

D18 Myst:

Building plans consist of 27 pages of written text and 11 sheets of computer-generated drawings, including full-size patterns for all major structural components (moulds, frames, floors, foils, hardware, etc.). This makes transferring the lines directly to the building materials a straight forward and easy task, saving the builder considerable time and effort during the construction process and greatly minimizing the possibilities of error.

Drawing #1403 (included with the study plans) shows details of the construction jig and also provides small scale patterns for making a flotation model. This may be useful for the first-time builder and can aid in understanding how the boat is to be put together, without first incurring the expense of building a full-sized hull. This model can be as simple or as complex as desired.

The design brief for "Myst" called for a moderately narrow hull, with an emphasis on good performance under sail throughout a wide range of weather conditions that might be encountered during offshore passages on the North American Great Lakes and along the Atlantic Seaboard. Extreme shoal draft was also desired, so that the boat could be easily trailed and launched off the beach in areas with very shallow water. Hence the need for some ballast to help the hull stand up to the generous sail plan. There is also considerable tumblehome designed into the hull to capitalize on a greater waterline beam and the higher initial form stability that it affords.

Any qualms about carrying ballast in an open boat are addressed by built-in buoyancy tanks to provide sufficient flotation to keep the boat afloat in the event of a capsize. This, coupled with the extra flotation provided by waterproof storage bags, should give the crew considerable peace of mind out on the water.

The lug yawl rig was chosen because of its inherent ability to adapt to variable wind conditions quickly and efficiently. In a squall, sail area can be dramatically reduced by simply dropping the main and carrying on under jib and mizzen. Alternatively, the boat can just as easily be sailed under main alone. Either combination will balance. The centre of effort of the sails in any one of these configurations will fall on the same vertical plane as that of the boat under full sail.

Hard on the wind, the hull can be balanced by trimming the mizzen - in effect, using it as a steering sail. The big centreboard also has a wide range of travel and can be adjusted to help balance the hull. Playing both in combination can trim out the helm and induce some degree of self-steering on most points of sail. All the running rigging can be led aft to the helm for single handing.

Inside, the layout is designed in such a way that all the cruising gear can be stowed beneath the thwarts, leaving the area above free of clutter. The central thwart area can be closed off with hinged side benches to provide a sleeping platform large enough for two people to rest on comfortably. This doubles as a deck underway and makes it very easy for the crew to move about the boat without worrying about treading on equipment and supplies stowed below.

Stripped of sail, the masts can be used to support a full-length boom tent over the living area. The tent can be arranged so that it overlaps the coamings and any rainwater would then be deflected over the side, keeping the interior snug and dry. Another option would be to simply set up a regular, free standing, dome tent on the sleeping platform. This would have the advantage of providing better protection for the crew in areas where insects are a problem. It would also save on the expense of a much larger, custom-made boom tent and could be used ashore, if desired.

Many other features have been borrowed from the very successful 18' beach cruiser Alaska design, including the wide, plank keel for ease of beaching, and the two point, endless-loop anchoring system that makes mooring and handling the boat from shore an easy job.

There is provision for an auxiliary outboard motor to be mounted on the transom. Long shaft models up to 5 HP can fitted, though a 2 or 3 HP engine is more than adequate to drive the hull at speed. For those who dislike motors, a pair of well balanced 10 oars have been designed to move the boat along nicely in light conditions.

Construction is epoxy-glued, strip-planking over laminated frames and longitudinals. Planking is 5/8" x 1" wooden strips - sealed, inside and out, with epoxy resin. Exterior fiberglass sheathing is optional, but not required structurally. This boat is intended to be economical and straight forward to build by an amateur possessing reasonably good woodworking skills. A detailed 35-page building text is included with the plans. It is highly recommended that this be further supplemented with the Gougeon Brother's book on Boat Construction for those with little experience using epoxies or building boats.

An excellent thread by Kent Tyson on building a Myst, including many detailed photos, can be found here on the Woodenboat Forum - Building / Repair:

<http://forum.woodenboat.com/showthread.php?167740-Building-the-D18-Myst-18-BeachYawl>

Please note: At this time, plans are only available in Imperial Measurement (feet and inches).

Payment can be arranged through PAY-PAL money transfer.

Study Plans PDF via e-mail: No Charge

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Specifications: D18 – Myst:

LOA	18' – 3"	5.5 m.
LWL	17' – 4"	5.3 m.
Beam Max	5' – 7"	1.7 m.
Beam LWL	4' – 8"	1.42 m.

Draft at LWL

Board up	0' – 9"	0.23 m.
Board down	4' – 0"	1.22 m.

Displacement

LWL	1200 lbs.	544 kg.
Maximum	1600 lbs.	725 kg.

Weight (hull) 400 lbs. 181 kg.

Ballast (lead shot) 400 lbs. 181 kg.

Sail Area

Total	160 sq. ft.	14.86 sq. m.
Main	103 sq. ft.	9.56 sq. m.
Mizzen	21 sq. ft.	1.95 sq. m.
Jib	36 sq. ft.	3.34 sq. m.

Wetted Area 109 sq. ft. 10.12 sq. m.

PPI 300 lbs. 136 kg.

Prismatic .536

Disp/Length 112

SA/Disp at:

1200 lbs. / 544 kg. 22.6

1600 lbs. / 725 kg. 18.7

Power: 2 - 5 hp outboard motor

Construction: wood-epoxy strip-planking.

Construction plans drawn to a scale of $\frac{3}{4} = 1$ and $1 = 1$ include:

1. Sail and Arrangement Plan
2. Construction Plan and Specifications
3. Construction Jig and Model Patterns
4. Spar, Oar, Centreboard, Rudder and Misc. Construction Detail
5. Lines Plan, Notes and Specifications
6. Hardware and Fittings (full size paper patterns)

Full-size patterns include:

1. Forward Construction Moulds and Stem Detail
2. Aft Construction Moulds and Transom Detail
3. Developed Transom and Deck Beams
4. Floors and Mast Steps
5. Centreboard Case, Centreboard, Rudder and Skeg

REFERENCE LIST:

- "The Gougeon Brothers on Boat Construction: Wood and West System Materials", by Gougeon Brothers, Inc., Bay City, Michigan, USA
- "Boatbuilding" and "American Small Sailing Craft", by Howard I. Chapelle. W. W. Norton and Co., Inc., New York, USA
- "Boatbuilding Manual", by Robert M. Steward. International Marine Publishing Company, 21 Elm Street, Camden, Maine 04843, USA
- "Boats, Oars, and Rowing" and "Skiffs and Schooners", by R. D. Culler. International Marine, USA
- "Building Classic Small Craft", by John Gardner, International Marine, USA
- "Working Boats of Britain, Part II", by Eric McKee, Conway Maritime Press, England.
- "Spritsails and Lugsails", by John Leather, Adlard Coles, Ltd., England.
- Any books on cruising in small open boats by Frank and Margaret Dye.
- "Woodenboat" magazine, P.O. Box 78, Naskeag Rd., Brooklin, Me. 04616, USA

BUILDING SEQUENCE:

Building a boat is never an easy task, especially if it is a first-time effort. However, it is a straight forward process and is thoroughly documented in the many excellent books and magazine articles on boatbuilding available today. The trick is to simply break the job down into its component parts and proceed in a natural order. This brief construction sequence lays out the steps for building Myst using the epoxy/strip-plank building method described in "The Gougeon Brothers on Boat Construction: Wood and West System Materials", published by Gougeon Brothers Inc., Bay City Michigan. The builder is urged to study this book thoroughly and refer to it as the primary manual for building this boat. It is available as a free download online from the WEST System website.

"Boatbuilding", by Howard I. Chapelle, is recommended as a supplementary text. Its emphasis is more on traditional boats and boat building techniques, but it can be very helpful in learning about the basics of wooden boat construction.

"Boatbuilding Manual", by Robert M. Steward, would also be useful for the beginner.

1. Begin by studying all the drawings carefully to get an overall picture of the boat and how it goes together. The Gougeon Brother's book and the Construction Specifications text should be referred to at every step of the process.

Full-size patterns have been provided for most of the components required to build this boat. Some pieces will have to be scaled or drawn full size, but no lofting is required in the traditional sense.

Where possible, all leading dimensions have been given on the drawings or in the accompanying text. However, an architect's scale reading 1" = 1'-0" is very useful for accurately taking measurements directly off the drawings where required.

The full-size patterns for the moulds, frames and floors are already drawn to the inside of the planking. No deduction for planking thickness is required.

Drawing #1403 provides scaled construction moulds, drawn to the inside of the planking, for those wishing to build a strip-planked flotation model of the hull first. This is especially recommended for anyone who has never built a boat before.

2. Transfer the station lines from the full-size patterns to the mould material and set up the construction form as shown in drawing #1403, paying particular attention to which side of the stations the moulds are set up.

Note that there is a transom mould as well as an actual transom. Do not fit the transom at this point, only the mould. Make sure everything is well braced, level and true.

3/4" K3 particle board can be used for the moulds. The strongback may be made of two 20' long 2x8 s, or four 10 footers joined together. It is not expected that this frame can be made

perfectly square and level for setting up the moulds, so the jig should be trued up using a stretched wire Base Line as a guide. See Gougeon Brothers, chapters 14 & 15 for details.

The floors, frames and skeg are shown for clarity only in the construction jig drawing. They are not included in the jig set-up, but are fitted afterwards as described further on in the text.

3. Make up the inner and outer keels taking the measurements from the drawings and patterns. A long batten can be laid along the centreline of the moulds on the construction form to mark the true positions of the stations and the width of the keel at those points. These can then be transferred to the keel planks for lofting, cutting and trimming to shape. A batten bent through all the points is used to define the width and shape of the keel.

Clearly mark the centre line, the station lines, and the frame and floor positions on the top of the inner keel for future reference.

4. Carefully measure and cut the slots for the centreboard case and the skeg. It is probably a good idea to make up the centreboard case and skeg now to assure an accurate fit.

5. Glue the inner keel and the inner stem together and fix them in place with temporary holding screws over the moulds and construction form, as shown in drawing #1403. Do not fit the transom or any other components at this time.

6. Laminate the risers and clamps in place over the moulds. Temporary holding screws, as well as regular clamps, can be used to hold them together until the glue sets. It is not necessary to glue all the laminations up at once. One layer at a time is preferred. Waxed paper or cellophane packing tape can be used to keep the laminations from sticking to the moulds or any other part of the structure, including the stem.

Note carefully how the laminations fit at the stem in drawing #1402. They are butted, not notched into the stem. Aft, the laminations are simply run out past the transom mould. Once fitted, glued and dried, the laminations can be marked and trimmed flush to the outside face of the transom mould.

The transom can now be made up and glued and fastened to the inner keel. The thwart beam #11 and transom frame #13 are not installed at this time. However, it is a good idea to make them up and pre-fit them to the transom for installation later, after the hull is turned over. Planking bevels can be taken off of the full-size patterns.

Temporarily fasten the clamps and risers to the transom, but do not bond them in place just yet. They will need to be released to allow the hull to be lifted off the moulds. Make sure all temporary holding screws at the stem and transom will be accessible once the hull is planked.

7. Plane and fair the whole structure in preparation for planking, as described in GB chapter 16. Long planking battens can be used as guides for beveling the moulds, inner stem, inner keel, transom, clamps and risers. Cover the moulds, clamps and risers (especially at the joints) with

wax paper, cellophane tape or plastic sheeting so the hull can be lifted off later without sticking to any of these components.

8. Begin planking from the sheer clamp up, leaving a slight overlap for fairing the planking flush with the top of the laminated clamps later on. Each strip should be pre-fitted to the moulds, carefully aligned, and drilled for fastenings before gluing up. 1/8" diameter hardwood dowels make excellent edge fastenings and should be set into 1/8" diameter predrilled holes about 1 3/4 times the depth of the planking. Four or five strips per side can be pre-fitted at a time before gluing up. The overall fit should be a little on the loose side to allow for glue thickness. It is not necessary to bevel the edges of the strips. A stealer or two may be required to straighten out the run of the planking in places.

The glue for planking should only be thick enough to keep it from running out of the seams. If it is too thick it may cause the strips to bulge apart between the moulds throwing them out of alignment. While not terribly serious, this can be annoying. Wetting out the edges of the planks with un-thickened epoxy resin prior to applying the glue is also advisable to assure a good bond between the strips.

Use a pipe cleaner to wet out the dowel holes with glue and drive the dowels flush or set them slightly below the surface of the strip. All dowels should be of equal length and the holes drilled slightly longer to avoid over-driving and splitting the planking. Remove excess glue from off of the planking, both inside and out, with a putty knife before it hardens. Swab off what's left with paper towels dampened in solvent. This will save hours of hard planing and sanding later on. (Methyl-hydrate, available in most hardware stores, is a cheap and effective solvent. Vinegar can be used to safely wipe epoxy off of skin and hair.)

Fasten, but do not glue, the planking to the clamps and risers. They will need to be released and repositioned later on in the construction process.

Temporary holding screws can be replaced by permanent bronze fastenings where required later on, such as in the inner stem and transom. Steel, round-head wood screws, with washers under them, make good temporary fastenings. They do not tend to break off when being removed. Heat applied with an electric soldering iron will loosen any hard-bonded fastenings. All permanent fastenings should be sealed and bonded in place with epoxy resin.

Please note that it is a good idea to wear a proper respirator with the appropriate filters and to provide good ventilation when working with epoxy and solvents. A powerful fan blowing fresh air across the work area helps eliminate harmful fumes or dust and also helps keep the builder cool on hot days.

9. Do not fair or finish the exterior of the planked-up hull at this point. Trace the station lines from around the edges of the moulds onto the inside of the hull with a pencil for future reference in fitting frames and floors, see #12 below.

Remove all temporary holding screws and carefully lift the hull off the moulds and construction form, leaving the sheer clamps and risers behind. Set it upright on a padded surface for interior finishing. (Because of the tumblehome in the topsides, it may be necessary to dismantle part of the jig before the hull can be freed.)

It may also be wise to have a few pre-measured cross spalls ready beforehand to brace the sheer after the hull is removed from the jig. These will help to prevent the hull from trying to fold back in on itself and distorting before you get a chance to finish off the interior and get the framing firmly in place.

10. Plug all unnecessary screw holes inside the hull with wooden bungs or thickened epoxy to about 1/2 the depth of the planking. Do not plug the screw holes for the sheer clamps and risers. Once the epoxy is cured, fair and smooth the inside of the planking with a block plane and spokeshave, followed up with 80 grit sandpaper to remove the blade marks. Finish up with 120 or 150 grit paper for a smooth, clean surface. Be sure to preserve the reference lines for the stations, frames and floors.

11. Apply four coats of resin to the interior of the hull. Use a large flat tray and thin foam rollers about 3" to 4" long on a small applicator frame to roll out the resin. Mix only about 6 oz. of resin at a time so as not to rush the job. Smooth out any air bubbles that form on the surface by jamming the roller to keep it from rotating and then dragging it back lightly across the wetted surface. This will knock down the bubbles and assure a smooth finish and minimal sanding later on.

After applying the first coat, wait about an hour for the resin to get a bit tacky and then apply a second coat directly over top of the first. Let the resin dry thoroughly before lightly sanding with 80 grit paper. At this point, stop and apply a light epoxy fillet along the edges of the inner stem and inner keel where they meet the planking to fill out the joints and any possible voids that may exist. Build it up in successive layers to keep it from sagging out. Fair and sand when cured, then apply the next two coats of resin over the entire hull - one over the other without sanding in between. Allow the first coat to become tacky before applying the second. Let the resin cure completely before lightly sanding with 80 grit paper and finishing up with 120 or 150 grit. Re-coat any spots that appear thin or over-sanded.

12. Make up and fit the frames and thwart webs, and temporarily fasten them in place. Pencil off where the frames and webs lie across the hull and then remove them. Refit the clamps and risers to the hull and mark where the frame and thwart web pencil lines cut across them.

Take the time now to plane the inboard edges of the clamps square to the centreline in preparation for fitting the coamings. Use the upper inside edge of the clamp as a guide. See cross-sections of sheer clamps and coamings in drawing #1402 for details.

Remove these once again and then notch the undersides of the clamps to accept the frame heads. Cut through the risers to accommodate the frames and thwart webs, as shown in the

drawings. Provide limber holes through the risers wherever they butt up against the frames, thwart webs, stem and transom. Rebate the aft sections of the risers to take the plywood cover for the aft buoyancy tank.

After final fitting, coating and finishing, permanently glue and fasten all the framing and interior joinery components back into place, including the clamps and risers. All the finished parts of the inside of the hull can now be painted if desired, taking care not to cover areas yet to be glued or coated.

13. Turn the hull back over and begin finishing the exterior by removing all temporary fastenings and plugging the deep screw holes with 1/8" dowels. All exterior holes should then be bored and plugged with wooden bungs set in epoxy glue. Then trim and plane the edges of the planking flush with the inner keel, inner stem and transom. Fair and sand the hull smooth and apply 4 coats of resin as was done on the inside of the hull.

14. An optional layer or two of 6 oz. fibreglass cloth, Dynel, or other fabric can be applied to the hull if desired. This will help toughen the surface a bit, but is not necessary structurally and may result in a little more difficulty making repairs to the hull later on. It will also add some weight, as well as expense - builder's choice.

To apply sheathing, dry fit the fabric to the bare wood of the hull one side at a time. Staple it lightly in place along the top of the inner keel to keep it from sliding down and apply epoxy resin with a foam roller or squeegee in the usual manner. Wedge shaped darts may need to be cut out of the fabric where it bunches up along the sheer, and is best done during the wetting out period. Be aware also that epoxy takes a long time to set and some sagging of the fabric may occur. Periodic re-rolling may help, but care must be taken not to lift the fabric off the hull and create air pockets.

Once the resin is set, but still a bit tacky, any staples holding the cloth in place can be removed and one or two more coats of resin applied to fill the weave. Excess fabric can be trimmed away later after the resin sets.

Note: Fabric should not overlap the keel, stem face, transom or edge of the planking in any way in order to avoid any possible cracking along these edges in future. Glass the surface of the planking only!

After the resin is well cured, the surface can be sanded smooth in preparation for the second layer of fabric or for painting. Any exposed weave should be re-coated and sanded to ensure a uniform finish.

15. To finish up, seal all end grain thoroughly with epoxy resin and then fit the outer keel and outer stem to cap the planking. Glue on the sacrificial hardwood shoe and skeg, making sure all edges are well rounded and well coated with epoxy. After bonding and fastening the external hardware in place, the hull can be painted and rolled upright to fit the decking, sheer cap, coaming, rub rail, trim and remaining hardware.

Note: the area of the hull between the rub strip and trim strip can be finished bright or painted a contrasting colour to the topsides for effect. An option would be to glue a sheer strake of 1/8 to 1/4 wood veneer onto the planking to give the hull an even more traditional appearance. The area under the veneer should not be sheathed. It should be glued directly to the planking.

16. Finishing the hull is mainly a matter of taste and experience with the different kinds of products available on the market today. It is basically the constructor's choice, but here are a few suggestions that may be of some help to the first-time builder.

- * During construction, all parts of the hull and structure to be painted should be given a minimum of three coats of epoxy resin, preferably four, to seal out moisture and stabilize the wood, particularly end grain and faying surfaces. Most of this work can be done on the bench before final installation to make the job a lot easier.

- * The interior should be painted with a good quality marine enamel. White or light gray looks good when contrasted with oiled or varnished wood and will help keep the hull and structure cool and stable. The exterior should also be painted, but colour is less critical here and even black paint is quite acceptable, except perhaps in very hot and sunny climates. The transom and sheer strake, on the other hand, can be finished bright for appearance.

- * Varnish finish is not recommended for a craft that is expected to be used hard, oil is better and far easier to maintain, although it must be recoated much more frequently for best results.

- * Oil or varnish looks best on bare teak without an epoxy undercoat, but the cedar sheer strake might best be served with spar varnish over clear epoxy resin for durability. However, oil can be used if desired, in which case these areas should then not be coated with epoxy resin or sheathed with fabric.

- * Below the waterline, a good hard finish anti-fouling paint can be used for protection.

- * Whatever the finish, it is still best to keep the boat on a trailer and stored in an open, breezy shelter away from the elements as much as possible. That way the finish will be preserved and maintenance will be reduced considerably. As with any wooden boat, preserving the finish means preserving the structure. It's nothing to add a coat of paint, oil or varnish regularly, compared to wooding down and refinishing a badly weathered hull.