

## Frequency Adjustment in Ultrasonic Tomography System with a Metal Pipe Conveyor

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The application of ultrasonic tomography systems for producing cross-sectional images of objects by a noninvasive method plays a dominant role in industry, especially in the oil industry. Since finding the appropriate ultrasonic sensor is the main step in designing an ultrasonic tomography system, determination of the properties of the ultrasonic sensor is very important. In this paper, the manner of ultrasonic wave propagation in various regions and its dependence on frequency are investigated. A finite element software (COMSOL Multiphysics 3.5) is used for visualizing the practical module in a virtual environment to describe the physical interaction inside a metal pipe. Since the transmission mode of an ultrasonic wave is significant in accordance with the data being carried, a frequency should be chosen in which the straight path wave is improved and other propagation modes such as a surface wave on the wall of a metal pipe are attenuated. A frequency of 40 kHz is extracted as the resonance frequency of a desired ultrasonic sensor owing to the simulation results. This claim is proved by the practical testing that is presented in this paper.

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