MASTERMELT

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STOP INDUCTOR LOOP PLUGGING

- Stop inductor loop plugging immediately on any furnace.
- Simple and inexpensive: Add Mastermelt DEOX material to slag layer — spread DEOX on top of slag layer in furnace.
- Add to furnace through any opening: slag door, sampling port, etc.
- DEOX doesn't melt.
- Don't slag furnace; maintain full slag cover.
- Allow slag layer to insulate bath from atmospheric contact.
- Mastermelt DEOX is SiC based — uneventful SDS.
- DEOX chemically reduces FeO and prolongs refractory lining life.
- Inductor plugging stops; slag line erosion stops.
- Crusty furnace slag changes to "dry" type consistency.
- DEOX doesn't affect bath chemistry.
- Let Mother Nature help you stop loop plugging.
- DEOX removes free oxygen from the bath... it's a new melting ballgame when free oxygen is controlled!

MASTERMELT DEOX

MASTERMELT SUCCESS STORIES: INDUCTOR LOOP PLUGGING STOPPED

1 Furnace performance in a gray iron melting system: 30 ton vertical channel, 13 tph cupola melt, 9% coke rate, 0.5% Mastermelt SiC inject rate.

Before cupola SiC injection, holding furnace slag was crusty, metal chemistry varied widely, inductor life was six months or less due to plugging, slag line erosion in the furnace body was rampant, cupola was drained daily due to chemistry issues if held during the six hour third shift idle period, chemistry declined dramatically over weekend hold periods. Furnace slag was "green poled" to break up the slag crust, the only way available for the temperature probe to penetrate the slag layer. Green poling was also used to break up the slag layer when alloying or making carbon additions, offsetting off spec chemistry. Frequent slagging was employed attempting to make the furnace slag more manageable.

Once Mastermelt SiC injection began, furnace slag became very workable, no green poling was needed. Slag was "dry" with no crust or stiff surface layer. Minimum chemistry decline occurred over hold periods. Slag covered the entire metal surface but was easily penetrated to obtain samples or temperature readings. Chemistry stabilized. Off spec iron stopped. Silicon oxidation losses lowered but didn't disappear. SiC injection rate was 0.5%, which is not adequate to eliminate all oxidation loss.

Inductor plugging was stopped throughout the seven-year period of Masteremelt SiC injection. After the seven-year period, injection was switched from Mastermelt SiC to lower cost standard grade SiC. The injection rate remained the same. Only change was the type of SiC injected.

Instantly, iron oxide levels in the cupola, iron oxide levels in the cupola slag, and free oxygen levels in the melted iron increased. Inductor plugging started immediately. Plugging, which had not been an issue for seven years, now surfaced, leading to premature inductor failure after only five months. The melt operation change producing the shortened inductor life was stopping Mastermelt SiC injection and changeover to a lower priced SiC.

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2 30 ton horizontal drum furnace: 12 TPH cupola, 9% coke rate, 1.0% Mastermelt SiC inject rate.

Before SiC injection, the furnace and its inductor encountered very short operating campaigns. The dreaded plugging and sub-surface shelf buildups in the furnace body shortened all campaigns. Furnace slag crusts could not be penetrated. Oxygen lances were used, at times, to open holes for cupola iron to enter. In some campaigns, the furnace body was totally bridged over from shelf type formations. Furnace operation ended up being a worst case scenario – it couldn't get worse.

Inductor life was 3-6 months. Furnace campaign life was erratic. The furnace needed daily "tending" to keep operational.

Many "special briquettes" and rich charge materials were used for chemistry control. Chemistry control was horrible. Wide variations in chemistry were hourly occurrences. Carbon and silicon alloys were added to the furnace on an almost daily basis.

Mastermelt SiC injection was started in the cupola. Some of the SiC injected was carried over into the furnace. The SiC imbedded into the slag layer. Mother Nature helped. Iron oxide was reduced by the imbedded SiC. Slag crustiness disappeared. Chemical uniformity was restored to the cupola-melted iron by Mastermelt SiC injection. No additions to the furnace were required to correct off-spec iron.

Loop plugging stopped. Plugging present up to the point of Mastermelt SiC injection startup did not decrease but further plugging was halted altogether.

Slag line erosion in the furnace body, which threatened to end the campaign, was stopped. Thermocouples on the furnace shell adjacent the worst erosion areas indicated no change in lining thickness once Mastermelt injection started.

The sub-surface shelf buildup, which had progressed outwardly from the refractory lining approximately twelve inches since the campaign startup, stopped growing. This shelf remained unchanged for the next 15 months of furnace operation. The holding furnace operation went on to set campaign life records; campaign life that was best since furnace installation 15 years prior.

RESULTS USING MASTERMELT:

1. **Inductor plugging stopped**
2. **Slag line erosion stopped**
3. **Sub-surface shelf buildup stopped**
4. **No inductor rodding needed**
5. **Furnace de-slagging minimized**

Iron attains highest metallurgical integrity, maximum fluidity, highest strength, lowest casting scrap rate, and lowest melting cost employing MASTERMELT technology while attaining near 1 PPM free oxygen content prior to casting or post melt treatment.

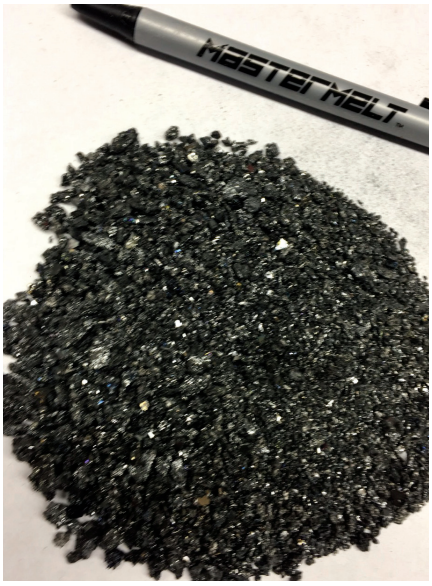
Photo above shows furnace slag from the 30 ton horizontal channel furnace referenced in the second Mastermelt success story.

- Low FeO furnace slag (0.35% FeO). Note green color.
- White specs on fracture surfaces are difficult to see, finely sized embedded SiC particles.

Free oxygen atoms in molten metal cause inductor plugging. Iron oxide in furnace slag supplies oxygen atoms to the bath. Limit iron oxide to 1.0% maximum, preferably < 0.50%.

Let us check your metal's free oxygen level with our special meter. It'll tell the story regarding plugging tendencies. Test is similar to temperature checking, uses a disposable probe.

You can check free oxygen level simply by checking carbon and silicon before and after furnace hold periods. Any chemistry decline indicates free oxygen is present.



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