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## **Using Infrared Cameras, Fuzzy Logic and Acoustic Temperature Measurement to Improve Combustion in MWCs**

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### **ABSTRACT**

A significant step for the improvement of firing rate and combustion control is the use of infrared thermography. Such a system has been successfully applied by L. & C Steinmüller GmbH (Steinmüller) a long period of time at the Stapelfeld municipal waste combustor (MWC) located in Germany.

A camera installed on the boiler top casing supplies instantaneous information on the combustion conditions on the grate. In the event of undesired changes in firing position or firing length, countermeasures may be instituted immediately. A control system based on fuzzy logic, divided into several stage each of which includes a short-term and a long-term strategy, has been developed for this purpose. This system reduces fluctuations during combustion to an unavoidable minimum.

The acoustic temperature measurement system installed in the first pass of the boiler provides valuable information about the temperature distribution in the zone. This allows the control room operator to adjust the distribution of secondary air to the front and rear row of nozzles so that uniform temperature and flow distribution are maintained at all times.

Both installations allow the firing system to operate at more optimized conditions which results in such positive effects as reduced emissions and increased steam production.

### **INTRODUCTION**

Today there is no doubt that waste should be avoided wherever possible and that recycling should be established wherever feasible. Despite these measures, there are still considerable quantities of waste that have greatly varying combustion properties and, in some cases, high loads of pollutants.