ADVANCEMENTS IN GRATE COOLING TECHNOLOGY

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ABSTRACT

Over the last few years an increase in the calorific value of the waste has been observed at our waste-to-energy facilities. Wheelabrator Technologies, Inc. in conjunction with Von Roll/Inova decided to install a zone of water-cooled grate blocks at the Millbury Massachusetts waste-to-energy facility as a pilot program. Common in Europe these water-cooled grate blocks address the issue of higher BTU waste and increase the overall life expectancy of the blocks compared to regular air-cooled grate blocks. This technical paper provides an overview on the installation, operation, and maintenance of a zone of water-cooled grate blocks. Discussed are the procedures for evaluating the overall project and some of the challenges we resolved.

INTRODUCTION

As a company Wheelabrator Technologies, Inc. (Wheelabrator) spends roughly 9% of its overall maintenance budget on combustion grates. Always on the lookout for ways to reduce expenditures and improve performance Wheelabrator paired with Von Roll/Inova, the original manufacturer of Wheelabrator’s grates, to install and perform tests on a zone of water-cooled grate blocks in our Millbury, Massachusetts facility. Common in Europe, water-cooled grate blocks have been installed at 25 plants in 39 boilers.

Chosen for its excellent operating statistics and motivated personnel, Millbury proved to be the right location for such an endeavor. The Millbury Waste-to-Energy (WTE) Facility (Millbury) consists of two 750 ton per day (tpd) mass burn boilers. In February of 2007 Wheelabrator personnel with assistance from Von Roll installed water-cooled grate blocks in zone #3 of one boiler.

VON ROLL WATER-COOLED GRATE BLOCK DESIGN

Von Roll first began offering their water-cooled Aquaroll® in 1994. Water-cooled grate blocks address the issue of an increase in the calorific value of the waste over the years and the subsequent increase in wear and resultant maintenance costs. Wheelabrator and Von Roll believe this increase in calorific value is due in part to recycling trends which preferentially remove high density, low calorific materials from the waste stream versus high calorific materials. When comparing life expectancy of air-cooled grate blocks versus water-cooled, Von Roll’s experience has shown that after 16,000 operating hours, 25% of air-cooled grate blocks will have to be replaced versus none of the water-cooled. An added benefit of the water-cooled grate blocks is that the under-grate air can be redistributed within the furnace to improve combustion. Whereas, air-cooled grate blocks this redistribution is not possible since air controls combustion and acts as the cooling medium for the grate blocks.

Von Roll currently offers several types of water-cooled grate blocks in Europe which are successfully operating in numerous facilities. The Type IIa water-cooled grate block is a casting with cooling water channels cast into it with welded block cooling water connections. The Type IIIa water-cooled grate block is a solid casting, made of a similar alloy as the air-cooled grate blocks, with embedded tubing in the interior of the casting. Wheelabrator decided to install the Type IIIa water-cooled grate blocks at Millbury because they could be run without water should a leak develop, and the modified piping connections seemed more reliable.