

# A Base Hit

Powered wheelchair bases are stirring up the market as manufacturers offer more options

By Andria Segedy

**A**s some manufacturers expand their drive system options for power wheelchairs, understanding the differences between front-, mid- and rear-wheel drive becomes even more critical for rehabilitation professionals, according to industry sources.

The choices can be confusing. A rear-wheel drive system is stable, maneuverable, and drives and handles well, according to Bob Clarke, product manager, Everest & Jennings, Earth City, Mo. 'The advantages of a front-wheel drive are that it's a stable wheelchair and is short-wheeled [overall length front to rear]. The mid-wheel drive advantage is a very short base—the

base—the wheels are out of the way and the turning is right over the center of gravity where it feels more natural. A front-wheel drive feels like you are being pulled and a rear-wheel drive feels like you are being pushed.

"E&J has a rear-wheel drive version," explained Clarke. "We will be coming out with a mid-wheel drive in

November. I see this as another tool. There are appropriate situations for a front-, mid- and rear-wheel drive. This offers the clinicians another choice and another tool in helping their client."

Invacare Corp. of Elyria, Ohio, plans to add a front-wheel-drive power base to its current line of mid- and rear-wheel-drive chairs. "We will offer all three, because they all serve a purpose," said Hymie Pogir, Invacare's vice president of marketing, power chairs. The front-wheel-drive power base will be available next month.

Sunrise Medical Home Healthcare Group, Longmont, Colo., will introduce a mid-wheel-drive chair this fall while continuing to market its rear-wheel-drive chairs, said Mark Greig, senior product manager for power wheelchairs. In addition, he noted that Sunrise's P320 has a drive wheel that can be moved and thus becomes a mid-wheel drive in its most forward position. "Even though you classify one chair as a mid-wheel drive, not all mid-

wheel-drive chairs are alike," he noted.

Pride Rehab, Exeter, Pa., offers several mid-wheel-drive models of its Jazzy. "The key on any chair is to match the end-user's goals," said Scott Higley, national sales manager. Pride's seven models offer a variety of options for different client needs, including indoor and outdoor use, client weights up to 400 pounds, and a chair that can climb curbs as high as 6 inches, he added.

Permobil, Wobum, Mass., has been making a front-wheel-drive chair for 30 years, according to Larry Jackson, national sales manager. "In the United States, you need an indoor and outdoor chair," he noted. "However, Medicare will fund only one chair. A front-wheel-drive chair allows you to go outdoors, over uneven terrain, and through thresholds and doorways. It allows you to maneuver in a door and has a tighter turning radius."

The OmegaTrac by Springbrook, Texas-based Teftec, is available in both front- and rear-wheel-drive. "The reason our people haven't built front-wheel-drive chairs is because there is a basic problem with directional stability," said president Tom Finch. "We solved that with a special type of transmission, which we have patented. The laws of physics say that, for directional stability, you have to have the center of gravity ahead of the fixed wheels."

Sewell, N.J.-based Chauffeur Mobility finds the rear-wheel-drive base to be the most stable, according to Jimmie Hall, national sales director, "especially for a user in a rehab environment." The Viva! was introduced in October 1997. "We are in the process of making it more adaptable with custom seating," he said. Hall expects to show the new Viva! at Medtrade this November in Atlanta.

Gendron of Archibold, Ohio, specializes in chairs for the bariatric client. "We've found the basic reason for a mid-wheel drive is the short turning radius and responsiveness," said Steve Cotter, vice president of sales and marketing. "With the bariatric user, a short turning radius isn't an issue because of the size of the chair. You won't find bariatric users operating in different environments like a pediatric or regular adult client. Rear-wheel drive gives us the most stable base for the user's needs."

All three bases drive differently, said Susan Johnson Taylor,

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**-Susan Johnson Taylor, OTR/L**

OTR/L, senior education specialist for Sunrise Medical's education department. The rehab professional needs to consider the client's ability, environment, transportation needs and seating requirements, she noted.

## Experience and Ability

"You need to look at all aspects of the person," Greig said. "Maybe maneuverability for this person is key; or cognitively he has better learning capabilities with a mid-wheel, which is a more intuitive type of drive wheel. Basically, you are turning about with the central axis of the person in alignment with the turning center of the chair, so as you turn, there is no translation. It's easier for the user to understand what is happening when he is turning. This can also be true for a new user who can get into it, learn to drive it more quickly, and adapt to the environment more quickly."

A client's physical and cognitive abilities will also help determine the type of chair, based on his or her torso control and speed requirements. "You'll find most front-wheel drives available today have only a moderate top speed," said Pogir. "They become unstable at top speed, squirrely. The back will start to wiggle around."

A mid-wheel drive system needs to stay on stable, flat surfaces, Pogir stressed. "The front stabilizers or front anti-tippers do not have caster action; they do not rotate 180 degrees even though they will move up and down and vertically. If the front end of the base sinks into carpet or dirt, for example, it will have to scrub through or across the surface."

The mid-wheel drive's center of gravity, close to the axle position, necessitates some type of anti-tipper in front, Clarke added. This adds to the chair's length and to the likelihood that an object could get in the way. "The chair is inherently tippy forward. It's not a power chair that works for everyone. It tends to be best for people with some trunk stability and some strength in the upper body. It tends to be a product that favors users who perhaps have MS, a stroke, a para with bad shoulders."

To overcome the tippy motion, Clarke said E&J is adding a soft stop controller and a good front suspension to help control the diving effect.

Pride's solution was to link the drive wheel with the front anti-tipper in its Active Trac suspension, according to Higley. "When you have an abrupt stop, it forces the anti-tipper down so that the chair doesn't pitch forward," he said.

"Ask what kind of tie-downs [the client has] in existing transportation," Taylor said. "If they can't afford to redo their tie-downs, particularly if they drive from their chair, that alone can lead to your choice."

Clients should also check the overall seat height in the new chair from the top of their heads to the floor "to be sure they can fit into the van door opening," she added.

## Client Positioning

"In terms of positioning a person's body in the chair, front-wheel drive can offer positioning of the feet under the seat, if someone has tight ham strings, without worrying about interference of the casters," Taylor said.

The space where the feet are also opens up with a mid-wheel drive, said Pogir, allowing for a proper 90 degree angle with good extension.

A mid-wheel drive has casters in the front and back and big wheels in the middle, Taylor said. "If you are adding a power seating system such as power tilt or power recline, consider the stability of each of the three bases."

Clinicians should consider any special issues, such as how a client transfers and how he or she uses the toilet, Greig said. "The base can have an effect on that if you want to do a side transfer, but you are in a base that is not maneuverable. If you can do a forward transfer, then it's not quite as much of an issue. It depends on the person's capabilities.

"Trunk stability can be an issue," he continued. "If there is sufficient trunk stability, a mid-wheel drive might be fine. But if not, some of the mid-wheel drives out there might pose problems."

Ultimately, the client or clinician should try the chair base before a purchase is made, manufacturers agreed, in an environment similar to that in which it will be used outside the rehab facility. "If they are going to be on a smooth floor inside a hospital, they will never see a difference," Finch said. "They have to go out to the real world with it."