



UNIVERSITY OF CALIFORNIA, DAVIS
DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING

Crush Protection Device for All-Terrain Vehicles

Presented by:

Farzaneh Khorsandi

Co-authors: Eric Fong, Paul Ayres

Assistant Agricultural Safety and Health Engineer in Cooperative Extension

Introduction

- All-Terrain Vehicle (ATV)
- In 2016, 97, 200 ATV-related, injuries, 661 ATV-related fatalities, in the United States
- 22 percent children younger than 16 years of age
- 60% of fatalities were associated with ATV overturns (General)
- ATVs are unstable vehicles
- ATV in farms
- Three out of five occupational ATV fatalities happens in the agriculture sector (OSHA)



<https://forums.daybreakgames.com>



<http://farmcreditilblog.com>



Recreational vs. agricultural ATV incidents

	Agricultural	Recreational
Types of accident	ATV rollovers (85%) Rider pinned under ATV (68%) Death by asphyxia (42%)	Riding fast, lost control, was ejected, and collided with a stationary or moving object Rider pinned under ATV (30%) Death by asphyxia (11%)
Injuries	Head injuries (13%) Chest injuries (59%)	Head injuries (49%)
Added load /or passenger	Attachments (≈50-75%)	Attachments (≈25 to 33%) More possible to carry a passenger

There is an obvious need to distinguish and treat the safety requirements for farm ATV differently compared to the recreational ATV

ATV rollover accidents

- Roll-Over Protective Structure (ROPS), Crush Protection Device (CPD)



Dahle ROPS



Johnson ROPS



MUARC ROPS

Crush Prevention Device (CPD)

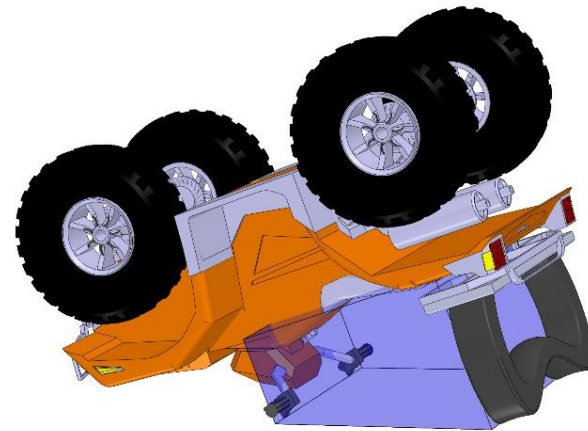
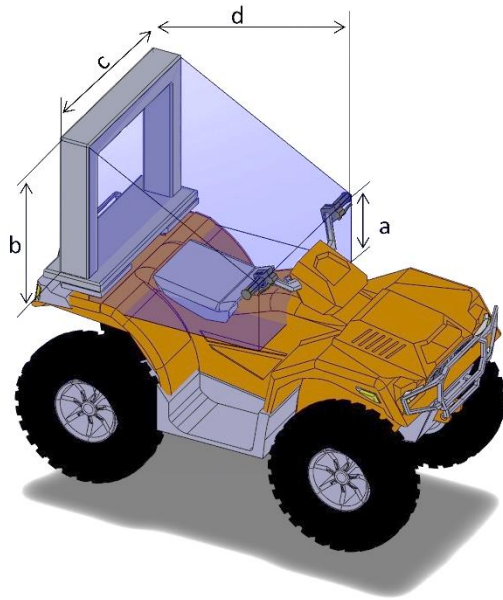
- Seat belt
- Active riding
- Increase the stability by 10% to 30%



NZ T-Bar CPD



HSE U-Bar CPD



The blue volume shows the rear CPZ of an ATV in the overturned position
(left) general trapezoid shape of CPZ and
(Right) CPZ of Lifeguard which is deformed in the overturned position

Commercial CPD/ROPS



Quadbar



Quadbar Flexi



Quick-fix



Auto ROPS



Lifeguard

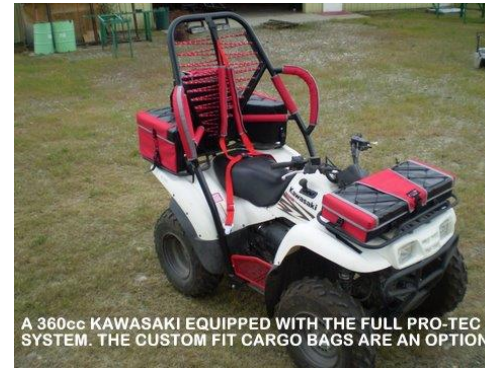


CFMOTO





MTV roll cage



Pro-Tec System ATV





Questions