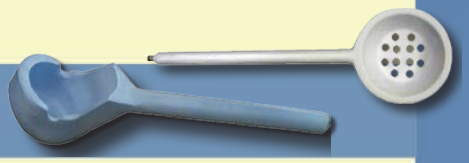
why RFM?



RFM® (Reinforced Fiberglass Material) is a composite ceramic material that is both tough and tolerant of mechanical abuse. Pyrotek's patented RFM material and design exhibits various advantages when compared to traditional cast iron, fiber laminated and other ceramic materials. RFM was developed in response to a need for a new refractory material having the following properties:

- Light, thin, strong and crack resistant material
- Low mass and thermal conductivity
- Excellent molten aluminium chemical resistance
- Minimal preheating—only to remove surface moisture
- Suitable for complex shapes
- Easy to clean

Since its introduction in 2004, products made with RFM gained wide popularity in all metal casting foundries by improving performance and saving energy. The following characteristics attracted customers to use RFM products:

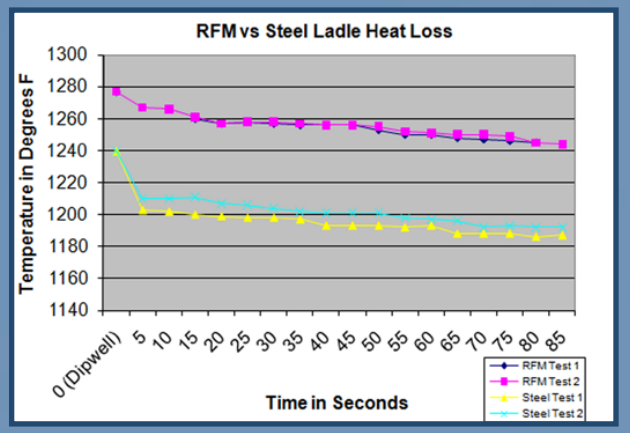
- Naturally non-wetting: no dross buildup, hence reduces oxide induced scraps.
- Long operational life: contributes to higher production yield and less downtime.
- Greater thermal insulation: contributes to lower furnace holding temperatures.
- Special composite ceramic: zero iron contamination yields higher quality parts.
- High impact resistance: helps protect against unexpected crashes.
- Flexible material formed into complex designs: addresses critical space constraints in tight holding furnace dip wells.

Key Benefits

- Reduces buildup of aluminium, a problem that leads to subsequent high scraps.
- Reduces or eliminates oxide return to the holding furnace, an increasing requirement of the major automotive companies.
- Reduces casting machine downtime, an expensive consequence for the diecaster.
- Lower acquisition cost verses service life.

Ladles with RFM Material Contributes t

Because RFM has better heat retention, it is possible to lower the furnace temperature, resulting in energy savings. The graph below illustrates the temperature loss during the first few seconds after ladle filling. The RFM ladle shows an average temperature drop of 15°F (8°C), while conventional steel dropped an average of 40°F (22°C). This can result in savings of thousands of dollars a year in energy consumption.



www.pyrotek.info/rfm

ATTRIBUTES	RFM	CERAMIC	STEEL OR CAST IRON
Resistance to Chemical Attack	★★★★★ • RFM is naturally non-wetting to molten aluminium • To further enhance non-wetting properties, the finished RFM ladle is coated with boron nitride Lubricoat Blue® ZS	★★★☆☆ • Can contain non-wetting agent to guard against aluminium attack • Careful preheating practices required to prevent non-wetting agent from burning • Frequent recoating required	★☆☆☆☆ • Protected by coatings • Requires frequent coating maintenance to prevent metal sticking and erosion • Potential of iron contamination
Preheating Requirements	**Minimal** • Minimal preheating time is required for removal of any moisture from ladle	**Required** • Requires preheating above the furnace to prevent thermal shock and remove moisture	**Significant** • Requires significant preheating time above furnace to condition the coating and remove moisture
Mechanical Strength	★★★★☆ • Excellent mechanical properties • Internal reinforced fiber material offers exceptional strength	★★☆☆☆ • More prone to thermal shock cracking • Cracks and breaks can occur if not preheated properly	★★★★★ • Metal strong but with high rate of thermal conductivity
Service Life	★★★★★ • Field test results show extensive service life improvement	★★★☆☆ • Low mechanical strength and high preheating requirements lead to short service life	★☆☆☆☆ • Most ferrous products have to be welded and repaired to achieve their rated life
Process Improvements	★★★★★ Can be engineered and designed to: • Reduce oxides and inclusions • Reduce skull, therefore less waste • Reduce furnace temperature • More energy efficient	★★★☆☆ • Thermal shock resistance • Longer life span than steel or cast iron	★☆☆☆☆ • Off-the-shelf and common with no added values to process improvements

Modern Casting—Thin Wall Ladle Improves Aluminium Diecaster's Efficiency (April 2009, page 46)

" General Aluminium Manufacturing...RFM technology consistently achieves six months of service life and more than 150,000 shots...The RFM material is more durable and offers superior insulating properties in comparison to many materials often used in this application..."

Foundry Trade Journal—Composite RFM Ladle Shows Benefits in Aluminium Casting (Dec. 2006, page 3)

" RFM ladles are extremely thermal shock-resistant..."

Cast Metal & Diecasting Times—Optimize Casting Performance and Metal Quality with Pyrotek (Oct/Nov 2009, page 19)

"...For improving metal quality, Pyrotek is the definitive source. Thin-Wall RFM ladle, designed to address the tight space constraints of the dip well and pouring envelope typically used in high pressure diecasting applications..."

RFM®

Reinforced Fiberglass Material

Metal Casting Foundry Process

www.pyrotek.info/rfm

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