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Abstract

Unit Thermal Ventilation is a air processing unit on leather drying machine Thema Dry Tunnel TH009. Variables that must be controlled is humidity and temperature of air in the tunnel. To run the process safely, the system must be able to control with better protection and must have a sufficient level of security. Meanwhile, the real plan that occurred during this system is not able to run optimally. So in this research, simulation by combining process, control system, and protection system according to a designed model has been done.

From the simulation results obtained for the humidity control systems have maximum overshoot 4.25%, settling time 31 seconds and error steady state 0.0375%. While for the temperature control system has a maximum overshoot 7.5%, settling time 24 seconds and error steady state 0.03%. The three parameters represent performance of humidity and temperature control system simulation results, of course better than the existing system. Layer of protection with the process design and control system is actually just enough to handle the dynamics of process, but protection system must remain connected to prevent possibility of control when the system is not able to handle more. Protection system has a value of Safety Integrity Level (SIL) 1 Probability Failure on Demand (PFD) of 6,628 x 10⁻². From this study through the simulation we can formulating and shows the effect of the instrument failure rate to response of control system.

Keyword : HVAC, humidity and temperature, control system, protection system, failure rate and Safety Integrity level.