



Steel Cleanliness Control and Fluid Flow in Continuous Casting Strands

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inclusions

Case 1

Cast time



Mold Powder Entrainment and Critical Velocity for Entrainment



Iguchi, 2002
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Effect of SEN Outport Angle on Inclusion Removal (Inclusions)



Down 15°, no Steps





 With more upwards SEN outport angle, more inclusions can be removed from CC mold;

 Steps in SEN can help remove more inclusions from CC mold.

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Particle Motion in SEN and CC Mold

Conditions:

- 300mm submergence depth
- 1.2 m/min casting speed
- no gas injection

pathline

50µm inclusions i 300µm

Speed	Turbulent	and CC Mold
(m/s)	energy dissipation rate (m ² /s ³)	Conditions: - 300mm submergence depth - 1.2 m/min casting speed - no gas injection - 1 - 1 - 2 - 2 - 2 - 2 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3
6.31e-03 3.98e-03 2.51e-03 1.58e-03 1.00e-03	1.16e 6.81e 4.01e 2.36e 1.39e	-03 -04 -04 -04 -04

Effect of SEN Submergence Depth on Inclusion Removal (Inclusions)



Casting

After some critical value of SEN submergence depth, inclusion removal from CC mold is independent of SEN submergence depth.



Casting speed decreases from 1.4 m/min to 0.6 m/min in 5 minutes with a variation rate of 0.15 m/min Steel cleanliness in is detected by automatic 2D image analysis

6

0.001

2

4

Steel cleanliness is worse at larger casting speed (>1.2m/min)

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Time/min

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Q. Zhang, X. Wang and L. Zhang: Baosteel BAC 2006-The Second Baosteel Biennial Academic Conference, L.X. Qihua Xie, (2006), 1, 118-124.

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