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5P69 - Design and Commissioning of a Medium Voltage Testbed Deploying Transient Loads*

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Microgrids have been studied considerably over the last decade and are now able to be uniquely designed and controlled to handle a wide variety of loads, many of which may operate in a transient manner. Historically, electric grids have relied upon fossil fuel powered motors to spin generators that source most of the electric power they need. Microgrids deploy a host of different distributed generation sources that are interconnected and controlled in real time to improve overall grid reliability and redundancy. Multiple microgrids are able to be interconnected to form a larger grid where power can be shared across smaller grids when needed. The use of a medium-voltage-direct-current (MVDC) is one possible solution to minimize power loss in the conductors and to reduce the power conversion requirement when high voltage loads are used. The non-continuous operation of such loads could introduce harmonics into the power system that severely impact power quality. In an effort to study the reliable operation and control of such a power system, the Pulsed Power and Energy Laboratory (PPEL) at the University of Texas at Arlington (UTA) has designed and installed a testbed that can be used to study a small microgrid deploying transient loads. The testbed, operating at power levels in excess of 300 kW, utilizes distributed AC and DC power sources and loads operating at the 480 VAC, 4160 VAC, 1 kVDC, 6 kVDC, and 12 kVDC, respectively. The testbed is being extended utilizing a hardware in the loop (HIL) simulator. The paper presented here will discuss the design of the testbed, the test plan methodology, and the results collected so far.

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