Application of ALU-STOP LC25 on tables for VDC and HDC castings

ALU-STOP LC25 在 VDC 和 HDC 铸造台上的应用指南

Castings of billets - Advantages

铝棒铸造 - 优势

One major field of application of boron nitride coatings is use on VDC and HDC billet casting machines. Boron nitride coatings are used to coat and protect thimbles, transition plates and the refractory lining of troughs. Due to its superb release and parting properties, the cleaning of the refractory parts is made easier. The easy release of the aluminium skull does prevent the refractory parts from damage, the damages are normally coursed be the use of steel tools, levering the skull of the refractory linings.

氮化硼涂料一个主要的应用领域是在 VDC 和 HDC 铝棒铸造机的套管，转接板和水槽的耐火衬里上。其优越的脱模和分离性能使得耐火部分的清理变得很容易。容易脱模的铝壳防止了耐火部位受到损伤，通常这种损伤是由于钢制工具在翘起耐火内衬的渣壳而导致的。

ALU-STOP LC25 Boron-Nitride-Coating is best suitable for the coating of thimbles, transition plates. ALU-STOP LC15 Boron-Nitride-Coating is best suitable for the coating of refractory lining of the distribution trough of Wagstaff™ Casting Systems. The excellent non-wetting property of ALU-STOP LC25 Boron-Nitride-Coating makes an easy and effective removal of residual solidified aluminium pieces. The use of ALU-STOP LC25 on thimbles and transition plates has provided a better release coat and aluminium flow in these areas. It is a proven replacement for graphocote (both based on xylene and water). The use of ALU-STOP LC15 on distribution troughs and Launders is also the replacement for the commonly used terracote or bone ash.

ALU-STOP LC25 氮化硼涂料最适合应用在铸造机套管和转接板上，尤其适合用作 Wagstaff 铸造系统的分流槽耐火内衬涂料。ALU-STOP LC25 氮化硼涂料完美的非润湿性能使得去除残余的固化铝块变得轻易而高效。使用 ALU-STOP LC25，可以让铝汤更顺畅地流过套管和转接板，并提供一个更好的脱模表面。这种材料已经确证可以有效替代黏土涂层（两者都是

用二甲苯和水做基底）。ALU-STOP LC15 在分流槽和流道的使用也是对常用的陶土或骨灰的替代。

ALU-STOP LC25 Boron-Nitride-Coating is a water-based, past-like product and should be diluted with distilled water prior to use. Best performance of ALU-STOP LC25 Boron-Nitride-Coatings achieved by applying thin coats of 50-100µm (2-4 mils). It may has and adverse effect if applied more than the advised thickness.

ALU-STOP LC25 氮化硼涂料是一款水基底膏状产品，使用前需用水稀释，使用时以形成 50-100µm (2-4 mils)的涂层效果最好，如果涂层超过建议的厚度，可能会有一些不良反应。

In the following examples the application of ALU-STOP LC25 Boron-Nitride-Coating is described on thimbles as well as on transition plates and on the refractory lining of the distribution trough.

下面的例子描述了 ALU-STOP LC25 氮化硼涂料在套管、转接板，和分流槽的耐火衬里上的使用。

Application on thimbles

套管应用

In conventional practice thimbles are treated using coatings based on graphite or iron oxide in order to prevent sticking of aluminium to the refractory material. However, experience shows that despite the applied coats, considerable amounts of metal sticks firmly to the thimbles. The force used with tools for the subsequent cleaning process of the thimbles. will destroy the thimble refractory surface. Tiny particles of the refractory material are separated from the thimble surface during this cleaning process enlarging its surface and providing even better adherence of melt in future castings. These are the initial stages of destroying the thimble and limiting the lifetime of these parts to about 200 ... 300 casts. The damaged areas will also be the start of oxide build-ups, which can and will release during the cast and influence to quality of the billet.

在传统的生产操作中，套管常使用以石墨或三氧化二铁为基底的涂料，以防止铝粘附在耐火材料上。然而，经验表明尽管使用了涂料，还是有相当大量的金属很紧地附着在套管上。随后用工具清除套管所产生的力量会破坏套管的耐火表面。这个清洁过程会使耐火材料的微小颗粒从套管表面分离，从而导致套管表面积增大，在将来的铸造中更易产生粘附和熔化。这是套管受到破坏的初始阶段，从而限制了这个部件的使用寿命只有 200 至 300 铸次。受损的区域也会是氧化物开始积聚的位置，这些氧化物在铸造过程中释放进而影响铝棒的品质。

Preparation before the installation of Thimble and Transition Plates

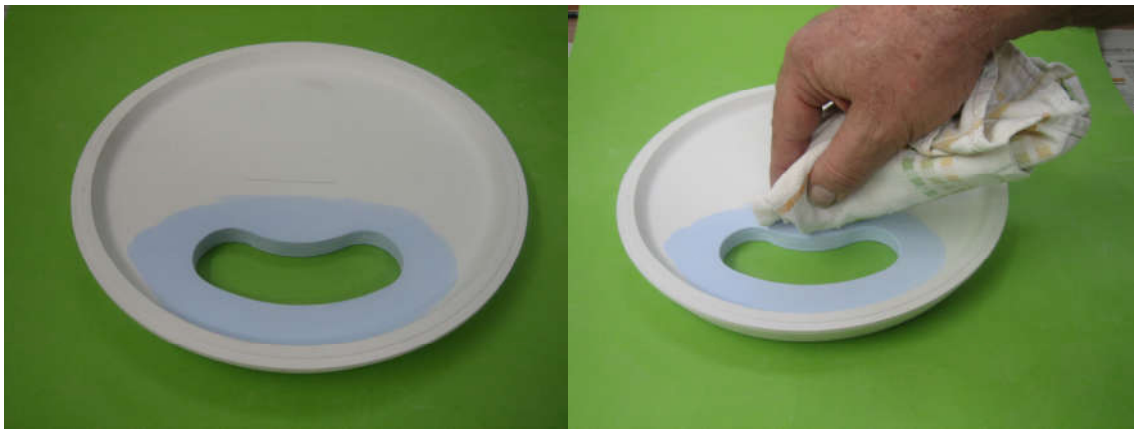
套管及转接板安装前的准备

In order to extend the lifetime of thimbles, today boron nitride coatings are used. Thimbles and transition plates should be pre-coated and polished before the installation and the first exposure to liquid aluminium.

为了延长套管的使用寿命，如今使用的是氮化硼涂料。套管和转接板应在安装前和第一次与铝汤接触前，预先做好涂层和打磨抛光。

Transition plate, before coating, note the two pencil marks on the right image.

未上涂层的转接板，请注意右边图片上的两个铅笔做的标记



Coated transition plate by brush, right shows polishing of the dried coating.

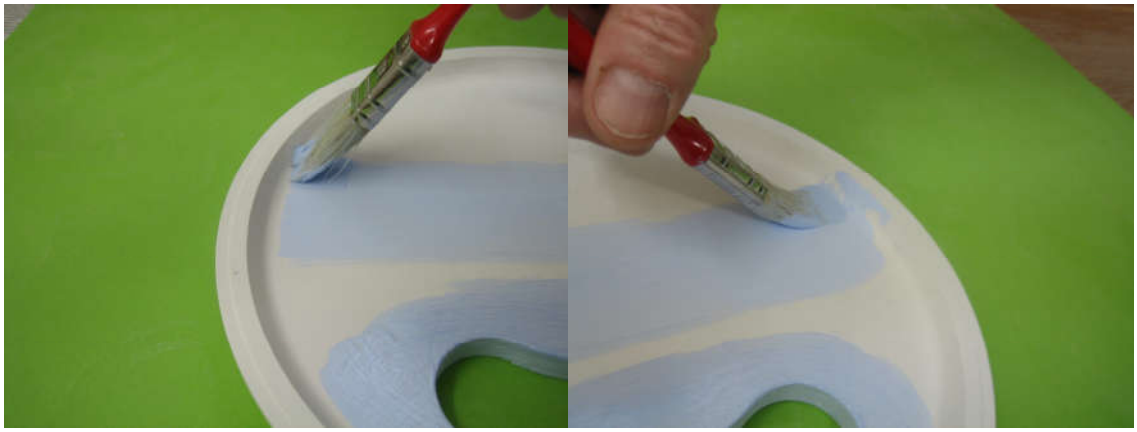
用刷子刷布了涂层的转接板，右边图片示意用干布对涂层进行打磨

Further polishing of the coating (left), polished surface shows a shiny appearance (right).

进一步抛光涂层（左图），抛光后的表面程现亮泽的外观（右图）

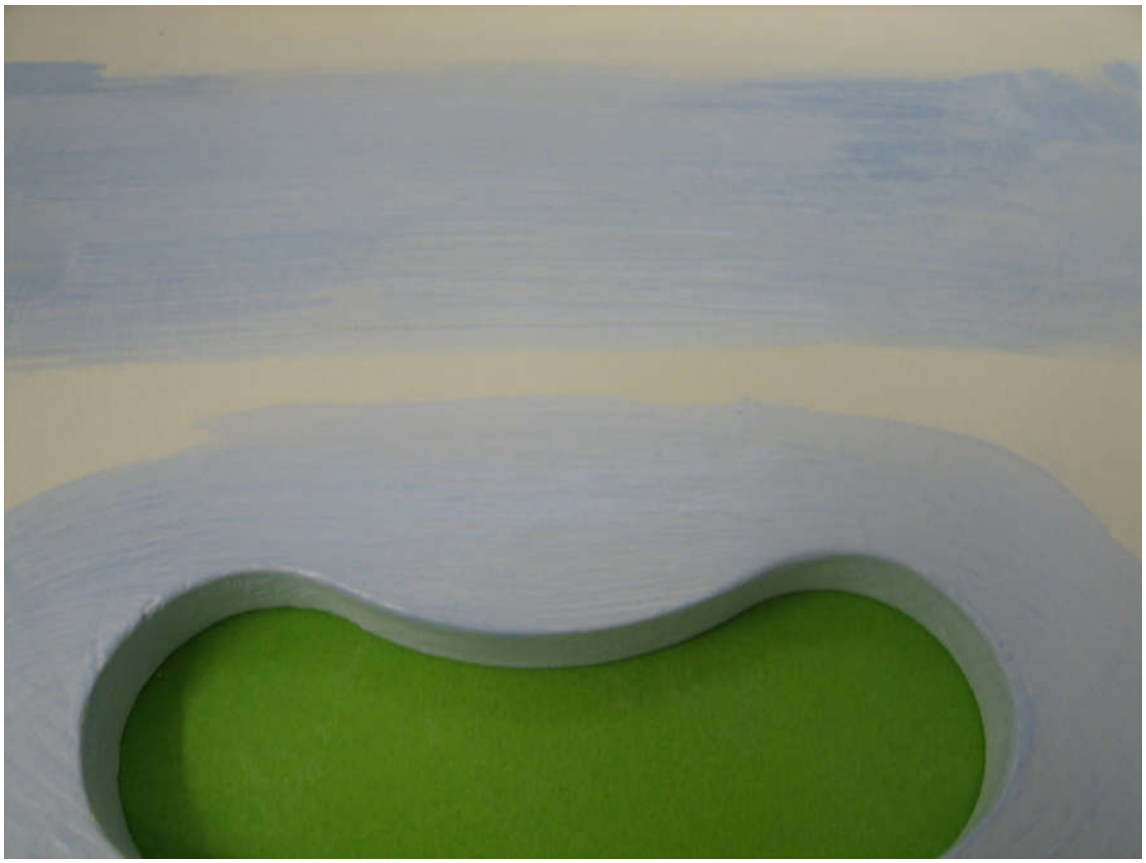
The initial coating of the thimbles and transition plates is done by preheating the items in an oven to 150º for 2 hours, then cooled to approx. 8oºC, then dipping the items into ALU-STOP LC25 for a moment, approx. 30 sec, returned to the oven at 150ºC for 2 hours and then polished with a cotton material. A mixture of 1 part ALU-STOP LC25 and 2-3 parts distilled water give best results. This way all pores are coated with ALU-STOP and a good release is provided. Now these items are ready for use. If the coating is damaged during the installation, some touch up with the brush followed by polishing will required to assure a sound and lasting coat.

要完成这个套管和转接板的初涂层，需将刷布涂料后的部件在 150℃烤箱中预热 2 小时后，冷却至大约 80℃，然后将部件浸入 ALU-STOP LC25 中片刻，约 30 秒，复又放入 150℃烤箱中烤 2 小时，然后用棉质材料打磨抛光。1 份 ALU-STOP LC25 和 2-3 份蒸馏水混合稀释可以达到最好的效果。这样所有的孔隙均被 ALU-STOP 被覆，可以提供一个很好的分离效果。现在这些部件已经准备好，可以被使用了。如果在安装的过程中涂层被损坏了，需要用刷子补涂后打磨抛光，以使涂层完整及耐用。



Application by brushing of ALU-STOP LC25 on a transition plate.

用刷子在转接板上刷布 ALU-STOP LC25 的使用方法



Application of ALU-STOP LC25 with a good thickness, where the pencil marks show through the coating (upper coating strip), lower right shows a part of the coating, which was applied too thick.

ALU-STOP LC25 的使用，涂布厚度良好时，铅笔做的标记隐隐透出（见上部涂料带），下部的涂料显示右下一小部分涂得过厚。

Readily coated and polished Transition plate with ALU-STOP LC25, note the shining surface on the right image.

ALU-STOP LC25 涂布和抛光完成的转接板，请注意右边图片的亮泽表面。

Application of ALU-STOP LC25 by brush on thimble (left) and inner surface of thimble, already coated and polished.

用刷子在套管上涂布 ALU-STOP LC25（左图）和完成涂布和抛光的套管内表面。

Maintaining in between casts

铸次间的维护

If attention is paid to the coating during the cleaning in between casts, the coating can last up to 4 cast before recoating is required. The thimbles are made from fused silica and do not require polishing after every cast, where the transition plate and the joint between the two items may need a minimal clean, re-coat and may require a polish after every cast. Between casting break, a brush should be used to brush the inner surface of the thimbles while hot 60 to 80º by using a mixture of 1 part ALU-STOP LC25 and 3-5 parts water. The correct preparation and treatment of the mentioned items with ALU-STOP LC25, will enable the operator to easily remove the remaining metal without the use of Steel tools. This is achieved mainly by the fact; that the surface of the refractory parts is not damaged any more by mechanical influence of any tools and remains in good shape. In this way ALU-STOP LC25 helps to extend the lifetime of thimbles and T-plates dramatically. As proven by many customers the cost reduction in release agent use and contamination of release agent to product, cooling water systems and shop floor will be a big improvement.

在两次铸造之间进行清洁的时候，如果小心注意维护，涂层最多可以连续铸造 4 次，才需要重新刷涂。套管是用融合的硅制造的，不需要在每次铸

造后打磨，然而转接板和两个部件的连接处需要做最低限度的清洁，重刷涂料和也许在每次铸造后需要打磨抛光。在两次铸造的间隔当中，需要用刷子在 60-80℃的时候在内表面刷布 1 份 ALU-STOP LC25 和 3-5 份水的混合液。用 ALU-STOP LC25 正确地准备和处理所提到的部件，可使操作者无须用到钢制工具而轻易去除残余的金属。这个效果主要是基于一个现实而达到的，那就是耐热部件的表面没有受到任何工具的机械破坏而保持良好的外形。ALU-STOP LC25 以此达到大大延长套管和转接板使用寿命的效果。正如许多客户已经证实的那样，花在分离介质的使用和分离介质污染产品的成本下降了，冷却水系统和车间地面都将获得巨大改善。

Important!

需注意的重点

It is important to apply thin coats because thick coats may crack during its use and do not show any technical advantages. 50-100µm (2-4 mils).

涂层要薄是很重要的一点，因为厚的涂层可能会在使用中裂开，也并没有显示出对技术而言有任何优势。50-100µm (2-4 mils)

New or refurbished Casting Tables

全新/再磨光的铸造台

After a new refractory lining is installed and coated with the sealer, ALU-STOP LC25 Boron-Nitride-Coating is brushed onto the could surface using a mixture of 3 parts LC25 and 4 parts of water. A whole table will be covered by about 750g of ready to use mixture (=320g ALU-STOP LC25).

一个新的耐热内衬安装和用封闭剂涂布后，将 ALU-STOP LC25 氮化硼以 3 份 LC25 配 4 份水的混合物刷布在表面。整张铸台将用掉约 750 克配比好的混合液进行覆盖（=320 克 ALU-STOP LC25)。

Application on transition plates

在转接板上的应用

Many cast houses are still coating transition plates (mainly made of Ca-silicate, N17, N400, Cal Cast) with graphite or talcum today. However, AirSlip transition plates are treated with ALUSTOP LC25 establishing a proven method to protect these parts and successfully replacing graphite.

许多铸造车间仍在使用石墨或滑石来做转接板（主要用钙-硅，N17，N400，Cal Cast 制造）涂层。然而，已经证实，用 ALU-STOP LC25 处理 AirSlip 转接板可以保护这些部件，ALU-STOP LC25 可以成功替代石墨。

The some method is applied on Horizontal Casting Mould Transition Plates.

同样的方法也用在水平铸造的转接板上。

Transition plates (usually of Ca-Silicate, N17, N400, Cal Cast) may be coated by brushing using a mixture or 1 part LC25 and 2-3 parts water.

转接板（通常由钙-硅，N17，N400，Cal Cast 制造）可用刷子涂布 1 份 LC25 和 2-3 份水配比的混合液。

Important:

需注意的重点

It is important not to coat the porous graphite die because this could interrupt gas flow. The smallest amount of BN on the permeable walls will restrict the gas flow.

避免覆盖多孔石墨模具是很重要的，因为这会阻断气流。在渗透壁上，最少量的氮化硼将会限制气流。

Remark:

注意

Caused by thermal stress the refractory lining of the distribution trough shrinks during use forming cracks of a width of 0.5-2mm. Because ALU-

STOP LC25 Boron-Nitride-Coating is applied in thin coats those cracks will not be covered. Therefore, these cracks must be filled in time by using a suitable repair putty. Otherwise liquid aluminium will fill these cracks causing adherence to the lining.

由于热应力，分流槽上的耐火内壁在使用中会形成 0.5-2mm 宽的裂纹。因为 ALU-STOP LC25 只涂覆很薄一层，那些裂纹将不会被覆盖。因此，这些裂纹必须按时使用合适的修复用油灰充填。否则液态铝会渗入这些裂纹而附着在内壁上。

Application on the Refractory Lining of the Distribution Trough

在分流槽耐火内壁上的使用

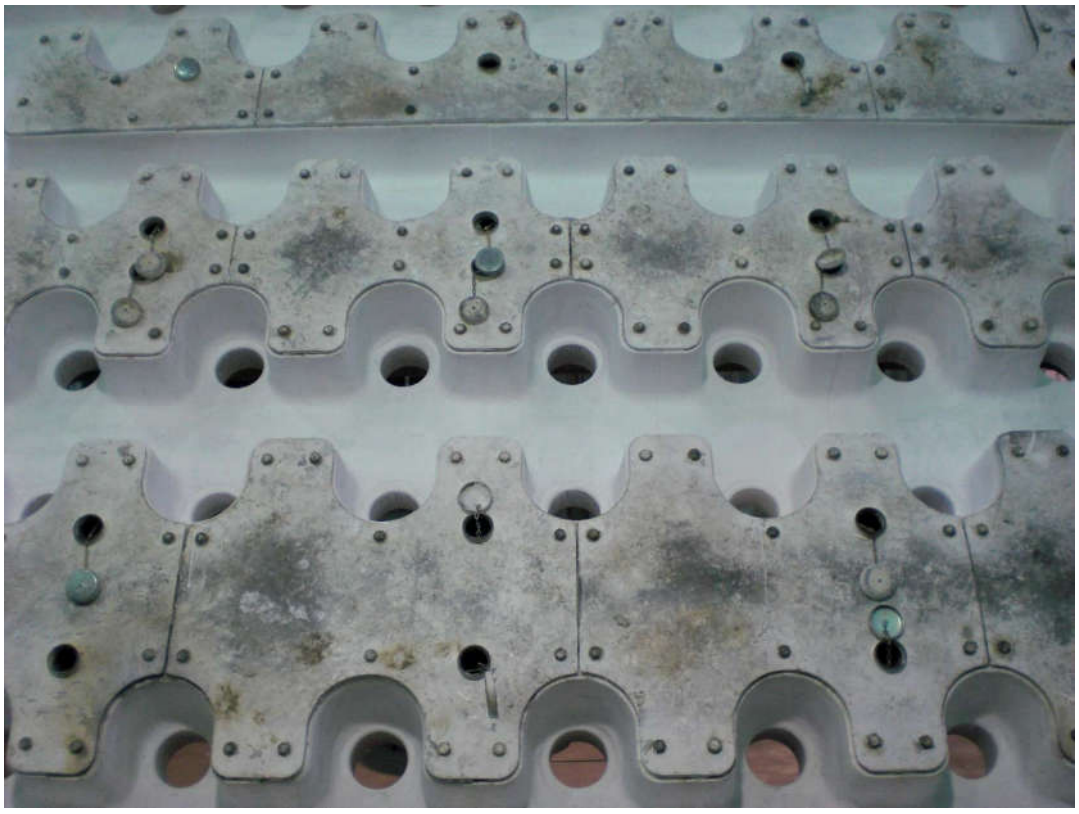
Standard procedure of coating in the distribution troughs, when casting Aluminium is the use of release coatings based on bone ash or iron oxide (red mud coatings). Bone ash is applied as powder whereas iron oxide slurries are painted yielding a coating thickness up to 1cm (0.39-inch). These coating contaminate melt and cooling water systems.

分流槽涂布涂剂的标准步骤，是当铸铝时使用以骨灰或氧化铁（红色泥样涂剂）做基底的分离涂剂。骨灰是使用粉剂而氧化铁浆是刷上去的，形成一个厚度最高为 1cm（0.39 英寸）的涂层。这两种涂层污染熔融和冷却水系统。

Nowadays, boron nitride coatings, ALUSTOP LC25 are used in troughs lined with Ca-silicate or low-density fused silica. Correctly applied, the achievable life time is extended to up to 3 time its current life time. Such results will be obtained only by a careful application and thorough maintenance of the coated troughs. Best way to do this is to start coating a cold trough by using a concentrated coating and polishing this coating into pores of the refractory material as well as into the joints. Thus the surface is sealed in order to prevent the aluminium from filling the voids of the refractory material and sticking to it. This enables the operator to clean the trough without damaging its surface. Subsequent applications of ALUSTOP LC25 are carried out during casting breaks, after the residual solidified metal is removed from the troughs. As described earlier the use of any tools for removing the metal from the trough should

be avoided in order to prevent any damage of the refractory substrate.

如今，氮化硼涂料 ALU-STOP LC25 被使用在内衬钙-硅或低密度融合硅的流槽中。正确使用的话，其使用寿命最高可扩展至目前使用寿命的 3 倍。只有在小心使用和对被覆的流槽全面维护的前提下，才会获得这个结果。最好的方式是开始使用一个高浓度的涂剂涂布冷的流槽并进行打磨，使其进入耐火材料的孔隙和连接处。这样其表面就被封闭住了，以防止铝填入耐火材料的孔隙并粘附在上面。这使得操作者可以在不破坏其表面的情况下清洁流槽。在剩余的固化金属被从流槽去除后，随后再在两次铸造间使用 ALU-STOP LC25。如之前所述，应避免使用任何工具去清除流槽中的金属，以防损伤底下的耐火层。



Distribution trough, coated with ALU-STOP LC25.

涂布了 ALU-STOP LC25 的分流槽

During each casting break ALU-STOP LC25 Boron-Nitride-Coating may be applied on hot surface after removal of aluminium by using a spray gun. Best mixture will be 1 part ALU-STOP LC25 and 4 parts water. A consumption of 575g of the ready-to-use mixture has been observed (=115g ALU-STOP LC25, about 6-8g ALU-STOP LC25/t casting).

在每个铸造完成后，下次铸造前，可用喷枪清除铝，然后在仍热的表面上使用 ALU-STOP LC25 氮化硼涂料。最好的混合比为 1 份 ALU-STOP LC25 加 4 份水。据观察，这将消耗 575 克配好的混合液（=115 克 ALU-STOP LC25，约 6-8 克 ALU-STOP LC25/吨铸造）。