

ABSTRACT

Some great part of industry major make controlling process as the important part of their programs so that the industry can produce good qualities productions. In this thesis, the author has made the implementation of SCADA system to monitor the work of “ plant simulator process control” and the author hope that it can represent of the plant process in industries.

Implementation of SCADA system was made by using some computers, so that the work of a plant can be monitor from some different places. In the realization the author has made the SCADA system with HMI, data base, and server in some computers that were located in separate places. Besides monitoring the “plant simulator process control“, the SCADA system can be use to operate the control based on the real panel. SCADA system that has made can use to monitor the control level process for the first mode that represent first order of control process, the control level process for the second mode that represent second order of uninteracted control process , the control level process for third mode that represent second order of interacted control process , and the control level process for fourth mode that represent third order of control process.

ABSTRAK

Sebagian besar industri mengutamakan pengendalian proses sebagai bagian yang penting untuk menghasilkan produksi dengan kualitas yang baik. Pada tugas akhir ini telah dibuat implementasi sistem SCADA untuk memantau kerja “*plant simulator* proses kontrol” yang diharapkan mewakili salah satu *plant* proses di industri..

Implementasi sistem SCADA dibuat dengan menggunakan beberapa komputer sehingga kerja suatu *plant* dapat dipantau dari beberapa tempat yang berbeda. Dalam realisasinya maka dibuat sistem SCADA dengan HMI, *data base*, dan *server* pada beberapa komputer yang terpisah. Selain untuk memonitoring “*plant simulator* proses kontrol” sistem SCADA juga dapat mengoperasikan pengendalian sesuai dengan *panel realnya*. Sistem SCADA yang dibuat dapat memonitoring proses kontrol level untuk mode satu yang mewakili proses kontrol orde satu, proses kontrol level mode dua yang mewakili proses kontrol orde dua tidak berinteraksi, proses kontrol level mode tiga yang mewakili proses kontrol untuk orde dua berinteraksi, dan proses kontrol level mode empat yang mewakili proses kontrol orde tiga.

DAFTAR ISI

	Halaman
ABSTRAK	i
ABSTRACT	ii
KATA PENGANTAR	iii
DAFTAR ISI	v
DAFTAR TABEL	viii
DAFTAR GAMBAR	ix
 BAB I PENDAHULUAN	
I.1 Latar Belakang	1
I.2 Perumusan Masalah	1
I.3 Tujuan	1
I.4 Pembatasan Masalah	2
I.5 Sistematika Penulisan	2
 BAB II LANDASAN TEORI	
II.1 Istilah-istilah Teknik Kendali	3
II.2 Programmable Logic Controller (PLC)	3
II.3 Pengalamatan pada Twidosoft	6
II.4 Protokol Modbus	7
II.4.1 Request Read N Bits	8
II.4.2 Request Read N Words	9
II.4.3 Request Write Bit	9
II.4.4 Request Write Words	10
II.4.5 Request Write N words	10
II.4.6 Request Write N Bits	11
II.5 IP Address	12
II.6 Sistem SCADA	13
II.7 Sistem Kontrol Lup Terbuka	16
II.8 Sistem Kontrol Lup Tertutup	16
II.9 Pengendali PID (Proportional-Integral-Derivative)	17

II.9.1 Pengendali Proportional (P)	17
II.9.2 Pengendali Proportional Integral (PI).....	18
II.9.3 Pengendali Proportional Derivative (PD).....	18
II.9.4 Pengendali PID (Proportional-Integral-Derivative)	19
II.9.5 Metode Tuning Trial And Error	20
II.9.6 Respon Transien dan Respon Keadaan Tunak	20
BAB III PERANCANGAN SISTEM SCADA	
III.1 “Plant Simulator Proses Kontrol” Mode Satu.....	23
III.2 “Plant Simulator Proses Kontrol” Mode Dua	23
III.3 “Plant Simulator Proses Kontrol” Mode Tiga.....	23
III.4 “Plant Simulator Proses Kontrol” Mode Empat	24
III.5 Pemetaan I/O “Plant Simulator Proses Kontrol”	24
III.6 Flowchart “Plant Simulator Proses Kontrol”	26
III.7 Pemrograman PLC Master	27
III.7.1 Pemrograman Request ke PLC Slave	27
III.7.2 Pemrograman Urutan Transmisi	29
III.8 Diagram Blok Sistem SCADA	30
III.9 Pemrograman SCADA Software Wonderware versi 9.5.....	31
III.9.1 Konfigurasi I/O Server.....	31
III.9.2 Pembuatan Tabel Alamat Memori	32
III.9.3 Perancangan Tampilan HMI dan Animasi.....	33
III.9.3.1 Log In Window	33
III.9.3.2 Main Window	34
III.9.3.3 Window Animasi “Plant Simulator Proses Kontrol”	35
III.9.3.4 Window Panel “Plant Simulator Proses Kontrol”	35
III.9.3.5 Window Manual “Plant Simulator Proses Kontrol”	36
III.9.3.6 Window Historical dan Real Trend.....	36
III.9.4 Pembuatan Data Base.....	38
III.9.4.1 Konfigurasi Trending.....	38
BAB IV ANALISIS DATA	
IV.1 Perbandingan Data pada Wonderware dengan Data Real	41
IV.2 Hasil Monitoring pada I/O Server.....	42

IV.3 Hasil Monitoring Human Machine Interface (HMI)	43
IV.3.1 Uji Coba Log In Window	43
IV.3.2 Uji Coba Main Window.....	45
IV.3.3 Hasil Monitoring Real Trend.....	48
IV.3.4 Hasil Monitoring Historical Trend.....	53
IV.4 Hasil Monitoring Trending	58
BAB V KESIMPULAN DAN SARAN	
V.1 Kesimpulan	65
V.2 Saran	66
DAFTAR PUSTAKA	67
LAMPIRAN A PROGRAM PLC	
LAMPIRAN B GAMBAR PLANT	

DAFTAR TABEL

	Halaman
Tabel II.1 Format Request Read N Bits	8
Tabel II.2 Format Request Read N Words.....	9
Tabel II.3 Format Request Write 1 Bit	9
Tabel II.4 Format Request Write 1 Words.....	10
Tabel II.5 Format Request Write N Words.....	10
Tabel II.6 Format Request Write N Bits	11
Tabel II.7 Class IP	12
Tabel II.8 Private IP Addresses.....	12
Tabel II.9 Subnet Mask Value	12
Tabel III.1 Memori Proses “Plant Simulator Proses Kontrol”	32
Tabel IV.1 Perbandingan Data Level pada Wonderware dengan Data Real	41
Tabel IV.2 Uji Coba Log In Window	43
Tabel IV.3 Main Window	45
Tabel IV.4 Window Panel “Plant Simulator Proses Kontrol”	46
Tabel IV.5 Manual “Plant Simulator Proses Kontrol”	47
Tabel IV.6 Data Hasil Monitoring Pengendalian Level dengan $K_p=3$	63
Tabel IV.7 Data Hasil Monitoring Pengendalian Level dengan $K_p=15$	63

DAFTAR GAMBAR

	Halaman
Gambar II.1 Contoh Tampilan Grafis Ladder Diagram.....	5
Gambar II.2 Arsitektur SCADA	14
Gambar II.3 Diagram Blok Sistem Kontrol Lup Terbuka	16
Gambar II.4 Diagram Blok Sistem Kontrol Lup Tertutup.....	17
Gambar II.5 Aksi Kontrol PID.....	20
Gambar II.6 Respon Transien suatu sistem.....	21
Gambar III.1 “Plant Simulator Proses Kontrol”	22
Gambar III.2 Flowchart “Plant Simulator Proses Kontrol”	26
Gambar III.3 Request Read N Words ke PLC Slave	27
Gambar III.4 Request Write N Words ke PLC Slave	28
Gambar III.5 Request Write N Words ke PLC Slave	28
Gambar III.6 Blok Diagram Urutan Transmisi Request.....	29
Gambar III.7 Diagram Blok Sistem SCADA.....	30
Gambar III.8 Konfigurasi I/O Server	31
Gambar III.9 Log In Window	34
Gambar III.10 Main Window.....	34
Gambar III.11 Window Panel “Plant Simulator Proses Kontrol”	35
Gambar III.12 Manual “Plant Simulator Proses Kontrol”	36
Gambar III.13 Window Historical	37
Gambar III.14 Window Real Trend	37
Gambar III.15 Server List Configuration.....	38
Gambar III.16 Pengisian Server, Login ID, dan Password.....	39
Gambar III.17 Server List telah Terisi	39
Gambar III.18 Window Trending Sebelum Ada Tagname yang Diaccess.	40
Gambar III.19 Window Trending Setelah dipilih Tagname yang Ingin Diaccess	40
Gambar IV.1 I/O Server Status Good	42

Gambar IV.2 I/O Server Status Failed	42
Gambar IV.3 Log On Failed	43
Gambar IV.4 Log On Operator	43
Gambar IV.5 Hasil Log On Operator.....	44
Gambar IV.6 Log On Teknisi	44
Gambar IV.7 Hasil Log On Teknisi.....	44
Gambar IV.8 Log On Administrator.....	44
Gambar IV.9 Hasil Log On Administrator	44
Gambar IV.10 Main Window	45
Gambar IV.11 Window Panel “Plant Simulator Proses Kontrol”	46
Gambar IV.12 Manual Panel “Plant Simulator Proses Kontrol”	47
Gambar IV.13 Window Animasi “Plant Simulator Proses Kontrol”	48
Gambar IV.14 Grafik Real Trend Mode 1 $K_p=3$	49
Gambar IV.15 Grafik Real Trend Mode 1 $K_p=15$	49
Gambar IV.16 Grafik Real Trend Mode 2 $K_p=3$	50
Gambar IV.17 Grafik Real Trend Mode 2 $K_p=15$	50
Gambar IV.18 Grafik Real Trend Mode 3 $K_p=3$	51
Gambar IV.19 Grafik Real Trend Mode 3 $K_p=15$	51
Gambar IV.20 Grafik Real Trend Mode 4 $K_p=3$	52
Gambar IV.21 Grafik Real Trend Mode 4 $K_p=15$	52
Gambar IV.22 Grafik Real Trend Saat Failed	53
Gambar IV.23 Grafik Historical Trend Mode 1 $K_p=3$	54
Gambar IV.24 Grafik Historical Trend Mode 1 $K_p=15$	54
Gambar IV.25 Grafik Historical Trend Mode 2 $K_p=3$	55
Gambar IV.26 Grafik Historical Trend Mode 2 $K_p=15$	55
Gambar IV.27 Grafik Historical Trend Mode 3 $K_p=3$	56
Gambar IV.28 Grafik Historical Trend Mode 3 $K_p=15$	56
Gambar IV.29 Grafik Historical Trend Mode 4 $K_p=3$	57
Gambar IV.30 Grafik Historical Trend Mode 4 $K_p=15$	57
Gambar IV.31 Grafik Historical Trend Saat Failed	58
Gambar IV.32 Grafik Trending Mode 1 $K_p=3$	59

Gambar IV.33 Grafik Trending Mode 1 $K_p=15$	59
Gambar IV.34 Grafik Trending Mode 2 $K_p=3$	60
Gambar IV.35 Grafik Trending Mode 2 $K_p=15$	60
Gambar IV.36 Grafik Trending Mode 3 $K_p=3$	61
Gambar IV.37 Grafik Trending Mode 3 $K_p=15$	61
Gambar IV.38 Grafik Trending Mode 4 $K_p=3$	62
Gambar IV.39 Grafik Trending Mode 4 $K_p=15$	62
Gambar IV.40 Grafik Trending Saat Failed.....	63
Gambar IV.41 Data Log Saat Status Good	64
Gambar IV.42 Data Log Saat Status Failed.....	64