

New generation in-line geometry inspection

Continuous improvement of technologies is what most accurately characterizes all spheres of modern production, including in-line inspection (ILI). Designers of inspection equipment are focusing on the constant search for solutions to improve the performance of inspection tools, and they have achieved some success in this field.

In December 2017 the Russian company **Transneft Diascan, JSC** (a subsidiary of the largest oil pipeline company in the world **Transneft, PJSC**) has commissioned a multi-channel geometry tool of the new generation. This type of inspection equipment is designed to measure the internal flow section and the pipeline bend radius of various diameters. It allows detection of defects such as dents, ovalities, buckles, as well as determining radii, directions of bends and pipeline bend angles. The tool operates on the electromechanical principle of measuring the deflection angles of arms that are in direct contact with the inner wall of the pipe. To determine the spatial position of the pipelines, the in-line inspection tool is equipped with a high-precision strap down inertial navigation system.

Standard Performance Characteristics:

Tool's diameters	6" ÷ 48"
Product in the pipeline	Liquid, gas
Temperature Range	-15°C ÷ +60°C
Max. operating pressure	14 megapascals
Operating speed range	Up to 6,0 m/sec
Min. bend radius	1,5D
Min. flow passage	0,75 overall opening diameter
Max. length of inspected area	350 kilometers

The commissioned geometry tool 40-PRN.02-00.000 is part of a new generation of high-resolution multi-channel geometry tools equipped with a navigation system. It has a significantly increased number of measuring levers in comparison with previous generations of these tools. Unlike previous versions that were equipped with polyurethane cups in the basic version, the new tool has a system of rigid supporting wheels and disks. This enables to enhance centering of the tool in motion, which brings its accuracy of measuring the bend radius of the pipe and the coordinates closer to a specialized flaw detector determining the position of the pipeline. This technical solution also may be used for gas pipelines inspection.

The resolution of geometry tool is 2.5 times higher and brings interpretation of the inspection data to a new level compared to the results of the previous generations of geometry tools. Its design features, such as vents of small diameter, are clearly identifiable among the mass of welded attachments. Due to the fact that the measurement error of geometry defect's width decreased more than twice, it has become easier to classify the defect scale.

In addition to an increase in the number of measuring levers, the construction of the tool was redesigned. The weight of levers was reduced and polyurethane parts were replaced by hard-alloy ones. This will not only prolong the operational life of the tool, but reduce the lever arm effect while the geometry tool moves at a high speed that is typical for gas pipelines.

The range of the ILI tools equipped with navigation system and operated by Transneft Diascan, JSC amounted to 29 multi-channel geometry tools and flaw detectors able to determine the position of the pipeline. The navigation features of these ILI tools even exceed the performance characteristics of foreign analogues. A short time ago, navigation was an exclusive supplement to in-line inspection. Nowadays it is an integral part of the whole complex of works aimed at ensuring reliability of pipelines operation.



Transneft Diascan, JSC 's inline geometry inspection tool



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