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Mechanisum of Silicone Rubber Piping over Bear Overhead Electric Conductors to Control Direct Hooking Electric Theft

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Abstract: ***In Maharashtra state industrialization is on the raising slope, hence demand of electricity continuously blooming. But to meet ever-growing energy demand for industrialization as well for house-hold work brings rise in tariff rates. Raising rates of tariff boost the increasing immoral activities in electrical power sector. With a technical point of view, Power Theft adversely affects the power quality, tariff rates and non-reliability of power supply. So power theft is a non-ignorable crime that is highly prevented, as it directly affected the power quality and economy of the state. Electricity theft is a social evil, so it has to be completely eliminated. Power consumption and losses have to be closely monitored so that the generated power is utilized in a most efficient manner. Now Utility companies have prime responsibilities to prevent the illegal usage of electricity. At these stage traditional methods to stop power theft is totally out dated. New technological development highly needed to solve the problem of illegal usage of electricity without any human control. The implementation of such technology will save large amount of electricity, and there by electricity will be available for more number of consumer then earlier with affordable tariff. This paper introduces the electrical power theft controlling mechanism.***

Keywords: Electricity Theft; Direct Hooking; Silicon Rubber Pipes

1. Introduction

Maharashtra State Electricity Board is bifurcated into three companies MAHAGENCO, MAHATRANSCO and MAHADISCOM. But power sector in Maharashtra is holding back. And short answer is power theft. According to State Economic survey an electrical distribution loss reaches up to 15.77% and aggregate technical and commercial losses (AT&C) to 21.83% in the year 2015-16. However, forcing consumers to pay Rs.6,600 crores every year. Fig.1 the AT&C losses have also gone up for MAHADISCOM from 18.71% in 2014-15 to 21.83% in 2015-16 [1,7].

With a technical point of view, Power Theft adversely affects the power quality, tariff rates and non-reliability of power supply. So power theft is a non-ignorable crime that is highly prevented, as it directly affected the power quality and economy of the state. Electricity theft is a social evil, so it has to be completely eliminated.

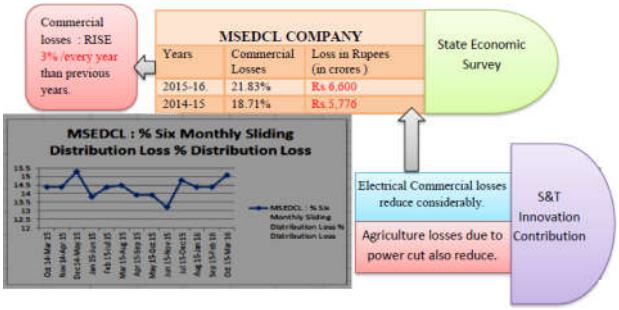


Figure 1: AT&C Losses Analysis of MSEDCL Company

As per experts, just 1% reduction in loss can bring additional revenue of Rs225 crores to the utility.Indian Power sector (Distibution Utilies of India) bears Rs.70K crores/Year lose due to Electricity Theft.Again Every year 3% Increase in Electricity Theft.Power consumption and losses have to be closely monitored so that the generated power is utilized in a most efficient manner [2,3]. Now Utility companies have prime responsibilities to prevent the illegal usage of electricity. At these stage traditional methods to stop power theft is totally out dated. New technological development highly needed to solve the problem of illegal usage of electricity without any human control. The implementation of such technology will save large amount of electricity, and there by electricity will be available for more number of consumer then earlier with affordable tariff [3,4,5].

The most well-known and least difficult method for stealing power is tapping energy, specifically from overhead conductors. In Maharashtra 80% power theft is done by direct hooking method. Now days it's very difficult to control this type of theft as there is no any technical solution to get rid from direct hooking rather than man power. Main objective of this paper is to build up Man-Power less Automatic system to control electric theft. In this paper, we introduce very simple and affordable Direct Hooking power theft controlling mechanism by using Silicone Rubber piping around bear overhead conductors [6].

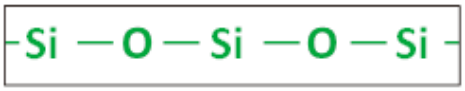
2. Silicone Rubber Prpoerties

Silicone rubber is an elastomer (rubber-like material) composed of silicone—itself a polymer—containing silicon together with carbon, hydrogen, and oxygen. Silicone rubbers are often one- or two-part polymers, and may contain fillers to improve properties or reduce cost. Silicone rubber is generally non-reactive, stable, and resistant to extreme environments and temperatures from -55 °C to +300 °C while still maintaining its useful properties. Due to these properties and its ease of manufacturing and shaping,

silicone rubber can be found in a wide variety of products, including:voltage line insulators, automotive applications; cooking, baking, and food storage products; apparel such as undergarments, sportswear, and footwear; electronics; medical devices and implants; and in home repair and hardware with products such as silicone sealants.

Silicone rubber offers good resistance to extreme temperatures, being able to operate normally from −100 to 300 °C (−148 to 572 °F). Some properties such as elongation, creep, cyclic flexing, tear strength, compression set, dielectric strength (at high voltage), thermal conductivity, fire resistance and in some cases tensile strength can be—at extreme temperatures—far superior to organic rubbers in general, although a few of these properties are still lower than for some specialty materials. Silicone rubber is a material of choice in industry when retention of initial shape and mechanical strength are desired under heavy thermal stress or sub-zero temperatures.[4][5][6] Organic rubber has a carbon-to-carbon backbone which can leave it susceptible to ozone, UV, heat and other ageing factors that silicone rubber can withstand well. This makes silicone rubber one of the elastomers of choice in many extreme environments. Silicone rubber is highly inert and does not react with most chemicals. Due to its inertness, it is used in many medical applications including medical implants. It is biocompatible, hypoallergenic, which makes it suitable for baby care products, and food contact in general. Silicone rubber is a reliable solution (as opposed to rubber and thermoplastic elastomers) for migration or interaction problems between the main active ingredients. Its chemical stability prevents it from affecting any substrate it is in contact with (skin, water, blood, active ingredients, etc.). Silicone rubber compounds have characteristics of both inorganic and organic materials, Silicone rubbers have fine electrical properties, good chemical stability and flame retardancy, and superior resistance to heat and cold. They are thus used in nearly every industry to improve the quality and functionality of products including electric and electronic equipment, office automation equipment, automobiles, food products, household goods, and leisure products.

The siloxane bonds (–Si– O–Si–) that form the backbone of silicone (dimethyl polysiloxane) are highly stable. At 433 kJ/mol, their binding energy is higher than that of carbon bonds (C–C), at 355 kJ/mol. Thus, compared to common organic polymers, silicone rubbers have higher heat resistance and chemical stability, and provide better electrical insulation.



a) Electrical Insulation Property

Silicone rubber has high insulation resistance of 1T.Ω.m-100 T.Ω.m, and its insulating properties are stable over a wide range of temperature and across wide frequency spectrum. There is almost no decline in performance even when immersed in water, making silicone rubber an ideal insulating material. It has particularly good resistance to corona discharge and arching at high voltages. Silicone rubber is thus used extensively as an insulator in high voltage applications.

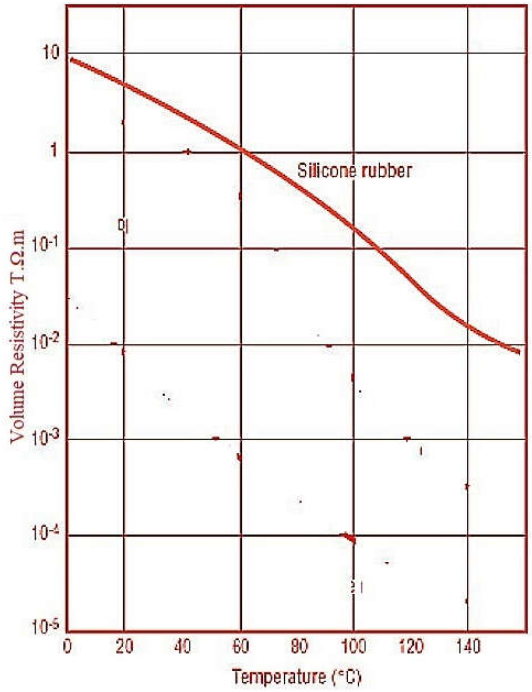
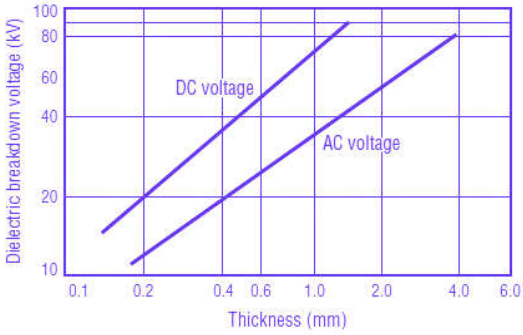


Figure 1: Graph of



b) Heat and Cold Resistance

In Silicone rubber withstands high and low temperatures. Silicone rubber can be used indefinitely at 150 ^{0}C with almost no change in its properties. It withstands use even 200 ^{0}C for 10000 hours or more, and some products can withstands heat of 350 ^{0}C for short periods. Silicone rubber Maharashtra 80% power theft is done by direct hooking method. Now days it's very difficult to control this type of theft as there is no any powerful technical solution to get rid from direct hooking rather than man power. First time our technology brings technical solution to stop direct hooking theft by using Drone mechanism. Drone Theft Controlling Mechanism Automatic, Reliable system & Cost efficient. The drone autonomously controlled using GPS navigation. For theft detection drone is send out for mapping and inspection for overhead conductors. In Fig.3. Overhead authorized service conductors are labeled with MSEDCL Barcodes. Barcode scanner can read and output printed barcodes. If unauthorized conductor found/ theft is found, Cutting tool get command to cut down service conductor. And if theft not found scanning procedure going repeated for

next service conductor Fig.4. Our technology introduces the electrical power theft controlling mechanism "Drone Operated Mechanism" for direct hooking theft. Main objective of this technology is to build up Automatic, reliable system to control electric theft. In future Direct Hooking Theft can be controlled by using Drone mechanism without using man power.

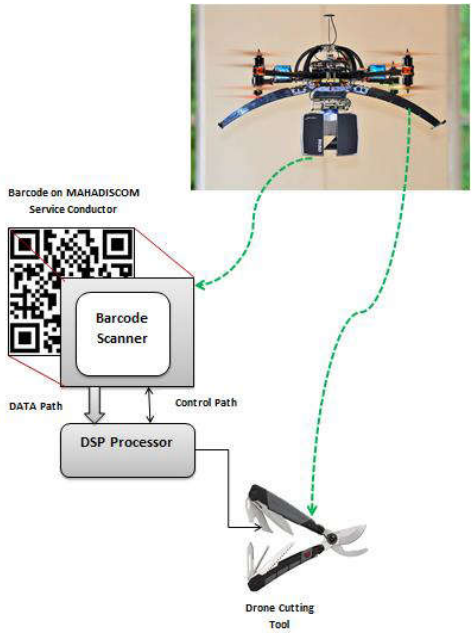


Figure 4: Working Methodology for Drone Operated Technology for Direct Hooking Theft

3. Quantifiable and Tangiable Benefits of Drone Electrical Direct Hooking Theft Control

Processes Modification	**1.**	**Automatic, reliable system to control electric theft.**
	2.	Faster results in than current theft controlling techniques.
	3.	Automatic: Man power saved during manual Theft Drive.
	4.	100% Theft detection & 100% Theft Control.
	5.	Decrease Risk to Human-No attack on Line-Staff during Theft Drive.
Outputs/ Results	1.	Resource (i.e. Coal at Thermal Power plants) saving by controlling power waste during Electricity Theft.
	2.	High productivity gain of rural industries & Agriculture sector due to availability of continuous Electricity Power.
	3.	Ecofriendly:-Pollution control due to burning of coal at Thermal Power Plants.
	4.	Improve Power quality.
Finance	1.	Rise revenue of Electricity Company by controlling power waste due to Electricity Theft. As per experts, just 1% reduction in loss can bring additional revenue of Rs225 crores to the utility.
	2.	Economically :-DO MORE WITH LESS
	3.	Lower Tariff Rate for Electricity Consumers.
Customers	1.	Customer satisfaction: No Load sheading & Good Power quality.

4. Conclusion

The research of this paper gives innovative method of power theft detection for meter tampering and direct hooking of overhead conductors. The developed system is Man-Power less, simple, easy to operate and cost effective. It saves time as well as revenue losses for the utility company. We have investigated the system model for both methods. Finally, we discuss the challenging issues in energy theft detection and provide some research directions. In the future, the smart grid requires more accurate and efficient energy theft detection designed.

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