Topic: N132-108

Anchor Technology, Inc.

Automated Method for Developing Concept Level Fluid Distribution Systems

Anchor Technology, Inc. is developing innovative software technology for automatically synthesizing, routing and analyzing shipboard distribution systems. These tools automatically generate detailed 3D models of ship distribution systems during concept design. Decisions made at the concept design stage have a profound impact on total life cycle cost of ships. Large numbers of alternatives need to be generated and evaluated permitting the discovery of optimal feasible solutions to be identified that meet cost, weight, survivability and other performance criteria. Shipboard distribution systems require special attention because integrated electrical power systems and high energy combat systems make intensive thermal management necessary. This new technology makes it possible to rapidly generate and evaluate large numbers of alternatives for the purpose of optimization that can translate to cost effectiveness during concept, preliminary, and detail ship design, as well as, over the total lifecycle of the ship.

Technology Category Alignment:

Maintainability/Sustainability
Survivability

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SYSCOM: NAVSEA
Contract: N00024-15-C-4055

Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00024-15-C-4055

Department of the Navy SBIR/STTR Transition Program

Statement A: Approved for Release. Distribution is unlimited.
NAVSEA #16-584

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WHO

SYSCOM: NAVSEA

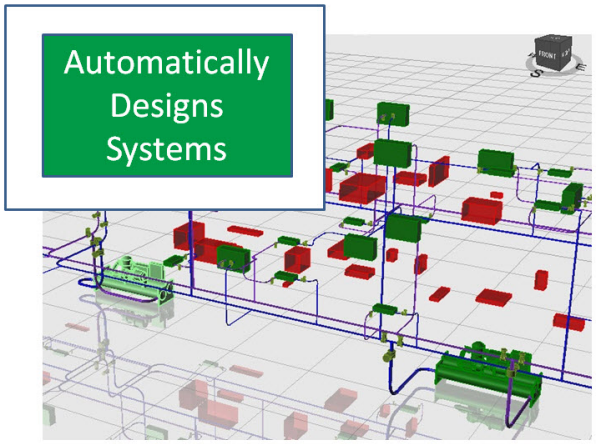
Sponsoring Program: Cross Platform Systems Development Program, NAVSEA-05T1

Transition Target: Future surface combatants

TPOC:
(215)897-7844

Other transition opportunities: Team Ships, Team Submarine, back-fit on existing platforms

Notes: This innovative software technology automatically synthesizes, routes, and analyzes shipboard distribution systems. The tool rapidly generates and evaluates large numbers of alternatives against performance, operational, and cost criteria to discover optimized and feasible design configurations.



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WHAT

Operational Need and Improvement: Analysis of design alternatives for future ships requires fast, accurate estimates for the size, weight, and cost of the thermal management systems needed to support equipment and personnel. Extrapolation of historical data is no longer reliable due to the magnitude of the changes introduced by integrated electrical power systems and high-energy defense and combat weapons. System designs are needed which meet all operational requirements and at the same time minimize total life cycle energy consumption and cost.

Specifications Required: A software tool is needed which can: (1) automatically synthesize shipboard cooling distribution systems, (2) optimize for survivability, electrical load, heat transfer, size, weight, and cost performance requirements, (3) analyze and validate the performance of candidate solutions under a number of operating conditions, (4) produce full 3D models of the systems to demonstrate that they can fit within the available space in the ship, (5) interoperate with existing Navy and commercial analysis and design tools, (6) be able to operate independently and within a Process Integration and Design Optimization environment that links numerous Computer Aided Engineering software tools used across engineering disciplines to conduct Set-Based-Design.

Technology Developed: Software for automatic generation of detail designs for fluid distribution systems, including cooling systems. The software is given the ship structure, plus a list of the shipboard components that need a service (chilled water, sea water, hydraulic fluid, fuel, etc.). Using an expert system, the software selects and sizes system components and synthesizes a large number of candidate distribution networks. The synthesis includes 3D routing of each candidate system within the ship. Candidate solutions are evaluated against a number of criteria, for each ship operational scenario. The best candidates are presented to the engineer for review and may be archived to a Navy LEAPS database.

Warfighter Value: Reduce the time lag between needs identification and fielded ship systems. Provide the ship designer with the tools necessary to achieve significant reductions in total energy consumption and cost.

WHEN

Contract Number: N00024-15-C-4055 **Ending on:** September 25, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase 2 Base 6 Month Demo	N/A	Prototype automatically generated a whole ship chilled water system.	5	May 2016
Phase 2 Base 18 Month Public Demo	Low	Core features tested in a realistic simulated environment.	5	April 2017
Phase 2 Base: Base Contract End	Low	Prototype successfully demonstrated in a relevant environment.	5	September 2017
Phase 2 Option: Contract End	Low	System completed and qualified through testing in expected conditions.	6	September 2018

HOW

Projected Business Model: Anchor Technology will develop and market this software. The company team has successfully developed, marketed, and supported engineering software with customers in 17 countries in the past. The initial customers for this new technology will be NAVSEA groups and naval architecture firms performing early stage design. The software will be extended into contract and detail design, where Navy prime contractors will be customers. The majority of long term revenue is expected to come from commercial sales in the architecture, engineering and construction industries.

Company Objectives: Anchor Technology intends to grow the capabilities of the software and extend it to other domains, including electrical power distribution systems. The goal is to provide value by dramatically reducing the man-hours required for the design of distribution systems. Anchor Technology is negotiating partnerships now with existing computer-aided design and engineering software companies to develop interfaces with their products.

Potential Commercial Applications: This technology is directly applicable to commercial ship design, and to the much larger fields of building design and process and power plant design.

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