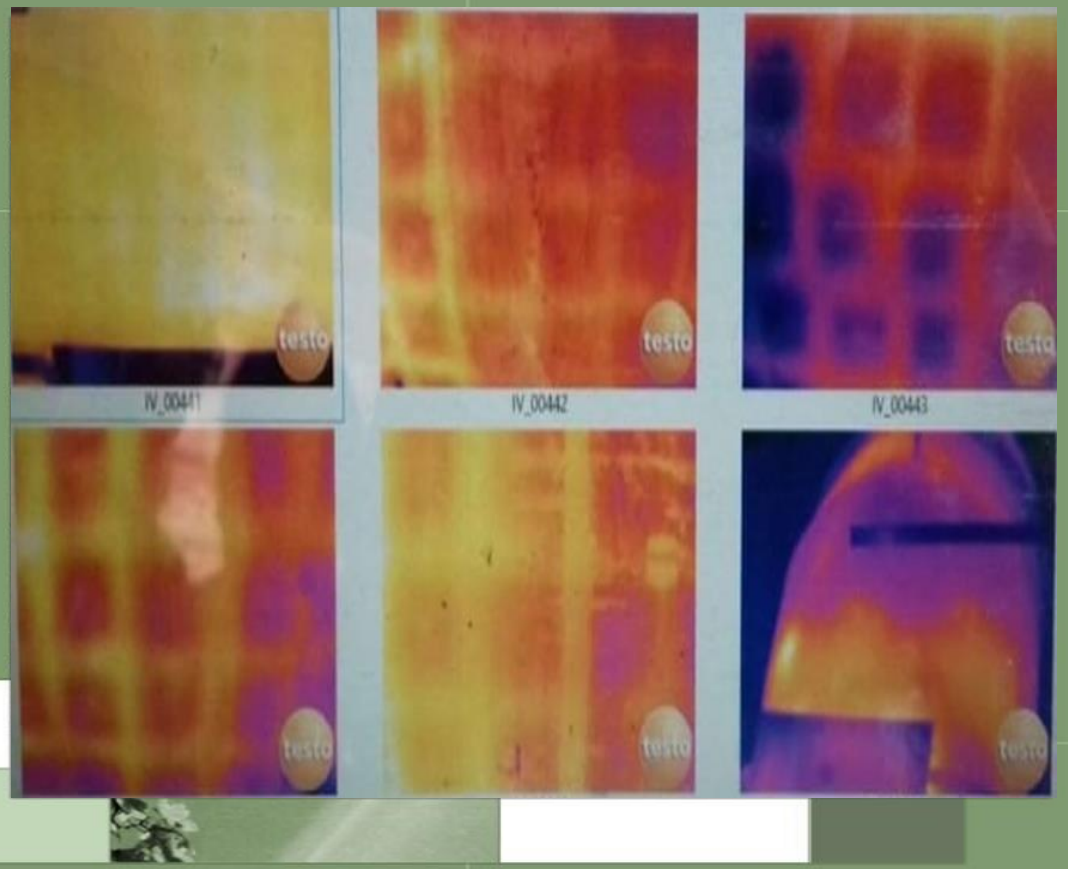
THE ONLY SUSTAINABLE REFRACTORY SOLUTION FOR ALL DRI PLANTS WITH CONTROLLED RADIATION AND CO2 EMISSION



THERMAL IMAGE OF KILN RADIATION AFTER DUAL LAYER CASTING (WITH INSULATION PAD)

CARBON EMISSION NEEDS TO BE CONTROLLED FOR A SUSTAINABLE FUTURE

AGENDA :

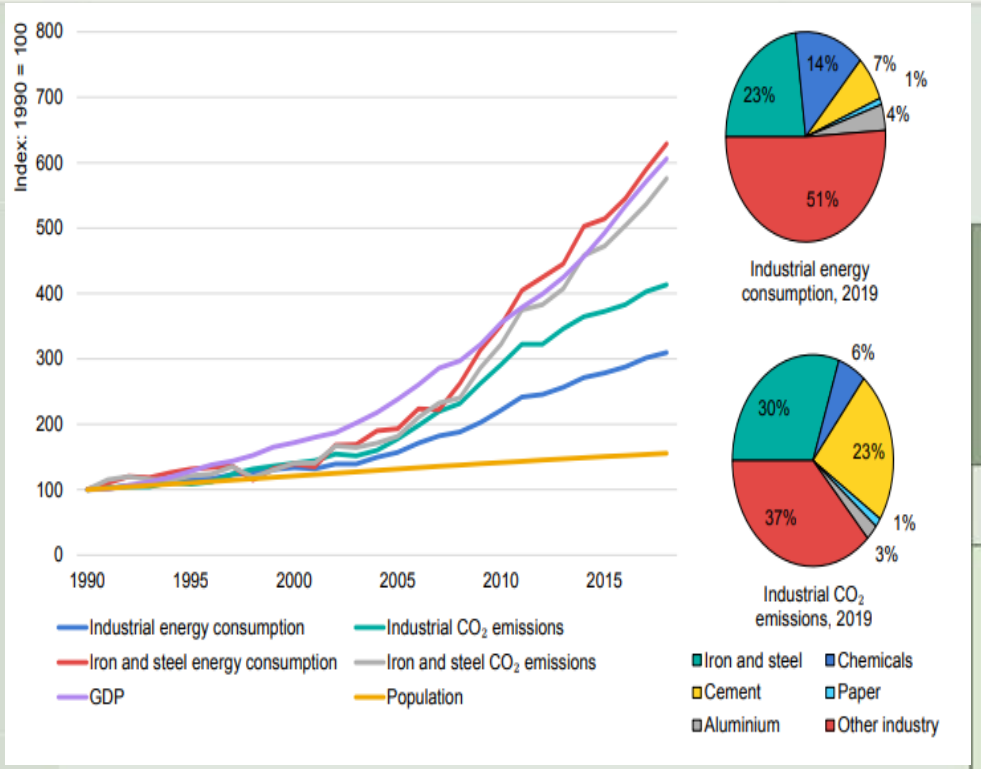
1. TO CONTROL CARBON EMISSIONS THROUGH CONTROLLED CAPEX AND OPEX.
2. SIMPLE CHANGES IN REFRACTORY DESIGN CAN HELP STEEL INDUSTRIES TO REDUCE CARBON EMISSION.

INTRODUCTION

CURRENT INDIAN SCENARIO:

- The iron and steel sector is responsible for around one-fifth of industrial energy consumption in India, with coal accounting for 85% of its roughly 70 Mtoe of total energy inputs. As a result, the sector is highly emissions intensive, contributing almost a third of direct industrial CO2 emissions, or 10% of the country's total energy system CO2 emissions.

- Due to the presence of many small production facilities, the significant reliance on coal for DRI furnaces, and the low share of scrap in total metallic production, India's steel industry consumes more energy and emits more emissions than that of many other countries.

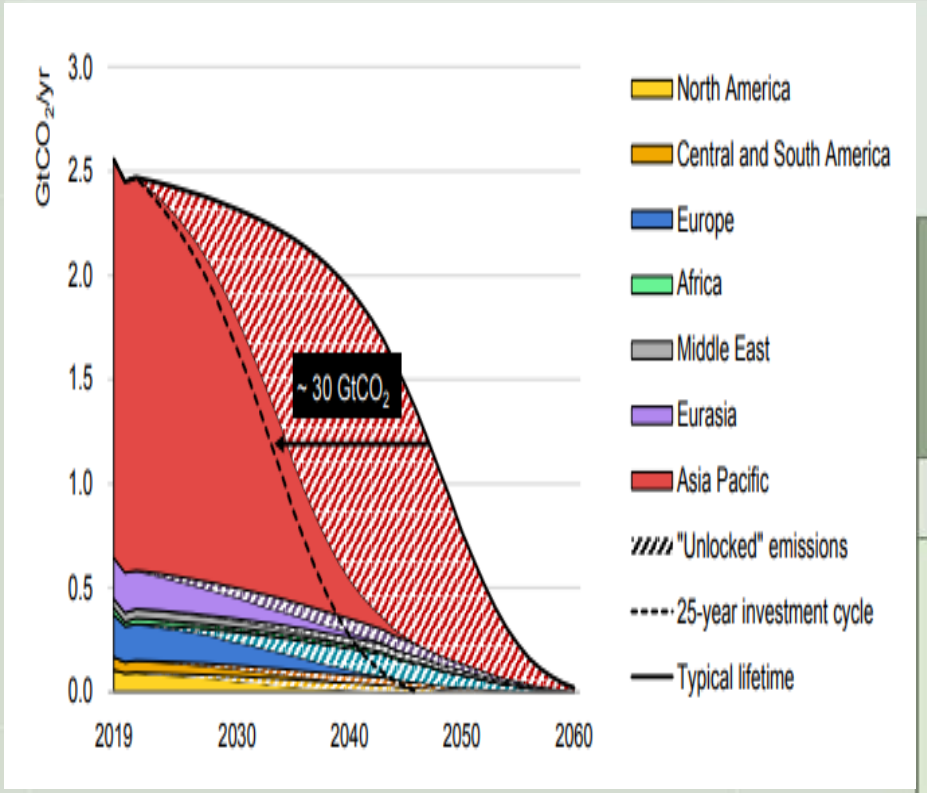


Energy consumption and CO2 emissions of India's industrial sector

INTRODUCTION (CONT…)

CURRENT GLOBAL SCENARIO:

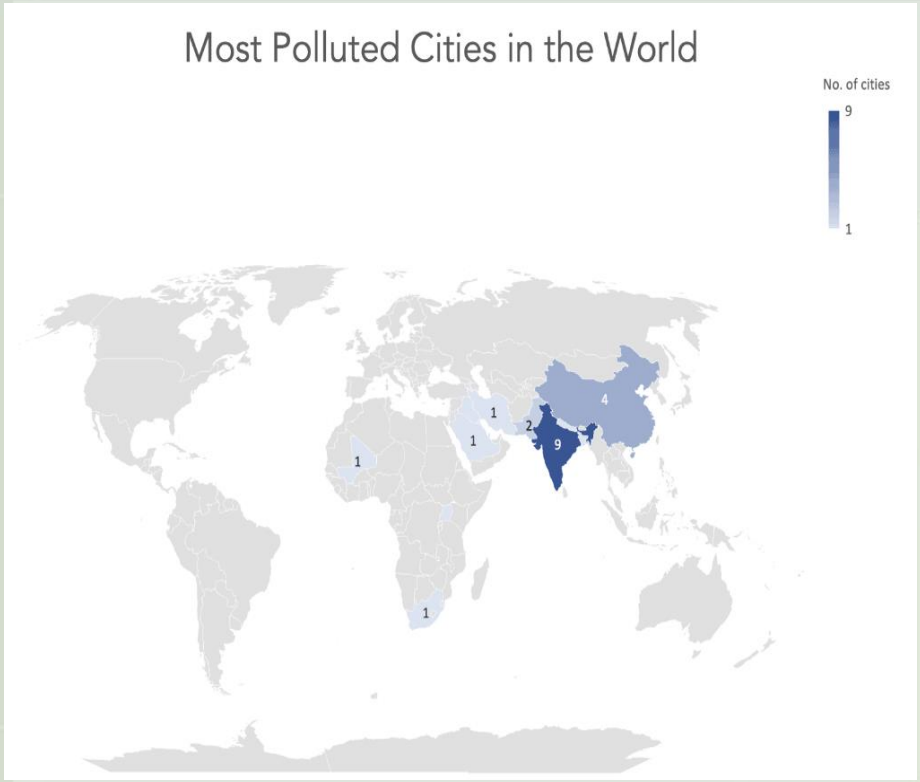
- Between 2000 and 2019, direct CO2 emissions from the iron and steel sector more than doubled, owing to rapid production development, mainly in India and China. With future output likely to expand, albeit at a far slower rate than in the previous two decades, decreasing the CO2 intensity of steel production will be important to limiting the sector's contribution to anthropogenic climate change.
- In 2019, the steel industry sector was responsible for 2.6 Gt of direct CO2 emissions globally, accounting for around one-quarter of industrial CO2 emissions and 7% of total energy sector emissions (including process emissions). Around 0.3 Gt of the steel sector's direct CO2 emissions.



Emissions from existing steel industry infrastructure under different lifetime assumptions

WHY CONTROLLED CARBON EMISSION HAS BECOME THE NEED OF THE HOUR?

- According to the study, the world’s 50 most polluted cities includes 30 + cities in India. Also 9 of the world's 25 most polluted cities are located in India.
- Carbon dioxide emissions from the steel industry are projected to jump to 837 million tons over the next three decades from 242 million tons now as India’s demand for steel more than quadruples to about 490 million tons, The Energy and Resources Institute said in a report. It will also contribute more than a third of the nation’s total fossil fuel combustion emissions from 12% currently.



DOES CARBON EMISSION REDUCTION AFFECT CAPEX AND OPEX?

According to the previous method used by companies up until now, in order to reduce carbon emissions, CAPEX and OPEX have to increase due to the designs of the equipment placed for the same reason.

It was the design of the equipment installed to reduce carbon emissions that resulted in greater CAPEX and OPEX.

To manage carbon emissions while reducing CAPEX and OPEX, industries must make minor changes to the design of refractories to help solve the problem on a limited or reasonable budget.

SINGLE LAYER CASTING DESIGN OF KILN (TRADITIONAL APPROACH)

LOAD OF REFRACTORY IN KILN: 915 MT (APPROX)

COST OF REFRACTORY: 4.78 CR (APPROX)

SIMPLE CHANGES IN REFACTORY DESIGN CAN REDUCE CO_2 EMISSIONS WITH REDUCED CAPEX & OPEX

It gives us immense pleasure in informing that **we @ PASMIN** in 2015, have made a revolutionary breakthrough in refractory designing, supply and application for Sponge Iron plants through concept of

DUAL LAYER CASTING

Our Assurance

"The only Sustainable Refractory Solution for all DRI plants."

Wondering How ?

Let us explain

WHAT LED US TO COME INTO DEVELOPING OUR NEW PRODUCT LIKE “DLC” (dual layer casting)?

- To minimize CO2 emission by controlling radiation temperature (up to 25° – 30°C less) which led to limited coal consumption.
- To reduce the refractory load in kiln which will contribute towards longer life of other equipment related to kiln.
- To extend refractory life by reducing radiation temperature.

OUR DUAL LAYER VS. OTHERS

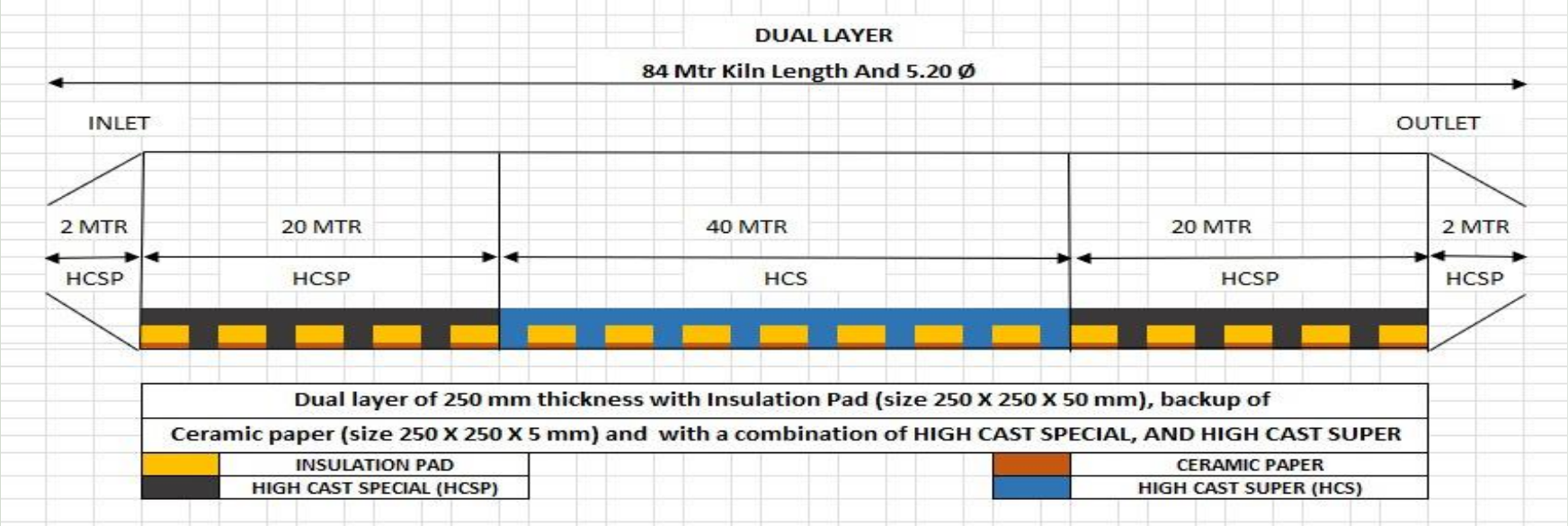
OUR DUAL LAYER

- Our own manufactured product.
- Reduces kiln load.
- Reduces CAPEX.

OTHERS DUAL LAYER

- They procure products from 3rd party manufacturer (hydrophobic board).
- It reduces kiln load very slightly.
- It doesn’t reduce CAPEX.

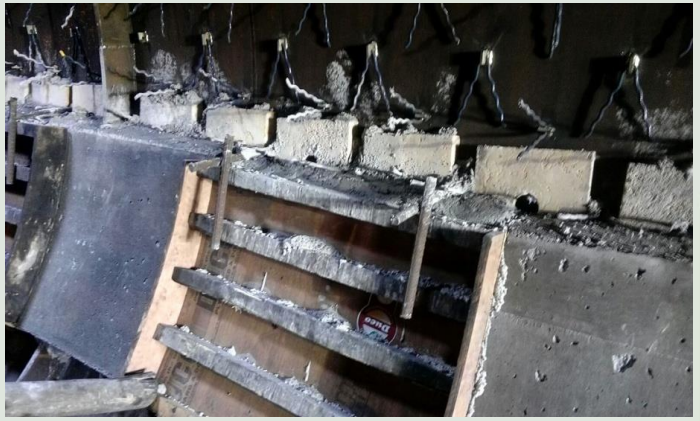
DUAL LAYER CASTING OF KILN (MORDERN APPROACH)



LOAN OF REFRACTORY IN KILN: 860MT (APPROX)
COST OF REFRACTORY: 4.4CR (APPROX)

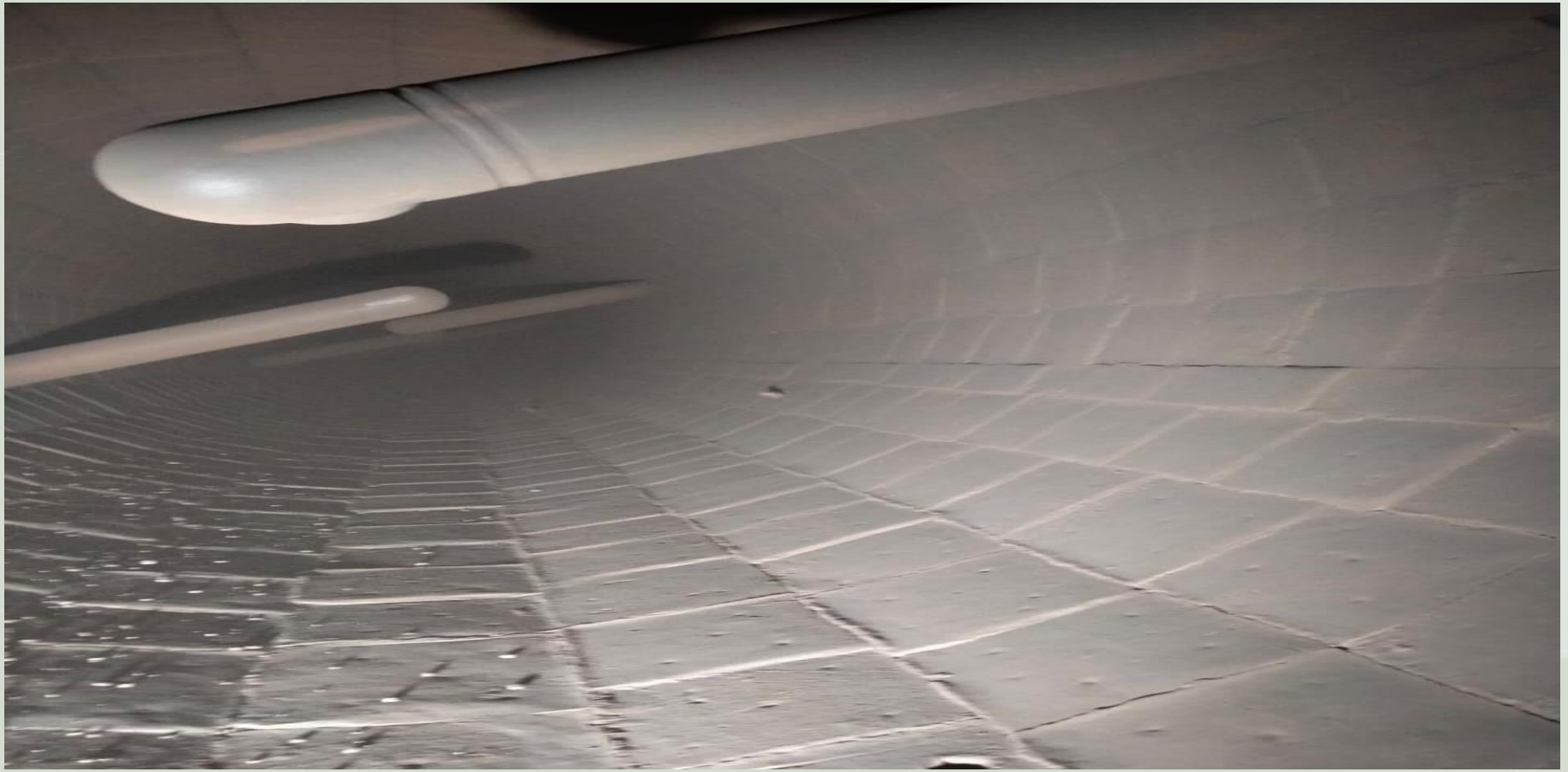
SHELL RADIATION TEMPERATURE: 25°C - 30°C LESS COMPARED TO TRADITIONAL APPROACH

PHOTOGRAPHS OF THE DESIGN

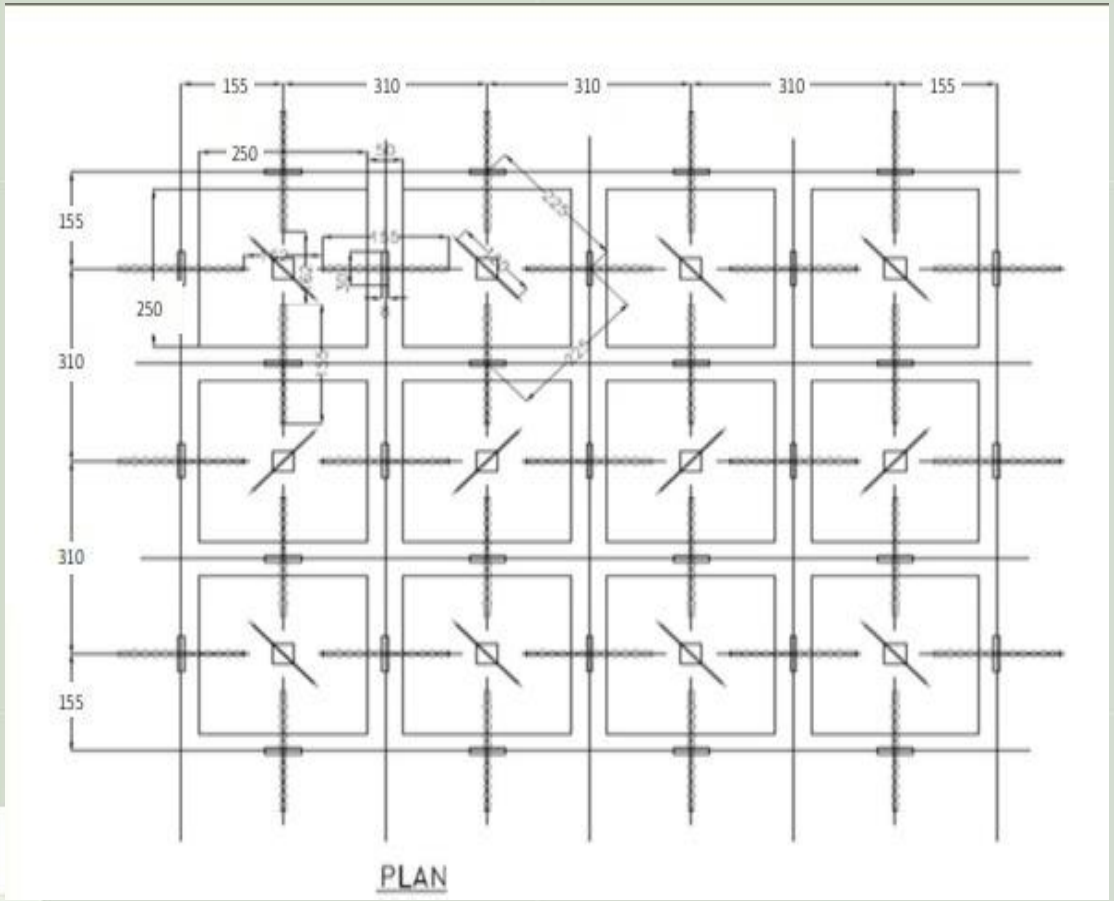


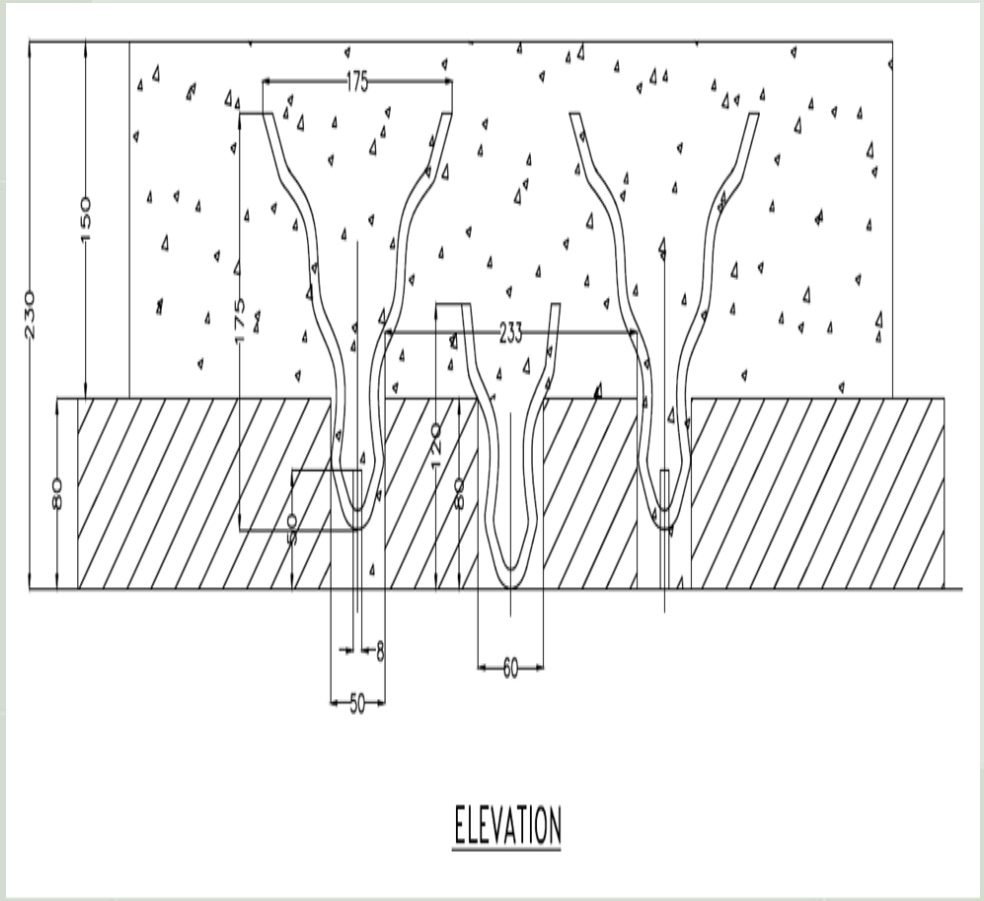
PHOTOGRAPHS OF THE DESIGN (Contd..)

PHOTOGRAPHS OF THE DESIGN (Contd..)



ANCHOR & REFRACTORY LYING DRAWING OF DUAL LAYER CASTING.





SAVINGS CALCULATION OF 650 TPD KILN (CO2 Emission)

E = Mass X Specific Heat (CV) X Θ
(Energy) (Capacity of air)

1mtr^3 of air weights 1.293 Kg
Specific heat capacity of air 1005 KJ/Kg Θ is the change in temperature

Energy/hr = (1.293X 50000) X 1005 X 30˚ C
(Total mass of air) (50000 M^3 is the average volume of air passing the kiln per hour)
= 1949197500 Joules/hr
(4184 J = 1 KCAL)
So 1949197500/4184 = 465869 KCAL/hr
1 Kg of Rb2 coal has 5200 KCAL

So saving of Rb2 = 465869/5200 = 90 Kg Appx.
Per Kg of coal emits 2.85 Kg (approx.) CO2
So when we are saving 90 Kg Rb2 coal per hour that means we reducing CO2 emission (90 X 2.85) = 256.5 Kg (approx.) per hour.
So Saving per day = 6156 Kg
And saving per year = 2216 MT (Appx.) 0f CO2 emission.

THE MAJOR FEAR/MYTH OF ALL CUSTOMSERS IS REFRACTORY MAY FALL DOWN…….

With the help of these two photographs we just want to clear the fear of refractory failure from your mind. In both the cases the same technology of load distribution is working. In the first photograph the load of the elephant is equally distributed on the foots of the stool, similarly in second case the load of materials feed in the kiln on the upper layer of the casting is distributed to kiln shell through the footing of 50 mm which is given between each insulation pads.

DUAL LAYER EXTENDES REFRACTORY LIFE

Revamping / Replacement of castable due to exceedingly higher Shell Radiation even if castable wear out is merely 50 % in Single Layer Casting.

- Say a kiln runs for 5 years :
  - ❑ Kiln with Single layer casting exhibits a shell temp = 400^{o}C
  - ❑ Kiln with Double layer casting shall exhibit 370^{o}C only
- That is a Kiln will be radiating 30^{o}C less in comparison to that of single layer casting.
- Therefore, the Kiln with Double Layer casting can run another 8 — 9 months to reach 400^{o}C shell temp.
- This implies increased productivity and **lesser Refractory Consumption per MT production of Sponge**

All said & done
We would repeat once again

Dual Layer Casting.

Our Assurance

“The only Sustainable Refractory Solution for all DRI plants.”

THANK YOU.