



ديبلوم تطبيقات التحكم الأتوماتيكي في نظم القوى الميكانيكية

MEP 599 Diploma Design Project-Summer Term 2015/2016

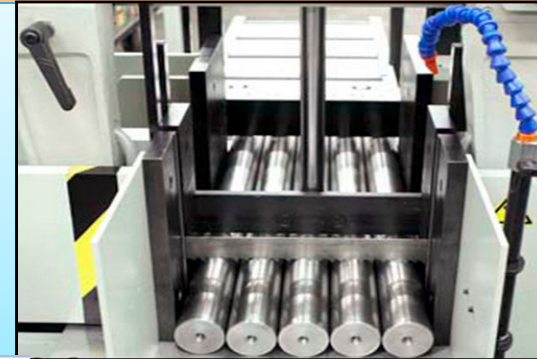
A Bundle Cutting Saw Machine Controlled by PLC

Eng. Mohamed Ibrahim Baiomy

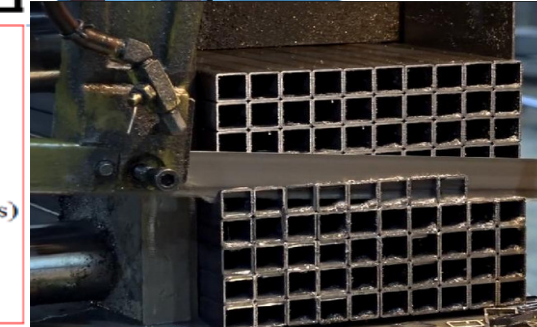
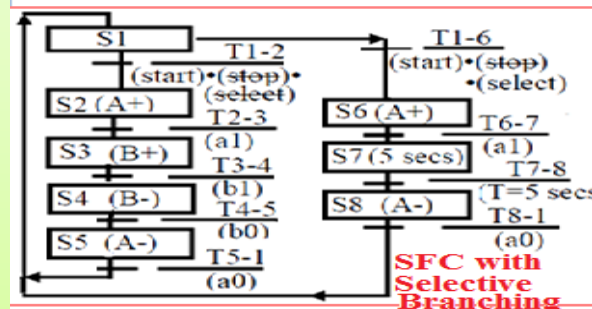
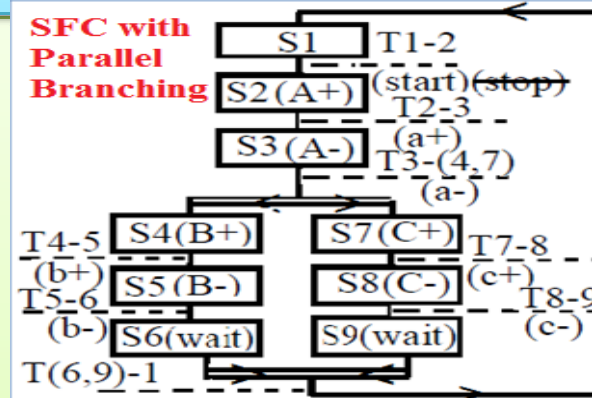
Supervised

Dr. Mohsen Sayed Soliman , ACC Manager and Dr. Amro Abdel Raouf, ACC Vice Manager
Mechanical Power Engineering Department

Abstract: main purpose of this project is to implement a PLC system along with required Ladder diag. to operate & control Bundle Cutting Saw Machine. Project includes detailed design & Simulation of cutting process presented by LAD diagram. Using PLC should produce accurate sequential bundle cutting system. The essence of any profitable & fully automated bundle sawing comprises 2 elements: high cutting performance & short downtimes. This performance should also be, safe, efficient & stable. The new, fully automated bundle cutting saws are designed for mass production sawing of solid materials, tubes, bars & to ensure a profile flow line. The easy operation & well thought out material handling should reduce the idle times & thus create the ideal conditions for highest efficiency.



PLC System Description: This Project does not specify type or model of a PLC device to be used in order to have a general design independent of any PLC or Hard-ware specifications. The design included determination of all required sequential steps for cutting & material cooling process. Many essential Sequential Flow Charts, SFCs, are also created. All transition conditions between different steps are specified. The design included description of all types & number of both Input sensors & switches and the Output actuators required for the fully-automated cutting and cooling process. The LAD diagrams are created using: i-TRiLOGI Soft ware (educational version). The I/O tables are generated and the various Networks of the LAD diagram are presented. After doing full diagnostics for final design LAD diagram, it was run on the PC. A complete simulation of the Run of the LAD diagram have been performed and presented in the project final Report.



Inputs:

- Saw motor tripped
- Saw ESR (emergency stop relays) healthy
- Saw motor start PB (push button)
- Saw motor stop PB (push button)
- Saw blade tension LS (limit switch)
- Saw motor running AUX(auxiliary relays)
- Coolant pump tripped
- Coolant pump select SW(switch)
- Coolant pump running AUX(auxiliary relays)
- Saw HYD(hydraulic) permit SW(switch)
- Saw lower push button
- Saw end cut LS (limit switch)

- Saw raise push button
- Saw top LS (limit switch)
- Saw hydraulic pump tripped
- Saw hydraulic pump running AUX
- Saw tension motor tripped
- Saw tension increase push button
- Saw tension decrease push button
- Saw tension pump AUX
- Saw clamp PB
- Saw unclamp PB
- Lamp test PB
- Saw HYD pump healthy
- West saw cut photo cell
- East saw cut photo cell

Components:

- PLC:
- Limit switches:
- Blade:
- Photo cells:
- Relays:
- Pump:
- Motor:
- Clamps:
- Solenoids:
- Timer:
- Push buttons:
- Switches:
- TRILOGI program (ladder diagram software):

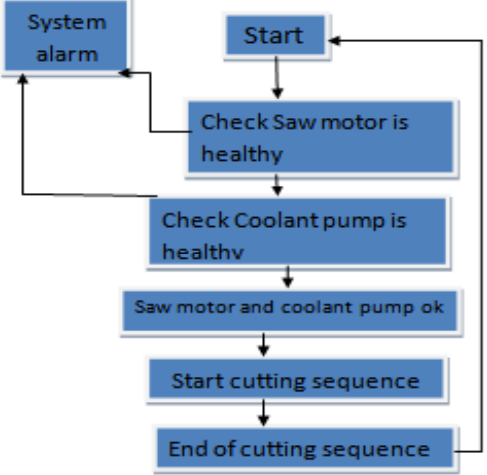


Outputs:

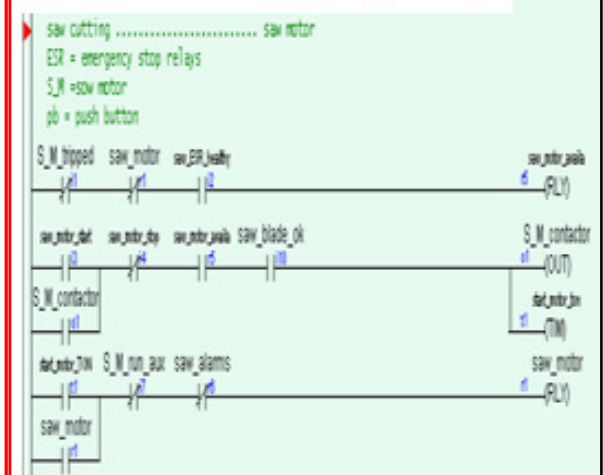
- Saw motor contactor
- Coolant pump contactor
- Saw lower fast
- Saw lower healthy
- Saw lower slow
- Saw hydraulic pump contactor
- tension pump contactor
- Saw tension increase
- Saw tension decrease
- Saw clamp solenoid
- Saw unclamp solenoid
- Saw INTlock healthy lamp
- Saw INTlock fault lamp
- Saw HYD pump healthy lamp
- Saw HYD pump running lamp

- Saw motor healthy desk lamp
- Saw motor INTlock healthy lamp
- coolant pump healthy lamp
- Saw HYD pump running lamp
- Saw at top desk lamp
- Saw raising desk lamp
- Saw lowering desk lamp
- End cut desk lamp
- Saw blade tension ok desk lamp
- Tension pump running desk lamp
- Bundle clamped desk lamp
- Bundle unclamped desk lamp
- Saw clamps limit switch
- Length short desk lamp
- Length correct desk lamp
- Length long desk lamp

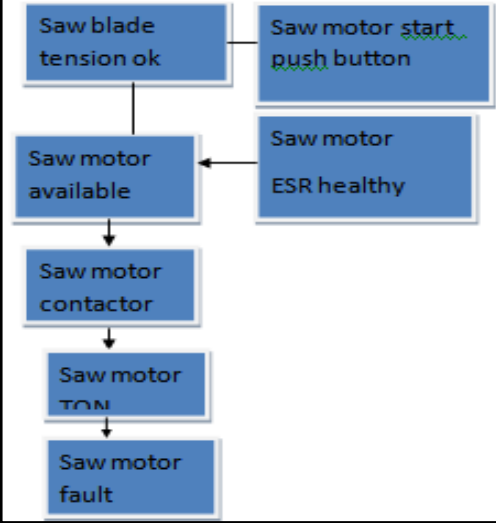
Bundle cutting saw flow chart:



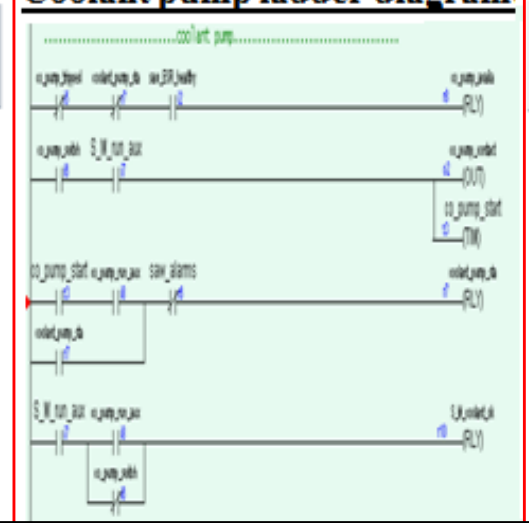
Saw motor ladder diagram:



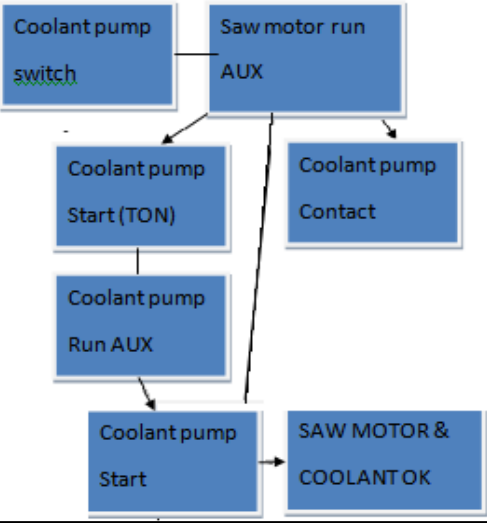
Saw motor sequential control



Coolant pump ladder diagram:



Coolant pump sequential control



Saw cutting sequence ladder diagram:

