In a clinic for adults with cerebral palsy, we worked with this client who had an extreme Muscular-Skeletal condition (pic 1). Initial thoughts from the clinicians was to intervene with lateral support seating modifications.

We evaluated the client in a chair (without lateral support) which we set-up with an Active Controls ReJoy midline joystick mount. His posture improved (pic 2) and his left non-driving arm remained comfortably on the armrest and lateral support pad.

These pictures are just one example of how the armrest drive control location can modify body mechanics and reduce abnormal postures.

- Russ Rolt, VP Sales and Business Development, Active Controls LLC
Biomechanical Advantages of a Central Mounted Controller for Electric Wheelchairs

- Alberto Esquenazi, MD
Chair of Department of Physical Medicine and Rehabilitation, Moss Rehab Hospital

Traditional power wheelchairs (PWC) use an armrest mounted joystick controller. Such devices force a change in body posture and weight distribution with deleterious effects over time. When operating a PWC with an armrest mounted drive control, the user must lean on the armrest where the joystick is mounted in order to improve drive control. However, driving from midline can facilitate improved PWC control and body posture allowing seating products to do what they are intended to do.

The Active Controls Center Drive System was developed to allow midline mounting for power chair joysticks and alternative drive controls. There are several benefits to the operation of a PWC at midline, including better postural alignment and weight distribution. Both benefits are vital in the preservation of skin health and pressure distribution, allowing seating products to maximize their function.

Using a center position control, the operator is in a more intuitive and functional position that aligns the visual field with the center of the chair’s travel path. Operating a power chair with its controls at midline will often increase the efficacy of the user.

In this study we compare the 3D kinematics and Dynamic EMG of the same subject using a traditional armrest controller and a center mounted one. Body posture, arm biomechanics and muscle activation patterns were recorded under both conditions and demonstrate better biomechanics for the central mounted controller compared with the side mounted one.

Subjects sit more erect and use less force to drive central mounted controls. They report more comfort while driving them and an improved sense of control over the wheelchair.

Dr. Esquenazi is Director of the Gait & Motion Analysis Laboratory at MossRehab.
As a Physical Therapist and Assistive Technology Professional, I have been afforded the opportunity to work in a variety of settings performing seating evaluations and prescribing wheelchairs to clients across the lifespan. More recently, as a Certified Ergonomic Assessment Specialist, I have also had the opportunity to grow my career within the niche field of ergonomic consulting.

Ergonomics is the science of fitting the task to the individual. Office and factory workers alike are encouraged to work within their ergonomic “power zone” performing frequent tasks at midline close to their body. In an office setting, it is recommended that the monitor, keyboard, and mouse are located directly in front of the worker to avoid excessive reaching and rotation, as this leads to muscular imbalance. Operating a wheelchair drive control utilizes upper body mechanics similar to those of seated keyboard or mouse use, hence replicating this positioning with a bilaterally supported center drive system may reap similar ergonomic advantages.

Ergonomic injuries are commonly caused by obstructed circulation as a result of awkward, static postures, especially when combined with contact stress, force, or repetitive movements. Operating a PWC control requires sustained repetitive motions, making the achievement of neutral positioning of the wrist, arms and shoulder critical to injury prevention.

Traditional power wheelchairs are controlled by an armrest-mounted joystick, which require the user to support their upper body via leaning on the armrest while performing repetitive joystick manipulations. As most wheelchair clinicians are well aware, armrest mounted joystick propulsion requires the driver to compromise their posture, while diminishing the effectiveness of the seating system. Previously there were no durable and ergonomically designed alternatives available, however the Active Controls Center Drive System combines an ergonomically advantageous configuration with a robust design.

To achieve neutral postures in a wheelchair, elbows should rest on the armrests of the chair with the input device positioned at a similar height as the armrests. The location of the input device should be positioned in the ergonomic “Power Zone” where the driver can achieve optimal wheelchair operation, proprioception and seated comfort.

Active Controls ReJoy midline mounting platforms re-use joysticks from armrests while providing secondary gel support surfaces for the hands, wrist and lower arms. Together with the powerchair’s armrests, these midline platforms provide improved posture and pressure distribution, while complimenting the intended benefits of the prescribed seating and positioning products. Optimal seating combined with an ergonomically designed and positioned midline drive control will help to prevent and amend musculoskeletal disorders (MSD’s) caused by armrest mounted controls.

**Neutral Postures vs. Awkward Postures**
The Center Drive System (CDS) Saves Wheelchair Clinics and Providers Time and Money

“I am a huge proponent of the Active Controls Center Drive System for use in wheelchair clinics. It is SUCH a time saver. In clinics, the time to conduct a wheelchair assessment is becoming more and more of an issue because it is usually limited to 60-90 minutes by third party payers.

“Follow up visits to clinic are especially hard to justify. Because the modular Active Controls System eliminates the time between assessments of different controls by 20-30 minutes, it dramatically limits the number of follow up visits needed.

“With the cost of clinic time of $400-$500 per hour, the return on investment of a sample evaluation kit is a capital expenditure that pays dividends in the first year while benefiting the patient and clinician.”

- Erin Michael, PT, DPT, ATP/SMS, Seating and Mobility Specialist
International Center for Spinal Cord Injury, Kennedy Krieger Institute

Active Controls Rehab Solutions™ is a breakthrough for Wheelchair Clinics and Providers. The sample evaluation kit is easily installed on nearly all makes and models of power wheelchairs. Because you can trial different platforms and a variety of input devices in different locations, it is now possible for more people to use power wheelchairs, including MANY who were never considered as candidates for power wheelchair driving. Leading wheelchair clinics, including Moss Rehab and Kennedy Krieger, are saving time and completing more effective assessments with Active Controls evaluation kits.

The multiple benefits of a sample evaluation kit are:
• Modular connection of pre-assembled joysticks and alternate drive controls increases the efficiency and effectiveness of wheelchair assessments.

• For the first time, clinics/providers now have the tools to trial any existing alternate drive control and instantly position it at midline for use by the hand(s), chin, lip, tongue or head.

• Clinicians and their patients are relieved of the energy-sapping efforts required to perform multiple wheelchair transfers to assess a second, third, fourth or fifth different type of drive control.

• Side-by-side comparisons between two similarly successful trials can be conducted to instantly gauge the patient’s opinion of which control works best and is most comfortable.

• In a clinical setting, the CDS mounted alternate drive controls do not require a technician to install and the need for reprogramming the chair is limited to changing from a proportional control to a switched control such as a head array.

• By investing in a set of 5-6 different controls pre-assembled to various Active Controls midline platforms, it establishes the clinic and providers who are its’ early adopters with a progressive reputation in the community it serves.

• The supervisors, clinicians and technical staff are energized by the quality time it frees up in clinic to work with their patients and document the medical justifications for the control selection and location.