



TENNIS

ANY

BODY

**Tennis Wheelchair Setup
and Maintenance Guide**

For coaches and players

INTRODUCTION

The Tennis Foundation

We are Great Britain's leading tennis charity; our vision is a sport which is inclusive and accessible to every kind of community. Our aim is to provide opportunities to encourage people to maximise their personal potential through tennis. We work closely with the Lawn Tennis Association (LTA) and a wide range of other partners to deliver those opportunities.

This Guide

This guide is aimed at coaches and players who wish to know more about maximising performance by adapting the chair to suit the needs of the participant. By taking into account the player's physical impairment you can make changes to the wheelchair set up which can:

- Improve comfort for the player
- Improve court coverage
- Increase court speed
- Increase shot power
- Reduce the risk of injury

Did you know?

Not everyone with a physical impairment needs nor wants to use a wheelchair, it is the player's choice to make and coaches should encourage players to play tennis in the way that suits them individually.



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1

WHY MAKE CHANGES?

A tennis specific sports wheelchair can be configured and adapted in numerous ways to suit the player's needs and improve performance and comfort. The aim is to have the chair work with the player as much as possible to:

- Maximise speed around the court
- Promote efficient turning
- Provide support and balance through the hit
- Maintain momentum after the hit to recover more efficiently
- Above all provide comfort for the player (tennis matches usually do not have a time limit so the player could be in the chair for hours at a time)

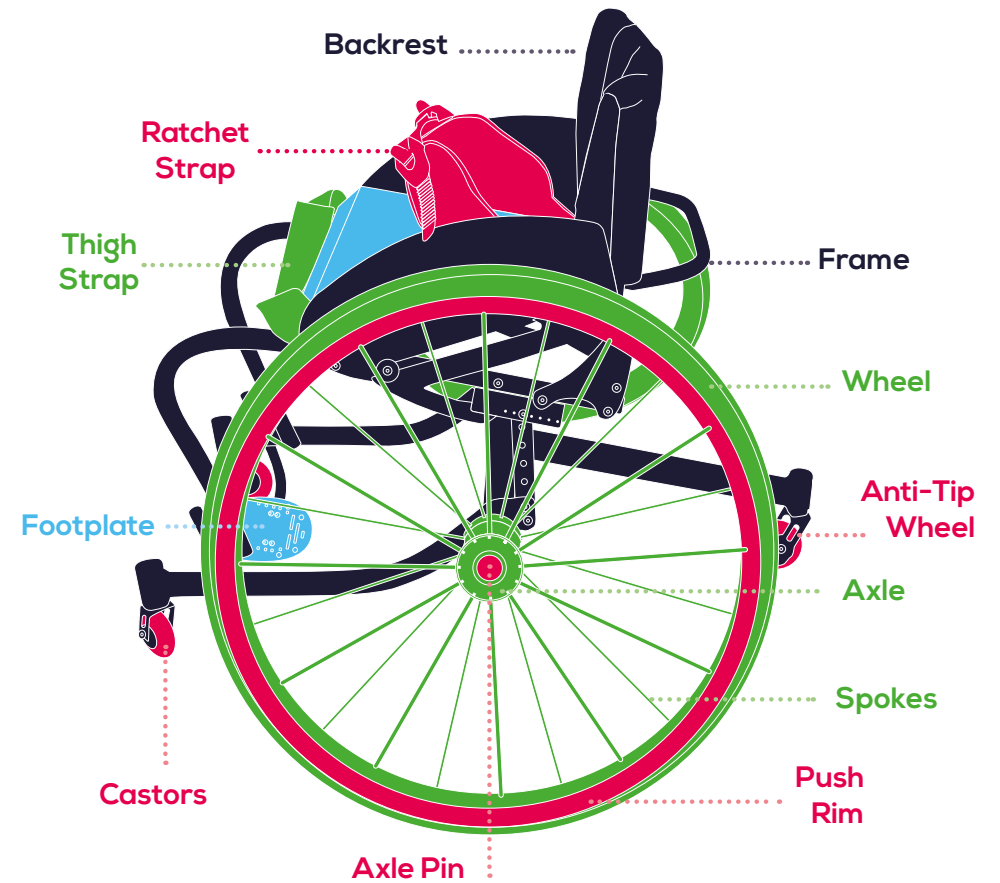
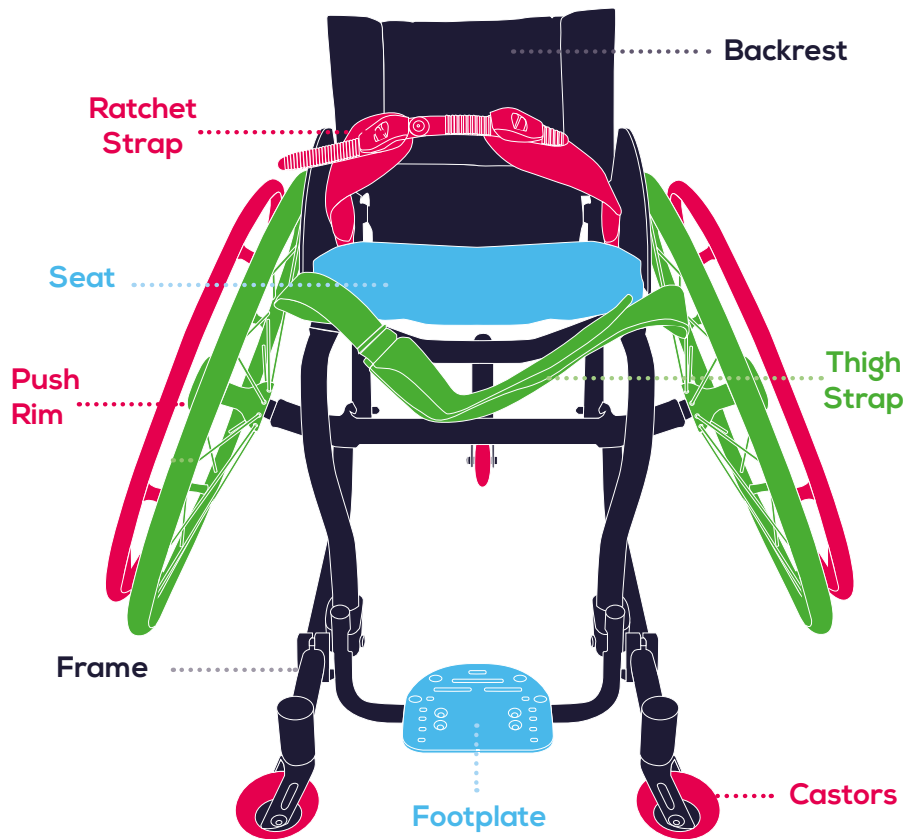
No two individuals are the same, so neither will their wheelchair set up be. This is more challenging when using the same chair for multiple players. However, a greater understanding of the adjustments that can be made to suit different needs will help to quickly adjust the chair for different users.



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THE WHEELCHAIR

The setup of the chair should link very closely with the level of the player's impairment. The higher the level of impairment, the more the player may require the use of straps and extra supports.



THE WHEELCHAIR

CONTINUED

Sports wheelchairs come in various shapes and sizes and can be fixed or adjustable. Fixed sports wheelchairs are preferred by elite players whereas fully adjustable chairs should be used for those newer to the sport as this will allow the same chair to be used by different people. Younger players especially will find that their body shape changes significantly through their early years in the sport so a chair needs to be adjustable as they change physically. Chairs can also be adjusted as a player's body shape changes and/or as their game style develops. The process is on-going so you should check on a regular basis that the setup is correct for the individual.



SET UP TIP

Coaches should look to educate players in wheelchair set up and maintenance so that they can learn how to adjust the chair to suit their needs and not rely solely on their coach(es) to do it for them. This can take up significant time at the beginning of each session which is wasted. Players should aim to understand how to adjust the wheelchair to suit their needs so when using chairs in a group session they can quickly adjust it and maximise hitting time.

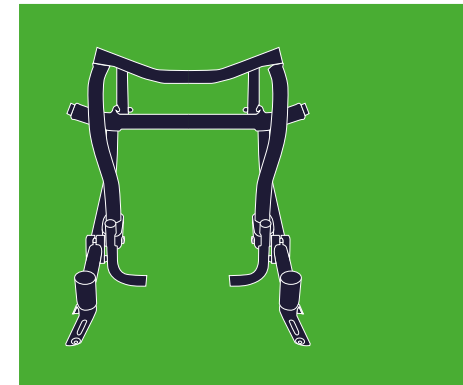
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WHEELCHAIR COMPONENTS



THE FRAME

The frame is a key component as it connects all parts of the wheelchair. Lighter chairs are easier and quicker to manoeuvre so aluminium and titanium have emerged as popular materials. Frames come in two formats: fixed and adjustable.



	Adjustable frame	Fixed frame
Pros	<p>Chair can be setup for a variety of users</p> <p>Generally can be folded down so good for storage</p>	<p>Generally lighter which can improve acceleration</p> <p>Generally stronger and likely to last longer</p>
Cons	<p>Can be heavier and impact acceleration</p> <p>Requires constant maintenance due to the number of users</p>	<p>Not adjustable so unsuitable for anyone who wants or needs to change the setup</p> <p>Repairs can be more expensive as the chair is built specifically for one player</p>
Suitable for	<p>Players within groups sessions</p> <p>Younger players who are likely to experience body shape changes</p> <p>New players as able to trial different setups to see which one is best for them</p>	<p>Elite level players</p> <p>Players who want their own personal chair and know their best setup after an extended period of trial and error</p>



THE SEAT

It is important to ensure the seat is correctly setup for the player using the wheelchair as this will have a major impact on their comfort and mobility.

To ensure maximum mobility and comfort the following needs to be assessed:



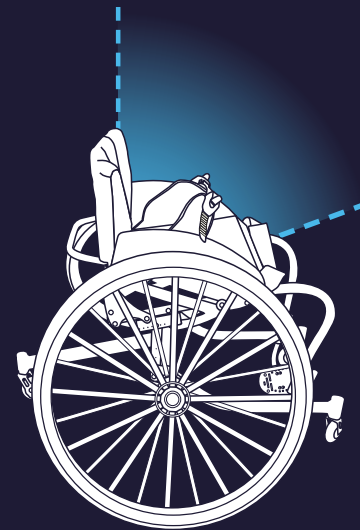
BUCKET (SEAT ANGLE)

The angle of the seat, referred to as the bucket, has an impact on the balance and stability of the player.

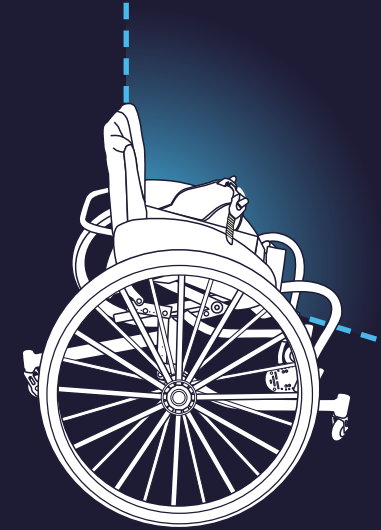
	Inclined (front of the seat points towards the sky)	Declined (front of the seat points towards the ground)
Pros	Greater stability	Greater mobility as player's bodyweight is leaning forward
Cons	Reduced mobility	Reduced stability
Suitable for	Players with less core function (high break or spinal injury) New players who may require greater stability/support	Players with more core function (low break or spinal injury) Players with an amputation

PLAYER WITH REDUCED CORE FUNCTION

PLAYER WITH GREATER CORE FUNCTION



The angle of the seat (bucket) is smaller and the front of the seat points towards the sky.



The angle of the seat (bucket) is greater and the front of the seat points towards the floor.



SEAT HEIGHT

The height of the seat has an impact on stability, mobility, reach, power and court view. When sitting on the seat, players should be able to reach the axle.

	High seat	Low seat
Pros	Serving can be easier and more power can be generated Better reach Better view of the court	Greater balance and stability Greater mobility
Cons	Reduced balance and stability Reduced mobility	Serving can be more difficult and thus weaker power Less reach Restricted view of the court
Suitable for	Players with more core function (low break or spinal injury) Players with an amputation	Players with less core function (high break or spinal injury) New players who may require greater stability/support

SEAT TIPS

- Extra padding may be required across the whole seat or partially if a player has a tendency to lean to one side to provide support and allow balance to be retained.
- Heat wicking cushions can be used to keep the chair cool and allow any sweat to run off and not be absorbed by the cushion.



BACKREST

The backrest is vital to ensuring the player is comfortable whilst using the chair.

	High backrest	Low backrest
Pros	Greater support and stability	Greater mobility Greater shot and serve power
Cons	Reduced mobility Reduced shot and serve power	Less support and stability
Suitable for	Players with less core function (high break or spinal injury) New players who may require greater stability/support	Players with more core function (low break or spinal injury) Players with an amputation

BACKREST TIPS

- The tension of the backrest can be altered and can impact balance and comfort. A tight backrest pushes the player forward and encourages them to hit the ball out in front but can be uncomfortable compared with a looser tension.
- Backrests need adequate padding or upholstery so that rubbing does not occur. Some players who lack feeling on their back would not be able to notice any sores created by hard or sharp back rests.



FOOTPLATE AND KNEE POSITION

The footplate is another component of the chair that can be altered to increase stability or mobility.

	Feet in front of the body	Feet directly under the body
Pros	Greater stability and balance	Greater mobility Greater turning speed
Cons	Reduced mobility Reduced turning speed	Reduced stability and balance
Suitable for	Players who are looking for more stability (beginners and those with less core function)	Players with good stability and looking for greater mobility

FOOTPLATE TIPS

- As a player develops it may be beneficial to move the foot plate back further as this allows the player to position themselves more over the ball and moves their centre of gravity nearer the axle of the chair. For those who have leg function it allows them to be able to push through their feet a bit more.
- Feet straps and knee/shin pads can be used for additional support and stability (see strapping).



STRAPPING

Strapping is vital in ensuring players are supported and stable whilst playing tennis. Strapping comes in different formats and for different areas of the chair and body.

● Waist Strap

Those with less core function will probably require a strap round their middle (waist up to chest) to help stabilise and support them. This helps with balance and can assist with shot production and recovery. Neoprene/Velcro straps can be used.

● Ratchet Strap

Similar to a ski-binding, a ratchet strap is used to secure the player into the chair around the hips. A ratchet strap is more effective than a Velcro one.

● Thigh Strap

A strap just above the knee is used to stop legs moving side-to-side as the chair turns. This improves turn efficiency and prevents the legs from working against the movement of the chair. A ratchet strap or neoprene/Velcro straps can be used.

● Knee/Shin Pads

These pads allow players to push against them providing resistance when striking the ball and help limit extra movement of the legs.

● Feet Strap

Typically smaller ratchet straps, toe clips or Velcro are used to secure a players feet so that they do not come loose or move around during play.

STRAPPING TIP

- Strapping is used to lock the player in place and make the body become part of the wheelchair. This should not come at the expense of comfort so it is important to work with the player to see what is best for them.



WHEELS (INCLUDING CASTORS)

The wheels play a significant role in the movement of the chair and it is important to ensure the player has the correct setup for them.

To ensure maximum mobility the following needs to be assessed:

● Size

There are different sizes of wheels which have an impact on acceleration, top speed and turning

	Smaller wheels (24" and 25")	Larger wheels (26" and 27")
Pros	Greater acceleration More turn efficiency	Higher speed once moving Chair rolls for longer resulting in energy saved as less pushes required
Cons	Lower speed once moving Chair doesn't roll for as long so more pushes /energy required to keep chair moving	Less acceleration /more energy to get the chair moving Reduced turn efficiency
Suitable for	This will depend on the player and what they require	

● Anti-tip and Front Castors

The anti-tip castor at the rear of the wheelchair and the front castors add stability and prevent the chair from toppling over. The three castors should not all be on the ground at the same time so a little bit of rock is a good thing and prevents wheelspin. However, too much rock will have a negative impact effect on balance, speed around the court and turning.

● Camber

The camber is the angle of the wheels in relationship to the axel. 20-24 degrees is generally the preferred camber for wheelchair tennis with anything above not recommended.

	Greater camber/angle	Less camber/angle
Pros	Greater balance Easier and quicker to turn	Greater straight line speed reducing the number of pushes required and saving energy
Cons	Reduced straight line speed requiring more pushes and energy	Reduced balance Slower to turn
Suitable for	This will depend on the player and what they require	

WHEELS TIPS

- Ensure the wheels aren't too wide that the player has to reach too far as this reduces the efficiency of each push and places more stress on the shoulders. A player should find it comfortable to push from approximately 12-2 or 12-3 on the wheel (the centre top of the wheelchair being 12 o'clock).
- Most wheelchairs have push rims that are metal with rubber or plastic coating. If this is not comfortable then additional cushioning (foam) can be added or gloves worn by the player.
- The anti-tip castor can be adjusted depending on the court surface. For carpet, clay and grass courts it is recommended to raise the anti-tip castor.

4 WHEELCHAIR MAINTENANCE

It's really important to regularly check and maintain your wheelchair to ensure smooth operation and long user life. You can break down your maintenance into three main areas:

1. Cushion and upholstery

- Look for ripped fabric or seams and worn out foam
- Check the cover and seat upholstery is tight within the chair and does not move or slide
- Clean the cushion cover and upholstery whenever it gets dirty
- Make sure if you do wash it you dry the cushion and upholstery fully before re-fitting to the wheelchair
- Exposing the cushion to direct sunlight and heat will damage the fabric

2. Anti-tip and front castors

- Regularly check if the anti-tip and front castors run smoothly. If they do not then the bearings may need changing or ball fluff/hair picked up from the courts will need to be removed
- You do not need to oil or grease the chair

3. Tyres/wheels

- Check tyres are fully pumped prior to each use
- Check spokes are tight
- Check the rear wheel quick-release axles are secure at each time of using
- Tyre pressure should be around 100-120psi (tyres will be printed with their recommended rating).* Depending on court surface, tyre pressure should be altered accordingly

*Did you know?

Tyre pressures below 50% inflation add an additional 25% increase in energy expenditure during wheeling (Sawatzky BJ, Miller WC and Denison I, 2005 - Measuring energy expenditure using heart rate to assess the effects of wheelchair tyre pressure).

Below is a checklist we recommend following to improve performance and extend the life of a chair. We also recommend every chair has a maintenance log in which you record each check. If a player were to injure themselves as a result of using the chair these records are vital to show that you, as the individual responsible for providing equipment which is safe to use, have followed reasonable steps to provide well maintained equipment fit for use.

Check	Weekly	Monthly	3 Months	6 Months	Annually
Tyre pressure	●				
Cushions & upholstery		●			
Anti-tip & front castors			●		
Wheels, tyres & spokes			●		
Frame				●	
Annual service					●

WHEELCHAIR REPAIRS

If your wheelchair requires new parts or repairing please contact your local wheelchair maintenance service provider. A simple search online will list the providers in your area.

STORAGE TIPS

Ensure that your chair is stored in a clean, dry area as water may rust or corrode your chair and significantly reduce its usable life.

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**USEFUL
RESOURCES**

We hope that you have found this guide useful, however if you are seeking further information there are a number of other sources that may be of some help:

- Wheelpower (<http://bit.ly/2fVlkSA>)
- Loughborough University – Practical Guidelines for Wheelchair Selection in the Court Sports (<http://bit.ly/2fFlejF>)

This guide has covered some factors when considering wheelchair set up but it's not exhaustive as each player is unique and will have differing needs. It's important for players and coaches to communicate with each other and trial different chair set ups until you find the right balance between performance and comfort. Wheelchair manufacturers can offer a lot of advice when you are at the stage of purchasing a new chair ensuring you get the best chair for you/your players.

**FINAL THOUGHT**

Is your player ready for competition? Yes should be the answer! We run competitions for ALL ability levels; you don't need to be "good" to play, far from it! To find out more please visit our website or get in touch

If you coach a player who you think has potential in the game we want to hear from you! Please do get in touch via info@tennisfoundation.org.uk with details about your player.

Making adjustments to your wheelchair may affect your rights under the wheelchair manufacturer's warranty. You may wish to contact the wheelchair manufacturer before making any wheelchair adjustments.



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