Introduction

Subsea pipeline inspection has been an ongoing concern in the Oil & Gas industry. Recently, this concern has increased, mainly driven by ageing infrastructure and tighter industry standards. The potential environmental impact from leaking of a subsea O&G pipelines has created a demand for a more thorough and comprehensive inspection process. Thus, formal assessments of pipelines condition are necessary to demonstrate their integrity to continue safe operation throughout their life-cycle.

Subsea pipelines are subjected to integrity threats from several sources (e.g. corrosion, fractures). In order to control external corrosion threats in pipelines it is necessary to assess their cathodic potential. Normally, the potential is measured by stabbing exposed anodes every kilometre. If a pipeline is partly or completely buried, this is not possible, either for sections or for the entire line. In this situation, the only option today is to excavate the pipe end inspect it visually. The cost of this operation is almost the same as installing a new pipeline.

The Field Gradient sensor - FiGS®, developed by FORCE Technology, opens up a new world in terms of disclosing Cathodic Protection (CP) values. Unlike traditional sensors with static reference cells, the FiGS® has two reference cells that rotate around a common axis, and use the physical shift between the two to ensure that readings are not influenced by cell drift. The rotation feature also provides the strength and direction of the electric field. Knowing the direction of an electrical field has proven useful to understand the distribution of CP currents, yielding detailed information about drain to connected structures, location of coating damages, and location of buried anodes, among others.

Apart from providing accurate readings for exposed pipelines, the precision of the sensor enables evaluation of the CP system and identification of coating defects in buried pipelines without excavation. A FiGS® CP survey of buried pipelines enables calculation of the potential profile of entire lines, securing a good basis for evaluating the protection level.

A FiGS® CP survey on pipelines
FiGS® CP survey on pipelines

Cost savings
> Data from a FiGS® CP survey enables calculation of accurate current density and anode performance, which is further used as input to CP models and may significantly reduce the CP retrofit cost
> The use of FiGS® enables the complete inspection of pipelines for a fraction of the cost (and risk) associated with performing multiple excavations

Safety
> FiGS® CP survey ensures safe offshore operations by performing subsea pipeline inspections that help preventing hazardous consequences
> Subsea inspection with FiGS® minimises injuries associated with heavy excavation and diving operations
FiGS® CP survey on pipelines

**Figure:** Effect of sea bottom in field gradient iso-lines around pipe resting on the seabed.