

Ultrasonic-based Monitoring System Capable of Measuring Thickness, Poisson's Ratio and Elastic Modulus at High Temperatures

Sung Sik Lee¹, Seongtae Yoo², Hyeong Deok Lee³, Byung Sik Moon⁴

¹R &D department, Safetech co., ltd, Republic of Korea, ¹R&D department, Safetech co., ltd., Republic of Korea, ¹R&D department, Safetech co., ltd., Republic of Korea, ¹R&D department, Safetech Co., Ltd., Republic of Korea

As domestic plant facilities are aging, securing the reliability of industrial facilities is becoming an important goal in the plant industry. Therefore, periodic non-destructive tests are being conducted for the maintenance and repair of aging facilities, but in recent years, the tendency to avoid 3D tasks has grown and social criticism of outsourcing risks is increasing, so traditional NDTs that directly deploy inspectors to dangerous areas are also facing great challenges. To overcome this problem, a corrosion monitoring system based on a multi-channel ultrasonic sensor that can be installed at high temperatures has been developed. The thickness can be measured periodically with 4-16 ultrasonic probes attached to the facility, and the collected data is transmitted wirelessly to the server computer, allowing the administrator to check the corrosion status of major facilities in real time based on the web. The ultrasonic transducer operates stably at high temperatures of up to 550°C and can measure longitudinal and transverse wave velocities, so it is possible to monitor the Poisson ratio and elastic modulus of metal facilities exposed to high temperatures for a long time. The developed system will be used to monitor corrosion of facilities that are difficult for humans to easily access, which will help improve the reliability of facilities and the safety of industrial sites.