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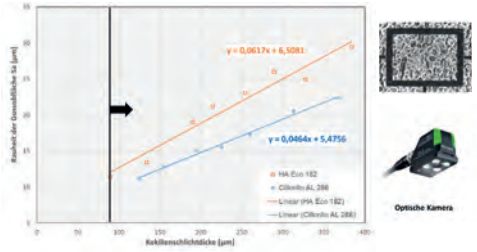
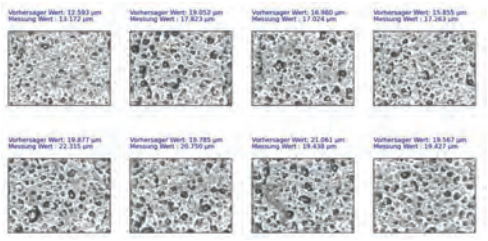
Deep-Learning based online Monitoring Approach of Mold Coating Status



Correlation between as-cast surface roughness and mold coating thickness.



Prediction of as-cast surface roughness based on deep-learning method

In permanent mold casting process, mold coating changes the heat transferred from the molten metal to the mold by acting as an insulating layer. Moreover, the mold coating status is a significant variable regarding the coating's thermal resistance, which strongly influences the mechanical properties of cast parts and the thermal erosion on expensive molds. However, in casting production, coating peeling-off and repeated recoating result in an inhomogeneous coating thickness distribution. Due to the high working temperatures of the molds, it is difficult for magnetic equipment to measure the coating thickness continuously. Moreover, there is a big deviation for the measured thickness values when the measured coating is certain. Therefore, no efficient online coating thickness measurements exist.

The approach of Fraunhofer IGCV is an indirect monitoring concept based on the as-cast surface corresponding to the coating area. Research results show a linear correlation between the roughness parameter of the as-cast surface and the coating thickness. Based on this correlation, the coating thickness can be derived from the corresponding as-cast surface analysis. To keep process costs low, the evaluation is based on deep learning of images from an industrial camera.

Contact

Fangtian Deng
+49 (0) 89 350946 128
fangtian.deng
@igcv.fraunhofer.de

Fraunhofer Institute for Casting, Composite and Processing Technology IGCV
Lichtenbergstraße 15
85748 Garching | Germany

www.igcv.fraunhofer.de/en

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