Preventive Maintenance Optimization
for Power Transformers in Use

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Abstract — The paper proposes a method for determining the optimal preventive maintenance intervals. It is highlighted the existence of a range for preventive maintenance actions which leads to minimizing the total cost of maintenance. For this purpose it is proposed to define a pre-defect state which allows the accumulation of the effects due to degradation of the transformer. At this state the transformer is still able to fulfill it's functions but it should be mentioned that its parameters are worsening being close to the limits permitted by normative. The paper presents the main objective functions that can be used to optimize maintenance activity. In this article it is presented a study case which aims to optimize the preventive maintenance activities taking in consideration an extension of the transformers lifespan from 25 years to 40 years. Depending on the considered objective function the optimal maintenance interval may have different values. For the example presented in this paper, to obtain the minimum value for the failure rate and minimum value of the unavailability time it is recommended to perform maintenance every 6 months. In order to decrease the maintenance cost, the maintenance time interval should be equal with 13 months. The purpose of the preventive maintenance is to maintain the rate of failure at a low value, which characterizes the normal operation of the equipment. Therefore when a pre-defect state occurs the equipment is removed from service before the appearance of any serious damage.