

An 'Olympic' Class Propulsion System

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How the White Star Line's greatest ships were propelled.

The decision to incorporate a Parsons low-pressure turbine in the new vessels of the 'Olympic' class, was a departure for the White Star Line from the conventional system of two piston-based reciprocating engines driving twin propellers. This was taken primarily, it is believed, following the results of improved efficiency and performance following the installation of a low-pressure turbine taking the exhaust steam from the reciprocating engines, in the White Star liner *Laurentic* of 1909. (1)

The conventional system had been employed in the ships of the 'Celtic' ('Big Four') class of 1901 – 1907, producing a steady moderate service speed of 16 knots combined with great economy; each ship burned a mere 280 tons of coal per day. However, owing to the enlarging of *Baltic* during construction in order to make her the largest vessel in the world, she had difficulty maintaining her schedule with the same originally designed engine power and the engines were subsequently modified for a greater power output. (2) Although the choice of engines had produced perfectly satisfactory results in these vessels, the horsepower needed to propel the larger 'Olympic' class at a service speed of 21 knots in any weather, it was claimed, would be far greater, stretching the system to its limits, and the *Laurentic's* improved performance with the addition of the low-pressure turbine convinced the White Star Line to adopt the combination method of propulsion in the new vessels.

Two inverted direct-acting triple-expansion reciprocating steam engines, developing a designed 15,000 horsepower at seventy-five revolutions, would drive the wing propeller shafts and the 23 feet 6-inch three-bladed propellers, while the low-pressure turbine, driven by the waste steam from the main engines, would produce 16,000 horsepower at 165 revolutions per minute while moving the central 16-foot 6-inch four-bladed propeller. On trials, however, *Olympic's* engines performed superbly, and although the usual 46,000 horsepower figure appeared in contemporary publicity, the engines were registered to develop 50,000 horsepower, producing a maximum of some 59,000 shaft horsepower with the main engines running at 83 revolutions per minute and the turbine at full power, according to *Olympic*

Time would prove the combination machinery's economy; on *Olympic*

Yet, although the turbine's addition had made such performance possible, giving a huge power increase for the same fuel consumption, time would prove that the turbine, still really in its infancy, was prone to excessive wear. This never became apparent on *Titanic*

Matters came to a head following the *Olympic's* refitting of late 1912/early 1913. Following her return to service, on April 9th 1913 the British Board of Trade were concerned that a close watch be kept on the turbine, and placed the turbine (although not the actual *Olympic*

Olympic

It was following the war that the turbine underwent repairs owing to deterioration. Following *Olympic*

With the other improvement to the ship's propulsion plant, the conversion from coal-burning to oil-burning, *Olympic*

Her reciprocating engines underwent major overhaul and repairs during her refitting of 1932/1933, but for that necessity to only occur after twenty-one years over one-and-a-quarter million miles (about 255,000,000 revolutions assuming an average speed of twenty-two knots) was surely a mark of their quality. Following 1933, *Olympic*

The skill of Harland & Wolff's designers and high-quality of manufacture and design ensured a sound propulsion system which achieved almost the same economy of fuel usage per one horsepower/per hour of the quadruple-screw turbine liners of the 'Lusitania' class; yet as the engines developed a maximum of 59,000 shaft horsepower compared to the more than 75,000 shaft horsepower of the Lusitania, the operating costs were somewhat lower. While *Mauretania* had burned about 850 tons of coal per day during her Westbound maiden trip, *Olympic* had used far less, 620 tons, especially impressive considering her larger displacement and hull surface. In spite of all the criticisms sometimes heard, citing that the combination plant soon died-out to be favoured by all turbine plants, it cannot be denied that it was a superb piece of engineering, entirely in keeping with the 'Olympic' class vessels, especially *Olympic*

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