

## Air Bending for Airboats

### *Pacific Press Brake Boosts Production by Cutting Welding Time for Hull Construction*

Skimming over the water at up to 110 mph, Diamondback Airboats (Cocoa, FL) can cut through miles of water rapidly. As more and more people discovered the joy and exhilaration the performance these boats deliver, the pressure was on Diamondback to produce more of them (building a larger range of boat sizes), and that led to manufacturing problems. To handle these types of top speeds, Diamondback Airboats need to be ruggedly built and designed. Airboats are made from aircraft grade aluminum welded and riveted together. Diamondback also has their own hull design using different grades of T6 aluminum depending on the application. A complete airboat can cost from \$17,000 up, and there are plenty of options, such as 500-hp engines, to make them “go-fast” boats.

“We started the company in November of 1989,” said President Bobby Fleckinger. “My first job was with another airboat company. They sold out, and then went out of business, and we opened up. Diamondback Airboats started out with just me, my mom, and dad. The first year we hired one employee, now we have 50.” Diamondback Airboats, located not far from the Kennedy Space Center and Disney World, now produces about 240 aluminum airboats per year in a shop that is 19,000 sq. ft. They’re adding another 8,000-sq. ft. to the back of the building, which should be finished in the Spring of 2004.

Before moving to this larger facility almost three years ago, Diamondback was in a much smaller shop just down the road from their present location. At the old facility, its size and the capabilities of their fabricating equipment were limiting their productivity. To produce their larger 30’ airboats, they had to bend the hull in two pieces then seam weld it together, which took from four to five hours. Once they were in their larger building, it was time to find equipment to boost their productivity and quality. Fleckinger said a larger press brake was an important addition for the shop. “We checked many different brake companies,” Fleckinger said. “Fran, my mother, controls most of the purchasing. I tell her what we need and she gets it. We reviewed 4 different company’s machines for capabilities, service, and pricing. After we analyzed all this forming equipment information, we chose a Pacific Press Technologies, L. P. (Mt. Carmel, IL) Fabri-K, 400-ton press brake with a 22’ bed length.”



With this new press brake, they were able to eliminate approximately four to five hours of welding for their larger airboats. But the press brake also gave them greater flexibility. Because beyond building airboats, the company also does custom fabrication work for airboats, boats and swamp buggies. Fleckinger said most of their airboats are “custom” made because of the many different options offered, very rarely are two alike. They also produce custom airboats up to 40’ long, which can hold up to 30 people for tour companies. Some of these boats have up to three engines, one in the front and two in the back. For do-it-yourself builders, Diamondback also sells seats, engine cages, and a full complement of airboat components along with airboat kits that include everything except the engine.

## ***Building an airboat***

Airboat hulls start out as a single sheet of aluminum (and the design for bigger boats require bigger raw material sizes). The piece is first trimmed to a net shape and prepared for bending. Bends are then made on both edges to produce the airboat's topsides. Using 10-degree bends, a radius is formed that produces the hull shape and, by design, significant strength. After the brake bending work, and depending on the type of airboat ordered, stringers, ribs, transom, and decking are added to finish the hull. Next, the engine, electrical components, fuel tank, seats, and any other options are added.

With the new press brake and larger facility, Fleckinger said the company can grow without feeling "squeezed" again. "We actually tripled our size since we moved into this building. We just got a contract with Ski Nautique, for their fiberglass boat ski towers. That's one of the best things that ever happened to us. It's a good sized annual contract, and because it's the same fabrication every time, we don't have to worry about any custom engineering time when working on these towers.



## ***Bending versatility and productivity***

Pacific's Fabri-K press brake is CNC controlled. Fleckinger said, "We put the airboat's model number in the computer and the brake's back gauge automatically moves the aluminum sheet around for bending. This makes it very user-friendly and easy to program. Their Fabri-K press brakes offer 400 tons of forming pressure and 264 tons of punching pressure. The ram and bed length is 22' with a 10" platen width. Throat depth is 10" and the height is 15". Maximum stroke, which is fully variable, is 12", and maximum open height is 20". Ram speeds in inches per minute are: rapid, 146", normal, 25" and fast return, 146". The ram's repeatability and parallelism is +/- 0.001".

For control, these press brakes use an Electronic Servo Level and Depth Control System. Y1/Y2 ram axes are controlled through bed-referenced, high-precision optical linear scales. The distance between the ram and bed is monitored by the DNC operator control and measured on each side with a precision of 0.0004". This measurement is fully independent of the machine load, both on-center and off-center loads. An



Anti-Whip Circuit is also integrated to the press brake's operation at Diamondback. When bending long pieces, "whip-up" can be very dangerous to operators and the resulting back bend can deform the boat hull. This circuit will decrease the speed of the ram to approximately one-quarter the normal pressing speed, thereby reducing the tip velocity of hull parts when forming. This prevents buckling due to inertia of the part that often results in

permanent set or reverse bend on the material. The anti-whip circuit is automatically activated during the last 1/8" of stroke or a selector switch is provided on the control panel to select the anti-whip feature instead of normal press.

Their Fabri-K press brakes use a DNC 60 Control that is pendant mounted. It offers easy

programming and high reliability. It has an LCD text display; automatic calculation of ram position, bending force, speed change points, and pinch point; programmable vertical and horizontal gauge finger movement (X & R axis capability); inch/metric programming; and a tooling library with 30 dies and 20 punches. Along with tooling nomenclature, the programmer can set safety zones and tonnage limits. It also utilizes automatic tonnage calculation and regulation based on tensile strength, vee die openings, material thickness, and bend length.

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