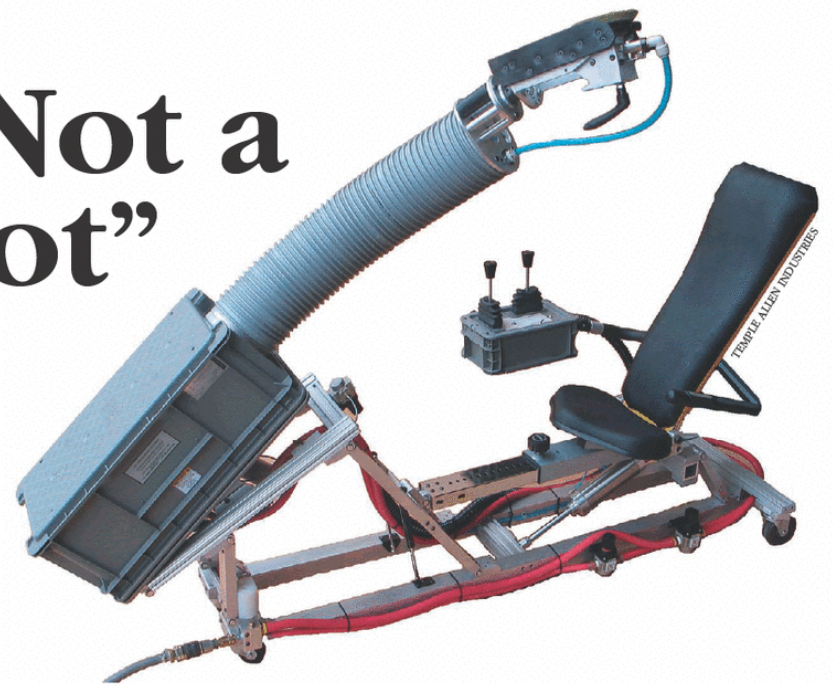
PRACTICAL SOLUTIONS

"It's Not a Robot"



Temple Allen Industries' well-designed and well-built machine, originally conceived for the aircraft industry, makes good sense for fast, consistent surface prep on boats.

by Paul Lazarus

***Above**—Configured for recumbent operation, in an adjustable apparatus called a belly chair, an EMMA (for "easily manipulated mechanical arm") makes short work of surface-prepping the underside of an airplane or helicopter fuselage. And the counter or hull bottom of a yacht. The business end of the pneumatically powered machine has considerable range of motion.*

Some of you may have seen EMMA—the acronym stands for "easily manipulated mechanical arm"—on display at the '08 edition of IBEX, in the Miami Beach Convention Center. EMMA shared an exhibit-hall booth with Norton, the longtime marine abrasives brand. There to explain and demonstrate EMMA to trade show attendees was its designer and developer, John Wentz, general manager of the company that manufactures it, Maryland-based Temple Allen Industries.

Several months earlier, Wentz and two versions of his EMMA were in Maine, to demonstrate the tool to invited members of the state's varied composites industry, hosted by the Maine Advanced Technology Center, in Brunswick. (For more on the Center, see *Professional BoatBuilder* No. 110, pages 14–15). Wentz and EMMA also visited selected boatyards along the Maine coast, which is how I got to see EMMA in action: not far from PBB's offices, Wentz was given a sailboat hull to sand at Brooklin Boat Yard. (For a profile of this full-service yard, see the cover story of PBB No. 84, page 36.) As it turns out, BBY was sufficiently impressed by the machine's performance that day to subsequently buy one—but in a different configuration from the two setups I observed being demo'd. We'll get to BBY's new machine in a moment.

The boat that BBY offered up as a "test article" (to borrow a phrase favored by clinical investigators) was no easy project: an aging 30′/9.1m Atlantic-class sloop, whose prototype was designed in 1928 by Starling Burgess. It remains an active class and was one of the first to convert to fiberglass, a transition to composite construction that started in 1953.

MATTHEW P. MURPHY

John Wentz, inventor and developer of EMMA technology, demonstrates his machine in Maine by removing the surface layers of an aging 30' (9.1m) FRP one-design in preparation for refinishing by Brooklin Boat Yard. Initially skeptical, BBY's paint-shop crew came away impressed by the tool's ability to apply consistently even pressure—without getting tired.

Steve White, the owner-operator of Brooklin Boat Yard, races an Atlantic of his own, so this day's test boat, belonging to a BBY customer, was not without special interest.

The project boat was single-skin fiberglass, sorely in need of refinishing. Beneath one or more coats of faded LPU paint, the original gelcoat was extensively cracked and alligatored. As stated, Wentz brought two versions of EMMA to the yard: one setup is what Temple Allen literature refers to as a "belly chair"; thus, the operator reclines, as on a recumbent bike, beneath the mechanical arm—an ideal arrangement for sanding the Atlantic's counter and much of its hull bottom. Both the arm and the chair can adjust up and down to optimize EMMA's approach to the changing geometry of the hull exterior.

The second EMMA version was a small work-platform on wheels, and fitted with a short scissor lift. In this setup, the operator stands at a control box mounted at about waist height and, with the machine's joystick controls in hand, moves the mechanical arm where desired. The latter version lent itself to topsides sanding.

Wentz, whose background is in robotics, is quick to point out that "EMMA is not a robot." Rather, it's "a manually operated, 100% pneumatically powered, mechanical arm." Which means the machine requires "no programming, no microprocessor, no electricity, and none of the expenses associated with automated or spark-capable equipment." The operating technician is in total control of the machine, whose mechanical arm eliminates the vibrations, high grip forces, and awkward positions that occur when a human applies a power sander to the changing contours of a boat hull. Wentz will also point out what those who've sanded plenty of topsides and bottoms already know: namely, that such physically demanding work can, over time, exact a toll in the form of muscular disorders and their associated medical costs.

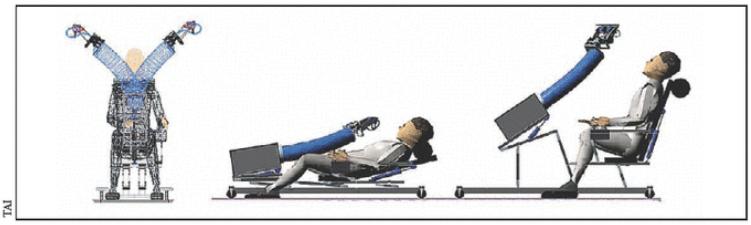
Two comments capture the features of Wentz's machine that most impressed those members of the BBY crew who observed and/or participated in prepping this Atlantic one-design: EMMA "doesn't get tired"; and it exerted "even pressure" on the hull's surfaces. I can attest to the fact that the surface prep was remarkably smooth, given the condition of the underlying layers of paint and gelcoat. And not just smooth, but perfectly free of digs and scallops—the hazard of handheld sander-grinders, which can occur in an unguarded instant. Not to mention a more subtle negative outcome caused by uneven sanding pressure: unintentionally creating an unfair surface.

Interestingly, Wentz acknowledged at BBY that this was his first boat job; previously, EMMA had prepped only whole aircraft or their detached parts, most of which were exclusively aluminum surfaces. Thus, at BBY, Wentz was working with abrasive grits much more aggressive than any he'd used before. And so, EMMA was experiencing dust it had never encountered before.

The machine handled both the coarse grits and the sanding dust well. (Nevertheless, Wentz resolved to reinforce EMMA's defenses against dust by way of improved shrouding of the equipment; plus, a dust-collection system is available as an option.) At BBY the machine also made good on a couple of key manufacturer's claims: namely, that EMMA would prove to be economical in its use of sandpaper;

TAI

An EMMA at work on the underside of an aircraft, though that could just as easily be the bottom of a fin-keel raceboat. The apparatus pictured is among the simplest of potential setups; an EMMA can be mounted in numerous arrangements—at the end of booms, suspended from gantries, and on tracks attached to variously sized work platforms. It all depends on the particular facility and job requirements.



TJ

A belly chair in computer-simulated action. An EMMA's basic anatomy, minus any supporting structure, comprises an "actuation package" housing the pneumatic circuitry and cylinders array that power the arm; joystick controls; a mostly hollow polyurethane-cored arm that mimics the sophisticated motions of a human's (without the human's risk of injury); and finally, the "end-effector," onto which can be mounted sander, blaster, polisher, and/or vacuum, in single or ganged setups.

and, that it would sand faster than its human counterparts, covering substantially more area in significantly less time. (Temple Allen estimates a sanding rate increase ranging from 300% to 1,100%, depending on the complexity of the part, along with a 50% to 80% reduction in sandpaper use.)

Besides the operational and enhanced quality-control benefits mentioned above, Temple Allen cites a lengthy list of additional reasons for companies to give EMMA close consideration, among them:

- No custom tools are required.
- Tool configuration is tailored to the customer's shop and work flow.
- Technical support is good, the operator's manual is user friendly and installation specific, and machine maintenance is minimal.
- The tool can also be made to polish or media-blast a surface, not just sand one.

I count at least 15 discrete configurations, subdivided into four categories, that will deploy EMMA for various industrial applications: floor-stand (e.g., telescoping boom); rail mounted (e.g., extended work platform); overhead rails and gantry (e.g., bridge boom); and a cart (e.g., belly chair). We don't have space enough here to illustrate all these setups, many of which are eminently suited to the hulls and superstructures of large yachts, which, as big smooth-skinned

and mostly curved objects, have much in common with the large aircraft that EMMA has already been busy prepping. Suffice it to say, the machine is unusually adaptable, and Temple Allen aims to please. The company states that any selection would of course take into account "the most ergonomic working position for the operator, the most effective position for the tool, and the least modification to the facility and existing equipment."

As for its new EMMA, Brooklin Boat Yard ultimately decided on an application different from the one demonstrated on the day I visited the yard and described here. BBY's tool is polishing 4′ x 8′ (1.2m x 2.4m) stainless steel sheet, in a fairly tight space under a boatbuilding platform. According to Temple Allen's Robert Kent, at BBY the EMMA there "is on a dual-rail x–y axis overhead gantry, with rotation and auto-adjust capability, and a pair of Dynabrade 13450 polishing tools mounted in opposite directions—so the wheels are spinning toward each other, which cancels out the overall force on the larger system, and also brings all the debris together for easier removal by the vacuum system. We expect to be using Norton abrasives on the pneumatic wheels of the 13450s, and Norton Liquid Ice buffing steps from their automotive line on the buffing end-effector, which I think uses Dynabrade 51392s." (*End-effector* is Temple Allen's term for the business end of the machine.)

By any measure EMMA is versatile, well made, and intelligently thought through. Regarding the latter point, Wentz continues to refine the concept, to further improve the design and manufacture of his invention. He seems enthusiastic—not at all reluctant—to upgrade the product as needed. (At IBEX Wentz said that Temple Allen will retrofit an EMMA purchased prior to an introduced upgrade, provided the sale occurred within that calendar year.)

Such imaginative product development does not come cheap. EMMA is a relatively expensive tool, even in a stripped-down format.

So why are we lauding a piece of equipment like this in the depth of a recession? Because the current economic crisis won't last—any more than earlier downturns did in recent decades. We hope you expect, and plan for, boatbuilding and repair to return to normal levels.

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