

Silica Tundish Board Life

Question

Our six strand tundish is lined with silica boards. We cast continuously for about 8 hours. Twice when we tried to cast for more than 8 hours the tundish was punctured. We do not like to break the sequence since every time the sequence is broken and restarted, startup problems like mould overflows and break-outs crop up in smaller cast sections on a multi-strand machine.

What steps are needed to increase the hot period of the tundish with silica boards? If silica boards are not suitable what other tundish lining materials would be recommended ?

S.S.K., India

Answer

It is not possible to pinpoint the root cause of your problem from the brief description contained in your question without understanding some further details of your casting practices, namely heat size, alloy types, deoxidation practices, cast tonnes per tundish sequence, ladle slag practice, tundish cover practice, lancing practices to name but a few. Having said this, your problem is very common in those billet casters around the world that are looking to extend the tundish sequence.

Our experience would indicate that the likely cause of your tundish breakouts is influenced by the fact that you are using silica boards as a working lining. Recent trends in billet casting have led to the drive for longer sequencing which in turn leads to more demands on the tundish. Ladle slag carry over each heat and calcium injection to maintain castability means that the tundish lining is exposed to greater quantities of slag, which tend to move from the acidic to basic type. This situation is particularly demanding in open pour billet practices where there is also significant reoxidation and the formation of manganese oxide and even iron oxide. This can make the tundish slags extremely fluid and reactive.

As most billet caster tundishes are narrow and shallow this also enhances the likelihood of significant turbulence in the pour box region. Occasionally these slags can become so locally basic that they solidify creating steel stream splashing and the operators usually attempt to clear the metal/ slag skull by

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oxygen lancing. Silica boards are limited under these conditions because they are not refractory enough to withstand the chemical incompatibility at the longer heat sequences.

I would suggest that you look at the origin of the failure. If the failure is occurring in the pour box area at the slag line then clearly the incompatibility or quantity of slag and turbulence is the main issue. A change to a more compatible working lining or zoning the slag line would be an appropriate solution assuming of course that you cannot prevent this slag from entering the tundish. Changing the working lining to a magnesite or magnesite-olivine refractory can accommodate this. In nearly all countries, the most common method of application today is by wet spraying a monolithic refractory veneer on top of the permanent tundish lining with subsequent dry out before casting, although some steel plants utilize a dry lining application method. The downside of this change is that the cost per tundish will be higher although as the number of heats per tundish increases the actual cost per ton of steel produced should decrease.

If the failures are occurring in the impact zone of the tundish then a change to a more refractory impact pad would provide an answer. I would suggest that you look at a precast alumina or even a magnesite impact pad to correct the problem. This solution will allow you to make a small gain before you again encounter the slag incompatibility issue.

I am sure that a local tundish lining supplier would be able to recommend a solution tailored to your technical and economic needs.

This answer was provided courtesy of Albert Dainton, National Sales Director FOSECO, 20200 Sheldon Road, Brookpark, OH, USA, 44142-1315 who can be contacted directly at Albert.Dainton@burmahcastrol.com or via fax at +1 (440) 816-3072.