



REAR WHEELS

Rear wheels are a critical component in manual wheelchair configuration and performance. Selecting the optimal rear wheel can allow for increased efficiency, durability, and ride characteristics. Along with frame materials, rear wheels are one of the first places wheelchair users will upgrade due to the clinical benefits. Below are options and specific features that can impact performance.

REAR WHEEL OPTIONS

MAG

Construction-related flex in mag wheels can lead to warping over time, requiring more energy for propulsion. Advancements have introduced higher-performance mag wheels made of lighter, stronger materials to mitigate traditional drawbacks. While some settings may prefer mag wheels for their spoke-less design, the inefficiencies should be carefully considered.

SPOKE

Spoke wheels are widely regarded as a 'gold standard' due to being inherently lightweight and rigid. Factors such as material, spoke count, and rim style within this category can affect weight, durability, and efficiency. There are a wide variety of spoke wheels ranging from no charge to high-performance options.

REAR WHEEL FEATURES

DIAMETER: The rear wheel size affects the rear seat-to-floor height and user access to the wheels, influencing upper extremity position during propulsion. A larger wheel enhances propulsion efficiency by extending handrim contact and increasing the tire contact area, aiding maneuverability. Larger wheels make navigating tight spaces challenging, although proper setup can mitigate this issue.

RIM MATERIAL: Wheel rims can be made of steel, aluminum alloys, or high-performance options like titanium, magnesium, or carbon fiber. Each material offers a unique balance between weight, durability, and even vibration damping properties. Premium wheels typically provide higher stiffness-to-weight ratios and increased strength.

RIM STRUCTURE: Wheel rims are categorized in terms of single, double and or even triple wall. This refers to the number of layers the rim is composed of, and this will respectively increase strength.

SPOKES: The number of spokes, their material and how they are fastened will impact stiffness and durability.

- **Materials:** Spokes come in a variety of materials including steel, aluminum, carbon fiber, titanium and alternate fibers such as Spinerger's patented PBO™ spoke. All materials come with their own ratios of weight and durability but also aesthetic and color choice.
- **Quantity:** If all other factors remain equal, the more spokes a wheel has, the less the load is across the hub, spokes and rims, which typically improves strength and stiffness. However, if the quality of other factors increases, a wheel may have less spokes while remaining high performing. More spokes can impact weight, while fewer spokes could impact wheel stiffness.
- **Attachment:** Refers to the way a spoke attaches to the hub of the wheel:
 - J-bend spokes feature a bend at the hub resembling the letter 'J', and are the basic choice in manufacturing. However, the bend in this style can be a weak point, limiting the tension the spoke can handle, which can affect performance.
 - Straight pull spokes have no bend at the hub, and exhibit increased durability due to their ability to handle higher tension. Therefore, this feature enables adequate tension with fewer spokes.

WEIGHT: The rear wheel is required to move and will directly affect overall efficiency. A lighter rear wheel requires less force to start and stop, benefiting upper extremity usage and reducing energy expenditure during daily activities.



PRO TIP:

For proper biomechanics, hand propellers should have 60-80 degrees of elbow flexion when their hand is at the top of the handrim.



PRO TIP:

For most active users, spoke wheel maintenance is typically not a concern however, proper wheel tension and alignment should be checked periodically. For users frequently navigating rough terrain or performing extreme movements, maintenance may be necessary.



PRO TIP:





If hand interference is a concern, consider using a spoke guard instead of a mag wheel. The weight of a no-charge spoke wheel with a spoke guard is 0.42lbs less than one mag wheel.





PRO TIP:

When considering rear wheel weight, it's essential to include the tire and handrim weight as well. Being mindful of their cumulative impact helps make informed choices for an optimal balance between weight and performance.

REAR WHEEL SPECIFICATIONS WITH IMAGES

REAR WHEEL OPTIONS	DIAMETER	SPOKE, COUNT, TYPE , MATERIAL <i>SINGLE 24" WHEEL</i>	RIM TYPE, MATERIAL	WEIGHT <i>SINGLE 24" WHEEL</i>	CLINICAL JUSTIFICATION
MAG (see above rationale to include in justification for this option)					
MAG 	20", 22", 24"	N/A	Composite	2.89 lbs.	<ul style="list-style-type: none"> • Preferred by some institutions.
SPOKE (see above rationale to include in justification for this option)					
NEWTON ONE 	20", 22", 24"	36, J-Pull, Stainless steel	Single wall, Aluminum	1.97 lbs.	<ul style="list-style-type: none"> • No charge spoke wheel, increases efficiency over a mag for no cost. • Handrim and spacing can be changed without taking off the tire.
NEWTON GRAVITY 	20", 22", 24", 25", 26"	24, Straight pull, Stainless steel	Double wall, Aluminum	1.49 lbs.	<ul style="list-style-type: none"> • Increased rigidity with straight spoke assembly. • Increases efficiency and lighter weight for minimal cost. • Double wall box rim for increased rigidity. • One white spoke points to the air stem.
SPINERGY SPOX 	22", 24", 25", 26"	18, Straight pull, PBO™	Double wall, Aluminum	1.54 lbs.	<ul style="list-style-type: none"> • Increased rigidity with straight spoke assembly • Spokes have vibration damping properties. • Double wall box rim for increased rigidity. • Good balance of lightweight and stability

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<i>SPOKE (see above rationale to include in justification for this option)</i>					
SPINERGY LX 	22", 24", 25", 26"	12, Straight pull, PBO™	Double wall, Aluminum	1.49 lbs.	<ul style="list-style-type: none"> • Increased rigidity with straight spoke assembly. • Spokes have vibration damping properties. • Double wall box rim for increased rigidity. • Minimal spokes for lightweight and aesthetic design. • Limited spokes allow convenient reach through access underneath the wheelchair.
SPINERGY CLX 	24", 25"	18, Straight pull, PBO™	Double wall, Carbon Fiber	1.21 lbs.	<ul style="list-style-type: none"> • Increased rigidity with straight spoke assembly. • Spokes have vibration damping properties. • Double wall box rim for increased rigidity. • High stiffness, low weight, high strength • Carbon rim is light weight and has vibration damping properties. • Esthetic carbon rim and blade style spokes.

This is what is offered on Motion Composites order forms, principles can be applied to other market options.

NOTES

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ACCESSORIES
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