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# Investigations on the Energy Chain supporting a Naval Railgun

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Due to the large muzzle velocities achieved by railguns, they are especially usefull to further extend the reach of artillery systems. At gun exit velocities of about 2.5 km/s a heavy artillery round is able to cover distances far above 100 km. In contrast to conventional, explosively driven guns, railguns apply constant acceleration pressure over the full acceleration length, resulting in a short, compact barrel. The weigth and volume of the required pulsed power supply (PPS) puts currently a question mark on the ability of the railgun to replace conventional artillery guns on existing mobile systems. For a shipboard railgun the ISL investigates since several years the possiblities of capacitively or inductively driven railguns. To allow for a focused discussion, a specific, realistic scenario was developed. A 25 MJ muzzle energy railgun accelerates a 8 kg heavy launch package to 2.5 km/s. As further parameter, the number of rounds to be fired per minute was fixed to 6. In a subsequent analysis, this scenario was used to compare a coil based PPS to a capacitor based PPS. It could be shown that both systems have specific advantages and disadvantages. The main disadvantage for a capacitor based system seems to be its weight and volume, while the coil based system suffers from its inability to store energy for longer than a fraction of the launch time. In a continuation to further define the investigated system this study includes batteries as primary energy stores and evaluates numbers for the overall system weight and volume. As batteries are able to store a large amount of energy, the system battery—PPS—railgun is a (close to) independent system that could be used as a “plug-in”replacement for the currently used deck gun on vessels.
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