# Comparison of Front, Mid and Rear Wheel Drive Power Chairs

N.B. Not comparing power with manual wheel chairs

<table>
<thead>
<tr>
<th></th>
<th>Rear wheel drive</th>
<th>Mid wheel drive</th>
<th>Front wheel drive</th>
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</thead>
<tbody>
<tr>
<td><strong>Turning circle</strong></td>
<td><img src="image1" alt="Rear wheel drive image" /></td>
<td><img src="image2" alt="Mid wheel drive image" /></td>
<td><img src="image3" alt="Front wheel drive image" /></td>
</tr>
</tbody>
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<tr>
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<th>Rear wheel drive</th>
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<tbody>
<tr>
<td><strong>Footplate position</strong></td>
<td><img src="image4" alt="Footplate position image" /></td>
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</tr>
</tbody>
</table>

- **Rear wheel drive**
  - Largest turning circumference.
  - More difficult to manoeuvre in tight spaces.

- **Mid wheel drive**
  - Smallest turning circumference.
  - Tightest turning radius.

- **Front wheel drive**
  - Medium turning circumference.
  - Turning in small space is difficult due to long back end.
  - Manages tight corners well due to short front end.

- **Footplate position**
  - Footplates typically add length to the chair as they need to be angled forward 60-80° to clear the larger front casters.
  - Central mounted single footplate may reduce overall length.

- **Rear wheel drive**
  - Front casters are typically wider apart than the drive wheels, so 90° footplates add less than 30mm to turning radius.

- **Mid wheel drive**
  - No front casters to interfere with 90° footplates, so add less than 30mm to turning radius.

- **Front wheel drive**
  - N.B. If client uses a hoist for transfers, consider interface between the hoist and chair. Check to ensure hoist legs can fit around the front castors and drive wheels to enable positioning the client well back in the powerdrive chair.

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### Handling obstacles and inclines

<table>
<thead>
<tr>
<th></th>
<th>Rear wheel drive</th>
<th>Mid wheel drive</th>
<th>Front wheel drive</th>
</tr>
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<tbody>
<tr>
<td>Drive wheels</td>
<td>Push front casters over obstacles, so less efficient than front wheel drives.</td>
<td>Most stable chair on slopes, as front and back casters prevent tipping forward or backward.</td>
<td>Better than rear and mid wheel drives for obstacle climbing and on rough ground, because the large drive wheels pull the chair over obstacles.</td>
</tr>
<tr>
<td>Least stable</td>
<td>for tipping compared to mid and front drives, as most of chair’s mass is at the rear of the chair.</td>
<td>The chair’s centre of gravity is about even with centre of chair. The drive wheels under the user make it stable over even ground.</td>
<td>Stability dependent on battery location.</td>
</tr>
<tr>
<td>Tipping</td>
<td>Least stable for tipping compared to mid and front drives, as most of chair’s mass is at the rear of the chair.</td>
<td>On uneven terrain or curbs, may get “stuck” on the front and rear casters, suspending the drive wheels off the ground.</td>
<td>Provides better weight distribution than rear and mid wheel chairs, as the weight of chair can be spread by having drive wheels at the front and batteries at the back. This makes it very stable for uneven terrain and hills.</td>
</tr>
<tr>
<td>Casters</td>
<td>Must have anti-tippers.</td>
<td>On uneven terrain or curbs, may get “stuck” on the front and rear casters, suspending the drive wheels off the ground.</td>
<td>If chair is set up with one battery behind and one in front of the seat, the chair must rely on front anti-tippers to improve stability. This would add length to the front of chair.</td>
</tr>
<tr>
<td>Additional</td>
<td>Must have anti-tippers.</td>
<td>On uneven terrain or curbs, may get “stuck” on the front and rear casters, suspending the drive wheels off the ground.</td>
<td>Provides better weight distribution than rear and mid wheel chairs, as the weight of chair can be spread by having drive wheels at the front and batteries at the back. This makes it very stable for uneven terrain and hills.</td>
</tr>
<tr>
<td></td>
<td>When going up steep hills the chair will lean back on its anti-tippers to assist in preventing chair from tipping backwards.</td>
<td>On sand or soft ground, the drive wheels may sink into the soft terrain, causing loss of traction.</td>
<td>Stability dependent on battery location.</td>
</tr>
<tr>
<td></td>
<td>Need access to expertise for correct set up.</td>
<td>When going up steep hills the chair will lean back on its anti-tippers to assist in preventing chair from tipping backwards.</td>
<td>Provides better weight distribution than rear and mid wheel chairs, as the weight of chair can be spread by having drive wheels at the front and batteries at the back. This makes it very stable for uneven terrain and hills.</td>
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### Handling at speed

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<th>Front wheel drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most stable</td>
<td>At higher speeds because most of the weight of the chair is around the drive wheels.</td>
<td>More sensitive to change of direction than rear wheel drive, due to drive wheel position</td>
<td>Less stable than rear wheel drive, and tendency to fishtail when turning at high speed because the chair is pulling more weight behind it</td>
</tr>
<tr>
<td>Speed</td>
<td>At low speed (6-8kph) all three drive systems are equally stable</td>
<td>To turn quickly, all four casters have to spin back into the direction of travel.</td>
<td>On hard braking, may tip forward.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Six points of contact.</td>
<td></td>
</tr>
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**Fact Sheet**

Queensland Spinal Cord Injuries Service

**SPINAL INJURIES UNIT**
Ph: 3176 2215
Fax: 3176 7462

**OUTPATIENT DEPARTMENT**
Ph: 3176 2641
Fax: 3176 5644

Postal and Location
Princess Alexandra Hospital
Ipswich Rd
Woolloongabba QLD 4102
AUSTRALIA

**TRANSITIONAL REHABILITATION PROGRAM**
Ph: 3176 9508
Fax: 3176 9514
Email trp@health.qld.gov.au

Postal
PO Box 6053
Buranda, QLD, 4102

Location
3rd Floor, Buranda Village
Cnr Cornwall St & Ipswich Rd
Buranda, QLD, 4102
AUSTRALIA

**SPINAL OUTREACH TEAM**
Ph: 3176 9507
Freecall 1800 624 832
(for regional clients)
Fax : 3176 9514
Email spot@health.qld.gov.au

Postal
PO Box 6053
Buranda, Q, 4102

Location
3rd Floor, Buranda Village
Cnr Cornwall St & Ipswich Rd
Buranda, QLD, 4102
AUSTRALIA

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Fact Sheet

- **N.B.** Power chairs in Australia are legally required to be speed limited to 10kph

### Smoothness of ride

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<th>Rear wheel drive</th>
<th>Mid wheel drive</th>
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</table>
| • Larger casters than mid wheel drive chairs, so smoother ride outdoors.  
  • Can be fitted with shock absorbers on all four wheels. | • Generally have smaller casters so a harder ride than rear or front wheel. However, can be offset by the softness of all wheels and quality of suspension.  
  • Six wheels going over the bumps and sending more shocks into the frame and seat.  
  • Suspension system tends to deflect and conform to the surface. Therefore, seat will be straight even if wheels at different heights. | • Larger casters than mid wheel drive chairs, so smoother ride outdoors.  
  • Can be fitted with shock absorbers on all four wheels. |

- Pneumatic tyres and casters provide the smoothest ride. Many chairs provide the option of solid casters and drive wheels to prevent flat tyres.  
  - All MASS funded chairs have solid tyres as standard

### Reversing

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<tr>
<td>Less sensitive than mid wheel drive. The larger casters have more contact with the ground, so weight is distributed over a larger area; thus, the chair moves in the desired direction before the casters swivel.</td>
<td>• More sensitive to change of direction of travel than rear and front wheel drives, because their smaller casters result in an instant change of direction</td>
<td>Less sensitive than mid wheel drive. The larger casters have more contact with the ground, so weight is distributed over a larger area; thus, the chair moves in the desired direction before the casters swivel.</td>
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</table>

- The casters have to spin back into the direction of travel for all power chairs, regardless of the location of the drive wheels.
**Ease of attendant operation**

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<tr>
<th>Rear wheel drive</th>
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<th>Front wheel drive</th>
</tr>
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<tbody>
<tr>
<td>Easy for attendant to use.</td>
<td>Operation by attendant may be difficult.</td>
<td>Difficult for an attendant to operate.</td>
</tr>
</tbody>
</table>

**Other advantages**

<table>
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</thead>
<tbody>
<tr>
<td>May be a good balance between indoor manoeuvrability and outdoor or uneven ground ride quality.</td>
<td>Manoeuvring is more intuitive, because the drive wheel is in line with the user’s head and centre of gravity. Therefore, may be better for people with perceptual and/or cognitive impairment.</td>
<td>Able to get close front on to work surfaces.</td>
</tr>
</tbody>
</table>

**References:**


**Disclaimer:**

This chart is intended as a general guide only. It should not be regarded as a prescriptive document for selection of one particular type of powerdrive chair over another. Therapists should always trial an item with the client in his/her home environment. Speak with suppliers for further information about their particular products, as specific characteristics vary between makes and models.

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