

Recovery Operation

COVEY CASE STUDY

Some years ago, the Shoalhaven paper mill installed a very small recovery furnace – of the type known as a smelter.

Shoalhaven in those days produced 40 t/day of cotton linters pulp using caustic soda in a Pandia digester. The problem with the furnace was that it was virtually impossible to control wild fluctuations in both the black liquor feed rate and in the furnace pressure.

Covey Consulting was engaged to resolve the problem.

Step 1 was to look at the furnace pressure and the wet scrubber and the fan. After a few tests with a cold boiler, we found that the water feed to the wet scrubber was the problem. A water seal was used between the furnace outlet duct and the scrubber inlet duct. The idea was that this could accommodate the expansion of the ductwork when the flue gas temperature varied. It also allowed the scrubbing water to be sucked in around the circumference of the duct. However, the tests showed that the water level kept varying wildly in a repetitive cycle. If the draft in the scrubber rose, more water would be sucked in. This put more load on the ID fan so the draft reduced which then meant less water would be sucked in. The draft would then increase and the cycle would repeat at intervals of a few seconds.

Step 2 was the black liquor feed. Occasionally this could run steadily for hours on end, but most of the time it varied erratically by 50 – 80%. When sizing a heat exchanger for the black liquor we discovered that the flow in the supply line was generally in the unstable region between laminar and turbulent flow. When the flow is laminar the pressure drop reduces, so the flow increases. When the flow gets high enough, it will switch to being turbulent, so the flow will decrease (as the pressure drop is higher). Normally this can be corrected by changing the line size, but for this small unit this would present fresh problems.



PO Box 99 Kew East VIC 3102

Tel: (03) 9859 4290 Fax: (03) 9859 4630

www.coveyconsulting.com.au



The occasional periods of stable operation were when the black liquor viscosity was outside its normal range due to either abnormal solids concentration or temperature.

this required trucking the spent liquor over a long distance, this proved to be the most economic option and was continued until the Shoalhaven pulp mill shut down because of lack of availability of cotton linters.

Step 3 As Shoalhaven was not in a position to fix either of these quickly, and in fact were keen to shut the furnace down, we sought someone to take the strong black liquor. This is somewhat easier said than done, but we did eventually find a company that recovered lead from dead car batteries. Their batch 'smelter' used heat and sodium carbonate to separate and refine the lead. Some trials were conducted which showed it was feasible to use strong black liquor to replace some of the fuel and sodium carbonate. However these trials took quite a while to progress, so we looked at other options.

Step 4 Amcor had recently bought APPM so another possibility was to ship the spent liquor to Maryvale Mill and burn it in the recovery system there (which has many times the capacity of the Shoalhaven plant). Although this required trucking the spent liquor over a long distance, this proved to be the most economic option and was continued until the Shoalhaven pulp mill shut down because of lack of availability of cotton linters.