



Visvesvaraya Technological University
BELGAUM, KARNATAKA

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ಬೆಳಗಾವಿ, ಕರ್ನಾಟಕ

A PROJECT REPORT ON

MULTI-CRITERIA DECISION MAKING USING ANALYTIC HIERARCHY PROCESS IN THE MAINTENANCE OF INDUCTION FURNACE

Submitted to Visvesvaraya Technological University in partial fulfillment of
the requirement for the award of Bachelor of Engineering degree in
Mechanical

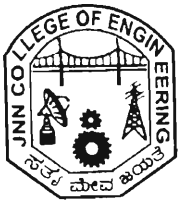
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ABSTRACT

In many situations engineers are required to take best decision among the multiple alternatives. The decision making process will be carried out by several techniques or tools like Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), Goal Programming (GP) etc. This work is based on AHP. This technique takes account of all the criteria which plays an important role in overall realistic decision.

AHP is a powerful and flexible decision making tool to help people set priorities and make the best decision when both qualitative and quantitative aspects of a decision need to be considered. AHP allows users to assess the relative weight of multiple criteria (multiple alternatives against a given criteria) in intuitive manner. Its major innovation was the introduction of pair wise comparisons. Pair wise comparison is a method that is formed by research showing that when quantitative ratings are unavailable and also, humans are good at recognizing whether one criterion is more important than another. Dr Thomas.L. Saaty, the inventor of the AHP, established a consistent way of converting such pair wise comparisons (X is more important than Y) into a set of numbers representing the relative priority of each of the criteria. For this intensity of important scale is considered.

AHP is a good substitute for mass inspection which is redundant. Thereby it reduces the cost of maintenance and thus proves to be an efficient tool.

This work is based on the use of AHP for the maintenance of Induction furnace. Here an attempt is made to prioritize the Induction furnaces using AHP and the one with the highest priority is taken for maintenance leaving behind all other furnaces. Thereby it avoids the inspection of those furnaces which are in good condition and thus reduces the inspection cost and time.

This work is carried out in Pearlite Liners Pvt. Ltd, Shivamogga, where four furnaces with six crucibles are being used for the melting purpose. These furnaces are named as K, J, B-C, M-L. Since M-L is different in its construction and usage, it has been obviated in our work for convenience. Remaining three furnaces are taken for study and AHP is applied to find out that furnace which has to be taken for maintenance first. The decisions are based on the expert elicitation. On the basis of current analysis, we have obtained furnace B-C is the one which has the highest priority and is decided to be taken for maintenance.

Presently in industry two furnaces at a time are being used till it breaks down. In the mean time the other furnaces are kept ready and are used when required. But when the demand is high and there is a need of using all the four furnaces simultaneously, this tool proves to be an efficient way of finding out that furnace which needs to be serviced.

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KEYWORDS: *Prioritization, Furnaces, Analytic Hierarchy Process, Multi-Criteria Decision Making, pair-wise comparison, judgement matrix, expert elicitation.*