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New layout of cruise ships

3,2 MVA



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New layout of cruise ships




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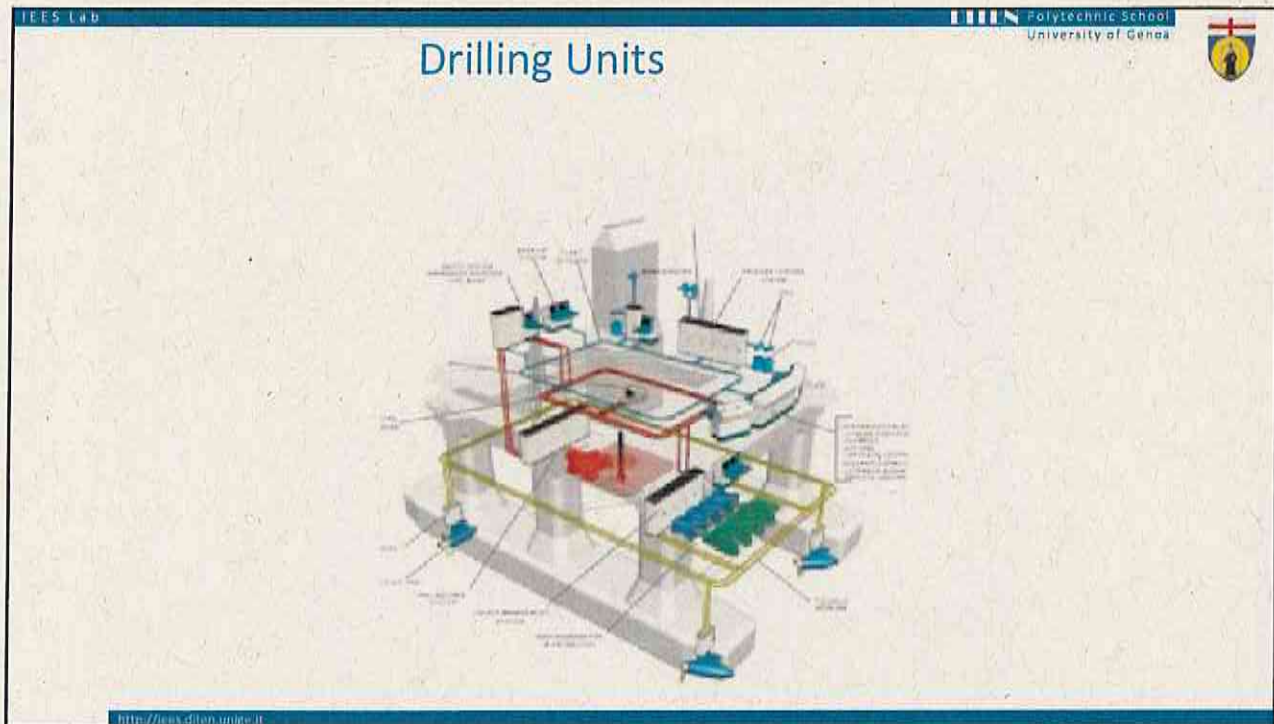
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Oil and Gas Exploitation and Exploration

- Drilling Units, Production Vessels and Tankers
- Typical of these vessels is their large installed thruster power, typically 20-50 MW. Together with the production, drilling, utilities, and hotel loads, the installed power is typically 25-55 MW. The typical installation has a common power plant for all these loads, enabling flexibility to operation with high energy-efficiency and high availability.
- The thrusters used for station keeping (DP operation) typically also constitutes the main propulsion in transit and maneuvering of the vessel, either all or selected units only.

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Field Support Vessels and Offshore Construction Vessels

- For vessels with dynamic positioning (DP) as the main operating mode, such as diving support vessels, crane ships, and pipe layers, electric propulsion was early taken into use, first with fixed speed CP propellers and later with variable speed thrusters.
- The **reduction in fuel consumption** and environmental emission from diesel electric propulsion compared to conventional mechanical propulsion is significant for vessels with a diversified operational profile. (30-40 %)
- These vessels will be configured as DP vessels, **class 2 or 3**, and most will have electric propulsion with a total power demand of **8-30 MW**, depending on size and drilling/lifting capability.

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- Off-Shore Supply Vessels



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- Dynamic Positioning



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Icebreakers and Ice Going Vessels

- The dynamic requirements for the frequency converters in propulsion application are low, compared to many other industrial applications.
- But in **ice-going vessels and icebreakers, the load variations may be significant and rapid**, and this implies that the propulsion system must have high dynamic performance in order to avoid over-loading of components and undesired tripping.
- **Electric propulsion has been used in a majority of new-buildings since the 80's.** The basic configuration can be similar as for service vessels, with a redundant power generation and distribution system, although there will normally not be any DP requirement for the icebreakers.
- The installed propulsion power may be in the range of **5-55MW**, depending on ice breaking capability.



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War Ships

- Despite the great interest in the application of electric propulsion to warships, there are quite few conventional surface warships with pure electric propulsion, but more are being projected.
- For sub-marines, electric propulsion with diesel engine generation and battery storage, fuel cell or nuclear power plant is applied.
- Electric propulsion for war ships does not conceptually differ much from the merchandise vessels, but the solutions may differ since the requirements to availability and redundancy are normally stricter.
 - Also, the ability to withstand shock and provide low noise signatures are prerequisites for electric drive when applied to a warship.



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Research vessel

- Geo technical research vessels, oceanographic vessels, and fishing research vessels have in common very strict underwater noise requirements, typically several decibels below normal levels for other applications.
- This has traditionally been achieved by use of direct propulsion with DC motors, special considerations for filtering and reduction of vibrations and torque variations.
- By use of modern frequency converters and filtering techniques, AC motors have become feasible for such high demanding applications as well, and are now taken into use in recent ship designs.

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Research vessel



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Trends

- Electric propulsion is continuously being investigated and evaluated for new applications.
- LNG and chemical tankers, Ro-Ro vessels, container vessels, fishing vessels are typical examples of large volume markets where electric propulsion yet is not taken into use because of the increased investment costs.
- However, only small changes in operation and design criteria, such as increased fuel or emission costs, regulatory restrictions, and equipment cost reduction, may give a tremendous shift in technology application for several of new areas.

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- Ro-Ro vessels



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UNMANNED SHIPS

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The slide features two photographs of unmanned ships. The top-left image shows a white container ship with a multi-colored stack of containers, sailing on a blue sea under a cloudy sky. The bottom-right image shows a sleek, white, autonomous surface vessel (ASV) with a streamlined hull, also on the water. The slide includes logos for IEES Lab, IIIN Polytechnic School, and the University of Genoa. A URL is provided at the bottom left, and the acronym 'IEES - Intelligent Electrical Energy Systems' is at the bottom center.

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