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

Presented By
R K Gupta
Regional Officer
MP Pollution Control Board, Indore
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 Chocked Regularly
  - Sulphur Content in Fuel Forms Acid Further Damaging Components Frequently
  - Ineffective ETP To Recycle Water
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 ºC)
- 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)
Various Options Were Considered To Control Flue Gas Temperature Suitable for Bag Filter

- 450-700 °C > 200-220 °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
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
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 repercurator
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:-

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Unit</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Particulate Matter (PM)</td>
<td>Mg/Nm³</td>
<td>39.48</td>
</tr>
</tbody>
</table>

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

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

Signature

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

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
- Fuel Rate: Rs 8 / Kg
- Total Savings: Rs 12800 / Day

Additional Electricity Consumption of FES (ID Fan, Combustion Blower, Air Compressor)
- 80 BHP x 0.746 x 10 = 597 kWh (units)

Total Electricity Cost: Rs 10/Unit x 597 = Rs 5970 / Day

Net Savings: Rs 12800 – Rs 5970 = Rs 6830 / Day

Pay Back Period: 234 Days
Thank You