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Effect of the Molding Material on the Roughness of the Castings

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INTRODUCTION

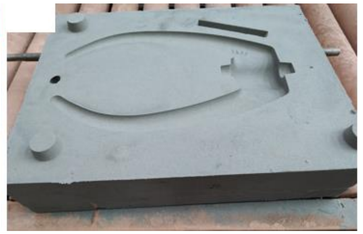
The high casting temperatures of steels require special attention in the selection of refractory materials for molding production. These materials comprise a diversity of products that can withstand high temperatures under specific processes and operating conditions of industrial equipment. The refractory materials ensure protection against defects, such as metal penetration. This type of defect is caused by the interaction of the metal with the sand mold pores, resulting in a surface with high roughness. Thus, refractory materials are a key factor in determining the efficiency of the mold coating, filling the pores left by the molding sand in the drying stage, and thereby the surface quality of the casting. An innovative process could be the production of sand molds by additive manufacturing. This technology has the advantage of producing molds and cores with high surface quality and gas permeability, along with the production of parts with a higher level of complexity.

EXPERIMENTAL PROCEDURE

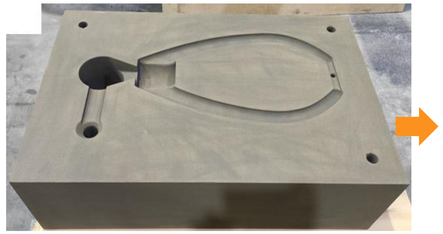
Mixing Fork Production

MOLD MAKING

Conventional self-drying followed by painting

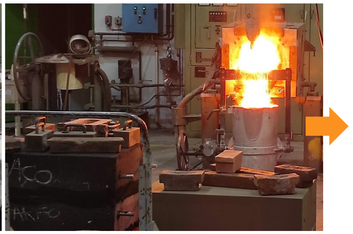


PEP SET cold-curing process with black iron oxide



Additive manufacturing of the mold

MELTING



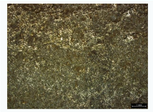
Charge melting

CASTING

Stainless steel pouring

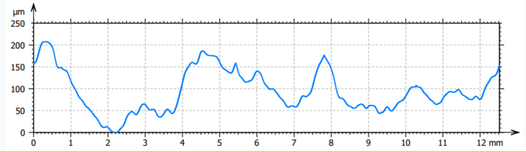
RESULTS

SELF-DRYING AND PAINTING

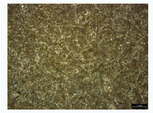


100x

- Ra of 15.28 µm.

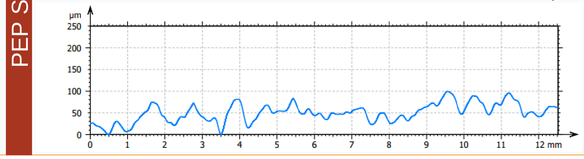


PEP SET COLD-CURING

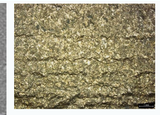


100x

- Ra of 10.72 µm.

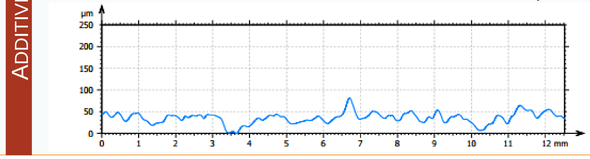


ADDITIVE MANUFACTURING



100x

- Ra of 7.33 µm.



CONCLUSIONS

The results showed that the PEP SET technology with black iron oxide had the best results for the production of functional mixing forks with optimized roughness. Additive manufacturing for mold production has also proven to be a very attractive technology with promising results for the manufacture of these parts.

ACKNOWLEDGEMENTS

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