Dedication

I dedicate this dissertation

To my family

To my teachers

To my colleagues

.To my friends

Acknowledgement

First and foremost thanks to Allah. Without his help and blessing I would not have been able to finish this work.

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Abstract

Investment in control systems has become an important factor in production increasing and cost reduction, this led to high competition between the companies of production for the development of control systems; PLC has become a widely used and essential in the field of industries such as chemicals, petrochemicals, sugar. Etc.

This project addresses the use of the PLC system in the stages of the sugar industry and in the Diesel Power Station (DPS) which is supplying the sugar factory by power source in terms of:

Move the crop of sugar cane to the factory, where the process of sugar cutting is the starting stage to prepare it for the grinding process which is called (Extraction) and then moves to the stage of hygiene through the removal by (Evaporation) followed by a process of Crystallization through boiling, and the last stage is the purification of sugar (Refining) in order to be ready for consumer use.

PLC controlled all these stages, the start of the process of transfer and cutting and grinding sugar, controlling the size of the pieces and mills speed and Synchronization, the temperature degree of boilers by sensors, the amount of water added through the valve, as well as generating alarms in case of emergency. In the case of The DPS, PLC controlled the speed of the engines as well as their starting and stopping, beside controlled the active and reactive power.

الأستثمار فى أنظمة التحكم أصبح عاملاً مهماً فى زيادة الأنتاج وخفض التصنيع و قد أدى هذا إلى خلق منافسة بين مؤسسات الأنتاج لتطوير أنظمة التحكم المختلفو قد أصبح نظام الPLC ذو استخدام واسع وأساسى فى مجال الصناعات مثل صناعة الكيماويات والبتروكيماويات وصناعة السكر ..الخ.

يتناول هذا المشروع أستخدام نظام الPLC فى مراحل صناعة السكر وفى محطة توليد الطاقة DPS الخاصة بأمداد المصنع بالكهرباء حيث :

يرحل محصول قصب السكر إلى المصنع، و من ثم تبدأ عملية تقطيعه إستعداداً لطحنه تسمى هذه العمليه بـ Extraction ثم ينتقل إلى مرحلة النظافه عن طريق الأزالة بالتبخير Evaporation تلى ذلك عملية البلوره عن طريق الغليان وأخر مرحله هى تنقية السكر Refining حتى يكون جاهز لأستخدام المستهلك.

نجد أن ال PLC يتحكم فى كل هذه المراحل بدءً من عملية نقل وتقطيع وطحن السكر حيث يتحكم فى حجم القطع و فى سرعة الطواحين وتزامنها وكذلك فى درجة الغلايات Boiler عن طريق الحساسات Sensors وأيضاً فى كمية المياه المضافه عن طريق الصمامات Valves وكذلك يطلق أشارات تحذير من أجهزة الأنذار Alarms فى حالات الطوارئ. أما فى محطة الطاقة DPS فيتحكم فى سرعة المولد وكذلك فى عمليات التشغيل والتوقيف،و التحكم فى القدره الفعاله والغير فعاله .

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List of Symbols and Abbreviations

PLC	Programmable Logical Controller
CPU	Central Processing Unit
LED	Light Emitting Diode
RAM	Random Access Memory
ROM	Read Only Memory
EPROM	Erasable Programmable Read Only Memory
EEPROM	Electronically Erasable Programmable Read Only Memory
I\O	Input\Output
AC	Alternative Current
RMS	Root Mean Square
DC	Direct Current

OSR	One Shot Relay
L	Latch
U	Unlatch
IOT	Immediate Output
SFCs	Sequential Function Charts
DPS	Diesel Power Station
RTD	Resistance Temperature Detector
USB	Universal Serial Bus
CAC	Charge Air Cooler
AVR	Automatic Voltage Regulator
PID	Proportional Integral Derivative
VRF	Volumetric Rotary Feeder
SCRC	Shredded Cane Rake Carrier
SCR	Shredded Cane Rake
TCH	Country code
TCD	Country code
BC	Belt Conveyor
SCC	Side Cane Carrier
RPM	Revolution Per Minute
G	Generator
C	Capacitor