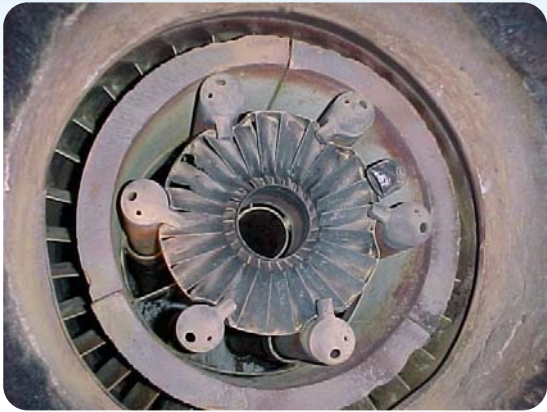


Case Study

Boiler Assessment

BMA carried out a study on a tangentially-fired boiler consisting of eight burners arranged on two levels, firing natural gas or fuel oil. The maximum boiler load was 140,000 kg/hr of steam, and the minimum load reached was 27,000 kg/hr. When the load was reduced below this value, control became very difficult. The risk of losing the burners and causing a boiler shutdown increased. Furthermore, the residual oxygen levels at low loads were very high. The desired operation range was 10,000 kg/hr to 100,000 kg/hr.



BMA observed several factors limiting the minimum stable load. The bad combustion air distribution in the burners caused the shutdown of some of them, increased the formation of unburned compounds, CO emissions, and particulate matter. The aerodynamic configuration of the burners (nozzles, injector, and air cross-sectional area) led to excessively low injection velocities. This affected the quality of mixing and the flame stability, and allowed for excessive pollutant generation. Some components on the oil and gas piping were found to be oversized. Last, it was observed that the water and steam flow meters were inaccurate and caused reading errors, making the instantaneous efficiency calculations erroneous.

In order to reach the desired operation or load range, modifications had to be made to the oil and gas injectors, as well as to the combustion air cross-sectional area. BMA recommended the modification of the four burners on the top level in order to reduce their load. These burners were modified to operate between 10,000 and 40,000 kg/hr. The burners on the lower level remained unchanged so that the simultaneous use of all burners would allow the total load to reach 100,000 kg/hr.



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Case Study

Boiler Assessment

The modifications recommended by BMA consisted in replacing the atomizing systems of the upper burners by cutting them from the existing oil guns and installing new atomizing systems while taking care of minimizing the impact on existing equipment. Also, the injection surface of the oil and gas injectors was modified. The combustion air cross-sectional area was reduced and optimized in order to increase the air and fuel velocities while respecting the limiting factor, which was the available pressure at the fan.



The modifications made to the oil guns ensured a stable combustion on the four burners at low loads. These four modified burners were able to operate in a range of load from 10,000 to 40,000 kg/hr of steam, as mentioned above.

Following the final report, the recommendations brought forward by BMA were implemented and allowed the plant to reach the desired operation range with success.



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