ANALISIS EFISIENSI BOILER BERDASARKAN PENGATURAN PARAMETER OPERASIONAL DENGAN PENDEKATAN SIMULASI *SYSTEM DINAMICS*

(Studi Kasus di HHP Boiler VI, Utilities-PP II, PT. Pertamina (Persero) RU V Balikpapan)

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Abstrak

Performance atau efisiensi dalam HHP Boiler VI, Utilities Power Plant II, PT. Pertamina (Persero) RU V Balikpapan menyatakan perbandingan antara panas yang dilepas oleh bahan bakar gas (fuel gas) dengan sejumlah panas yang diserap oleh feed water untuk menghasilkan steam superheated. Steam superheated berfungsi sebagai fluida kerja/penggerak, sebagai media pemanas, sehingga menjamin lancarnya proses industri pengilangan. Salah satu peralatan yang banyak menggunakan energi adalah Boiler sebagai alat penukar panas (heat exchange). Boiler penghasil steam superheated telah banyak dihitung performancenya dengan formula yang berbeda oleh peneliti sebelumnya. Dalam penelitian ini performance atau efisiensi Boiler dihitung dengan formula heat absord dan disimulasikan dengan pendekatan simulasi system dynamic. Software system dinamics yang digunakan adalah Powersim Studio 2005. Model simulasi yang terbentuk menyatakan penurunan efisiensi Boiler erat kaitannya dengan hasil analisa impurities feedwater, serta temperature feedwater itu sendiri sebelum masuk ke Boiler. Kandungan chloride berdasarkan rata-rata 1,4 ppm (max. yang diisyaratkan 0,3 ppm), sehingga akan menaikan flow blowdown sebesar 860,625 kg/jam (setara 408.722,875 kJ/jam. Sementara temperature feedwater berdasarkan data rata-rata 133 ^{0}C (max. 138 0C), maka setiap kenaikan 6 ^{0}C temperature feed water karena penggunaan economizer akan menghemat pemakaian fuel sebesar 1%. Dari hasil uji validasi menggunakan uji MAPE (mean absolute percentage error) diperoleh 7,82 %, sedangkan validasi dengan uji hipotesis t-test baik two-sample T-Test diperoleh t-hitung -8,78 maupun Paired-T Test menghasilkan t-hitung -19,80. Dengan demikian kedua uji menyatakan model simulasi valid dan signifikan.

Kata kunci : *HHP Boiler VI, Efisiensi, Paramater Operasional, Heat Absord, System Dinamics*

BOILER EFFICIENCY ANALYSIS BASE OF OPERATIONAL PARAMETERS ADJUSTING WITH APPROACH SYSTEM DINAMICS SIMULATION

(Case Study in HHP Boiler VI, Utilities-PP II, PT. Pertamina (Persero) RU V Balikpapan)

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Abstract

Performance or efficiency in HHP Boiler VI, Utilities Power Plant II, PT. Pertamina (Persero) RU V Balikpapan is the ratio between the heat released by the fuel gas with the amount of heat that is absorbed by the feedwater to the produce superheated steam. Superheated steam serves as a working fluid / activator , as a heating medium, thus ensuring the smooth process of refining industry . One equipment that uses a lot of energy is the boiler as a heat exchanger. Boiler producing superheated steam has many performance calculated with different formulas by previous researchers. In this study the performance or efficiency of heat Boiler absord calculated by formula and simulated dynamic system simulation approach. Dinamics system software used is Powersim Studio 2005. The simulation model is formed states decline Boiler efficiency is closely related to the results of the analysis of impurities feedwater and the feedwater temperature itself before entering the Boiler. The content of chloride based on an average of 1.4 ppm (max . Which is hinted at 0.3 ppm) , so it will increase the blowdown flow amounted to 860.625 kg / hour (equivalent 408,722.875 kJ / hour. While the feedwater temperature based on the average data 133 ^{0}C (max . 138 ^{0}C) , then every 6 ^{0}C temperature rise due to the use of feed water economizer will save fuel consumption by 1%. From the results of the validation test using test MAPE (mean absolute percentage error) gained 7,82%, while validating the hypothesis t -test both two-sample T - test obtained t count -19,80 and Paired - T Test produce t-count -8,78. Thus both states test simulation model is valid and significant.

Keywords : *HHP Boiler VI, Efficiency, Operational Parameters, Heat Absord, System Dinamics*