



P. T. INDOCEMENT TUNGGAL PRAKASRA, TBK

False Air Leak Survey and Repair

SUMMARY OF THE OPTION

Indocement is one of the largest cement producers in Indonesia, established in 1985 and currently operates 12 plants, nine of which are located in Citeureup, Bogor, West Java; two in Palimanan, Cirebon, West Java; and one in Tarjun, Kotabaru in South Kalimantan. “False Air” is atmospheric air infiltrating/ingressing into process equipment that operates under vacuum through openings, fittings and cracks. Much of the major process equipment, including the cooler, kiln, pre-heater cyclones, electrostatic precipitators and raw mill, are under varying degrees of vacuum. False air reduces the line’s specific energy consumption. An acceptable level of false air is around 10%. Therefore, to reduce false air, there was an opportunity to shut sources of the false air into the system and attempt to minimize it. Management has made daily schedules that, if the oxygen content is more than 3%, there will be reparation on false air. With this commitment, the false air is expected to be always less than 3% (theoretically), suitably to target the company’s objective, which is decreasing false air, indicated from the O₂ content at top cyclone of 3.8% into 2.8%. Investment costs were US\$ 3804, annual savings are US\$ 121165 and the payback period is 0.5 months. Coal savings are 2425 tons per year resulting in 828 tons CO₂ emission reductions per year.

KEY WORDS

Indonesia, Cement, Furnaces & Refractories, Vacuum Leaks, False Air

OBSERVATIONS

Many air leakage points were heard and observed throughout Plant #6. This was particularly evident in the Raw Mill area and around the Pyroclone Preheater.

Two significant points of false air ingress were observed in the Raw Mill area:

- At the inlet mill (the end of conveyor coming in). The ingressing air velocity was measured at approximately 17 m/s.
- At the Top Classifier, the velocity of the leak was measured at approximately 5 m/s.
- In the Pyroclone Preheater area, one significant false air point at Line 1. The 6th level had a velocity measurement of approximately 3.5 m/s.
- Throughout the plant there was evidence of previous leak repairs.

OPTIONS

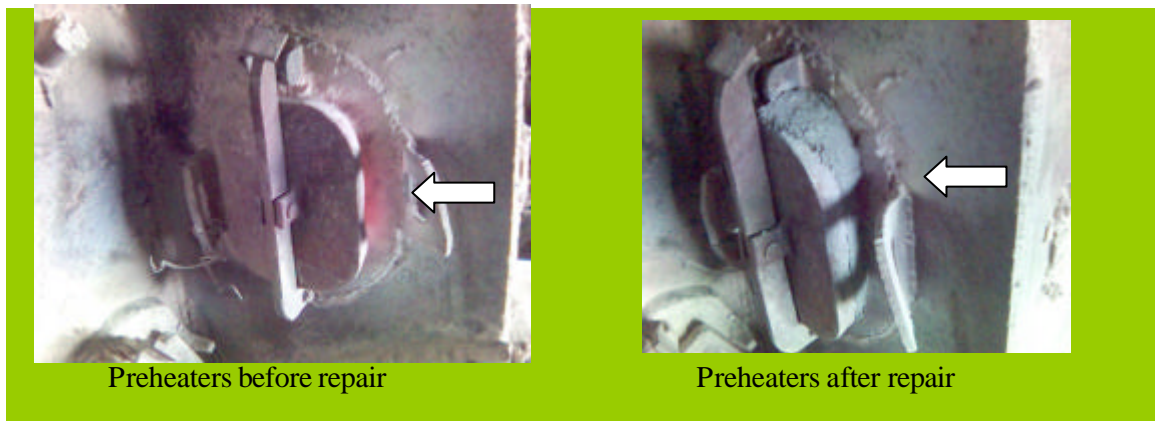
Various options are recommended based on the observations made above. Vacuum leak survey and immediate repairs of leaks is recommended to reduce excess False Air because:

- Excess False Air increases load on induced draft fans, causing an increase in power consumption.
- Excess False Air, particularly at the kiln and preheaters, where fuel is consumed for heat generation, will lead to artificially exaggerated fuel consumption. This has direct impact on the thermal efficiency (currently = 817 kCal/T Clinker).

- Management has made daily schedule that if the oxygen content is more than 3%, there will be reparation of false air. With this commitment, the false air is expected to be always less than 3%, the suitable target for the company, which is decreasing false air, based on the decrease of O₂ content at top cyclone from 3,8% to be 2,8%, however, it is difficult to decrease Oxygen at Top Cyclone to 2.8% (in this project, oxygen decreasing is only reach 3.3%). This condition occurs because PT. Indocement uses waste tyres as alternative energy which substitutes 5% of coal consumption and it causes the increase of O₂ into the system (cost saving data of waste tyres in 2004 is included under the results section).

RESULTS

This option is a daily maintenance operation. Hence, leaks that are found can be fixed immediately. A leak detection survey is conducted if the oxygen content in the top of cyclone is more than 3%. Because leak identification and repair is a daily maintenance exercise and conducted by the Indocement employees themselves, it was not possible to quantify future investment costs and savings.



Financial benefits

- Investment: Rp 35,000,000 or a approximately US\$ 3804
- Annual operational cost: included in daily maintenance
- Annual cost savings: US\$ 121265 or Rp. 1,115,642,646
- Payback period: 0.5 month (35,000,000/1,115,642,646 X 365)

Environmental benefits

- Annual energy savings: 2425 ton coal
- Annual GHG savings: 828 tons CO₂ (emission factor sourced from UNEP GHG Indicator: www.uneptie.org/energy/tools/ghgin/)

The coal savings were calculated as follows

- Reducing O₂ content from $\pm 3.8\%$ to $\pm 3.3\%$ in top Cyclone (SP)
- Saving from the average air saving/yr = $100/20 \times (3.8\% - 3.3\%) = 2.5\%$
- At SP: $[2.5\% \times 0.9 \times 7650 \text{ Nm}^3/\text{min} \times c_p \times (550 - 35)]$
 $= (2.5/100) \times 0.9 \times 7650 \text{ Nm}^3/\text{min} \times (60 \times 24 \times 365 \text{ min/yr})$
 $\times 0.380 \text{ KCal/NM}^3 \cdot \text{C} \times 515 \text{ C}$
 $= 14.55 \times 10^9 \text{ Kcal/yr}$
- Energy saving at SP (Coal 6000 Kcal/Kg): $(14.55 \times 10^9 \text{ Kcal/yr}) / 6000 \text{ Kcal/Kg} = 2,425 \times 10^6 \text{ Kg/yr} = 2425 \text{ tons/yr}$
- Coal consumption in plant #6 $\pm 600 \text{ ton/day}$: 180,000 ton/yr
- % saving coal: $2425/180,000 \times 100\% = 1,5\%$



Cost savings were also calculated for the use of waste tyres as an alternative fuel:

- HV Tire: 7500 Kcal/kg.
- HV Coal: 6500 kCal/kg.
- Tire Cost: Rp/MCal: 50
- Coal Cost: Rp/MCal: 100
- Ban Base Uses on 28 09 2004 (C): 4.8 tons/6 hours: 0.8 T/h (5%)
- Coal Decreasing: 7.5 tons/6 hours: 1.25 T/h
- Coal Cost/M Cal: 1.25 X 6500 X Rp. 100.-: Rp. 812,500.-
- Tire Cost/M Cal: 0.8 X 7500 X Rp. 50.-: Rp. 300,000.-
- KKI manpower for tire: 20 X Rp. 837,500.-: Rp. 16,750,000.-/month
- Average of tire uses operation: 17 hours/day
- Kiln Operation per month: 27 days
- Tire use cost per month: 27 X 17 X 0.8 X 7500 X Rp. 50: Rp. 137,700,000.-
- KKI manpower cost: 20 X Rp. 837,500.-: Rp. 154,450,000.-
- Coal Cost per month: Rp. 372,937,500.- (27 X 17 X 1.25 X 6500 X Rp. 100)
- Cost Saving from using of tyres: 0.8 T/h: Rp. 218,487,500.-

FOR MORE INFORMATION

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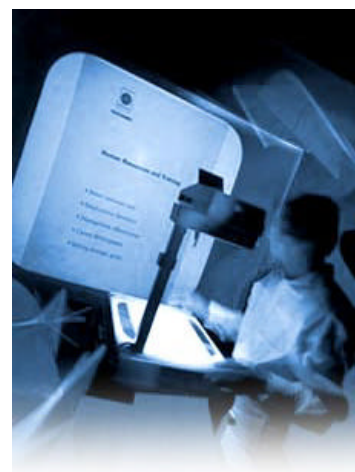
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