Encyclopedia
Titanica

www.encyclopedia-titanica.org

Was the Titanic's Rudder Large Enough?

by Capt. Charles B. Weeks Jr.

There have been several times when the question has been raised about whether the Titanic's rudder was large enough. It has been suggested that if the rudder had been larger she would have turned more quickly and thus missed the iceberg.

The usual way of determining the proper size of a rudder is to compare the area of the rudder to the longitudinal area of the ship's hull on the centerline (LBP x Draft).

On page; 207/208 in Modern Ships, La Dage says the "usual ratio for a cargo ship is about 0.015, while … a usual ratio for a tugboat would be about 0.03 or 0.04." In Reed's Naval Architecture on page 149, Stokoe says rudder area for fast ships should be $1/60^{th}$ of hull area, and for slow ships $1/70^{th}$. In Ship Design and Construction the authors say "For merchant ships, the area of the rudder is usually about 2 percent of the product LT for ships 120m long and over"; L is length between perpendiculars and T is draft.

Titanic's LBP was 850′ and her full load mean draft was 34.5′, so her longitudinal area on the centerline was 29,325ft²; this must be reduced by 455 ft². This is the area of the cutaway forefoot (13ft high by 70 ft. long). Thus her effective hull area on the centerline is 28,870 ft². Her rudder area (using Simpson's Rule) was 401.63ft². Dividing through one gets a ratio of 0.014, compared to La Dage's 0.015. Using Mr. Stokoe's method, a rudder that was $1/60^{th}$ of the hull area would be 481.75ft² and $1/70^{th}$ would be 412.43ft² . Using the method in the SNAME book, a rudder that was 2% of the hull area would be 577.4 ft² ;1.5% would be 433.1ft²

So Titanic's rudder would be very slightly too small. In each case, the amount the rudder is too small is minor, so it probably didn't influence the outcome significantly. Particularly when you take into account other activities like stopping or reversing the engines and lag time for the steering engine to put the rudder over.

Works Consulted

La Dage, John H. Modern Ships. 2nd Ed. Centerville, MD. Cornell Maritime Press, 1979.

Stokoe, E. A. Reed's Naval Architecture for Marine Engineers. 4th Ed. London: Thomas Reed, 1991.

Taggart, Robert. Ship Design and Construction. New York: The Society of Naval Architects and Marine Engineers, 1980.