

ZYP'S MAXIUM SPRAYABLE COATINGS IMPROVE RFM[®] LADLE PERFORMANCE



Foundries in Europe casting pistons and cylinder heads generally employ pouring robots equipped with RFM[®] pouring ladles. The advantages of RFM ladles are now widely identified and well accepted for their thermal and non-wetting properties and improved productivity. However, as explained by Pyrotek's European Product Manager for Coatings, Jean-Pierre Erard, moves to reduce casting cycles generate problems due to oxide films sticking on the RFM ladles.

Now, customers across Europe have asked Pyrotek to consider methods of preventing oxide films from returning to the holding furnace.



Examples of poor deskulling

CUSTOMER DEMANDS

Some well known names in the automotive industry are now demanding solutions from foundry sub-contractors to avoid returning any oxide film to the holding crucible. Aluminium foundries specializing in pistons and cylinder heads are now highly automated, and operating in a very competitive global market, they are faced with increasing demands in terms of quality, productivity and price competition.

QUALITY

Technologies such as pouring robots, degassing equipment and flux injection machines are now commonly used to achieve high levels of metal cleanliness. The "Big 4" constant enemies of foundry operators are: pinholes due to hydrogen; shrinkage due to a poor feeding system; misruns due to using incorrect die coatings, and inclusions due to the presence of oxide films.

PRODUCTIVITY

Productivity is boosted by investments such as pouring robots and RFM ladles which also deliver benefits in terms of metal cleanliness. The move to increasing production reduces the available maintenance downtime for both the die and casting ladle. Pyrotek was asked to work on the particular problem of recoating the pouring ladles during the production cycle.

CURRENT SITUATION

The majority of the biggest foundries now employ RFM ladles (Reinforced Fiberglass Material), which are pre-shaped calcium silicate or fused silica-based products.

The RFM ladles are delivered from the Pyrotek manufacturing plant pre-coated with ZYP Lubriccoat ZS boron nitride water-based coating. Due to erosion by liquid metal over time, an application of a new thin layer of BN coating is necessary when aluminium buildup starts to appear inside the ladle, or when a thin film of oxide returns to the holding furnace. Oxide return is now totally disallowed by some piston and cylinder heads producers in France and Germany.

The excellent thermal properties of RFM allow for reduced casting cycle time, but consequently, coating maintenance of the pouring ladle is difficult without a shut down.

Currently, there are two options. One is either to coat and re-coat on a “cold” ladle, below 100°C (212°F), but the existing coatings are difficult to apply by brush due to their high viscosity. The other is to apply the coating by brush on a “hot” ladle, above 250/300°C (482/572°F), but existing products become too fluid and do not adhere.

PYROTEK INVOLVEMENT

ZYP, a partner of Pyrotek for the full range of BN products, first developed Maxium B, a coating for cast iron, steel and RFM ladles. This product offers advantages compared to other coatings, including reduced fumes and a wider range of application temperatures.



No fumes at the first immersion



Maxium BHT-L applied by brush before drying

A development has been to reinforce Maxium B with BN, particularly for RFM ladles. Pyrotek initiated trials with Maxium BHT-L using the brushable version with a new high-temperature binder (HT) and added BN content (L for Lubriccoat).

A further improvement was to re-coat with a longer frequency on “hot” ladles during the production cycle, by developing a sprayable version, Maxium SHT-L. Tests on the coating carried out in a customer’s piston foundry showed that oxide films did not return to the holding furnace.



Oxide film is not allowed to return to the holding furnace



Spraying Maxium SHT-L during the tests

Further trials were carried out in a foundry casting cylinder heads, involving very hot pouring ladles, above 400°C (752°F). To achieve the objective, Pyrotek proposed the sprayable version Maxium SHT-L, applied directly in the casting cycle.



Tests were carried out using this coating with the customer’s holding furnace set at 740–750°C (1364–1382°F). Very positive results were obtained showing improved casting performance, including no oxide sticking to the RFM ladle.

www.pyrotek.info/zyp