

SUCCESSFUL CONTROL OF INDUSTRIAL AIR POLLUTION IN RE-ROLLING MILLS AT INDORE

Presented By

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Regional Officer

MP Pollution Control Board, Indore



BARLAI

RAJODA

MANGLIYA

SANWER ROAD

POLOGROUND

LAXMIBAI NAGAR

SHIVAJI NAGAR

NAWLAKHA

SCH. NO. - 71

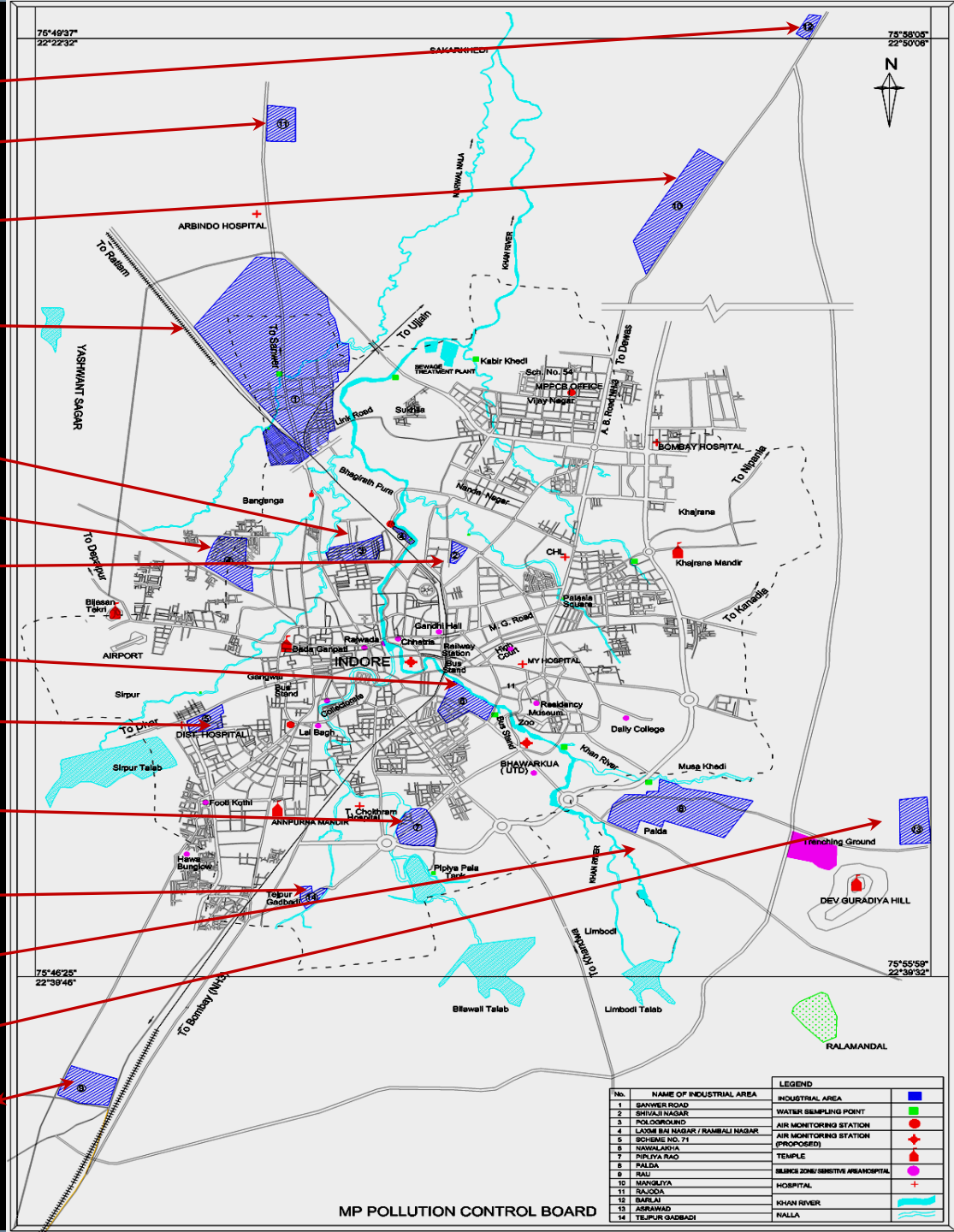
PIPLIYA RAO

TEJPUR GADBADI

PALDA

ASRAWAD

RAU



Background

- Indore, Business Capital of Madhya Pradesh
 - ▣ Declared as Critically Polluted by MOEF, GOI in 2010 & 2013
 - ▣ CEPI Score Found as 78
 - ▣ High CEPI Score due to PM 10 & PM 2.5
 - ▣ MPPCB Identified Various Sources of Air Pollution & Prepared Long Term Action Plan
 - ▣ Industrial Air Pollution from Re-Rolling Mills at Sanwer Road Industrial Area were Found as One of The Contributors



Air Pollution from rolling mills



Re-Rolling Mills at Indore

- 35 Re-Rolling Mills in Sanwer Road I/A
- Manufactures Steel Bars, Flats, Angles, Channel from Iron Scrap/Steel Ingots
- Reheating Furnace is Used for Metal Softening
- Attenuation Done As Per Required Size/Shape
- Coal is Used as Main Fuel
- Specific Coal Consumption of 100-110 kg/MT
- Mill Capacity 4 to 10 MT/H
- Capital Investment of Rs 30-150 Lacs

MPPCB's Resolve To Clean Air

- Industries Were Using Wet Scrubbers to Control Air Pollution
- CPCB Norms for Particulate Emission : 450 mg/Nm³
- Long Term Action Plan MPPCB Contemplated Particulate Matter : 150 mg/Nm³
- Wet Scrubbers were Found Ineffective to Achieve Desired Norms (470 mg/Nm³ was Observed at One of the Mills)
 - ▣ Fine Dust Particles Can Not Be Captured With Wet Scrubber
 - ▣ Water Spray Nozzles Get Choked Regularly
 - ▣ Sulphur Content in Fuel Forms Acid Further Damaging Components Frequently
 - ▣ Ineffective ETP To Recycle Water

MPPCB : Committed to Clean Air

- ❑ MS, MPPCB Directed RO, Indore to Take The Challenge & Install One Demonstration Plant in One of the Re-Rolling Mill
- ❑ Techno-Economical Acceptance of Suggested APCE, Bag Filter System with Recuperator
- ❑ Price Was A Big Hindrance for Re-Rolling Mills Being Small Scale
- ❑ Challenge : Effective Yet Economical & Acceptable Solution By Industry at Large

MPPCB @ Action Ground

- ❑ MPPCB Organised Meeting With Association of Steel Re-Rolling Industries
- ❑ Industry Body Resisted Proposal Citing High Capital Investment & Flue Gas Temperature (450-700 °C)
- ❑ A Committee Formed To Resolve The Issue
- ❑ With Industry Representatives, Technical Experts (Mr Prasad Vyas) & MPPCB Technical Team
- ❑ Advanced Pulse Jet Bag Filter Was Suggested As BACT (Best Available Control Technology)

MPPCB @ Action Ground... Cont

- Various Options Were Considered To Control Flue Gas Temperature Suitable for Bag Filter
- $450-700\text{ }^{\circ}\text{C} > 200-220\text{ }^{\circ}\text{C}$
- Various Alternatives of Heat Exchangers
 - ▣ Forced Draft Cooler
 - ▣ U Tube Cooler
 - ▣ Water Pre Heater
 - ▣ Recuperator

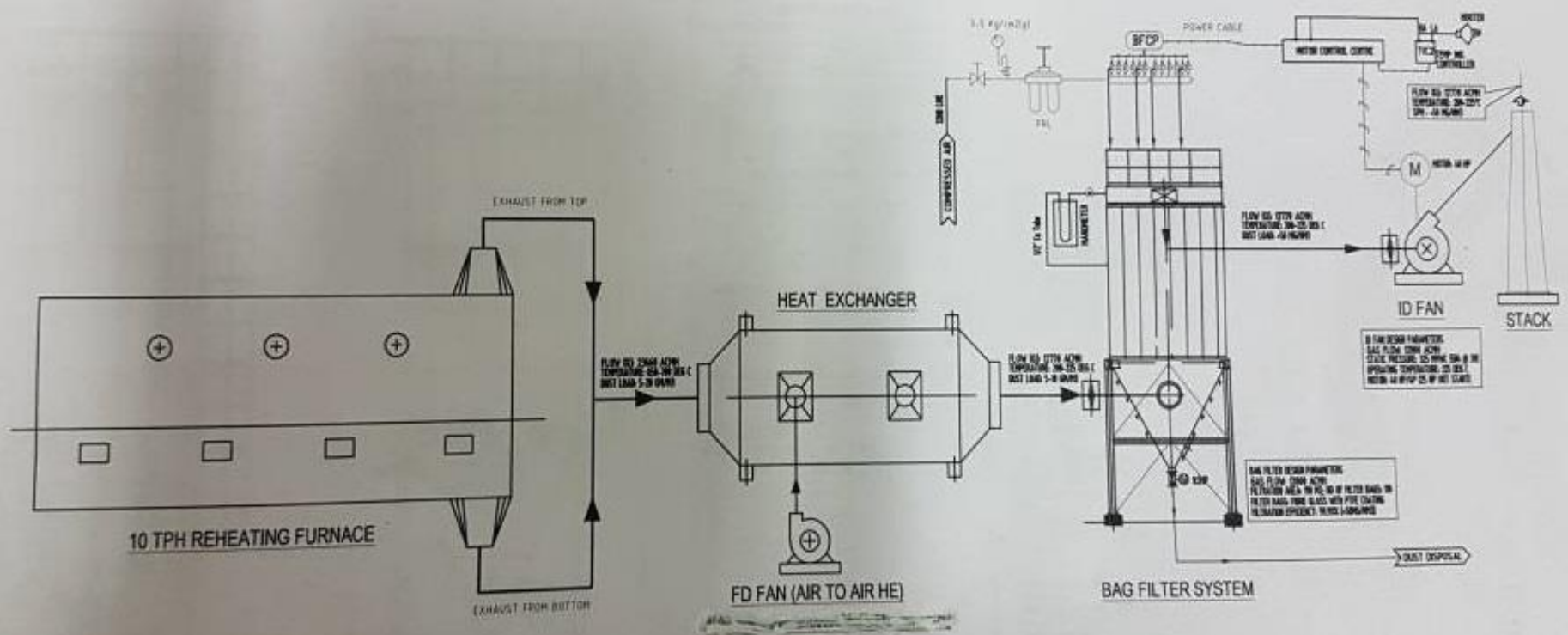
Bag Filter With Recuperator

- Bag Filter System Installation with Recuperator Sounded Good To Everyone
- Industry Association Decided To Install One Model Plant on Mutual Cost Sharing Basis
- Industry Body Assured To Install Bag Filter System If Found Successful
- M/s Madhyanchal Steel Private Limited, Indore was Chosen For Pilot Plant Testing

Proposal of APCE Based on Bag Filter for Steel Rolling Mills at I/A, Sanwer Road, Indore

8. INLET-OUTLET PLANKS OF BAG FILTER ARE NOT DESIGNED FOR CARRYING ANY LOAD OF DUST
9. RAIN PROTECTION SHED - SUGGESTED FOR RAIN PROTECTION (DUST SHED)
10. PAINTING (ON MS FABRICATED PARTS) : RED OXIDE PRIMER (2 COAT) + ALUMINA/WHITE GREEN (2 COAT, ONLY ON EXTERNAL PARTS)
11. MS PLATE 4 MM THK AND BELOW ARE AS PER IS 8081 & ABOVE 4 MM THK ARE AS PER IS 3082
12. ALL FOUNDATION BOLTS TO BE GROUNDED PROBABLY USING FOUNDATION TEMPLATE BEFORE EQUIPMENT ERECTION
13. CUSTOMER TO APPLY FINISH PAINT AT SITE AS FOUND NECESSARY AFTER ERECTION OF EQUIPMENT
14. HOPPER SHOULD NEVER BE USED FOR DUST EXHAUST PURPOSE AND MUST BE CLEARED OF COLLECTED DUST ON CONTINUOUS BASIS
15. INSULATION - BAG FILTER TO BE INSULATED WITH 75 MM THICK LITE BATTEN WITH 24 MM ALUMINUM CLADDING AREA 100 SQ (MINS)
16. ASH DUMP POINT - TO BE CALCULATED BY CUSTOMER BASED PURE GAS COMPOSITION
17. CLEAR SPACE OF 4000 MM REQUIRED ABOVE BAG FILTER TOP DOORS FOR CASE REMOVAL

BAG FILTER MODEL NO : GS-FES-64-T10300
 TOTAL FILTRATION AREA : 180 SQ
 AIR TO DUST RATIO : 1:12 (G/M³/G)
 FILTER MEDIA : FINE GLASS WITH EPDM MEMBRANE LAMINATION, 170 (G/M)
 MAINTENANCE OF FILTER BAGS : FROM CLEAN CHAMBER
 COMPRESSED AIR : BY CUSTOMER OR A MIXTURE PIPE, 10 (G/M³), 20-40 (G/M³)
 PNEUMATIC ACTUATOR/OIL CONTENT : 0.10% (MAX)
 PRESSURE DROP : 120-150 MMWG (100 MMWG)
 PAINTING : RED OXIDE + ASHA GREEN PAINT (20 MM PAINT, ASHA GREEN ONLY OUTSIDE)
 INLET DUST LOADING : 100-200 (G/M³) (20 MMWG)
 OUTLET DUST LOADING : < 30 (G/M³)
 POWER CABLE : 45% 30 HZ, 3 PH, AC
 CONTROL CABLE : 20% 30 HZ, 1 PH, AC
 LOCATION : TO BE CONFIRMED WITH SITE CONSTRUCTION



SCHEMATIC ARRANGEMENT OF FUME EXTRACTION SYSTEM
FOR 10 TPH REHEATING FURNACE

DRAWING NO	2017 IND C A 01 01 02 A0	Item/Ref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference
APPLICATION	10 TPH REHEATING FURNACE	Designed by	NSG/01/01/2017	Checked by	NSG/01/01/2017
PROJECT	FUME EXTRACTION SYSTEM	Approved by	NSG/01/01/2017	File name	NSG/01/01/2017
CLIENT PO	TBC	GREEN STAR APC TECH PVT LTD		Project	NSPL, INDORE
				Scale	NTS
				Sheet	01

Fume Extraction System Details

- Furnace Capacity : 10 TPH
- Fuel Used : Coal, 6000 GCV, 100-110 Kg/MT
- Flue Gas Profile
 - At Furnace O/L : 23668 m³/Hr, 450-650 °C, 5-20 gm/m³
 - At Recuperator O/L : 12770 m³/Hr, 200-220 °C, 5-10 gm/m³
 - At Bag Filter O/L : 12770 m³/Hr, 200-220 °C, <50 mg/m³

Bag Filter System Details

- Gas Volume : 12800 m³/hr (1.3 m³/kg of Coal)
- Desired Air To Cloth Ratio : 1.02 m³.min/m²
- Filter Bag Size : Dia 150 mm x Length 3.66 mtr
- Filtration Area Per Filter Bag : 1.72 m²
- Offered Filtration Area : 209 m²
- No of Filter Bags : 121
- Woven Fibre Glass with Teflon Finish, 260 °C

System Under Installation



Bag Filter for 10 TPH Re-Rolling Mill

ADVANTAGES OF HIGH EFFICIENCY FUME EXTRACTION SYSTEM

1. REDUCTION IN HAZARDOUS STACK EMISSIONS (<50 MG/NM³)
2. ENHANCED COMBUSTION EFFICIENCY (CE, UPTO 92%)
3. REDUCTION IN SPECIFIC FUEL CONSUMPTION (SFC, 20-40%)
4. INCREASE IN MILL OUTPUT (5-10%)
5. REDUCTION IN WORKING CAPITAL FOR LESSER FUEL PROCUREMENT
6. LOWER FUEL HANDLING, MAINTENANCE & RELATED EXPENSES
7. PAYBACK PERIOD OF 6-10 MONTHS

Air Pollution Control in small Rolling Mills of Sanwer Road I/A

Air Pollution from rolling mills



Bag filter in rolling mill



Air Pollution from rolling mills



View of fume extraction and recuperator



Results

- Air Quality Monitoring Report at Stack
 - ▣ Monitoring Date : 7 May 2018
 - ▣ Particulate Matter : 39.48 mg/Nm³

- Recuperator Performance
 - ▣ Flue Gas @ Recuperator Inlet : 450-550 °C
 - ▣ Flue Gas @ Recuperator Outlet : 200-220 °C
 - ▣ Cold Gas @ Recuperator Inlet : 25-35 °C
 - ▣ Hot Gas @ Recuperator Outlet : 150-200 °C

Form V
REPORT BY THE STATE BOARD ANALYST
(See Rule -14(2))

Report No. 200
Date:- 07/05/2018

I hereby certify that I, (I) **Mr. R. M. Gamad, Scientist** State Board Analyst duly appointed under sub- section (1) of section 27 of the Air (Prevention and Control of Pollution) Act, 1981 received on the (II) 07th day of May, 2018 from (III) **Shri Atul Kotiya, Scientist, M.P.P.C.B., Regional Lab., Indore, Dist.- Indore, sample of M/s Madhyachal Steels Pvt. Ltd., Sec-E, Sanwer road Indore (M.P.)** The samples were in a condition fit for analysis and reported below:-

I further certify that I have analyzed the aforementioned sample on (IV) 07/05/2018 and declare the result of the analysis to be as follows:-
SAMPLING POINT (I) Stack – Furnace Stack

S. No.	Parameter	Unit	Result
1.	Particulate Matter (PM)	Mg/Nm ³	39.48

The sample was received in sealed condition and fit for analysis.
Analysis of sample was done according to Standard method of Analysis APHA.
Signed this report on dated: 09.05.2018

Exceeds as per Indian Standards

Address:-

Mr. R.M. Gamad (Scientist)
Regional Laboratory,
M.P. Pollution Control Board, Indore

Signature

To,
The Chief Chemist
Regional Laboratory
M.P.P.C.B
Indore

(Mr. R.M. Gamad)
State Board Analyst
Regional Laboratory
M.P. Pollution Control Board, Indore
Scientist

- I Here write the Full name of the State Board Analyst
II Here write the Date of receipt of the Sample
III Here write the name of the State Board or Person or Body or Persons or Officer from whom the sample was received
IV Here write the Date of Analysis.
V Here write the details of the analysis and refer to method of analysis. If the space is not adequate the details may be given on separate sheet of paper.

Pay Back Calculations

- ▣ Capital Investment : Rs 16 Lacs for 10 TPH Furnace
 - ▣ Fuel Savings : 20-25 Kg/MT of Steel Produced
 - ▣ Average Production : 6 MT/Hr
 - ▣ $20 \text{ kg} \times 8 \text{ MT} \times 10 \text{ Hrs} = 1600 \text{ kg/Day}$
 - ▣ Fuel Rate : Rs 8 / Kg
 - ▣ Total Savings : Rs 12800/Day
 - ▣ Additional Electricity Consumption of FES
(ID Fan, Combustion Blower, Air Compressor)
 $80 \text{ BHP} \times 0.746 \times 10 = 597 \text{ kWH (units)}$
Total Electricity Cost : Rs 10/Unit $\times 597 = \text{Rs } 5970/\text{Day}$
- Net Savings : Rs 12800 – Rs 5970 = Rs 6830 / Day
- Pay Back Period : 234 Days

Thank You