USING FUZZY LOGIC SYSTEM TO OPTIMIZE MEASURING POROSITY BY AERODYNAMICS SENSOR

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ABSTRACT

Porosity is a measure of the void spaces in a material and is a fraction of the volume voids over the total volume, between 0 and 1, or as a percentage between 0% and 100%. Many methods have been developed for determining porosity. Most of the methods developed have been designed for small samples, it is the need to determine the bulk volume, pore volume and the volume of its solid matrix for the sample. The direct and indirect methods are based on volume determination and measuring of some properties of the void space respectively.

In this paper an aerodynamic sensor related to the indirect determination porosity method was designed to measure in-process grinding wheel porosity. The fuzzy logic control system was used to optimize the best design and dimensions for best transducer reception out of the porosity variations. A computational fluid dynamic package used to design the sensor parameters, and to simulate different pores wall to be measured. An experiment made with different porosity levels grinding wheels to validate the theoretical method. The results provide the ability of the sensor to detect wall porosity up to 0.05 %, also. Composites mesh, sponges, rocks and other pores surfaces can be future research candidates.

KEYWORDS: Measuring Porosity, CFD, Fuzzy Logic Control System & Aerodynamic Sensor

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