Power Wheelchair Drive Wheel Position

When choosing a power wheelchair, one of the most important factors to consider is drive wheel position as it will impact the chair's performance over obstacles, on hills, at higher speed and on uneven terrain. It will also affect access at home, during transportation and all the places that our clients want to go: school, workplace and community. This guide provides easy to understand considerations and implications for each of the drive wheel positions.

Wheelchair manufacturers can now make power wheelchairs with 4 drive wheel locations. The drive wheel location is described in relation to the user's sitting position.

MID WHEEL DRIVE (MWD)

FRONT WHEEL DRIVE (FWD)

REAR WHEEL DRIVE (RWD)

HYBRID WHEEL DRIVE (HWD)

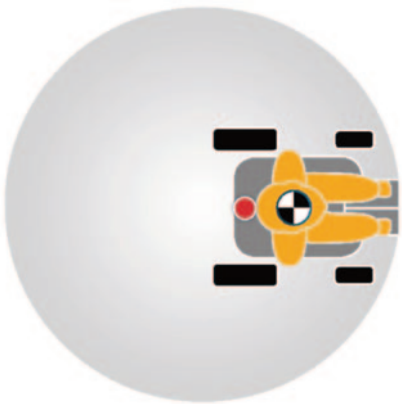
MWD has the client's center of gravity over the drive wheel. FWD has the client's center of gravity well behind the drive wheel. RWD positions the client's center of gravity ahead of the drive wheel. HWD Hybrid drive has the drive wheel position in between that of a mid and rear wheel drive.

The following charts describe how the drive wheel position affects the performance of the wheelchair. This should be considered a guide only, realizing that many other wheelchair features and client goals need to be considered before prescribing a power wheelchair.

Maneuverability is determined both by how a wheelchair turns and how much space is required to turn. This maneuverability will affect how easy it is to get into tight spaces. It can be "measured" by looking at the turning radius. (Center of the drive wheel to the furthest most point of the wheelchair.)

MID WHEEL DRIVE

FRONT WHEEL DRIVE



REAR WHEEL DRIVE

HYBRID WHEEL DRIVE

Turning Radius

MID WHEEL DRIVE	FRONT WHEEL DRIVE	REAR WHEEL DRIVE	HYBRID WHEEL DRIVE
The smallest turning circle option as the user's center of gravity is closest to the chair's center point. As a result, it is considered more intuitive for the user. Easiest to learn.	Longer turning radius because of the base length. Shorter than RWD because casters can be closer than RWD.	Longest turning radius because of the base length and the need for the casters not to clash with the leg rests.	Longer turning radius because of the base length. Shorter than RWD because casters can be closer than RWD.

Ease of Turning

MID WHEEL DRIVE	FRONT WHEEL DRIVE	REAR WHEEL DRIVE	HYBRID WHEEL DRIVE
User's center of gravity is closest to the chair's center point so chair turns where client is sitting. Most intuitive to drive. Easiest to learn.	The back end of the wheelchair swings during turning. The front drive wheel must clear the doorway before the turn can start. Drivers have to learn to "turn late" This style of chair is more challenging for clients with cognitive or perceptual difficulties. Requires learning a strategy.	The front end of the wheelchair swings so that users must drive through the doorway before they begin to turn and stay wide to the door opening when turning. It's easier than a FWD because the client can see the chair in front of them and better gauge turning space.	Hybrid is more intuitive to drive than a RWD but a bit less than MWD. Because the user is sitting a bit in front of the drive wheel, It will have some of the feel of a rear wheel.

Handling obstacles is determined in large part by the size of the wheel that encounters the obstacle and by the suspension built into the chair.

MID WHEEL DRIVE	FRONT WHEEL DRIVE	REAR WHEEL DRIVE	HYBRID WHEEL DRIVE
The caster wheels are smaller with MWD so the chair will rely on the wheelchair suspension to manage obstacles - look for dynamic articulation (movement) of the caster wheels so that they can move and allow the drive wheel to stay loaded and "push" up the obstacle.	The drive wheels should contact the obstacle 1st in a front wheel drive so they typically can manage obstacles well. If the front hangers are positioned low, this might reduce the ability of the drive wheel to reach the obstacle reducing its performance.	Again, the smaller caster wheels will encounter the obstacle first so the chair will have to rely on suspension to keep the drive wheels loaded to push up the obstacle. Base suspension can help.	The base is a bit shorter and has dynamic back stabilizers so the chair will be able to navigate obstacles better that its RWD counterpart.

Traction in large part is determined by how well the drive wheel remains loaded when going up or down inclines or hills. If a lot of the weight of the wheelchair comes off the drive wheels, the chair can lose traction and get stuck.

MID WHEEL DRIVE	FRONT WHEEL DRIVE	REAR WHEEL DRIVE	HYBRID WHEEL DRIVE
Does well for traction both up and down inclines if the drive wheel remains loaded so its performance is very dependent on good suspension (articulation of the casters). If the weight gets shifted to front and rear casters, this type of chair can lose traction.	Does well on inclines until very steep then the chair can lose traction as weight shifts to the smaller casters. Steeper declines can perform poorly as chair can feel tippy forward.	Good traction and best on inclines because center of gravity shifts towards the drive wheels. On steeper declines, it can lose traction and perform poorly if too much weight is shifted to the casters.	Does well as it combines the benefits of a RWD with the suspension added to the rear caster arms.

Control at Higher Speeds is determined by many of the factors we have already discussed.

MID WHEEL DRIVE	FRONT WHEEL DRIVE	REAR WHEEL DRIVE	HYBRID WHEEL DRIVE
Does quite well with directional control at higher speeds. When you add in how intuitive it is to drive, this becomes an easy chair to control.	Worst directional control at higher speeds. Chair may "fishtail" although advanced electronics and programming can help.	Best directional control at higher speeds.	Nearly as good as its RWD counterpart at control with speed.

Ease of Attendant Drive This can be a really important consideration if caregivers are going to be moving the power wheelchair – particularly in tight spaces like bedrooms or vans

MID WHEEL DRIVE	FRONT WHEEL DRIVE	REAR WHEEL DRIVE	HYBRID WHEEL DRIVE
This drive wheel position can be tricky to drive from an attendant control located at the back of the chair because the control is so far behind the turning center of the wheelchair.	This drive wheel position can be tricky to drive from an attendant control located at the back of the chair because the control is so far behind the turning center of the wheelchair. Chair may "fishtail" although advanced electronics and programming can help.	This drive wheel position offers the easiest management/directional control for an attendant joystick mounted at the back of the chair.	Nearly as good as its RWD counterpart with attendant joystick control.

As with all AT decisions, there are always considerations and compromises. But by understanding the key features and benefits of each of the drive wheel positions, you can give advice to clients about which might best suit their lifestyle and usage.

References

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