

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

٢٠ وَعَلِمَ إِدَمَ الْأَسْمَاءَ كُلَّهَا ثُمَّ عَرَضَهُمْ عَلَى الْمَلَائِكَةِ
فَقَالَ أَنِّي شُوِّنِي بِاسْمَاءٍ هَوَّلَاءِ إِنْ كُنْتُمْ صَدِيقِنَ ٢١
سُبْحَنَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ
٢٢ قَالَ يَقْعَدُمُ أَنِّي شُوِّنِي بِاسْمَاءِهِمْ فَلَمَّا أَنْبَأَهُمُ بِاسْمَاءِهِمْ قَالَ
أَلَمْ أَفْلَ لَكُمْ إِنِّي أَغْلَمُ غَيْبَ السَّمَاوَاتِ وَالْأَرْضِ وَأَعْلَمُ مَا
تُبَدِّلُونَ وَمَا كُنْتُمْ تَكْنُونُ ٢٣

صَدَقَ اللَّهُ الْعَظِيمُ

Dedication

To...

The Soul of My Father

My Mother

My Brothers

My small family

My Friends

Acknowledgment

Firstly, I would like to praise to Allah who gave me health, strength and patience to fulfill this work.

*Secondly, there are many people who I want to thank for the encouragement and support, **USTAZ/Abdallah Salih** as my teacher and advisor; he has been of great help. My project would not be what it is without him.*

I am indebted to: Prof. Shamboul, Prof. Saad, Dr. Eisa, Dr. Ahmed Khalied and Dr. Ahmed Imam. Your teaching certainly will never be forgotten, and I will apply the knowledge I learned from you.

Finally, I would like to thank my colleges Mustafa, Omer and Mohamed. Words cannot describe how grateful I am to these three for all the support they have provided me since I started my graduate study.

Abstract

The turbine protection system protects the turbine from over speeding, monitors all critical turbine parameters, and trips the turbine if a condition exists that could cause equipment damage.

The aim of this research is to use Programmable Logic Controller to protect steam turbines with capacity of 30 Mega watts in Khartoum North Power Station by using Siemens S7-300 controller,

The existing turbine protection circuit consists of relays, contactors and resistor, and it operates more than 25 years. it has Only one common alarm for turbine trip, the alarm not define which circuits is tripped and which condition is occurring .This lead the maintenance and the troubleshooting of the circuit takes long time to define the cause of the trip signal and Also there is lack of spare parts.

The existing trip signals are condenser water level extra high, condenser vacuum low, lubrication oil to bearing pressure low and electrical trip signal from generator protection this signal are digital signal.

Additional analog signal added using the existing signal for turbine over speed, lube oil bearing temperature, bearing vibration and generator winding temperature.

The software was written for Siemens S7 300 PLC using ladder logic language. And it consist an alarm for turbine trip and another one to define which signal cause the trip. Then it simulated by PLCsim.

نظام حماية التوربينه يحمي التوربينه من السرعه العاليه ,ويرا قب كل الحالات
الحرجه ويو قف التوربينه اذا كان حاله تؤدي الي تلف المعده.

إن الهدف من البحث هو استخدام التحكم المنطقي المبرمج لحماية توربينات
بخارية بسعه 30ميجاواط في محطة بحري الحرارية, باستخدام متحكمات شركة سيمنز S7
300.

دائرة الحماية الحالية تتكون من المراحلات واللامسات والمقاومات وهي تعمل
لأكثر من 25 عام. وتوجد بها إشارة إنذار وحيد توضح إن التوربينه تو قفت عن العمل
ولكنها لا توضح سبب التوقف. وهذا يؤدي إلى ان الصيانة وتحديد الاعطال للدائرة يأخذ
وقت طويل لتحديد السبب, وأيضا هناك شح في قطع الغيار.

إشارات الحماية الحالية تتمثل في مستوى الماء في المكثف عالي جدا, انخفاض
ضغط المكثف, وانخفاض ضغط الزيت في الحوامل وإشارة عند فصل المولد. وهي إشارات
رقميه.

تمت الاستفادة من بعض الإشارات التماضية الموجودة لزيادة الحماية للعده
والإشارات هي السرعة العالية التوربينه, درجة حرارة الزيت في الحوامل, الا هتزازات في
الحوامل ودرجة حرارة الأوجه في المولد.

تمت كتابه برنامج بلغه السلم لمتحكمات شركة سيمنز 300 S7. وبه إشارات
توضح إن التوربينه تو قفت عن العمل وسبب تو قفها. ومن ثم تمت تجربه محاكاة
الدائرة.

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