

FARR HORIZONS

An inside look at our world of yacht design.

The Design Process

By Michael Price, Senior Designer

Yacht design is a fairly complex process blending art, science, experience and creativity. A large part of the practice is based on an intuitive sense of what is right and wrong and what will work and not work. Pushing and exploring the limits of what we know and understand makes the process fun and successful.

The goal of the yacht designer is to produce a design that meets or hopefully exceeds the requirements and expectations of the client. The product is the finished boat and as such the designer's job is to convey all the necessary elements of the design as concisely and accurately as possible to the builder. This is ultimately done through a set of drawings and specifications.

There have been many technological advances in the tools designers use. Some of the programs commonly used by our team would include:

- ◆ Parametric 3D modeling for keels, rudders, decks, interiors and internal structures.
- ◆ NURBS surfacing programs such as Fast Ship for designing the hull shapes.
- ◆ CFD (computational fluid dynamics) programs for hull and appendage resistance analysis.
- ◆ FEA (finite element analysis) for structural design.
- ◆ AutoCad (drafting program) is the most utilized piece of design software in our office. All geometry ultimately has to be represented in two dimension on drawing sheets so the builder has a set of plans from which to build the final product. This is essentially the modern way of producing drawings that were once drafted by hand with pen and pencil on paper and film.



Senior Designer, Michael "Mick" Price has been with FYD since 1991.

Some of the advantages of drawings produced using Cad software are:

- ◆ The drawings can be emailed to the builder saving time.
- ◆ The builder having the same capabilities can make desired alterations and email those changes for discussion/approval.
- ◆ Full size mold frames and bulkheads can be cut using computer aided machines/routers.
- ◆ The overall accuracy of the design work is very high.

Yacht design is an iterative process starting with an owner's brief and developing preliminary concepts based on prior designs and knowledge base methodically working towards the final design. There is no magic button to push and out pops a design! At our office we break this design process into four basic stages:

◆ **Stage 1 - Design Brief**

At this stage we identify the owners requirements and the design approach.

◆ **Stage 2 - Concept Development**

In this stage we develop the preliminary elements and parameters of the design. Information from previous designs, displacement, sail area, deck and interior sketches, appendages, etc are brought together to form the basic elements of the design. When we are satisfied with the

concept we move towards fine tuning the design.

◆ **Stage 3 - Preliminary Design**

During this stage we focus more on comprehensive detailing. Structural details are resolved, appendage design is analyzed and refined, deck layouts and interiors are fully sorted, and weight calculations are arduously produced. The process goes through a series of steps which is commonly referred to as the design spiral. This is essentially going over each element in the design adjusting-checking-adjusting until reaching a point where we are ready to produce the final drawings.

◆ **Stage 4 - Design Detailing**

Once all the decisions have been made the last task is to produce the necessary information to build the boat. All designs vary from small and large to simple and complex. Builders have varying requirements as to the information needed to build the boat. Typically a set of drawings would include but not be limited to:

- Lines Plans
- Full size Patterns (information to build the hull plug or mold)
- Deck Geometry
- Hull Construction
- Deck Construction
- Internal Structure
- Construction Details
- Deck Layout (with Hardware and Running Rigging Specifications)
- Interior Arrangement
- Sail Plan (with Mast and Rigging Specifications)
- Rudder Geometry and Construction
- Keel Geometry and Construction

After the design is complete and drawings issued there is a fair amount of continued support. This includes frequent

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...Designer's Voice continued

consultation with the builder (which may include visits to the yard during construction) and suppliers such as sailmakers, spar builders, hardware manufacturers etc. After the boat is launched we are involved with rig tuning, measurement and other aspects that will help ensure the full potential of the design.

The best part for all of us at Farr Yacht Design is to go sailing! It is our passion which we hope shows in our work.