

New Solution on Invaded Gas Hole Formation from Green Sand Process

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Abstract: Gas blister or invaded gas hole is one of the public defects for castings made from green sand process, which forms through the interplay of gas development and permeability [1]. To investigate the new solution on improvement of gas defect, one anti veining additive on green sand properties has been studied in Clariant Zhenjiang Lab. The results indicate, the casting surface finish has been improved even eliminating coating at 0.7% addition by weight of sand for core making, while the gas defect percentage for casting increases as well.

Keywords: Gas blister, green sand, anti-veining additive, green sand properties, invaded gas defect

1 Introduction

Green sand is one of the most economical and environmental molding sands, which has been widely applied to produce kinds of volume production for small and middle size castings, embracing such advantageous as high efficiency, low cost as well as good environmental compatibility.

Gas hole is one of the common defects for ductile iron production with green sand process, which is always forming during pouring and solidification. There are a lot of physical, chemical factors as well as interplay factors on this defect. Normally our foundry engineer shoots this defect by reducing moisture, active clay, total clay, loss on ignition, gas development of green sand, reducing influx of organic core sand. It rarely had articles on how the anti-veining additives from core does influence on gas defect.

The physical properties of one brand additives for Yinfeng application has been tested, the relative effects on green sand properties have also been studied, the relationship between the dosage and rate of casting has been observed as well. defect is investigated in this article, new solution has been founded through matching the solidification time with proper gas evolution and gassing speed.

2 Experimental procedure

The physical properties of anti- veining additive have been tested with the facilities from Clariant Lab, and the returned sand was simulated by the core sand influx into green sand in accordance with the additive dosage implemented at Yinfeng core shop, 0.4% and 0.7% by weight of core sand are studies, 120kg core sand influx into green sand during differentiate case production.

3 Result and discussion

Dosage of additive on Casting defect

Gas defect free for casting with 0.4% additive for core, while burn on occurring without coating, 5% gas defect occurring with core sand with 0.7% additive, no any penetration was founded as fig. 1.

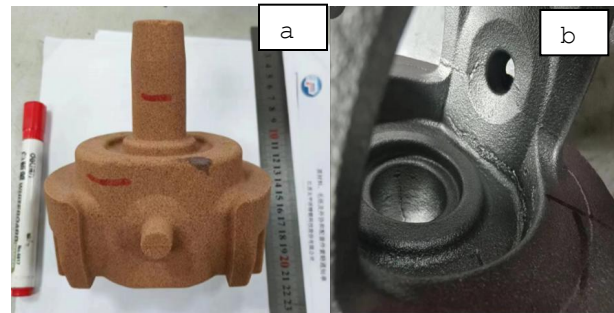


Fig. 1 Defected casting and core(a)Core with 0.7% additive;(b) defected casting.

Effect of additive on green sand properties

Table1. Effect of additive on properties

	Permeability	GCS	WTS	DCS	Gas
	m ³ /m ² ·min	Kpa	Kpa	Kpa	mL/g
Without additive	189	189	4.7	206	9.8
With 0.7% additive	176	192	4.7	214	11

It observed the additive reduces the dry compressive strength and gas evolution, while almost no influence on green compressive strength, wet tensile strength and permeability.

Effect of additive on gas evolution and velocity

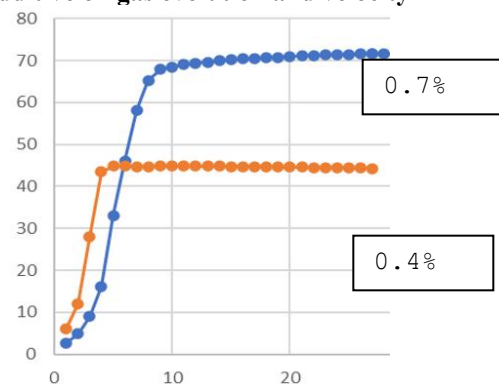


Fig.2 Additive on gas evolution

It understood with the increasing of the additive, the gas evolution is higher, while the gas velocity keeps same.

Effect of additive dosage on casting defect

It reported the gas defect rate is high as 5% at a dosage of 0.7% additive, casting surface is acceptable without coating, while zero gas defect at a dosage of 0.4% while needs coating to avoid penetration.

4 Conclusion

Additive dosage below 0.7% doesn't create gas defect while rough surface finish obtained without coating.

Additive dosage above 0.7% improve surface finish without coating while 5% of gas defect occurring.

Anti veining agent reduces hot compressive strength and no obvious effects on other green sand properties.

Proper additive dosage could balance casting surface finish and gas defect.

Acknowledgments

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References

- [1] Werner Tilch, Michael Franke, Handbook on bentonite-bonded moulding materials. P 279.