INTISARI

Penelitian ini bertujuan merancang dan membangun sistem *Supervisory Control and Data Acquisition* (SCADA) yang terintegrasi dengan *Programmable Logic Controller* (PLC) untuk mengendalikan serta memantau proses pencampuran bahan minuman secara otomatis berdasarkan kadar keasaman (pH) dan volume. Sistem tersebut dilengkapi antarmuka *Human Machine Interface* (HMI) agar operator dapat melakukan pengaturan parameter dan memonitor jalannya proses secara terpusat.

Metode penelitian dilakukan dengan merancang sebuah alat berbasis PLC Schneider M221 yang terdiri atas tiga tabung, yaitu tabung cairan asam, tabung bahan minuman, dan tabung utama sebagai tempat berlangsungnya proses pencampuran. Pada tabung utama dipasang dua sensor utama, yakni sensor ultrasonik untuk mengukur volume cairan dan sensor pH untuk mengukur tingkat keasaman campuran. Selain itu, HMI digunakan sebagai sarana pengendalian dan pemantauan proses pencampuran, sehingga operator dapat mengoperasikan sistem secara lebih terstruktur dan informatif.

Hasil penelitian menunjukkan bahwa alat yang dikembangkan telah berhasil mengendalikan proses pencampuran berdasarkan nilai volume dan pH sesuai *set-point* yang ditentukan. Kinerja pengukuran menghasilkan rata-rata galat sebesar 2,86% pada nilai volume dan 7,8% pada nilai pH. HMI mampu menerima masukan *set-point* serta menampilkan proses pencampuran, nilai pH, nilai volume, dan trend nilai pH dan volume.

Kata kunci: SCADA, PLC Schneider M221, pencampur, kadar keasaman, HMI Wonderware InTouch.

ABSTRACT

This study aims to design and develop a Supervisory Control and Data Acquisition (SCADA) system integrated with a Programmable Logic Controller (PLC) to automatically control and monitor the beverage mixing process based on acidity level (pH) and volume. The system is equipped with a Human Machine Interface (HMI) that allows operators to set parameters and centrally monitor the process operation.

The research methodology involves designing a PLC-based system using a Schneider M221 controller, consisting of three tanks: an acidic liquid tank, a beverage ingredient tank, and a main tank where the mixing process takes place. Two primary sensors are installed in the main tank, namely an ultrasonic sensor for measuring liquid volume and a pH sensor for measuring the acidity level of the mixture. In addition, the HMI serves as a control and monitoring interface for the mixing process, enabling operators to operate the system in a more structured and informative manner.

The results show that the developed system successfully controls the mixing process based on volume and pH values according to the specified set-points. The measurement performance yields an average error of 2.86% for volume and 7.8% for pH. The HMI is capable of receiving set-point inputs and displaying the mixing process, pH value, volume value, as well as the pH and volume trends.

Keywords: SCADA, Schneider M221 PLC, mixer, acidity level, Wonderware InTouch HMI.