**Part:** Headlamp Visor  
**Material:** ZA8  
**Weight:** 2.78lbs  
**End Market:** Harley-Davidson Motorcycle

**Challenge/Method Used to Produce:** In an attempt to reduce cost and part numbers, the customer combined two parts into one while maintaining very high cosmetic standards. Due to the stringent surface finish requirement, the casting process is required to be closely monitored and controlled.

**Solutions/Advantages:** A uniquely designed die casting tool was built to produce this difficult casting. Coupled with the tooling design was careful process set-up and tight control of process parameters to produce the casting with a surface finish conducive of accepting a highly cosmetic chrome plated finish.

**Die Caster’s Comments:** The headlamp visor plays a key functional role in the integrated motorcycle handlebar assembly, which offers adjustability for individual rider’s comfort and stands out as one of the highpoint aesthetic features of the bike. This is a new and unique product design application.
Magnesium Die Casting Under .5lbs

310 Congress St. W.
Maple Lake, MN 55358

Caster Award Nominees: Pace Engineering & Operations

Customer: Milwaukee Electric Tool Co.

Customer Award Nominees: Brian Wattenbach
**Part:** SAWZALL Gear Case Assembly

**Material:** A291D

**Weight:** .293 lbs

**End Market:** Milwaukee Sawzall

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**Challenge/Method Used to Produce:** The customer wanted a right-hand and left-hand gear case casting for a reciprocating saw that eliminated the need for machining and reduced the cost of similar aluminum castings.

**Solutions/Advantages:** Pace Industries Product Technologies Division designed a right-hand and left-hand gear case casting of magnesium with dimensional tolerances that eliminated the need for machining. Since machining was required for the aluminum casting, the total cost of the magnesium castings is less than that of the aluminum castings. All requirements were met at a lower cost to the customer.

**Die Caster’s Comments:** Die cast of magnesium, this part forms half of the gear case for a power tool. There is a left half and a right half. The assembled two parts met the durability and life requirements for the world’s longest lasting SAWZALL.
**Caster:** Twin City Die Casting Company  
1070 33rd Ave. S.E.  
Minneapolis, MN 55414

**Caster Award Nominees:** Scott Braaten, Denny Schalger, Robert Krismer, TCDC Monticello Plant

**Customer:** Bose Corporation, Automotive Systems

**Customer Award Nominees:** Benjamin Demicco, Mike Goderre

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**Magnesium Die Casting Over .5 lbs**
Part: Magnesium Part
Material: AZ91D
Weight: 1.1 lbs
End Market: Automotive Audio Amplifier

Challenge/Method Used to Produce: The customer desired a housing/enclosure with good heat dissipation but at a lighter weight than previous enclosures. The die cast enclosure was also required to be cost effective.

Solutions/Advantages: In order to remain light weight and still have good heat dissipation, a casting was designed of magnesium with relatively thin walls and many fins of high aspect ratio. The top of the fins have a thickness of 0.040 inch and are 1.3 inches high. To maintain cost effectiveness throughput was maximized by developing a 4-cavity tool and secondary operations were minimized by minimizing gate area. Several blade ejectors are used for this tool.

Die Caster’s Comments: This is the electronics housing for the amplifier used in high end car audio systems. Heat removal is a very important characteristic as well as the overall weight of the component. This is the first magnesium housing for Bose. Typically the housings are die cast aluminum.