MODERN CASTING

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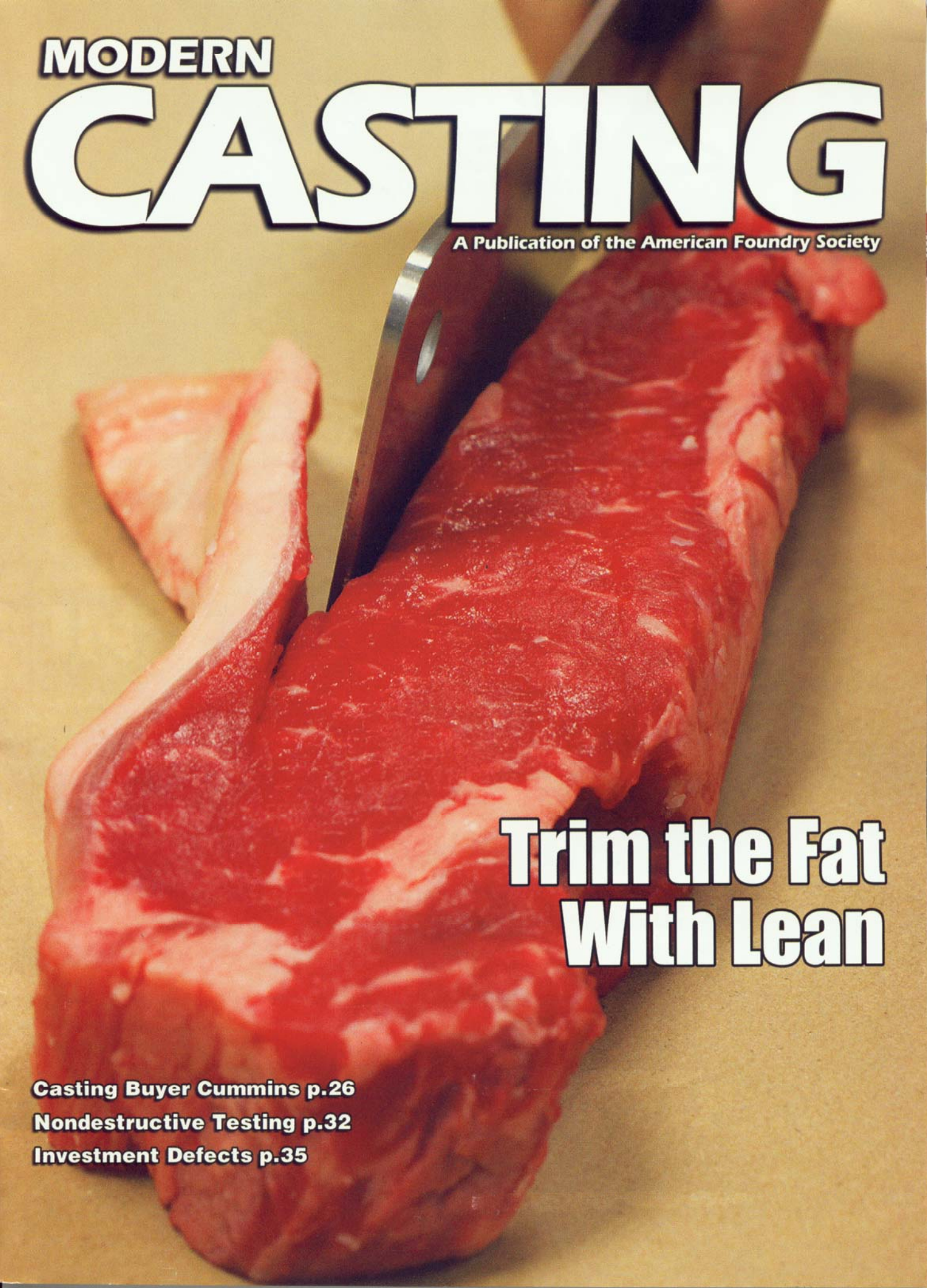


Trim the Fat With Lean

Case Study

Thin-Wall Ladle Improves Aluminum Diecaster's Efficiency

As part of a plant-wide cost-savings initiative, General Aluminum Manufacturing's Fremont, Ind., diecasting facility recently replaced its fiber laminate ladles with thin-wall auto-pour ladles from Pyrotek Inc., Spokane Valley, Wash., to cut down on its maintenance costs and achieve longer ladle service life.

General Aluminum had been experiencing two to six weeks of service with its fiber laminate ladles. The new auto-pour ladles, using reinforced fiberglass material (RFM) technology, consistently achieve six months of service life and more than 150,000 shots. General Aluminum also has experienced reduced oxide-induced scrap and improved cast repeatability from ladle to ladle.

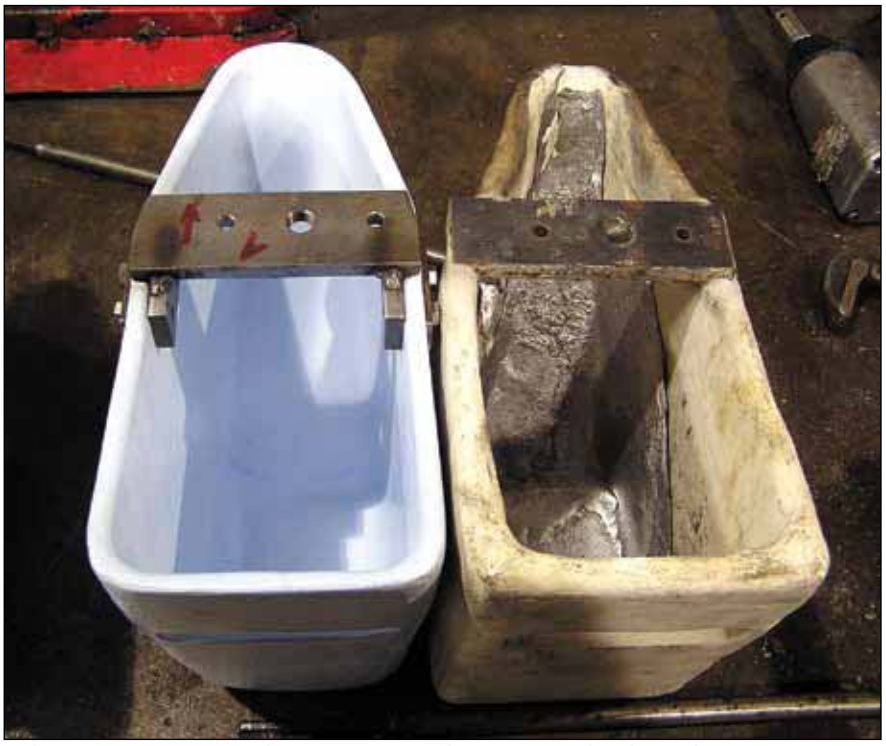
RFM ladles have gained popularity in squeeze casting, sand casting and permanent mold aluminum casting operations as a result of their low maintenance requirements, longer service life, non-wetting and insulating properties.

General Aluminum found that the non-wetting surface of Pyrotek's ladles prevented skull build-up. Metal build-up in the ladle can cause a short shot that leads to insufficient biscuit length. Since the robot removes the casting from the die by gripping the biscuit, inconsistent biscuit length can prevent proper robotic removal. This situation resulted in machine down time and the need for operator intervention at General Aluminum. Metal build-up in the ladle also was a prime cause of non-fill defects that resulted in scrap parts at the diecasting facility.

Without skull build-up in the RFM ladles, the pouring volume remains the same, allowing a consistent biscuit length. Since the ladles' introduction, General Aluminum has experienced greater efficiency in robotic removal of the castings.

RFM ladles are constructed from a low-density refractory composite material using a lamination process that results in tough products that are tolerant of mild mechanical abuse. The construction process allows the walls and base of the RFM ladle to be manufactured with much thinner sections than usually associated with cast refractory ladles, adapting better to the tight space constraints of the dip well and pouring envelope typical in high-pressure diecasting.

Shown is a 12-lb. reinforced fiberglass material ladle with a non-wetting boron nitride coating.



Reinforced fiberglass material ladles (left) routinely have service life of six months, compared to two to six weeks of service with fiber laminate ladles.

The shape of RFM ladles also contributes to their efficiency. When ladle shape is inconsistent, reprogramming of the ladle fill and pour parameters is required to maintain proper die fill. During manufacturing, RFM ladles are fabricated over a mold, and mounting hardware is placed and properly aligned with the aid of a fixture to ensure consistent location from ladle to ladle. The resulting consistent shape makes reprogramming unnecessary.

The RFM material is more durable and offers superior insulating properties in comparison to many materials often used in this application. Its material density of 1600 kg/cu.m affords a good strength to density ratio. Pyrotek's RFM auto-pour ladles come with a factory applied finish of non-wetting ZYP Boron Nitride Lubricoat Blue to enhance ladle performance. ***MC***

For more information, visit www.pyrotek.info.

New Product

Hybrid Machine Cleans and Deburrs Parts

An internal part feature is deburred with a rotary lance nozzle (shown without water for clarity).

Metalcasters supplying machined complete components are expected to deliver burr-free clean castings that are ready for use in the field. Traditional mechanical and abrasive deburring methods include hand and/or robotic mechanical deburring with deburring tools and rotary brushes or vibratory finishing. More recently, high pressure water deburring (HPWD) has gained wider acceptance in the automotive industry as an environmentally- and part-friendly technology for removing contaminates, burrs and chips while also cleaning the part. Bertsche Engineering, Buffalo Grove, Ill., offers a hybrid machine that performs both mechanical and high pressure water deburring.

With CNC HPWD machines, a high pressure water jet typically between 5,000 and 10,000 psi is directed along edges and specific part features to selectively deburr surfaces. Water with a rust inhibitor is the typical deburring media.

HPWD can remove material that is not solidly attached to a casting surface. Loosely attached burrs will come off, but firmly attached burrs, which cannot be removed with 10,000 psi, do not. Feather edge burrs, often only visible through a microscope, are removed.

The most suitable materials for HPWD are soft metals such as aluminum and cast iron. Harder materials require higher pressures; softer materials require lower pressure. The time it takes to deburr a casting is a function of the type of machine, the power of the machine's pump, the sophistication of the nozzle tooling and, most importantly, the number of features that need to be deburred. Pump sizing is a function of the size and number of orifices that are designed into a nozzle or the manifold. The greater the flow rate for a given pressure, the larger the pump power rating. Typically, deburring will take five to 10 seconds per part feature, with total cycle times between 30 and 60 seconds.

HPWD is well suited for applications that require inaccessible features to be deburred, when castings must be very clean, when consistent quality is required or when parts cannot be subjected to heat or corrosive chemicals.

A CNC HPWD machine either moves the nozzle to the part feature or moves the part to the nozzle. Machines are either of X-Y-Z configuration with one or more rotary axes or robot-based. In general, robots have less positioning accuracy, and machines that rely on a robot to move the part require more floor space. The robot also is exposed to continual high pressure water spray within the deburr and wash chamber that, over time, will cut through pneumatic and hydraulic hoses and electrical cables and compromise exposed motors, encoders and sensors.

Parts dimensioned in X-Y-Z coordinates translate easily to CNC X-Y-Z coordinates for part program execution. Bertsche Engineering's X-Y-Z and C-axis waterjet deburring system moves the part (or multiple parts) to the nozzle for both mechanical power deburring and HPWD. Only the overhead ram holding the part is in the wash chamber. Parts are linearly processed from station to station. Horizontal and vertical part face operations can be performed in any of six workstations on the equipment. The part is moved and indexed to present the face to be deburred to the water jet nozzle.

Maintenance on X-Y-Z machines is low because all high-pressure lines are rigidly piped and do not require high-pressure flexing hoses that have a short life at high pressure. Stationary workstations also allow for more complex tooling, including same-time multiple feature deburring. ***MC***

The Bertsche 4-axis iJet with integral drying station and post deburr/part rinse station is a hybrid of mechanical deburring and high pressure water deburring.

Visit www.berthsche.com for more information.