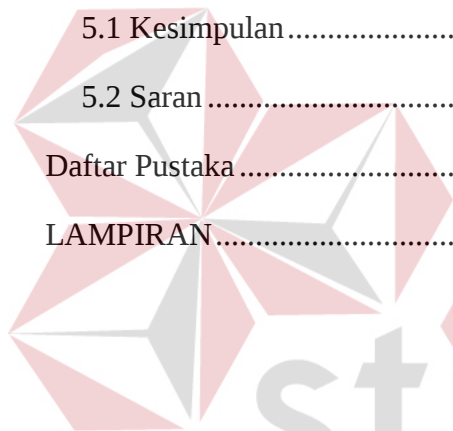


## Daftar Isi

|                                            |      |
|--------------------------------------------|------|
| ABSTRAKSI .....                            | i    |
| ABSTRACT.....                              | ii   |
| PERNYATAAN.....                            | iii  |
| KATA PENGANTAR .....                       | iv   |
| DAFTAR ISI.....                            | vi   |
| DAFTAR GAMBAR .....                        | ix   |
| DAFTAR TABEL.....                          | xii  |
| DAFTAR PUSTAKA .....                       | xxvi |
| <br>BAB I                                  |      |
| PENDAHULUAN .....                          | 1    |
| 1.1. Latar Belakang Masalah .....          | 1    |
| 1.2. Perumusan Masalah.....                | 5    |
| 1.3. Pembatasan Masalah .....              | 5    |
| 1.4. Tujuan.....                           | 6    |
| 1.5. Kontribusi .....                      | 6    |
| 1.6. Sistematika Penulisan.....            | 7    |
| <br>BAB II                                 |      |
| LANDASAN TEORI.....                        | 9    |
| 2.1. Programable Logic Control ( PLC)..... | 9    |
| 2.1.1 Komponen Dasar PLC .....             | 10   |
| 2.1.2 Bahasa Pemrograman .....             | 12   |
| 2.1.3 Timer & Counter .....                | 16   |
| 2.1.4 Flag.....                            | 18   |
| 2.1.5 Multitasking .....                   | 19   |
| 2.1.6 PLC FESTO FC-440 .....               | 20   |

|                                                                 |    |
|-----------------------------------------------------------------|----|
| 2.2.Motor 3 Fasa .....                                          | 23 |
| 2.2.1 Structure Motor 3 Fasa .....                              | 24 |
| 2.3. Inverter VF-S11 .....                                      | 27 |
| 2.3.1 Koneksi.....                                              | 28 |
| 2.3.2 Mode Operasi Inverter.....                                | 29 |
| 2.3.3 Parameter Inverter .....                                  | 31 |
| 2.4 Relay .....                                                 | 34 |
| 2.5 Switch .....                                                | 35 |
| 2.6 Limit Switch .....                                          | 36 |
| <b>BAB III</b>                                                  |    |
| METODE PENELITIAN.....                                          | 38 |
| 3.1 Perancangan Perangkat Keras ( HARDWARE ).....               | 41 |
| 3.1.1 Modul FEC-FC440 FST .....                                 | 43 |
| 3.1.2 Mixer .....                                               | 50 |
| 3.1.3 Rangkaian Pendukung.....                                  | 51 |
| 3.1.4 Tombol Pengendali.....                                    | 51 |
| 3.1.5 Modul Relay .....                                         | 53 |
| 3.2 Perancangan Perangkat lunak ( SOFTWARE ).....               | 54 |
| 3.3 PerancanganMekanik.....                                     | 61 |
| 3.3.1 Mekanik Mixer .....                                       | 62 |
| 3.3.2 Mekanik Pendorong Bahan .....                             | 63 |
| 3.3.3 Mekanik Pemotong Bahan.....                               | 65 |
| 3.3.4 Peletakan Komponen Elektronika Pada Perangkat Keras ..... | 66 |
| <b>BAB IV</b>                                                   |    |

|                                                  |    |
|--------------------------------------------------|----|
| PENGUJIAN SISTEM .....                           | 69 |
| 4.1 Pengujian PLC Festo FC-440 .....             | 69 |
| 4.2 Pengujian Inverter Toshiba VF-S11 .....      | 71 |
| 4.3 Pengujian Rangkaian Relay Motor 1 Fasa ..... | 74 |
| 4.4 Pengujian Relay Motor DC .....               | 76 |
| 4.5 Pengujian Seluruh Sistem .....               | 79 |
| BAB V                                            |    |
| KESIMPULAN DAN SARAN .....                       | 82 |
| 5.1 Kesimpulan .....                             | 82 |
| 5.2 Saran .....                                  | 83 |
| Daftar Pustaka .....                             | 84 |
| LAMPIRAN .....                                   | 86 |



INSTITUT BISNIS  
& INFORMATIKA  
**stikom**  
SURABAYA

|                                                             |    |
|-------------------------------------------------------------|----|
| Gambar 3.1 Diagram Keseluruhan .....                        | 38 |
| Gambar 3.2 Sistem Kerja Mekanik.....                        | 40 |
| Gambar 3.3 Diagram Block Rangkaian Kelistrikan .....        | 41 |
| Gambar 3.4 Diagram Block Perangkat Keras.....               | 42 |
| Gambar 3.5 Modul FEC-FC440 .....                            | 44 |
| Gambar 3.6 (a) Diagram Block Program Utama .....            | 45 |
| Gambar 3.6 (b) Diagram Block Program Utama... ..            | 46 |
| Gambar 3.7 Diagram Program Multitasking .....               | 50 |
| Gambar 3.8 Blok Diagram <i>Mixer</i> .....                  | 51 |
| Gambar 3.9 Tombol Pengendali .....                          | 52 |
| Gambar 3.10 Rangkaian Tombol Pengendali .....               | 53 |
| Gambar 3.11 Modul <i>Relay</i> Motor AC 1 Fasa .....        | 53 |
| Gambar 3.12 Modul <i>Relay</i> Motor DC .....               | 53 |
| Gambar 3.13 Diagram Alur Program Pada PLC .....             | 55 |
| Gambar 3.14 Diagram Alur Program Pembuatan Jenis Pelet..... | 57 |
| Gambar 3.15 Diagram Blok Program Pelet Kecil .....          | 59 |
| Gambar 3.16 Diagram Blok Program Pelet Sedang .....         | 60 |
| Gambar 3.17 Diagram Blok Program Pelet Besar .....          | 61 |
| Gambar 3.18 Tampak Mixer Bagian Atas .....                  | 62 |
| Gambar 3.19 Letak Motor AC Dan Gear Box .....               | 63 |
| Gambar 3.20 Motor Pendorong Satu Poros .....                | 64 |
| Gambar 3.21 Penambahan Gear Pada Motor Pendorong .....      | 64 |
| Gambar 3.22 Pisau Pemotong.....                             | 66 |
| Gambar 3.23 Motor Tiga Fasa Dan Inverter.....               | 66 |

|                                                                |    |
|----------------------------------------------------------------|----|
| Gambar 3.24 <i>Box</i> Kotroller.....                          | 66 |
| Gambar 3.25 Komponen Elektronika Relay.....                    | 68 |
| Gambar 4.1 Pemberitahuan Program Sukses Di Download.....       | 71 |
| Gambar 4.2 <i>Inverter</i> VF-S11 Dan Motor Tiga Fasa.....     | 73 |
| Gambar 4.3 Pengaturan Mode <i>Inverter</i> Toshiba VF-S11..... | 73 |
| Gambar 4.4 Rangkaian Relay Motor Satu Fasa.....                | 76 |
| Gambar 4.5 Rangkaian Relay Motor DC.....                       | 79 |
| Gambar 4.6 Hasil Akhir Percobaan Menggunakan Bahan.....        | 81 |



## DAFTAR GAMBAR

|                                                                  | Halaman |
|------------------------------------------------------------------|---------|
| Gambar 2.1 Diagram Block PLC .....                               | 10      |
| Gambar 2.2 Ladder Diagram .....                                  | 13      |
| Gambar 2.3 PLC FESTO FC-440 .....                                | 21      |
| Gambar 2.4 Hardware FEC Standart .....                           | 21      |
| Gambar 2.5 Hardware FEC Standart Dengan Ethernet .....           | 23      |
| Gambar 2.6 Tampilan FST .....                                    | 23      |
| Gambar 2.7 Beda Fasa Pada RST .....                              | 24      |
| Gambar 2.8 Structure Motor Tiga Phase .....                      | 24      |
| Gambar 2.9 Structure Star .....                                  | 25      |
| Gambar 2.10 Hubungan Structur Star Pada Motor Tiga Phase .....   | 25      |
| Gambar 2.11 Structure Delta .....                                | 26      |
| Gambar 2.12 Hubungan Structure Delta Pada Motor Tiga Phase ..... | 26      |
| Gambar 2.13 Rangkaian Pembalik Arah KeKanan .....                | 27      |
| Gambar 2.14 Rangkaian Pembalik Arah KeKiri .....                 | 27      |
| Gambar 2.15 Terminal Board .....                                 | 29      |
| Gambar 2.16 Mode Source .....                                    | 29      |
| Gambar 2.17 Mode Sink .....                                      | 30      |
| Gambar 2.18 Mode PLC .....                                       | 31      |
| Gambar 2.19 ( a ) Relay ( b ) Bagian Dalam Relay .....           | 35      |
| Gambar 2.20 Simbol Switch .....                                  | 36      |
| Gambar 2.21 Limit Switch .....                                   | 37      |

## Daftar Tabel

|                                                                     | Halaman |
|---------------------------------------------------------------------|---------|
| Tabel 1.1 Komposisi Ransum Dan Zat-Zat Makanan Dari Bahan Baku..... | 4       |
| Tabel 2.1 Perbedaan Dan Persamaan Counter/Timer .....               | 18      |
| Tabel 2.2 Perbedaan Antara CMP Dan CPM .....                        | 20      |
| Tabel 3.1 Fungsi Input Dan Output Pada Modul FEC-FC440.....         | 49      |

