International Journal of Psychosocial Rehabilitation, Vol. 23, Issue 03, 2019
ISSN: 1475-7192

Survey on Smart Pig for Inspection Robot

E. Kanniga and Mohamed Malik

Abstract--- *Smart pigs are a aggregate of sophisticated electronic gadgets utilizing numerous technology and encompass signal sources, sensors to discover numerous anomalies, onboard computer(s) to acquire and collect statistics and power assets to pressure all the electronics. Together this gadget installed on a pig sled can without difficulty exceed several heaps in weight, specifically the ones tools for large diameter pipelines. The term "smart pig" is utilized to distinguish the equipment containing sophisticated electronics from more traditional run in pipelines for numerous functions. Existing technologies for inspecting pipelines and different matters, which includes the human frame, are surveyed. A sensor that could document multiple information kinds, along with temperature, pressure, and acceleration, and save them at the unit turned into selected and adapted for use in pipelines*

Keywords--- *PIG, Sensors, IML, Inspection Robot.*

I. INTRODUCTION

Pipelines represent a considerable investment on behalf of the operators and might often show strategic to countries and governments. They are usually familiar as being the maximum green method of transporting fluids across distances. In order to protect those valuable investments, maintenance have to be completed and pigging is one such renovation device. During the 1940s, pipelines within the United States had been specially pigged to eliminate paraffin to growth efficiency in crude oil pipelines a good way to maximize float situations for the struggle effort. The pigging gadget applied at that point was confined to 3 applications while being very crude in nature. In latest international, pipelines are pigged for a selection of motives and the pigging equipment used is designed by engineers to perform unique functions.[2] Pigging is a broadly applied procedure that is the act of propelling a well sized spherical or cylindrical device via the indoors of a pipeline by means of manipulating the pressure & go with the flow of the present media, or through artificially added media or via mechanically pulling the tool via the pipeline for the unique reason of cleaning, analyzing or distributing inhibitor in the course of the pipeline. A pig is a tool inserted into a pipeline which travels freely through it, driven by way of the product flow to do a selected assignment inside the pipeline. These duties fall into numerous extraordinary regions:

- Utility pigs which perform a function which include cleaning, separating products in-line or dewatering the road.
- Inline inspection pigs that are used to provide facts at the situation of the pipeline and the quantity and area of any hassle (along with corrosion as an example).
- Special duty pigs which includes plugs for setting apart pipelines.

E. Kanniga, Professor, Department of Electronics & Communication/Instrumentation Engineering, CEDSE– Excellence Centre, BIST, BIHER, Bharath Institute of Higher Education & Research1, Selaiyur, Chennai. kanniga.etc@bharathuniv.ac.in

Mohamed Malik, Research Scholar, Department of Electronics & Communication/Instrumentation Engineering, CEDSE– Excellence Centre, BIST, BIHER, Bharath Institute of Higher Education & Research1, Selaiyur, Chennai. mohamedma89@gmail.com

Received: 21 Feb 2019 | Revised: 12 Mar 2019 | Accepted: 06 Apr 2019

One principle is that two pipelines have been status subsequent to a line while a pig went beyond. As the pig travelled down the road pushing out debris, one in all them made the comment that it sounded like a pig squealing. The pig in query consisted of leather-based sheets stacked collectively on a steel body. Without doubting the authenticity of the story, it does imply that these equipment were around for a while. Another concept is that PIG stands for Pipeline Intervention Gadget. The first pigging operation occurred around the year of 1870, some years after Colonel Drake discovered oil in Titusville, Pennsylvania. Before pipelines have been used for transporting it, the oil turned into trucked to the refinery with the aid of horse-drawn tank wagons. This proved to be very tough during winter months because of heavy snows and frozen wagon tracks, and in wet weather whilst wagons might sink in the mud. To enhance upon this approach of transportation, a pipeline was built, the fabric of which isn't always recorded, but every period of pipe become nearly clearly joined through the bell-and-spigot technique that we see these days in plastic pipe. After transporting crude oil for a year or two thru this pipeline, the flows started out to decrease, and the pumping stress extended, indicating that there were deposits building up on the inner partitions of the pipe. Many matters have been tried to cast off the paraffin deposits, however nothing worked successfully for any time frame. Eventually the concept of pumping something through the pipeline changed into considered. It has been counseled that a package deal of rags tied in a ball become used, and with fantastic results. Later, bundles of leather-based had been used in location of the rags. Leather will swell when wet, so it created a tight seal going via the pipeline.

II. SURVEY FOR PIG

The paper titled “PIG’s Speed Estimated with Pressure Transducers and Hall Effect Sensor: An Industrial Application of Sensors to Validate a Testing Laboratory by Gustavo F. Lima 1,* , Victor C. G. Freitas 1, Renan P. Araújo 2, André L. Maitelli 2and Andrés O. Salazar 2 The pipeline inspection using a device called Pipeline Inspection Gauge (PIG) is safe and reliable when the PIG is at low speeds during inspection. We built a Testing Laboratory, containing a testing loop and supervisory system to study speed control techniques for PIGs. The objective of this work is to present and validate the Testing Laboratory, which will allow development of a speed controller for PIGs and solve an existing problem in the oil industry. The experimental methodology used throughout the project is also presented. We installed pressure transducers on pipeline outer walls to detect the PIG’s movement and, with data from supervisory, calculated an average speed of 0.43 m/s. At the same time, the electronic board inside the PIG received data from odometer and calculated an average speed of 0.45 m/s. We found an error of 4.44%, which is experimentally acceptable. The results showed that it is possible to successfully build a Testing Laboratory to detect the PIG’s passage and estimate its speed. The validation of the Testing Laboratory using data from the odometer and its auxiliary electronic was very successful. Lastly, we hope to develop more research in the oil industry area using this Testing Laboratory.

The paper titled” Pipeline Inspection Techniques “Claudia Maneggia, Nouveau Policy Associate, January 16, 2017” author said Overall, pipelines provide an alternative transport system that is less polluting and more economical compared to conventional vehicles. The main idea is to transport fluids through fixed structures that do

Received: 21 Feb 2019 | Revised: 12 Mar 2019 | Accepted: 06 Apr 2019

not require, as in the case of oil tankers or trucks, gasoline or fuel to operate. Pipelines are the most efficient systems for the transportation of oil and natural gas.

It is a massive works of engineering that must face and overcome complex construction problems first, and a high level of maintenance in the long term. Technology helps to increase and maximize safety.

The paper titled “Effects of ractopamine hydrochloride and immunological castration in pigs. Part 2: belly quality characteristics and fatty acid composition” by Leticia Cristina COSTA E SILVA1*, Roger Darros BARBOSA1, Expedito Tadeu Facco SILVEIRA2 said The effects of immune-castration and ractopamine in the diet on the belly quality were investigated from two crossbred pigs under different conditions of production, diet, management, and slaughter arranged in factorial design using two levels of addition of ractopamine in the diet, 0 and 7.5 ppm, and three genders (gilts, immune-castrated and barrows). The quality of bellies was analysed for chemical composition, pH, meat and fat colour, backfat thickness and fatty acid profile of the fat. The addition of ractopamine showed no significant influence on pH, colour and chemical composition in two crossbred pigs. The immune-castrated had thicker belly backfat compared to the bellies of the gilts. The contents of fatty acids polyunsaturated, linoleic, linoleic, arachidonic, total omega 3 and omega 6 were higher for immune-castrated pigs, as well as presenting values greater than 0.4 for the PUFA:SFA ratio, thus, providing bellies with better nutritional quality. The bellies of the gilts and immune-castrated pigs had higher concentrations of iodine value, indicative of higher unsaturated fat content. The results indicated that the addition of ractopamine and immune castration had little influence on the quality of bellies as well as in their fatty acid profiles, suggesting the continuity of implementation of these techniques.“PIPE FEATURES IDENTIFIED DURING INLINE INSPECTION USING MFL PIGS ,,by Susanne Hohler*, Hossein Karbasian Salzgitter Mannesmann Forschung GmbH, Duisburg, Germany Johannes Bruckner Open Grid Europe GmbH, Essen, Line pipe material is delivered by pipe manufacturers who have to fulfil specifications. During the pipe manufacturing process certain cosmetic repairs are permitted in the tolerance frame of technical delivery conditions. Mill made features/repairs are examined and registered by the pipe supplier. Once in operation, in-line inspections (ILI) of the pipeline are carried out. In some cases, mill made features and possible repairs as previously accepted in the mill, cannot be identified in the sequel of assessments based upon MFL data. Signals where the discrimination between mill related defects (e.g. grindings) and corrosion-based wall thickness reduction is not possible, lead to a need of further investigations regarding a certain characterization of these indications. Those actions (e.g. excavation and non-destructive tests) are often time and cost intensive. In the frame of a research project within the European Pipeline Research Group (EPRG) a systematic collection of structural defects has been carried out, which are related to the line pipe manufacturing process of high strength steel tubes and which are possibly able to cause indications during inline inspection. The first part of the study presents an overview of typical defect types, which are classified as common for specific tube types by literature. Secondly, the results of a voluntary questionnaire to the EPRG members are summarized. The questionnaire was distributed to gather data in the range from manufacturing up to the operating conditions of onshore pipelines. This was done for pipe manufacturers and for pipeline operators. The extracted database shows a range of MFL inspection results in

comparison with further examination on the excavated pipe at these positions, in particular for cases, where mill related defects were found.

The paper titled “A Practical Guide for Pipeline Construction Inspectors “CEPA Foundation, Kim McCaig, MBA (CEPA Foundation), Published March 2016” said Introducing a fundamental step change in the training and qualification of Pipeline Construction Inspectors as a means of improving the construction quality of projects. Improving the overall quality of work performed by Pipeline Construction Inspectors within the industry.

III. CONCLUSION

As per the theoretical survey the authors are concentrated towards performance improvement. The proposed work may be concerned about automation and monitoring through cloud as per standards and metrics.

Acknowledgement:

ACKNOWLEDGEMENT

This work is supported by the esteemed BIHER management and department of research and development Chennai and CEDSE excellence centre mentors and members

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