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SPACE ASSETS FOR PIPELINE INTEGRITY MANAGEMENT (PIMS)

Abstract

Pipeline integrity management (PIMS) is a key concept in the gas and pipeline industry that aims to ensure that pipeline systems are safe and full-time operational. It addresses infrastructure design construction, inspection maintenance, management and documentation. Space Assets for PIMS is a recently completed feasibility study of the European Space Agency's Integrated Application Promotion program. Its objective is to investigate and define services that provide added value to PIMS-related activities by integration of multiple space assets, i.e. Earth Observation (EO), Satellite Navigation and Satellite Communication.

The application of PIMS has been particularly successful in steadily reducing the number of incidents in pipeline operation, due to e.g. accidental third party intervention, sabotage, corrosion or landslides. Nevertheless, pipeline monitoring as performed today remains costly and therefore incomprehensive. Significant improvement can still be achieved by more ubiquitous use of Geographical Information Systems (GIS) such as Pimoa and other innovations.

PIMS International has performed the PIMS Space Assets feasibility study. Involved users are the gas pipeline operators SASOL (South Africa) and GasUnie (The Netherlands). These users have expressed, as a primary need, a cost reduction of pipeline inspections and a more frequent inspection. In particular, third party interference has to be better avoided. The study has next addressed the added value, feasibility, viability and sustainability of novel services based on integration of multiple space assets into PIMS activities. For example satellite images (SAR, hyperspectral, optical) can be used to detect large industrial vehicles or areas where landslides occur or subsidence takes place. In remote areas the pipeline could be equipped with sensor networks that transmit in-situ measurements via satellite communication to a central data processing facility, where the data is then checked for signs of corrosion and other anomalies. Finally satellite navigation can improve the georeferencing of pipelines and the measurements, overcoming the drawbacks in using traditional station coordinates or paper drawings of the pipeline.

The project has resulted in a PIMS service design that integrates the PIMS Pimoa software suit with a multi-source and wide area network of sensors. The sensor suite comprises EO imagers and radars for observing the surrounding conditions of the pipeline, in-situ sensors measuring basic pipeline data, and a

communication network so that all data can be analyzed centrally. The development of a pre-operational service together with the involved users is foreseen as a next step.