NEW ERA IN NAVAL WARFARE EQUIPMENT

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REZUMAT. Noua tehnologie este în prezent implementată la bordul navelor pentru utilizare zilnică și pentru o capacitate ridicată de luptă. Majoritatea celor mai noi echipamente sunt dezvoltate în secret și sunt folosite de forțele navale de top în războaiele din întreaga lume. Această lucrare va prezenta unele capacități de luptă instalate pe nave din surse relevante. Conceptul, designul, propulsia modernă, gestionarea modernă a energiei, armele moderne sunt astăzi cele mai recente subiecte de cercetare navală.

Cuvinte cheie: naval, echipamente, razboi modern.

ABSTRACT. New technology is nowadays implemented onboard ships for daily use and for high combat capacity. Most of the newest equipment are developed in secret and are used by the leading naval forces in wars worldwide. This paper will present some known combat capacities installed on ships from relevant sources. Concept, design, modern propulsion, modern energy management, modern weapons are nowadays the latest naval research topics.

Keywords: naval, equipement, modern warfare.

1. INTRODUCTION

Worldwide interest in a new generation of weapons, electric naval systems and new devices is increased due to development of technology. Future naval combat require a new generation of high energy weapon to increase combat capacity. Naval forces are exploring the means to harness energy and power needs to use high capacity warfare technology.

Reducing noise, size, weight, and power demands all continue to be key design considerations for naval design for propulsion, design of components, energetic system and weapons system.

2.NEW ERA IN DESIGN OF SHIPS

New design for ship related tointerconnected automation systems with focus on enabling data sharing and connected electronic warfare. Nowadays data is relevant to watch-keeper, humanitarian, antipiracy, and antiterrorism roles. Ships are expensive, so focus is primarily on ways to improve the capabilities ofexisting fleet with new solutions like data sharing, open source,higher-resolution 4k display panels, and the cloud.

3.MODERN ELECTRIC PROPULSION SYSTEMS

Electric propulsion systems utilize electrical power to drive propeller blades with high efficiency. Electric propulsion has gained momentum in a wide range of marine applications and offers improved economic and environmental performance.

The power used to drive the propellers in electric propulsion systems becomes load for the generators. The "ship's electric power station" supplies power for propulsion, equipment, weapons and electrical requirements on board.

Fig. 1. Next Gen Ships
Concept of a HELIOS laser system aboard a U.S. destroyer.
Lockheed Martin Image

Azipod is a high efficiency propulsion unit suitable for high power ships. The newest Azipod has is improved efficiency by installing to the pulling Azipod propulsion unit a special nozzle module including stator blades to straighten the water flow from the propeller to reduce the turbulence and energy loss and to give the optimum thrust for the vessel. This gives about 5 - 10 % efficiency improvement. Compared to the conventional shaft line concepts, up to 20 % improvements can be achieved. The electric efficiency is improved

over the whole ship speed range and not only at one design point and this is a key point in recommending electric propulsion for navy.

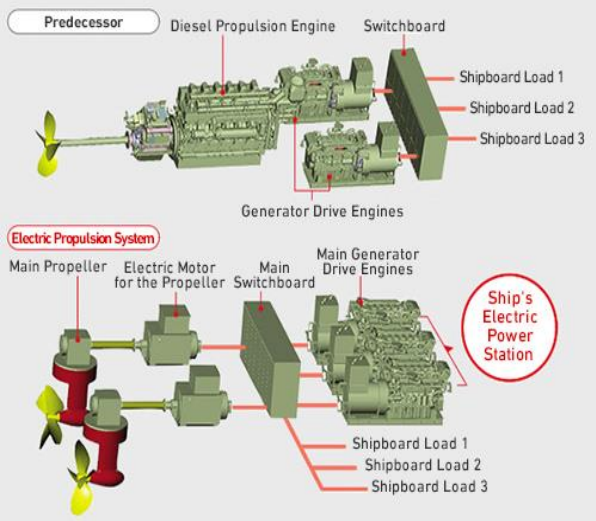

Fig. 2. Ship's electric power station general scheme.

Fig. 3. Azipod systems for electric propulsion

High electric power needed by new warfare equipment is available onboard ships of the newest electric propulsion systems.

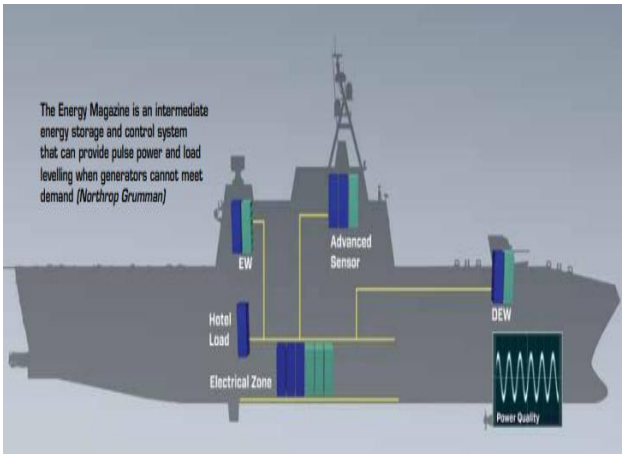

Fig. 4. Nothrop Grumman solution
Source: https://www.grumman.com/Capabilities/IPES/Documents/Northrop-Grumman-Integrated-Power-and-Energy-System.pdf

The next generation of high energy weapons and sensor symptoms demand improved power quality and control, stable back-up power and load balancing in order to meet multiple pulsed power needs. This need has generated requirements for shared, large-scale energy storage as a means to respond to the challenges associated with increased demand for shipboard electrical power. During times of lower demand, the energy magazine is 're-charged' from the ship's electrical system.

4.FUTURE WEAPONS SYSTEMS

SNLWS

The first weapon, officially called Project 3402 in the Navy budget, is also known as the Surface Navy Laser Weapon System. SNLWS is an "advanced prototype laser weapon" in the 60-kilowatt-or-higher class. The US Navy recently announced this laser would be installed on the guided missile destroyer USS *Arleigh Burke*, but the budget provides funding to outfit not just one but three destroyers.

The SNLWS is a solid-state laser the Navy sees as useful in "Anti-Surface Warfare, Integrated Air and Missile Defense and Counter-Intelligence, Surveillance and Reconnaissance (C-ISR)." The laser can "dazzle and destroy" drones as well as "fast inshore attack craft" (FIAC). The 2019 budget allocates $190 million for the SNLWS. The Navy anticipates the first destroyers outfitted with the laser weapon in late of 2020.

ODIN

The second weapon is the ODIN, or Optical Dazzling Interdictor, Navy (which formerly carried the bland-sounding moniker Low Power Module). ODIN is a laser designed to blind and disrupt "Unmanned Aerial Systems (UASs) and other platforms that will address urgent operational needs of the Fleet." That wording implies drones are currently being used to watch U.S. ships at sea.

Two ODIN units have apparently already been funded, and the 2019 budget provides for three more (installation costs will be covered in the 2020 budget). Each ODIN unit consists of a "Beam Director (Telescope, Optics, Fast Steering Mirrors); Lower Power Lasers (2); Sensors (Coarse Track, Fine Track, ISR Imaging); Computer Rack, Network Switches; and an Operator Laptop." The U.S. Navy is spending $44 million in 2019 on the ODIN. [7]

Solid State Laser & RHEL

Next up is Solid State Laser - Technology Maturation. It's a much larger 150-kilowatt laser to be mounted on a *San Antonio*-class ship in 2019. Finally, the Navy mentions the Ruggedized High

Energy Laser, or RHEL, a 150-kilowatt laser that will apparently employ "different laser architectures" that will handle more powerful laser beams eventually.

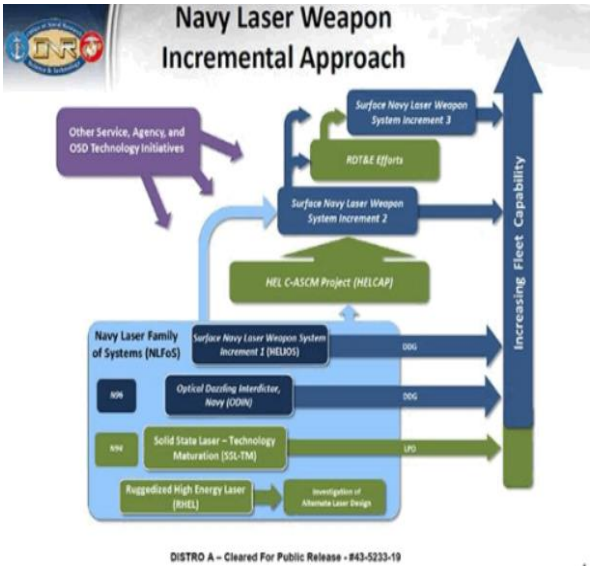

Fig. 5. ONR picture for laser weapon
Source https://news.usni.org/2019/11/28/report-on-navy-laser-railgun-and-gun-launched-guided-projectiles-2?fbclid=IwAR2b_Qp0tQmWzHmEWJuqtkx3l59-S2Q37jXTK0UWYmcdL5yszWR9pNdPb3o

But what about the U.S. Navy's vaunted railgun, also known as Project 3370. The 2019 budget provides zero funding for the railgun. In its place, the Navy is funding the Gun Launched Guided Projectile, also known as the Hyper Velocity Projectile Block 0, which will "double the range of the current 5-inch conventional ammunition while meeting multi-mission operational requirements for Anti-Surface Warfare (ASuW), Anti-Air Warfare (AAW), and Naval Surface Fire Support (NSFS) missions."

Each U.S. Navy guided missile cruiser and destroyer has at least one 5-inch gun. The U.S. Navy is spending $15 million on the GLGP. [7]

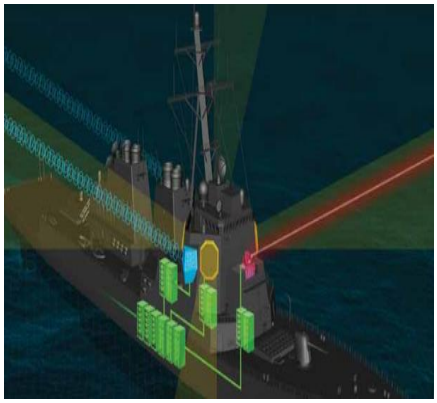

Fig. 6. Model for laser weapons arrangement.
Source https://www.grumman.com/Capabilities/IPES/Documents/Northrop-Grumman-Integrated-Power-and-Energy-System.pdf

LRAD

The Long Range Acoustic Device (LRAD) is an acoustic hailing device developed by LRAD Corporation for warning tones.

LRAD systems are used for long-range communications in a variety of applications including as a means of non-lethal, non-kinetic crowd control and now is installed onboard ships.

According to the manufacturer's specifications, the systems weigh from 15 to 320 pounds (6.8 to 145.1 kg) and can emit sound in a 30–60° beam at 2.5 kHz. LRAD systems are used by law enforcement, government and defense agencies, as well as maritime and commercial security companies to broadcast audible notifications and warnings over distance.

Fig. 7. LRAD onboard ship.
https://en.wikipedia.org/wiki/Long_Range_Acoustic_Device#/media/File:USS_Donald_Cook.jpg

5.CONCLUSION

This paper will present only technology available in sources without any restrictions and presented below. All ships will be updated or replaced with the new technology and it is only a matter of time. This paper presented only some known combat capacities installed on ships from relevant sources. Concept, design, modern propulsion, modern energy management, modern weapons are nowadays the latest naval research topics for global shipyards and participants in naval industry.

Future naval combat will be different than nowadays consisting in cyber defense and means to harness energy and power needs to use high capacity warfare technology.

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