Casting Connection

• Your Link to Investment Casting News from Ransom & Randolph •

Inside this Issue:

Keycote® Slurry Reduces Costs

The primary slurry system at Foundry S was failing when variables such as temperature and humidity changed. Foundry S needed a solution that was robust, worker-friendly and could "plug & play" into their current process. R&R looked specifically at pH control, short slurry life and difficult maintenance.

A plan was developed to evaluate available primary binders and select a material that would address the objectives and work well with detailed geometries and varying part sizes.

Based on the objectives, Keycote® concentrate and binder were recommended. Trial slurry was built, trial parts were selected and tests were run. Parts were processed as normal, and monitored for defects and scrap percentages. Foundry S implemented the KEYCOTE slurry into production and within two months of building the slurry, the test system showed a significant advantage over the standard system.

- pH levels are worry free, saving approximately $1,000/year.
- New primary slurry shows superior adhesion, resulting in a savings of $6,000/year.
- Extended slurry life, saving approximately $4,500 in discarded material costs/slurry.
- Reductions in scrap rates and finishing times, resulting in an immediate 40% decrease in shell related scrap.
- The end result is cost reduction, quality and throughput improvements; leading to an overall **annual savings of $72,300**!

Struggling with process hurdles and casting goals? Partner with the experts at R&R and realize the numerous benefits of a foundry consultation and customized trial.

Contact your R&R Regional Sales Manager to schedule your consultation today!

Investment Casting Seminar

Please Join Us!

R&R/Paramelt IC Seminar

- Tues., May 10, 2016
- 9:00AM - 3:30PM
- DoubleTree by Hilton
- Brookfield, Wisconsin
- Continental breakfast and deli lunch included

This is an excellent opportunity to learn new troubleshooting skills, refresh process control skills and train new employees!

There is no cost to attend!

Seminar topics include:

- 9:40AM–10:15AM **Wax Room 101**
- 10:15AM–10:50AM **Ceramic Core Fill Materials Use & Application**
- 11:00AM–11:35AM **Refractory Considerations for Investment Casting**
- 11:35AM–12:10PM **Benchmarking Your Shell System**
- 12:55PM–1:30PM **Common Casting Defects - Descriptions, Causes & Cures**
- 1:30PM–2:05PM **Alloy Castability - Best Practices**
- 2:15PM–2:50PM **FlashFire Dewax for the Modern Foundry**

Register today!

Registration form on pg. 4

Investing with Innovation™

Core Material Application Tips & Tricks

Pattern Preparation

Certain pourable core materials can be applied directly against the wax pattern, others are exothermic and must be poured against a layer of shell. For the Kwik-Core™ system, which can be poured against the wax, it is important that the patterns are prepared in advance. The patterns need to be washed, rinsed and dried prior to pouring the core material. If the core in the wax pattern has multiple openings, all but one opening will need to be sealed, blocking off any areas that the pourable core materials can potentially leak out of during the filling process. Suitable materials used for sealing patterns include: tape, rubber boot, wax film and pliable sheet wax.

Mixing

Before you begin mixing your pourable core materials, you need to select the mixing volume based on the core size and the working time of the investment. If you have multiple cores to fill, you need to consider how much time it is going to take you to fill all the cores.

Mixing methods will vary depending on the equipment available. Suggested mixing methods include jewelry or dental investing mixing equipment, kitchen style mixers or bucket & plaster style mixers. Some casters even use the stick and cup method, where you simply use some sort of mixing utensil, or stick, with a cup.

• *Continued on pg. 3* •

Kiln Korner

PACIFIC KILN

Heat Distribution in the Burnout Furnace

A consistent quality casting is not a matter of luck in investment casting. Many variables must be controlled, from tooling to wax to slurry to metal. Within this sequence, the shell burnout can often be overlooked in its importance to a consistent finished casting. Perhaps one of the most overlooked aspects of burnout furnace is the role proper heat distribution plays. Heat variations in the load area should not exceed ±25°F. Beyond that, the hotter and cooler shells can yield significantly different castings. Cooler shells may chill the metal as it enters and prevent it from reaching the finer outer parts and features of the mold. The hotter mold, on the other hand, may cause the metal to remain molten for too long and cause ceramic fluxing and possible surface oxidization.

But ±25°F is not always easy to achieve. Many factors have a role in proper heat distribution, among them proper burner placement, burner velocity and balance between burners, exhaust flue placement and proper sizing of the flue opening, furnace pressure and proper furnace loading. An overloaded furnace will never yield good heat distribution.

There is a balance of these factors that must be achieved to attain acceptable heat distribution. The payoff is every shell being cast at the same temperature. It's just another variable eliminated in the quest for the perfect casting and reduced scrap rates.

Source: PKI, Degrees° Newsletter, March 2016, Vol. 18 No. 1

New Technology Manager

Casey Wolfe
Technology Manager

R&R is pleased to announce the promotion of Casey Wolfe to Technology Manager. In this new role, Casey will be responsible for managing R&R's R&D and QA teams.

In her new position, Casey's responsibilities include planning and performing research programs for the development of new products, applications and processes, as well as ensuring that all R&R products and services are shipped to R&R's high quality standards.

Casey joined the R&R team in 2008 as a Product & Application Engineer and quickly rose to Product Development Manager, being promoted in 2013. Throughout her tenure at R&R, Casey has effectively gained customer respect, developing very successful relationships. Prior to R&R, she held R&D roles at TJ Technologies and BASF.

Wolfe earned her Bachelor of Science in Polymers and Coating Technology from Eastern Michigan University in Ypsilanti, Michigan.

Please join us in congratulating Casey on her new position!

Core Material Tips & Tricks

• *Continued from pg. 2* •

Pouring

Immediately after the powder is sufficiently mixed with water, the material should be poured into the pattern. It is recommended to utilize a pliable container; which helps control the flow rate. Suggested containers include paper or plastic cups, rubber bowls, etc. Carefully pour the pourable core material into the cavity. Be sure to try not to trap any air while pouring. Vibrate the filled pattern after core filling to remove any excess air.

It is important to note that the core materials are formulated to provide a mixed viscosity that allows the material to easily fill and conform to most

cavities. Still, it is important to follow proper pouring techniques in order to completely fill void spaces and to reduce creation of air bubbles during the pour. The core should be poured down the side of the cavity and filled from the bottom up with minimal splashing. Using a rubber or paper cup will allow for more control during pour. Piping the material in with a syringe, pipette or pastry bag may be required for small, irregular core shapes. Vibrating the pattern during or after the pour to remove any entrapped air is recommended.

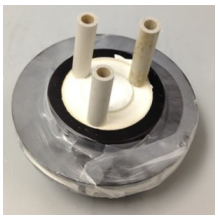
• *Continued on pg. 4* •

Core Material Tips & Tricks

• *Continued from pg. 3* •

Stabilizing Core

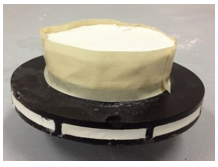
If the core material is being poured directly against the wax, it will require additional stability and an area to mechanically bond with the shell. This can be achieved using either core pins or a by creating a core print.

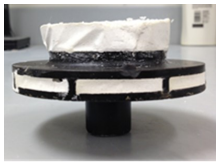


Core pins can be made with ceramic or metallic rods. These should be placed into the core during the last 1-2 minutes of the core material's pouring time.

A core print is created allowing excess material to extend out of the cavity. Using tape, a rubber boot or wax film, an extension is created that protrudes from the core.

The extension created by the core pin or core print should extend at least 1/4 inch from the core. Larger cores will require a longer extension. If the core is poured after the application of 1-2 coats, the addition of pins or prints may not be necessary.





Curing & Processing Shell Molds

Upon completion of pouring, the pattern should remain undisturbed for at least one hour. This allows the bonding reaction to complete for maximum strength.

Once the material has completely set up, the pattern can continue through the normal shelling process. If an autoclave is used for pattern removal, special care should be taken during depressurization. The pressure must be released very slowly to prevent the destruction of the core material. The time from peak pressure to atmospheric pressure should be at least two minutes. If core breakages occur at this stage, it may be necessary to increase depressurization time or allow more time between the pouring and shelling stage. Hand packed cores will require additional time to dry in between the autoclave cycle and the firing cycle. If the shells are placed into the furnace before the cores are completely dry, steam will be generated and will crack the cores. For flash fire dewax, no changes to the process are necessary.

When firing shells with hand packed cores, it will be necessary to allow extra time to completely burn out the core. If the core is not completely burned out, outgassing may occur when the alloy is poured.

Pourable core materials are formulated to provide necessary green strength for shell building and dewax, while also providing a post fired strength that allows for easy removal. These materials do not typically require any additional techniques beyond normal shell removal. It may be necessary for a foundry to adjust the water to powder ratio for specific strength requirements.

For more information on R&R core materials, visit www.ransom-randolph.com/application-instructions.html

- 50/50 Core Mix, C-1 Core Mix and Core Hardener 2000™ Binder
- 910 Investment
- Kwik-Core™ Materials

Seminar Registration

Tuesday, May 10, 2016
DoubleTree by Hilton
Brookfield, Wisconsin

Attendee Name(s):

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Company:

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Address:

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City:

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State:

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Zip:

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Email(s):

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Reserve your space!

Reply no later than:
Friday, April 29, 2016

Please return this form via fax or email to:
Alisa Rawski
Ransom & Randolph
419.865.9997 (FAX)
alisa.rawski@dentsply.com