

Billet Laps

Question

At our billet caster, we are experiencing double skin or laps on the surface of low carbon and high carbon billets. Our billet's size is 127 mm x 127 mm; casting speeds are between 2.7 to 2.9 mm/min; stroke is 10 mm; curved and parabolic molds; and a servomechanical oscillation table is used. The oscillation table is experiencing an accelerated wear problem with the spherical plain bearing. Less wear is experienced with the eccentric bearing and pin. However the chief complaint are the laps on the billets.

A.B.E., Mexico

Answer

Since the problem is surface related and the billet surface is formed in the mold at the meniscus, laps or double skins must be formed during the first stages of solidification. The quickest fix to this problem is to check the tundish temperature at the time of lap formation. Typically double skins will form as molten steel's viscosity increases due temperature drops. The steel will roll into the gap between the skin and the mold wall thus causing a double skin.

Solutions to Tundish Temperature Problems

1. Try raising the tundish temperature and then maintaining that temperature by keeping a uniform molten steel depth in the tundish;
2. Use tundish lids and placing an insulating powder on top of the molten steel in the tundish;
3. Proper ladle stirring prior to reaching the caster and using ladle lids and insulating powder in the ladle.
4. Proper tundish refractory installation and drying
5. Use a ceramic ladle to tundish submerged entry shroud.

Sticking in the mold may be another cause but this can be easily determined by looking for bleeders or transverse surface cracks on the billet surface; either plainly visible or revealed after some surface removal operation and dye penetrant test..

Previous Skull Session columns, May 1999, pg. 45, "Negative Strip" and July 2001, pg. 82, "Mold Lead (Mold Oscillation)," and have extensively detailed negative strip percentage and time calculations so these will be left up to the readership to

determine if the mold oscillation operation is within acceptable operating parameters. Make sure that the mold oil flow is uniform around the perimeter of the mold and sufficient to lubricate the billet removal operation.

Check the mold level control to make sure that it is maintaining a uniform meniscus level. Sometimes the mold level indicator meter show uniform operations but the level is going up and down. Splashing in the mold due to misdirection of the tundish nozzle stream will cause laps. Excessive mold EMS may be another cause of laps or double skin.

To summarize, a non-uniform and cold tundish temperature or excessive EMS are the first items to examine as a cause of billet surface laps. Splashing caused by tundish nozzle flow problems is another potential cause. If surface cracks are found, check your mold oscillation parameters, check the mold lube and make sure the mold level control is functioning properly.

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