

INERTIAL PIPELINE GEOMETRY INSPECTION



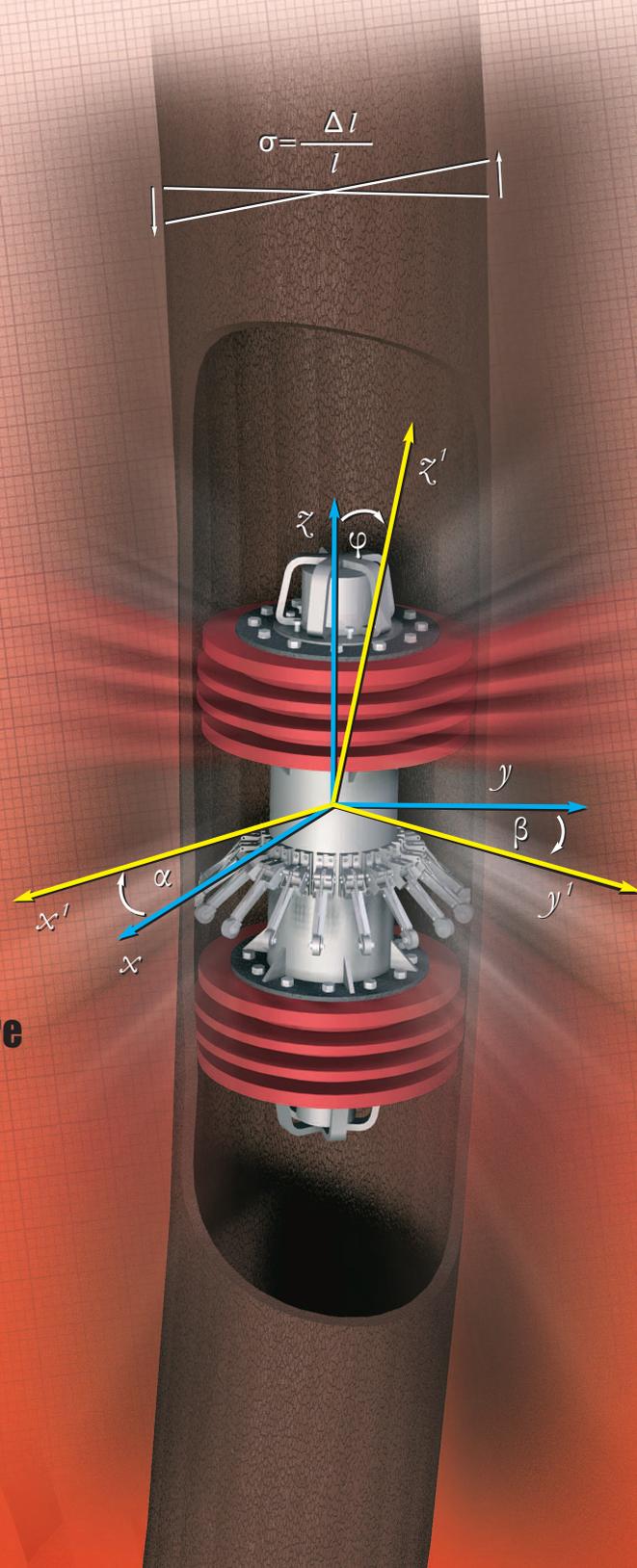
- High end gyroscopes
- Inertial grade accelerometers
- GPS location
- Bending strain determination



- Pipeline movement
- Accuracy > 1:4.000
- 3-D Pipeline mapping
- Ground coverage



- Flexible output
- Multi-channel caliper
- Powerful user-friendly software
- GIS mapping



Inertial pipeline geometry inspection

The Inertial Geometry Pig (IGP) provides pipeline operators with three-dimensional geographic and geometric information of their pipeline.

The IGP combines two advanced technologies from Pipesurvey International: the multi-channel calliper function and a high resolution Inertial Measurement Unit (IMU).

The IMU contains three orthogonal ring laser gyroscopes, known to be the most accurate, stable and rugged gyroscopic devices, combined with three orthogonal inertial accelerometers to create an inertial strap-down system. Starting from a known position, determined by Differential GPS, the IMU is able to determine its present position and orientation at any time with the slightest error possible. Comparing the result of an inspection with previous runs or as built information, will reveal any pipeline movement that has taken place.

The XYZ data obtained through the IGP is helpful for pipeline mapping and incorporation of the valuable inspection results in the customers' GIS system.

The multi-channel calliper system features accurate mechanical sensors that sample the pipeline cross section at very small intervals. The sensors cover the circumference of the pipe wall in order to detect the location, orientation and size of any deformation of the pipe. The calliper system incorporates high frequency linear and rotational accelerometers to register the pig's dynamic behaviour, which reveals information about



welds, pipe friction, sedimentation, contamination and other pipe wall characteristics. Pressure sensors, differential pressure sensors and temperature sensors complete the tools' analytical system.

Not only will the pig detect and accurately measure pipeline defects like buckles, dents, wrinkles, ovalities, liquid slugs, bend radii, misalignments; based on the data of the extremely stable and accurate IMU, information about the profile of the pipeline can be obtained. This helps to determine pipeline curvature and bending strain in the pipe wall due to movement in geotechnically unstable areas such as river crossings, slope instabilities, mining areas, or marine environment. Furthermore this technology is beneficial to pipelines that have suffered from temperature cycling or 3rd party interference. The IGP complements or replaces the use of strain gauges and monitoring rods, or even provides data about pipeline movement where usage of strain gauges is not practically possible.

DATsurvey[®] is Pipesurvey International's powerful and user-friendly software, used to analyze and visualize the inspection results. It allows the user to visualize the detected features, view the pipeline on variable scale, select length sections, view cross sections, curved sections, zoom in on anomalies, and generate 3-D plots. Each spot can be printed on a data sheet with log distance, weld distance, the length of affected pipe, clock orientation and characteristics of the deformation. One can scroll through the complete inspection data, assess and quantify deformations, correlate caliper data with pig dynamics and pressure differential data, plot a velocity profile, monitor pipeline profiles and the operating conditions. The software can be installed on the users PC together with the data and is a helpful instrument to interpret measurements. It enables the pipeline operator to prioritize pipeline remediation activities.

Tool specification

Pressure range	0- 300 bar
Temperature range	0 – 65 °C
Power supply	200 hrs (expandable)
Bend radius	1.5 D
Pipe run length	400 km (expandable)
Odometer channels	3
Caliper detection limit	1 mm
Caliper depth sizing resolution	1 mm
Caliper orientation resolution	5 degrees
Minimum pipe bore	75% Nominal Pipe Diameter
Distance to girth weld	0,01 m
Location Accuracy	min 1 : 4.000
Velocity range	0,1 – 10 m/s
Sampling rate	Up to 1500 Hz



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