# Every Builder's Job Shop

**Text and photographs by Aaron Porter**

In late February, ice was just starting to form at the edges of the global economy as word of the virus spread. Manufacturers with components or materials coming from China were the first to signal that January's below-the-fold news about a virus in faraway Hubei province might have some relevance to boatbuilders in Europe and North America. Returning from a visit to a Taiwanese yard, our technical editor gave respectful but sober accounts of the measures authorities there were taking to monitor everyone's body temperature and limit public spreading of the coronavirus that causes COVID-19.

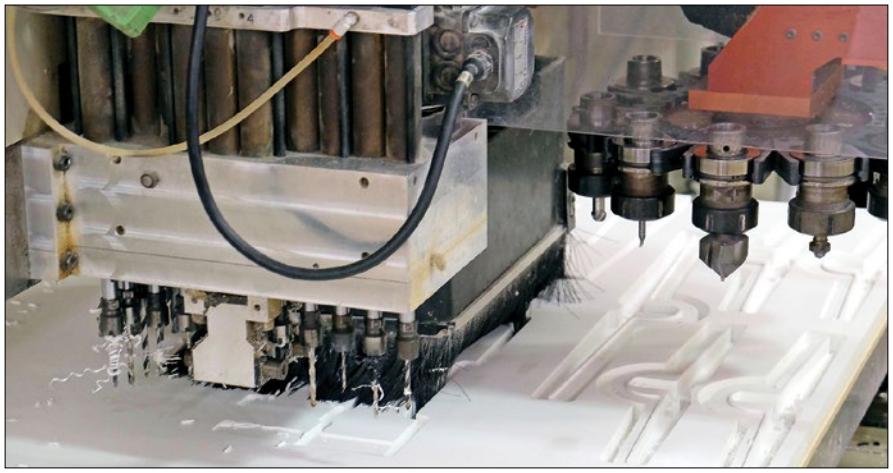
Next came a rush of virus stories from other Far Eastern countries, then European nations, followed quickly by outbreaks on the east and west coasts of North America. Death tolls rose to the thousands, blanket stay-at-home orders were issued across states and cities, international borders were closed to all but essential travel, and nonessential workplaces were shuttered.

***Above—****At Teak Isle's Ocoee, Florida, plant an employee assembles a gasketed door and frame unit. The company builds components for 200 individual boatbuilders.*

**Teak Isle builds thousands of made-to-order parts and components, mostly in acrylic and polyethylene, for hundreds of boatbuilders, yet most boat owners never know its name.**

Boatbuilders braced for the actual viral pandemic as it washed around the globe and for the deep freeze of economic activity in its wake.

In early April I was less than hopeful when I shot a note to Pat Brown, president of marine manufacturing experts Teak Isle in Ocoee, Florida, to see how they were weathering the crisis. When I'd visited in September 2019, the 279-employee company was developing a couple dozen new parts per day for clients and building upward of 1,200 different products per week at an average of seven units each, so I knew complexity was its specialty, and it had the capacity to be nimble in the face of change. I also knew that checking in with Pat is one of the easiest ways to take the temperature of mainstream boatbuilding in the United States. That's because Teak Isle serves more than 200 individual boatbuilders, making it one of the most vital and ubiquitous suppliers of plastic components, cabinetry, and design services to production boat manufacturers in North America.



*The majority of Teak Isle's output is in CNC-cut plastics like HDPE King StarBoard and acrylic Plexiglas, contrary to the hardwood in the company name.*

Pat promptly confirmed that the boatbuilding side was very slow—most builders were shut down or limited in production by the closure of key vendors. What I hadn't expected was his report that Teak Isle had engineered a full pivot to meet requirements of social distancing in the workplace, and simultaneously developed an entirely new division to build plastic face shields and clear-plastic intubation boxes for medical professionals and Plexiglas protective screens for cashiers and receptionists. On April 9 he reported: "We are supplying the State of Florida and local hospitals with these products and are looking to supply whoever else may need them. The great thing here is that we have a way to help the situation with our manufacturing firepower and also to keep people working and stay viable as a supplier."

I shouldn't have been surprised. It's the same mix of agility, imagination, and industry that has made Teak Isle an indispensable job shop for so many boatbuilders.

*All in a day's work, made-to-order parts include hors d'oeuvre trays for a pontoon boat; fish-cleaning stations; tackle centers; storage bins; and hatches, doors, and boxes in a range of standard colors.*

## Beginning with Teak

One unavoidable question for any first-time visitor to Teak Isle is "Where's the teak?" The answer is 1979. That's when Sandy Brown, a successful Florida Wellcraft dealer, teamed up with a couple of partners to offer specialized accessories on his boats.

"One of his partners had some contracts down in Honduras, and they set up a small factory building teak dive platforms for the back of boats," recalled Sandy's son Dave Brown, who co-owns and operates Teak Isle today with his brother Pat. Sandy's sales strategy worked, getting the attention of boat buyers and then other dealers as well as Wellcraft headquarters. "Through his relationship with Wellcraft he became a supplier," Pat said. But in spite of the early ties to Wellcraft, Teak Isle kept the door open to other builders who came knocking.

At first the focus was on teak accessories—boarding ladders, grabrails, swim platforms, etc.—but that changed quickly in the mid-1980s, about the time Pat joined the company full-time. He recalled how, when growing up in the dealership, his job was to start at one end of the yard, wash the boats, oil the teak, turn around, and start again a week later. Then came King StarBoard, a high-density polyethylene (HDPE) rigid plastic material from King Plastics in North Port, Florida. As the guy cleaning and oiling all the teak, Pat saw a welcome alternative to wood and, though he likely didn't know it at the time, the future of the company.

Today Teak Isle uses upward of 3.5 million lbs (16,000 t) of King StarBoard annually. In addition, it now specializes in other synthetic materials—Corian, Plexi-Acrylic, foam PVC board, Sparalloy, King StarLite, powder-coated aluminum frames, and some treated plywood as underlayment for laminate surfaces and core material for bulkheads. Its products are as diverse as the boatbuilders it serves: baitwell lids, sliding doors, windscreens, full galley units, tackle drawers, electronics boxes, rod holders, liquor cabinets, etc. built for Hinckley, Regulator, Viking, R.J. Dougherty, Sea Ray, Sea Hunt, Scout, Yellowfin, Crest, Hatteras, Boston Whaler, and Seminole, to name a few.

***Above—****Teak Isle's workforce specializes in hand-finishing and assembling HDPE and acrylic parts—skills not common or efficient for boat manufacturers to source and keep on their in-house staffs.* ***Left—****There's still some wood in the shop, especially in ready-to-install head and galley cabinetry units and as core material for bulkheads.*

## Expansion with Plastics

By the mid-1980s Sandy had bought out his partners as the company grew into more than just a supplier of dealer upgrades and aftermarket add-ons. Pat recalled how that change started when Wellcraft wanted to build boats in its wood-fabrication building. They asked Teak Isle to take over producing the parts that came out of that building. "I drove down and picked up one of everything," he recalled. It was before computer files and CNC routers, so the crew created a full wall of Wellcraft patterns and produced what the builder needed on demand. When Dave joined the company in the early 1990s, the trend was in full swing: boatbuilders were becoming assemblers. "They'd do the fiberglass parts, and they'd buy from people like us or the cushion makers, or the wire-harness guys, or whatever. Then they'd put it all together," Dave said. For some builders, efficient manufacturing practices meant that keeping all the skills and capacities to create finished boats in one shop didn't make sense anymore. And working with new materials like StarBoard and acrylic often fell outside the skill set of conventional boatbuilding crews. In a prescient move, Sandy had bought a CNC router in the late 1980s, which allowed for clean handling and efficient use of the synthetic sheet goods they were starting to specialize in.

As ubiquitous as they are now, early CNC routers were a mixed blessing for boatbuilders, who had to find space for them in their shops, hire skilled

technicians to operate them, optimize design files for cutting, maintain machines and their many high-speed moving parts, and try to make them pay for their keep. In short, it often didn't make good business sense for builders to own a CNC machine, but having access to Teak Isle's routers and technicians was a different story.

Pat said one major West Coast builder called on them after discovering a huge pile of HDPE scrap was not being figured into the cost of the parts produced. "We took on the majority of their stuff, even with shipping all the way to Washington."

Teak Isle's materials efficiency is possible in part because of the high volumes of each color and type of material they process. "The advantage we have is that Boston Whaler uses Arctic white, Sea Ray uses Arctic white, and Seminole. We may be cutting a big tackle box here, but it's cutting a rod holder for a Seminole out of the middle where the door would go," Dave said. The optimized nesting of parts is done by computer. Even then, Dave said, the best they can attain is about 20% waste. "We recycled over 1.2 million lbs [544 t] of plastic last year," Pat said.

Another high-end builder called on Teak Isle to help eliminate quality issues on its production line. It turned out the problem was as much cultural as technical. Workers didn't want to object to substandard parts coming from their colleagues up the line, but once they knew the parts were coming in from Teak Isle, they became far more vigilant about quality. "It's easy to send it back to us," Dave said.

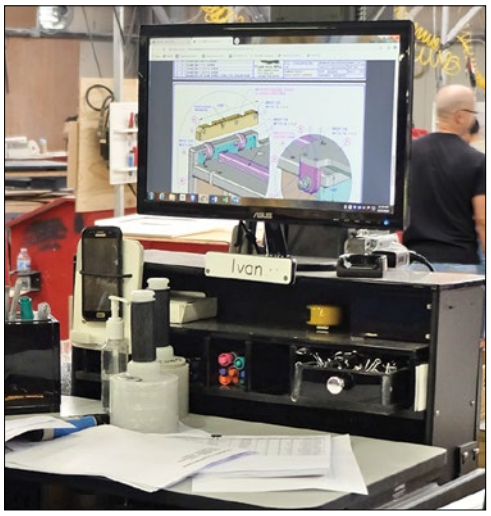
*While efficient use of materials is one of Teak Isle's strengths, the computer-nested parts routed from plastic sheet goods still yield significant recyclable waste—1.2 million lbs (544 t) last year.*

Transitions can be tricky as new companies come on board. Pat said that to get an accurate account of all the parts in some models, one builder locked up its StarBoard, so anyone coming off the line to make little incidentals like mounting blocks had to describe and specify the piece so it could be given a design file and part number Teak Isle could use.

## Design and Engineering

As actual design specifications and cutting files for components came to reside at Teak Isle, builders increasingly leaned on the job shop's design and engineering department. Dave said the CNC machines drove the need for in-house expertise, tweaking some existing files from builders and designing some new components based on sketches from others who had come to count on Teak Isle's service.

For any given piece—a baitwell lid or a windshield and helm station—all the parts in multiple materials are programmed with pilot holes, through-holes, notches, and ticks where screws go. "We make it so once the CNC router cuts it, it's just a big assembly project when it gets to somebody's bench," Pat said. Most of those parts are put together at Teak Isle, and the full component or assembly is shipped. "We hang an acrylic door in a powder-coated frame with a hinge and a latch, so it's a complete system—a boatbuilder


***Left—****Nine Fusion XL CNC machines from Komo (each running 12 different cutter heads and 20 drill bits) are the heart of production at Teak Isle.* ***Right—****Each of the thousands of parts it produces has a complex computer file with part history, design specifications, materials, hardware and assembly details, and cutting parameters for the router.*

*Andrew Brown (seated) heads up Boat Outfitters, the online retail division of the company. His father, Pat (right), and uncle, Dave (center), own and operate Teak Isle.*

can just cut a hole in the boat and install it," Dave said.

According to Pat, the design team creates about 25 new parts every day. Some may be slight variations on an existing part, while others are completely new. The engineer who gets a project creates the cutting files and materials list, which goes out to the appropriate shops for frame build, CNC routing and polishing, hardware, and finally to a crew of four near the engineering offices who only assemble prototypes. They troubleshoot the new part, give feedback to the engineers if it's necessary to tweak the files and lists, and finally photo-document the result before it ships to the client for approval.

Pat and Dave stressed that the in-house engineering is available to any client regardless of build volume. And they take evident pride in their custom solutions—everything from a $10,000 tackle station and a helium tank for filling kite-fishing balloons, to a humidor and a cabinet for a specific model coffee maker.

## Boat Outfitters

As the accumulated part files in their archive grew, Pat and Dave, who took over ownership of the company in 2002, saw the potential to put the accumulated data and the engineering team to more use. (Because of his depth of experience and extensive knowledge of the boatbuilding business, Sandy remains essential to the design team.) In 2012 they started Boat Outfitters, an online retail platform that allows boat owners or repairers to have custom parts like doors, tackle boxes, and grabrails built, or to replace known components or hardware for boat models that are in the Teak Isle database. For instance, for Boston Whaler they have more than 2,000 parts, many for models no longer in production. Whaler, like other client companies, was delighted to have a place to send boat owners looking for parts for those older models.

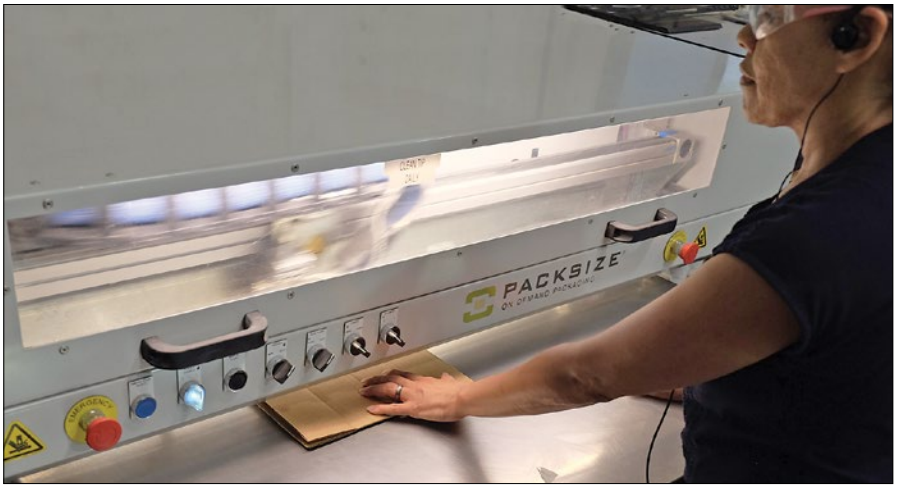
Pat's son Andrew heads Boat Outfitters with several key project managers and a small crew in a call center piggybacked onto the shops and engineering office at Teak Isle. For a custom door, clients can enter materials, dimensions, and design parameters on the website. A designer goes through the details to create a job file and sends it to the shop. "We can ship it in two or three days with hardware installed," Pat said.

Just eight years since it started, the online retail division accounts for about 15% of the company's business. Dave noted that it's become useful for commercial clients, who can go through the library of templates for different parts online and then choose one that suits their needs completely or may just need some refinement. That saves engineering time and money.

## The Shops

Teak Isle's sprawling facility in Ocoee includes the 45,000-sq-ft (4,181m$^2$) main structure, a nearby 19,000-sq-ft (1,765m$^2$) metal shop (7,500 sq ft/ 697m$^2$ for powder-coating), and another 40,000-sq-ft (3,716m$^2$) shop for cabinetry and, currently, COVID-19 response equipment. With a half-dozen massive


*Shop crews are divided into three production cells, each responsible for a portfolio of specific builders determined largely by the color, volume, and complexity of the parts they order.*



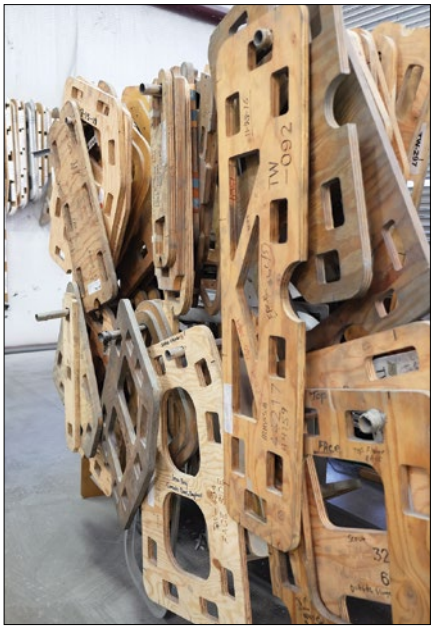

***Top—****Fresh from the router, StarBoard components must have their exposed edges rounded off before assembly.* ***Above—****The range of part shapes and sizes to be shipped from the shop every day is efficiently accommodated with a computer-controlled custom box-making machine.* ***Left—****Full bending forms are built for panels to be shaped to a specific curve or angle under high temperatures in an oven.*

Fusion XL CNC machines from Komo (each with 12 different cutter heads and 20 drill bits) sprinkled around the building, multiple shaping tools, sanders, and a fork truck running, it's not a quiet environment, but you can carry on a conversation. Crews need to communicate rapidly and effectively as projects move at a fast clip and slight changes in priorities can shift workflows multiple times per day. Or that's how it works now.

Twelve years ago the plant had one big CNC department and a big assembly area, "and it was unmanageable," Pat recalled. Any problems had to be walked back to another department, and project flow was anything but simple. They decided to break up the shop into three cells. "Each cell is [its] own little garage shop," Dave said. They each have their own employees, their own cutting area, finish crew, and shipping department. And their client lists are based on grouping companies with similar dominant colors, materials, and complexities. Now the lead person in each cell has everything within about 40′ [12.2m], and proximity and familiarity encourage communication, so someone doing roundover or finishwork can easily tell the router operator to check the bit if the parts look flawed.

The variety and pace of activity in the shop disorient an outsider. Carts of components and hardware are loaded and moved; sheets of HDPE are constantly fed to the CNC routers; usable scraps are cataloged for reuse in the computer-managed inventory; and a custom-packaging machine turns out boxes for the myriad shapes and sizes pushed out of the building to builders all over the country every day. In Cell 3 is a library of 1,000 bending forms for various parts in a mezzanine, where they can be easily retrieved. Large ovens that accept the full form and some special localized heating and bending devices allow the sheet goods to be molded to the designed curve of a cabin door or a windshield.

Those pieces will match the curve of aluminum frames shaped, welded, and drilled for fasteners at the separate



***Above left—****In the metal shop, CNC bending machines form extruded aluminum stock into custom frames.* ***Left—****In preparation for finish powder-coating, frames are run through a series of chemical baths and distilled-water rinses.* ***Above—****Racks of drilling fixtures for specific frames in the metal shop. These guides ensure that the manually drilled holes for installation and mounting hardware perfectly correspond to those in the plastic panels they marry to.*

metal shop, where its own library of drilling fixtures and CNC benders ensure that the frames' fastener holes perfectly correspond to the acrylic or HDPE elements in the main shop. The metal shop makes some leaning posts and other elements, but not extensive rails and towers. Also, stock metal and hardware like piano hinges are cut and selected there to be installed on the right parts by the appropriate cell.

A series of dip baths filled with sodium hydroxide, fluotitanic acid, ammonium hydrogen fluoride, and distilled water prepare the aluminum frames, which hang for five minutes in each, for finish powder-coating, the last step before any seals are installed and they head to the main shop. It's a smaller crew down there, but the metal shop is clearly crucial to the smooth functioning of all three main production cells.

Pat recalled a recent example of the metal shop's importance and the company's responsiveness to clients. A pontoon boat builder "had a bad count in their stockroom. They were out of frames. We worked Saturday to build 100 frames that were ready to ship on Monday." The builder was back hanging doors by Tuesday.

It's a practical reality of the industry that modern boat manufacturers lack the space or time to create every element of each boat on the shop floor; they must rely heavily on outsourced parts, components, and services. It's also no secret that some builders are soft on complex inventory management. Teak Isle offers solutions to these common challenges and has the ability to respond to almost any new customer and problems that arise. "In a week we build about 1,200 different products, on average seven at a time, and all just in time," Dave said.

That's the kind of job shop you want in your corner if you're a boatbuilder... or a hospital beset by a pandemic.

PBB

***About the Author:*** *Aaron Porter is the editor of* Professional BoatBuilder.

## PBB Resources

- Boat Outfitters: boatoutfitters.com
- Corian: Corian.com
- Fusion XL CNC machines from Komo Machine Inc.: komo.com
- King Plastic (King StarBoard): kingplastic.com
- Plexiglas: Plexiglas.com
- Sparalloy: Spartech.com
- Teak Isle: teakisle.com