iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** IV **Month of publication:** April 2020

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue IV Apr 2020- Available at www.ijraset.com

Reasons for Failure of Transmission Lines and their Prevention Strategies

Swapnil Namekar[1], Shubham Yadav[2]
[1]*Assistance Professor,* [2]*Student, Department of Electrical Engineering, Bharati Vidyapeeth Deemed University, Collage of Engineering, Pune India*

Abstract: ***Transmission line towers, however, planned per code arrangements, may come up short during compulsory testing required in numerous nations, which prompts huge harm to the force framework. Various sorts of untimely disappointments that are seen during different full-scale testing of transmission line towers and their outcomes are talked about in detail. The significance of the plan presumptions and association enumerating the general execution of towers were considered. The significance of the auxiliary part plan and association detail in the general execution of the pinnacle was considered. The non-direct limited component investigation is helpful in understanding the framework conduct and for an expectation of disappointment example and extreme burden. In view of the test outcomes the significance of contemplating the disappointments is featured. The requirement for actualizing different disappointment anticipation procedures in transmission line towers has additionally been accentuated clearly.***

I. INTRODUCTION

The force transformer is one of the most significant gadgets, which gives an essential connection in the chain of different gadgets for providing electric capacity to the customers. Dependable and proceeded with the execution of the power transformer is the way to profitable age and transmission of electric power. Transformer disappointment could occur as far as of tripping that outcomes in an unscheduled or inconspicuous blackout. Consequently, a good upkeep technique is a critical part to have in a power system so as to stay away from sudden disappointments. Right now, the causes of transformer-disappointment inside the force framework have been checked on. The audit segments have encased the potential reasons for power system disappointments that have been assembled through analytic outcomes and experiments. Research works, that contemplated different sorts of test analysis and observing strategies to forestall future undesirable events, have likewise been referred to. Bushing-disappointment, being identified as one of the major reasons for transformer breakdown in different detailed studies[1–5], has been considered as one of the keys focusses of this review work. The testing of harmed transformer bushings uncovered a few significant realities about transformer bushing disappointments. Bushing has all the earmarks of being a delicate piece of a transformer, and it has been discovered that 44% of a constrained blackout of the huge transformers identified with bushings and winding this announcement is upheld by the Universal Chamber on Large electric Frameworks (CIGRE/Conseil Worldwide des Grands ReseauxElectriques), overview, which expressed that 10% of transformer disappointments were brought about by bushing harm, trailed by a calamitous result [7]. While investigating continuous wellsprings of transformer disappointments, bushing disappointment is found to contribute a significant level of the considerable number of causes portrayed in Fig. 1 [8].From the physical and electrical perspective, bushing gives off an impression of being the most fragile piece of the transformer. The underlying breakdown procedure of the bushing structure couldn't be distinguished effectively, and that could prompt an unexpected disappointment of the bushing, in the long run, disappointment of the entire transformer. Factual information on the blackouts because of bushing issues from 2004 to 2009 are delineated.

II. OUTLINE OF INTENSITY TRANSFORMER

A. Transformer Failure Analysis

Kumar et al. have distributed a flow outline for transformer upkeep as appeared in Fig. 3 and efforts were made to break down the main drivers that added to the disappointments of intensity transformers. Authors have comprehensively arranged the methods of intensity transformer disappointments into three sections, in particular: 1) electrical, 2) mechanical and 3) thermal warm. These disappointments are additionally arranged into inner and outside segments as appeared in Table 1, which regularly happens in the principle tank, bushings, tap changer, and force transformer helpers into four fundamental parts: 1) Protection, 2) Conductor, 3) Association clasp, and 4) Frill. They further indicate two different kinds of protection, which are Condenser type (Capacitive reviewed) and Non-condenser type (Strong bushing). High voltage bushing can be wide classifiedinto into three classifications, to be specific 1) Composite bushing, 2) Compound-filled bushing and 3) Condenser type bushing [33]. Creators in [34]further arranged

©IJRASET: All Rights are Reserved

different kinds of condenser type bushings into Sap fortified paper bushings (RBP), Pitch impregnated bushings (Tear), and oil-impregnated paper bushings (OIP). Accomplishment et al. [35] have uncovered, that the two regular sorts of transformer bushings, Strong porcelain bushing, and Oil filled condenser bushings, are especially utilized in littler and bigger transformers, separately. Right now, creators have likewise introduced the yield results dependent on the examination of fiveblackouts because of nearby bushing disappointments from the inside corruption of the bushing protection as demonstrated by the consume blemishes on the condenser paper, and two liquefied spots on the HV focal conductor.

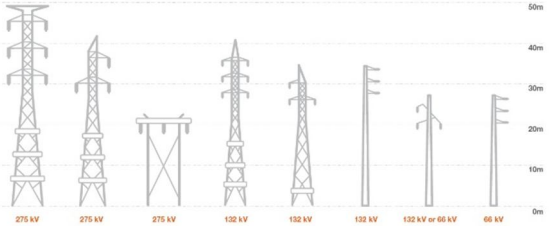
B. Protection Strategies

Transmission lines must be ensured for a smooth working of the force framework and to lessen the danger of harm to the ordinary working parts. Some of the measures for counteraction of the lines are talked about in the accompanying focuses.

1) *Improve The Nature Of The Electrical Structure:* Improvement in the nature of the electrical plan will expand security. The structure of different electrical gear is as per the activity without thinking about the encompassing of establishment. The plan of transmission lines, for example, towers, conductors, encasings, and assistant fittings remain same all through the transmission of the force framework without considering the encompassing conditions. The computation and determination of Beam gadgets is very critical to the fashioners who simply just precisely duplicate, duplicate the run of the mill plan and structure particulars. As referenced over, the lightning factor after the mishap of the lightning cause the shortcoming, which can be secured by embracing explicit plan, the architect as per with nearby encompassing take the proper lightning security measures, duplicating the plan particular, bringing about assurance from the lightning factor. Later in the establishment of flood arresters on towers, the mishap was once in a while the equivalent time, the electrical cables should likewise be a sensible structure so as to all the more likely exercise its obligations. In the structure work of the transmission line there is extraordinary need of cautious figurings, site overview, and line way choice of the geology and line the way. These measures perhaps dodge a wide range of mishaps, to guarantee the the ordinary activity of the transmission line.
2) *Lightning Protection Measures:* The lightning insurance zone idea permits us to plan, execute and screen assurance measures. Every single applicable gadget, establishments, and frameworks must be dependably secured to a monetarily sensible degree. To this end, a structure is isolated into zones with various hazard possibilities. In view of these zones, the necessary security measures can be resolved, specifically the lightning and flood assurance gadgets and segments. An EMC-based (EMC = electromagnetic similarity) lightning insurance zone idea incorporates outside lighting assurance (air-end framework, down conductor, earthing), equipotential holding, spatial protecting and flood security for the force supply and data innovation framework. The lightning assurance zones are characterized underneath.
3) *Tower Area And The Right Decision Of The Pole:* Transmission tower or force tower (then again power arch or varieties) is a tall structure, normally, a steel cross-section tower used to help an overhead electrical cable. They are utilized in high-voltage air conditioning and DC frameworks and arrive in a wide assortment of shapes and sizes. Common tallness ranges from 15 to 55 m (49 to 180 ft),[1] however the tallest are the 370 m (1,214 ft) towers of a 2,700 m (8,858 ft) length of Zhoushan Island Overhead Powerline Tie. Notwithstanding steel, different materials might be utilized, including cement and wood. There are four significant classes of transmission towers:[1] suspension, terminal, strain, and transposition. Some transmission towers join these fundamental capacities. Transmission towers and their overhead electrical cables are regularly viewed as a type of visual contamination. Techniques to decrease the special visualization incorporate undergrounding.

C. Suggestions Issues Referenced in the paper can be Forestalled by Embracing the Accompanying Strategies

1) *Transmission line structure:* Transmission structures are one of the most obvious components of the electric transmission framework. They bolster the conductors used to move electric force from age sources to client load. Transmission lines convey power over long separations at high voltages, commonly between 115 kV and 765 kV (115,000 volts and 765,000 volts).



©IJRASET: All Rights are Reserved

The unthinkable structure ought to be favored rather than the grid type or H-type transmission structure. Reasons that made forbidden transmission structure ideal over other structure are forbidden structure can be constructed in 30 feet in length segment in a wide scope of the distance across sizes what's more, material thickness. The forbidden structure can be provided with a hot plunge aroused covering or metallic paint explicitly figured for astounding enduring over an all-inclusive timeframe.

2) *Type of conductor to be Used*

a) *Hard Drawn Copper Transmitter:* Such kind of conductors invigorates high malleable. It has high electrical conductivity, long life, and high piece esteem. It is generally reasonable for dissemination work where ranges and tapping are more.

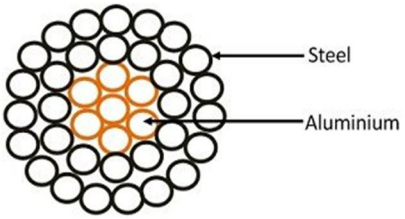
i) *Cadmium Copper Conduit:* The rigidity of the copper is expanded by roughly 50 percent by adding about 0.7 to 1.0 percent cadmium to it, yet their conductivity is diminished by around 15 to 17 percent. The property of higher elasticity empowers the conductor to be raised on longer ranges with a similar list. This conductor has the upsides of simple joining, more protection from climatic conditions, better protection from wear, simple machinability, and so on. The temperature at which copper toughens and mellow is additionally expanded, and temperature consequences for stresses are less. The variety in a hang because of changes in burden and temperature is limited.

b) *Steel-Cored Copper Channel (SCC):* In steel cored copper channel a couple of layers of copper strands encompass steel cored copper conduits. The steel center adds the rigidity to the conductor.

i) *Copper Welded Transmitter:* In such kinds of transmitters, the uniform layers of copper are welded onto a steel wire. The conductivity of the copper welded transmitter shifts from 30 to 60 percent to that of a strong copper conduit with a similar measurement. Such kinds of conductors might be utilized for a more drawn out range, for example, a waterway crossing.

c) *Hard-Drawn Aluminum Conductor or All-Aluminum Conductor:* The expense of the copper transmitter is extremely high, and thus it is supplanted by the aluminum conduit. The dealing with, transportation, and erection of the aluminum wires become exceptionally practical. It is utilized in dispersion lines in the urban region and short transmission line with the lower voltages.

d) *Aluminum Conductor Steel Strengthened :* All aluminum conductors are not adequately solid precisely for the development of long-length lines. This lack in quality can be remunerated by adding a steel center to the conductor. Such a conductor is called steel-cored aluminum conductor (SCA) or aluminum conductor steel strengthened (ACSR). ascr-conductor ACSR conductor has seven steel strands shaping a focal center around which there are two layers of 30 aluminum strands. The conductor stranding is indicated as a 30 Al/7 St.The The ACSR conductors have high rigidity and lightweight and henceforth it is utilized for little droop.



Aluminium Conductor Steel Reinforced

Cirucit Globe

e) *Smooth Body ACSR Conductor:* Such kind of conductor is likewise called Compacted ACSR. The traditional ACSR conductor is squeezed through passes on to smooth the aluminum strands into segmental shape. The interstrand space is filled, and the distance across the channel lessens without influencing its electrical and mechanical properties. This conductor can be made with various proportions of aluminum to steel. The figure appears underneath the conductor having proportion 6 Al/1 St

Convenctional ASCR Conductor

Compacted ASCR Conductor

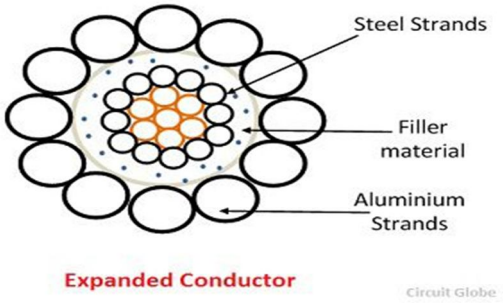
Circuit Globe

©IJRASET: All Rights are Reserved

f) *Extended ACSR Conductor:* For lessening the crown misfortune and radio obstruction at a high voltage a stringy or plastic material is filled between the strands. The distance across the conductor extends because of the filling material and thus, it is called an extended conductor. These conductors comprise of paper material that isolates the inward aluminum strands from the external steel strands.

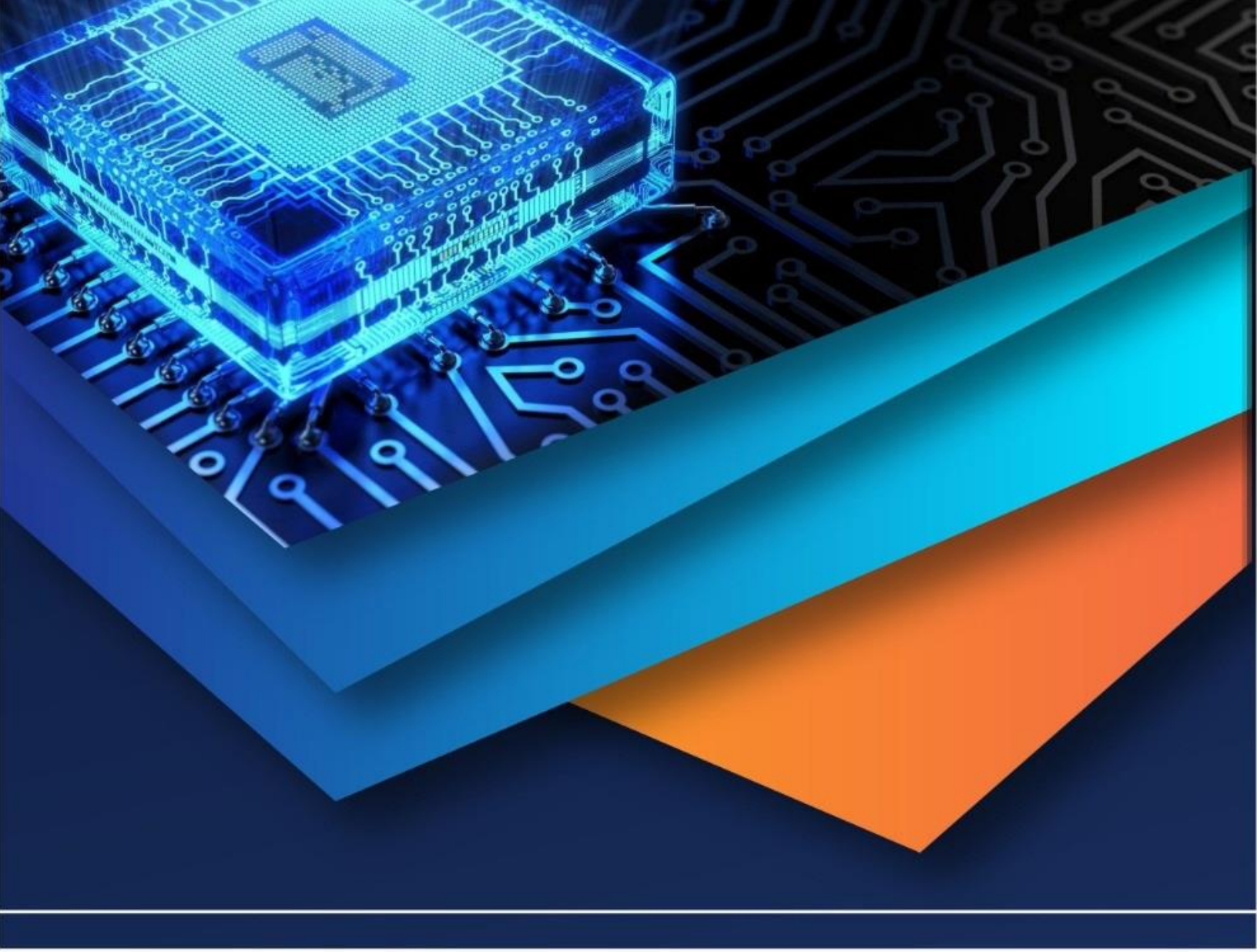
REFERENCES.

[1] IEEE PSRC Working Group: J. Esztergalyosetal.SinglePhase Tripping and AutoReclosing of Transmission Lines IEEE Committee Report. [12] M. J. Pickett, H. L. Manning, and H. N. V. Geem, .Near Resonant Coupling on EHVCircuits: I-Field Investigations,. IEEE Transactions on Power Systems, Vol. PAS-87,No. 2, February 1968.
[2] M. H. Hesse and D. D. Wilson, .Near Resonant Coupling on EHV Circuits: II-Method ofAnalysis,. IEEE Transactions on Power Systems, Vol. PAS-87, No. 2, February 1968.
[3] C. F. Wagner and R. D. Evans, .Symmetrical Components as Applied to the Analysis ofUnbalanced Electrical Circuits,. McGraw-Hill, New York, 1933.
[4] D. L. Goldsworthy, .A Linearized Model for MOVProtected Series Capacitors,. IEEETransactions on Power Systems, Vol. PWRS-2, No 4, Nov 1987, pp 953.95



[5] G. Phadke and J. S. Thorp, .Computer Relaying for Power Systems,. Research StudiesPress Ltd. 1988.22
[6] A. G. Phadke, J. S. Thorp, and M. G. Adamiak, .A New Measurement Technique forTracking Voltage Phasors, Local System Frequency, and Rate of Change of Frequency,.IEEE Transactions on Power Apparatus and Systems, Vol. PAS-102, No. 5, May 1983.
[7] P. J. Moore, J. H. Allmeling, and A. T. Johns, .Frequency Relaying Based on InstantaneousFrequency Measurement,. IEEE/PES Winter Meeting, January 21.25, 1996, Baltimore,MD.

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)