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## Choosing Your Optimal Manual Wheelchair Power Assist Device

When choosing a power assist/add-on device for a manual wheelchair, consider that each has distinct capabilities, benefits, and drawbacks. This guide provides an easy-to-understand overview of the considerations and implications for each broad category of devices.

	Independent Propulsion Power Assist			Caregiver Power Assist	
	Push Devices	Wheel Add-Ons	Pull Devices	Caregiver Push Devices	Caregiver Wheel Add-Ons
<b>PRODUCT CONSIDERATIONS</b>					
Wheelchair Compatibility	★★★★★	★★★★★	★★☆☆☆	★★☆☆☆	★★★★☆
Air Travel Considerations	★★★★★	★★★★☆	★☆☆☆☆	★★★★☆	★★☆☆☆
Wheelchair Footprint	★★★★★	★★★★☆	★☆☆☆☆	★★☆☆☆	★★☆☆☆
Control in Small Environments	★★★★☆	★★★★★	★☆☆☆☆	★★★★☆	★★★★☆
Use in Outdoor Environments	★★★★☆	★★★★☆	★★★★★	★★☆☆☆	★★★★☆
Use for Extended Distances	★★★☆☆	★★★★☆	★★★★★	★★☆☆☆	★★★★☆
<b>CLIENT CONSIDERATIONS</b>					
Hand Function/Strength for Attaching to the Wheelchair	★★★★☆	★★★☆☆	★☆☆☆☆	★★☆☆☆	★★☆☆☆
Ease of Use	★★★★☆	★★★★☆	★★☆☆☆	★★★★☆	★★★★☆
Options for Degenerative Diagnosis	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★★☆	★★★★☆
Considerations with Stopping	★☆☆☆☆	★☆☆☆☆	★★☆☆☆	★★☆☆☆	★★★★★
Compatibility for Hemiplegic Clients	★★☆☆☆	★★☆☆☆	☆☆☆☆☆	★★★★★	★★★★★
Hand Function for Controlling	★★★☆☆	★★☆☆☆	★☆☆☆☆	★★★★☆	★★★★☆

# Independent Propulsion Power Assist

There is strong evidence for increased incidence of upper limb (UL) repetitive strain injuries (RSI) among manual wheelchair users. These injuries occur due to repetitive movements and result in muscle tears, inflammation, nerve impingement, bursitis, and pain. They primarily affect the shoulders, wrists, and elbows and can manifest as rotator cuff impairments, carpal tunnel syndromes, and "tennis elbow," among other symptoms. Research indicates that power assist devices can help to preserve independent function & UL health and reduce risk of future damage while still allowing independent mobility with a manual wheelchair.

## Push Devices

A unit is clamped on to the wheelchair frame and "pushes" the manual wheelchair forward. Speed on/off is controlled by a hand controller generally mounted on the side rail.



Empulse R90 push device



Push devices are generally the easiest power-assist devices to attach and remove

PRODUCT CONSIDERATIONS					
Wheelchair Compatibility ★★★★★		Air Travel Considerations ★★★★★		Wheelchair Footprint ★★★★★	
<b>Factor</b> Most can be used with either folding or rigid manual wheelchairs, but require different brackets depending on type and width.	<b>Consideration</b> Consider the bracket's weight compared to its durability.	<b>Factor</b> These are the smallest and lightest of the models. Consider whether the battery can be easily removed for air travel. A few have lithium batteries that can be removed and put into the cargo hold of the plane (with prior approval of the airline).	<b>Consideration</b> Check that the size of the battery meets both distance and transportation requirements.	<b>Factor</b> The power assist is mounted to the wheelchair's camber tube to prevent adding width to the system. Some devices add length.	<b>Consideration</b> For the devices that do add length, consider how this will affect maneuverability, especially in small areas.

PRODUCT CONSIDERATIONS					
Control In Small Environments ★★★★☆		Use In Outdoor Environments ★★★★☆		Use For Extended Distances ★★★★☆	
<b>Factor</b> Good in small environments if the client can control it well. The client will need to pay attention and monitor speed in tighter/busier environments.	<b>Consideration</b> Consider the client's cognitive ability and wheelchair skills.	<b>Factor</b> Best suited for harder ground and pavement.	<b>Consideration</b> Depending on the terrain, it can lose traction on soft surfaces like grass and dirt.	<b>Factor</b> Great for longer distance travel.	<b>Consideration</b> It's not a power wheelchair, but it will allow the client to go further with less fatigue/effort.
CLIENT CONSIDERATIONS					
Hand Function and Strength For Attaching / Detaching to the Wheelchair ★★★★☆		Ease of Use ★★★★☆		Options For Degenerative Diagnosis ★★☆☆☆	
<b>Factor</b> These devices are generally one of the lighter devices in comparison to the other types (13-17 lbs.), allowing easier connection or removal from the wheelchair.	<b>Consideration</b> Consider if the client has range of motion, motor control, and strength to remove the device. In some models, the wheel can retract off the ground so it doesn't need to be removed when not being used.	<b>Factor</b> Some systems have simple dials to change the speed, some use push buttons or a series of taps. These devices do not have a braking function and require the rider to stop the wheelchair using the handrims after cutting power to the unit using the control system.	<b>Consideration</b> Consider whether your client has the cognitive ability and reaction speed to adequately control the device, especially in busy areas or at faster speeds. Some of the devices are not as intuitive to use.	<b>Factor</b> Most of these devices can be programmed to adapt to declining strength and UL function. Some are able to adapt to the loss of some ability on one side (hemiplegia).	<b>Consideration</b> Push devices do not have the same programming capabilities as a power wheelchair, and power seat functions can't be added. Consider whether your client would be better suited for a power wheelchair.

**Push Devices** (Continued)

CLIENT CONSIDERATIONS					
Considerations With Stopping ★☆☆☆☆		Compatibility For Hemiplegic Clients ★★☆☆☆		Hand Function For Controlling ★★★☆☆	
<b>Factor</b> Clients need to have the strength to stop the wheelchair by holding the handrims/wheels.	<b>Consideration</b> Once the chair is set in motion, even if they turn off the device, the chair does not have brakes like a power wheelchair. They will need to physically stop the wheelchair.	<b>Factor</b> Most can be controlled by one hand. Remember they require the rider to stop the wheelchair using the handrims after cutting power to the unit using the control system.	<b>Consideration</b> These devices can be challenging to use for full hemiplegics.	<b>Factor</b> These devices have some type of a control box for speed and on/off.	<b>Consideration</b> Consider whether your client has adequate strength and finger function to safely control the wheelchair.

**Wheel Add-Ons**

Motors are incorporated into the wheels, which then provide forward propulsion.



EMPULSE M90 wheel add-on

PRODUCT CONSIDERATIONS					
Wheelchair Compatibility ★★★★★		Air Travel Considerations ★★☆☆☆		Wheelchair Footprint ★★★☆☆	
<b>Factor</b> Most can be used with either folding or rigid manual wheelchairs, but require different brackets depending on type.	<b>Consideration</b> With most devices, the wheels are similar to a normal manual wheelchair but with extra weight. The tire options may be limited.	<b>Factor</b> Consider whether the battery can be easily removed for airline travel or transport. Powered wheels need to be stowed carefully.	<b>Consideration</b> Check the size of the battery meets transportation requirements. Also some device batteries are easier to remove than others.	<b>Factor</b> Consider whether the device adds width to the wheelchair as it depends on the unit selected.	<b>Consideration</b> Consider if the increased width will impede function.

PRODUCT CONSIDERATIONS					
<b>Control In Small Environments</b> ★★★★★		<b>Use In Outdoor Environments</b> ★★★★★☆		<b>Use For Extended Distances</b> ★★★★★☆	
<b>Factor</b> Great in small environments where maneuverability is essential, as the client is fully in control of the device.	<b>Consideration</b> A winner in this regard as long as the footprint size isn't altered and the width doesn't impede getting through doorways or reduce maneuverability.	<b>Factor</b> Best suited for harder ground and pavement.	<b>Consideration</b> Remember: it is not a power wheelchair and it has normal manual wheelchair-sized wheels and tires.	<b>Factor</b> Great for longer distance travel.	<b>Consideration</b> It's not a power wheelchair, but it will allow the client to go further with less fatigue/effort.
CLIENT CONSIDERATIONS					
<b>Hand Function and Strength For Attaching / Detaching to the Wheelchair</b> ★★☆☆☆☆		<b>Ease of Use</b> ★★★★★☆		<b>Options For Degenerative Diagnosis</b> ★★☆☆☆☆	
<b>Factor</b> This type of device adds weight to the wheels- some add significant weight, others are minimal additional weight.	<b>Consideration</b> Consider whether the wheels will need to be removed and how often. Is this doable by the client or family?	<b>Factor</b> Because the client pushes the handrims like a normal manual wheelchair, learning how to use them is easy. The motor multiplies the force generated and can extend the distance per push.	<b>Consideration</b> Consider whether your client has the cognitive ability and reaction speed to adequately control the deceleration of the wheelchair, especially in busy areas or at faster speeds.	<b>Factor</b> Most wheel add-on devices can be programmed for increasing weakness or to accommodate strength differences.	<b>Consideration</b> Wheel add-on devices do not have the same capabilities as a power wheelchair, nor can power seat functions be added. Consider whether your client would be better suited to a power wheelchair.

## Wheel Add-Ons (Continued)

CLIENT CONSIDERATIONS					
Considerations With Stopping ★☆☆☆☆		Compatibility For Hemiplegic Clients ★★☆☆☆		Hand Function For Controlling ★★☆☆☆	
<b>Factor</b> Clients need to have the strength to stop the wheelchair by holding the handrims/wheels.	<b>Consideration</b> Wheel-Add Ons do not have brakes like a power wheelchair. Most have some braking functions and allow the rider to slowdown through handrim control using less force than with out the power assist.	<b>Factor</b> Can program for one side substantially weaker than the other. Will likely need to use a foot for accurate steering.	<b>Consideration</b> These devices can be challenging to use for full hemiplegics.	<b>Factor</b> These devices require the client to push the handrims like a normal manual wheelchair, but they multiply the force generated and can extend the distance per push.	<b>Consideration</b> Consider whether your client has adequate strength and control to push the handrim.

## Pull Devices

A front wheel assembly is attached to the frame of the wheelchair and a motorized wheel provides the power. Handlebars allow the client to steer.



EMPULSE F55 pull device



EMPULSE F55 pull device

PRODUCT CONSIDERATIONS					
Wheelchair Compatibility ★★☆☆☆		Air Travel Considerations ★☆☆☆☆		Wheelchair Footprint ★☆☆☆☆	
<b>Factor</b> These devices require a fixed front end so that the unit can clamp onto the wheelchair.	<b>Consideration</b> Consider whether your client can transfer in and out without swing-away hangers/foot-plates.	<b>Factor</b> These devices are bigger and heavier than the other types of power-assist devices.	<b>Consideration</b> Does the client need to transport the device? If so, how will it be loaded? Is there space available?	<b>Factor</b> This device will add substantial length to the wheelchair. Depending on the device, it can substantially reduce maneuverability.	<b>Consideration</b> Best used in outdoor environments.

**PRODUCT CONSIDERATIONS**

<b>Control In Small Environments</b> ★☆☆☆☆		<b>Use In Outdoor Environments</b> ★★★★★		<b>Use For Extended Distances</b> ★★★★★	
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<b>Factor</b> Depending on the device, they can substantially reduce maneuverability indoors.	<b>Consideration</b> Great in outdoor environments and should be removed for most indoor environments. Depending on the device, some are easier to remove than others.	<b>Factor</b> Great for outdoor activities. Depending on the device, they can have substantial speed and torque.	<b>Consideration</b> Does the client have the wheel-chair skills and cognitive ability to use the device safely?	<b>Factor</b> Great for longer distance outdoor travel.	<b>Consideration</b> As there are many different models, make sure the wheel size and power suits the client's needs and activities.
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**CLIENT CONSIDERATIONS**

<b>Hand Function and Strength For Attaching / Detaching to the Wheelchair</b> ★☆☆☆☆		<b>Ease of Use</b> ★★☆☆☆		<b>Options For Degenerative Diagnosis</b> ★★☆☆☆	
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<b>Factor</b> These devices are heavier and generally require good hand function to attach to the wheelchair.	<b>Consideration</b> Consider if the client has the hand function to use. Also, consider whether the attachment clamps stay on the chair (adding weight) when the device is not in use.	<b>Factor</b> These devices are controlled by handlebars with both a throttle and squeeze-trigger brakes.	<b>Consideration</b> Does the client have trunk control and limb function to control safely at higher speeds and over uneven terrain?	<b>Factor</b> These devices require good trunk and upper extremity function.	<b>Consideration</b> May be difficult for progressive disabilities.
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## Pull Devices *(Continued)*

CLIENT CONSIDERATIONS					
Considerations With Stopping ★★☆☆☆		Compatibility For Hemiplegic Clients ☆☆☆☆☆		Hand Function For Controlling ★★☆☆☆	
<b>Factor</b> Depending on the power assist, it will have manual hand brakes, electronic brakes, or both.	<b>Consideration</b> Does the client have adequate trunk control and limb/hand function to manage the brakes?	<b>Factor</b> These devices are difficult to use for full hemiplegics.	<b>Consideration</b> A different device should be considered for full hemiplegics.	<b>Factor</b> These devices are controlled by handlebars, requiring hand grip and strength.	<b>Consideration</b> Does the client have the strength and endurance to safely manage the device?

## Caregiver Power Assist

There are clients unable to functionally propel manual wheelchairs and cannot successfully operate a power wheelchair. For these clients, research has shown power assist devices can better allow caregivers to provide this mobility, improving client function and participation.



EMPULSE R20 caregiver push device



Caregiver push devices can help with climbing curbs

## Caregiver Push Devices

A powered wheel is attached to the wheelchair, generally to the rear. These devices are designed for clients who are dependent on caregivers for mobility but who are also not power wheelchair candidates.



## Caregiver Push Devices *(Continued)*

PRODUCT CONSIDERATIONS					
<b>Wheelchair Compatibility</b> ★★☆☆☆		<b>Air Travel Considerations</b> ★★★☆☆		<b>Wheelchair Footprint</b> ★★☆☆☆	
<b>Factor</b> Most of these devices can be used with either a folding, rigid, or tilt-in-space wheelchair. Depending on the device, it can be removed for vehicle transport or the client can sit in the system during transport.	<b>Consideration</b> Some devices have limitations on the type of tires and wheels that can be utilized.	<b>Factor</b> Models differ in this category in regard to how the battery is removed for storage, transport, or charging.	<b>Consideration</b> Consider the battery's location and whether it's easy to remove for storage or transport.	<b>Factor</b> Depending on the device, this type of power add-on can add length to the wheelchair.	<b>Consideration</b> As the unit is generally mounted at the rear of the wheelchair, consider whether this impedes a carer walking behind the wheelchair.
<b>Control In Small Environments</b> ★★★☆☆		<b>Use In Outdoor Environments</b> ★★☆☆☆		<b>Use For Extended Distances</b> ★★☆☆☆	
<b>Factor</b> These devices work quite well in small environments.	<b>Consideration</b> As the unit is generally mounted at the rear of the wheelchair, consider if the unit adds length.	<b>Factor</b> These devices are designed for more urban outdoor environments and generally have slower maximum speeds.	<b>Consideration</b> Consider whether an add-on wheel can manage the speed and terrain the client requires.	<b>Factor</b> These devices are designed for assisting caregivers in moving a wheelchair over longer distances.	<b>Consideration</b> Consider whether an add-on wheel can manage the speed and terrain the client requires.

## Caregiver Push Devices *(Continued)*

CLIENT CONSIDERATIONS					
<b>Hand Function and Strength For Attaching / Detaching to the Wheelchair</b> ★★☆☆☆		<b>Ease of Use</b> ★★★★★		<b>Options For Degenerative Diagnosis</b> ★★★★★	
<b>Factor</b> Models differ in this category in regard to product weight and how they attach to the chair.	<b>Consideration</b> Consider the ease of adding/removing the device. It's also important to consider if the wheelchair can be folded with the device in place.	<b>Factor</b> Most units are simple to use with on/off and speed adjustments.	<b>Consideration</b> Most caregivers can understand and use these devices successfully.	<b>Factor</b> As these are controlled by the attendant, client loss of function will not impact these devices.	<b>Consideration</b> Push devices do not have the same capabilities as a power wheelchair, and power seat functions cannot be added. Consider whether a large change in function is anticipated and whether the client might be better suited to a power wheelchair.
<b>Considerations With Stopping</b> ★★☆☆☆		<b>Compatibility For Hemiplegic Clients</b> ★★★★★		<b>Hand Function For Controlling</b> ★★★★★	
<b>Factor</b> The device has power and speed up/down control. Depending on the device, it may or may not have electronic braking.	<b>Consideration</b> Does the caregiver have adequate strength/skill to manage the chair in the necessary environments, including steering and stopping? Some devices may not have electronic brakes.	<b>Factor</b> As these devices are controlled by the attendant, they can be appropriate for more complex hemiplegic clients.	<b>Consideration</b> Appropriate for dependent hemiplegic users. Remember: it does not have the capacity of a power wheelchair.	<b>Factor</b> These devices have some type of a control box to adjust speed and on/off. This control box is mounted in the attendant position on the back canes.	<b>Consideration</b> Some devices use very simple dials/push buttons. Others use squeeze triggers. Consider the ease of use for the caregiver.

## Caregiver Wheel Add-On

Powered wheels are attached to the wheelchair, replacing the normal rear wheels. These devices are designed for clients who are dependent on caregivers for mobility but who are not power wheelchair candidates.



ZIPPIE iXpress caregiver wheel add-on

PRODUCT CONSIDERATIONS					
<b>Wheelchair Compatibility</b> ★★★☆☆		<b>Air Travel Considerations</b> ★★☆☆☆		<b>Wheelchair Footprint</b> ★★☆☆☆	
<b>Factor</b> Most of these devices can be used with either a folding, rigid, or tilt-in-space wheelchair.	<b>Consideration</b> Some devices have limitations on the type of tires that can be utilized. Consider if this is an important maintenance issue.	<b>Factor</b> Models differ in this category in regard to how the battery is removed for storage, transport, or charging.	<b>Consideration</b> Consider the battery's location and whether it's easy to remove for storage or transport.	<b>Factor</b> The powered wheels can add to the overall width of the wheelchair.	<b>Consideration</b> Consider if the increase in width will impede function and maneuverability.
<b>Control In Small Environments</b> ★★★★★☆		<b>Use In Outdoor Environments</b> ★★★☆☆		<b>Use For Extended Distances</b> ★★★☆☆	
<b>Factor</b> Most devices do not add additional length to the wheelchair, but could add width.	<b>Consideration</b> A winner in this regard as long as the added width doesn't impede getting through doorways or reduce.	<b>Factor</b> These devices are designed for urban outdoor environments with harder surfaces.	<b>Consideration</b> A great solution for a dependent user who is not a power wheelchair candidate and is using the device mostly on sidewalks and paved surfaces.	<b>Factor</b> These devices are designed for urban outdoor environments. They generally have higher speeds, more power, and a bit more capacity when compared to add-on wheel devices.	<b>Consideration</b> A great solution for a dependent user who is not a power wheelchair candidate and whose carer cannot push a manual wheelchair over the distances required.

CLIENT CONSIDERATIONS					
<b>Hand Function and Strength For Attaching / Detaching to the Wheelchair</b> ★★☆☆☆		<b>Ease of Use</b> ★★★★★		<b>Options For Degenerative Diagnosis</b> ★★★★★	
<b>Factor</b> Models differ in this category in regard to product weight and how they attach to the chair. Some are considerably more complicated to remove than others.	<b>Consideration</b> Consider if the device needs to be removed from the wheelchair. Most can stay on a wheelchair permanently. If the chair needs to be folded, consider if the device allows this.	<b>Factor</b> Most units are simple to use with on/off and speed adjustments.	<b>Consideration</b> These devices are simple to learn how to use.	<b>Factor</b> As these are controlled by the attendant, client loss of function will not impact these devices.	<b>Consideration</b> Wheel add-on devices do not have the same capabilities as a power wheelchair, and power seat functions cannot be added. Consider whether a large change in function is anticipated and whether the client might be better suited to a power wheelchair.
<b>Considerations With Stopping</b> ★★★★★		<b>Compatibility For Hemiplegic Clients</b> ★★★★★		<b>Hand Function For Controlling</b> ★★★★★	
<b>Factor</b> The device has power and speed up/down control. Depending on the device, it may or may not have electronic braking.	<b>Consideration</b> These devices are easy for caregivers to use.	<b>Factor</b> As these devices are controlled by the attendant, client hemiplegia will not impact their use of the device.	<b>Consideration</b> Appropriate for dependent hemiplegic users. Remember: it does not have the capacity of a power wheelchair.	<b>Factor</b> These devices have some type of a control box to adjust speed and on/off. This control box is mounted in the attendant position on the back canes.	<b>Consideration</b> Some devices use very simple dials/push buttons. Consider the ease of use for the attendant.

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