PigLet Snuffles Out Pipe Problems

A. Hak Industrial Services offers for more than 10 years inspection of steel pipelines to the Oil & Gas industry. The inspection tool "Piglet" is based on ultrasonic technology and the tool is pumped with product through the pipeline. The inspection results are displayed directly on-screen via a unique developed glass fibre optic module (www.a-hak-is.com).
For standard steel, the used ultrasonic technology makes it possible to identify corrosion areas and to determine accurately the remaining wall thickness.
This remaining wall thickness is one important parameter to determine the maximum allowable operating pressure of steel pipelines, and thus important to determine the integrity of steel pipelines.

However in the water and waste water industry pipelines consists of other material than steel.
Normally PVC, HDPE, asbestos cement, cast iron and concrete lined steel pipes are used, which need another approach to determine its integrity. For these types of materials the degradation system is not fully known yet and other parameter than the remaining wall thickness could be important.

Projects are ready to get started were the degradation systems of various materials will be investigated, sponsored by the Dutch water industry and the Government (TTIW). In these projects the problem is investigated on a more academic level, and at the end the question of "how to determine the integrity of these types of pipelines" must be answered. However these projects are time consuming and results on a short term are not expected. In addition to this, inspection methods should be developed to determine the degradation parameters, which is another step to go.

In the mean time A. Hak Industrial Services started a more trial and error approach. Together with the water and wastewater industry some critical pipeline types were identified and were inspected using the existing ultrasonic Piglet technology.

Tests were carried out in the laboratory to determine the ultrasonic properties of PVC, HDPE, Asbestos cement and concrete lined steel pipes.
The ultrasonic inspection results of the asbestos cement were poor but for PVC and cement lined pipe wall thickness measurement could be obtained. In addition the ovality of the pipelines could be determined very accurately, which could be an important parameter for the integrity determination of PVC pipes. In some occasions cracks could be detected, however to determine cracks more accurately, more research and tool development should be executed.

Together with the water industry a project was started to look more closely to the concrete lined steel pipes. The results of this project is reported by the water industry project manager who uses this thesis to obtain the degree "Master of Pipeline Technology"
In addition a trail project was started together with the waste water-industry to inspect a 600 meter long HDPE waste water pipeline. Part of this pipe was new laid while the other part consists of a 30 years old section. Prior to the inspection the pipeline was cleaned using a MD-foam pig were after the inspection run was started from the pump station to the septic tank.

During the inspection a few areas were identified with different thicknesses, due to the change in pipe material and the production process. A few areas were ovalities were measured in combinations with some dents. These areas were investigated more closely and dig-up verification was carried out. In one area a gas pipeline was found pushing onto the pipe and causes the ovality and dent at the area. It was expected that in the future this

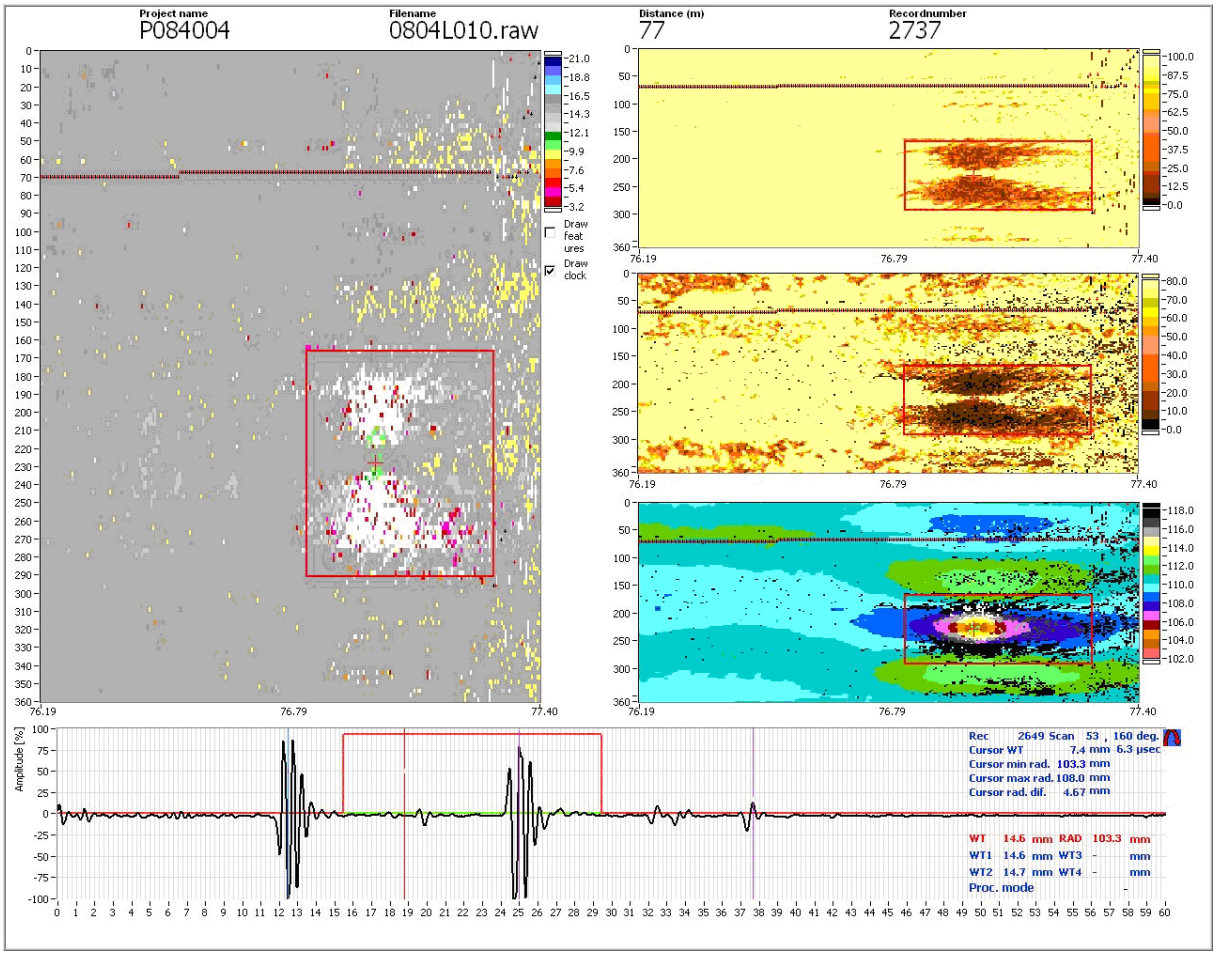
could be a critical leakage, resulting in unwanted shutdown of the pipeline and dangerous sitiations.

Inspection pig as used for the inspection of the HDPE sewage pipeline

Retrieval of the inspection pig in the Septic tank

Launching area at the pump station.

Example of an Anomaly with identification Dent located during the inspection
Report for Anomaly with identification Dent located at log distance 77.07 m



Anomaly no.	4	Width (mm)	244
Log distance (m)	77.07	Length (mm)	473
Joint no.	150	Remaining t (mm)	-
Average t / joint (mm)	14.6	Mean anomaly depth (%)	-
Average radius / joint (mm)	110.4	Maximum anomaly depth (%)	-
Average percentage of successful measurements / joint (%)	99	Up weld distance (m)	2.18
Average reliability / joint (0-1)	n.a.	Clock position (h:min)	5:20
Joint length (m)	9.95	Reliability (0-1)	n.a.
Feature type	Anomaly	Defect assessment method	ASME-B31.G
Feature identification	Dent	PSafe (MPa)	-
Anomaly dimension class	-	ERF	-
Surface location	Not applicable	Defect assessment comment	-
Comments	9 mm deep.	Feature scan name	S00077_07.jpg;

Picture taken of the anomaly detected during the inspection after verification dig-ups. It was found out that the waste water lines has been moved about 20 –25 cm and now rests on a PN160 gasline, which causes the deformation of the HDPE pipeline.