

Microgrid Development Center

Analysis and Verification of Microgrid-enabled Distributed Energy Solutions.

Lockheed Martin's Microgrid Development Center (MDC) offers a holistic approach to power systems design. The MDC helps our customers and partners in industry analyze and verify the impact of new technologies on microgrid system performance. This is achieved through industry-leading systems engineering processes, a world-class simulation and visualization center, and software-in-the-loop and hardware-in-the-loop integration experience.

Energy System Planning

From individual components to control algorithms, an efficient microgrid system design requires a rigorous systems engineering approach. That's where the MDC can help. Experts there analyze the mission, model component characteristics and measure the impact on key performance parameters — all essential to creating and verifying requirements.

Advanced Solution Testing

The MDC houses state-of-the-art planning, design and simulation tools which are specifically designed to produce and validate intelligent microgrid solutions. The automated microgrid planning tools enable drag-and-drop design of complex systems and complete evaluation of all aspects of a microgrid from design/installation costs through complete forecasting of operation and maintenance for the life of the microgrid. The detailed design, modeling and simulation tools, and full-up workstations, allow for complete modeling and optimization of the microgrid as well as the internal and external interfaces. The graphical user interface will enhance simulation and emulation of all critical systems and provide real-time updates on the operation of the microgrid and its components. For example, the control room of a nuclear power plant can be designed and modeled to show the real-time status of all critical, and especially safety-critical, portions of the nuclear island. This saves both development time and money and provides a more complete and robust solution for the customer.

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Evaluating Energy Technology

The MDC is also used to develop and evaluate key hardware and software technologies such as energy conversion, energy storage, advanced power generation techniques, centralized and distributed controllers and optimization algorithms. Advance and efficient energy conversion technologies are built and assessed within the MDC to provide high density and flexible power conversion architectures for the microgrid. The facility also acts as a test bed for advanced control and optimization algorithms that support the function of the centralized and distributed controllers. The controllers monitor the network and optimize the system to ensure the most efficient use of distributed power resources, while guaranteeing the reliability and versatility of the entire microgrid.

Software- and Hardware-in-the-Loop Testing

The MDC is a complete integration and test environment with everything necessary to provide full software-in-the-loop and hardware-in-the loop testing to evaluate the intelligent microgrid Solution before it is delivered and installed at the customer facility. The MDC has a wide range of legacy and modern generators, on-site renewable energy sources, energy storage and an integrated energy network of central and distributed controllers. The MDC is able to emulate, field-relevant load profiles with a full array of programmable loads of various types within a high-fidelity, plug-and-play simulation environment. This is all brought together with multiple, high-fidelity, human-in-the-loop monitoring stations that constantly collect, display and log all relevant aspects of development, integration and validation testing.

The MDC uses real hardware and software to deliver systems that will efficiently power the most critical conventional and nuclear operations.

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