

www.ijprems.com

editor@ijprems.com

INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

Vol. 03, Issue 05, May 2023, pp : 578-581

DESIGN & DEVELOPMENT OF OXYGEN TANK LEAKAGE INDICATION & BYPASS SYSTEM

Shaikh Gulamgaus¹, Shaikh Md Fahad², Shaikh Nasim³, Patel Raza⁴,

Prof. Kshatriya Vaibhav⁵, Prof. Zeeshan Shaikh⁶

^{1,2,3,4}Diploma Scholar, Jumma Masjid Charitable Trust's, JMCT Polytechnic, Nasik

⁵Head of Automobile Engineering, Jumma Masjid Charitable Trust's, JMCT Polytechnic, Nashik ⁶Head of Mechanical Engineering, Jumma Masjid Charitable Trust's, JMCT Polytechnic, Nashik

ABSTRACT

During COVID situation it was having most of cases of Oxygen Tank Leakage & shortfall. In Zakir Husain Hospital, Nasik, Maharashtra, India. Gas tragedy is an example of accidents due to oxygen gas leakage. The reason for such leakages is due to substandard cylinders, old valves, no regular checking of gas cylinders, worn out regulators and a lack of awareness of handling gas cylinders. Therefore, it will be needed to detect and controlled the oxygen gas leakage to protect people from danger. In this choice of technology, a smart oxygen gas leakage detector & prevention is designed and implemented to detect oxygen gas levels above the normal threshold level, especially in a confined environment. The main objective of this project is to avoid accidents due to oxygen tank leakage in hospital. The system will made is environment friendly; take care of human health & also eco-friendly for hospital use. Keywords: Oxygen Tank, Gas Leakage, Gas Regulators, Bypass System.

Keywords: Impact Energy, Drop Weight.

1. INTRODUCTION

Leakage in industrial and domestic environment can occur in several ways during the handling of storing and transmitting equipment's like tanks, pipelines and machinery. Hence, monitoring and control of leakage is essential to reduce resource, energy and economic loss. Major leaks mainly occur in transmission pipeline which might go unnoticed due to the vast networks and inaccessible locations, for example underground pipelines. Pipelines may develop leak due to ageing over time, corrosion, design faults, accidents, and operation outside limits or sabotage. Depending on the kind of material being transported and the depth of the leak, the results can be catastrophic, ranging from minor injuries, ill health, and property loss to major explosions and severe fatalities. So, an efficient leak detection system is necessary to detect, quantify and locate leaks With the development of world, the technology is enhanced day by day with the realistic projects and efficient work. A number of reviews on the subject of gas leakage detection techniques there done in the past either as part of research papers/technical reports on a certain leak detection method and other gas related subjects. Although, gas leakage detection is very important, but preventing fire requires adequate control of the detected gas leakage. In order to prevent gas explosion, there should be statutory environmental requirements on the use of gas so as to prevent accidents, and protect life and property from disaster. The safety of life and property is vital in all our daily activities whether domestic or industrial. Achieving utmost safety requires adequate planning, early fault detection, and the use of appropriate forms of protection. Gas leakage leads to various accidents resulting in both material loss and human injuries. Home fires have been occurring frequently and the threat to human lives and properties has been growing in recent years. The risks of explosion, fire, suffocation are based on their physical properties such toxicity, flammability, etc. The number of deaths due to the explosion of gas cylinders has been increasing in recent years. The Bhopal gas tragedy is an example of accidents due to gas leakage.

Duration of project work Task	Sept.	Oct.	Nov.	Dec.	Jan. 5	Feb. 6
problem identification						
Literature survey						
Objectives & Problem statement						
Conceptual Model Development						
Project Design						
Material Purchase & Production Process					-	
Model Testing						
Final Report writing & Presentation						

Figure 1 Methodology



INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

e-ISSN : 2583-1062 Impact Factor : 5.725

www.ijprems.com editor@ijprems.com 2. FABRICATION

Vol. 03, Issue 05, May 2023, pp : 578-581





Figure 2 Pressure vessel

Oxygen tanks are one of type of pressure vessel used to store gas for:

- medical breathing at medical facilities and at home
- breathing at altitude in aviation, either in a decompression emergency, or constantly (as in unpressurized aircraft)
- Oxygen is rarely held at pressures higher than 200 bars (3,000 psi), due to the risks of fire triggered by high temperatures caused by adiabatic heating when the gas
- changes pressure when moving from one vessel to another. Medical use liquid oxygen Airgas tanks are typically 350 psi (24 bars).



Figure 3 Pneumatic hoses and fittings

Pneumatic tubing is also available in a number of other materials both with and without reinforcement for use in standard applications. SMC fittings incorporate a positive tube seal while the fitting is under pressure which allows polyurethane tubing to be used. Tubing is available in sizes of 1/8", 5/32", 3/16", 1/4", 5/16", 3/8", and 1/2". Metric tubing sizes of 3.2, 4, 6, 8, 10, 12, and 16mm are available.

Tubing Series:

Polyurethane Tubing : TAU, TCU, TFU, TIUB, TU

Nylon Tubing : T, TAS, TIA, TISA, TRS, TS

Spark Resistant Tubing : TRB, TRTU

Coaxial Tubing : TW

Polyolefin Tubing : TP

Moisture Control Tubing : IDK

This can be used for connection of pneumatic system with total drill assemble.



Figure 4 2/2 Solenoid valve

A valve is a device that regulates the flow of fluid (gases, liquids, fluidized solids or slurries) by opening and closing or partially obstructing passage ways. A 2/2 way directional valve from the name itself has 2 ports equally spaced and 2 flow positions. It can be used to isolate and simultaneously bypass a passage way for the fluid.



www.ijprems.com

editor@ijprems.com

INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

Vol. 03, Issue 05, May 2023, pp : 578-581



Figure 5 Hose Collector & Connector.

In our pneumatic system there are two types of connectors used; one is the hose connector and the other is the reducer.



Figure 6 Pressure switch

The Pressure switch is generally used in much pneumatic circuit. Pressure switch carriers at pressure range setting which are widely used in pressure controlling and sense pressure receiving signals are quite easily available. The control unit activates the pneumatic valve system, so that bypass valve can activate. Stainless Steel 1/8" Pneumatic Adjustable Pump Pressure Switch QPM11-NC Normally Close



Figure 7 Washer

A washer is a thin plate (typically disk-shaped) with a hole (typically in the middle) that is normally used to distribute the load of a threaded fastener such as a screw or nut. Other uses are as a spacer, spring (wave washer), pad, preload indicating device, locking device, and to reduce vibration(rubber washer). Washers usually have an outer diameter (OD) about twice the width of their inner diameter (ID). Washers are usually metal or plastic. High quality bolted joints require hardened steel washers to prevent the loss of pre-load due to Brinelling after the torque is applied. Rubber or fiber gaskets used in taps (or faucets, or valves) to stop the flow of water are sometimes referred to colloquially as *washers*; but, while they may look similar, washers and gaskets are usually designed for different functions and made differently. Washers are also important for preventing galvanic corrosion, particularly by insulating steel screws from aluminium surfaces.



Fig 8 Nut and Bolt

As nuts and bolts are not perfectly rigid, but stretch slightly under load, the distribution of stress on the threads is not uniform. In fact, on a theoretically infinitely long bolt, the first thread takes a third of the load, the first three threads take three-quarters of the load, and the first six threads take essentially the whole load. Beyond the first six threads, the remaining threads are under essentially no load at all. Therefore, a nut or bolt with six threads acts very much like an infinitely long nut or bolt.



www.ijprems.com

editor@ijprems.com

INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

Vol. 03, Issue 05, May 2023, pp : 578-581

e-ISSN : 2583-1062 Impact Factor : 5.725



Fig 9 Pressure Gauge

A pressure gauge is a fluid intensity measurement device. Pressure gauges are required for the set-up and tuning of fluid power machines, and are indispensable in troubleshooting them. Without pressure gauges, fluid power systems would be both unpredictable and unreliable. Gauges help to ensure there are no leaks or pressure changes that could affect the operating condition of the fluid system.

3. CONCLUSION

The main objective of this project is to avoid accidents due to oxygen tank leakage in hospital. The system will sense the leakage of the oxygen tank The system will develop by us will be work for the protection of lively hood due to oxygen tank leakage in hospital. The system will develop by us will be sense the change in hydrostatic pressure difference while oxygen tank leakage & reduce accidents ofdue to the oxygen tank failure. The system will operate and monitor all the oxygen tank units in the hospital by using auxiliary bypass tank and control valve. The system will indicate the failure of oxygen tank to fulfill the required objective of project. Safety is the proactive, and the cheapest option to preventing accidents and mishaps. Gas leakage induced fire is a menace that has occurred in different parts of the world. This study presents the design of a model O2 gas detection and leak prevention system. After design implementation, the device accurately detected gas leakage, and buzzer, user alert system performed exactly as designed. The bypass valve automatically activated to pass away the leaked gas from the enclosure so as to prevent a potential ignition and fire. This smart device offers a number of safety benefits that are vital for early gas leakage detection, and response towards preventing gas leakage.

4. **REFERENCES**

- [1] Hao SHAO, Peng-fei LI, Xu-mao SHI Key, Study of the Gas Leakage and Optimized Supply of Oxygen in Coal Laboratory of Coal Methane and Fire Control, 8th International Conference on Fire Science and Fire Protection Engineering (on the Development of Performance-based Fire Code) Available online at www.sciencedirect.com Procedia Engineering(2017),pp.599-605.
- [2] Vasud v Yadav, Akhilesh Shukla, Sofiya Bandra, Vipin Kumar, Ubais Ansari, Suraj Kha na, A Review on Microcontroller based LPG Gas Leakage Detector, Journal of VLSI Design and Signal Processing, Volume 2 Issue 3, MAT Journals 2016, pp.1-10
- [3] Aderibigbe I. Adekitan, Victor O. Matthews, Olayinka Olasunkanmi, A microcontroller based gas leakage detection and evacuation system, IOP Conf. Series: Materials Science and Engineering 413 (2018) 012008 doi:10.1088/1757-899X/413/1/012008,pp.1-8.
- [4] Mohammad Monirujjaman Khan Sensor-Based Gas Leakage Detector System Eng. Proc. 2020, 2, 28; doi:10.3390/ecsa-7-08278,pp.1-6.
- [5] Anjali. M., Development of Gas Leakage Monitoring and Localization System in Pipelines using LabVIEW, International Journal of Applied Engineering Research ISSN 0973-4562 Volume 13, Number 10 (2018) pp. 7868-7873.
- [6] Kulothungan.S, Gukan.A, Arunprabu.K.B. Automatic Gas Leakage Detection And Prevention System, International Journal of Engineering Development and Research IJEDR 2019 | Volume 7, Issue 2 | ISSN: 2321-9939 pp.10-12.
- [7] E. Jebamalar Leavline, D. Asir Antony Gnana Singh, B. Abinaya, H. Deepika, LPG Gas Leakage Detection and Alert System, International Journal of Electronics Engineering Research. ISSN 0975-6450, Volume 9, Number 7 (2017) pp. 1095- 1097.
- [8] Armin Lambrecht, Eric Maier, Hans-Fridtjof Pernau, Thomas Strahl and Johannes Herbst, Gas Leak Detection by Dilution of Atmospheric Oxygen, Article-Sensors 2017, 17, 2804; doi:10.3390/s17122804,pp1-14.