Petrol Pure Industry Using SMART @ BALL Technology

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Abstract- *significant financial and environmental consequences often result from line leakage of oil product pipelines. Product can escape into the surrounding soil as even the smallest leak can lead to rupture of the pipeline. From a health perspective, water supplies may be tainted by oil migrating into aquifers. A joint academic-industry research initiative funded by the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) has led to the development and refinement of a free-swimming tool called Smart Ball ® which is capable of detecting leaks as small as 0.150 liters per minute in oil product pipelines.*

Keywords- Leak Detection, Tran's petro, Accelerometer, Gyroscope, SMART @ BALL.

I. INTRODUCTION

Smart Ball® is a new approach that combines the sensitivity of acoustic leak detection with the 100% coverage capability of in-line inspection. The free-swimming device is spherical and smaller than the pipe diameter, thus allowing it to roll silently through the line and achieving the highest detection of small leaks. It is typically launched and retrieved using conventional pig traps; however, its size and shape allow it to be launched by other means and to negotiate obstacles that could otherwise render a pipeline.

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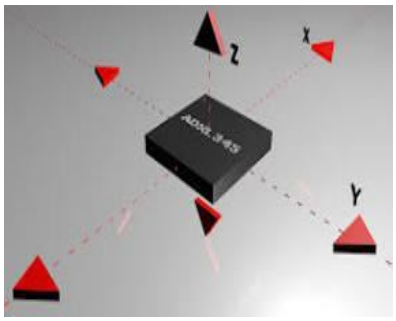
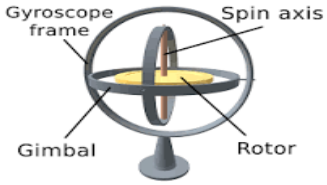
1. **PROCESSS:** smart Ball@ based mapping utilizes the latest accelerometer and gyroscope Technology to create a field generated x and y map of pipeline, which can be used by pipeline manager to better understand the alignment of their pipe. Maintenance work more efficiently, reduce the linkage of third party Damage.
2. **SMART @ BALL:** smart Ball@ based mapping utilizes the latest accelerometer and gyroscope technology to create a field generated x and y map of a pipeline for checking external pressure.

Smart Ball@ is a physical structure combination of Accelerometer and Gyroscope.

ACCELEROMETER: accelerometer is measure the speed of or continuous speed of petrol.



GYROSCOPE: it is a spinning wheel or disk in which the axis of rotation is free to assume any orientation by itself.



SENSOR: sensor technology is used in accelerometer and gyroscope means all activity are catch throw sensor.

II. IMPLEMENTATION OF SMART @ BALL TECHNOLOGY USING IN PETROLEUM INDUSTRY

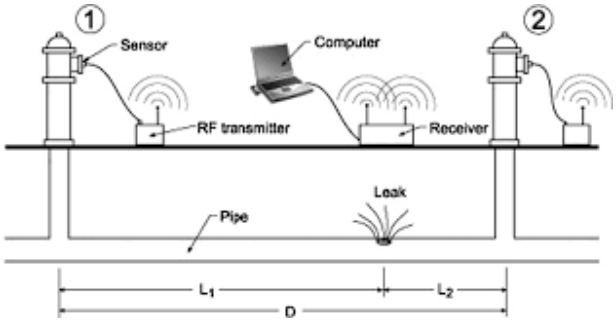


Fig. 1 actual process of smart ball.

- **OVERVIEW:** Smart Ball is an acoustic-based technology that detects anomalous acoustic activity associated with leaks or pockets of trapped gas in pressurized pipes. The Smart Ball is composed of an aluminum alloy core that contains a power source, electronic components and instrumentation (including an acoustic sensor, tri-axial accelerometer, triaxial magnetometer, GPS synchronized ultrasonic transmitter, and temperature sensor).
- **SMART BALL RECEIVER:** Tracking the position of the Smart Ball in the pipeline is critical for locating important features such as leaks and gas pockets. Figure 2.2 shows an acoustic sensor, which is adhered to the pipe or pipeline appurtenance and is attached to the Smart Ball Receiver via coaxial cable. There are special techniques used for both tracking the Smart Ball and locating leaks and gas pockets.
- **SMART BALL TRACKING:** Smart Ball Receivers (SBR's), which detect the ultrasonic pulses emitted from the Smart Ball, are positioned along the pipeline to track the position of the device as it traverses the pipeline.
- **LOCATING LEAKS AND GAS POCKETS:** Once a suspected leak or pocket of trapped gas is identified during the data analysis the positional data for Smart Ball is reviewed to determine its location.

Advantages of Smart Ball:

The Smart Ball acquires high quality acoustic data which is then evaluated to identify leaks and pockets of trapped gas. Since the Smart Ball passes right past each anomaly individually from each acoustic anomaly of interest, three significant advantages are recognized:

I. **Medium and Large Diameter Pipe:** Smart Ball can be used to detect leaks on medium and large diameter pipes in the range of (>12 inches and over 96 inch diameter) have been successfully inspected by Smart Ball. Many conventional leak detection technologies (e.g. correlations) have limitations that preclude their use on medium and large diameter pipe.

II. **Pipe Material:** Smart Ball's leak detection ability is not affected by pipe material. Because the tool passes by the point at which the acoustic event is being created the pipe wall is not relied on to transmit the acoustic event through the line to a sensor located far away from the actual event of interest which greatly increases it sensitivity and ability to distinguish between separate events.

III. **Sensitivity:** The sensitivity of all leak detection technologies is a function of several variables and as a result, no resolute thresholds can be established. However, the acoustic sensor inside the ball always passes within one pipe diameter of a leak and therefore it can be used to identify very small leaks due to the proximity of the tool to the leak

PROPOSED MODEL

Proposed model is ultimate model than real model because it is faster and advance and faster than real model. Reason is it uses BAROMETER and barometer is count air pressure of pipe directly. But REAL MODEL is very slow because it uses accelerometer and accelerometer is count pressure according to acceleration.

PROPOSED MODEL is work with or without help of REAL MODEL.

HOW TO MAKE ADVANCE YOUR SMART BALL @TECHNOLOGY: Above showing all the physical and logical study of SMART @ BALL technology you add advance meter instead of accelerometer or with accelerometer:

How to work SMART @ BALL technology if you add following type of meter in your SMART @ BALL:

BAROMETER: *USE FOR:* Weather forecasters use a special tool called a **barometer** to measure air pressure. **Barometers** measure atmospheric pressure using mercury, water or air.

How it is work in SMART @ BALL technology:

If you are add the barometer in SMART @BALL it count air pressure on pipe and inform operator before leak pipe.

ALTIMETER: *USE FOR:* An altimeter or an altitude meter is an instrument used to measure the altitude of an object above a fixed level.

How it is work in SMART @ BALL technology:
If you are add the altimeter in SMART @BALL it count the Altitude means height of pipe up to 3000 meter and inform To the accelerometer very minimum time. Because accelerometer is track up to 3000 meter only.it is save the time of process.

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III. FUTURE WORK

This technology is not perfect because researcher can added many features in SMART BALL@ technology.

- ✓ To add all type of miter in the smart Ball@ to useful for any type of mapping according to need.
- ✓ To add hot sensor cheap that show the temperature of petrol.
- ✓ To add advance tracking area technology.
- ✓ To advance sensor technology that show actual petrol filtration throw camera.

IV. CONCLUSION

With base on this technology, was proven to the Petrobras/Transpetro crew involved on these operations that Smart Ball provides a quick, reliable and efficient leak detection tool, with quick response time – the information about the simulated leak points was known in within 3 hours - and solid information provided on a fast report. The ability of the tool to go through unpiggable pipelines is in very high demand, and its accuracy has proven to detect leaks of minimum size, preventing environmental / financial damages.

REFERENCES

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