iPerm Report Summary

Project ID: 730648

Periodic Reporting for period 1 - iPerm (iPerm: Guided wave monitoring tool)

Reporting period: 2016-10-01 to 2017-09-30

Summary of the context and overall objectives of the project

Today, there are more than 40 major transnational oil and gas pipelines traversing Europe, accounting for over 34,565 km of strategically critical pipeline infrastructure, 40% of which are over 40 years old and subject to corrosion induced catastrophic failures impacting negatively upon European society and its economy. With such an extensive and growing network of pipelines, and an increasing incidence of failures, it is no longer feasible to rely upon current intermittent manual inspection techniques to maintain safe operation, from the twin perspectives of probability of detection over such a large network, and consequence of failure given the hazardous materials being distributed. Clearly, a wide-area coverage Structural Health Monitoring solution is overdue. The iPerm project seeks to address this challenge by developing a permanent, intelligent and energy-efficient monitoring network which will deliver a step-change improvement over existing inspection systems, and thus a step change in the safety and reliability of Europe’s pipeline network.

Our vision is to capture 3.3% of the Oil & Gas segment, the fastest growing segment of the global NDT market, within five years following product launch aiming to add (cumulatively) €26.79 million to our top-line and generate more than €6.93 million in operating profit, resulting in an investment multiple of two times the European funding. In addition, we will create 215 new direct jobs as a result of the generated revenue, and more indirectly. iPerm is the definite answer to a more secure and safe environment for large-scale pipeline operations.

The purpose of the iPerm project is to help European and worldwide oil and gas companies to reduce the number of pipeline leaks and thereby increase safety standards. The overall objective is to address this challenge by developing a permanent, intelligent and energy-efficient monitoring network, which will deliver a step-change improvement over existing inspection systems, and thus a step change in the safety and reliability of Europe’s pipeline network. The project outcome will comprise a commercial monitoring system, employing the patented guided wave technology, permanently mounted on the outside of pipelines in environmentally hostile, safety critical or difficult to access areas.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

Commercial hardware finalization

Finalization of flexible transduction system:
- Optimised design produced to achieve a cost-effective, yet mechanically stable and durable solution for permanent installation.
- iPerm demonstrator manufactured, assembled and installed.

Electronics packaging and integration:
- Pre-amplifier unit developed to increase signal performance for heavy-coated/buried pipes.
- Portability of iPerm unit improved (smaller, lighter, and more user-friendly).
- Ergonomic enclosure manufactured and electronics assembled.
- Wireless communication between pulser-receiver unit and tablet PC for streamlined unit control.

Optimization of installation procedure:
- Optimized system design facilitated installation in target time (i.e. installation by a single qualified technician in one day).

Modification of collar and encapsulation:
- New encapsulation method suitable for harsh environmental conditions produced.
- New encapsulation method compatible with required range of pipe sizes (2 to 48”) produced.

Software refinement and optimization:
- A full set of user-defined parameters to configure the pulser-receiver unit.
- Simple ‘one-click’ data collection.
- Instant inspection data storage in the iPerm tablet PC.
- Recall of previously stored inspection settings.
- Visualization of the gathered inspection data.
- Communication with the iPerm Cloud application and upload of the inspection data to a remote location.

Remote connectivity, cloud platform and front-end Interface:
- User account processes.
- Inspection data storage/retrieval (upload/download functionality).
- Storage/retrieval of inspection metadata, such as inspection location, owner of asset, equipment parameters, etc.
- User-friendly interface with interactive map and multiple search options.
- iPerm Support Team environment for platform administration tasks.

Validation in operational environment:
- Pipeline specification document produced.
- On-site trial locations specified.

Dissemination, iPerm promotion and IPR management:
- Development of the project website.
- Production of dissemination material in the form of a project logo, flyer and poster.
- Promotion of the project at various events, such as conferences, exhibitions, networking sessions and face-to-face meetings.

A project logo was designed to be used in all dissemination and promotional material, and to enhance the visual identity of the project.

The official project website comprises:
- A public area providing general information on the project concept and objectives and highlights important project milestones and major dissemination activities.
- A password protected members’ area.
The project flyer highlights the major benefits of the iPerm system for the end-users.

The project partners have participated in a number of events such as conferences, brokerage events and workshops.

Pre-launch preparation and market replication:
- Established a support team of three natively speaking personnel for servicing customers in three different European markets (UK, Spain and Turkey).
- Two training tutorials produced:
  - How to operate the cloud platform, which is used to remotely manage the inspection data.
  - How to operate the iPerm pulser-receiver unit in order to perform a pipe inspection.

**Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)**

The following technical advances have advanced current state of the art:

- Optimised flexible PCB demonstrator produced to achieve a cost-effective, yet mechanically stable and durable solution for permanent installation.
- New inspection collar suitable design for harsh environmental conditions and compatible with a wide range of pipe sizes (2 to 48").
- Pre-amplifier unit developed to increase signal performance for heavy-coated/buried pipes.

The expected results from the iPerm project comprise a commercially available pipeline monitoring system:

- Capable of 100% structural inspection coverage.
- Facilitating non-intrusive inspection (in contrast to pigging technology).
- Providing reduced pipeline maintenance costs (through semi-automated equipment operated by personnel with minimal training).
- Reducing the risk of catastrophic failure and leakage into the environment.

The potential impacts arising from the iPerm system include:

- More than €26 million generate cumulatively within five years following product launch.
- More than €6 million in operating profit.
- Over 200 new direct jobs as a result of the generated revenue, and more indirectly.
- Improved structural reliability that will help European pipeline operators to keep their lead in this sector.
- A more secure and safe environment for large-scale pipeline operations.
- Internationalisation of SMEs through European co-operation.

Since the iPerm system is still not yet commercially available, there have been no impacts produced to date.

**Related information**