TUNRA BULK SOLIDS

Case study on improvement to flyash conveying system

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Optimisation Investigation Technique

System performance

- Is it achieving design capacity?
- Is there opportunity to improve capacity using existing system components?

Analyse existing system

- Instrument existing system
- Explore optimisation of conveying cycle
- Investigate opportunities to increase capacity through:
  - Air supply management and feeding techniques
  - Systematically Implement improvement opportunities

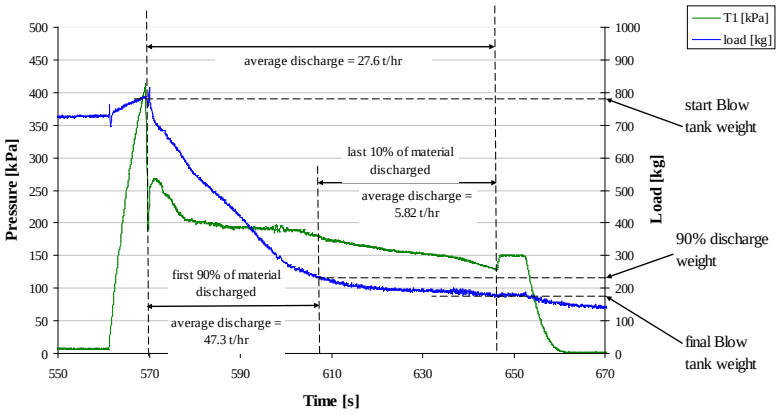

Figure 1: Blow tank optimisation analysis

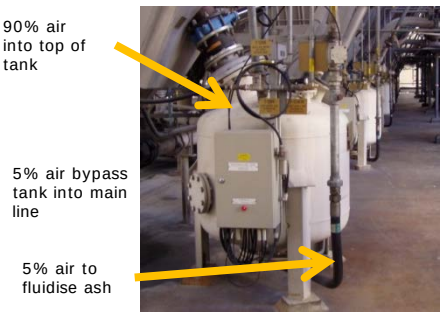

Figure 2: Flyash Blow tank feeder airflow improvement into pneumatic conveyor

Analysis outcomes

With reference to figure 1. the changeover time between blow tank discharge into the main pipeline was 10 s, which includes the pre-pressurisation time. Total conveying time of 73 seconds at 27 t/hr. Therefore, an average cycle time of approximately 83 seconds (or 43 cycles per hour)representing an effective tonnage rate of 24 t/hr for the system. HOWEVER, 90% discharge rate occurs in the first 41 second with an instantaneous flow rate of 47 t/hr. Airflow into blow tanks creating excessive fluidisation.

Opportunity for significant improvement in tonnage rate through better cycle management and airflow control.

Cycle management optimisation

Procedure 1. Analysis that the current flyash material has a conveying rate below 270 kPa which is well below the current pre-pressurisation setting of 400 kPa. It was recommended that the pre-pressurisation is reduced to 300 kPa in order to save energy and also to provide a faster pre-pressurisation time of approximately 5 seconds.

Procedure 2. Increase cut - off pressure from current 100 kPa to 130 kPa. a new cycle time of 51 seconds (or 70 cycles per hour).

IMPROVEMENT. Provides an effective discharge rate of 38 t/hr. Effective discharge rate increases output capacity by 58%.

Airflow management optimisation

Procedure. Add additional airflow line to top of tank and split blowtank air from fluidisation line. Set fluidisation airflow rate to minimum fluidisation air. Remaining blowtank air goes top of tank ensuring a steady feed rate into pipeline (See figure 2).

FINAL IMPROVEMENT. Cycle time remains the same. Onsite analysis showed increased effective tonnages 40 – 45 t/hr (originally 27 t/hr)

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