Low-Cost Rollover Protective Structures (ROPS) Implementation Project in Newfoundland and Labrador

Executive Summary

Agriculture continues to be one of the highest-risk industries in Canada, with tractor rollovers remaining a leading cause of fatal and serious workplace injuries. Research consistently shows that rollover protective structures (ROPS), when used with seatbelts, are highly effective in preventing death and serious injury during tractor rollover events. Despite this evidence, a significant number of older tractors in Canada continue to operate without ROPS due to cost, limited availability of commercial systems for legacy equipment, and the low market value of older tractors.

The Low-Cost ROPS Implementation Project was undertaken to address this persistent occupational health and safety risk. Primarily funded by WorkplaceNL, and delivered in partnership with the Canadian Centre for Rural and Agricultural Health (CCRAH), Memorial University of Newfoundland (MUN), and the Newfoundland and Labrador Federation of Agriculture (NLFA), the project evaluated whether engineered, low-cost ROPS could be safely fabricated by farmers using specialized designs supported by professional engineering oversight.

This project formed part of a broader national initiative aimed at reducing tractor rollover fatalities by making CSA-compliant ROPS more accessible and affordable for older tractors. The Newfoundland and Labrador project served as the first large-scale field implementation to test the designs, fabrication instructions, farmer fabrication skills, engineering support processes, and promotional approach under real farm conditions.

This project's specific objectives were to:

1. Engage key provincial stakeholders to ensure the program aligned with provincial agricultural practices;
2. Assess the prevalence of older tractors without ROPS and farmer willingness to participate;
3. Coordinate the fabrication and CSA testing of low-cost ROPS built by farmers; and
4. Support extension and safety partners in promoting the program to the farming community.

A multidisciplinary team with extensive experience in agricultural safety, engineering design, and knowledge translation led the work. Three parametric ROPS designs were developed to cover older tractors based on tractor weight ranges, rather than based on individual tractor makes and models. This approach significantly increased the potential coverage of older tractors while maintaining compliance with the CSA M5700 ROPS Static Test Standard. The designs incorporated features intended to reduce weld stress, improve energy absorption during rollover events, and support consistent quality by the fabricators.

Strong collaboration was established between WorkplaceNL, NLFA, MUN, CCRAH, and provincial government representatives. Regular meetings, farm visits, and outreach activities were conducted to understand farmer needs, assess equipment suitability, and support recruitment. Engagement confirmed that many older tractors in Newfoundland and Labrador remain without ROPS and that farmers generally demonstrated the skills, interest, and capacity to fabricate ROPS themselves, or using trusted friends or local fabricators. Timing was identified as an important factor, with winter months preferred for fabrication due to reduced farming workload.

Eight ROPS were fabricated during the project, meeting the project's minimum target. Seven units were subjected to CSA M5700 static testing, and one was installed directly on a tractor. Most ROPS passed testing successfully. Units that failed did so due to clearly inadequate weld quality rather than design deficiencies. These failures validated the importance of the project's proposed remote verification and inspection process, which is intended to identify and correct fabrication issues before final approval. Testing results confirmed the overall robustness of the designs and demonstrated that minor weld remediation could effectively address deficiencies.

Material costs for the fabricated ROPS ranged from approximately $457 for smaller units to just over $1,000 for larger designs. These costs were substantially lower than commercially available ROPS and were considered reasonable and affordable by participating farmers. Fabrication time generally ranged from 8 to 12 hours. Farmers reported that the process was manageable and that engineering support was accessible and effective.

An independent survey conducted by MUN and NLFA confirmed a positive participant experience. All respondents agreed that the program improved safety awareness, met cost expectations, and would be beneficial to other farmers. Participants identified affordability, improved safety, and adaptability of the designs as key strengths, while also providing practical suggestions to improve fabrication instructions and clarity.

Overall, the Newfoundland and Labrador Low-Cost ROPS project demonstrated that farmer-built, engineered, CSA-compliant ROPS are a feasible and effective injury prevention strategy for older tractors. The project confirmed strong stakeholder support, demonstrated measurable progress toward reducing rollover risk, and validated a scalable model suitable for broader implementation. The results support additional research in NL to fine tune the program. The results also supported further expansion of this approach as part of a coordinated national effort to reduce serious injuries and fatalities associated with tractor rollovers and to strengthen occupational health and safety outcomes in Canadian Agriculture.