# RELIABILITY STUDY OF DISTRIBUTOR VALVE AND AVAILABILITY OF SPARES FOR EQUIPMENT AND INVENTORY CONTROL

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**Abstract -** The main focus of this project is to study about the rate of failure of distributor valve used in Air brake equipment and related pattern of failures. Beside with this information we can drive the optimal solution to bring down the lead time of equipment for want of spares and maintain the optimum list of spares to bring down the inventory on spares and cost, to reduce the overhauling cost and time.

Due the failure of distributor valve, availability of spare valve is mandatory to put back the coaches to regular passenger's service. Hence the concept of LRU's (line replaceable unit / unit exchange concept) is the latest trend of maintenance which requires set of main components under the head of spares and such that, the cost of inventory will be double the time of consumption of spares cost, hence we need to study the pattern and rate failure of valve to optimize the requirement of spares and LRU.

The failure data base will provide the sequence and rate of repetitive of failure and components, from this optimum level of stock and lead time may be optimized.

*Key Words***:** Service, Spares over hauling time and inventory control

# 1. INTRODUCTION

The distributor valve plays a vital role in the function of brake system in rolling stock of Indian railways. There are millions of coaches are running in the line to cater the need of the customer demand. The maintenance and overhauling of the components consumes more money and time.

The distributor valve requires critical care to perform the activity without any line failures. Being the safety item, the single failure will lead to huge time loss and even in some case damages to wheels due to break binding.

In general en-route failures in Indian Railways are considered most serious issues and will hamper the rolling stock movements. To avoid such failures and to support the on line staff, the ready ness of spare and spares valve in essential to replace the equipment on time without time delay.

Hence, the need of spares and valve required are studied in detail to minimize the spare cost, overhauling cost and time delay for want of spares / valve and also to keep the inventory under control

Given the constructive, functional and operational characteristics of rolling stock, the braking systems must meet certain specific requirements, providing multiple performance exigencies. Some of the most important are then pointed out. While achieving safe and effective brake actions to allow speed reductions, fixed-point stops and vehicle or train maintenance on slopes in complete safety, it is very important that brake operation and performance should not be influenced by environmental conditions.

## 2. METHDOLOGY

The filed failure report is to be created in the designed format. The trouble shooting and pattern of failure are captured using simple excel format.

Workshop wise failures are captured and recorded in the filed failure format. For the new stock the date of put in service and for POH stock date of overhauling to be recorded. To determine the theoretical distribution law are used graphical and analytical methods. Graphical methods are very simple and are often used in engineering practice. Features of Microsoft Excel allow easy application of both methods. Graphical method for determining the distribution law and relevant parameters, is done using probability paper, which is a simple way can be generated in Microsoft Excel. The probability chart is entered point with coordinates [ti, F(ti) = MR]. Number of points equal to the number of observed elements n or interval with, if the data given interval. If the plotted points can be approximated by a straight line, a supposed model of distribution law is good. Otherwise, rejects the

hypothesis of the law distribution. Using graphical methods can be assumed as to the validity of the model law distribution and estimate the parameters of the distribution.

Options Microsoft Excel, in terms of producing different types of diagrams, which are very important in the analysis of reliability are extremely high. For the analysis of reliability construct a histogram frequency of failure occurrence f, cumulative frequency of failure occurrence F, diagrams empirical and theoretical function of frequency of failure occurrence f(t) and function of cumulative frequency of failure F(t), the reliability function R(t) function and failure rate $\lambda$(t). Analytical methods can be somewhat more accurately determine the parameters of the distribution of the graphical methods. Especially in situations of abnormal and analytical procedures are suitable, for example. when the shape parameter $\beta$, in the Weibull distribution, has extreme value. Of course, Spreadsheet to Microsoft Excel - in very useful analytical approach to determining the parameters of the distribution.

## 3. LITERATURE REVIEW

Blanchard (2004) defines operational availability as mean time between maintenance (MTBM) divided by MTBM plus the mean maintenance down time MDT). MTBM expresses the uptime of the system and MDT is an expression for the downtime. The uptime of the system (MTBM) will be conditioned upon how reliable the system is in terms of failures and upon how much preventive maintenance the system needs. The number of failures in any system has to do with the systems reliability. Reliability can be defined as the probability that the system will perform in a satisfactory manner for a given period of time when used under specified operating conditions Blanchard 2004).

## 4. REFERENCE

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## CONCLUSION

In this research, certain solutions to the problems of reliability of valve and spare-parts where there is no control over event of failure conditions is studied. In the context reliability of spare-parts air brake distributor valve, the goal is to maximize the life coverage in the long term considering the failures like leak and struck of moving parts. Minimal repair on failed distributor valve should be scheduled to ensure that the system, should be put back in the service to avoid the holding of coach under sick marking. Our proposed solution approach solves the dynamic problem as successive static spare-parts over shorter time periods. Several spare-parts algorithms and different spare-parts policies are proposed to schedule the repair activities online with dynamic reaction to the brake system failures. The length of the spare-parts horizon and the frequency of spare-parts are the features defining our three policies. To address the relationship between service run and due periodic overhauling spare-parts in this research, it is assumed that valves are maintained only at failures.