

Typical Case History using REDUX EF40L (U.S. Patent 7,618,473B1)

International Foundry X

Trial conducted during Spring 2012

The foundry is a gray and ductile iron foundry producing large castings, some of which are up to 10 feet in diameter. Castings are poured in green sand and furan resin no-bake molds.

The Iron is melted in 3 – 2 metric ton medium frequency coreless induction furnaces, tapping 3500 lb. (1600 kg) per heat per furnace, but only two furnaces are run together at any one time.

The Iron is transferred and cast into the molds using CO₂ cured, “wet rammed” silica lined tea-pot ladles. A lengthy test was run to determine the effect of using Redux EF40L to eliminate excessive slag build-up in the coreless furnaces, which had been plaguing Foundry X for some time.

The furnaces were averaging 253 heats per lining, based on the last three furnace relines.

For a reference point, only one furnace (Furnace A) would have Redux EF40L added for the trial period; the trial started after the Furnace A was relined to give a zero base line. Furnace A was lined with a commercial dry-vibratable silica lining with a prescribed amount of boron oxide.

Redux EF40L was added as a powder, in 1 lb.(0.454 kg) pre-weighed bags. Approximately 1.5 lbs (0.675kg) was initially added on every charge of each heat, but as the trial progressed, flux was added when there was a build up of slag on the lining.

The furnace was loaded with good chunky scrap, returns and compressed shavings (briquettes) from their machine shop.

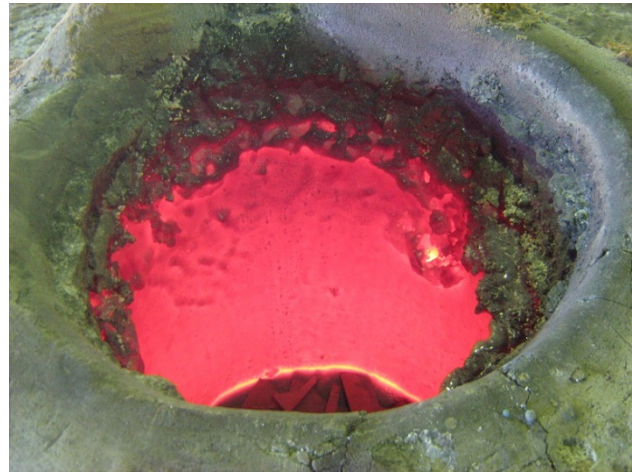


2nd Heat on Furnace A



23rd Heat Furnace A treated with Redux EF40L

Where build-up started to form on the upper portion of the furnace (freeboard area), a package of the Redux EF40L would be added.



74th Heat Furnace A



75th Heat Furnace A after adding Redux EF40L

Note the slag build-up on the upper portion of the furnace was eliminated on the next heat, after a powder pack of Redux EF40L was added.



78th Heat on Untreated Furnace B



184th Heat Furnace A treated with Redux EF40L



190th Heat Furnace B – untreated



Heat 260 on Furnace B – Untreated, taken out of service to be relined





327th Heat – Furnace A treated with Redux EF40



373rd Heat– Furnace A treated with Redux EF40L

A total of 411 heats were tapped from the furnace before it required a reline, resulting in an increase of 62% in refractory life.

Prior to the trial, the furnaces had to be superheated to remove the slag build-up in the upper portion area (slag ring in freeboard); without the Redux EF40L additions, this area of the furnace had to be constantly chipped away to remove the slag, and subsequently any damage to the lining had to be continually repaired with refractory patching material.

FOUNDRY X FOUND THAT CONTINUAL REDUX ADDITIONS RESULTED IN THE FOLLOWING SAVINGS:

- Reduced electricity costs – elimination of lengthy superheating to remove the upper Slag ring that form in the Freeboard area, which resulted in lost production.
- Increased melting efficiency – Any slag build-up increased the refractory lining thickness, resulting in increased power usage and longer melting times.
- Reduced Labor Costs – Elimination of chipping and patching repairs of the excavated lining.
- Reduced Material Costs – measured a 62% increase in lining life and associated labor costs resulting from more frequent lining replacement and patching materials.
- Increased production – consistent furnace capacity throughout an extended service campaign. Elimination of non-productive, energy consuming downtime due to increase melt cycles for superheating.