Casting Connection

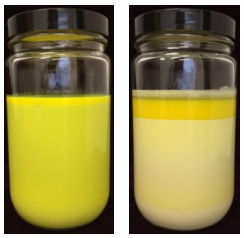
• Your Link to Investment Casting News from Ransom & Randolph •

Inside this Issue:

Ferrous Casting Simplified

We are pleased to introduce SuspendaSlurry® ZR material for ferrous metal casting. Formulated with 100% zircon refractory flour, SUSPENDASLURRY ZR material provides industrial casters with a *pre-made slurry that does not require continuous mixing.*

Ransom & Randolph launched SuspendaSlurry® FS material for non-ferrous metal casting last year. SUSPENDASLURRY FS material can be used for backup coats with SUSPENDASLURRY ZR material. Both products are shipped in re-sealable containers, which can be used as a dip tank, or SUSPENDASLURRY material can be transferred to a larger vessel for dipping. Close the tank tightly when not dipping to preserve the slurry.



Above left: SUSPENDASLURRY material (after sitting for 3 weeks)

Above right: Standard Primary Slurry (after sitting for 24 hours)

The SUSPENDASLURRY material product line was developed to eliminate costs associated with continuous mixing and slurries lost to electrical failure. The SUSPENDASLURRY material family also simplifies the initial mixing process by eliminating the need to weigh and mix binder and refractory components.

Based on R&R's leading primary binder technology, using SUSPENDASLURRY materials allow casters added benefits over standard colloidal silica shells: such as stronger layers; reduced buckling, lifting or cracking defects; and simplified slurry

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Kiln Korner

Source: Pacific Kiln & Insulations, Degrees° Newsletter, June 2016, Vol. 18 No. 2

Temperature uniformity in the burnout & preheat furnace

Temperature uniformity surveys or TUS are performed to get an accurate snap shot of the thermal characteristics of the furnace load area. Typically this is done using a 9 point survey with 2 thermocouples in each corner, one high and one low and the ninth thermocouple located in the center of the load area. The TUS should be performed on an empty furnace. The layout should mimic the actual area where product will be processed in the furnace. The corner thermocouples should be placed 10-12" from the corners.

The most common types of thermocouples used are type K, Inconel sheathed. The thermocouples should be calibrated to the temperature range that the product will be processed at. The TUS should also be performed at the critical temperature that the product will be processed at. The thermocouples are attached to a calibrated recording device.

The furnace is then ramped up to the process

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Core Materials Success Story

Cross-sections of the Core Area

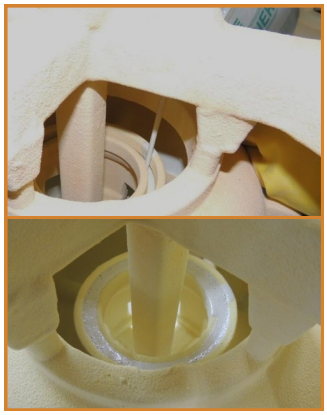
In the last two issues of Casting Connection, we have discussed casting with core materials, as well as covered application tips and tricks. But, who's using core materials and how effective are they? Let's take a look at a success story.

Aerotec Alloys, of Norwalk, CA serves the aerospace industry with high precision aluminum and stainless steel castings.

Aerotec utilized a phosphate bonded core mix on a steel part with a challenging internal feature, a slot with a constricted opening that forms a ring. The slot opening is 0.25" and increases up to 0.45", creating a constricted opening where slurry needs to flow.

Using traditional shell building techniques in an effort to shell build the slot, Aerotec was successfully using multiple slurry coats with fine stucco. The shell building process took six additional days to process due to extended drying of the internal slotted core area and they saw 5% leakers while shell building the slotted core area.

Taking advantage of the core building process to build the internal core, the pourable core mix was added after the second slurry coat. In preparation for the core filling process, 6 parts were prepared. The core mix was then prepared by carefully adding core material powder to the water and then stirring until blended to a uniform consistency. Aerotec mixed the core material in a mixing container with a stirring stick. They found that this was sufficient enough mixing to build a core capable of withstanding their investment casting shell process. After the core material was properly mixed, the slot/ring core area was filled.



Core Filling Process

Process results at Aerotec were as follows. Shell building process time was positively impacted by using the core material with this particular part. Six days of shell building process

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BINDZIL® Colloidal Silica Gets Rebranded

Brand Name through May 31, 2016	Brand Name effective June 1, 2016
BINDZIL 830	Levasil F0830
BINDZIL 1430	Levasil F01430

On June 1, 2016, AkzoNobel consolidated all their colloidal silica product lines under a single brand name: Levasil® colloidal silica. This brand name consolidation does not impact the material specifications or performance of the materials you are purchasing.

The item numbers used to order material will *not* change; however, the product label, order acknowledgment and invoice descriptions will reflect the Levasil brand. Updated product data sheets are available at www.ransom-randolph.com/product-data-sheets.html and SDS information is available by e-mailing alisa.rawski@dentsply.com.

Should you have additional questions or concerns, please contact your R&R Regional Manager.

Visit Us at ICI 2016

The Investment Casting Institute (ICI) is hosting their 63rd Technical Conference and 2016 Product/Literature Expo in Columbus, OH from October 16th - 19th, 2016.

Meet us at the Expo in Booth 312 to discuss your casting goals and how R&R can help you achieve those goals. **We look forward to seeing you at the show!**

Build A Consistent Shell

R&R recommends adhering to the following technical tips for building a consistent shell in your foundry.

1. If the slurry is foamy or has entrapped air (which weakens the ceramic shell), make sure:
   a. the propeller mixer is not running at excessive speeds, causing a vortex;
   b. the propeller mixer is not running continually, entrapping air and causing slurry overheating (5 minutes on and 5 minutes off is often used); and
   c. that binder solids did not increase excessively. When binder solids are above the control range, defoaming characteristics are adversely affected, which can cause binder gelation and inconsistent viscosity, leading to casting defects.
2. It is best to maintain the slurry temperature within a 5°F (3°C) operating range and not more than 10°F (6°C) above ambient temperature, as with any conventional colloidal silica slurry.
3. Shell drying time can be reduced by lowering relative humidity up to 50% or increasing airflow (250-400 fpm, 1.3-2.0 m/s). Temperature should be held constant to avoid shell cracking caused by pattern expansion or contraction. In most cases, final dry times will be 12-16 hours.
4. When using a rainfall sander, stucco larger than 30 mesh on the first backup coat may adhere poorly.
5. R&R recommends maintaining a detailed slurry log of refractory, binder, water additions and other checks. Refer to the Slurry Control Technical Tips available for download at www.ransom-randolph.com under resources.

Ferrous Casting Simplified

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maintenance.

Available from R&R's Maumee, OH manufacturing plant or our Commerce, CA warehouse, SUSPENDASLURRY ZR material is available in 100 and 600 pound slurries; SUSPENDASLURRY FS material is available in 60 and 400 pound slurries. Stuccos are sold separately.

For more information on how you can put R&R's SUSPENDASLURRY materials to use in your foundry, please contact your R&R Regional Sales Manager today!

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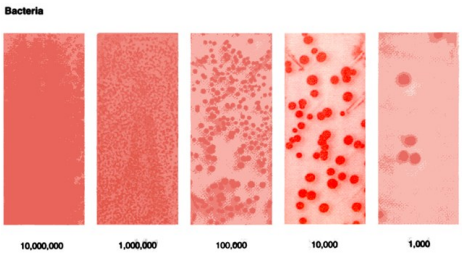
Battle Bacteria with Grotan

Bacteria growth in a slurry can be detrimental to both the performance and life of a water based slurry. Bacteria can be introduced through a variety of sources such as airborne bacteria. Due to the potential for bacteria contamination in a slurry, a program should be set up to test for and eradicate any bacteria growth.



Culture slides can be used to test for the presence of bacteria in a slurry. The procedure for using the culture slides is provided by the manufacturer of these kits. At R&R, we use MCE Combi Dip Slides. They are available from Metal Working Equipment & Chemical Company Inc. at (518)523-2355.

Only make additions if bacteria growth is present, Grotan was not designed to be added on a regular basis. To test for the presence of bacteria, use the culture slides on a sample of binder separated from the slurry. If bacteria are detected, use the following additions of Grotan:

Bacteria Count	10^3	10^4	10^5	10^6	10^7
Additions of Grotan (ml/gal slurry)*	1.1	1.7	2.2	2.8	3.4
Additions of Grotan (ml/l slurry)*	0.3	0.5	0.6	0.7	0.9

**These additions should be made as part of a deionized water addition.*

Retest the slurry 48 hours after Grotan additions. If bacteria are still present, repeat additions and retest. Slurries should be tested at least monthly for bacteria.

Kiln Korner

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temperature and allowed to soak and normalize before the actual TUS is recorded.

Temperature tolerances of ±25°F to ±50°F should be easily obtainable.

A couple key factors for good TUS results are:

- Good air flow through the furnace load area
- Proper furnace pressure, 0.0" WC to slightly positive will get the best results
- Proper balance of the furnace burners

Core Materials Success Story

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time were eliminated. This was a direct result of removing the need to extend intercoat dry time for each of the backup layers in the process.

Additional process time was saved during water blast shell removal. Parts made with the core material were much easier to clean than the 100% shell built parts. Throughput in the water blast process increased from 8 castings per hour to 15 castings per hour – almost doubling the amount of product processed in this area. During water blast, the pressure needed to remove the shell material and the pourable core was 2500 psi (reduced from 4000 psi previously). Aerotec noted that running the water blaster at the lower pressure helped extend the life of the seals on the water blaster.

Process Area	Benefit Achieved
Shell Building	6 day reduction in shell building time
Shell Removal	87.5% increase in throughput during water blast; 37.5% reduction in water pressure required for water blaster
Casting	0% leakers compared to 5% leakers without core material

Casting results for the cored parts showed scrap reduction. Aerotec reduced leakers by 5% with the pourable core material compared to their previous shell build in the slot.

In summary, pourable core materials are a useful tool for investment casting foundries to produce complex casting geometries that are difficult to produce with traditional shell building methods. Pourable core materials allow investment casting foundries to eliminating the need for extended drying times between shell coats. Casting yields are improved as difficult geometries are no longer hollow and prone to metal penetration. Clean-up is faster as core materials are easier to break out of narrow passageways. Process efficiencies can be improved using pourable core materials, such as shell building time, shell removal and cast finishing.