

# Quads - Active Riding & Stability

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## What is “active riding”?

- Movement of body weight to assist with maintaining stability of quads
- Newtons Law of Motion
  - **For every action there is an equal and opposite reaction.**
- “The process of having a gyroscope up your bum to keep the vehicle stable” (Yossi Berger)



# Lateral Stability - A Simple Concept

- “In spite of all the rhetoric to the contrary this is a simple concept.”
- “We and our contractors have run literally thousands of tests to explore the dynamics of ATVs and there is no question that lateral stability is directly related to the operator’s ability to maintain control.” (Ray Deepa - US Consumer Product Safety Commission, 1990)
- Industry agreed in 1989 to work towards a lateral stability standard

## Why is “active riding” important?

- The industry has and continues to use “active riding” as a pretext not to impose a lateral stability standard.

“Similar to a motorcycle, a key to maintaining the stability of an ATV is that the rider engage in ‘active riding’, using their body weight and movement to provide for particular movement and stability of the vehicle.....

A lateral stability coefficient cannot be meaningfully applied to an ATV because of the nature of the terrain in which ATVs regularly operate.”  
(Honda Australia Motorcycle and Power Equipment Pty Ltd, 2012)



# The truth behind active riding?



- There is no question that moving body weight will have some impact on stability (physics dictates that) - the real questions are:
  1. How much of an impact does “active riding” really have on stability?
  2. Is this really at a level that means a lateral stability standard cannot be applied to a quad?
  3. Even if active riding is a considerable influence on stability, will not a more stable vehicle in the first place, still mean fewer rollovers (and potentially ejections)?

# What's the Evidence on Active Riding?

- UNSW study - calls on industry to show us the evidence
- Exploratory study undertaken between 2000-2004 (DRI compiled)
- Purpose to assess the typical range of “rider active” effects, rather than any vehicle-centered differences in “rider active” effects
- Rider-active percentage change was calculated - compared use when “rider active” versus “passive”

- Objective measures include static uphill, downhill & lateral stability - based on use of a tilt-table (quantified) - one “expert” rider used (close to 50<sup>th</sup> percentile male)
- Subjective measures include dynamic lateral and pitch stability - three “expert” riders rode prescribed courses with sinusoidal bumps, ditches, sand, closed circuit turn & creek bed:
  - (a) 5 times passively (no movement)
  - (b) 5 times “actively”
- Made a judgement on a scale of perceived benefit of “active” riding compared to “passive” riding on each course





- **Objective:** Static stability - mean benefit of 7% (0-20%)\*
  - Noting the lateral, uphill and downhill data were all combined into one score, though graphs in report indicate approximately <5% benefit (uphill) and < 1% benefit (downhill).
- **Subjective: Dynamic roll (pitch) stability** - mean benefit 31% (0-85%)
- **Subjective: Dynamic roll (lateral) stability** - mean benefit 38% (0-88%)

\* Rechnitzer, Day, Grzebieta, Zou, Richardson (2003) - identified maximum of 19%

- These data presented to the UNSW study team are purported to represent the **total quantum of nearly 30 years of evidence** validating the importance of “active riding”!
- All studies have limitations & the authors do note:
  - (a) this was an exploratory study
  - (b) other limitations with the methodology and its broader interpretation

- One “expert” rider for the static tests and three “experts” for the dynamic tests (to limit inter-rider variability). However, typical users are not “expert riders”. Hence data represents a best-case scenario.
- Rider undertaking the static tilt-table tests, would also be completely aware of the expected movements of the tilt-table.

## Limitations (not listed) - Tracks Used

- Tracks used for dynamic assessment (photos in report), are generally well defined and unlike use in an agricultural work-context, where holes/rocks/stumps etc may be obscured by long grass, are highly visible and predictable. This enables these “expert riders” to be well-prepared for rider movements that may be required.



Dry creek bed



Closed circuit turns

- › Attempts to justify the subjective ratings scale are provided, however these “expert riders” would have well-entrenched pre-existing views on the purported benefits of “active riding” and how this could be validly assessed subjectively without any bias is unclear.
- › The subjective ratings are presented in both the Executive Summary and Summary/Conclusions of the report, however the objective assessment (which is not as “glowing” of the impact of active riding), is not mentioned in either.

# Imminently Hazardous Product - Three Wheelers a History Lesson

- May 31, 1985 - CPSC published an advanced notice of proposed rulemaking (ANPR) on a three-wheeler (including mandatory stability) and a product ban.



- Zellner & Weir (DRI) - An Introduction to the Operational Characteristics of All-Terrain Vehicles (Feb 24-28, 1986).
- Paper does not in anyway implicate design flaws of three-wheelers as a potential contributing factor to rollovers.



- Indicates (repeatedly) that any rollover risk can be simply and effectively controlled by “active riding”.

- Data on the impact of active riding is very weak & this cannot be used to dismiss establishing a lateral stability standard.
- Only the objective data can be relied upon in this study. Hence the actual benefit of active riding (in best case scenario) may be around 7% (max 20%) and is modest at best.
- From an agricultural perspective and use in related work contexts, while active riding:
  - “...can play an important part in extreme maneuvers, (but) its importance should not be over-emphasized for normal occupational use.” (Stevenson, 1998)

1. How much of an impact does “active riding” really have on stability? **MODEST AT BEST ~ 10%**
2. Is this really at a level that means a lateral stability standard cannot be applied to a quad? **NO**
3. Even if active riding is a considerable influence on stability, will not a more stable vehicle in the first place, still mean fewer rollovers (and potentially ejections)? **UNDOUBTEDLY**
4. Will the industry try to counter any moves on a lateral stability standard? **UNDOUBTEDLY**



- › Manufacturers' will continue to espouse "active riding" as a reason not to improve the safety of these vehicles & to dismiss a lateral stability standard
- › They will not be led, they will need significant prodding

