

RANCANG BANGUN RANGKAIAN KONTROL *BAR SCREEN* UNTUK PEMBERSIHAN KANAL DI AREA *INTAKE 3* DI PT. INDAH KIAT PULP & PAPER PERAWANG

Nama Mahasiswa : Jerry Yohanes Saputra Siahaan
NIM : 3204221477
Dosen Pembimbing : M. Nurfaizi, S.ST., M.T.

ABSTRAK

Sistem intake air baku merupakan infrastruktur penting di PT. Indah Kiat Pulp & Paper (IKPP) Perawang yang mengambil air dari Sungai Siak untuk mendukung kebutuhan operasional pabrik. Pada Area Intake 3, sering terjadi penyumbatan bar screen akibat sampah padat dan eceng gondok yang sebelumnya dibersihkan secara manual oleh operator. Kondisi tersebut membutuhkan waktu 2–3 jam setiap kejadian, berisiko terhadap keselamatan kerja, serta menyebabkan peningkatan head loss yang dapat mengganggu kinerja pompa. Penelitian ini bertujuan merancang dan membangun sistem kontrol bar screen otomatis konvensional berbasis timer untuk meningkatkan efektivitas proses pembersihan kanal. Sistem menggunakan komponen elektromekanis non-PLC berupa Time Switch, Time Delay Relay (TDR), Magnetic Contactor, Auxiliary Relay, Thermal Overload Relay (TOR), dan Limit Switch. Penggerak sistem menggunakan motor induksi AC 3 fasa 2,2 kW dengan gearbox rasio 1:60. Pengujian dilakukan melalui cold test di laboratorium dan commissioning di lapangan selama 14 hari dengan beberapa skenario pembebanan. Hasil pengujian menunjukkan sistem mampu menjalankan proses pembersihan secara otomatis dan berurutan setiap 2 jam. Limit Switch mampu membatasi pergerakan rake dengan baik, sedangkan sistem interlock dan proteksi TOR berfungsi efektif dalam menjaga keamanan rangkaian dan motor. Waktu pembersihan berhasil dikurangi menjadi 45,8 detik per siklus, sehingga meningkatkan efisiensi waktu lebih dari 99,5%, mengurangi head loss hingga 80%, serta menurunkan kebutuhan tenaga operator hingga 66,7%. Dengan demikian, sistem kontrol bar screen konvensional berbasis timer dapat meningkatkan efisiensi, keselamatan kerja, dan keandalan proses pembersihan.

Kata Kunci: Bar Screen, Sistem Kontrol Konvensional, Time Switch, Motor AC 3 Fasa, Area Intake 3, PT. Indah Kiat Pulp & Paper.

DESIGN AND CONSTRUCTION OF SCREEN BAR CONTROL CIRCUITS FOR CLEANING INTAKE 3 DI AREA CANALS DI PT. INDAH KIAT PULP & PAPER PERAWANG

Nama Mahasiswa : Jerry Yohanes Saputra Siahaan
NIM : 3204221477
Dosen Pembimbing : M. Nurfaizi, S.ST., M.T.

ABSTRACT

The raw water intake system is an important infrastructure at PT. Indah Kiat Pulp & Paper (IKPP) Perawang, supplying water from the Siak River to support the plant's operational needs. In Intake Area 3, frequent clogging of the bar screen occurs due to solid waste and water hyacinth, which were previously removed manually by operators. This condition required 2–3 hours for each cleaning process, posed safety risks, and increased head loss, potentially affecting pump performance. This study aims to design and develop a conventional timer-based automatic bar screen control system to improve the efficiency of canal cleaning. The system uses non-PLC electromechanical components, including a Time Switch, Time Delay Relay (TDR), Magnetic Contactor, Auxiliary Relay, Thermal Overload Relay (TOR), and Limit Switch. The system is driven by a 2.2 kW three-phase AC induction motor with a 1:60 gearbox reduction ratio. Testing was conducted through laboratory cold tests and 14-day on-site commissioning with several loading scenarios. The results showed that the system was able to perform the cleaning process automatically and sequentially every 2 hours. The Limit Switch effectively controlled the rake movement, while the electrical interlock and TOR protection operated effectively to ensure circuit and motor safety. The cleaning time was reduced to 45.8 seconds per cycle, resulting in more than 99.5% improvement in time efficiency, up to 80% reduction in head loss, and a 66.7% reduction in operator requirements. Therefore, the conventional timer-based bar screen control system can improve the efficiency, safety, and reliability of the cleaning.

Keywords: Bar Screen, Conventional Control System, Time Switch, Three-Phase AC Motor, Intake Area 3, PT. Indah Kiat Pulp & Paper.