

Faculty of Engineering, Assumption University

Bangkok, Thailand

Design and Implement Battery Energy Storage System

By

Wutthikorn Threevithayanon

Abstract

The thesis deals with the design, construction and testing of a small Battery Energy Storage System (BESS) rated for 1.2kW power level. The principal objective of this project is to develop appropriate converter technology indigenously. The BESS developed consists of a 3-phase pwm based IGBT converter capable of bidirectional power and reactive power transfer between the battery system and electric grid. The converter control is done using two numbers of Texas Instruments Digital Signal Processor TMS320F241. In particular the Battery energy storage system is tested in the following modes:

1. As a stand alone 3-phase –380volt –50Hz a.c generator capable of supplying power to an isolated load with proper voltage and frequency control.
2. In synchronized mode operating stably in parallel with the existing 3-phase electric grid supply. In this mode the BESS is tested for active and reactive power flow in either direction. Power and reactive power levels can be controlled from a computer by sending the required commands to one of the DSP through serial communication.
3. After synchronising the BESS with the electric grid, it is made to operate in power levelling mode that is the power drawn from the grid is kept at a fixed level and the excess demand by the load connected is met by the BESS.