COMPARISON OF RESULTS FROM IN-LINE INSPECTION WITH NCMMM TESTING ON BURIED GAS PIPELINES

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Abstract:
In contribution are presented results of internal inspection of buried pipeline of gas pipe DN1000. After evaluation of registered data there were determined few location for following inspection by non-contact MMM method (NCMMM). At those locations, non-contact MMM method (NCMMM) was applied. The obtained results confirmed anomalies of MMM signals. By comparison of anomalies from both inspecton techniques, it was recommended not to make the excavations and local inspection. Special case was evaluated during combination of in-line inspection and NCMMM inspection and excavation was recommended. Localized area of anomaly was inspected by contact MMM inspection and other NDT techniques and corrosion damage on outer surface was confirmed under insulation.

1. Introduction
Lifetime assessment of gas, oil, and other pipeline systems is very important especially with respect to the existing as well as developing defects in the pipes during their long-term use. The aim of the measurement was to find possible places with increased concentration of stress, which would correspond to the occurrence of defects on the pipeline. The inspected pipeline, DN1000 in West Bohemia, is one of the 3 main gas pipelines going from the East to the West Europe in the area of Czech territory. In total, 6 places were inspected by both NCMMM and contact MMM measurement. Those areas were chosen by previous indications received from the regular inner inspection. GPS device was used for location of the area of measurement.

2. Methods
Application of the MMM method
The method of magnetic metal memory of the material was applied by using a TSC-7M-16 measuring system to find the anomalies in the stress concentration zones (SCZs) to be recorded and localized in combination with a Type-11 probe, designed for contactless diagnosis of buried pipes. This measuring system records the signals by means of probes either in the time domain or in combination with a wheel for measuring the length run. Signals were recorded along the pipe length every 4 mm, guaranteeing a sufficient sensitivity of measurement at each site of the material.
3. Results

On base of results of in-line inspection it was decided to excavate few areas to inspect closely the situation of buried pipeline. On the beginning the visual inspection was provided. There were no significant general corrosion damaged areas. By contact MMM inspection, defect areas, given by in-line inspection were tested. By contact MMM inspection were found local areas of stress concentration zones. By closer investigation by Eddy Current technique, the surface stress corrosion cracks were confirmed. Paralell to this, magnetic particle testing was used after MMM measurement.

Fig. 1- Schematic view of all defects localized by internal inspection

Fig. 2- Measured position in area Bíluky

Fig. 3 – Non-contact MMM measurement in the excavation
Non-contact inspection by MMM confirmed the existing surface defects on the pipeline under insulation. Defects were determined as a stress corrosion defects, starting at the surface, going up to 1-2mm deep into the metal wall. Those types of corrosion defects are usually localized in the colonies at areas where the chemical condition around the pipe allows their creation. Defects are located along the pipeline on the bottom part.

At all inspected areas the defects were of same type and it is caused also by similar soil condition – mostly the clay and agriculture activities.

4. Conclusion

Comparison of in-line and MMM inspection confirmed the possibility to apply MMM measurement to detect anomalies, which correspond to the damaging area on buried pipelines.

Inspection by contact MMM measurement after excavation again confirmed areas of defects on the pipeline.

Another used NDT technique (Ultrasound and Magnetic particle inspection) also confirmed existence of defects in those areas.