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AbiliTrax floor with Step-N-Lock seats "nested" together for storage to create more interior space.

Full access

Wheelchair base manufacturer relies on garnet abrasive that cuts reliably and fast

In Fenton Mobility Products Inc.'s world, a latch is the most critical component in seat configurations for vans and other vehicles equipped to accommodate wheelchairs. High-precision waterjet cutting with the right abrasive makes it possible to achieve the necessary quality.

Fenton Mobility Products designs and manufactures seat bases that ensure wheelchair passengers' safety in vehicles. The bases contain the latches that attach to Fenton's specialized AbiliTrax rail system in vehicles like the Ford Transit van, the RAM Promaster and the Mercedes Benz Sprinter. Fenton specializes in commercial applications for state agencies, public transportation and group homes where longevity, durability and versatility are of the utmost importance along with safety and comfort for passengers.

"The latch is the critical component of this assembly," says Scott Fenton, president and one of the three owners of the family owned business. "That is the key ingredient. Without the latches, everything else is just a failure."

Ensuring precision

At Fenton's 70,000-sq.-ft. manufacturing facility in Randolph, New York, a Flow Mach 2 waterjet machine cuts the metal for the latches. Fenton has been using waterjet for the last four years. The owners had at one point considered buying punching and grinding equipment.

"We had some machinery dealers that tried that (punching and grinding) but it

Forward interior view of an AbiliTrax up-fitted Ford Transit van.

Fenton waterjet cutting a latch for the patent-pending CAMLock two-seat leg.

Step-N-Lock large and small latches out of a seat base in the "locked" position to demonstrate quality of fit.

> "The vehicles we ship weigh between 7,000 and 8,000 lbs. Each one of our seats could literally pick the vehicle up."
>
> **Scott Fenton**, Fenton Mobility Products Inc.

Step-N-Lock large and small latches installed in a seat base in the "unlocked" position to demonstrate an actual installation.

was not successful. Then we settled on waterjet and we've been waterjet cutting ever since. We've had some laser contractors come in and want to try a laser cut on the latches. That just isn't the same," Fenton says.

A laser process has a heat effect of its own, which can cause quality issues. The mere geometry of the latches makes cutting by waterjet the better process, according to Fenton. The latches have small radiuses in the corners, for example, and a waterjet's speed can be slowed in those corners to improve the quality of the cut, he explains. Laser cutting, on the other hand, can create a crack zone that can lead to latch failure.

"That is why we use A514 Grade B ½-in. plate steel and waterjet to manufacture our latches. We need the precision of the waterjet to cool the cut; we can't have any heat-affected zones on that latch and that is what it takes. We have used some laser applications in the lab and they instantly fail," says Fenton.

Waterjet has been the best cutting process for this manufacturer, but a change in abrasive material made a significant difference in production efficiencies. Fenton Mobility was using an 80-mesh alluvial garnet and, to obtain the high-quality cut required for its parts, the waterjet operator had to increase the orifice size and dial up the abrasive well beyond the machine quality settings. Abrasive consumption—and cost—far exceeded expectations and the Fenton team sought alternatives. Fenton contacted Barton International, Glens Falls, New York, for a recommendation. After testing, Fenton Mobility switched to Adirondack hard rock garnet and achieved favorable results. The company "uses significantly less abrasive with increased speed and reduced cut times with the same high cut quality," Fenton says. "Since making the switch to Adirondack garnet, our abrasive consumption has dropped by 50 percent."

The Adirondack garnet is used to cut carbon and stainless steels up to 1½ in. thick, aluminum and even flooring material. The abrasive is versatile and gives the precision and efficiency needed, according to Fenton.

Rigorous testing

Seat bases and related systems must undergo vigorous in-vehicle, third-party testing. As an example, Fenton Mobility manufactures a Step-N-Lock seat. It's a quick-disconnect seat that can be moved around the vehicle, then stepped and locked into position. For testing, Step-N-Lock may be installed into a Ford Transit van with Fenton's AbiliTrax rail system, where then the seat will undergo pull tests at the laboratory.

Testing is done on every single application. Each application is required to have a 3,000-lb. pull at the lap belt, a 3,000-lb. pull at the shoulder belt, and 20 times the weight of the seat at the center of gravity.

Kevin Martin, lead machinist and Flow waterjet operator, inspecting the tolerances for a latch with Fenton Mobility President Scott Fenton.

Essentially, it is about a 7,200-lb. pull in all directions at once. There is a window of 30 seconds to bring the seat to a 7,200-lb. load and has to hold for 10 seconds.

"The stress just pushes right to the rail and the critical latches," Fenton says. "Not only that, if there is a seat within 12 in. of another seat in the vehicle, they have to be tested simultaneously. We typically test three seats next to each other, bringing test loads to 22,000 lbs. The vehicles we ship weigh between 7,000 and 8,000 lbs. Each one of our seats could literally pick the vehicle up."

On Fenton's seats, the belts are all connected to the seats so those loads transfer all the way down to the latches. The seats sit independently inside the vehicle. There is no belt coming off the wall so all those loads are transferred directly to the latches.

Fenton's products include multiple latches in most cases, such as its CAM-Lock-1 seat leg, which uses five; its CAMLock-2 uses four. An ordinary approach to manufacturing will not suffice.

Quality and consistency are important to Fenton Mobility. The manufacturer must make sure that the seat bases are manufactured to the same standard every time.

"Barton's Adirondack garnet has proven to be highly consistent and flows well," says Fenton. "They are very knowledgeable and were even able to help us quickly troubleshoot a leaky hose issue to get us back to full operation quickly. They are a good business partner." **FFJ**

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