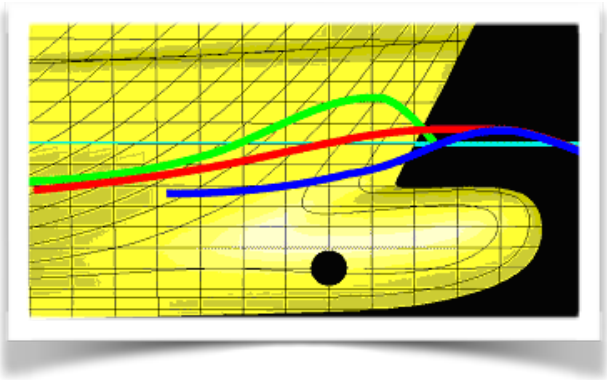
– HULL DESIGN CONSIDERATIONS –

Anyone who spends much time around large ships has noticed the bulb-shaped protrusions that are common on bows of large ships.

◊Bulbous Bow

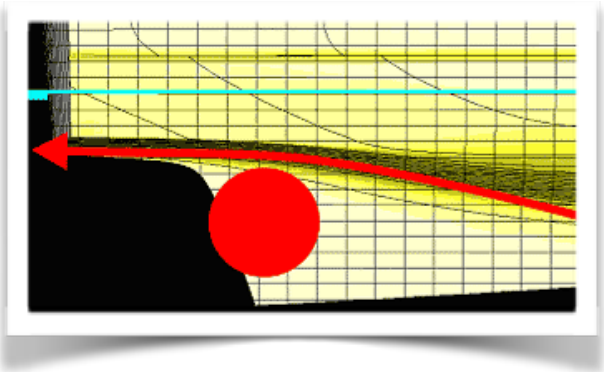
To understand the purpose of the bulbous bow, we have to briefly review the characteristics of a displacement hull as it moves through the water. Displacement hulls push water aside as they move. The water that is pushed aside forms a wave that begins near the bow. The length of this wave is proportional to the speed of the hull through the water—the faster the hull moves, the longer the bow wave. At some speed, the length of the bow wave increases to the point that it matches the length of the hull, and the hull operates in the trough of the wave, with a peak near the bow and another peak near the stern. This speed is called the « hull speed » and it is approximately 1.34 times the square root of the waterline length of the hull. The purpose of bulbous bow is to change the nature of this bow wave to reduce the drag it induces on the hull. The bulbous bow creates it's own wave that is farther forward and « out of phase » with the natural bow wave created by the hull, effectively subtracting from the normal bow wave and reducing it's drag-inducing effect.



In this illustration, the green line represents the natural bow wave of the hull without the protruding bulb. The blue line represents the wave created by the protruding bulb. The red line is the sum of these two. Notice that the height of the bow wave is substantially reduced, which in turn, reduces the hull drag associated with the bow wave. This improves fuel economy and increases range. The Selene 62 for instance offers an optional bulbous bow with an optimised bulb shape, in place of the simple cylindrical bulbs commonly used on trawlers. Instead of a simple cylinder shape, the bulb is an inverted teardrop shape helps damp pitching motion and reduces slamming at the bow rises and falls in larger waves.

◊Disappearing Chines

Modern trawler yachts are used in two different scenarios with conflicting requirements. The first is the classic passage-maker scenario, where a yacht makes a long passage in the open ocean. This scenario typically emphasises range over speed, and the trawler will likely be operated at speed to length of 1.0 or less for maximum range. At these speeds, the hull operates as a true displacement hull. However, many trawler yachts are more regularly used for shorter distance passages where range and fuel economy may be sacrificed to speed. Getting to and from a favorite cruising spot may motivate the captain to operate at, or even well above, hull speed. The Selene Trawler line incorporates a disappearing chine concept designed to blend the favorable fuel economy and range of a full displacement hull with the high speed capabilities of a semi-displacement or planing hull. The Selene hull has very typical round bilges in the forward half of the hull, while the aft part of the hull shows more pronounced chines and a flatter section. Where a full displacement hull will tend to squat in the stern as it approaches hull speed because of the trough from the bow wave, the flatter aft section of the Selene hull provides more lift and allows the hull to begin to plane, enabling higher speeds. This design also incorporates slightly concave or hollow bottom near the stern, which tends to increase the water pressure under the hollow, where the propeller is. The higher pressure discourages propeller cavitation, which increases efficiency. See the illustration.



The most common drawback for a hull with flat sections aft is it's tendency to yaw in following or quartering seas. The Selene hull design counters this tendency with a deep full ballasted keel and a large rudder for added directional stability.

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