

COMPARATIVE STUDY OF TWO COGENERATION SYSTEMS BASED ON ENERGY RECOVERY OF FUMES FROM A CASTING PROCESS

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Abstract

This paper develops the comparison of two cogeneration systems that are suitable to perform heat energy recovery of the smoke produced by a casting process.

Introduction

The industry sector has great potential in taking advantage of fumes from waste heat in order to produce heat and power, and thereby to provide dramatic cost, energy, economic and environmental benefits.

Case Studies

The case studies are intended to recover energy from smoke from a foundry cupola. These fumes have an average flow of 17,000 Nm³/h at 620°C.

The study considers two alternatives for the main cogeneration system.

- Alternative N^o 1 considers the installation of modules FREE POWER FP120. It is a system producing electricity and hot water. It is a compact equipment which includes the main elements of a cogeneration system (turbine, generator, condenser, ...) and is capable of providing 130 kW of electrical power and 612 kW heat at 65°C.

- Alternative N^o 2 considers the design of a classical plant with steam turbine and all other necessary components. This option has a higher flexibility and versatility in terms of installed capacity and heating water temperature.

Energy analysis

The power available depends on the flow and on the change of temperature obtained from the fumes. This is approximately 3,000 kW.

Economics analysis

The economic analysis focused on:

- To get the cost of equipment and facilities of the two alternatives.
- To obtain the necessary investment in order to implement each one of the alternatives
- To get the incomes of each alternative

Additionally, it performs the technical and the economic analysis of each one of the alternatives.

Conclusions

The paper will develop the results obtained in electricity and heat generation of the two cogeneration systems based on waste fumes from an industrial process.

A comparison of the equipments from the functional, energy and economical points of view will be carried out.

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