MITIGATION TECHNIQUES FOR VOLTAGE SAG IN POWER DISTRIBUTION SYSTEM BY USING DYNAMIC VOLTAGE RESTORER

Project report is presented in partial fulfillment for the award of the Bachelor of Electrical Engineering (honors)

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ABSTRACT

In power quality, voltage sag is the one of the problem issue in the power distribution system and Dynamic voltage Restorer (DVR) is used for mitigation of the sag problem. Voltage sags are normally caused by switching factors or faults at the transmission line. The fault can be occurring in terms of balance and unbalanced fault. Unbalance fault sag are commonly occur in the distribution system while the balance faults often seen as the worst case and however it seldom occurs. Since voltage sag is creating worse affect, the researches almost keen to find the solution for this problem. According to this problem an effective devices has been designed in order to mitigate the voltage sag problems. Nowadays, a lot of devices have been developed to mitigate voltage sag such as Dynamic Voltage Restorer (DVR), Voltage Dip Compensator (VDC), and Voltage Dip Proofing Inverter (DIP). In this study, focus is given only on the DVR system that will be simulated by using MATLAB SIMULINK software in order to mitigate and overcome the immunization of the sag problem that is occurred by the faults. This device will be connected in series to the problem circuit and it will improve the problem of the sag. At the same time simple calculation for voltage sag and voltage injection by DVR system also described. Finally the DVR system also will improved by increasing the value of MVA rating and secondary transformer in certain specific condition as to ensure that this device has more opportunity to mitigate voltage sag in long duration. The increasing of the capability of DVR also is very important for future development in order to analyze the impact of the DVR to the power distribution system.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

Service reliability and quality of electrical power have become growing concerns for many industrial facilities, especially with the increasing sensitivity of electronic equipment and automated controls. Although utilities do their best to supply reliable and high-quality power, periodic sags and surges on utility lines will continue to be a fact of life. Even a brief shutdown of process equipment can result in large additional production costs such as from downtime or scrap product. More than 50% of the today power quality issues are related to voltage sags and interruptions. Equipment manufacturers or manufacturer associations give the voltage sag equipment susceptibility. The fault in power distribution system is gradually reduced by the efforts of utilities and customers. However, the customers' sensitivity for voltage sag that is the most representative problems of power quality by the faults in power system is actually increased.

Both electric utilities and end users of electrical power are concerned about the quality of electric power. The term *power quality* has become one of the most prolific buzzword in the power industry since the late 1980s[1]. The issue in power quality problems is not confined to only energy efficiency and environment but more importantly on quality and continuity of supply or power quality and supply quality. Power quality may also be defined as the degree to which both the utilization and delivery of electric power affects the performance of electrical equipment[1]. A power quality problem is defined as any power problem manifested in voltage, current, or frequency deviations that result in power failure or disoperation of customer of equipment from the perspective of customers[2].