

## ABSTRACT

Oil Palm Empty Fruit Bunches (EFB) is a biomass that contains lignocellulosic which can be converted into G2 bioethanol, G2 bioethanol is the processing of bioethanol from agricultural and plantation waste products which consists of four stages of processing, namely, the first is pretreatment or the initial stage, the second is hydrolysis to produce monomer sugar, the third is the process of processing sugar into ethanol is stopped, and the fourth is purification or distillation. The result of the pretreatment process is in the form of cellulose slurry, before proceeding to the hydrolysis process of cellulose slurry through a washing process first to reduce the lignin content contained in the cellulose slurry, the washing process consists of three main stages, namely the process of separating the lignin liquid contained in the cellulose slurry, there are two processes of neutralizing the pH value of the cellulose slurry, and the third process of transporting the cellulose slurry to proceed to the next process. To maximize the results of the washing process, a monitoring and control system was designed using PLC and HMI, controls were designed at each stage of the washing process and the pH sensor readings obtained had an error value of 0.146% and the reading of the NaOH concentration value had an average error value of 0.03 % then the results obtained from controlling the pH value in the washing tank takes an average of 26 minutes to reduce the pH value by 0.04-0.05 using HCl and to transport 2 Kg of cellulose slurry takes an average of 3 minutes.

**Keyword: HMI, PLC, Bioethanol, Washing process, Control, Monitoring, washing tank, HCl, NaOH**