



TechnoTalk

The TASC Newsletter

Volume 14

Issue 5

May 2005

building futures



Editorial

by Jo Ford

This month we have dedicated the May edition to Powered Wheelchair Scripting. This article is based on information Catherine Webster received while attending the International Seating Symposium held in Florida earlier this year. It is always refreshing to find out what the latest practice in regards to powered mobility is currently being used and researched internationally. Catherine has so much information on this topic that she has decided to spread her article over two editions.

After 10 years of producing a monthly edition of TechnoTalk we have decided to make some changes to the frequency of publication. As of July 2005 we will have bi-monthly editions of TechnoTalk so you can look forward to six information filled editions each year. While we are never short of new ideas and equipment to review it is time for a change for the TASC Consultants who spend many hours each month putting the newsletter together for you. If you have a paid subscription we will be sending out subscription renewals in June.

Happy reading until next month

Jo Ford



Scripting Power Wheelchairs

Catherine Webster

I was extremely lucky to attend the International Seating Symposium, held in Orlando in January this year. The Seating Symposium brought together a number of therapists, product dealers, medical professionals and product users from around the world, who were able to participate in various workshops, paper presentations and exhibitions related to mobility and seating and associated topics.

This article will provide information gained from one of the workshops, which focused on the factors that can influence the performance of a power wheelchair. This was a really practical workshop, that provided excellent information that can be considered when undertaking the process of selecting a power wheelchair that best meets the individual user's needs. The part of the workshop discussed in this article was presented by Ian Denison (PT, ARP) and Doug Gayton (ATP) from G. F. Strong Rehab Centre, Vancouver, BC, Canada. It is acknowledged that this article describes the findings of Denison and Gayton, based on their own research and testing.

Power wheelchair performance:

It was noted that there are a number of factors that can influence the way in which a power wheelchair will perform for individual users. Specific factors, which were discussed included:

1. **wheel location**
2. **power and**
3. **power delivery**

1. WHEEL LOCATION

History of classifications:

The way in which powered wheelchairs have been classified, according to wheel location has changed a lot over the years.

Historically, powered wheelchairs were viewed as being either forward wheel drive (FWD) or rear wheel drive (RWD). This was broadly defined, based on where the main drive wheel was positioned, in relation to the wheelchair user's primary weight distribution or centre of gravity (for example, if the drive wheel was located in front of the user's centre of gravity (COG), the chair was labeled as a FWD chair. Alternatively, if the drive wheel was located behind the person's COG, the chair was labeled as being RWD).

Over time, the concept of another classification of powered wheelchair, according to drive wheel position, was developed. The term mid-wheel drive (MWD) was introduced to describe any power wheelchair with the drive wheel located in close proximity to the user's COG (i.e. either directly behind, underneath or in front of the COG).

Associated with each classification of powered wheelchair (RWD, MWD or FWD) were various attributes that helped to explain the way each type of chair would be expected to 'behave' in a number of circumstances.

Continue next page.

From previous page.

A new classification:

The presenters described the most current power wheelchair classification, according to wheel location. This classification aims to group power wheelchairs more specifically, using not only the location of the drive wheels as a predictor for performance, but also the percentage of weight thought to be on the driving wheels.



The 'Trailblazer'
- an example of a low ratio RWD 1

The main differences with this classification are:

1. The term 'centre wheel drive' replaced mid-wheel drive and instead of it applying to all wheelchairs where the drive wheel is located near the person's COG, it refers to powered wheelchairs configured with the drive wheel directly underneath the user's COG.
2. The term 'high ratio' has been introduced to describe a FWD or RWD chair which would previously have been regarded as a MWD chair (because the drive wheel is located near the person's COG). The description 'high ratio' is used to impart that a large percentage (eg. 85%) of the person's weight/centre is 'on' the main driving wheel of the chair (this is usually because the drive wheel is located just in front or just behind the person's centre of gravity).
3. The term 'low ratio' describes FWD or RWD wheelchairs with the main drive wheel located a further distance away from the user's COG (i.e. either right at the front or at the rear of the chair). It was estimated that approximately 60% of the weight is on the drive wheel in these circumstances.

The location of the main drive wheel can have differing outcomes, depending on the environment in which the chair is being used. The workshop described that the location of the drive wheel may cause the chair to react in one way on a flat surface (they referred to this as the impact of 'horizontal location of gravity') and yet react another way going up or down an incline, as this results in the person's centre of gravity changing, in response to the incline (this was known as the 'vertical location of centre of gravity').

Traction on incline:

Powered chairs with different drive wheel configurations were tested on the same inclines (up and down hills) and the following basic conclusions were found:

Going up an incline:

- Low ratio, rear wheel drive chairs demonstrated the best traction
- High ratio, rear wheel drive chairs and centre wheel drive chairs performed second best
- Centre wheel drive chairs had the third best traction, followed by high ratio front wheel drive wheelchairs
- Low ratio, front wheel drive wheelchairs generally presented with the worst traction when traveling up an incline

Going down an incline:

The wheelchairs generally performed in the following order, in relation to the level of traction produced:

- Low ratio, front wheel drive chairs
- High ratio, front wheel drive chairs and high ratio, rear wheel drive chairs
- Centre wheel drive chairs
- Low ratio, rear wheel drive chairs

The centre wheel drive chairs performed the most consistently in respect to going both up and down hills, however the rear wheel and front wheel low ratio chairs were superior at the end range of going up and down the inclines (respectively).

The wheelchairs with configurations supporting a lower vertical centre of gravity generally performed better (however the implications of a low seat to floor height need to be considered when deciding about this).

2. POWER

While the drive wheel location may give you an idea of the capabilities of how a chair may behave, the power



The 'Vibe'
- an example of a high ratio RWD 2

attributed to the chair will give you an idea of how well the chair is able to meet these capabilities.

Factors that may influence the power associated with a wheelchair may include:

• **Wheel characteristics – for example:**

- Smaller drive wheels (12" – 16") can be more efficient in energy consumption for the motor



The 'Jazzy 1121'

- an example of a high ratio FWD ³

- A larger drive wheel 'footprint' is advisable on soft terrain
- Pneumatic tyres may offer better performance, but require ongoing maintenance
- Different suspension options may assist in 'dampening' the effects of spasticity, that can be experienced when using a powered chair

• **Battery capacity – for example:**

- A bigger battery will result in a longer drive, however environments that require a lot of stopping and starting or traveling up hills will drain more power from a battery. The presenters recommended that a rear wheel drive chair may be beneficial for people accessing these environments, as they can require less 'correcting' for the user



The 'Pronto'

- an example of a CWD ⁴

• **Drive mechanism – for example:**

- Different driver controls may affect the performance of a wheelchair in a number of ways (this may also be related to the person's ability to access and control the driver mechanism, in different environments)

3. POWER DELIVERY

The driver control that is used and the way that the chair is programmed can have a significant effect on the way that the chair will perform. Completing a thorough assessment of the client and their needs (including the environment) will assist in matching the correct chair to the person. Product dealers can be very helpful in providing information about how the chair can be programmed, configured or scripted to ensure the identified goals are met. Often technology exists to allow for a chair with a particular wheel configuration to adapt and perform in ways not typically associated with that particular configuration.



The 'Permobil Corpus'

- an example of a low ratio FWD ⁵

Keep an eye out in future TechnoTalk editions for the next installment of '**Scripting Power Wheelchairs**', which will detail information presented about Indoor and Outdoor analyses of different power chairs.

Reference:

'Power Wheelchairs A New Definition', G.F. Strong Rehab Centre. Workshop material presented at the International Seating Symposium, Orlando, Florida, January 2005.

Pictures sourced from:

- 1 www.GTKRehab.com.au
- 2 www.lr.com.au
- 3 www.lr.com.au
- 4 www.invacare.com
- 5 www.permobil.com





ARATA Conference 2006

"Connecting People Community and Technology"

Where: The Esplanade Hotel ,Fremantle, WA.

When: Tuesday 17th to Friday 20th October 2006.

For more information:

<http://www.e-bility.com/arata/conf.php>

for information on the conference and download Expression of Interest information.



The Esplanade Hotel Fremantle, WA.

Website Review

Title of Page:

RoboMount Switch Operated Robotic Wheelchair Mounting.

Last Update or Copyright Date:

Last modified: December 05, 2004 Copyright 2000.

Title of Site:

Assistive Technology Solutions for People with Disabilities Rehabilitation Technologies.

URL: <http://www.retech.com.au/RoboMount.htm>

Last Accessed:

31st May 2005.

Review: This website provides information on the RoboMount Switch Operated Electronic Mounting System for Communication Devices and Laptops. This device can provide independent positioning of devices for clients who are unable to operate a standard swing away mount.

We welcome any feedback, good or bad, that you have on our service.

Please feel free to contact us by phone on 02 9972 8183, email at tasc@tscnsw.org.au or in writing at the address below.

TechnoTalk is available free from www.thespasticcentre.com.au/technotalk or by subscription for \$27.50 (GST \$2.50 incl)



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