

Piping Erosion Diagnosis System “Scan-WALKER™”†

1. Introduction

JFE Mechanical performs erosion diagnosis, mainly of overhead piping, at steel works of JFE Steel using “Scan-WALKER™,” which was developed by JFE Steel, and has achieved important results, including prevention of gas leaks, etc. and fulfillment of the company’s social responsibility to prevent environmental disasters.

This report introduces an erosion diagnosis technology using “Scan-WALKER™” in diagnosis of the side plates of oil tanks.

2. Development of Erosion Diagnosis Technology for Side Plates of Oil Tanks, Etc.

To enable measurement of the side plates of oil tanks, it is necessary to expand the plate thickness measurement range from 12 mm, which is possible with the existing technology, to 20 mm.

2.1 Development of New Sensor

Detection up to a maximum plate thickness of 24 mm was made possible by a development process in which the optimum range of the distance between electrodes, measurement frequency, and excitation voltage were obtained (Fig. 1).

2.2 Development of New Type Self-Traveling Device

As conditions, it was necessary to secure high speed travel corresponding to the large scale and increased weight of the new sensor, and to prevent the device from

becoming detached and falling from the tank. Therefore, development was carried out on three points: (1) large-scale frame, (2) doubling of motor torque, and (3) large-scale wheels (increase from 46 mm in dia. to 62 mm in dia.; wheels use neodymium magnets).

3. Example of Application of New Type “Scan-WALKER™” to Oil Tank

This development enabled stable data collection without problems, including weld beads of approximately 5 mm in the horizontal direction, under conditions of scanning in the tank vertical direction and paint peeling (Photos 1–3).

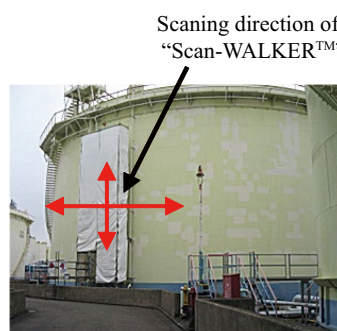


Photo 1 Oil tank

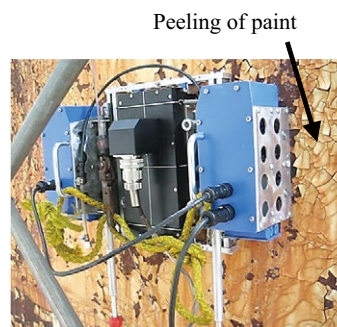


Photo 2 Scanning to the vertical direction

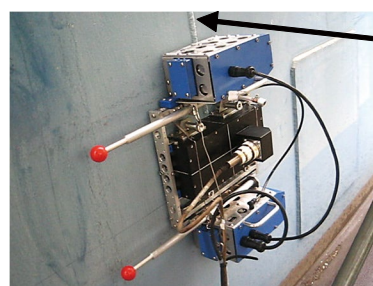


Photo 3 Scanning to the horizontal direction

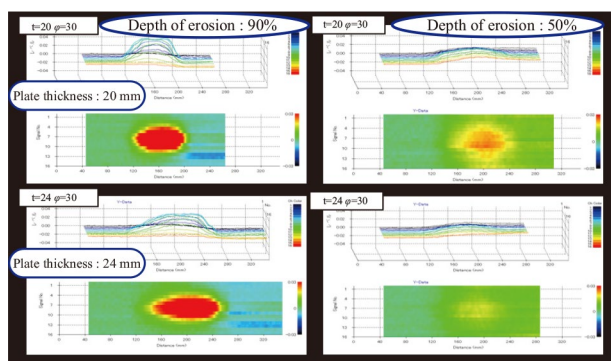


Fig. 1 Inspection result of test piece

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4. Conclusion

In addition to the introduction presented in this report, the plate remaining thickness estimation logic was also improved in this development, and estimation accuracy was improved from $\pm 20\%$ to $\pm 10\%$. At present, development of a wireless device (remote operation) is in progress.

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