Legal status of SEGWAY PERSONAL TRANSPORTER in New Zealand

Segway New Zealand Limited’s view is that the Segway Personal Transporter (PT) falls within the definition of a mobility device.

The Land Transport Act 2005 defines a mobility device as a vehicle that:

(i) is designed and constructed (not merely adapted) for use by persons who require mobility assistance due to a physical or neurological impairment; and

(ii) is powered solely by a motor that has a maximum power output not exceeding 1 500 W

We present evidence to support our view.

SECTION ONE: the Segway PT is designed and constructed for the purpose of providing mobility assistance (as well as for other personal mobility roles).

SECTION TWO: the Segway PT is officially approved in other countries as a mobility device suitable for persons who require mobility assistance.

SECTION THREE: the Segway PT is widely adopted both in New Zealand and worldwide by persons who require mobility assistance.

SECTION FOUR: the Segway PT has a power output of up to 750 W.

SECTION FIVE: the Segway PT is a “good fit” with the intention of this part of the Act.

Accordingly the Segway PT is a mobility device under the definition in the Act. Any person is entitled to operate a mobility device (whether mobility impaired or otherwise) in New Zealand.

SECTION ONE - DESIGN AND CONSTRUCTION

1. Patents pertaining to the Segway PT

Patents have been accepted in New Zealand that can be legally enforced here for the self-balancing two-wheeled “Segway PT” device. For example, US Patent 6,302,230 - “Personal Mobility Vehicles and Methods” is illustrated with diagrams of persons standing on devices resembling Segway PTs, and makes the following claims:

“We have found that a vehicle in accordance with the invention may act suitably...for persons with a disease (such as Parkinson’s Disease or ear disorders) or defect, in their ability to maintain balance or to achieve locomotion.”

and elsewhere in the same filing:

“We have observed a dramatic restoration of balance and locomotion control to a person suffering from Parkinson’s Disease who utilized a vehicle in accordance with this invention. Surprisingly, the effect is to substantially reduce tremors.”
Further, US Patent 7,370,713 is illustrated with the diagram to the right and claims:

“The invention provides, in a preferred embodiment, a device for carrying a standing person...”

and elsewhere in the same filing:

“[T]he present invention, may advantageously be used for ameliorating the symptoms of balance-impairing diseases”

On the basis of the above, it is correct to conclude that the Segway PT is designed and constructed to provide mobility assistance for impaired persons.

2. Segway, Inc. says the Segway PT is suitable for disabled persons

Segway, Inc. specifically set out to design and construct the PT in accordance with the principles of Universal Design, which is the recognised design ethic to consciously build equipment to be suitable for use by impaired persons in the first instance, and for fully-able persons as a consequence. Segway, Inc. addressed this issue in a press release (3 June 2009), positively asserting that the PT is designed for use by disabled persons:

“Segway has incorporated the concepts of Universal Design into its commercially-available products [eg: the Segway PT]...Our products are designed for a person (any person, whether disabled or not) who...is capable of exercising good riding judgment, and who is capable of riding in accordance with our instructions.”

3. Segway, Inc.’s “Keeping Up Has Never Been So Easy” brochure promotes to mobility market

Segway, Inc.’s own advertising materials present and promote the Segway PT as an assistive device to persons who might otherwise use a mobility scooter. For example, the brochure “Keeping Up Has Never Been So Easy” features photos of older persons, and someone unable to keep up with their child or grandchild. It uses language consistent with a presentation about the needs and concerns of mobility users. It is significant that this brochure continues to read properly if the phrase “Segway PT” is substituted with the phrase “mobility scooter”, but it does not read properly if other vehicles are substituted (eg: electric bicycle, low-powered stand-on scooter, moped, golf cart, motor car, etc). There can be no doubt this brochure is aimed at individuals with mobility issues.

4. Owner of Segway, Inc. gifts 1,000 Segway PTs to mobility charity

In 2010 Jimmy Heseldon, the owner of Segway, Inc. donated 1,000 Segway PTs to the US charity Segs4Vets, for distribution to injured soldiers returning home from overseas duty. Recipients are primarily those who lost limbs or sustained permanent leg or spinal injuries. This donation is a clear demonstration that the Segway PT is useful and appropriate for providing mobility assistance to the impaired, and is intended by the manufacturer to be used for this purpose.

SECTION TWO - OFFICIAL RECOGNITION

1. Recognised by governments

The Segway PT is officially recognised as a mobility device by governments in other countries.

For example, in September 2010 the US Federal government specifically classified the Segway Personal Transporter (PT) as a mobility device under the Americans with Disabilities Act (ADA). According to the official announcement, this new rule accommodates

“…the growing use of the Segway® PT as a mobility device by returning veterans and others who are using the Segway® PT as their mobility aid of choice.”

The US Federal government exempted the Segway PT from regulation as a motor vehicle in 2002, and most individual states have gone on to define the Segway PT in legislation as a type or category of mobility device - typically as an "Electric Personal Assistive Mobility Device" or EPAMD (ie: an electrically powered device to assist a person with their mobility). Users - whether disabled or not - are permitted to ride on footpaths and in
public places and parks like a pedestrian, and in cycle lanes and along urban roads with cars like a bicycle.
Segway PTs can be used in 47 US States.

Provinces in Canada as well as many European states officially recognise the use of Segway PTs by impaired
persons, to the point that some began pilot programs allowing disabled persons to use PTs before rules for all
persons were established. The European Commission has exempted the Segway PT from its vehicle legislation,
releasing it from regulations as a road vehicle. In 2003 the Chairman of the Transport Committee of the
European Parliament invited all Member States to authorise explicitly the use of the Segway PT as soon as
possible. By 2008 most European states permitted the use of Segway PTs on both footpaths and roads (in some
places one or the other. In some states this was through new enabling legislation, in others through exemptions
to current legislation. In a few states current legislation does not restrict their use.

2. Recognised by medical profession and government agencies in New Zealand

In New Zealand, Occupational Therapists and other medical practitioners proactively recommend the Segway
PT as a mobility device, on the basis of its health benefits over mobility scooters (for example, standing versus
sitting). ACC, Ministry of Health and Ministry of Education were amongst the first government organisations in the
world to recognised the Segway PT as a superior mobility device for impaired persons.

3. Recognised in scientific and medical literature

There are published studies that confirm the Segway PT is a superior mobility solution compared with a mobility
scooter for a wide range of conditions. Examples include:

  Personal Transporter as a Mobility Device for People With Disabilities: A Pilot Study" and concluded "[This]
  study has shown that the Segway is a useful device for populations with a range of functional disabilities.
  Our results indicate that using a Segway may increase personal mobility for some people with functional
  limitations. This would enable them to become more involved in meaningful activities, and therefore it has
  the potential to increase one’s self-esteem and quality of life. The Segway...[is]...a viable mobility option for
  people with disabilities.”
- Scientific American (February 2007) reports how the Segway PT is providing enormous benefit to those for
  whom impairment is a gradual process, noting Segway PTs: "...have also lengthened the careers of older
  workers, who were finding the constant walking increasingly difficult.”
- "Universally Designed Technology Solutions: People who have trouble walking and the Segway PT” by
  Jerry Kerr, sets out in detail the many advantages of the PT over traditional mobility solutions for disabled
  persons, and the communities and spaces in which they move around on mobility devices.
- A very thorough study into the use and safety of the Segway PT in urban spaces conducted by the German
government concluded the PT is suitable "....not only for healthy people but also for mobility handicapped.”

SECTION THREE - WIDELY USED

Use of Segway PTs by disabled persons is not an incidental or spin-off application of the device, but one of its
most significant applications.

As of the start of 2011, more than 100 disabled New Zealanders own and use Segway PTs. The range of
physical and neurological impairments for which Kiwis have found the Segway PT to be suitable is very wide:

permanent spinal injuries (including incomplete paraplegia)
permanent leg injuries (including above-knee and double below-knee amputee)
temporary reduction in/loss of mobility due to injury or disease
leg and foot deformities
impairment from Deep Vein Thrombosis
CP (Cerebral Palsy)
MS (Multiple Sclerosis)
Muscular Dystrophy
Parkinson’s Disease
various other peripheral ataxia conditions
Stroke
Lung Disease and Emphysema
Heart Disease
Arthritis
Scoliosis
Fatigue/IM/weakness
other general age-related loss of mobility

Worldwide, it is estimated that more than 20,000 disabled persons own and use Segway PTs for mobility
assistance. In the USA alone, DRAFT (Disability Rights Advocates For Technology) reported in 2008 that
disabled users of Segway PTs exceeded 9,000 individuals.
In New Zealand, more than half (>50%) of all private buyers of Segway PTs in 2010 were mobility impaired. This segment has been growing year-on-year since 2004 (were it was 25% of sales), and Segway New Zealand projects Segway PTs to account for more than 10% of current mobility scooter sales by 2014.

SECTION FOUR - POWER OUTPUT

The Act requires that a mobility device:

quote

"is powered solely by a motor that has a maximum power output not exceeding 1 500 W."

end quote

The Segway PT operates within a power envelope up to 750 W. This is because legislation in many US states require EPAMDs (eg: Segway PTs) to have a maximum continuous power output of 750 W (or 1 horsepower), and some also set limits on speed. Accordingly, all Segway PTs manufactured to date operate within this 750 W limit, and have a top speed electronically limited to approximately 20 kph.

Mobility devices are permitted to have more than one motor because Section 33 of the Interpretation Act 1999 permits the singular to include the plural. The phrase “powered solely by a motor” is intended to exclude devices that have more than one type of motive power, such as power-assisted pedal bicycles/tricycles. Most of the 5,000 power chairs (“electric wheel chairs”) in New Zealand have two electric motors, as do many of the ~20,000 mobility scooters in use.

The Segway PT has two brushless DC motors, one for driving each wheel. The direction and rotation of these motors are controlled by software, which sets limits on acceleration and top speed. The actual continuous power output at any point in time depends on speed, slope of the surface being climbed, and the weight of payload (rider plus any cargo). This can vary from a few tens of Watts at rest on a flat surface, to a hundred or so Watts when moving at pedestrian speeds, through to 750 W when going “full steam” (such as when carrying a heavy rider up a hill). This is illustrated by examples provided by Segway, Inc.’s engineers:

1. At 12.5km/h on level ground carrying a 82kg rider, power output is ~111 W. When climbing a 5 degree hill the power output rises to ~508W.
2. At 20km/h (maximum speed) on level ground carrying a 82kg rider the power output is ~227W.
3. Carrying a heavy rider up a steep hill the power output approaches 750W, and the speed of the ascent will fall to a few kilometers per hour (depending on weight of rider and degree of climb). In Segway New Zealand’s own hill tests, ~740W has been measured.

The motor used in the PT is supplied by Pacific Scientific:

Model: YZ05107, with continuous ratings: Max speed: 8250rpm Voltage: 72V Current: 8A
Output: 72X x 8A = 576 W electrical power. At 85% efficiency, mechanical power is 492 W.

In the Segway PT the motor runs at 5310 rpm when moving at maximum speed of 20km/h (calculated from 1:24 gearbox, 480mm diameter wheel). This reduces the motor voltage and thus the available power:

5310/8250 x 72V = 46V

46x x 8 A = 370 W continuous electrical power

Continuous maximum power output of 370W per motor (740W total for both motors) is consistent with the restriction of 750W set in law by some US states. It is beyond the scope of this article to go into further engineering and electrical detail. Further technical information is available on request.

SECTION FIVE: SEGWAY PT IS A GOOD FIT WITH THE INTENTIONS OF THE DEFINITION

The definition of a mobility device is framed in terms of enabling impaired persons to be able to legally use the most suitable device to solve their mobility needs.

It does not set out to be “prescriptive” (for example, it does not attempt to prescribe any specific physical elements of design - such as number of wheels), and this intention was clearly flagged in a report published while the Act was being developed. It explained how the term “mobility device” was selected because it is already widely accepted overseas, and further that our government intended for a wider range of devices than an “invalid carriage” and “disabled persons vehicle” (terms used in previous legislation, and not repeated in the new) to be encompassed by the new definition. Also of note is that the term “impaired” is a broader definition that “disabled”.

We conclude that there is no bias implied in the current legal definition that would exclude the Segway PT.