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Ultrasonic Wall Thickness Monitoring at High Temperatures (>500°C)

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Corrosion and erosion shorten the life of components that are used in the petrochemical industry. In order to mitigate the safety and financial risks posed by the degradation mechanisms, plant operators monitor wall thicknesses at regular inspection intervals. In high temperature locations inspections have to be carried out at plant shut downs because conventional ultrasonic sensors cannot withstand the high operating temperatures. The authors have developed a waveguide based high temperature thickness gauge for monitoring of wall thicknesses in high temperature areas. The waveguide allows the use of conventional transduction systems (max temp. 60°C) at one end and guides ultrasonic waves into the high temperature region where the inspection is to be carried out. Slender stainless steel waveguides allow a temperature drop of ~500-600°C per 200mm length to be sustained simply by natural convection cooling. This paper describes the technical challenges that had to be overcome (dispersion and source/receiver characteristics) in order to implement this "acoustic cable". A commercial system for wireless corrosion monitoring based on the technology is now available. Experimental results of thickness measurements on components of different thickness, furnace tests at different temperatures and accelerated corrosion tests are presented as well as data from sensors that have been installed in petrochemical plants. In addition to this it is demonstrated how trending and multiple repeat measurements allow extraction of more information from the measured data.

Ключевые слова:

Содержание.

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