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Power Transformer Fire and Explosion: Causes and Control

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Abstract: An increasing number of failures of power transformers over the world has led to greater interest in building up much needed expertise in electric power transformers, from its design to both preventive and prescribed maintenance. Winding failure is a frequent cause of transformer failure, bushing failure leads of fire and explosion, but it is still uncertain whether the increasing failure of transformers may be related to increasing lightning activity or increasing electric energy of the transient, surge voltages generated by lightning, especially long continuing currents and rate of rise of currents. But there are other important causes as well which need close attention, including wearing out of the contact points of tap changers in power generating and substation transformers, and poor maintenance of transformer oil. This paper seeks to review some of the well-known causes that lead to transformer fire and explosion, and highlights the important parts of the power transformer that need careful selection, installation, maintenance and condition monitoring. Moreover the containment of fires and measures that help to prevent transformer explosions in case of transformer fires are also discussed.

Keywords: Embedded systems, Smart Antenna; Adaptive Array; Artificial Neural Network.

1. INTRODUCTION

Power transformers play a crucial role in electric energy transmission and distribution. The typical layout, cooling and protection systems of an electric power transformer is as shown in Figure 1. Although they age with time as devices that carry large amounts of electric energy for twenty four hours daily throughout the year, they also vulnerable to catching fire and exploding, resulting in major loss of power supply to the consumer and danger to other expensive power equipment in substations, generator stations and other buildings and to human lives [1-2]. This is particular so with oil filled transformers found in generating stations and substations. Transformer condition monitoring and fire risk management are major concerns to power authorities. When such failures of