Casting Connection

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

Inside this Issue:

Controlling Your Slurry

Conducting regular testing is essential to best understand the properties of your slurry.

To control the slurry in your foundry, R&R recommends conducting the following tests.

Slurry Viscosity

Check slurry viscosity at the beginning of each operating shift, at minimum. Deionized or distilled water should be added, as necessary, to reduce viscosity; which increases as a result of evaporation. The use of tap water may lead to premature gelation.

Slurry Density

Check slurry density weekly, at minimum. Slurry density should only be measured on a stable slurry within the target viscosity range. The slurry density should be maintained ± 0.02 g/ml from the target density. If slurry density deviates out of this range, then a total solids test should be performed.

Total Slurry Solids & Refractory Solids

Check total slurry solids weekly, at minimum. Total slurry solids is the combination of binder solids and refractory solids. The total slurry solids calculation is required to determine the refractory solids percentage. Uncontrolled refractory solids can lead to weak (too low) or brittle (too high) shells. High refractory solids can cause shell cracking and make the shell difficult to remove. Control refractory solids to the appropriate range.

Binder Solids & Specific Gravity

Check binder solids two times per week, at minimum. Binder solids include SiO_2 and other

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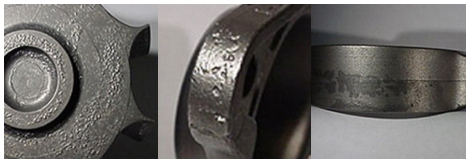
Analyzing Casting Defects

Analyzing casting defects is often not a simple or straightforward exercise. Often, by the time you analyze your defect, most of the evidence is already gone. For example, the part has already been cut off of the tree and it has usually already been through an initial cleaning; which makes some investigations more difficult.

Some causes for casting defects are easily spotted and corrected; while others can linger and not be as easily resolved. Casting defects can be due to many factors throughout the investment casting process and some can be due to more than one potential cause in various or different parts of the process.



So where do we start the investigation to determine corrective action?

Understanding the

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Investing with Innovation™

R&R Dentsply Sirona

Let's Get Social!

We are excited to announce the launch of the R&R company page on LinkedIn!

The page will feature product launches, company announcements, upcoming events, relevant industry-related content, breaking news and more!

Check it out at: www.linkedin.com/company/ransom-and-randolph. Look for our ceramic shell and jewelry showcase pages too!

Follow us on LinkedIn today!

Analyzing Casting Defects

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different types of casting defects is your first line of defense in correcting them in your process.

Positive Metal Defects

These defects indicate that metal is in a place that the shell should have prevented it from being. In other words, the shell was compromised.

Common positive metal defects include:

- Air bubbles
- Buckling
- Burn-in
- Finning
- Lifting
- Metal penetration
- Orange peel
- Over etching
- Pimples
- Scabbing/ delamination
- Spalling on edges
- Worming

Negative Metal Defects

These defects indicate that metal was restricted from forming against the boundary defined by the shell.

Common negative metal defects include:

- Blowholes or gas
- Cold shut/non-fill
- Flow lines
- Inclusions (ash or dust)
- Inclusions (ceramic)
- Inclusions (slag)
- Pinholes or gas
- Pitting
- Rat tailing/oxidation crazing

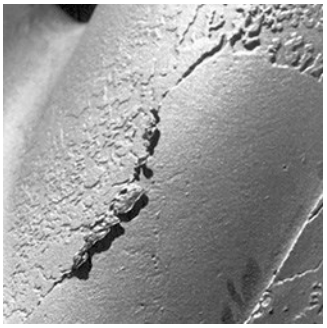
Other Defects

These defects include those that do not fall directly into either the positive or negative metal defects categories.

Common other defects include:

- Black stain
- Hot bulging or creep
- Shrink

For common causes and cures to combat defects, visit our Defect Analysis page: ransom-randolph.com/defect-analysis.html or contact our technical department at 800.253.4502.



NEW! SculptaCast™ Waxes

R&R is excited to introduce SCULPTACAST waxes to the art casting industry!


SCULPTACAST Dragon wax


SCULPTACAST Earth wax


SCULPTACAST Limerick wax

SCULPTACAST is a trademark of Precizioned Ltd.

SCULPTACAST waxes are formulated with the purest synthetic and natural raw materials available in the industry; producing extremely low ash content and enabling the cleanest burnout and most accurate reproductions allowable.

Characteristics such as flow, toughness, durability, replication of detail, ductility, memory and release have all been engineered into SCULPTACAST waxes for specific applications.

SCULPTACAST waxes are available in numerous formulas to meet virtually all requirements from hand forming to slush casting. Whether you are a sculpture artist or a foundry making sculpture castings, SCULPTACAST waxes have been designed to meet your specific needs.

For in-house wax adjustments, SCULPTACAST waxes also include SCULPTACAST Victory wax for a soft addition and SCULPTACAST Hardener wax for a hard addition.


SCULPTACAST Victory wax SCULPTACAST Hardener wax

All SCULPTACAST waxes undergo stringent quality control testing in a state-of-the-art laboratory to ensure the highest level of quality.

For more information about SCULPTACAST waxes, please contact your R&R Regional Sales Manager today!

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	SCULPTACAST Dragon wax	SCULPTACAST Earth wax	SCULPTACAST Limerick wax
Color	Red	Red/Brown	Green
Fluidity	Moderate	Very High	High
Hardness *(1=Soft/10=Very Hard)*	7	3	6
Shrinkage	Moderate	Very Low	Very Low
Ductility	Low	High	Moderate
Polishing	Excellent	Good	Excellent
Hand Forming	Poor	Excellent	Good
Set-up Time	Moderate	Slow	Fast
Tacky/Sticky	Moderate	Low	Very Low

Bill Pay Made Simple!

Did you know that R&R accepts multiple payment methods? We even encourage you to email checks to us! While email is the preferred method, checks may also be faxed. We also accept VISA, MasterCard and AMEX credit cards.

Email Payments*
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Jo.Breault@dentsply.com

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Fax checks to: 419-865-9997. Be sure to send us an email or call to let us know you've faxed a payment so we can quickly retrieve it from the fax machine.

Note: *whether emailing or faxing checks; to avoid payment duplication, original checks should NOT be submitted via regular mail.*

Credit Card Payments
Simply call us with your credit card number. We will process your payment and email you a copy of your receipt.

To make a payment or if you have any questions, please contact:

Mickey Pantoja: 419-794-1214
Mickey.Pantoja@dentsply.com

or Jo Breault: 419-794-1216
Jo.Breault@dentsply.com

**Checks submitted via email or fax will be electronically processed upon receipt and immediately debited from your account.*

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Controlling Your Slurry

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solids (i.e., polymer) in the binder. The specific gravity calculation is required to determine the binder solids percentage. Uncontrolled binder solids can affect the life of the slurry and the performance of the shell (resulting in weak shells). Binder solids must be controlled in the appropriate range. A gelation test should be performed if binder solids are out of control.

Binder pH
Check binder pH with a pH meter weekly, at minimum. Binder pH is a reflection of binder stability. Colloidal silica binder is alkaline and becomes unstable as pH drops. Too low of a pH will lead to gelation of the binder/slurry. Normally the pH of your slurry binder will not vary much. If the slurry pH falls below 9.25, a gelation test should be performed to determine the stability of the slurry.

Gelation Test
Perform a gelation test, as needed based on pH and binder solids testing results. The gelation test is an accelerated aging test that determines the approximate stability, or life left, in a particular slurry. A thickening, or gelled slurry, can lead to casting defects (surface conditions) and weak shells (cracking). Any slurry that gels in 24 hours is near the end of its useful life and should be discarded.

Antifoam Test
Perform an antifoam test weekly, at minimum. Various conditions, such as high binder solids, excess wetting agent, temperature and excessive shear, degrade the antifoaming characteristics of a slurry and an antifoam test should be conducted to check for the presence of adequate antifoam.

Slurry Log
R&R recommends maintaining a detailed slurry log of refractory, binder, water additions and other checks.

For your convenience, automated Slurry Control Worksheets (Microsoft® Excel®) are available for download at ransom-randolph.com/resources-slurry-control-worksheets.html.