

AT HELPS FARMERS KEEP WORKING



Farmers grow crops and raise livestock to provide food to the nation. Farming is a physically demanding profession, even with the many advances in automation available today. It is also one of the most dangerous industries. According to the Occupational Safety and Health Administration (OSHA), in 2011 agricultural workers had a fatality rate of 24.9 deaths per 100,000 – seven times higher than the fatality rate for all workers. OSHA also notes that about 243 farmers experience a serious injury each day and 5% result in a permanent disability. In addition, the United States Department of Agriculture (USDA) reported that almost 33% of the farming workforce is over the age of 65. Higher rates of disability and secondary limitations are associated

with this age group. Together, these figures show the significant need for assistive technology (AT) that can help farmers with physical disabilities continue to work, as well as help them prevent future injuries.

This guide describes common types of AT that are available to support you with farming tasks if you have physical disabilities or impairments. Other resources useful for the agriculture industry are also presented.

Getting Around on the Farm

Getting around to the fields and barns is an essential farm function. AT options to aid with this task include personal outdoor mobility aids and modified trucks.

Outdoor Mobility Aids

Several outdoor wheelchairs designed for rugged terrain are available if you are a farmer with lower limb disabilities or impairments. Some chairs are track-driven, meaning they use a continuous rubber track instead of rubber wheels. The battery powered Action TrackChair is operated by a joystick and has an 8 mile range. The Ripchair 3.0 is a continuous-track vehicle that does not require you to transfer from your standard wheelchair to operate it. Instead, you roll your wheelchair onto it and can use its controls without having to get out of your wheelchair. The TrackMaster Power Chair is designed to navigate in snow, mud, sand, grass, and gravel and showcases a narrow width. Two options for wheel-driven outdoor mobility are the HexHog and the Journeyman Scooter. The HexHog is an all-wheel-drive chair with a 12 mile range. The Journeyman Scooter is designed to climb hills and wade through 6 inches of water without hanging up, tipping over, or stalling out.

Modifications for Trucks

Trucks are essential for many daily farming tasks and can be outfitted with various types of AT to assist you with using them. If you have lower limb disabilities, lifts and hoists are available to assist you in transferring your body or wheelchair into and out of your truck. The In-Vehicle Glide 'n Go Pickup Truck Transfer-Assist Seat lifts you from a wheelchair or scooter up to the vehicle's seat height, then rotates you for easy transfer. The Out-Rider Wheelchair Hoist is an electrically powered, boom-type hoist with a winch to assist you with loading and storing your wheelchair. The device can be controlled from inside the cab of your truck and allows you to transfer your wheelchair, for example, from the ground to the bed of your truck or vice versa.



Tilt-A-Rack Scooter/Wheelchair Carrier

<http://www.agrability.org/toolbox/solution.cfm?solution=318>

Do-It-Yourself (DIY) Wheelchair Lift

An Iowa farmer built a wheelchair lift for his pickup that consists of a flat, steel plate bolted to the bed floor just behind the driver's seat, with a 4-foot vertical pole mounted to the plate so that it can rotate. To load a wheelchair from the ground, the winch tightens the cable to raise the parallel linkage and chair. The actuator is then retracted to rotate the linkage over the truck bed, and the chair is lowered for transport. Control switches are mounted by the driver's seat in the cab to operate the winch and actuator, both of which run off the truck's electrical system.

Source: <http://www.agrability.org/Toolbox/solution.cfm?solution=637>

Tilt-A-Rack Scooter/Wheelchair Carrier is another option for loading a wheelchair. It is a rack that attaches to the rear of your truck and is parallel to the ground. You pull a lever on the rack to tilt one side of it down to ground level, so you can guide your scooter/motorized wheelchair onto it. As you guide your scooter/motorized wheelchair, the rack automatically levels until it is again parallel to the ground. Then you tie your scooter/motorized wheelchair to it.

Once you are in your truck, there is also AT to assist you in operating it. Hand control conversion kits are available for brake, clutch, and gas pedal operation if you have limited or no use of your lower limbs and feet. Hand controls are placed where you can easily reach them. There are several types of controls that should be selected based on your finger dexterity. For example, a Power-Assist Hand Control unit is an electronic microprocessor-controlled hydraulic system that lessens the effort required to operate the brake and throttle when you have limited or weak upper arm strength. The PHC-3 Portable Hand Control is a good

option if you have lower extremity impairments and need a hand control to use in multiple vehicles. You can quickly install and uninstall it in most vehicles. It is also small enough to fit in a small grocery bag, making it easier for you to carry around.

Working with Heavy Equipment

Much of farming requires the use of heavy equipment such as skid loaders, tractors, and combines. There

is a range of AT available for farming this equipment too.

Skid Loader Adaptations

If you have lower limb limitations, Hand-Control Conversion Kits for complete hand-controlled operation are available for typical Bobcat skid loaders. Hand controls are standard equipment on the Case Hand-Controlled Skid Loader. The Mustang One-Hand Skid Loader can be controlled in two ways, by dual levers and foot pedals or by a single “T” bar and foot pedals. In addition, optional Suspension Seats are available to minimize the effects of vibration and discomfort.

Modifications for Tractors and Combines



Portable Pilot Lift <http://www.agrability.org/toolbox/solution.cfm?solution=516>

This equipment is the mainstay of the farm. Similar to trucks, lifts and hand controls are the major modifications typically needed if you have lower limb disabilities. Battery-operated mechanical lifts are available to help you get in and out of tractors and combines. The Glide ‘n Go XR Tractor Cab Access Lift is mounted to the exterior of the tractor. The hydraulic system is powered by the tractor’s battery and can lift up to 250 pounds. A similar product for taller tractors is the Glide ‘n Go XR Tall Truck Transfer Lift Seat. This lift is mounted behind the cab door and operates by a hand-held remote that runs off of the tractor’s battery. You lower the seat to wheelchair/scooter level, transfer over into it, ride it up to vehicle-seat height, and then manually rotate it inward to where you can easily transfer your body into the tractor.

Another option is the Portable Pilot Lift. This is a trailer-mounted lift that can be used to access multiple pieces of equipment. It is powered by an onboard battery with its own charger. The lift arm is radio remote-controlled and can take you 10 feet high and 230 degrees around the lift mast.

Tractors and combines can be modified with hand controls so if you have lower limb disabilities you can continue to operate your machinery. There are adaptations for the operation of the brakes, clutch, and steering wheel. Many of the mechanical hand control systems for the tractor brakes are products created and then sold by other farmers themselves. For example, an Iowa farmer made Hand Brake Levers for his John Deere 4230 tractor. The levers are flat bar stock with bicycle grips for hand holds. A short angle iron segment was welded to each brake pedal shank, with the flat surface facing up; and a piece of flat steel was welded to the bottom end of each control lever. The flat steel on the lever was then bolted to the angle iron on the pedal in order to fasten the hand brakes. The brakes are activated by pulling the lever toward you (<http://agrability.org/Toolbox/solution.cfm?solution=545>). If you have limited use of your right leg, a customized Right-to-Left Foot Control Pedal Kit is available, which allows the control of the machine to be transferred from right to left pedal (<http://www.agrability.org/Toolbox/solution.cfm?solution=1291>).

One of the most-used tractor controls during farming operations is the clutch. If you have leg amputations or limited use of your legs from a spinal cord injury, for example, tractors are often retrofitted with hand-operated clutches. There are mechanical linkage systems and air-operated systems. Valtra Valmet

tractors come with an optional Finger-Controlled Electric Clutch. It includes an electro-hydraulic valve and actuator, which, at the push of a switch, automatically controls clutch pedal operation. When the switch is depressed, the pedal immediately disengages the clutch; when the switch is released, the pedal rises at a controlled rate to full clutch engagement. The clutch can still be foot-operated with no modifications.

If you have grasping difficulties or limited upper extremity strength, modifications for the steering wheel are available. Spinner steering devices mounted on the steering wheel provide a relatively simple modification that can offer better steering control. For limited gripping ability, there are several options. The Tri-Pin Handle has a vertical pin that is held and two additional pins stabilize your wrist; the Quad Fork Handle has a “U” shaped prong and your hand is placed between them; and the Spinner Knob is shaped like a doorknob. The Spinner Ring is a steel loop that spins freely and can be easily gripped if you have a prosthetic hand.

There are also more high-tech options available for steering tractors, such as GPS. The AgGPS Autopilot Steering Assistant automatically guides a tractor for straight rows. The AutoFarm GPS Steering Control System and EZ Remote GPS Joystick are other GPS steering options. Knob extenders for all the tractor or combine controls can easily be fashioned. The knob extensions are short segments of radiator hose clamped onto and extending beyond the knobs, with a nail pushed crosswise through each extended hose making them easier to grip. These can be used for air conditioning, starter key, and other controls.

Handling Crops and Managing Livestock

DIY Adaptations for Livestock

A Missouri farmer converted a ground-driven manure spreader into a Pasture Hay Feeder that allowed him to feed large square hay bales without leaving his pickup truck.

Source: <http://www.agrability.org/Toolbox/solution.cfm?solution=227>

A Pennsylvania farmer created a Water Wagon, a 125-gallon water tank mounted on a cart that’s pulled by a truck and allows him to frequently change watering sites for the livestock.

Source: <http://www.agrability.org/Toolbox/solution.cfm?solution=246>

Some AT is designed to assist with very specific farming tasks such as handling crops and managing livestock. This group of AT often consists of some form of automation to reduce the risk of secondary injuries if you already have a disability. GPS sensors, motion sensor devices for fences, and automatic hitching devices are becoming more widely used. We provide a few examples here, but there are many unique products available.

To help with harvesting hay, there is an adaptive bale spear that fits onto the back of a pick-up truck and can also be used as a bed hoist, a log splitter, and bale un-roller. Both the Triple-C Flatbed Bale Handler and the DewEze Flatbed-Truck Bale Handler utilize hydraulically powered gripping arms that mount onto the sides of a small truck’s flatbed. The arms rotate behind the bed, grip the large round bales, then rotate forward to load the hay onto the bed.

For unloading and hauling grain, there are several tools that minimize stress to your body. Both the Smartgate Grain Chute Opener and the Electronic Grain Chute Opener allow you to control grain flow without having to leave the truck or tractor seat or without having to climb down from the grain bin, grain drill, or air seeder being filled. The Roll-Rite Electric Power Kit opens and closes crank-operated grain trailer or wagon hopper doors at the push of a button.

Feeding livestock involves constant bending which can be avoided by using a Motorized Feed Cart which allows you to mix and feed rations to your animals without having to scoop grain or fork silage, greatly reducing strain to your body.

Doing a Host of Chores with Body Prosthetics and Other Tools for Amputees

According to the National Safety Council about 1 out of 10 farm injuries result in amputations of limbs. As a farmer, you use your hands and arms for many tasks to maintain and operate your farm equipment. There are a number of prosthetic arm devices available that may be used to help regain function if you



have lost a limb. There are standard cable-driven prosthetic arms with hooks as well as high-end prosthetics that are operated via the electrical signals in the muscles. While the electrical arms are advancing, they are often not the best choice for farmers. They are not as durable for outdoor work as they may short out when they get wet or dirty. Farm chemicals can also corrode the devices.

According to AgrAbility, the most popular prosthetic arm for farmers is the Dorrance Hook. This is a basic prosthetic that employs a laminated socket, connects to the body with a harness around the shoulders, and has a hook that opens and closes by cable. Another device, the N-Abler wrist unit allows individuals with prosthetic

arms to use eating utensils, mechanic and carpentry tools, and even sports equipment. For example, the hand-tool system consists of a terminal device that screws into the prosthetic arm and has a socket into which tools such as hammers, wrenches, saws, files, and locking pliers can be fit. A button-operated mechanism allows quick and convenient tool insertion and removal from the terminal device. A new device, the Farm Arm, was recently developed to allow agricultural workers with amputations to operate machinery controls more safely (<http://thefarmarm.org>).

Resources



<http://www.agrability.org/>

The goal of the AgrAbility program is to enhance quality of life for farmers, ranchers, and other agricultural workers with disabilities. It is composed of the National AgrAbility Project and State/Regional AgrAbility Projects. They provide educational services, promote networking and provide direct services to

agricultural workers. Typically, they do not provide direct funding for AT, but will help customers identify other funding sources. AgrAbility is supported by the USDA.

<http://agrability.org/Toolbox/index.cfm>

THE TOOLBOX

Assistive Technology Database

The Toolbox is AgrAbility's database of AT solutions for farmers, ranchers, and other farm workers. It provides information about products that are commercially available. It also boasts many DIY solutions from other farmers. Many items from their database are described in this guide. The Toolbox is an excellent resource to support problem-solving in the unique aspects of the agriculture industry.

eXtension

https://www.extension.org/farm_safety_and_health

Extension is an interactive learning environment focused on agricultural safety and health.

For More Information

[Contact us](#) at AbleData.

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