

Introduction to Propellers



Figure 1: Left: Hamilton Standard 54H60 propeller on US Navy plane. Right: A typical high aspect ratio propeller, AP156-hi.

Though propellers were first fitted on ships in the 1830s, it was really the Wright brothers who began serious optimization of their design because of their critical need for lightweight and efficient propellers for their pioneering airplanes. Like the wings of an aircraft, propeller blades are most effective when they have a high aspect ratio, that is to say they are long and thin as exemplified by the aircraft propellers in Figure 1. However, as with wings, structural limitations demand greater strength and this constraint is particularly severe for marine propellers which, to be sufficiently strong and rugged, must have blades of much smaller aspect ratio as exemplified by Figure 2. As described in the following section, the design of a propeller is influenced by many factors that include not only the required thrust and structural strength but also the vulnerability and susceptibility to damage.

Propellers, most notably marine propellers, feature in a variety of historical contexts as illustrated in Figures 3 and 4.



Figure 2: Left: Five different marine propeller designs. Right: 85 ton, bronze marine propeller.

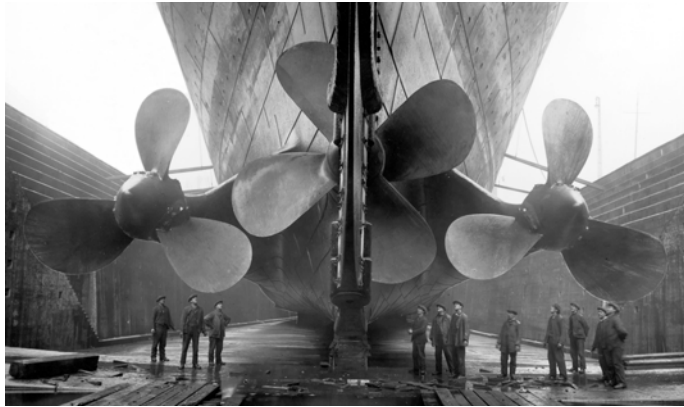


Figure 3: Left: The three propellers on the Titanic. Right: Propeller on the Queen Mary.



Figure 4: Left: Propellers on the salvaged U-boat, U-584.