

## **UNCOUPLING DEVICE FOR SEMITRUCKS**

### **Hamann Angus Ranch Improves Working Conditions**

Mint truck drivers at Hamann Angus Ranch were experiencing numerous muscle discomforts during the course of their routine work. Hamann joined forces with the Oregon OSHA (OR OSHA) and Oregon Manufacturing Extension Partnership (OMEP) to resolve or greatly improve the working conditions for their employees. This group accomplished their task and effectively streamlined the productivity of the truck drivers as well.

During the summer mint harvest, truck drivers are required to couple and uncouple trailers used to haul and process mint. Studies indicate that one driver might couple and uncouple trailers up to 24 times per shift. The significance of this is that each time a trailer is uncoupled, the landing gear (legs) must be cranked down to support the trailer when the tractor is removed. Coupling the trailer requires the landing gear to be cranked up for travel. Since the gear was cranked up and down by hand the drivers incurred numerous areas of discomfort from this activity.

To determine a solution to the problem Mr. Don Hulick of the OMEP met with Hamann executives to study the complete process in the working environment. The process was documented by the OMEP with the assistance of Mr. Rob Strickland, OTR, an ergonomic consultant. During the evaluation, the entire procedure was reviewed with Mr. Strickland paying special attention to forces and loads as they equate to posture and body mechanics.

The approximate height of the hand-crank pivot on the trailers is 36". This height proved awkward as the relationship of the crankshaft to the center of gravity of the average size person requires a large number of position changes in the body posture to operate the landing gear. For example, the driver often has to change at mid-stroke from pulling to pushing at an extreme extended position. This continued motion could easily increase the potential of musculo-skeletal injury to the operator. Difficulty in operating the crank due to dirt, dust and other foreign objects would increase the potential for injury. This operation alone gives discomfort to the operators from the neck to the feet and outward to the hands.

The OMEP and the OR OSHA saw the need for a remedy after reviewing the preliminary study. They authorized a Worksite Redesign Grant, allocated \$40,589 for the project and initiated it on Apr 1, 2001.

To solve the problem Don Hulick and his team saw the first point of attack was limiting the range of body motion and the force required by the operator. To accomplish this they knew they needed to find a power tool to crank the landing gear up and down. They would have to modify the gear on the trailers to accommodate the power tool. They determined that a great number of their

concerns were addressed if they could utilize this method. The refinement they created to solve the problem would have to allow the traditional hand crank system to be fully functional also. They also would design the system to be adaptable to all types of truck and trailer combinations and all trucking industries. Some of the considerations for the tool design they had to take into account included;

- **Maintain neutral joint postures** Study the torque of the equipment that would rotate the crank and determine it's effect on the wrist, forearm and shoulder positions. The hands need to stay in front and close to the body, elbows near the trunk and not raised, shoulder should stay relaxed, not elevated. The neck should not have to bend severely downward, sideward or rotate significantly to see while operating the tool.
- **Use the appropriate muscle groups** The muscles to be used for the operation were considered. Efficient ergonomics requires that larger muscle groups should be utilized when exerting higher levels of force. Use smaller muscle groups for trigger operation to adjust the speed.
- **Proper Grip Orientation and Surfaces** The grip on the power tool is located to provide minimum torque effect, and maintain neutral joint posture as much as possible. The surface of the grips is mildly compressible, slightly textured handles enhance gripping ability, minimizing slip.
- **Minimize repetitions** This power tool system eliminates the repetitions of movement for the operator. The tool socket is placed on the landing gear drive shaft and the trigger is pulled and held by the operator until the cycle is complete.
- **Minimize the amount and duration of force** The power tool weighs 8 lbs. and is only used for 30 seconds during each coupling and uncoupling.
- **Allow sufficient hand clearance** The power unit was checked with the configurations of all of the trailers to determine no unsafe pinch points or other unsafe conditions will occur during operation of the power system.
- **Eliminate pressure points on hands and fingers** Pressure points fingers and palms of hands were considered to minimize contact stress to the hands.
- **Availability of the tool for use** The power tool itself is stored in a holster mounted to the utility bed on the tractor. Power is provided by means of compressed air. An auxiliary air tank is mounted on the truck adjacent to the stack. The system incorporates safety valves to protect the air supply to the truck, so it is never jeopardized. This configuration allows the maximum availability of the tool. It is only a few steps from the landing

gear system whenever it's needed. The operator will have power available without having to set up the system each time.

The air powered landing gear tool is similar in appearance to a drill. It has large handles (16" end to end) at the user's end to form the shape of a "T". The driver attaches the air hose to the tool, places the end device (modified nut driver socket) on the landing gear drive shaft and while gripping the handles, and activates the tool with the finger trigger switch. The landing gear can be operated in either high or low gear. The tool torque can be changed from high to low as needed with an air pressure regulator, and speed can be varied by the amount of force on the trigger switch. Thus, using this tool, all manual cranking of the landing gear has been eliminated.

The equipment tested very satisfactorily. The team noted that this project is a major benefit for drivers with medical restrictions. The drivers all agree that this has been a very worthwhile workplace improvement.

The Oregon worksite Redesign Program is administered by the Oregon Occupational Safety and Health Division (OR OSHA) of the Department of Consumer and Business Services (DCBS). The program offers research and development grants to Oregon employers, employer groups, employee groups and educational institutions. OR OSHA awards grants for the research and development of innovative solutions to workplace problems that employers can't resolve through the use of "off-the-shelf" technology.

All products developed through this program are public property. The design is complete, and will be freely available to anyone wishing to duplicate or further develop the landing gear power system. A web based project archive is in the process of being constructed, that will provide details on this and many of the 35 to 40 grants being completed. It will be linked from the main Oregon OSHA website and will provide information such as project overviews, ergonomic reports on the projects, as well design and vendor information so that anyone may research the results and adopt the technologies.

Information about developments and the status of this program can be obtained from Oregon OSHA ([www.orosha.org](http://www.orosha.org)). Ph: 503/453-7690. Ph: 503/947-7448. <http://www.cbs.state.or.us/osha/grants/worksitere design.htm>

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