

HOT TOP TESTING PROCEDURES

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Jim B
For your information
File
See if you agree with all changes

The following information may be old hat to some, elementary to others. But, in this competitive age, to get a competitive edge, proper care must be exercised. Therefore, at the risk of boring you, here it is.

In any test, it behooves the people or person involved to maximize the conditions to insure the best possible results. Hot Top testing is no different. It is especially important in these days of heavy price competition that we attempt to offer to the customer, results that competition cannot duplicate, making a higher priced system cost efficient or more valuable in use than competitive price leaders.

BY RESULTS, I AM SPEAKING OF THREE BASIC ELEMENTS:

1. Better yield
2. Better segregation characteristics
3. Improved rollability

HOW DO WE OFFER RESULTS THAT COMPETITION CANNOT DUPLICATE?

1. Be designing a top that contains the least feasible volume at the maximum ingot weight.
2. By designing rollability features such as a tapered top.
3. By insuring that our PROFAX®/PROFLEX® recipe and quality of that recipe are the best available. *new year product.*
4. By making sure the manufacture of the system is to print. *double check in plant on drawing. Print as directed.*
5. By insuring that the best possible topping compound is used at the right time and in right quantity. *for 770 cast.*

THERE ARE FOUR BASIC STAGES THAT MUST BE FOLLOWED CLOSELY IN TESTING,

- 1 *p.* *product* *drawn*
- 2 *X.* Setting
- 3 *2.* Pouring
- 4 *2.* Holding

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EXHIBIT

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- 4. Charging
- 5. Rolling
- 6. Close

1. SETTING

Big End Down

- A. Make sure the boards fit properly. If the boards are held away from the mold due to bad top manufacture, scrap on the mold wall or any other reason, molten metal will penetrate behind the boards and cause a boiling reaction which, in turn, causes bad surface and board entrapment in the hot top area. In many cases the board breaks away, causing a floater. If the mold is corrugated, check the fit extra carefully to insure that the corrugations of the sideboard match those of the mold.
- B. To help maximize the setting; proper hardware should be designed with consideration to type and size of the mold. The hardware used must be applied at the proper place, which in most cases, is approximately $1/3$ of the way from the bottom of the board. Boards that are not fastened tightly and/or at the wrong location will also tend to float. Bear in mind that a floater, in most cases, means the ingot involved will either be diverted (downgraded) or scrapped, making it necessary to re-melt, which is very costly.
- C. In the case of variable settings, (setting the board at various heights in the mold to vary ingot weight), make sure that the boards are set at the desired height for the particular heat. Most mills measure down from the top. Some have devices that measure from the bottom and mark the mold with chalk.
- D. After setting, make note of anytime the tops are exposed to rain or any kind of water. Wet or damp boards will boil. Re-check the boards after the molds have been transferred to the pouring area to make sure that the movement did not shake anything loose.

Big End Up

- A. The Big End Up hot top casting is nothing more than a mold extension to hold the insert and ring. Care should be taken to see that the tops are set properly, fit is good and material is manufactured to specifications.

- B. Inspect the mold tops prior to setting the castings on the molds. Scrap on top of, or a defective mold top (cracked, chipped, etc.) can cause the metal to leak. The ingot will then be diverted or scrapped.
- C. When placing the castings on the molds, make sure the rings are not damaged by impact with the mold. If any are, have the crane-man return the casting to the stand and replace the ring. Check to see that the castings are centered properly. An off center casting will cause a leak between the ring and mold. Again, the ingot will be diverted or scrapped. It also necessitates cleaning the scrap off the top of the mold before it can be poured again.
- D. As in the case of Big End Down, check the hot tops after they have been transferred to the pouring area to make sure no damage was incurred in movement. Again, wet or damp boards will boil so make note of any exposure to water.

2. ONE PITCH UNIT FOR COMPANY

2. POURING

- A. The procedures are much the same in both B. E. U. and B. E. D. The observing party should be familiar with the recommended pouring height (how high up on the boards the metal is poured) and make sure the steel pourer is accurate.
- B. The compound should be up on the platform prior to pouring. Check before the heat is tapped and if compound is not there, inform the Pit Foreman so he can get it to you. Check the compound containers and make sure the bag weights are right.
- C. The compound should be applied immediately after the mold is filled. This insures the maximum results. If the helper is lax in application time, tell him that you are conducting a test and you would appreciate his help.
- D. Make note of any irregularities with attention to type, ingot number (in sequence of pour) and if serious enough, the steel pourer's name.
- E. Use the attached test data sheet to note heat number, grade, etc. to insure that you will follow the same heat throughout.
- F. *NOTE ANY MOLD ADDITIONS SUCH AS FLUXES THAT COULD EFFECT THE HOT TOP PERFORMANCE. THEY MAY BE FLUXING OUT MATERIALS THAT ARE MAJOR COMPONENTS OF OUR HOT TOP COMPOSITION.*

3. HOLDING

- A. The basic purpose of holding ingots at the pouring platform for a prescribed time is to allow proper solidification and to allow segregation to top out as far up in the ingot as possible. Some mills pull the drag from the pouring platform immediately after pouring to a sidetrack for holding. If the drag must be moved, it should be immediately after the heat is poured.
- B. Holding time can be computed by the following formula:

$1/2$ the narrow cross section squared (in minutes)

For example,

$$\begin{array}{r} 30 \times 45 \text{ mold} \\ 15 \\ \hline 2 \quad 30 \end{array} \quad 15 \times 15 = 225 \text{ minutes}$$

This is approximate and indicates to you whether the mill is following established procedures. An early pull can foul up your test by changing the segregation characteristics, mainly by placing them lower in the ingot, reducing the yield

4. CHARGING

- A. When the ingot is taken from the mold, obviously the temperature is super hot to hot going from center to surface. The purpose of the soaking pit is to bring the temperature of the ingot to a uniform level throughout. This temperature normally is in the area of 2400 degree F. At 2400 degrees the steel is in a plastic state and will roll without cracking.
- B. As the ingots of the heat are charged into the soaking pit, you must confer with the foreman in charge and get the positions of the ingots in the pit. The positions are either alphabetical or numerical. This is important so that you can identify your test ingots as they are pulled from the soaking pit and rolled. Make sure you have the telephone numbers for the soaking pit and rolling mill foremen's offices. Most times, they forget to call you to observe the rolling so check with them frequently when the rolling time nears, generally eight to twelve hours from charge, depending on ingot size.

2.5 in per min
out

5. ROLLING

A. Every effort should be made to properly identify each ingot as it is removed from the soaking pit and rolled. Some tests involve one or more additional suppliers as well as control ingots poured with standard practice.

B. Utilizing the attached form, record the following information:

1. Ingot number and/or letter
2. Hot topping system used on each ingot.
3. Heat number
4. Slab, billet, bloom or round size being rolled
5. Top crop (in inches)
6. Bottom crop (in inches)
7. Length of each finished slab, billet, bloom or round
8. Recorded rolling mill yield (or a computation of cubic inches X 0.28 lbs. and matching it against the theoretical gross ingot weight.

9. ~~ATTEMPT ACTUAL SLAB, BILLET OR ROUND DIMENSIONS~~
~~IF THE PRODUCT IS GETTING TO COOL.~~
Do not hesitate to ask questions nor to nicely question the practices if they appear to be working against you. Many shearers will cooperate fully if you tell them what you want. Remember that your future in the particular mill may be at stake and riding on the test. Treat it critically.

10. ~~SAME REQUEST~~ ^{ACTUAL} INGOT WEIGHTS, ACTUAL BLOOM WEIGHTS IF THEY HAVE SCALES AVAILABLE OR INCURRED TO AFFORD THIS ADDITIONAL SERVICE.

THEORETICAL GROSS INGOT WEIGHT: _____