DEVELOPMENT OF MODEL FOR THE SIMULATION OF AN INDUSTRIAL DEAERATOR FOR BOILER FEED WATER PRODUCTION

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ABSTRACT

This research considers a mathematical model development for deaerator performance simulation considering current operating parameters and monitoring trend of performance based on the flow-regimes and operating conditions. This research is aimed at generally minimizing the cost of boiler feed water (BFW) production by reducing energy losses and achieving ≤1ppm oxygen concentration in boiler feed water with minimum chemical deaeration requirement. To achieve this, Mass & Energy balance was done on the deaerator under study, models were also developed to predict the actual steam and venting rate required for appropriate mechanical deaeration, and the oxygen continuity equation was adopted and solved to estimate oxygen concentration in feed water from deaerator. The outcome of this research showed that current deaerator performance was <40% and deaerator excess steam /venting rate losses could be minimized to mitigate artificial rain around deaerator and still achieve minimum oxygen concentration in deaerator outlet by maintaining balanced heat load to the deaerator during operation. Owing to deaerator design specification and result of simulation, case study deaerator should be operated at a temperature ≥108°C as this after simulation corresponds to an oxygen concentration of ≤1.33ppm at the deaerator outlet, a control valve should be utilized at deaerator vent to regulate venting based on operating conditions. Further studies should consider studying how conductivity/other properties of water affect deaeration.

Keywords: Deaeration, Eliminox, Low pressure steam, Return Condensate, Corrosion.