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ROPS Are Not Homemade

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Abstract

Safety professionals should speak up when secondary school teachers and FFA advisors consider fabricating and installing low-cost rollover protective structures (ROPS) as service learning projects for ag education students or as a service to the farm community. These projects are often motivated by the desire to address the continued occurrence of tractor rollovers, which are the most frequent cause of farm-related fatalities (NIOSH, 2018). These projects have also been made feasible by the availability of online plans for ROPS fabrication, including plans from the National Institute for Occupational Safety and Health (NIOSH) that are designed for specific makes and models of tractors. Because of the large number of older tractors that were not originally equipped with ROPS, and the cost and lack of easily accessible ROPS retrofits, fabricating a structure to provide operator protection in the event of an overturn can be attractive as a service learning project. In addition, several of the NIOSH Agricultural Injury Prevention Centers have promoted these projects as a means of reducing the frequency of rollover-related injuries.

However, in light of the liability risk involved, such projects should be weighed carefully. Fabricating a ROPS is not the same as building a chicken house, fabricating a welding table, or welding together a hay feeder. ROPS are life-saving devices that must meet specific design and installation standards that exceed the expertise available in most secondary school ag education shops, and even most local machine shops. In fact, “ROPS” is a technical term defined by OSHA standards and the Society of Automotive Engineers (SAE). It does not apply—nor should it be applied—to untested, homemade structures that are installed on tractors with the intent of protecting the operator.

Keywords

Agricultural Injury Prevention, Aftermarket ROPS, NIOSH, ROPS, ROPS retrofits, Tractor rollovers

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Comments

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Editorial: ROPS Are Not Homemade

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Editorial

Safety professionals should speak up when secondary school teachers and FFA advisors consider fabricating and installing low-cost rollover protective structures (ROPS) as service learning projects for ag education students or as a service to the farm community. These projects are often motivated by the desire to address the continued occurrence of tractor rollovers, which are the most frequent cause of farm-related fatalities (NIOSH, 2018). These projects have also been made feasible by the availability of online plans for ROPS fabrication, including plans from the National Institute for Occupational Safety and Health (NIOSH) that are designed for specific makes and models of tractors. Because of the large number of older tractors that were not originally equipped with ROPS, and the cost and lack of easily accessible ROPS retrofits, fabricating a structure to provide operator protection in the event of an overturn can be attractive as a service learning project. In addition, several of the NIOSH Agricultural Injury Prevention Centers have promoted these projects as a means of reducing the frequency of rollover-related injuries.

However, in light of the liability risk involved, such projects should be weighed carefully. Fabricating a ROPS is not the same as building a chicken house, fabricating a welding table, or welding together a hay feeder. ROPS are life-saving devices that must meet specific design and installation standards that exceed the expertise available in most secondary school ag education shops, and even most local machine shops. In fact, "ROPS" is a technical term defined by OSHA standards and the Society of Automotive Engineers (SAE). It does not apply—nor should it be applied—to untested, homemade structures that are installed on tractors with the intent of protecting the operator.

The ROPS currently found on all U.S. manufactured tractors must meet a set of rigorous engineering standards that were developed in the early 1980s and have been continually updated to reflect changes in tractor design and the results of ongoing testing. These standards include the type of steel required to fabricate the ROPS, the quality of the welds, the mounting configuration and fasteners used, the dimensions of the enclosed zone that protects the operator in the event of an overturn, and the placement and use of seatbelts, as well as specific static, dynamic, crush, and field upset testing, including low-temperature testing, to ensure the integrity of the ROPS and reduce the possibility of ROPS failure.

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In addition to the design criteria, any operating practices or potential applications that might result in unanticipated or excessive forces being applied to the ROPS are also critical, as demonstrated by the documented failures of original-equipment ROPS that met current test standards. In a recent editorial, Myers (2018) concluded that the current test standards for ROPS may not be adequate for larger tractors operating at higher speeds or on steep slopes. These observations raise significant concerns about attempts to design or fabricate ROPS at the local level, especially in secondary school ag education shops.

Currently, a wide variety of aftermarket ROPS are commercially available that have been designed and tested to fit the most common makes and models of tractors. These aftermarket ROPS should be the first option for retrofitting a tractor. However, aftermarket ROPS are likely not available for older tractors (built before the 1970s), certain imported tractors, and tractors with a low number of units in use. In fact, in many cases, older tractors cannot accommodate a retrofitted ROPS due to the inability of the axles and frames to withstand the forces caused by an overturn.

To determine if an aftermarket ROPS that meets the current test standards is available for a specific tractor, the first place to visit is the local authorized tractor dealer. Dealers can identify reliable sources of aftermarket ROPS, including those available through the tractor manufacturer that the dealer represents and from short-line manufacturers that specialize in aftermarket ROPS. Another source to check is the Kentucky ROPS Guide (UK, 2017), which provides a listing of certified, commercially available ROPS and the tractors that they fit. In a few states, tractor owners may be eligible for financial incentives for ROPS retrofits. For more information, visit https://www.ropsr4u.com.

If an aftermarket ROPS is not available for a particular tractor, there is probably a good reason. Anyone considering local fabrication of a ROPS retrofit should therefore proceed with caution or consider another alternative, including:

- Confirm with the tractor owner that a ROPS retrofit is not available, or is cost-prohibitive. It is not the responsibility of agricultural educators to tell a tractor owner what to do, but educators can help the owner make an informed decision.
- Explain to the tractor owner that the tractor may not safely accommodate a ROPS retrofit, even if a frame could be fabricated to fit. A homemade frame over the operator, regardless of how rugged it looks, is not a ROPS.
- Suggest that the tractor owner consider replacing the tractor with a newer model equipped with a factory-installed ROPS. For an older tractor, the design, fabrication, and installation of a ROPS may exceed the market value of the tractor.
- Encourage the owner to limit use of the non-ROPS tractor to activities where the risk of overturn is low, or non-existent, and avoid high-risk locations such as ditches, terraces, woodlots, ponds, and streambanks. High-speed operation, such as road transport and hay raking, should also be avoided.
- Suggest that the owner consider other tractor modifications that would reduce the risk of overturn, such as adding ballast, installing a wide front end on a tricycle-type tractor, using wider placement of the rear wheels (if adjustable), or installing a fixed drawbar to replace a floating three-point hitch. In addition, avoid using a non-ROPS tractor with a front-mounted loader, a rear-mounted hay spear, or other equipment that elevates the tractor's center of gravity.

Fabrication of a homemade device that looks like a ROPS or is based on a design found on the internet may seem like an economical option, but it can put the fabricator and installer (the school and its staff, in the case of a service learning project) at risk of liability

if the homemade frame fails and someone is injured, regardless of how the tractor was being used or misused. If an injury occurs due the use of a non-compliant, retrofitted roll-over frame on a tractor, several questions will demand answers, including:

- Were the fabricator and installer aware of, or made an effort to become aware of, which tractors and models were suitable for safe installation of a ROPS?
- Did the fabricator and installer have the necessary knowledge, skills, and equipment to fabricate a ROPS that meets the current engineering standards as published by SAE? This includes knowledge of materials and hardware, the capacity to complete welding operations that are strong enough to absorb the forces created during a roll-over, and proper placement of required seatbelts.
- Did the fabricator and installer understand the proper placement of the ROPS to ensure that deformation of the ROPS during an overturn did not encroach on the operator's zone of protection or cause tractor components, such as axles, to fail? A ROPS that collapses onto the operator can be just as dangerous as not having a ROPS at all.
- Did fabricator and installer recognize the potential liability associated with fabricating a ROPS and transferring it to a consumer, even if the ROPS was provided at no cost or as a community service?

The bottom line: If your school or FFA chapter fabricates and installs a ROPS on a tractor, and a subsequent rollover of that tractor results in an injury or death, then your organization has an assumed liability. That liability cannot be completely avoided by requiring that the consumer sign a release of liability because fabricating a protective device and falsely or incorrectly claiming it to be a tested ROPS can be viewed as negligence.

There are better alternatives for reducing the risk of tractor rollover-related injuries and deaths than the fabrication and installation of homemade protective devices by ag education students, who may not have the skills needed to complete the job correctly. Many other projects are available for them to engage in that are far less likely to expose the school and the FFA program to the risk of liability.

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