

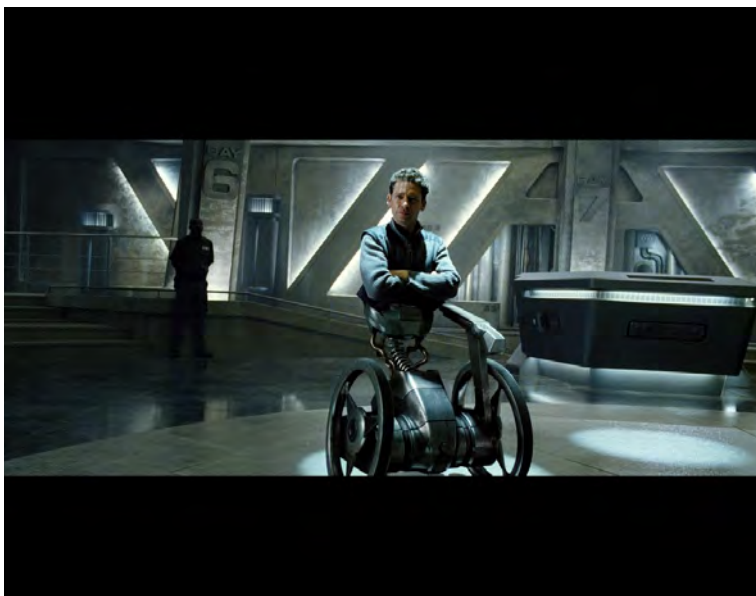
Wheelchairs

“An integration of humans and machines”



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“The researchers at the Mars UAC station have unwittingly opened a door, and all hell has broken loose...Pinky, a technician and communicator at the UAC labs on Mars, has a cybernetic wheelchair for a lower body due to a bad teleporting accident. He was fundamental to guiding the marines around the UAC complex and warning them of any monsters that might be lurking around the corner.” Fans of the movie ‘Doom’ might recognize this exciting character. Although this is a work of fiction, it highlights the interesting design and combination of human and machine that makes a wheelchair.



Formula 1 racing, which each year produces some of the most intensively engineered vehicles on earth, is a well-spring for design innovation. F1 race cars have monocoque hulls--rather than being formed of a frame with a composite skin, the skin itself is a single sheet of composite that provides all the structural rigidity. This wheelchair borrows the same concept, thus producing a lighter, stronger design:

Historically, the power chair was simply a manual wheelchair equipped with motors, batteries and a joystick. Today the power chair is a dramatically different design. Most power chairs, today, are designed to



have two major components, the power base (containing the motors, wheels, batteries and control module) and the seating component. Each component (power base and seat) are offered with a wide variety of options. The most obvious difference in power bases is the position of the drive wheel. Power wheelchair manufacturers now offer three types of “drives” – rear wheel, mid wheel and front wheel drive chairs. The placement of the drive wheel has a significant impact on “how” the chair moves. Each method has its advantages and disadvantages in both indoor and outdoor driving conditions. Your best bet is to arrange for a test drive, ideally with three different chairs, each with a different drive wheel position. Riders quickly identify the drive wheel placement, which feels most comfortable to control. Once a particular drive wheel placement has been chosen, there are several different models (from different manufacturers) from which to choose.

The Quickie Xtender provides a power assist to a manual chair, and users can now maintain the look, control and functionality of a manual chair without the extra effort involved in an unassisted manual chair.

It appears that more auto manufacturers are pursuing an avid interest in wheelchairs. Suzuki has developed a new motorized wheelchair dubbed MIO, which features a fuel cell unit that uses direct methanol. Unlike the batteries currently used in motorized wheelchairs, the fuel cell does not require recharging, and it enables the chair to travel more than 25 miles with a gallon of methanol. The per mile charge is not that spectacular as most existing electric wheelchair already have the capability to travel approximately 25 miles per charge on existing two 12-volt dry cell batteries.... perhaps the backup battery can recharge the cell as its traveling.

The Toyota I-Real is a natural evolution of the I-Unit, constructed from lightweight carbon fiber reinforced plastic, boasting operating controls located in the side arm rests in lieu of a steering wheel. The I-Real has a maximum speed of 18.6mph and will be able to go from an upright position to a reclined position for its High-Speed Mode.



Standards are being promulgated for wheelchairs more actively and the

latest is the ISO 7176-10:2008 standard – “Determination of Obstacle Climbing of Powered Wheelchairs”, which specifies test equipment, procedures and specifications to report test results. Of course RESNA/ANSI standards for wheelchair testing has been around for more than a decade and WC-19 is a critical standard for designing and manufacturing wheelchairs used in motor vehicles. The website includes an up-to-date list of successfully crash tested wheelchairs and seating systems. (www.ercwts.org/WC19)

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