

Wednesday May 6th Plenary Talk
8:15 -9:15 AM

*Next Generation Integrated Power System: The Backbone of the Electric Warship
(Hybrid Electric Drive: A Near Term Opportunity)*



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ABSTRACT: Advances in materials, controls, packaging, thermal management have played a significant role in improving efficiencies, power density, availability of power, and other desirable metrics in electric power systems. The US Navy, leveraging these advances, and in cooperation with industry, is developing the necessary architectures and modular building blocks, or pieces, consisting of power generation, power conversion, energy storage, power distribution, and power load modules. These pieces each add their own contribution to the system or architecture that they fit into, to comprise the system. Their construct also allows for tech insertion as technology matures and requirements change. Such applications as Hybrid Electric Drive (HED) focused on reducing fuel consumption, and dependency upon fossil fuel, benefit from this modular; puzzle piece approach and will be described herein. Further, it is the architecture, or backbone, or Next Generation Integrated Power System (NGIPS) as referred to by the Navy, which must first be established, derisked, and matured in order to enable the common set of modules to be installed that lead to the delivery and employment of an affordable, highly efficient, power dense and reliable navy platform known as the electric warship. However,

NGIPS is not only about technology, it's also about how we design, acquire, and provide in-service support to the power systems. This process is the Open Architecture Business Model.

This presentation describes 1) the NGIPS Technology Development Roadmap, 2) Open Architecture Business Model, 3) Technologies that are being currently developed and considered for potential mid and far term module insertion, and 4) An example application that employs the modules to support HED focused on reducing fuel consumption and dependency upon fossil fuel.

Biographical Information on Captain Petersen

Captain Petersen was born on 02 April 1964 in Toledo, Ohio. He is the son of James F. Petersen (deceased) and Hilda K. Weyant (remarried.) He attended St. John's High School and graduated in 1982. Following graduation, he received appointment to the United States Naval Academy, and reported July 1982. In May 1986, he graduated from the Naval Academy with a Bachelors of Science Degree in Mathematics and was appointed an Ensign in the United States Navy. He attended and graduated from Surface Warfare Officer School (SWOS) and Engineering Officer of the Watch (EOOW) School in January, 1987. He reported to his first ship, USS HALSEY (CG-23), forward deployed with the Kitty Hawk Battle Group. While in HALSEY, 1987-1990, he served as an Engineering Department Division Officer (M, DCA, B, and A&E) and qualified EOOW, and SWO. He was then assigned to the USS BIDDLE (CG-34), stationed in Norfolk, VA. as the Main Propulsion Assistant. Highlights from this tour include a second qualification as EOOW, and a 9 month deployment to the Red Sea in support of Operation Desert Shield and Desert Storm. Following this tour of duty, he received orders for the Naval Postgraduate School (NPS), Monterey, CA. While at Monterey, he was selected for lateral transfer to the Engineering Duty Officer program. He received the Engineer-In-Training (EIT) state of California in 1993. He graduated from NPS in 1994 with a Masters of Science in Mechanical Engineering with thesis emphasis on Structural Dynamics. Following completion of the EDO Basic School, he reported to Puget Sound Naval Shipyard (PSNS.) While at PSNS, he was a Project Superintendent on the USS ARKANSAS (CGN-41) DSRA, USS ABRAHAM LINCOLN (CVN-72) EDSRA, and Director of the Pacific Northwest Pump and Motor Regional Repair Center. During this tour, he qualified EDQP. After leaving Active Duty in 1998, he affiliated in the Navy Reserve. He has served with six navy reserve units to include tours as Admin, Training, Projects, Executive, Commanding Officer of NR NAVSEA Unit 121, Rochester, NY and Commanding Officer of NR CNSL DET 305, Pittsburgh, PA. His last assignment was Executive Officer, NAVSEA Wilmington. Captain Petersen promoted to the rank of Captain on 01 March 2009. Captain Petersen is authorized to wear the Meritorious Service Medal, Navy Commendation Medal (Six awards), the Navy Achievement Medal (Two awards) and numerous unit and campaign medals.

Following Active Duty, he was hired by the Naval Surface Warfare Center, Carderock Division, Annapolis, MD as an Electrical Engineer. From 1998-2002, he led several projects supporting Navy Electric Drive and authored several papers and reports on electrical propulsion, generation and distribution. In October of 2002, he was detailed to the Office of Naval Research (ONR) in Arlington, Virginia as the Deputy to the Submarine Science and Technology Officer, and was hired as a Program Officer in May, 2006 where he led the electromechanical sub-thrust of the Advanced Electrical Power Systems Program and was the ONR S&T rep to the Electric Ship's Office, PMS 320. In November, 2008, he was recalled to Active Duty with assignment as the Deputy Director, Electric Ships Office, PMS 320. He is a member of the Acquisition Professional Community (APC) and DAWIA Level III Certified in Science and Technology Management (STM). He has been active in his Church and his children's school and extra-curricular activities. He is a member of the Gideon's, ASNE and IEEE. He is married to the former Alena Kay Northrup of Pasadena, MD. They have two children, Madelyn 20 and Robert 19. They built a home in Oxford, PA in 1999 and have lived there since then.