FORM 2

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COMPLETE SPECIFICATION

(See section 10 and rule 13)

RECLAMATION AND LIFE ENHANCEMENT OF GRIZZLY BAR BY ATTACHING COMPOSITE CAST BLOCK TO THE SURFACE OF THE GRIZZLY BAR

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Preamble:

Sintering plants are associated with the production of hot metal in blast furnace in integrated steel plant. The Process of sintering is basically a pre-treatment process step for the production of charge material called sinter for blast furnace. Sinter is made from iron ore fines and also from metallurgical waste like mill scale, sludge and dust. Sintering is a thermal process carried out at 1300°C to 1400°C used to agglomerate a mix of iron ore fines, fluxes and coke, with a particle size of less than 10 mm, so that the resulting agglomerated sinter with screen size of 10 to 30 mm.

The process begins with preparation of raw materials. These materials mix consisting of iron ore, fluxes and coke is mixed in a mixer.

The present invention is process known as reclamation of Grizzly Bar also known as Knife Bar by block casting. By this process the Grizzly bars are not only reclaimed repeatedly many times but also enhance the life of the spikes by 3 to 4 times.

Field of invention

Inventor has developed a process known as reclamation of Grizzly Bar also known as Knife Bar by block casting. By this process the Grizzly bars are not only reclaimed repeatedly many times but also enhance the life of the spikes by 3 to 4 times.

Based on the design of the Grizzly bar a suitable composite block is made separately and is attached to the worn out Grizzly bar.

Background of the invention and Prior Art

The process innovation on reclamation and life enhancement of sinter breaker grizzly bar by attaching composite cast block on the wearing surface of the grizzly bar is not a part of in the prior art search in the form of prior publication, prior claiming and prior use. The innovation is novel, useful and industrially applicable.

Description:

Sintered iron ore is an important component of the total charge to the blast furnace for production of pig iron. Sinter for blast furnace produced by mixing iron ore fines, coke and limestone in definite proportion. Through a feeding drum the mixture is laid uniformly on the moving sinter pallet car and is ignited to produce sinter by heating under controlled high temperature. The sinter produced on the pallet cars is discharged into the sinter breaker machine.

The sinter machine consists of a set of grizzly bars on which the hot sinter at temperature ranging from 650° to 1000°C falls. The sinter breaker also known as sinter spike continuously crushes the hot sinter while in rotation. The grizzly is bar subjected to heavy impact and abrasion at elevated temperature. Because of harsh working condition the wear rate is very high. After reaching the discard limit the complete set of grizzly bars (set of 10, 11, and 15) is scrapped.



Photo of Grizzly Bar

Material specification of grizzly bar – IS 2062 Gr. B

Chemical Composition: - C 0. 15/0.20, Si 0.30/0.40, Mn 1.0/1.50, S&P. 0.05 Max

Process steps:

Step 1 - The surface of the grizzly bar is covered with multi carbide alloy which is removed by are gauging electrode or by air are gauging process. After the hard layer is removed the worn out area of each grizzly bar is removed by oxy fuel cutting process. The line of cutting is as per the dimension of the block to be fitted so that after fitting of the block the dimensions of the grizzly bar is as per the drawing.



Removal of layer of multi carbides by electric air arc gauging

Step 2 – Preparation of block

Steel plate confirming to IS2062 Gr 250 BR 100 MM thick is cut to the profile as per the drawing to make mold for the casting of blocks.

Step 3 – Preparation of molds for weldcasting

On the steel plate matching the profile of the cut out portion of the knife bar mould is prepared using 10 mm thick steel plate confirming to IS2062Gr 250 BR for block casting.



Mould for block casting

Step 4 – Making the block for fitting on the grizzly bar.

The complete mold assembly is heated to 500 to 700 degree C. After attaining the temperature a molten pool of complex carbide is created by electric are using flux cored wire confirming to DIN8555:MF10-GF-65-GT at voltage 26 to 30 and current at 350 to 450 Amps. All the molds are filled continuously. While the weldcast process is in progress the temperature of the complete block is maintained at about 700 degree C. After completion the block it is allowed to cool down slowly. To reduce the rate of cooling the block is either covered with heat resistant blanket or is put into lime powder.

Cast Block

The base plate of the cast block is steel conforming to IS 2062 Gr250BR which is fully weldable.



Step 5- Fitting of the cast blocks to the spike

The cast block is aligned with the cut out portion of the grizzly bar and welded to achieve the final shape and size as per the drawing. The block is joined to the grizzly bar by electric arc welding SMAW or MIG/MAG process. Welding electrode confirming to AWS/SFS-5.1 E7018, FCAW confirming to AWS/SFA-5.20 E71-T5, Solid MIG/MAG Copper coated welding wire confirming to AWS SFA-5.18 ER70S-6. During welding pre-heat is maintained at 150 to 200 degree C.

Advantages of the innovative process is as follow

1. Reduction in downtime of sinter making machine because of 2 to 3 times enhanced life.

2. Reduction of wearing of the blocks increases productivity of the sinter braking machine.

3. Crushed sinter is more uniform in size.

4. Recycling of used and worn out grizzly bar 3 to 4 times reduces consumption of new grizzly bars.

5. Reduction in overall cost of production of sinter.

Claims:

We claim:

1. A process of reclamation and life enhancement of grizzly bar, comprising steps of making of a separate block and fitting on the worn out grizzly bar to reclaim and enhance the life of the sinter spike.

2. A process of reclamation and life enhancement of grizzly bar as claimed in claim 1, wherein a composite cast block is attached to the grizzly bar.

3. A process of reclamation and life enhancement of grizzly bar as claimed in claim 2, wherein, the steel plates of the block conforms to IS2062 Gr. 250BR.

4. A process of reclamation and life enhancement of grizzly bar as claimed in claim 3, wherein, the alloy deposit on the plate conforms to DIN DIN8555:MF10-GF-65-GT.

5. A process of reclamation and life enhancement of grizzly bar as claimed in claim 4, wherein, the alloy deposited on the plate up to thickness of 35 mm to 50 mm thick.

6. A process of reclamation and life enhancement of grizzly bar as claimed in claim 2, wherein, the cast block is attached to the cut off area of the grizzly bar by welding.

7. A process of reclamation and life enhancement of grizzly bar as claimed in claim 5, wherein, while depositing the alloy on the steel plate, temperature of the entire block was maintained at 700° C to 800°C for block casting.

8. A process of reclamation and life enhancement of grizzly bar as claimed in claim 6, wherein, welding to join the block to the cut out portion of the grizzly bar is done using welding electrode confirming to AWS A5.1 E7018 or AWS/SFA-5.20 E71-T5 or AWS SFA-5.18 ER70S-6

Abstract:

Reclamation and life enhancement of grizzly bar by attaching composite cast block to the surface of the grizzly bar

Reclamation and life enhancement of grizzly bar by attaching composite cast block to the worn out area of grizzly bar. The composite cast block is made of steel base and blocks of alloy deposit with complex carbides which retains hardness at elevated temperature. The process is ideal for reclamation of worn out grizzly bar and at the same time enhances the life of the grizzly bar by 2 to 3 times, the grizzly bars can be reclaimed at least 5 to 6 times till the shape of grizzly bar is not damaged.

----------E-signed----------

Dr. Prachi Pandey

Regd. Patent Agent (IN/PA 3808)