The Special and Desirable Characteristics of Classic Swans as Offshore Yachts

Part I

By
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The heyday of the S&S Swans was the period between 1966 and 1989. During those 23 years the New York firm of Sparkman and Stephens produced 15 designs of offshore sailboats for a builder in Finland. The Finnish yard of Nautor built and launched 824 hulls, ranging from 36 to 76 feet in length. These boats excelled in both racing and cruising, and the name Swan became a legend in sailing circles throughout the world.

What makes the Sparkman & Stephen Swan designs such desirable yachts for cruising and racing, especially offshore? The answer can be separated into two categories, namely sea kindliness (comfort), and seaworthiness (survivability).

The following paragraphs focus on the first category, sea kindliness, with the second category, seaworthiness (survivability), discussed at a later time, in a second paper. It should be noted that several of the following enumerated details have an influence on both categories. As such an effort has been made to separate these attributes into each of the categories. It should also be kept in mind that the response of a floating body in seas and wind is a very complicated scenario. Consequently, certain simplifications were made in the following for the sake of clarity.

Sea kindliness (comfort)

In plain English, this means creature comfort while at sea. It is the behavior of the S&S Swan hull in a seaway that manifests itself into more desirable motions, as opposed to some of the more modern yacht designs.

The following enumerates some of the classic Swan hull shapes that lend themselves to a positive cruising experience:

Motion

S&S Swans are said to have balanced ends (*See Fig. 1*). This refers to the Swan's water plane shape (looking down) which tapers both forward and aft, in addition to generous overhangs forward and aft (*See Fig. 2*). These two features combined with more "V" shaped sections forward, versus a "U" shaped sections provide for a more comfortable ride. Consequently, when heading into a sea, the hull tends to cut through the water, and similarly, but to a lesser extent, in a following sea the wave more easily passes under the hull going forward. In terms of the resulting motion, the narrower and more V shaped forward sections coupled with the more tapered water plane aft tends to attenuate the pounding of the waves against the hull thereby reducing shuddering. This results in less crew fatigue.

Wetness

As the bow sections are V shaped, and the forward overhang is generous, the combination of these shapes tend to shed the water away from the deck making for a dryer deck and cockpit. (This assumes proper fore and aft weight distribution in the hull).

Directional Stability

This refers to the S&S Swan hull's ability to maintain its heading without excessive correction to the helm. It is important to understand that an increase in directional stability is at the expense of maneuverability, and *vice versa*.

All design is a compromise, since here "nothing is free." To illustrate the tension between directional stability and maneuverability, a good lesson comes from the field of aeronautics. For example, the stealth fighter is said to be extremely maneuverable, hence capable of quicker and tighter turns in all directions. To make the plane as stealth as possible it has faceted surfaces to scatter the radar signal. The facets produce a shape that is aerodynamically horrible. In the world of aerodynamics it means the plane is very directionally unstable. As the plane is unstable, the control surfaces are adjusted by a computer, which makes the adjustments several times a second. Human reaction times are too slow for safe flying.

The laws of physics as applied to aerodynamics are very close cousins to those for hydrodynamics. Much of what we know about flight can be applied to yachts. However, yachts are unique to aircraft in that they operate at the interface of two fluids, air and water, which have, loosely speaking, very dissimilar densities. As air is compressible and water is incompressible, when a vessel moves through the

water it results in surface waves. Hence, we can use some of the principles of aerodynamics.

Canoe Body Shape/Hull Appendages

A yacht's profile characteristics impact directional stability and steering comfort. That is the frequency and magnitude of helm adjustments needed to maintain a heading, which can also contribute to fatigue.

As the term "canoe body shape" in profile may be new to the reader, the following definition is provided. If one extends the section shapes of the skeg and the keel to their intersection with the hull sections, the location of these intersections, in profile, define the canoe body shape. It should be noted that most designs prior to the mid-1960s had full keels with attached rudders, a blended forefoot with the keel, and sections with generous radii to fair it into the appendage. Hence, it was problematic as to where the canoe body began and ended.

Over time hull and appendages (keel/rudder) evolved becoming more distinct from each other. The rudder was separated from the keel appendage and crept aft, the forefoot and aft profiles were cut back, and the radii at the keel/hull section intersections were reduced. This resulted in a more clearly defined underbody profile (*See Fig. 3*).

These profile changes were driven by the desire for increased speed, particularly in light air, and to improve maneuverability by giving up some directional stability. The latter change was made as it was felt that the pre-1960s attached rudder designs took too long to respond to the helm and required large turning radii.

The Swans were designed with skegs having an attached rudder, both aft, as opposed to a rudder without a skeg. The reasons for this are threefold, in terms of directional stability, as follows:

a) The rudder/skeg combination moved aft (a larger steering lever arm) makes up for some of the directional stability sacrificed by reducing the profile area. The rudder/skeg aft can be compared to the feathers on an arrow, or fins on a missile.

b) Having a skeg in front of the rudder tends to clean up the flow of water into the rudder.

c) Without a skeg in front of the rudder, the rudder has a greater chance of stalling at large helm angles, hence becoming ineffective.

Again, the above changes were undertaken as it was felt that the pre-1960s designs needed improvements in light air speed and with maneuverability, so a new balance was struck. And profile changes

continue to this day, as part of the evolutionary process.

In short, when designing a yacht, one must decide where in the spectrum it should be, directional stability versus maneuverability. In the case of the S&S Swans, they lean toward directional stability.

These qualities of the S&S Swans express themselves in their performance. Sailing a classic Swan is a memorable experience. The immediate sensation is a unique combination of elegance and power.

Of course, the true test of quality is competition. Whether racing internationally or locally, against similar Swans or against other boats, classic Swans meet the challenge, which is remarkable in an age of technically advanced vessels of all kinds. Especially in long-distance offshore races, classic Swans give other boats literally "a run for their money." They are relatively heavy and by no means the fastest, but they sail with ease and in safety in all sea conditions. That is where good design and good engineering come into play[1].

The Beauty of the Design

In addition to the preceding technical considerations, a unique feature of the S&S Swan designs is that they resulted in beautiful boats. Not always does the modernist notion that form should follow function succeed in producing beauty, but when it does, something extraordinary is born.

As an example, from city design, how was it that an urban development plan designed for the pursuit of public health and counterinsurgency, for the efficient movement of goods and troops from railway stations to nodal points of intervention, produced the iconic beauty of Paris?

Regarding yachts, how is it that a clean deck and a sleek coach house on a sailboat, designed for ease of maneuvers and reduction of windage, make it look like a mean and beautiful shark? This metaphor became the signature shape of an S&S Swan.

It was a great fortune that the lines of classic Swans were drawn at the premier design firm of their time led by one of the best designers of all time, Olin Stephens. The years of collaboration between Nautor and S&S were a period of transition, progress, and breakthroughs, both theoretical and practical.

Starting with the tools of observation and intuition, to which he gradually added quantitative analysis and an early use of computers, Olin Stephens saw like few others, the way shape was coupled to performance. His was a constant growth in the ability to measure the forces that propel or retard a sailing

1 For a complete study of the mechanics of classic Swans, consult Daniele Fua and Lars Strom, "Technical Particulars that Characterize the S&S Swans, in Matteo Salamon, ed., S&S Swan. A Legend, Milan: 1916.

yacht, and the way they interact. He reduced the age-old mystery in sailboat design and managed to accurately combine the vectors that moved a vessel in the water. As with Paris among cities, among sailboats Stephens' lines and Nautor's construction managed to demonstrate the philosophical dictum that "beauty is either the resultant of force vectors or it is nothing at all."[2]

Both the exterior and the interior of a classic Swan recall the work of Alvar Aalto. Aalto was a Finnish architect that created his own style from an interpretation of modernism, focused on local materials and functionality. He emphasized the use of wood for providing warmth to simple austere projects and a stronger connection with local culture. Below decks a classic Swan immediately reminds the visitor of a Scandinavian design store. It is both pleasing to sight and touch, and very safe offshore.

Beauty is said to be in the eye of the beholder. But there are beholders and then beholders. Nobody would call the Herreshoff family of yacht designers, or the Stephens brothers who followed them in fame, "romantics." These remarkable individuals were on the cutting edge of design, construction, and technology. Yet they all had a keen eye for the looks of a yacht. L. Francis Herreshoff wrote: "When a thing is out of the usual and pleasing to contemplate, it is romantic. When an object is nicely proportioned and has retained some well-proven ancient quality, it is romantic looking. I suppose to a sailor a romantic vessel is one that looks like a good sea boat, one which has good sheer and nicely proportioned ends: in short, a vessel that he falls in love with at first sight."[3] In his autobiography, Olin Stephens all but concurs[4]. They would probably disagree with Bob Derecktor –himself a designer of pretty boats—who is reputed to have said, "Any boat that wins is never ugly." By contrast S&S Swans sail well, are bullet proof if properly looked after, and can look stunning in a timeless way.

The Evolution of Design

As time went by, sailing -both racing and cruising- underwent significant evolutions, moving in different directions in concept, lines, building materials, technical aids, creature comforts (in the case of cruising), and speed (especially in racing contests). Some trends have moved the sport pretty far from what it used to be.

In racing today, the obsession with winning, with establishing records, with increasing speed over the water, moves sailing towards the status of an extreme sport, in which flying is paramount and contact with the water minimized. Foils and kites tend ultimately towards fully flying hulls.

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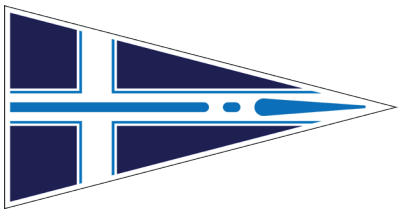
2 *Theodor Adorno's lecture on modern architecture, in https://caesuramag.org/posts/functionalism-today*

3 *L. Francis Herreshoff, The Compleat Cruiser. The Art, Practice, and Enjoyment of Boating, New York: Sheridan House, 1956.*

4 *Olin J. Stephens, All This and Sailing Too, Mystic, CT: Mystic Seaport Museum, 1999.*



In cruising, boat size and creature comforts prevail. Onboard systems make sailing easy, but beneath the surface, dependence on these systems makes a glitch escalate into a major breakdown, as the systems are integrated electrically and electronically, and the sailor, turned mere operator, is at a loss on repairs.

The same is true on navigation. Reliance on e-charts and GPS makes old skills obsolete. Situational awareness is replaced by screen dependence, and the real life at sea is replaced by a virtual life. Convenience and living-room comfort are, from the point of view of seamanship, de-skilling trends.

Such differentiation, and the increasing professionalism of the sport, has moved the legendary S&S Swans to the status of classics. What does that mean?

Why are S&S Swans Classic Boats?

A classic –whether a work of art, a musical composition, a book, an architectural design, a yacht, and even wine --is a human creation that may age but does not become old. As one of us likes to say, if the design aesthetics still looks good 20 years later, then it is a good design.

In literature the Italian writer Italo Calvino called a classic text one that has not finished saying what it has to say, and the Argentine writer Jorge Luis Borges called a classic book one that mysteriously continues to elicit the loyalty of many generations of followers. And so it is with some sailing boats. The basic questions are: why and how? We have provided some answers in these categories: design, performance, and beauty. In short, classic Swans tend to sit and drive through the water, while the more modern lighter cruising yachts tend to ride on the water, like a cork. As such they are pushed around more by the wind and sea than the classics, which gain stability by being surrounded by the incompressible water. In other words, the classic yachts tend to live in the water, while the more modern yachts tend to live on the water.

To complete the explanation, we will add two other features, namely construction, and, in a second article (Part II), seaworthiness.

Construction

From the very first Swan, Nautor followed the highest standards of marine technology by selecting only the most advanced equipment, fittings, and materials available. A lot of the fittings were manufactured in house (as they had been in another era by the Herreshoff Manufacturing Company for their own boats), especially when suppliers could not match a specification. As a result, Nautor spars and

masts were envied by other yacht builders the world over.

Swan offered owners a combination of series production and specification flexibility. Interior and deck layouts, communication and navigational equipment were –and continue to be with upgrades through the years— personalized. Artisans combining traditional skills with the latest materials carefully achieved the quality, detail, and finish of every component. Finnish workers, under the technical direction of Lars Strom and the overall supervision Rod Stephens, produced unequalled boats. In 2008, while an S&S Swan 38 was being restored at the Yxpila Boatyard in Kokkola, Finland –only a few kilometers away from the Nautor yard, one of us met some of those artisans. One day, as he was examining the condition of the mast, an elderly gentleman, who told him in a hesitant English "I helped build this mast", approached him. The mast had been built in 1974, and it was in excellent condition after many years of hard sailing. He was now working for Ola Hallman, who ran a yard devoted to the maintenance and restoration of classic Swans[5].

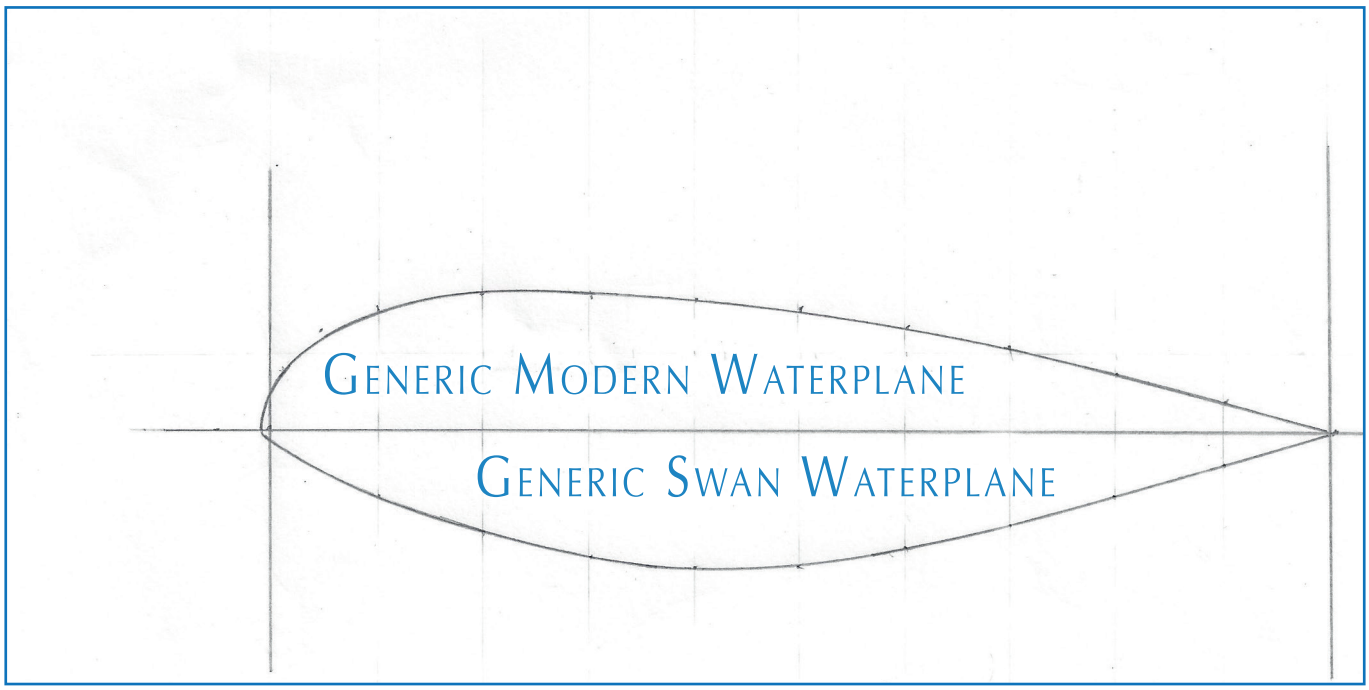


Fig. 1 - ***Design Waterline (DWL) Plane Comparison (at equal Waterline Length)***

5 *See https://www.facebook.com/YxpilaBoatYard/photos/ss-36-052-sy-leda-built-in-1969-is-this-years-winner-of-the-ola-hallman-memorial/910331309076903/*

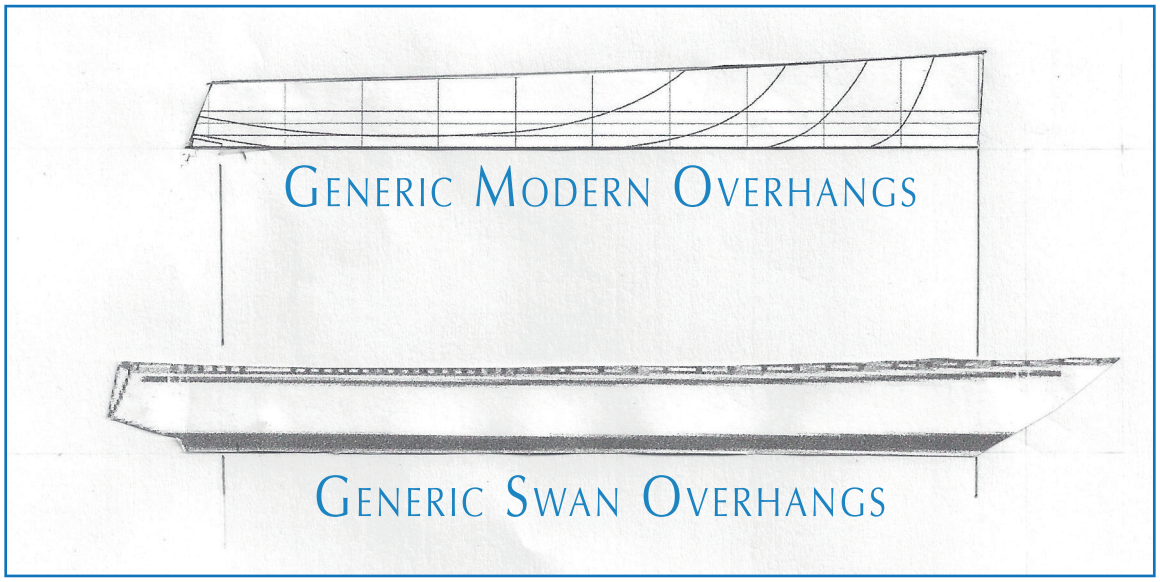


Fig. 2 - ***Freeboard Fore / Aft Overhang Comparison (at equal Waterline Length)***

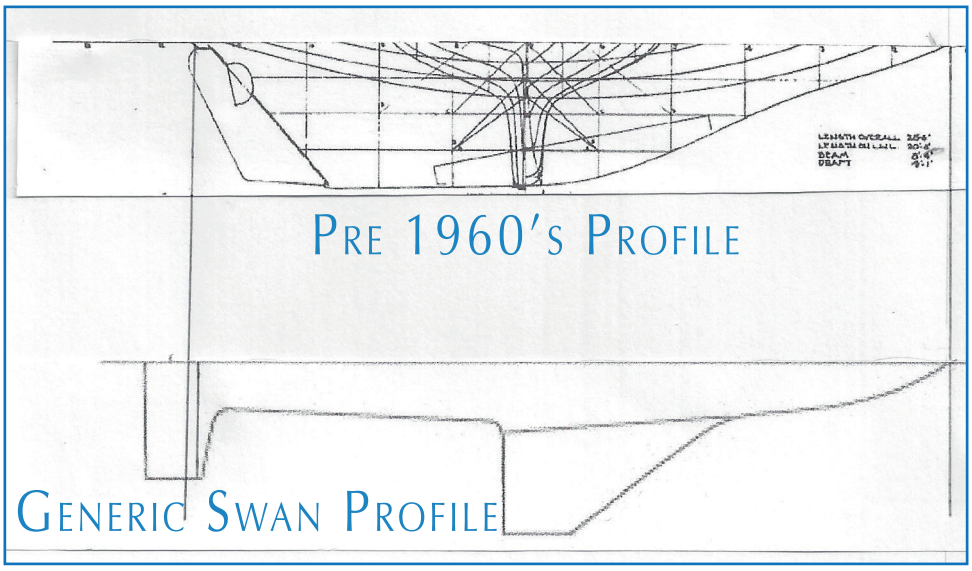
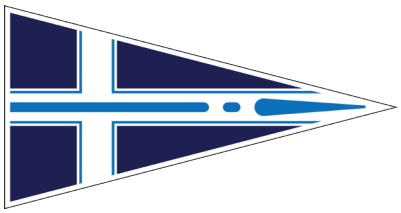


Fig. 3 - ***Under Water Profile Comparison (at equal Waterline Length)***



Once you own a classic Swan you can have direct communication with Nautor's manufacturing plant. You can also consult with the retired technical director of Nautor at the time they were built, Lars Strom, who advises the S&S Swan Association, and has become "the professor" for the fleet[6].

In Part II (the article that follows this) we shall examine the seaworthiness (survivability) of classic Swans.

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Alan Gilbert is a graduate naval architect, ocean, and marine engineer. He has devoted his career to the design/engineering of both power and sailing yachts, in all sizes, and in various materials. His familiarity with S&S Swans results from his 27-year tenure at S&S. He ultimately became Chief Engineer, and Executive Vice President. During this time the majority of S&S Swan models were designed.

Juan Corradi is professor emeritus of sociology at New York University and an avid ocean sailor. His experience sailing with a classic Swan during 22 years was published in the book The Voyages of Pirate. 55,000 Ocean Miles on a Classic Swan (2019).

6 *https://www.59-north.com/onthewindpodcast/273-lars-strom-swan-professor*