Abstract

A study of combustion process in Khartoum North Steam Power Plant.

Improving the efficiency of burners and furnaces is one of the key issues for reducing fuel consumption and thus also pollutant gas emissions. Even small improvements in burner energy efficiency and performance can have significant impacts in a continuous operation. For optimizing burner efficiency of Khartoum North Power Station (KNPS) investigation of atomization mixing process was carried out by using Fluent CFD code. The results in steam and heavy fuel oil pressures were found to be 13.2 bars for heavy fuel oil and 8.4 bar for steam, in stead of 10 bar for heavy fuel oil and 8.5 bar for steam. The problems of emission reduction in gaseous of pollutants, particularly of CO, NOₓ and SO₂ are definite necessity because of permanent intensification of combustion process and rigorous environmental protection principles. This forces to develop new methods of combustion technologies and burners construction in order to reduce the pollutant emissions. The results indicate that significant NOₓ reduction can be obtained through spray steam at post combustion with flue gas recirculation to produce low flame temperature and dissolving NO and SO₂. The resulting steam injection is reduces both thermal and fuel NOₓ production. These results indicate the effectiveness of NOₓ reduction techniques is directly linked to the amount of injected steam rate and the quality of the fuel. Reductions in NOₓ of up to 85% can be obtained simply through controlled use of steam injection. The variations in fuel characteristics such as viscosity, distillation curve, carbon residue, and ash composition limits the potential emissions reduction and maintain stable combustion.
الملخص

دراسة اجراء الاحتراق بمحطة بحري البخاري

تحسين كفاءة المحارق وغمغمة الاحتراق للغلايات واحدة من القضايا الرئيسية للحد من استهلاك الوقود وبالتالي من انبعاثات الغازات الملوثة. بالنسبة للمحرق التحسينات الصغيرة في كفاءة استخدام الطاقة والأداء يمكن أن تكون لها تأثيرات هامة بالأخص إذا كان المحرك يعمل باستمرار كمحارق الغلايات. لتحسين كفاءة المحارق العاملة بمحطة الخرطوم بحري البخاري تم التحقيق في عملية الانحلال لزيت الوقود الثقيل بواسطة الخلط بين زيت الوقود الثقيل والبخار وذلك باستخدام برنامج الحاسوب (CFD) للوصول لضغط مثالي للخلط. النتائج التي تم الحصول عليها بار لزيت الوقود الثقيل 13.2 بار لزيت الوقود الثقيل و8.4 بار للبخار بدلاً من الضغوط المستخدمة بالمحطه وهي 10 بار لزيت الوقود الثقيل و8.5 بار للبخار.

المشاكل الناتجة من تقليل انبعاثات الغازية الملوثة للبيئة الناتجة من عمليات الاحتراق وخصوصاً أول ايسيك الكربون و ايسيك النايتروجين بالإضافة الى ثاني ايسيك الكبريت حتى تصبح ملائمة للنسب المحدد وملائمة للمبادئ الصارمة لحماية البيئة ادى الى الدفع بقوه الى استخدام تكنولوجيا حديثه للاحتراق و تصاميم للمحارق من اجل الحد من الانبعاثات الملوثة. وتشير النتائج الى ان مهمة الحد من ايسيك النايتروجين يمكن الحصول عليها عن طريق رش بخار الماء في الغازات قبل خروجها الى الهواء ومن ثم استخدام جزء من الخليط واعداده مع هواء الاحتراق. هذه الطريقة
ادت إلى انخفاض درجة حرارة اللهب مما أدى إلى انخفاض
اكسيد النيتروجين المكونه حرارياً والمكونه من
النيتروجين المصاحب للوقود و ازابة اول اكسيد الربون و
ثاني اكسيد الكبريت.
وتشير النتائج إلى فعالية تقنيّة حقن البخار في خفض
اكسيد النيتروجين و ارتباطها مباشرة بقدرة و معدل حقن
البخار بالإضافة إلى نوعية الوقود المستخدم . اعتر الـ
الطريقه إلى تخفیض أكسيدي النيتروجين بنسبة تصل إلى 85
% يمكن الحصول عليها بكل بساطة من خلال الاستخدام الحكيم
لحقيق البخار.
التياثين في خصائص الوقود مثل اللوزجة ، منحنى التقطير
والمخلفات ، وتكوين الرماد تمكن من خفض الانبعاثات
والحفاظ على استقرار الاحتراق.
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Without even one of you, this paper would not have been possible.

Before and after all thanks to ALLAH for every things.
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<td>ABMA</td>
<td>American Boiler Manufacturers Association</td>
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<tr>
<td>AEL</td>
<td>Alternative Emission Limit</td>
</tr>
<tr>
<td>ASME</td>
<td>American Society of Mechanical Engineers</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
</tr>
<tr>
<td>BOOS</td>
<td>Burners out of service</td>
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