PT SEMEN CIBINONG TBK

Compressed Air Leak Survey and Leak Repair

SUMMARY OF THE OPTION

PT Semen Cibinong Tbk is one of the largest cement producers in Indonesia with an annual production capacity of 5,700,000 tons, and supplying to domestic and export markets.

The compressed air system is divided into a series of decentralized compressor houses and the compressed air pressure is only measured in the Central Control Room but not at the individual compressor houses or in the piping network. Compressors operated at 73% or less, which is much lower than the benchmark of 90%, which indicates that compressed air losses through leakages are high.

A compressed air leak survey was carried out at the kiln and raw mill area using the soap foam method (air bubbles appear when soapy liquid is sprayed on suspected leaking points) and the size of leaks was determined with an adapted anemometer. Leaks were found in the pipelines (loose flanges, damaged welding connection), valves and water and oil traps (worn out mechanical seals). Approximately 160 leak points were detected and cost US$ 16,667 to repair, resulting in US$ 50,092 annual savings, with a payback period of 4 months. Repair of the leaks resulted in potential annual electricity savings (i.e. based on calculated losses before leak repair) of 901,660 kWh/yr and 805 tons CO2 emission reductions.

KEYWORDS

Indonesia, Cement, Compressors & Compressed Air System, Leaks

OBSERVATIONS

The following observations were made of the compressed air system at the Narogong #4 production line:

- The compressed air system is divided into a series of decentralized compressor houses, each intended to meet the compressed air demand in a separate part in the process. The individual systems are: Limestone Crushing – 1 x Atlas Copco GA11, Raw Mill Conditioning Tower – 4 x Atlas Copco GA160W, Raw Mill Preheating – 1 x Atlas Copco GA160W, Pyro Processing Area – 3 x Atlas Copco GA160W, Finishing Area – 2 x Atlas Copco GA90W, Packing Area – 3 x Atlas Copco GA90W
- The compressed air system was controlled by pressure, and the only pressure readings for each system were recorded in the Central Control Room (CCR). Site inspection revealed that there was no local flow metering device installed at any of the compressor houses.
- The compressors were operating at levels 73% or less. This emphasized a definite need to optimize the compressor load since the normal load can reach up to 90% (based on data from other companies).
- Compressed air leaks from pipe work and equipment cause the largest compressed air losses in any industrial system. Many compressed air leaks were observed throughout the

Narogong #4 plant. This was particularly evident in the Raw Mill area when it was not running

- Best practice for industry was to control leakages in a compressed air system by 10% of total flow. In general, industrial plants that do not conduct regular leak surveys, the leakage will account for 20-30%. Although the audit team was informed of a "Leak Team" on site, there was no evidence of regular leak repair campaigns conducted hence, compressed air savings of 10-20% were anticipated.

OPTIONS

A leak survey was carried as follows:

- Defining the survey area: A plant layout was obtained to mark the areas where compressed air is used and to mark the areas to be surveyed
- Preparation of the materials for the survey, including
  - Soapy solution (water and soap) in a sprayer
  - Plastic tags to label identified leaks
  - Marker two write on the plastic tags
  - Form to fill out the leak number, location, description and estimated size
- Carrying out the survey, using the following steps:
  - Soap solution is sprayed on equipments, pipe lines, ducting etc. In the event of a leak, air bubbles appear
  - Because flow meters, The size of the leak is measured using a modified anemometer that measures the amount of air flow from the leak. Sometimes leaks were in locations that were difficult to reach with the anemometer, in which case the size of the leak was estimated by comparing the size of air bubbles with those at leaks that were measured
  - The leak is marked with a plastic tag
- Calculating the power loss (in kW) based on the measured air leakage and references in the Air Compressor Installation Guide (published by Atlas Copco 1st edition 1996)

Figure 1: Soapy method

Figure 2: Sound leak detector method

Figure 3: Sprayer

Figure 4: Anemometer

Figure 5: Leak measuring

Figure 6: Marking of Leak

RESULTS

The leak survey found the following:

- Approximately 160 leak points were found during the survey in kiln and raw mill area.
- Usually leaks were found in the pipelines, such as loose flanges and damaged welding connections. Leaks in valves, and water and oil traps were usually caused by worn mechanical seals
- The total energy loss per day from 160 leakage points was 448.5 liters per second, therefore power loss was about 125 kW

Financial benefits

- Investment: US$ 16,667 (= Rp 150,000,000 with US$ 1 = Rp 9,000)
- Annual operating cost: none
- Annual cost savings: US$ 50092 (901,660 kWh X Rp 500/kWh = Rp 864,000,000, with US$ 1 = Rp 9,000)
- Payback period: 4 months

Environmental benefits

- Annual electricity savings: 901,660 kWh (= 125 kW X 24 hour/day X 300 operation days/year)
- Annual GHG emission reduction: 805.18 tons CO_2 (=901,660 kWh/year X 0.000893 tons CO_2/kWh) *Note: the emission factor is taken from the Greenhouse Gas Indicator: www.uneptie.org/energy/tools/ghgin/*

FOR MORE INFORMATION

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