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Building Seriously by Necessity in New Brunswick

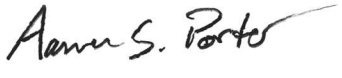
Last March, in a planned detour from the route between my father's farm on the South Shore of Nova Scotia and my home in Portland, Maine, I turned right in Moncton, New Brunswick, and drove north into the vast conifer forest among rich salmon rivers of the province's Acadian shore. Two hours later, on the heels of a late season snowstorm, I arrived in the small coastal fishing town of Pointe-Sapin. In a community where most people work at the boatbuilding shop, a fish plant, or a peat bog, my destination, DJ Marine, was easy to spot. Big commercial lobsterboat hulls in varying stages of readiness for the looming fishing season crowded the lot around the yard's retail storefront. A long wall of newly minted wire lobster traps had spilled out of the onsite trap mill ready for deployment into the Northumberland Strait on opening day in May. It was not a place I'd expect to find cutting-edge boatbuilding practices or workforce development strategies, but that's what awaited me (see "Infusion Acadienne," **page 60**).

Growing up on Nova Scotia's South Shore, I'd known the moderate freeboard, flared-bow models as "strait boats" in reference to their region of origin on the choppy waters of the Northumberland Strait around Prince Edward Island. They still have a deserved reputation as serious fishing boats for serious fishermen.

During my visit, DJ Marine General Manager André Friolet shared some insights into the regional commercial lobster fishery his company primarily serves. It's typified by short seasons—two or three months depending on the lobster management area—rough conditions, relatively shallow waters near shore, a dayboat schedule that has vessels start in the early morning and return to port by early afternoon, sometimes followed by a second run to catch baitfish, all with crews of two to four including the captain on board. In the offseason some of the boats participate in the Gulf of St. Lawrence crab fishery, some go for tuna, and others are simply laid up until lobstering comes around again.

The boats all seem to fetch up again at DJ Marine at some point for repowering or hull and gear alterations. And prosperous fishermen replace their boats as frequently as every three to four years. That means steady business at DJ Marine catering to a fleet of independent commercial operators. But these aren't yachtsmen for whom expenses are relative. For Friolet's clients the bottom line matters, and all expenses must be justifiable as measures that improve on-water productivity. That said, it's hard to predict their priorities. The unexpected installations I saw in the shop included a seakeeper stabilizer on a commercial lobsterboat, raked custom-fabricated masts with oversized work lights and antenna arrays, and a comfortable enclosed pilothouse well suited for a *slipper captain*, a new term to me that describes a skipper with enough skilled hands on board that he needn't ever step out onto the weather deck.

Friolet's mantra is to pay attention to what clients are talking about. While electric or hybrid propulsion and renewable composites might not be something many are ready to invest in yet, he says they are points of discussion that he'd be foolish to ignore. The infusion of a 45′ (13.7m) hull with recyclable Elium resin I reported on in this issue and his attendance at the Electric & Hybrid Marine Expo in California in late March indicate his commitment to keeping DJ Marine current on the global boatbuilding trends most likely to become important to his community of fishermen—a regional clientele that expects quality boats just because the prevailing climate and use profiles demand them.



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COURTESY INNOV

Infusion Acadienne

Recyclable thermoplastic resin and a crew of trainees are put to the test building a commercial fishing boat at DJ Marine in Pointe-Sapin, New Brunswick.

by Aaron Porter

The French Connection

The heart of French language and culture in North America is the bustling cosmopolitan Canadian city of Montreal, but the reach of French knowhow and traditions in the marine trades on this side of the Atlantic is a long one. From commercial builders on the Louisiana Gulf Coast and yacht yards in the French Caribbean to thriving shipbuilding in Quebec and the Canadian Maritimes and innovative composites engineering and materials development in Quebec's southern townships, there's a welcome and persistent infusion of French influence in our industry. So it should have come as no surprise that the first time I saw French chemical coatings and adhesives giant Arkema's recyclable thermoplastic resin Elium included in the recipe for a true workboat, it would be at DJ Marine, a commercial boatbuilding shop on the cold Acadian shore of New Brunswick, where the wind whips in off the Northumberland Strait, and on a clear day you can see across to the big windmills spinning on Prince Edward Island's western headlands. But surprised I was—I had to

***Above**—Boatbuilding industry trainees install the vacuum bag on a DJ Marine 45 hull mold as part of a Community College of New Brunswick INNOV infusion training program last October.*

look up the fishing town of Pointe-Sapin online to get my bearings.

It was some comfort to me that Nicolas Valloir, business manager at Arkema, identified the remoteness as one of the virtues of the shop as a place to put Elium resin to the test. It's about a 10-hour drive from Montreal. "Far, far east and north where conditions are very tough," Valloir said. "This is what we were looking for.

"These boats have to be very sturdy because they go in cold weather fishing lobster and crab in the winter.... We wanted to show the people the resin is very robust."

It was a good marketing plan. Like other industry publications, our prior coverage of Elium has been as an esoteric, environmentally virtuous option for infusing composite hulls and parts—always in the context of its recyclability and often tied to big-budget, high-performance sailboats. Using it to build a stout fishing boat could shift the expectations for the resin from obscure, almost academic applications to infusing a practical workboat hull.

The team spent a week cutting laminates and loading the mold with layers of E-glass and some sheets of balsa core visible here on the bottom panels.

However, the project wasn't a creation of Arkema's promotional team. Its genesis was part of a Community College of New Brunswick INNOV program's Advanced Materials division in Caraquet, about 120 miles (193 km) from DJ Marine. "The division is here to help support industry in the sector," said project manager Luc Lanteigne. To that end, the school offered three training sessions in resin infusion during 2023, primarily to boatbuilders in Canada's Maritime Provinces. Taking advantage of the depth of boatbuilding expertise in France and the common language, they hired French composites consultant and the former infusion expert at yacht builder Bénéteau, Franck Tison, to come run the program.

In Training

"We did three different trainings in infusion," Lanteigne said. "The first session was 10 ways to infuse, from really basic to double-bagging and high-performance infusion. The second session we did large panels because we want to do the bulkheads with infusion." All that was done on-site at the INNOV facility in Caraquet, but for the third act Lanteigne planned to have students infuse a full-size boat hull.

That presented a bit of a challenge, as none of the local builders had molds built with vacuum infusion in mind. The newest and best in the neighborhood was the mold for the DJ Marine 45 (13.7m), an able Northumberland Strait-style fishing boat. The model was introduced three years ago when DJ Marine, a supply and boatbuilding subsidiary of regional marine fisheries conglomerate Enterprise Shippagan, decided it wanted to have its own mold instead of always finishing out hulls from other Atlantic Canadian boatbuilders. "We took an old Magna mold—a small one from the 1980s—and we cut the hull in 11 places," said DJ Marine General Manager André Friolet. "We didn't just raise the boat, we kind of exploded it to keep the proportions." It grew from 42′ (12.8m) with a 13′ (4m) beam to 44′11″ (13.7m) long with a 16′4″ (5m) beam and 42″ (1.1m) draft. Since then, they've built seven of the boats for the thriving local lobster fishery despite market fluctuations due to COVID, supply-chain disruptions, and high interest rates.

Friolet saw an opportunity for his build crew in the INNOV infusion program. He was keen to add resin infusion and the associated improved composite quality to the shop's abilities, and once he'd volunteered the relatively new mold for the program, he welcomed the opportunity to try infusing a DJ Marine 45.

"Our first option was to use polyester for the infusion," he said. It was a

The DJ Marine 45 is a seaworthy and burdensome fishing boat designed to work the choppy Northumberland Strait between the Canadian provinces of New Brunswick and Prince Edward Island. The three-year-old model is an extreme adaptation of a smaller successful 1980s-vintage workboat hull.

safe plan for a class of novice infusion technicians shooting their first big part, but Lanteigne and Tison had other ambitions. "We pushed a little bit more and did it with the recyclable infusion resin," Lanteigne recalled. "It was new for us. The Elium resin is peculiar…it's really sensitive to air leaks, and it's more difficult to infuse compared to polyester resin."

Friolet: "We knew we weren't really ready for big-scale Elium infusion, but if you can do that, you can do anything." So it would be a test, but with Tison, who had run multiple Elium infusions in France, overseeing the operation, the crew had confidence.

That's when Lanteigne at CCNB asked Arkema to join the effort. "It was their own initiative," Valloir insisted, but the resin supplier was happy to oblige. What his team found inside the DJ Marine shop was to their liking.

"Not everything was set up for Elium," Valloir said. And the crew was green. "How to infuse a boat was new technology to them as well. Such a large boat is a good learning curve." It would be a great test of the utility of the resin in far-from-ideal conditions.

Like the New Brunswick builders, Valloir had confidence in the trainer. "They'd never tried Elium before, but they had Franck Tison," he said.

Infusing the DJ Marine 45

The infusion date was set for the end

DJ Marine: A Builder Built on Fishing Boats

AARON PORTER (BOTH)

General Manger André Friolet met me out front in DJ Marine's retail supply store in Pointe-Sapin, a very small town on the coast of New Brunswick. The place was well stocked with fishing gear, marine paint, hoses, hardware, propellers, shafts, electronics, and engines (they're dealers for Cummins and Volvo). "We're a one-stop shop. We sell everything you need for boatbuilding," he said. Founded in 1998, DJ Marine was acquired six years ago by regional marine fisheries conglomerate Enterprise Shippagan for the

A new DJ Marine 45 in build exhibits the extreme bow flare characteristic of workboats in the region.

***Right**—The first layer of glass fabric laminate for infusion is installed over the vinylester gelcoat and skincoat the crew at DJ Marine had already cured in the mold. **Below right**—With the glass laminates in place, crews start fitting a layer of release film.*

COURTESY INNOV (BOTH)

of October, 2023. DJ Marine's preparation task was to gelcoat and skincoat the boat in the mold using standard vinylester resin. Then the crew of trainers, consultants, and nine trainees showed up.

"We scheduled a two-week window, and the first week was just to lay up the fiberglass," said Maxime Saulnier, project manager at INNOV. "The second week we installed all the consumables, peel ply, etc., and then on the Friday we infused." The laminate stack was multiple layers of conventional E-glass cloth, all cut on site in the Pointe-Sapin shop. In addition, some sheets of balsa core were placed in bottom panels to strengthen the running surface. (Friolet requested that we not disclose the specific laminate schedule used by DJ Marine.)

According to Valloir, "The only thing you need to know with Elium is that it's sensitive to air inhibition. So when you do an infusion, you don't want to see any leaks. That's really the only point that you have to control."

Easier said than done. Lanteigne said the vacuum bag material they'd ordered for the infusion was too thin and had

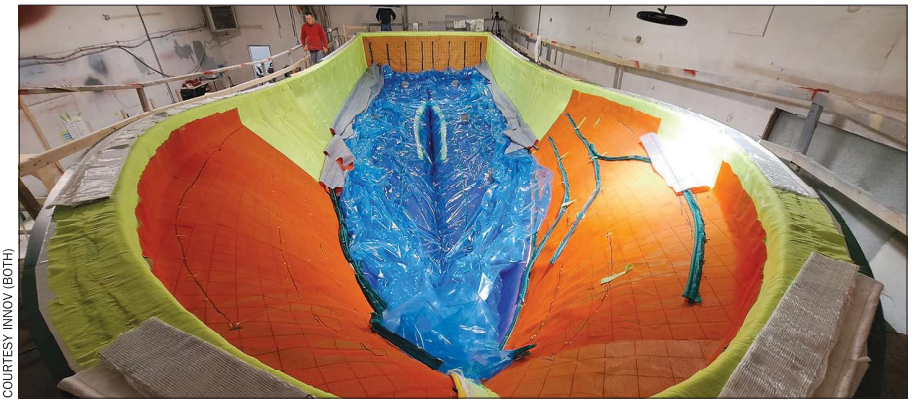
AARON PORTER (BOTH)

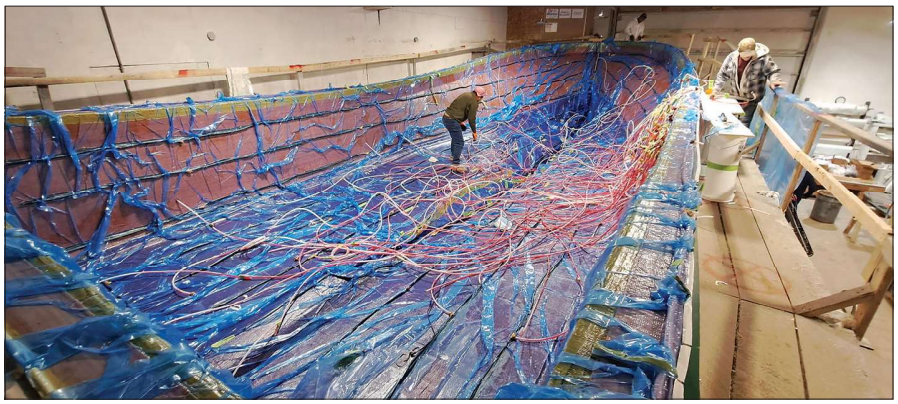
***Left**—A tunnel in the DJ Marine 45 hull bottom allows operators to spin a big propeller while keeping the draft minimal. It also improves shaft angle. **Above**—Skilled laminators install bulkheads in the open hull of a new Magna 50 the yard is finishing for a repeat client.*

fishing gear store and the boatbuilding business. Both continue to thrive.

The building component almost exclusively serves the local fishing community. That means big Northumberland Strait-style boats that can operate in shallow water and have a high flared bow to run as dry as possible in choppy seas. The business had been finishing out bare hulls sourced from other shops in Maritime Canada—Samson, Magna, Dixon—and installing full systems for fishermen. Then three years ago, they added their own hull, the DJ Marine 45, to their lineup (see main story) but will still finish whatever boat fishermen want for lobster or crab fishing to a turnkey readiness.

The boat shop is behind the retail store, and the yard between them is scattered with big fishing boats awaiting the opening of the two-month lobster season in May. In the main shop





COURTESY INNOV (BOTH)

***Left**—With release film and flow media installed, the troublesome blue vacuum bag awaits fitting. **Below left**—Infusing with leak-sensitive Elium thermoplastic resin, the crew learned to troubleshoot a couple of pinholes in the bag by adding vacuum lines to counter unwanted air intrusions.*

pinholes in it, which led to multiple leaks as they attempted to do a standard vacuum drop test before running the resin. "The more you tried to find the leaks, the more leaks you had where you stepped on the plastic," Friolet said. "It was nerve-wracking."

The crew got on the phone with Valloir and some Arkema technicians to discuss the problem. "They asked us for a certain amount of drop in vacuum," Lanteigne recalled. The thin bag wouldn't hold it. "But Franck was so used to these complications that he said, 'We're going to be able to solve the problem when we infuse.'"

are five construction bays—three for fiberglass work and two for systems installation. During my visit, two of the new 45-footers were being finished while a larger Magna hull in its third week in build was being fitted with engine beds and Coosa bulkheads by a three-person composites crew.

There's also a metal-fabrication shop, where rudders, masts, and rails are welded up, and shafts are fine-tuned on a lathe and milling machine.

AARON PORTER (BOTH)

The mechanical and wiring installations I saw were well executed to meet Transport Canada standards. All the shops were set up for efficiency, their mezzanines well stocked with bins of hardware and rolls of composites or wire appropriate to the particular construction bay. Given the relatively remote location, the shop carries a lot of inventory, from diesel engines to stacks of Coosa and drums of resin, Friolet said. They don't count on just-in-time materials delivery, a habit that served them well during the supply chain interruptions of 2021.

"It's hard to finish a boat for under $500,000 today," Friolet observed, adding that one of the well-appointed models we'd just seen was topping out at $950,000. Despite those prices, as we

***Far left**—Rudders lined up outside the well-appointed fabrication shop. **Left**—Wall-mounted spools of wire and a meter for wire or rope in the shop's systems bays streamline electrical installations.*

After two hours of conversation with Valloir, they got the okay to infuse.

Lanteigne recalls that they found at least two leaks forward in the mold. And thanks to Tison's backup vacuum lines they were able to prick the bag close to one leak and install the vacuum line right behind it so the air still coming in the pinhole traveled a very short distance instead of compromising a large area of hull.

"When you have one line that goes bad, you have to react, and then everybody panics," Friolet said. "Franck was very calm, stopped the pump, reset, and started again." The lesson: You have minutes to react, and that is enough.

Some of that forgiving time they had to take corrective measures was a function of the resin choice. "With this infusion we chose our three-hour-open-time Elium. We wanted extra open time just in case," Valloir said. "You don't want to screw up a part that costs $50,000."

In the end, there was "just one dry spot from a leak, and we did a patch and repaired it" by flowing resin into the void area, Friolet said.

Conclusions

In the end, the training exercise and the infused hull were both successful. Lanteigne said the experience was important to the participants, and there has been increased interest in infusion among local builders looking for greater consistency in the build process, especially in the hull and the cabin structures.

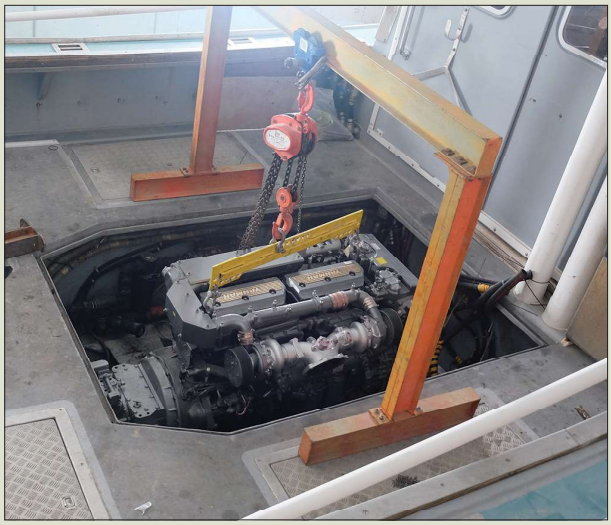
Friolet said he sees significant potential for infusion to improve his resin-to-fiber ratio over hand layup, increasing his hulls' strength for the same thickness, or possibly cutting weight out of the superstructure, where it negatively impacts stability. When I visited the shop in March, the new hull was packed away for the winter, but Friolet said he planned to work on it this summer, infusing the deck and wheelhouse once he has installed the vacuum pump system in one of his build shops. He's also interested in diversifying his composites shop to be less dependent on the marine sector. Capability to deliver efficient, consistent infusion won't hurt in that effort.

As for Valloir, he's ecstatic that the experiment infusing a hull in a remote shop with relatively inexperienced crew was a success: "We asked, 'Can we make it?' And yes, we did," he said, beaming.

While the Elium resin made for a more ticklish infusion process than might have been the case with vinylester, the infusion lesson was likely better for the added trouble. For a crew that can infuse this fussy resin, conventional materials will be comparatively easy to handle. PBB

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

AARON PORTER (BOTH)



Above—*Installing a new diesel engine in a lobsterboat. Maintaining and upgrading the local fleet is a vital part of DJ Marine's business.* ***Left—****To meet its workforce needs, the yard recruits skilled composites workers outside of Canada to immigrate and live in Pointe-Sapin.*

walked by one Magna hull in for alterations Friolet observed, "This guy builds a new boat every three or four years." It seems that so as long as the fishery stays strong, so will the build book at DJ Marine.

The workforce of about 35 employees comprises three welders and fabricators, two mechanics, and one electrical technician, with the balance working in the glass shop, the supply department, and management.

Like most boatbuilders, keeping a good crew together is a challenge, Friolet said. At DJ Marine they rely on an experienced local workforce, but it can't meet demand, so they've been recruiting some experienced composites workers from the Philippines and Mexico. He said they immigrate to Canada and become part of the local community, bringing with them their experience building wind blades or other composites. "These guys brought us some new ideas and techniques," he said. "If it weren't for that, it would be very difficult for us to build boats like this in Pointe-Sapin."

—Aaron Porter