

Topic: N16A-T009

## ISSAC Corp

Medium Voltage Direct Current (MVDC) Fault Detection, Localization, and Isolation

Issac utilizes model-based systems engineering to model components and interactions before manufacturing. It also utilizes prototype development of MVDC fault detection and isolation methods in a lab environment. Current effort is to provide a detailed specification and architectural recommendations for Fault Detection, Localization and Isolation (DLI) and Next Generation Electric Ship (NGES). The effort includes: 1. Exploring architectures to discern thresholds for DLI parameters; 2. Exploring technologies through prototype development and testing; 3. Understanding potential impacts and developing requirements for other NGES subsystems; 4. Understanding cross-system integration issues and architectures and specifications to mitigate risks. These activities can help with innovation and provide a competitive advantage for other industries that use DC to power vehicles or microgrids.

### Technology Category Alignment:

Biomedical Informatics / Health Information Systems & Technology

Advanced Computing/Software Development

Synthesis/Analytics/Decision Tools

Engineered Resilient Systems (ERS)

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**SYSCOM:** NAVSEA

**Contract:** N68335-18-C-0149

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-18-C-0149](https://navystp.com/vtm/open_file?type=brochure&id=N68335-18-C-0149)

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2019-0545

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WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:**

**Transition Target:** Naval Power and Energy Systems (NPES) Integrated Power and Energy System (IPES)

**TPOC:**  
(202)781-2520

**Other transition opportunities:**

Transition of this capability would be follow on work to continue the specification development and standards refinement for all the major Advanced Development Model (ADM) components that interface with the medium voltage direct current system components. This overview from a systems engineering perspective will allow deriving other sub components that will "fit" in to the anticipated architecture.



<https://allhands.navy.mil/Media/Gallery?igphoto=2002118658>

WHAT

**Operational Need and Improvement:** In support of the NPES Technology Development Road map, research and analysis is necessary in the use of medium voltage direct current (MVDC) within a shipboard architecture. The Navy needs to understand how commercial industries utilize MDVC in transmission to minimize loss across long distances in order to apply that technology to the electric ship design. Additionally developing MVDC circuit protection in multiple transmission variants will need analysis for component design and implementation.

**Specifications Required:** This effort is to create design specifications for required MVDC implementation to support fault detection, localization and isolation (DLI). Additionally, this effort will provide inputs to update any standards effected by the new design and implementation requirements such as the Draft MIL-STD 1399 section for MVDC

**Technology Developed:** In addition to the specifications and standards, modeling and simulations will be utilized to test fault DLI impacts and limitations. The specification development will utilize model-based systems engineering techniques to model the entire DLI environment.

**Warfighter Value:** Disciplined engineering processes will be utilized to design components that do not exist today or modify current components for the rigors of a ship environment

WHEN

**Contract Number:** N68335-18-C-0149 **Ending on:** December 15, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Draft Standard List	Low	Internal Review	3	September 2020
Draft Specification	Low	Internal Review	3	September 2020
DLI Trade Study	Low	Internal Review	3	September 2020
Models Analysis Results	Low	Navy Customer Review	3	September 2020
Final Standards List	Low	Navy Customer Review	3	December 2020
Final Specification	Low	Navy Customer Review	3	December 2020

HOW

**Projected Business Model:** Knowledge gained through additional model based systems engineering experience can be used on other components in the MVDC environment.

**Company Objectives:** Provide large companies with an ability to analyze and model large amounts of data for hidden information.

**Potential Commercial Applications:** ISSAC can utilize this experience in the data analysis components of Naval Research

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