CORPORATE R&D, BHEL, HYDERABAD

Technical Specification for Manufacturing Hi-Chrome White Cast Iron Insert Castings

1.0 GENERAL:
This specification governs the quality and performance requirements of high chrome white cast iron inserts for making Insert Grinding Rolls.

2.0 APPLICATION:
For pulverizing coal in Bowl mill requiring resistance to grinding wear and impact during operation of the mill.

3.0 CONDITIONS OF DELIVERY:
3.1 The Insert castings shall be supplied in "soft" condition (from 40 HRC to 50 HRC) in annealed condition. Annealing heat treatment will be performed by heating to 940-950^{o}C @30^{o}C/ min heating rate for approx. 12 hours followed by furnace cooling.
3.2 BHEL representative will conduct final / stage inspection
3.4 Material shall be manufactured and supplied with approved quality plan. Inspection of the inserts shall be witnessed by BHEL personnel and the inserts shall be subjected to dimensional inspections, dye penetrant test, ultrasonic test and hardness measurement.

4.0 FREE FROM DEFECTS:
The surface of the castings and defect acceptance criteria shall be as per qualified vendor for internal specifications to meet the final specification in the mill.

5.0 CHEMICAL COMPOSITION OF THE INSERTS:
The chemical composition of the inserts will be as follows:

C	=	2.6 – 3.0 %
Cr	=	15.0 – 22.0 %
Mo	=	1.0 – 2.0 %
W	=	1.0 – 2.0%
Mn	=	1.0 – 2.0 %
Si	=	0.5 – 1.0 %
S	=	0.1 % max
P	=	0.1 % max

Separate test piece will be cast for chemical analysis. Inserts should be made by using induction melting furnace. Casting of a few inserts shall be witnessed by BHEL personnel.

6.0 HEAT TREATMENTS OF ROLLS:
Heat treatment of roll or roll segment will be performed by heating to 940-950^{o}C @30^{o}C/ min heating rate for approx. 12 hours followed by air quenching. This will be followed by tempering at 290^{o}C.

7.0 MICROSTRUCTURE:

After final heat treatment of the roll/ roll segment, the microstructure in the insert will consist of carbides, martensite and retained austenite.

8.0 MISCELLANEOUS AND OTHER CONDITIONS:

8.1 High Chrome Inserts for use in making 50" pulveriser Rolls.

8.2 Drawing of the insert, solid model of inserts along with the die and drawing of the die in which Inserts are to be assembled will be provided by BHEL R&D.

8.3 Total number of Inserts required for making one pulveriser Roll is 60.

8.4 Individual inserts should have inbuilt provision so as to maintain proper gap of 10 mm between each Insert by providing two projections of 15mm length and corresponding grooves of 5 mm depth on the other side of the insert. The dimensions are given in the drawing.

8.5 Vendor should prepare the pattern and should get it approved by BHEL R&D before final casting.

8.6 The complete insert casting to be housed in the bottom drag mould so that the parting line matches with one surface instead of being in the middle.

8.7 Melt/ heat number should be inscribed on the side of the insert.

8.8 Supplier/BHEL should cast five nos of trial insert segments. One insert should be cast in a suitable size rectangular segment in SG iron and given the required heat treatment for trial purpose.

8.9 Chemical composition of ferritic SG iron is as follows:

C	=	3.5 – 3.8 %
Mg	=	0.05 – 0.07% residual
Si	=	2.2 – 2.4 %
Mn	=	0.7 % max
S	=	0.01 % max
P	=	0.05 % max

8.10 After confirmation from BHEL R&D, the casting of balance nos of inserts should be undertaken.

8.11 Vendor should contact the indentor for any clarifications and for approval before final casting.

8.12 These inserts would be used for manufacturing of grinding roll in Vertical Centrifugal Casting process in S.G Iron.

8.13 These Inserts are required to have a hardness of about 60 HRC after casting and heat treatment of roll/ roll segment. If the hardness is not achieved after heat treatment of roll segments, heat treatment schedule will be modified.

8.14 The technically acceptable inserts will be delivered at BHEL R&D in properly packaged condition.

Note :

1. Initially cast 20 nos of inserts.

   5 nos of roll segments with one insert in each segment will be cast by BHEL at RCPuram foundry in SG iron for trial purpose. The roll segments will be given the final heat treatment as specified in the enclosed specifications so as to achieve a hardness of ~ 60 HRC.

2.. After acceptance of roll segments, 420 nos of inserts will be cast as per the enclosed drawings.

3.. After successful casting of 420 nos of inserts, 220 nos of inserts will be cast with slightly modified drawings.

4. Test certificates wrt chemical composition should be furnished.

For any Clarifications contact Dr Kulvir Singh, SDGM(MTL)
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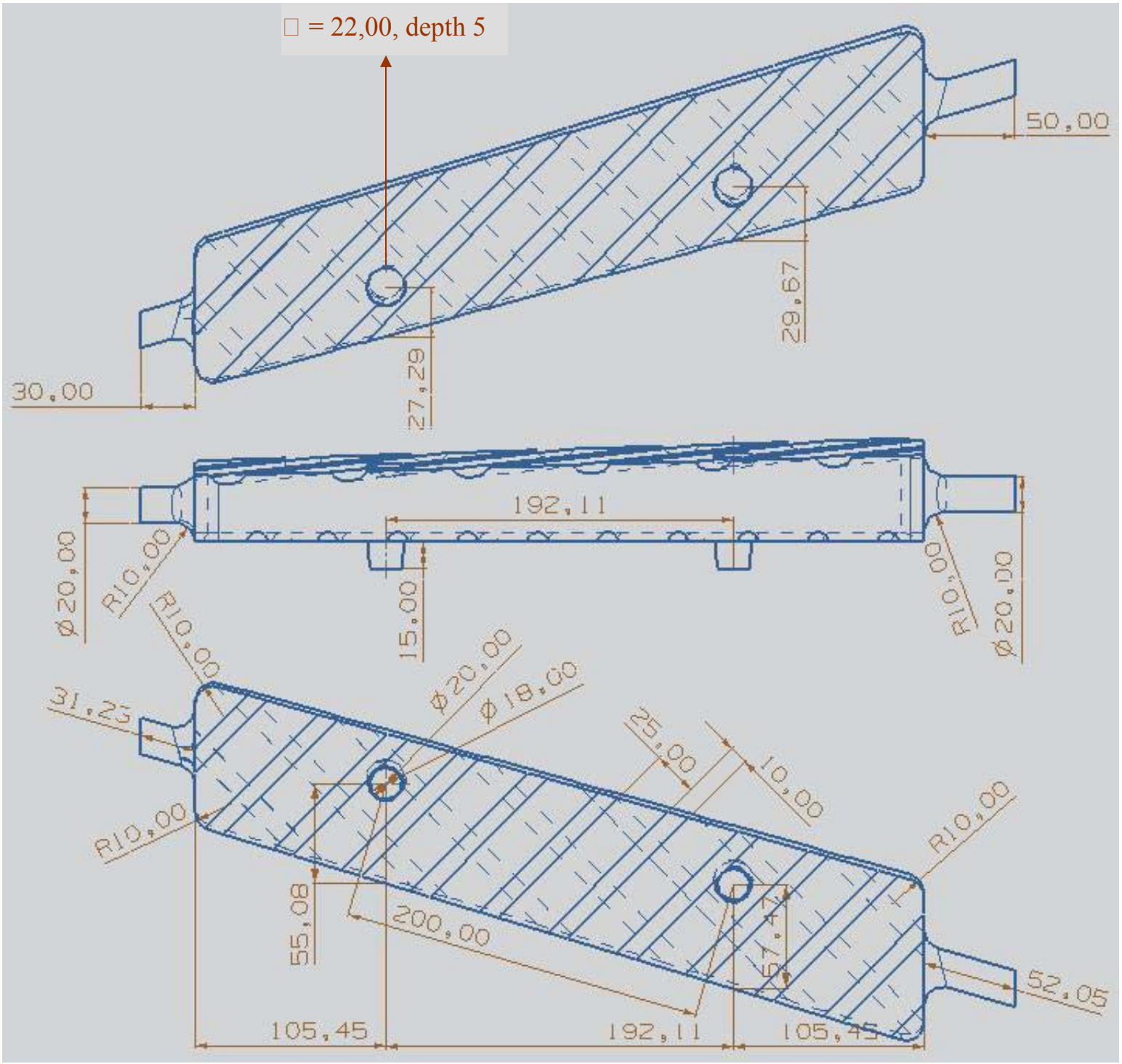
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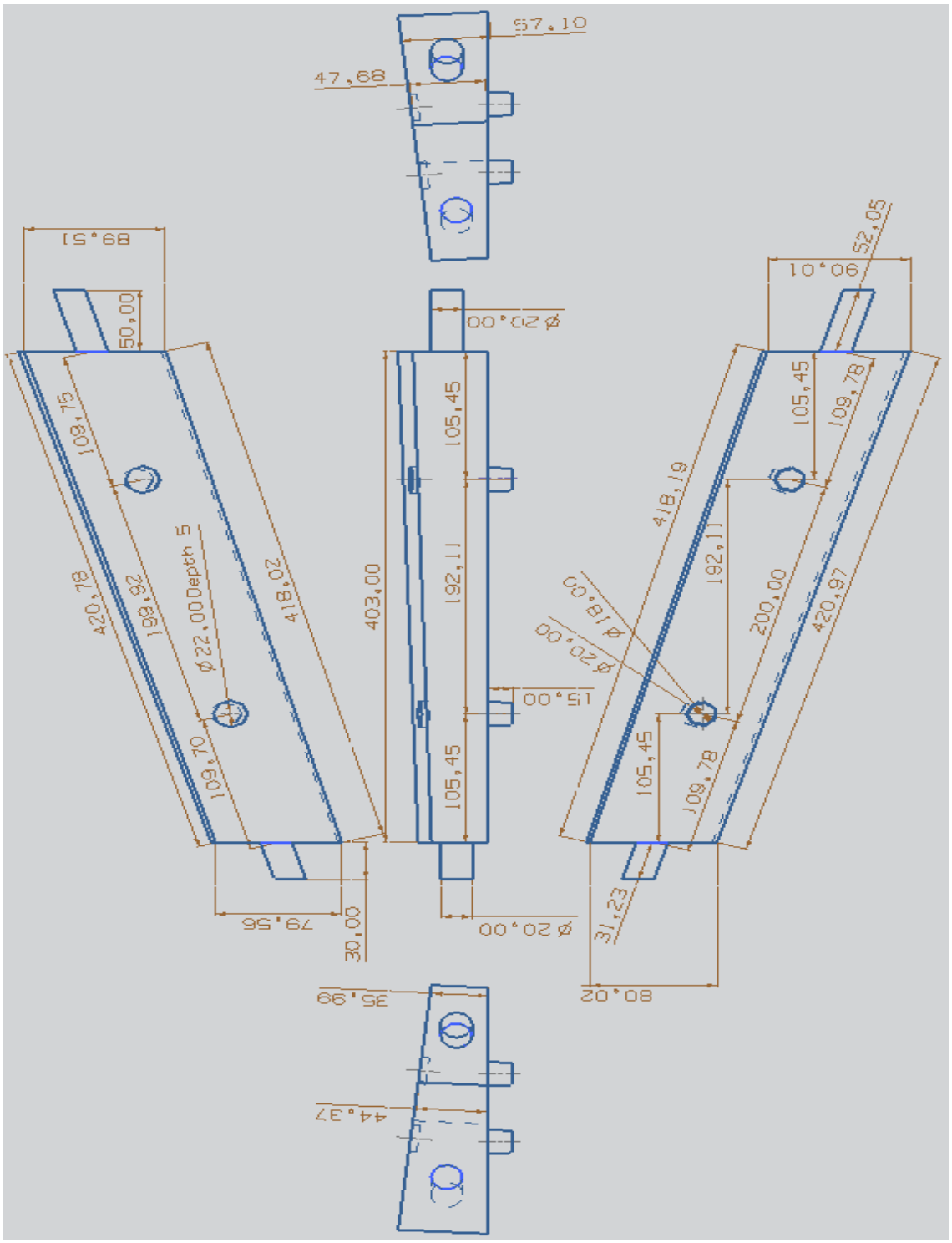
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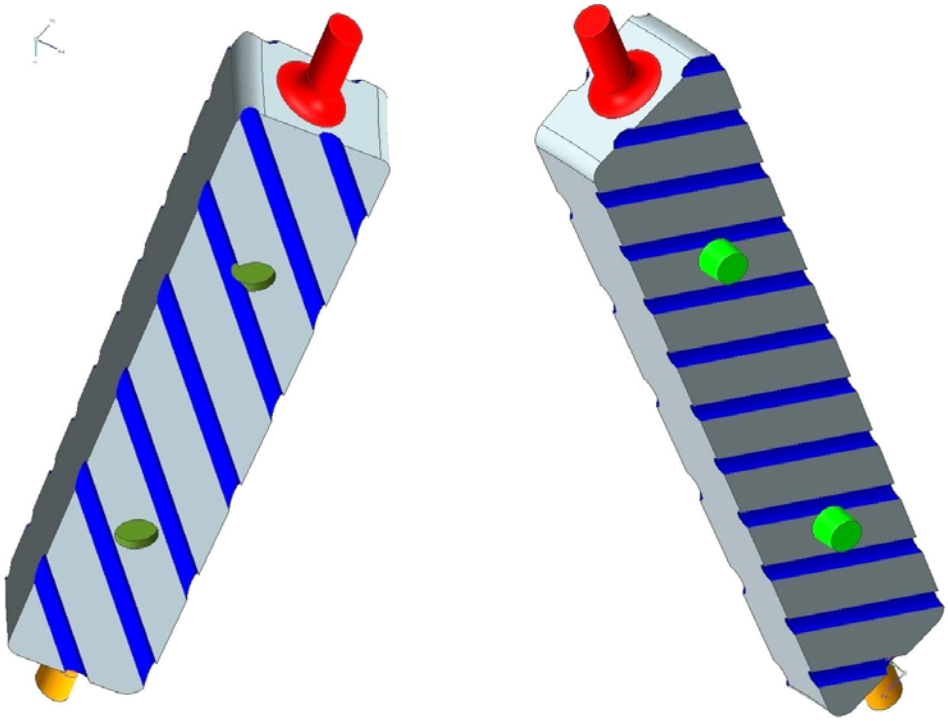
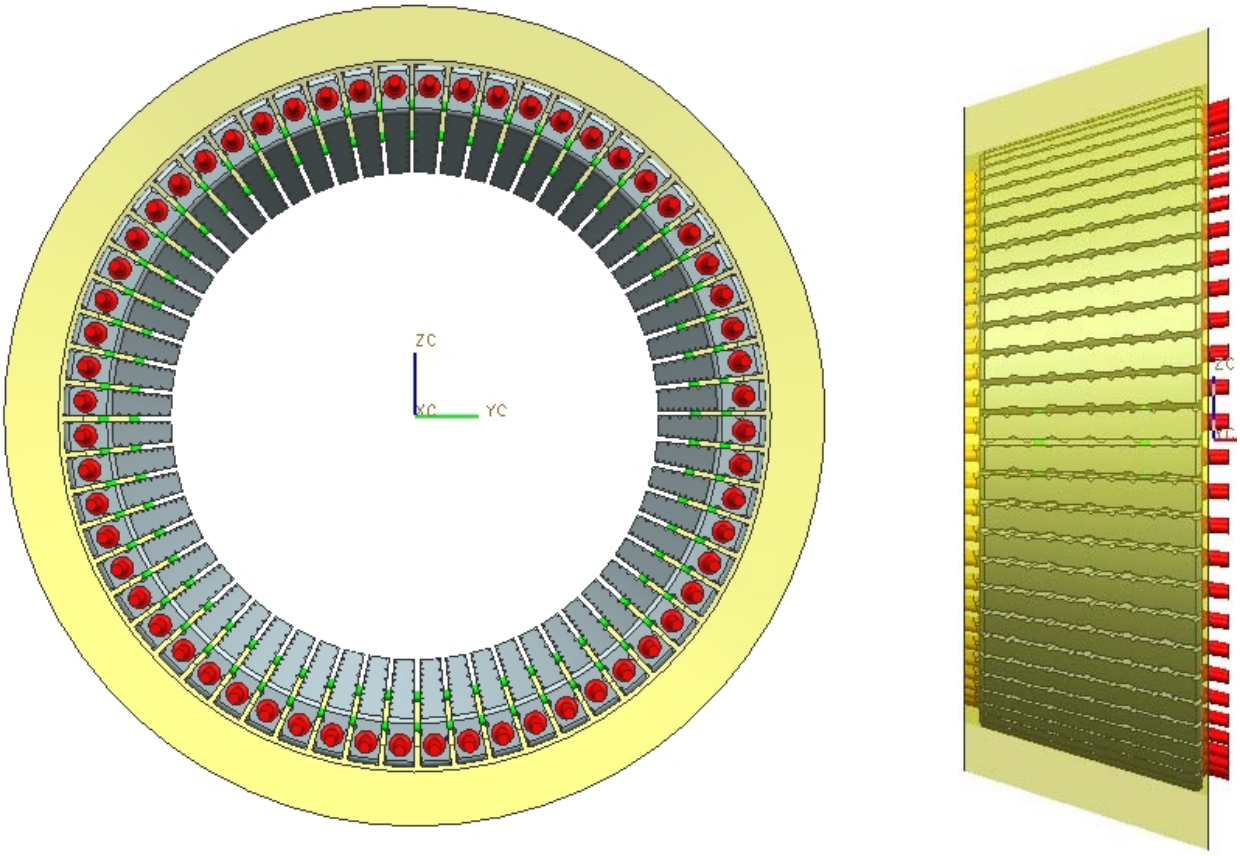


Sketch of both sides of the inserts



Placement of inserts in a bowl mill roll