

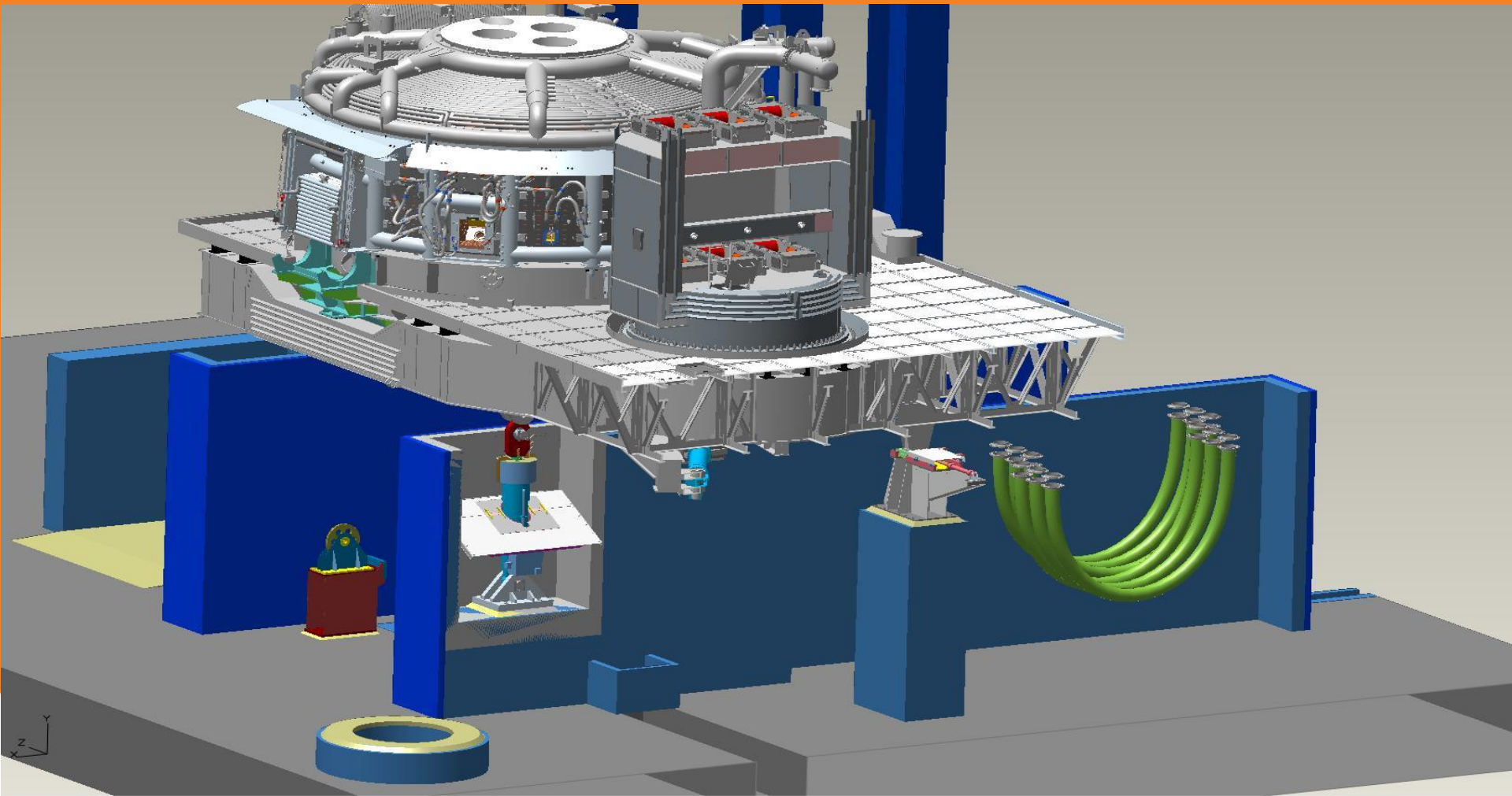


*New EAF Technologies  
and Advances  
Auxiliary Systems*

21.01.2020



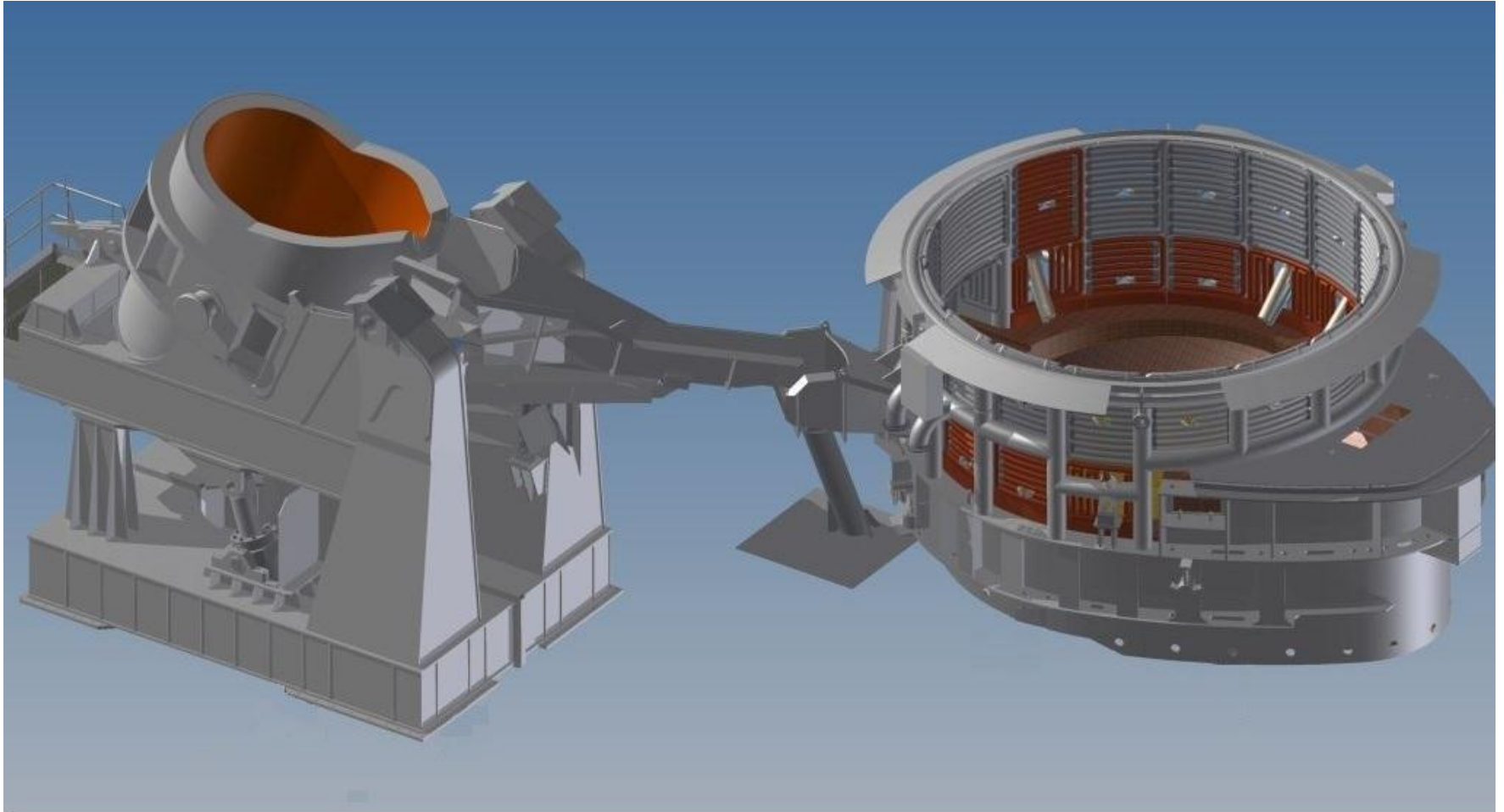
# *Electrical Arc Furnace*



# New Oxygen Electric Arc Furnace

**“Zero Power Furnace” (NOF)**

**Utilization of Maximum hot metal Up to 100%.**

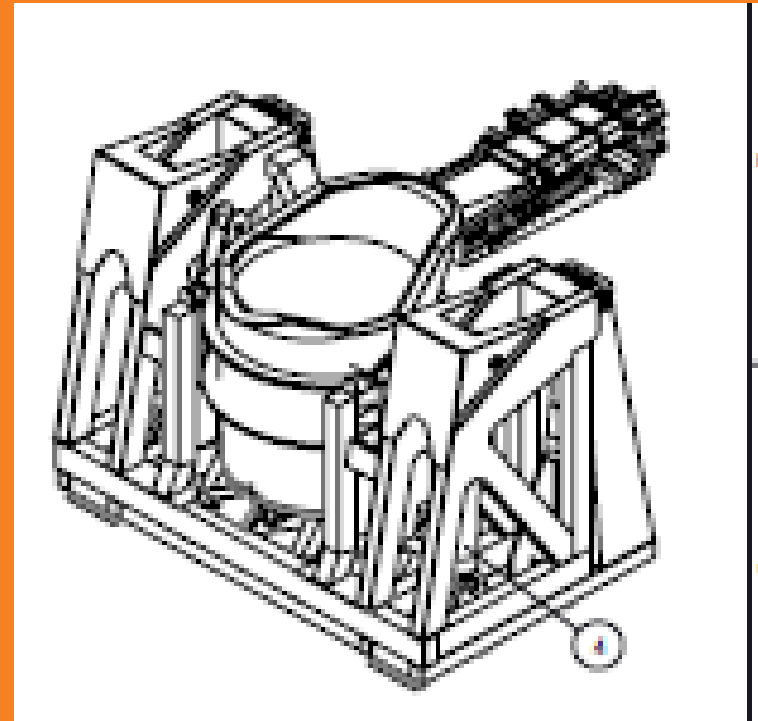


## Modification Carried Out : Existing EAF

- Introduced ladle Tilter for charging of Hot Metal
- Introduced Bottom Stirring System.
- Enhancement of Oxygen Injection System.
- Modification on the Fume Extraction System.

## Ladle tilter

- A hot metal tilting device (HMTD) is introduced in the system to consistently feed hot metal into the EAF so the process control is optimized and stable.
- The Carbon / Silicon level in the Bath will maintain at Low level
- The chances of Boiling due to high silica is minimize with the control Pouring .





## Introduced Bottom String System.

- Bottom Stirring system of Ar /N2 Supports the metallurgical melting process and homogenization of the steel.
- Bottom Bath stirring plugs is installed inside the refractory lined bottom of the furnace shell

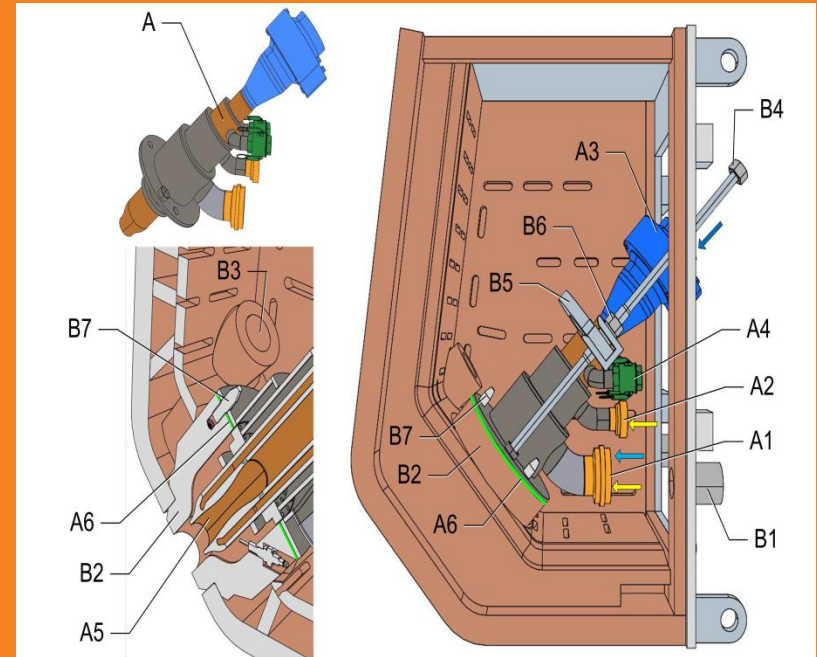
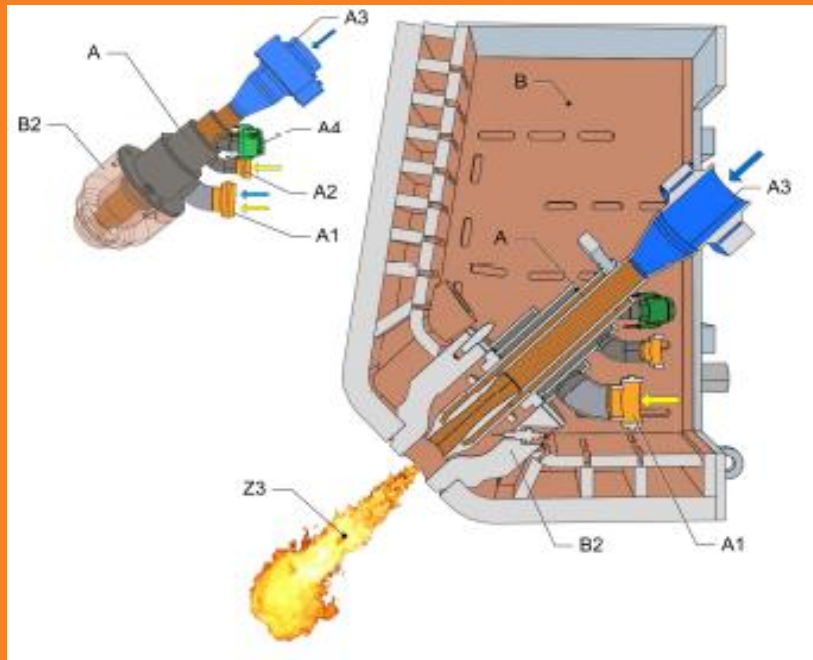
Stirring gas : Argon or Nitrogen  
Number of plugs : 6 Nos



## Enhancement of Oxygen Injection System.

- **Oxygen Injectors:** The Oxygen injectors are equipped with a water cooled copper box and are supported
- The Injectors are Specially designed to supply oxygen which is blown into the molten metal at supersonic speed through a Laval nozzle
- 3x injector @ 2,500Nm<sup>3</sup>/h → 5x injector @ 3500- 4400Nm<sup>3</sup>/h
- Total flow Rate enhanced → Max 22,000 Nm<sup>3</sup>/h

# Enhancement of Oxygen Injection System.





# Fume Extraction System.

## **OPTION 1: 5 x 3500 m<sup>3</sup>/hr**

The existing was system with the oxygen blowing capacity as 294 Nm<sup>3</sup>/min O<sub>2</sub> @ max. (17,500 Nm<sup>3</sup>/h) for which Fume Extraction system is also designed is marked as OPTION 1 in this proposal.

## **OPTION 2: 5 x 3900 m<sup>3</sup>/hr = 19,500 Nm<sup>3</sup>/h**

To enable the higher fume flow through elbow at roof due to increased oxygen blow rate, to maintain the velocity of fumes within critical limits through the elbow, the cross sectional area of the existing fume elbow on the EAF roof has to be increased.

## **OPTION 3: 5 x 4400 m<sup>3</sup>/hr = 22,000 Nm<sup>3</sup>/h.**

In case of 85% to 90 % hot metal the maximum potential O<sub>2</sub> amount of 22000 Nm<sup>3</sup>/h can be blown with No electrical power input

The modification required for accommodating increased Oxygen Flow rate by increase the length of water cooled Duct or additional parallel duct to the existing

Description			With Oxygen Flow @17500 Nm3/hr			With Oxygen Flow @19500 Nm3/hr			With Oxygen Flow @ 22000 Nm3/hr		
			Option 1			Option 2			Option 3		
1	Charge Mix (HDRI@550degC)	%	HM: 45% HDRI: 47% CDRI 8%	HM: 70% HDRI: 30% CDRI: 0%	HM: 84.8% HDRI: 0% CDRI: 15.2%	HM: 45% HDRI: 47% CDRI 8%	HM: 70% HDRI: 30% CDRI: 0%	HM: 84.7% HDRI: 0% CDRI: 15.3%	HM: 45% HDRI: 47% CDRI 8%	HM: 70% HDRI: 30% CDRI: 0%	HM: 84.7% HDRI: 0% CDRI: 15.3%
2	Total Charge	T	304.10	296.50	288.20	301.20	294.10	287.30	301.20	294.10	287.30
3	Heat Size	Mt	250			250			250		
4	Tapping Temp	deg C	1620			1620			1620		
5	Productivity	Heat/Day	28.6	24.6	24	32.3	26.9	26	32.3	26.9	28.0
6	<b>Annual production</b>	<b>MPTA</b>	<b>2.22</b>	<b>1.91</b>	<b>1.86</b>	<b>2.50</b>	<b>2.08</b>	<b>2.02</b>	<b>2.50</b>	<b>2.08</b>	<b>2.17</b>
7	Blowing Time	Min	39.9	48.5	50	34.1	43.5	45.3	34.1	43.5	41.4
8	Power ON Time	Min	36	25	0	30.5	20.5	0	30.5	20.5	0.0
9	Power OFF Time	Min	10.5	10	10	10.5	10	10	10.5	10	10.0
10	Tap to Tap Time	Min	<b>50.4</b>	<b>58.5</b>	<b>60</b>	<b>44.6</b>	<b>53.5</b>	<b>55.3</b>	<b>44.6</b>	<b>53.5</b>	<b>51.4</b>
11	Yield	%	82.21	84.3	86.75	83	85	87	83	85	87.0
12	Slag amount	Kg/T	258	189	180.6	205	180	126	205	180	126.0
13	Electrical Energy Consumption	kWh/T	305	172	0.0	265	147	0.0	265	147	0.0
14	Electrode Consumption	Kg/T	1.0	0.8	0.0	1.0	0.8	0.0	1.0	0.8	0.0
15	Oxygen Consumption (Specific)	Nm <sup>3</sup> /T	46	56	58	44.3	56.5	58.8	44.3	56.5	58.8

THANK YOU