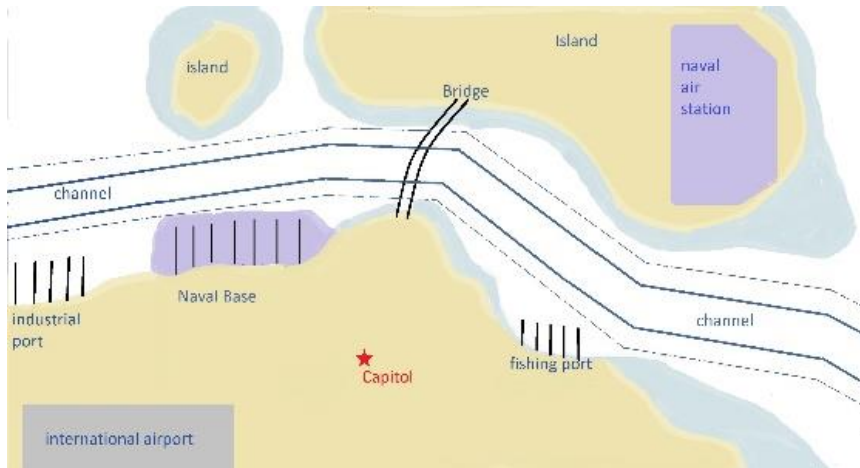


Creating HAVOC: A Modern-Day Fireship Conversion

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Historically a fireship was a ship filled with combustibles or explosives, deliberately set on fire, and steered or drifted into an enemy fleet to destroy ships, break naval formations, or induce panic. These vessels were used due to the large tactical benefit the fireship could offer at a low cost against a much larger fleet but the rise of steam propulsion and iron hulls led to a gradual decline in the use of traditional fireships.

The objective of this conversion was *to* reduce enemy coastal capabilities *by* disabling critical enemy infrastructure *using* a converted disposable maritime platform. This was accomplished by understanding the sponsor's requirements and creating our own derived requirements. The sponsor required the team to create a fireship that can cause maritime port denial/disruption without risking US lives, the project cost no more than the US equivalent missile that would be utilized to execute a similar task and that is was manufacturable at speed/scale of expendable weapon systems and can be applied to a variety of hulls.



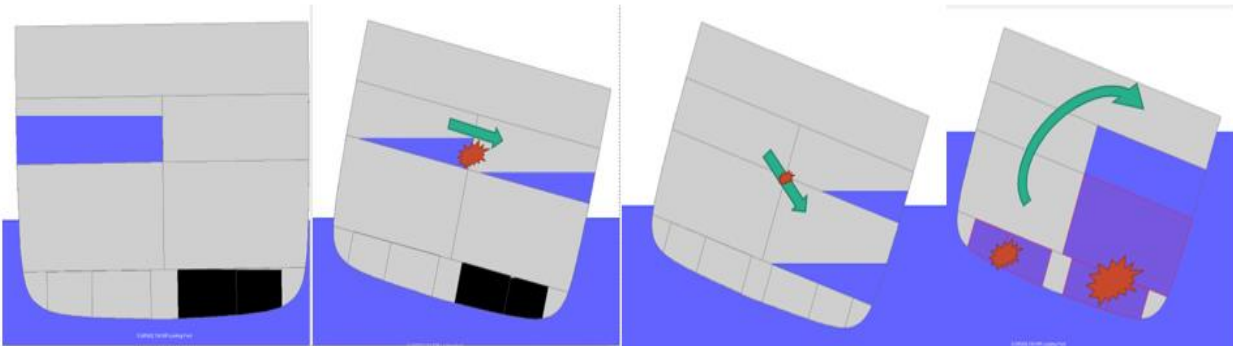
A scenario for the fireship was created to bound the conversion by fabricating a nautical chart of the enemy nation seen to the left. The fireship will conduct its mission by entering the narrow channel and ultimately sinking through a series of controlled flooding and explosions under the bridge. This location was chosen to

block the narrow channel to any deep draft vessel that needs to get to the Naval Base or industrial pier. This led the team to decide what vessel to convert in order to ensure the vessel could hide in plain sight and accomplish all of the requirements.

To accomplish this mission the team researched autonomous systems that could be retrofitted to fit pre-existing ship systems, allowing for smooth execution of the mission at minimal costs. To select a final hull a port analysis was performed, and the team opted to convert a fishing trawler by adding longitudinal bulkheads to the lower decks. The addition of these bulkheads allowed for simulations of controlled flooding and the eventual capsize of the vessel. The trawler hull was entered into POSSE where the team needed to essentially reverse engineer the



software to see how a vessel would sink rather than how to salvage a vessel that was already damaged. This was done by assessing how to properly distribute weight throughout the vessel to maintain stability and proper seakeeping while getting to the target site but ensure the vessel capsizes in the desired manner (on its port side) under the bridge. The figures below represent the four stages the vessel will execute enroute to its target location. Finally, the team provides recommendations for further alterations or additions that can be made to a hull to hinder salvage efforts; thereby prolonging denial of access to the port or ocean by the opposing nations navy.



This fireship concept is a novel approach to a historic concept and the team recognized there are endless possibilities in the conceptual approach to this project. Team HAVOC utilized the tools and software for designing ships in a way they have not yet been utilized and the outcome was promising in that it showed these tools could be manipulated for alternate purposes. A fireship's success is entirely dependent on the scenario it is used but for the purposes of this conversion the goal was successfully met and executed.