

NEW COATINGS AND ADDITIVES CONCEPTS AS AN ENTIRE APPROACH FOR DEFECT AND RESIDUE FREE CASTINGS

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There has been a lot of effort in the last years to eliminating coating process in the foundries. In some areas the target has been successfully implemented, e.g. for less demanded Ductile Iron castings. ASK Chemicals has been able to develop new type of additives which enable the foundries to reduce the casting defects significantly and thus pour more uncoated cores.

Engineered sand additives VEINO ULTRA and ISOSEAL are such developments, which have amazing anti-veining properties.

OEM's are forcing the foundries to deliver castings with a limited minimum amount of residue in their castings. A special coating based on good anti-veining and anti-penetration properties has been developed, which reduces the coating residue after pouring to a minimum.

Keywords: *Mould and core coating, sand additives, foundry, performance, casting defect.*

1. Anti-Veining and Anti-Penetration Additive with the Scope to pour uncoated cores

There has been a lot of effort in the last years to eliminating coating process in the foundries. In some areas the target has been successfully implemented, e.g. for less demanded ductile iron castings [1].

ASK Chemicals has been able to develop new type of additives which enable the foundries to reduce the casting defects significantly and pour more cores uncoated.

VEINO ULTRA is such a development, which have amazing anti-veining properties.



Fig. 1 Uncoated core and casting poured with uncoated core

2.1 Anti-Veining Coating

Special requirements concerning casting quality is to have no veining along the parting line of the core box.

For the production of the cores furthermore there is a strong demand to have no deformation of the cores during drying process .

Examples of the coating generation MIRATEC™ BD show that the coating eliminate the veining and by the improved application properties, the cores can be dipped in a reduced cycle which has been improved 100% without getting drops on the core.

2.2 High Gas Permeable Coatings against Scabbing

Scabs and gas defects belong to the sort of severe defects in serial production, because this leads to scrap in the foundry.

In a development project, ASK developed different coatings that are extremely gas-permeable and suppress these defects.

Castings, in which the cores are highly thermally loaded by a critical low mould filling on special areas, tend to suffer from scab formation. Based on the MIRATEC MB 501, a coating that shows good results (especially in the serial casting) to avoid veining and penetration, the feature “increased gas permeability” was implemented.

The new coating, which fulfils this profile, is the MIRATEC AH 501. By the implementation of this coating the scab defects could be removed both from a hydraulics casting part (core package Cold Box + shell sand) and from an Axle housing (Cold Box - core).

Furthermore the cycle time of the dipping process has being able to be reduced to the half with this coating in comparison to the initial coating.

2.3 Residue-free Castings with MIRATEC TS

Besides the primary function of the coating to prevent casting defects, the presence of residuals in cast components, especially automotive parts, has become increasingly significant and is determined by means of cleanliness analyses and limit controls carried out by OEMs in accordance with VDA 19 (ISO 16232).

The limiting of so-called residuals was originally necessary to prolong the maintenance intervals for motor vehicles. Residuals in the hollow spaces of the engine block caused the filters to clog early and lead to undesirable shorter maintenance intervals than required. On the other hand, it is quite difficult and expensive – in particular in a water jacket or oil channel – to shot-blast these areas in such a way that every spot is residue-free. Hence, special washing

machines need to be installed in some cases, which increase costs and reduce productivity, however.

On the basis of the good protective properties of well known coatings against veining and penetration, a special coating MIRATEC™ TS has been developed which reduces the coating residue from casting to a minimum. The development was initially evaluated by means of a heating microscope (optical dilatometer) measurements and casting tests involving practical geometries, such as those of a water jacket. The casting tests sought to investigate whether or not the coating film can be removed from the cast part merely by blowing it with compressed air. Systematic series of developments have ultimately succeeded in producing such a “peel-off coating” that comes away from the metal on its own. SEM comparison (Scanning electron microscope) reveals that MIRATEC TS has these properties in comparison to a conventional coating.

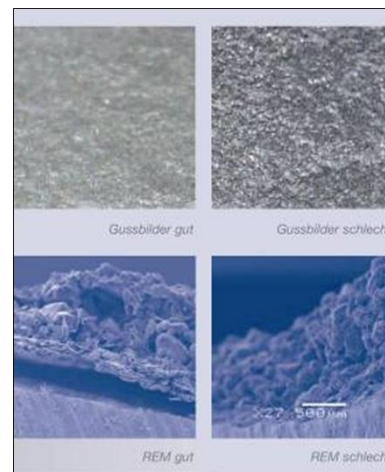


Fig. 2 SEM comparison of MIRATEC TS (left) and a conventional coating (right)

Summary

New coating and Additive developments enable foundries to produce flawless and residue free castings in a less complicated way with less side effects and even enable coating free casting production.

References

- [1] Showman, R., Horvath, L., Clifford, S., Harmon, S., Lawson, E., “A Systematic Approach to Veining Control”, FS Casting Congress Proceedings, 11-005.