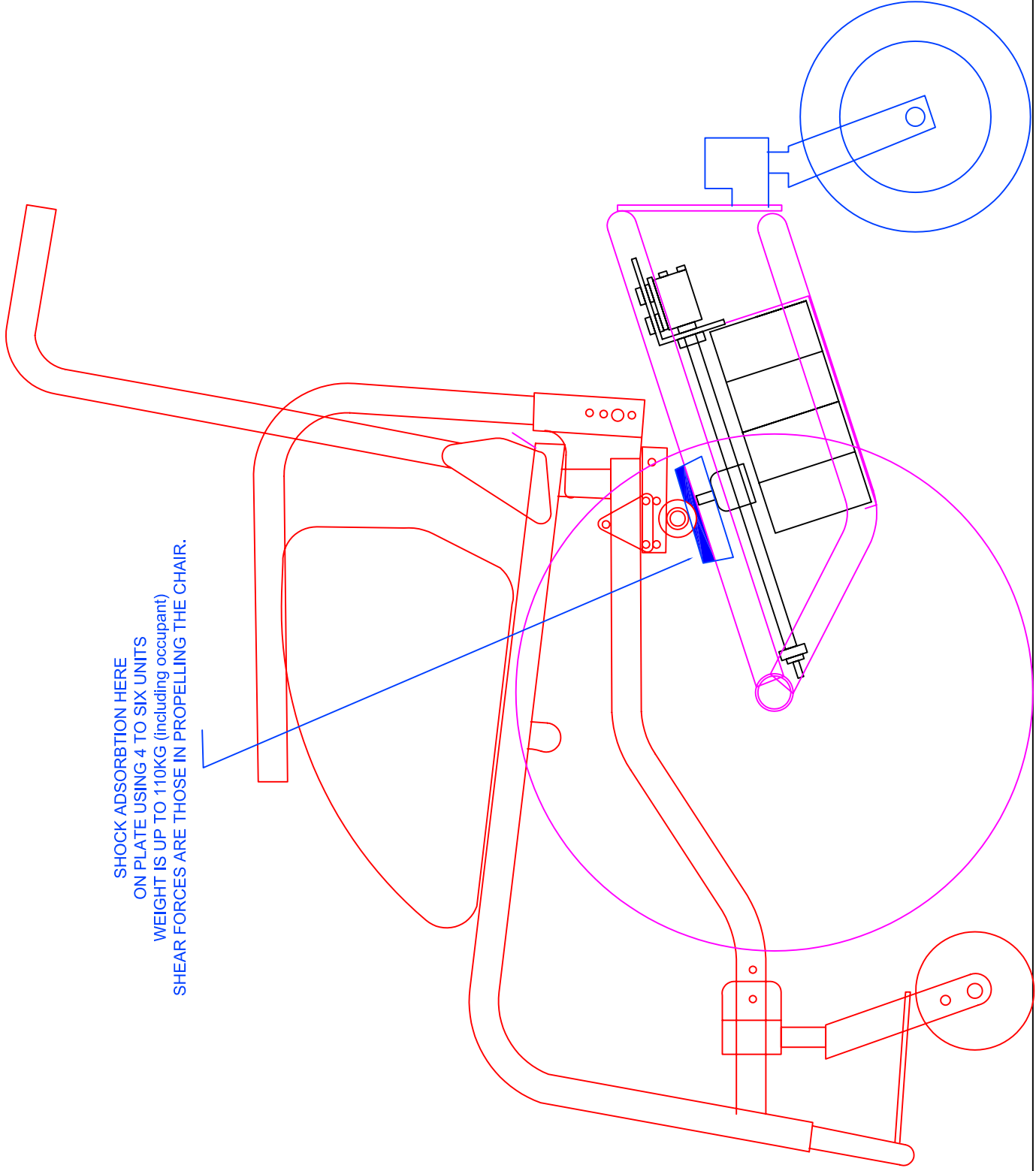


SHOCK ADSORBTION HERE
ON PLATE USING 4 TO SIX UNITS
WEIGHT IS UP TO 110KG (including occupant)
SHEAR FORCES ARE THOSE IN PROPELLING THE CHAIR.





The “Kangan Roo” a New Style of Power Wheelchair

What electric wheelchair uses a titanium rigid sports chair as a seating base and a three wheel power base to create a joystick controlled wheelchair with plenty of power? A new design from Australia called the Kangan Roo. The Kangan Roo electrically shortens for indoors, needing only a 35” turn radius, and extends for outside cruising. The Kangan Roo can also mount up to a 6” curb or step independently.



With a five wheel support seating base, this mid drive wheelchair flexes at the center, allowing it to contour with the terrain. Though a fully loaded, high performance chair, it is lightweight, weighing only 100 lbs (44kg). Two thirds of the chair’s weight rests over the two 18” drive wheels, creating a smooth ride and better threshold mounting.

The Kangan Roo battery pack is amazingly light,

weighing only 22 lbs (9.2 kg). Using NiMH batteries, as in digital cameras, these batteries were built for hybrid cars and vans and deliver 26 volts @19 Ah. These batteries can deliver all their charge without damaging the battery and can then be recharged in 1 – 5 hours, depending on the charge rate. These batteries will last over a thousand recharges, resulting in a three year plus battery life.



Comparison of Weight Distribution - "Kangan Roo" to "Ranger X" with 100 kg RESNA Dummy

Kangan Roo Extending mid wheel drive	Front Casters	Mid Drive Wheels	Rear Caster	Total
Extended Frame for outdoor cruising	15%	69%	16%	100%
Shortened Frame for indoor maneuvering	24.5%	51.5%	23.7%	100%
Invacare "Ranger X" rear-wheel drive	Front Casters	Rear Drive Wheels	Total	
Representative frame set-up	44%	56%	100%	

As you can see from the above table, most of the weight is over the drive wheels, which improves traction. Nearly equal weight rests on both the front and rear casters, providing easy turning and a great ride. For steep gradients, the user performs a body weight shift to switch the chair into ‘mono’ mode.

Coupled with new rare earth, brushless hub motors in 18” mag wheels, which were developed by CATEA of Georgia Tech and where final development and testing is in progress, the technological efficiencies of this chair give it superior performance over heavy, conventional power chairs, and the sports chair design gives it a sexier, more appealing look and feel. The Kangan Roo is fun to drive and has a soft ride, thanks to elastomer vibration connectors between seat and drive units.



At any time the rear power unit can be detached (the power unit can be driven independently up a ramp and into a car trunk), and 24" push wheels can be put on the chair to create a manual sports chair. Such versatility is invaluable. For example, a user capable of pushing a manual chair would

find connecting flights in the airport a much easier prospect with the "Kangan Roo." The power base could be checked through to the destination, yet the chair, after conversion to a manual sports chair, could be used during the airport layover and to reach the connecting gate. Those who use both a manual and a power chair will greatly appreciate this chair's modifiability, as will those in need of a great looking, joystick driven, electric wheelchair.

The Kangan Roo can be transformed into multiple wheelchair modes with ease. It can be driven like a mid to front wheel chair indoors and can handle tight corners with ease. With the flick of a switch, the Kangan Roo can stretch up to 7" longer in the front (depending on front frame dimensions) and at the same time recline another 5°, creating a comfortable outdoor cruiser chair. This cruiser chair mode is capable of traveling 6 mph (10kph) with mid to rear wheel drive characteristics.



Like the Australian kangaroo, the Kangan Roo has five points of contact with the ground. A kangaroo's power comes from its center, and a kangaroo uses its tail and front paws for control and balance. Similarly, the Kangan Roo uses a large rear caster to absorb the torque from the motors instead of transmitting it as "wheelie" torque to the frame. This makes the Kangan Roo much better at slope climbing than other chairs. The rear caster allows the front frame to "pop a mono" and rest comfortably and stably at approximately a 30° rearward tilt. The Kangan Roo can still be driven around flat areas in this "mono" mode and can be useful as a pressure relief mechanism, for blood pressure reduction, or to create a comfortable reclining chair for recreational purposes.

“Mono” mode also allows the user to mount curbs or steps with little disturbance, as the front wheels don’t have to “bump” up the step. When in “mono” mode, the chair’s front wheels are already clear of the curb or stair, and moderate speed creates forward inertia, which then rolls the user up the curb or step with ease and control. Users need just enough trunk movement to throw their weight backwards to gently tip the chair back to reach a secure resting position on three wheels.

The Kangan Roo is not suitable for everyone, but it fills a niche that the designer, Colin Johanson, recognized through his own experience as a C6 Quad. Johanson whose days of relying only on a manual chair were limited, did not want a huge, cumbersome power chair. So, he began work 25 years ago on designing a cutting edge, sleek-looking, versatile chair. Now, with today’s innovative motor and battery technologies, the chair Johanson conceived a quarter century ago is finally possible.



The previous prototype of the Kangan Roo has already won both the Judges and Viewer’s Choice episode of an Australian TV show called, ‘The New Inventors,’ and the prototype may qualify to be in the final competition. This show generated a great deal of feedback on the prototype, which came from a wide demographic, including those with multiple sclerosis, cerebral palsy, and polio survivors and encompassed a range of ages. This chair proved so appealing that a number of respondents asked where the chair could be purchased.

The Kangan Roo is protected by PCT/AU2005/001168 filed 4 August 2005

which, in the most recent International Preliminary Report on Patentability, 28 June 2006, from the Australia Patent Office Stated that: Novelty (N), Inventive step (IS), Industrial applicability (IA) Claims 1 – 37 **YES**, no Claims rejected. Citations and explanations (Rule 70.7): -

“Claims 1 to 37 meet the requirements of PCT Articles 33(2) - (4). None of the prior art documents, or obvious combination thereof, disclose a wheelchair alterable between a short wheelbase mode and a long wheelbase mode, wherein the centre of gravity of the wheelchair is higher in the short wheelbase mode than in the long wheelbase mode. The claims are therefore novel and inventive. The claims also have industrial applicability.”

For more information on the process behind this latest prototype, you can visit the website www.kangan.edu.au/kanganroo for photos of the previous prototype or contact:

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- Stephen Sprigle, Director, CATEA, Georgia Institute of Technology, 490 10th Street, Atlanta, GA 30332-0156 PH 404 894 4960. <http://catea.gatech.edu/>