

# Design and Fabrication of Pneumatic System to Generate Compressed Air by Using Locomotive Wheel

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**Abstract:** Train passenger door is the key system for operation and maintenance on urban rail train. In this paper, we analysis passenger door system of urban rail train working process and establish the mathematical model Firstly, we use the method of parameter estimation to get physical parameters of doors on different working condition. Then fault diagnosis experiment is done to train passenger door with principal component analysis and rough set theory, In the end, we verify fault diagnose accuracies under different time settings of opening and closing profile with the test rig.

**Keywords:** Door control system, fault diagnosis, principal component analysis (PCA)

## I. INTRODUCTION

Locomotive is any type of self-propelled vehicle used by railroad to pull or push other type of rolling stock, including passengers, freight. An India is an extensive country. Nowday's railway playing a vital role in transport of freight and passengers. Trains are the veins of are country. Indian railway network is one of the largest rail way network in the world. Today the growth is phenomenal and the network have a route length of 62,458 Km, with 7116 station. It has fleet of 8268 locomotive 29,501 Coaches , 3291 Electronic multipleunits&3,46,394 wagons. Today energy conservation is the need of every industry, transportation field . So we have taken challenge to make project in this Train field to support energy conservation system.

## II. LITERATURE REVIEW

A With increasing operation tasks, passengers congestion happens during peak time, extrusions and manhandles on the door affecting doors' normal working process, causes doors fault, trains delay, even rescue. The way to improve operation efficiency and quality of urban rail train by using real-time data, is a big issue for metro operation department. Door system is one of most frequently damaged system on urban rail train, while the passenger doors are the main objects for maintenance personnel to receive complaints in case of its large quantity and high frequency utilization.

All along, the domestic and foreign research scholars research mainly focused on analysis through historical data, whose methods are lack of real-time and effective. The studies of urban rail trains electric door are limited to the reliability analysis because of real-time data acquisition difficulties, they usually use methods such as reliability block diagram, bias methods, fault tree network, GO and FMECA, but the applications of these methods require a large number of prior knowledge, and did not make full use of the state data real time train operation, so they are not feasible to new train lines or new model of equipment. Mig ueláñez & Leh rasab proposed a dynamic neural network fault diagnosis method for the pneumatic door, Dassana yake proposed a parameter identification method for vehicle door motion state, the motor inductance, resistance and other parameters are estimated to guide the diagnosis of the door system, but this method is more applicable too the door system as fault review.

### 2.1 History of Pneumatic System

For thousands of years, man has used air as anaidin doing various tasks, e.g. a bellows for lighting fires. In the year 260BC, a Greek called Ctesibios built the first air gun In addition to a tight sinew, he used air compressed in a cylinder to increase the range of projectiles. So it is not surprising that "pneuma", the Greek word for "air", has given its name to the technology known as pneumatics. During the industrialization process in the 19th century, machines powered by compressed air were used for mining and building roads. Pneumatic technology has be come in dispensable in modern industry.

implemented with accuracy and precision, requires a more challenging task of familiarizing, however is not very accurate and precise small scaled or Proto model.

**Base Frame**

Base frame is made of Fabrication angle. Supported angles are joint under base frame, where the motor & valve is located. Then piston supporter is mounted. Use: The use of the base frame is to give Support & Stability to all project components.

Length	Width	Thickness
250mm	150mm	2mm

Weight Calculation of door:

Area =  $A = L \times W = 250 \times 150$

Volume =  $V = L \times W \times t = 250 \times 150 \times 2 = 75000 \text{ mm}^3$  Weight =  $V \times \rho = 75000 \times 7850 = 588750000 \times 10^{-9} = 0.5887 \text{ kg}$

The door is opened & closed on the base frame at the centre. A piston connection is given at the backside of the door due to which the door moves in both directions. Use: for comfort entry & exit to public.

**Wheel**

Material	Weight	Diameter	Quantity
Mild Steel	1Kg	100mm	4



Fig1. Train Wheel

By gas cutting a round shape locomotive wheel is made. Then rolling shaft is attached at the centre line of wheel & connecting rod is fixed at the periphery of wheel. Use: To give power and Rotary motion to Connection rod.

**Objective**

The main objectives of the project are,

- To be able to design and construct a energy conservation system,
- To be able to operate door operation, window operation, cleaning, sweeping. The first object is very straight forward it requires the modern designing capacities. The complete pneumatic system was first designed and assembled in designing software. We have used AutoCAD for design. The model was designed as per the actual dimension soft the of system. Our objective is to construct physical parts of the Pneumatic system and the an assemble them. An additional objective was to make use of manufacturing process and make a structure as per design done in AutoCAD. This option, if to be implemented with accuracy and precision, requires a more challenging task of familiarizing, however is not very accurate and precise small scaled or Proto model.

**III. CONCLUSION**

It has been a great experience while competing our project we come across lot many practical knowledge as well as experience. We had an opportunity to learn how project are been done. We received a lot of practical experience while working on this project as well as got enough freedom to our ideas for the improvement in our assigned project and check whether ideas are fruitful. While designing Train wheel operated compressor it was kept in mind that this machine is being

manufactured only once. Therefore the design must be as perfect as possible and special attention is given during each manufacturing activity.

#### **ACKNOWLEDGMENT**

Ability and ambition are not enough for success. Many able people fail to achieve anything worthwhile because he or she not been properly guided and directed. Success of any project depends solely on support, guidance, encouragement received from the guide, our parents and well-wishers that includes all our staff members and friends. We have been fortunate to have more than one pillar strength in our humble effort to make this project successful.

#### **REFERENCES**

- [1] US3010433A- Pneumatic motion-checking device and door operating system including sameInventor(s): - CODLINGELDREDP+, Applicant(s): -NATPNEUMATICCOINC+, Application Status:-Patented Case (Reference –Public Pair Us pto )
- [2] US7537042B2- Door operating mechanism and method of using the same Inventor (s) & Applicant (s) :- ALTIMORELARRYJ Application Status:-Patented Case (Reference –Public Pair Us pto )