

User Benefits:

Our solutions offers the following Benefits to users:

- **Long Term Insurance for pipeline:**
- **Reliable means for Data collection:** data flows to the server automatically at pre-set timings without any manual intervention
- **Visualization & Analytics:** data and detailed Analytics reports can be viewed from anywhere at the click of a button. Authorised personnel are alerted about deviations immediately through sms or e-mail
- **Integrated Communication Strategies:** ConnectM chooses the most appropriate communication technology based on the location of TR & TLP units
- TR & TLP units are initializable from remote
- The TLP Data Logging units are equipped with internal batteries with very high life. The Data Loggers use an innovative power management methodology to further optimize the battery life

Products

TLP Data Acquisition Unit (Table - 2)		
Parameter	Range	Accuracy
DC Voltage (PSP) Acquisition	3V	0.001V
AC Interference Acquisition	15V (peak)	0.001V
Remotely programmable Data Acquisition Period	every 1 to 24 Hours	
Remotely programmable data transmission period	every day to week	
Transmission of system health condition; (temperature, humidity, door open status)		
Synchronization with other TLP & TR units to get Cyclic ON/OFF PSP values.		
Parameter transmission with Date and time stamp		
Threat Scan data (eg. Vibration sensing due to events such as digging etc.)		
Mechanical isolation from pipeline in normal state. Maintains 10 Mega Ohms input impedance at the time of data acquisition to ensure electrical isolation for safety purposes .		
Uses GSM/GPS networks or RF/GPS network for communications.		

TR Data Acquisition Unit (Table - 3)		
DC Cathode to Anode Potential Acquisition	50V	0.001 volts
DC current Acquisition	50Amps	0.001 Amps
AC Volt & AC Current Acquisition on Transformer Primary side	300V, 10 Amps	0.05%
Measure up to 3 drain DC Potentials		
On-Off Control of TR remotely.		
Synchronization facility with other TR and TLP units for cyclic OFF/ON PSP values to get external IR drops.		
72 hours battery back-up.		

Installation, Provisioning and Maintenance

The installation & commissioning, provisioning and regular maintenance of the solution is provided by our partners who have rich experience in the field of Cathodic Protection.



Automated Cathodic Protection

ConnectM
a Sasken and IDG Ventures company

Overview

In 1863, scientist Dmitri Mendeleev proposed that pipes could be used as a mode of transportation for materials. It is now being used to transport oil & gas products, water, sewage, slurry and beverages like beer.

Pipelines are generally the most economical method of transporting oil & gas products in large quantities over long distances. Compared to other means of surface transport, pipelines offer a much lower per unit cost of transportation. Although pipelines are also built under the sea, the process is economically & technically demanding. For this reason, majority of oil transportation at sea happens through tanker ships.

Corrosion

Very simply put, corrosion is the natural tendency of metals to return to their natural state. In technical terms it is defined as the electromechanical degradation of a metal as a result of its reaction with its environment. When immersed in an electrolyte like soil, water, concrete etc, metals produce a current which causes ions to leave the surface. This causes corrosion. An ampere of current can consume approximately 20 pounds of metal in a year.

All metallic structures face corrosion eg. pipelines, storage tanks, ships, construction piles, communication and transmission towers.

Corrosion Protection

It is a life's mission for corrosion engineers to slow down if not completely halt the process of corrosion. Included in their repository of techniques are material selection, coatings, corrosion inhibitors and Cathodic Protection.

Cathodic Protection

Varying resistivity of soil causes areas of high potential (with respect to soil) called Anodic sections and areas of lower potential called Cathodic areas. The flow of current causes corrosion on the anodic section whereas the cathodic sections are protected.

In its simplest form, cathodic protection involves introduction of a metal with a naturally higher potential than the structure. This metal then becomes the anode thus protecting the cathodic structure. This type of Cathodic Protection is called Galvanic Protection. Metals like magnesium and zinc are commonly used to protect steel structures.

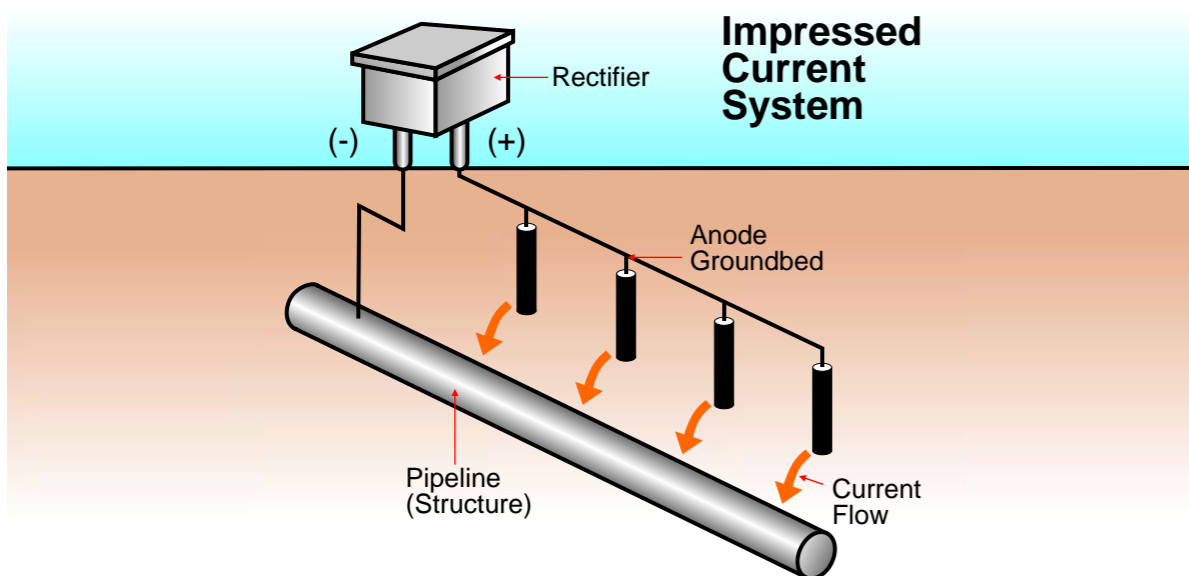


Figure 1: A Conventional Cathodic protection system

It is a usual practice to use an external power source to induce current in relatively inert metals like cast iron and graphite. This technique is called Impressed Current Cathodic Protection and is being employed effectively these days. In the conventional method, Transformer-Rectifier units (TR) are used to impress current to raise the potential of sacrificial anodes. This makes the structure cathodic with respect to the sacrificial metal rods thus protecting it from corrosion. In order to measure Pipe-to-Soil Potential (PSP) and stray currents along the length of the pipeline, measuring points called Test Lead Points (TLP) are created. Measurements are made at regular intervals (usually once every month) to measure these parameters. It is also prescribed to measure OFF PSP at least once in six months to estimate the rate of corrosion in the pipeline. Off PSP requires synchronized switching-off of the TR units and measuring the dying curve of PSP at each of the TLPs

Constraints of Conventional Cathodic Protection

The conventional Cathodic protection techniques has various limitations:

- Manual measurements (PSP) have to be conducted at thousands of TLPs every month across remote areas
- Accuracy of manual data is not assured
- Only a snap-shot of the particular day's events is available. This does not capture effects of short term intermittent currents that are induced due to external interferences on the pipelines eg: HT lines, railway tracks, highways, chemical industries etc in the vicinity of the pipeline
- Off-PSP measurement is extremely difficult. Indications are that this may also not be accurate enough to provide a true picture due to technology constraints in synchronized switching-off

Automated Cathodic Protection System

The automated Cathodic Protection system (ACP) addresses all the constraints of the conventional Cathodic Protection technique through innovative use of modern communication technology. In doing so, this system uses conventional methods as the basic building block.

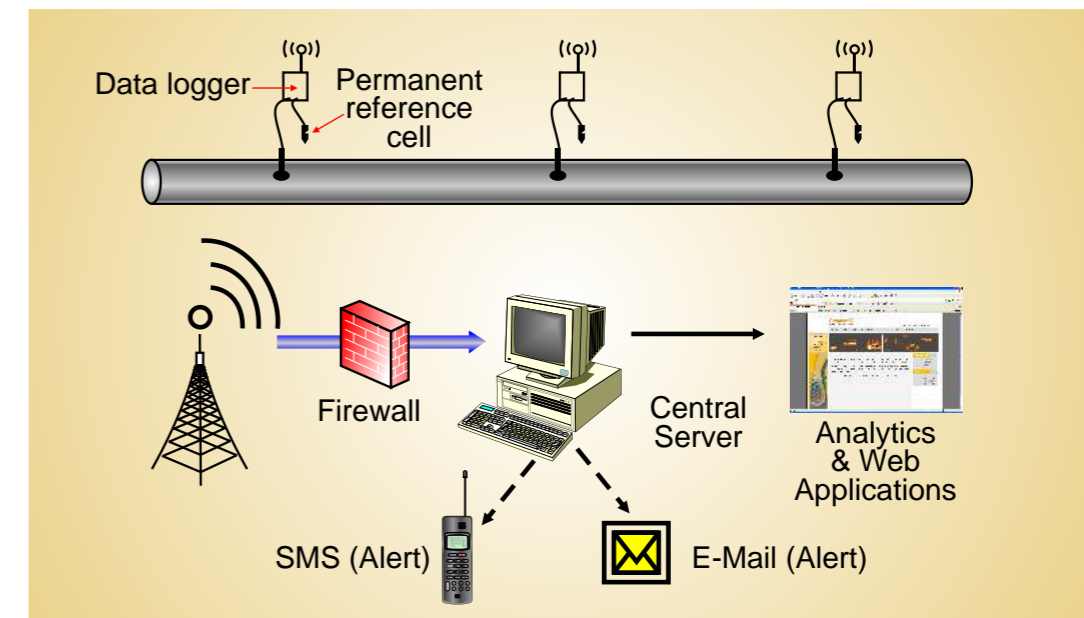


Figure 2: Schematic of Automated Cathodic Protection system

Our Automated Cathodic Protection system incorporates data loggers at the TR units and the TLP stations. The TR & TLP Data Loggers use GSM/GPRS & RF technologies for communication.

The data loggers acquires the critical parameters (refer tables 2 & 3) at preset periods and transmits it to a central server hosted at ConnectM's data center. ConnectM provides an Analytical engine interface to this data which analyses the same and provides historical trending and reporting features. A user can view the data and the Analytics reports through a secured website created by ConnectM for the specific customer. This allows visualization facility for the user from any location using a standard internet connectivity and web browser. Emergency alerts are notified to authorized personnel through SMS or e-mail.

The Automated Cathodic Protection system from ConnectM can be integrated with new as well as existing pipelines. In

Comparison between Conventional Method and Automated Cathodic Protection system

Conventional Method	Auto CP System
Mid-Point Voltage Measured every ---30 days	Measured in regular periods (1hour to 1day)
All TLP measurement—6months	Measured in regular periods
TR parameter measurement-10days	Measured in regular periods and also Instant demand of parameters available
OFF-PSP.....Measured in 6 months(Synchronization Problems)	All TLP units and TR units can be synchronized for any time.
Possibility of Deviating from Standard Established norms Special instruments used for measuring AC interferences.	Alarms are generated for every thresholds. Data loggers can measure clamped voltages.

Table 1: Comparison of Conventional & automated Cathodic protection solutions