



"SMART PIPELINE SYSTEM", an innovative Fiber Optic Pipeline Structural Monitoring System

2018 IPLOCA Environmental Award sponsored by Shell

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Findings

Exposed pipeline due to a debris flow

A 48 inch gas pipeline in Switzerland was affected by a debris flow which caused the interruption (which lasted for months) of strategic gas importation from Russia to Italy. In order for the pipeline to operate again, local Swiss Authorities asked the owner (Transitgas) to provide a variant and, above all, the possibility to have a continuous and reliable structural monitoring system, capable of providing the status of the strategic pipeline in real time and even to advise whenever a shutdown is necessary



Solution

Structural monitoring technology

For this specific case, the solution realized for Transigas is innovative with respect to the past experience from both a hardware and a software point of view.

With regard to the hardware, the traditional approach is based on electrical strain gauges installed in critical sections along the asset to be monitored. This traditional approach was judged as NOT APPLICABLE for the subject project due to several factors, e.g. complexity of the area subject to geohazards in terms of morphology, site accessibility, impossibility to supply electrical power in the field (including solar panels and/or batteries), speed of the phenomenon to be monitored



Implementation

Fiber sensors installation



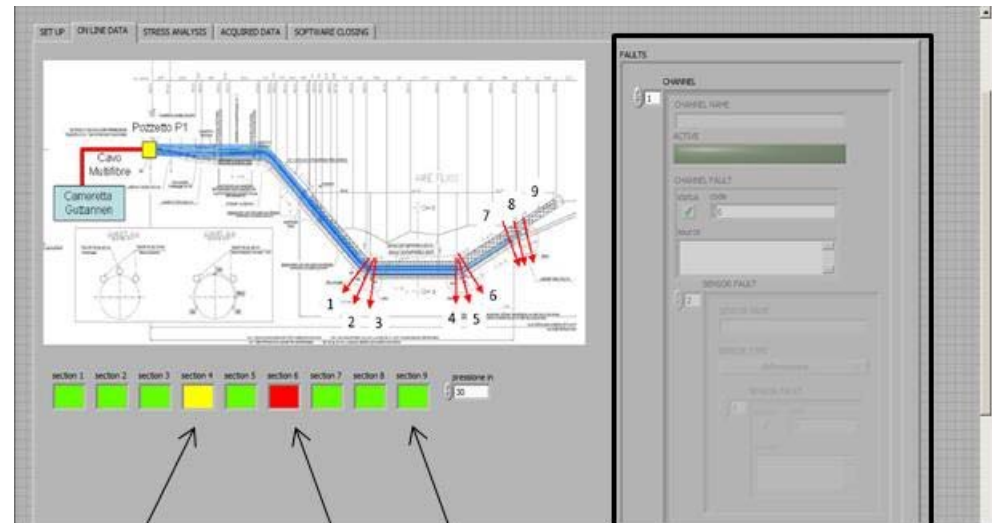
The innovative proposal suggested and developed by Saipem is based on fiber sensors, which make the solution applicable and bring several additional advantages such as easier installation, easier interface with existing communication network infrastructures, the possibility to multiplex more sensors on the same fiber, excellent fatigue resistance, ability to monitor fast phenomenon, absence of active equipment in the field, immunity to any electro magnetic issue, safe (spark free) globally cost effective solution.

Implementation

Customized software

With regard to the software, the traditional approach is based on standard applications capable of providing only strain values.

The innovative solution suggested and developed by Saipem is based on a new customized software capable of elaborating the data acquired and providing the control room operator (working in a remote location with respect to the monitored pipeline sections) with a user friendly decision support system.



warning

alarm ok

Alarm interface