

Session III: Other Systems

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Session III., Other Systems, was designed to incorporate a variety of AUV energy and power systems and technologies that were not included in Section I on Batteries, or Section II on Fuel Cells. This Section, held on Thursday AM, was very well attended and a variety of questions were discussed in a workshop session format. The facilitator for this Session, Dick Bloomquist, introduced the subject with an overview of AUV and submersible air independent energy and power systems from several foreign countries. This helped introduce the six technical papers that addressed cryogenic oxygen, hydrogen storage, safety, reliability, systems integration, etc.

Paper III-1, presented by Dr. Robert Hebner, presented an update on fly wheel technology with a wide variety of examples and potential applications. These new flywheels have been extensively tested and their reliability is demonstrated. Noted specifically these systems are very useful for load leveling and may also be seen as alternative to ultra capacitors.

Paper III-2, was presented by Mark Habermusch, and emphasized the reliability and safety of cryogenic AUV oxygen systems being developed by Sierra Lobo of Fremont, OH. These systems have potential for other applications where air independence is a requirement such as space based systems.

Paper III-3, presented by Dr. Timothy Miller presented a description of a new research project at ARL PSU. The Al-seawater system was system was selected as having the greatest theoretical energy density potential. This project is utilizing very comprehensive modeling techniques and computational fluid dynamics procedures in the design of a novel vortex combustor. System process flow diagrams were presented that illustrated the integration and dynamics of such a design. Many of the system components have been developed and limited system integration tests are complete.

Paper III-4, presented by Dr. Daniel Kiely, showed a table of potential energy from compounds in thermal systems. These systems have often been limited due to lower efficiency and power density of the conversion subsystems. Recent developments in mini turbines and mini turboalternators coupled with the very high-energy potential combustors make these systems candidates for AUVs. It was notable that this system employs hydrogen peroxide as an oxidant source and can be operated open or closed cycle.

Paper III-5, was presented by Peter Keller of the Carderock Division of the Naval Surface Warfare Center. This presentation incorporated a video to demonstrate the kinetics and dynamics of a variety of electrochemical systems for autonomous applications. The presentation focus was on the safety

the Carderock Division considering a variety of environmental conditions including shipping, handling, and disposal.

Paper III-6, was introduced by Claude Brancart and presented by Richard Blidberg of the Office of Naval Research. This technology was the result of a partnership with the Russian Science Institute and developed a long range vehicle with demonstrated performance. This AUV is currently awaiting an export license for sale or lease in the west.