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Computer-aided Generator Paralleling System

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Computer-aided Generator Paralleling System

Final Project Report

25 April 2011

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ABSTRACT

The output of a single three-phase AC generator can only supply power to a specified amount of load. When this limit of the load capabilities is met, the generator's output is inefficient for load demand. In situations with these conditions, a second generator needs to be introduced and paralleled with the first to provide a combined load capability of both. In order for the outputs from the two generators to be combined, the three-phase voltage signals need to be synchronized. Synchronization requires that three conditions be met: the output voltage magnitude of both generators must be matched; the frequency in both generator outputs must be equal; and the phase angle of respective phase voltage must be the same. When generators are paralleled without adequately meeting these three conditions, there is a loss of energy from one generator to the other. One of the generators will be seeing the other as a load and will be feeding it. In situations where manual synchronization is used, perfect synchronization is never achieved. There is always a time lag between the visual certification of synchronization conditions, and the manual closing of the generator paralleling switch. Even where automatic synchronization is used, the efficacy of the synchronization depends on the cost and effectiveness of the embedded technology utilized. In this project, the development and implementation of a software-controlled data acquisition system to connect two synchronous generators in parallel with minimal hardware at a relatively low cost is implemented. The project successfully gained the input values necessary for generator signal synchronization and used paralleling equipment controlled both by a LabVIEW software environment and manual connection, emphasizing an automatic connection feature.

Key Words:

Generator Paralleling, Signal Synchronization, Phasing Lamps, NI LabVIEW, Data Acquisition, NI ELVIS, PCI-6014.

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