International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 07 | July 2019 www.irjet.net p-ISSN: 2395-0072

Smart Production Line Industry 4.0 - Leak Testing for Fuel Tank

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Abstract: Lean Production is well known and accepted within the industrial setting. It considerations the strict integration of humans within the producing method, never-ending improvement and target value-adding activities by avoiding waste. However, a replacement paradigm known as trade four.0 or the fourth historic period has recently emerged within the producing sector. It permits making a sensible network of machines, products, components, properties, people associate degreed ICT systems within the entire price chain to possess an intelligent plant. So, currently an issue arises if, and the way these 2 approaches will be and support one another. In this test system that is designed to test the leakage and Continuity in fuel tank. The procedure to test the component is to pressurize the fuel tank and the amount of leakage is measured by the Ateq leak detector using Differential pressure mechanism. Data Logging System will Log the data of each tank and generate a print at the end of cycle, assuring the leak testing is OK.

Keywords: industry 4.0; lean automation; lean production; production management, Ateq leak detector

1. INTRODUCTION:

This guide contains several necessary safety messages. Continually browse and conform all safety messages. This can be the protection alert image. It alerts you to safety messages that inform you of hazards that may kill or hurt you or others, or cause harm to the merchandise. All safety messages are preceded by the protection alert image and therefore the hazard signal word DANGER, WARNING or CAUTION. Danger associated Warning indicate that you simply are killed or seriously slashed if you don't follow directions and caution indicates an imminently risky state of affairs that if not avoided, might end in mirror or moderate injury, or product harm solely. All safety messages can establish the hazard, tell you the way to cut back the possibility of injury, and tell you what will happen if the directions don't seem to be followed. Keep this guide during a safe place for future reference.

Configure safety circuits external to the programmable controller to make sure that the whole system operates safely even once a fault happens within the external power offer or the programmable controller. Failure {to do|to try to to|to try associated do} thus might end in associate accident thanks to an incorrect output or malfunction. Emergency stop circuits, protection circuits, and protecting interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) should be designed external to the programmable controller. Machine OPR (Original purpose Return) of the positioning perform is controlled by 2 sorts of data: associate OPR direction associated an OPR speed. swiftness starts once the near-point watchdog signal activates. If associate incorrect OPR direction is ready, motion management might continue while not swiftness. To stop machine harm caused by this, piece associate interlock circuit external to the programmable controller. Once the central processing unit module detects a slip-up throughout management by the positioning perform, the motion slows down and stops. Outputs might stay on or off thanks to a failure of a part like a semiconductor device in associate output circuit. Piece associate external circuit for observation output signals that would cause a significant accident. In associate output circuit, once a load current surpassing the rated current or associate over current caused by a load short-circuit flows for a protracted time, it's going to cause smoke and hearth. To stop this, piece associate external safety circuit, like a fuse. Piece a circuit in order that the programmable controller is turned on initial then the external power offer. If the external power offer is turned on initial, associate accident might occur thanks to associate incorrect output or malfunction. Piece a circuit in order that the external power offer is turned off initial then the programmable controller. If the programmable Logic controller is turned off initial, associate accident might occur thanks to associate incorrect output or malfunction. For the operational standing of every station once a communication failure, consult with relevant manuals for every network. Incorrect output or malfunction thanks to a communication failure might end in associate accident. Once dynamical knowledge from a computer peripheral connected to the central processing unit module throughout operation, piece associate interlock circuit within the program to make sure that the whole system can continually operate safely. For different controls to a running programmable controller (such as program modification or operational standing change), browse relevant manuals fastidiously and make sure the safety before the operation. Especially, within the case of a sway from associate external device to a far off programmable controller, immediate action cannot be taken for a retardant on the programmable Logic controller thanks to a communication failure. To stop this, piece associate interlock circuit within the program,

and confirm corrective actions to be taken between the external device and central processing unit module just in case of a communication failure. Don't install the management lines or communication cables along with the most circuit lines or power cables. Keep a distance of 100mm or additional between them. Failure to try and do thus might end in malfunction thanks to noise.• throughout management of associate inductive load like a lamp, or magnet valve, an outsized current (Approximately 10 times bigger than normal) might flow once the output is turned from off to on. Therefore, use a module that encompasses a decent current rating. Once the central processing unit module is hopped-up on or is reset, the time taken to enter the RUN standing varies betting on the system configuration, parameter settings, and/or program size. Style circuits in order that the whole system can continually operate safely, notwithstanding the time.

2. LITERATURE SURVEY:

1. Paper Name: Towards Lean Production in Industry 4.0

Author: Beata Mrugalska, and Magdalena K. Wyrwicka

Description: Lean Production is widely recognized and accepted in the industrial setting. It concerns the strict integration of humans in the manufacturing process, a continuous improvement and focus on value-adding activities by avoiding waste. However, a new paradigm called Industry 4.0 or the fourth industrial revolution has recently emerged in the manufacturing sector. It allows creating a smart network of machines, products, components, properties, individuals and ICT systems in the entire value chain to have an intelligent factory. So, now a question arises if, and how these two approaches can coexist and support each other.

2. Paper Name: Gerotor Fuel Pump Performance And Leakage Study

Author: Mario Alberto Ruvalcaba, and Xiao Hu

Description: Gerotor pumps are utilized in a number of automotive applications such as fuel lift. Volumetric efficiency and leakage are causes of concern in gerotor pumps. To optimize pump performance and reduce leakage, it is fundamental to comprehend the fluid dynamics inside the pump passageways. In this paper, a three-dimensional CFD methodology has been developed and applied to predict the pump performance, to understand pump flow dynamics and to investigate pump leakage for gerotor pumps equipped in automotive fuel systems. The methodology is based in the commercial code ANSYS FLUENT and the analytical focal points are the pump performance and leakage over a range of motor speeds and output pressures, 4000 RPM and 5400 RPM, also 450 kPa and 600 kPa. The CFD results are first contrasted with the experimental data and a very good agreement has been achieved.

3. Paper Name: Air Bubble Leak Detection Test Device

Author: Arthur D. Wilson, Mesa, Ariz.

Description: Improved measurement of leakage in fuze seals is obtained by employing an r bubble leak indicator. The fuze to be tested is connected to an air supply line coming from an air bubble leak indicator. The air bubble leak indicator has a narrow orifice submerged in a liquid, which in turn is connected to an air supply. When the system has stabilized, any leakage from the fuze seals will result in air bubbles passing through the liquid. A light source and light detector placed at the outlet of the orifice will electronically detect bubbles and provide an electronic indication of leakage. The system also offers a visual indication of leakage. All parts of the unit being tested remain in a dry condition.

4. Paper Name: Leak testing of pipelines uses pressure and acoustic velocity

Author: Hough, J.E

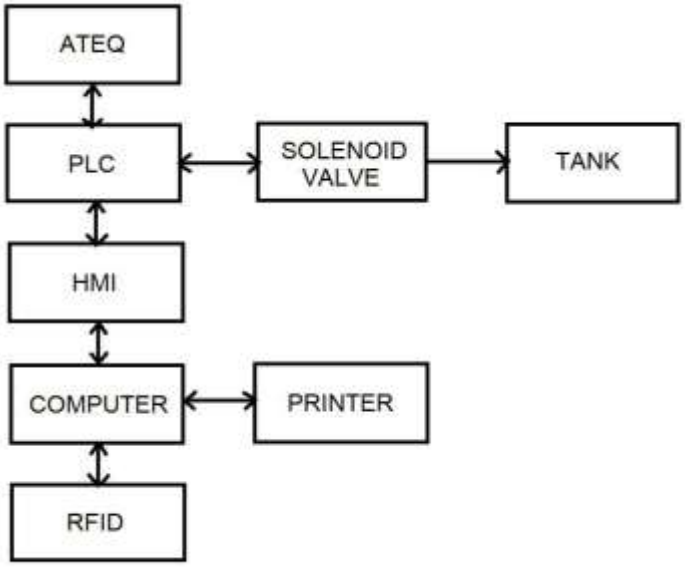
Description: To verify the integrity of the installation of steel pipelines, especially in the oil and gas industry, hydrotesting is used. This involves the sealing of sections of pipe, filling with water, pressurizing to check the strength of the pipe (strength test) and leak tightness (leak test). It is common practice in the testing of buried pipelines to measure the volume added during pressurization (dP/dV) to confirm the pipe stress/strain characteristics and assess the process of air. Leak testing has traditionally involved the measurement of pressure and water temperature over a period of time (commonly 24 hr to reduce diurnal influences). The average water temperature is used to assess the pressure change/temperature change ratio (dP/dT). A technique to replace temperature measurements during dydrostatic testing of pipelines has been successfully field tested. The procedure described in this paper, employs acoustic-velocity measurements in a liquid-filed pipeline for direct comparison with the pipeline's pressure readings. It was recently field tested on a 14-km pipeline. The resolution and sensitivity of the technique are currently adequate for testing of pipelines. To improve these requires increasing the sensitivity of the instrumentation and further refining of the signal processing techniques.

5. Paper Name: Sequences in the implementation of lean production

Author: Ålström P.

Description: One question facing a company wanting to improve manufacturing performance is whether to implement improvement initiatives in parallel or sequentially. This article examines whether any sequences of manufacturing improvement initiatives exist and what these sequences are. For two and a half years, the author participated in and studied one company's implementation of lean production. The findings group the principles of lean production into four different categories, depending on when management devoted effort and resources to the principles. The conclusions indicate that there are sequences in which lean production principles are implemented, but management also need to devote effort and resources to a set of principles in parallel.

3. SYSTEM ARCHITECTURE:

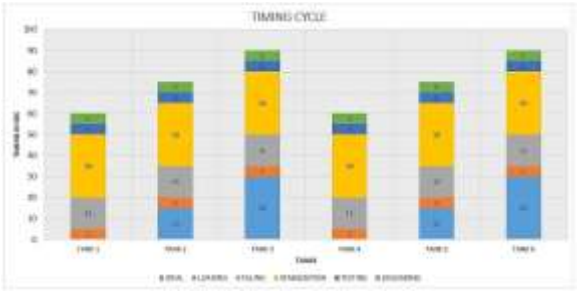


4. COMPONENT DESCRIPTION:

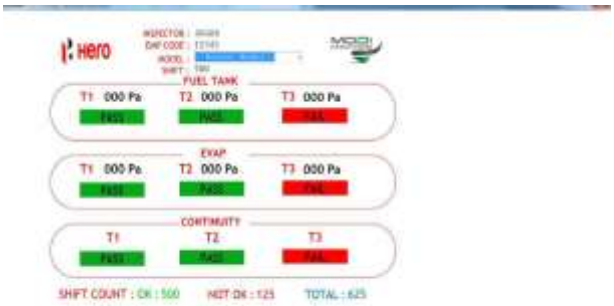
- **ATEQ F620:**

The ATEQ F620 could be a compact air/air leak detector accustomed take a look at the air tightness of components. the strategy used relies on the menstruation of atiny low variation or come by differential pressure between the take a look at and reference components, once each area unit crammed to a consistent pressure.

5. TIMING CYCLE CHART



6. SCREEN SHOTS:



CONCLUSION:

In this check system that's designed to check the discharge and Continuity in fuel tank. The procedure to check the element is to pressurize the fuel tank and also the quantity of discharge is measured by the Ateq leak detector mistreatment Differential pressure mechanism. knowledge work System can Log the information of every tank and generate a print at the tip of cycle, reassuring the leak testing is OK.

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