

DEDICATION

I would like to thank my parents and my family for unconditional support with my studies and for giving me a chance to prove and improve myself through all my walks of my life

ACKNOWLEDGEMENTS

I would like to express my sincere thanks, with deep sense of gratitude to my Supervisor **Dr. Tawfig Ahmed Gamal EL-din** for his guidance and supervision during this research.

I am eternally grateful to SUDANEES THERMAL POWER GENERATION CO (STPG) for providing us the opportunity and infrastructure to carry out research in a scientific engineering manner.

I am very thankful to all the Engineers of Khartoum North Power Station (KNPS), for their keen interests the research.

My thankful extended to all visible and invisible hands which helped me to complete this research with a feeling of success

ABSTRACT

Boilers of Dr.Shareif Power Station suffer a power loss by radiation and convection.

The objectives of this research to improve boiler efficiency by reducing heat losses due to radiation and convection.

The methodology of this research by collecting data from Khartoum North Power Station and Calculate boiler heat losses throw thermal insulation and calculate optimum insulation thickness. Calculate pay back if we repair the boiler thermal insulation.

To study the problems of power losses, a thermal camera was used to locate and spots of heat radiation in the boiler. The heat losses were estimated to be 250kw which cost 112935 SDG per year. This work will assist in determining what is needed when on over hall maintenance in terms of location and insulation type and thickness. In this case heat losses by radiation were 62905 W and by convection were 19806 W. 32 cm is the thickest insulation that will pay for

itself in one year. Using infrared thermal camera is the optimum method for studying heat losses from boilers side wall.

مستخلص

غلايات محطة د/ شريف الحرارية تعاني من فقدان فى القدرة بواسطة الاشعاع والحمل .

اهداف هذا البحث هي تحسين كفاءة الغلايات عن طريق الحد من فقدان الحرارة بسبب الإشعاع والحمل الحراري .

منهجية هذا البحث من خلال جمع البيانات من محطة د/ شريف الحرارية وحسب الفقدان الحراري في الغلاية خلال العزل الحراري وحسب حساب السطوح المثلثية للعزل وحسب بتسديد إذا كنا إصلاح العزل الحراري بالمرجل .

لدراسة مشكلة فقدان القدرة ، استخدمت الكاميرا الحرارية لتحديد مناطق نقاط فقدان القدرة فى الغلاية . فقدان القدرة قدر بـ 250 كيلو واط والذي يكلف 112,935SDG فى العام .

هذا البحث يساعد فى تقدير الاحتياجات فى فترة الصيانة السنوية وتحديد المناطق التى تحتاج لعالجة العزل الحراري فيها . في هذه الحالة كانت الخسائر الحرارية عن طريق الإشعاع 62905 W وكانت عن طريق الحمل الحراري 19806 W. 32 سم هو سمك العازل الذي يستخدم فى وحدة تكلفة استخدامه . استخدمت الكاميرا الحرارية تحت الحمراء هو الأسلوب الأمثل لدراسة الفقدان فى حرارة الغلايات .

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NOMENCLATURE

Subscripts

Symbol Term

MCR	Maximum continuous rating
Re	Reserve Feed Tank
WRB	radiation power for real body
Nu	nusselt number
Pr	prantl number
K	thermal conductivity
V	air velocity
L	length
A	surface area
h	convection coefficient
Th	insulation thickness
CV	fuel calorific value
KNPS	Khartoum North Power Station
σ	Stefan Boltzmann's Constant
ε	Body emissivity
	Surface temperature K (Kelvin)
	Ambient temperature K (Kelvin)
	film temperature
	Kinematic viscosity