Rancang bangun perangkat lunak simulasi proses pembangkit uap terintegrasi PLC menggunakan matlab simulink = Design of PLC integrated process simulation software for steam generator using matlab simulink

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Abstrak

ABSTRAK
Tesis ini membahas penelitian yang telah dilakukan untuk membuat perangkat lunak simulasi berbasis Matlab Simulink untuk pembangkit uap. Pembangkit uap ini bekerja dengan 72% kualitas uap, 1.2% kandungan oksigen, laju aliran uap didesain maksimum 3600 Barrel per hari dan laju aliran gas bahan bakar didesain maksimum 1300 MSCF per hari .

Perangkat lunak simulasi pembangkit uap terdiri atas Tungku Pembakar, Aliran Bahan Bakar, Aliran Air Umpan, Konveksi, Radian dan Aliran Uap. Di dalam bagian-bagian tersebut, prinsip termodinamika dan perpindahan energi panas seperti konduksi, konveksi dan radiasi diaplikasikan untuk menghitung nilai tekanan, nilai suhu dan nilai laju aliran.

Proses validasi dilakukan pada kondisi stabil dan kualitas uap 72% telah tercapai kepada 10 parameter proses penting pembangkit uap hasil simulasi. Persentase kesalahan yang dihasilkan dari simulasi Beda Tekanan Orifis Bahan Bakar Gas : 2,39% , Tekanan Bahan Bakar Gas : 1,37%, Suhu Gas Bahan Bakar Gas : 5,95%, Laju Aliran Gas Bahan Bakar : 1,25%, Beda Tekanan Orifis Air Umpan : 1,94%, Tekanan Air Umpan : 1,54%, Laju Aliran Air Umpan : 0,92% , Beda Tekanan Orifis Uap : 3,26%, Tekanan Keluaran Uap : 1,93% and Kualitas Uap : 0,05% .
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ABSTRACT
This paper describes the work done in order to make Matlab Simulink based steam generator simulator in simulation of a steam generator. The steam generator is operated with steam quality of 72%, O2 content is 1.2%, design steam volume flow is 3600 barrel per day at at a maximum and design fuel gas volume flow is 1300 MSCF per day at at a maximum.

The steam generator simulation program is consisting of Burner, Radiant, Convection, Exhaust Stack, Feedwater Pump Discharge and Steam Discharge. Within the components, thermodynamics and heat transfer principles such as conduction, convection and radiation were applied to compute the pressure

values, temperature values and flow rate values.

The validation process has been done with steam generator is operating on steady steady state and steam quality target of 72% has been achieved to the 10 important process parameters of the steam generator. The error percentage resulted from simulation of Fuel Gas Orifice Differential Pressure : 2.39%, Fuel Gas Pressure : 1.37%, Fuel Gas Temperature : 5.95%, Fuel Gas Flow Rate : 1.25%, Feedwater Orifice Differential Pressure : 1.94%, Feedwater Pressure : 1.54%, Feedwater Flow Rate : 0.92%, Steam Orifice Differential Pressure 3.26%, Steam Discharge Pressure 1.93% and Steam Quality : 0.05%.