

LOG OF MEETING
DIRECTORATE FOR ENGINEERING SCIENCES WITH PORTIONS REMOVED

SUBJECT: Recreational Off-Highway Vehicles (ROVs) – Meeting requested by the Outdoor Power Equipment Institute (OPEI) to discuss static and dynamic testing of ROVs.

DATE OF MEETING: March 4, 2010

PLACE OF MEETING: U.S. Consumer Product Safety Commission, Bethesda, MD

LOG ENTRY SOURCE: Caroleene Paul, ESME *CP*

COMMISSION ATTENDEES: See attached attendance list

NON-COMMISSION ATTENDEES: See attached attendance list

SUMMARY OF MEETING:

Representatives of the Outdoor Power Equipment Institute (OPEI) ANSI B71.9 Committee met with CPSC staff to discuss Multipurpose Off-Highway Utility Vehicles (MOHUV). OPEI presented an overview of the development of their standard for MOHUVs and presented technical data on their testing of vehicles (see attached presentation). The data included static stability, tilt table tests, and vehicle handling characteristics.

CPSC staff questioned OPEI representatives on their thoughts on occupant retention and protection. MOHUV manufacturers have performed some occupant protection tests and the current consensus is that the development of a performance requirement would be complex due to repeatability issues with test methods.

CPSC staff thanked OPEI for their presentation and their technical approach to the issues.

MEETING ATTENDANCE RECORD
ROHVA / CPSC Staff – December 9, 2009

COMMISSION ATTENDEES:

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OPEI/ANSI B71.9 Committee Presentation to CPSC

4 March 2010

ANSI B71.9 Multipurpose Off-Highway Utility Vehicles (MOHUV)

- Outdoor Power Equipment Institute (OPEI) is an ANSI accredited standards development organization.
- Representation from the following companies:
 - Ariens
 - Club Car
 - Honda
 - Kawasaki
 - MTD Products
 - Toro
 - Bush Hog
 - Husqvarna
 - John Deere
 - Kubota
 - Textron
 - Yamaha

Current Draft Definition of MOHUV

- A MOHUV is a vehicle:
 - Intended to transport persons and/or cargo, with a top speed in excess of 25 MPH (40.2 km/h) but not more than 50 MPH (80.4 km/h)
 - Designated seating for two or more occupants
 - With a non-straddle seat
 - 80 in (2030 mm) or less in overall width
 - Designed to travel on four or more wheels
 - Using a steering wheel for steering control
 - With a Gross Vehicle Weight Rating of no more than 4000 lbs (1814 kg)
 - 350 lbs minimum cargo capacity

Usage and Design Trade Offs

Utility Use

Recreation Use

Usage Trade Off



Design Trade Off

Stability

Mobility

Recent Developments

- Draft MOHUV standard sent to canvass in October, 2008
- R & D - test data
- CPSC ANPR released
- Accident information availability (IDIs)

Items Discussed By Committee

- Definition of a MOHUV
- Accident info and recently released IDIs
- Handling characteristics testing
- Static Stability testing
- Occupant protection
- Features related to intended use

CPSC IDIs

- Observations from IDIs
 - Failure to use seatbelts
 - Vehicle load configuration (occupants/cargo)
 - Occupants not in designated seats
 - Most did not involve vehicles while being used for work
 - Underage drivers
 - Alcohol & drug use
 - Improper use
 - Use on public roads
- Limitations of the data
- Availability of other data
 - Ex. NEISS

Test Data Reviewed

- Handling characteristics test
- CG location and track width measurement
 - Used to calculate K_{st}
- Tilt table in various load conditions

Note: Data shown in this presentation based on testing from SEA, Ltd.

Handling Characteristics Test

- Test procedure based on SAE J266
 - Vehicle driven around a constant radius at steadily increasing speed
 - Collected steering angle & lateral acceleration data
 - Plotted data to determine steer gradient
 - Ran for both loaded and unloaded condition

SAE J266: Steady-State Directional Control Test Procedures for Passenger Cars and Light Trucks.

CPSC Graph on Oversteer/Understeer

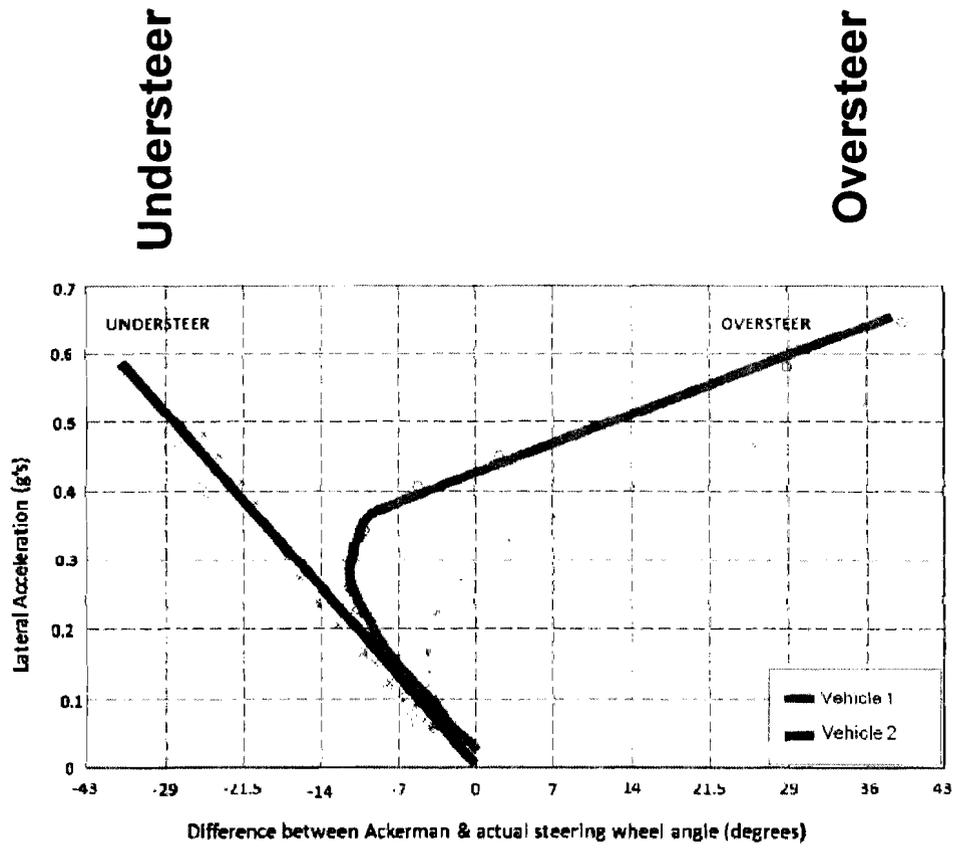
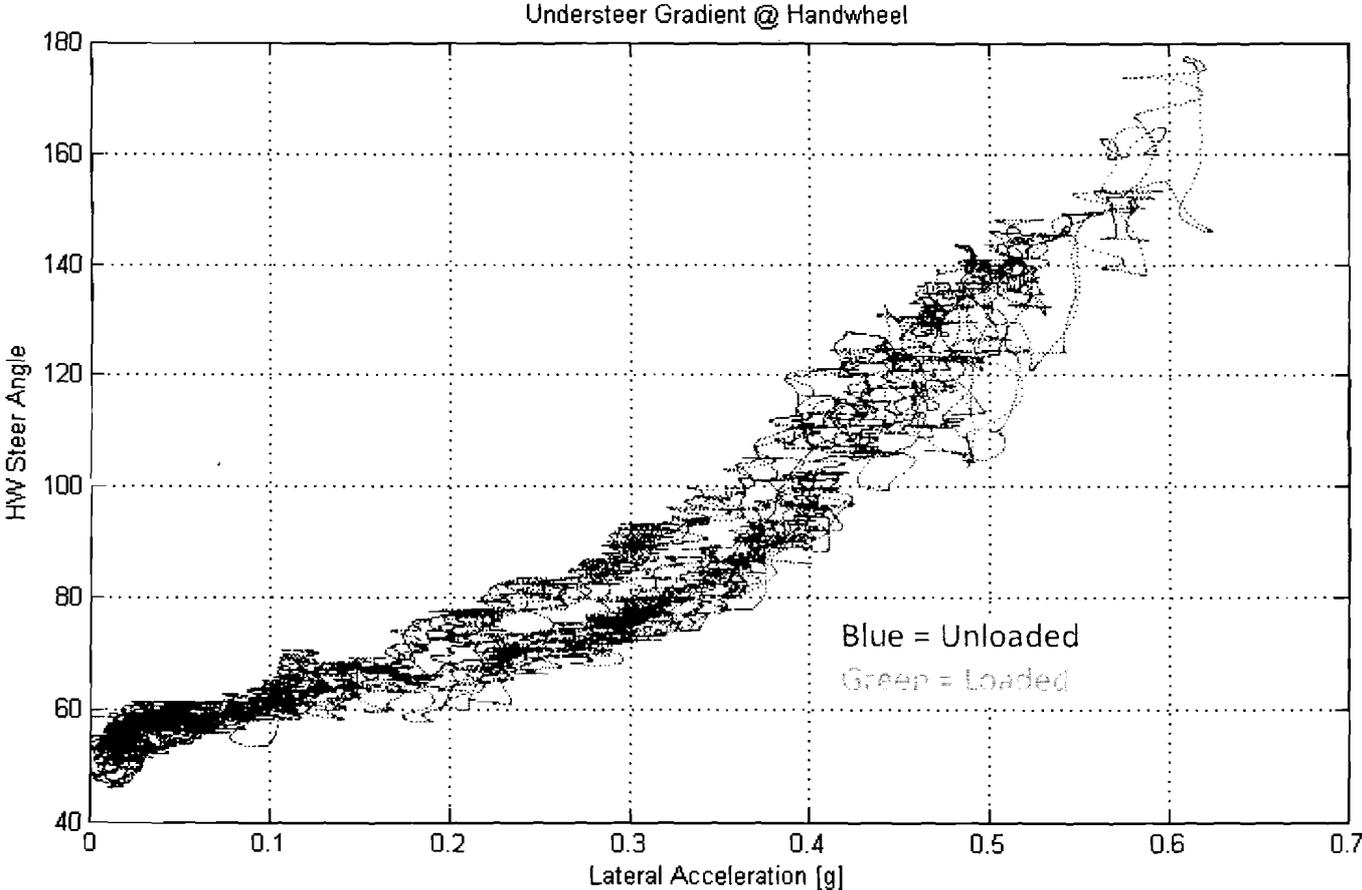
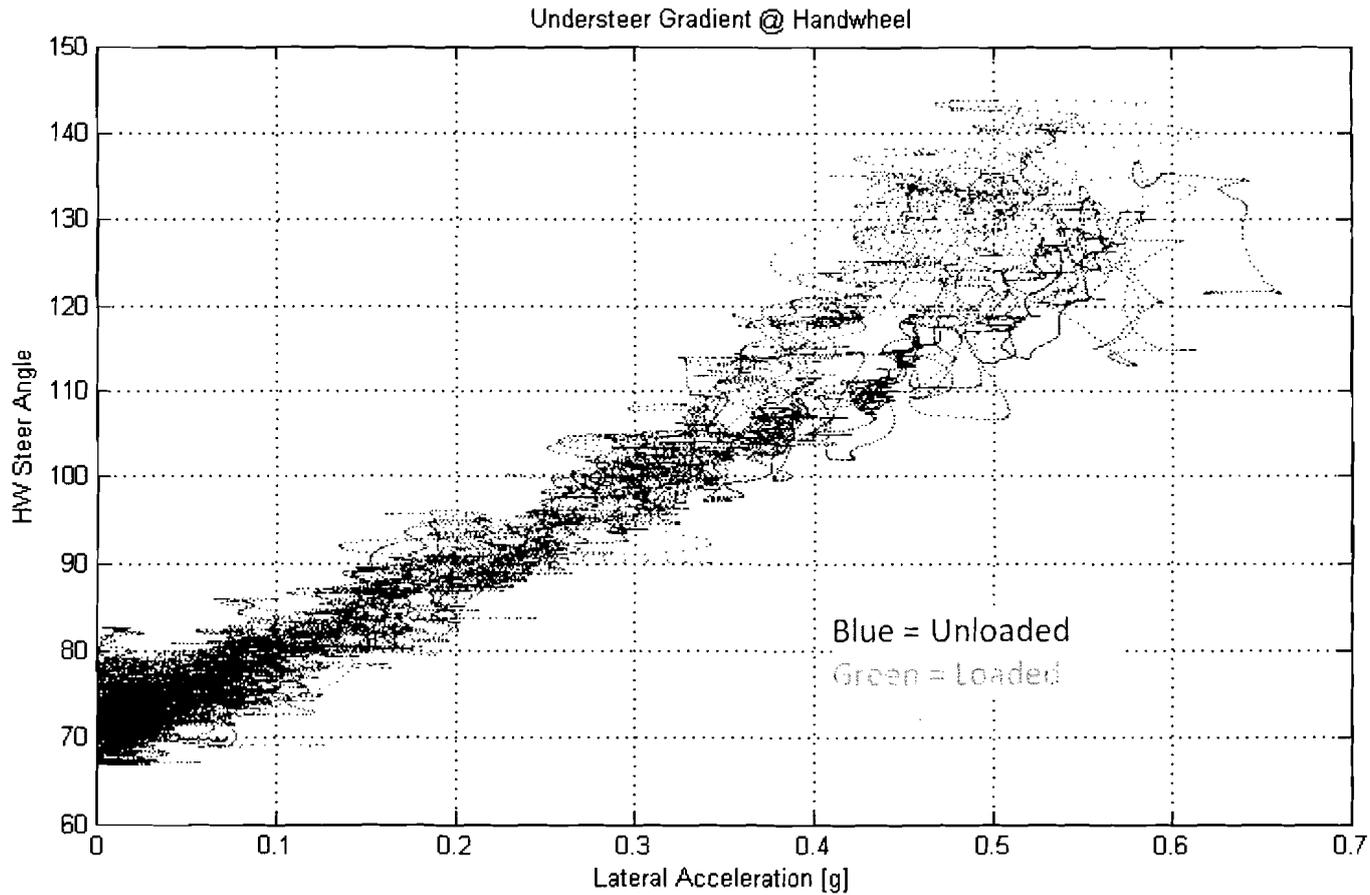


Figure 2. Handling Diagram for ROVs Tested by CPSC Staff

Constant Radius Test Unloaded vs. Loaded (Vehicle X)



Constant Radius Test Unloaded vs. Loaded (Vehicle Z)



Kst & SSF Definition

- Variables:
 - T = Vehicle average track width (center of tire to center of tire)
 - Tf = Vehicle front track width
 - Tr = Vehicle rear track width
 - H = Height of vehicle center of gravity (CG)
 - L = Vehicle wheelbase (center of rear axle to center of front axle)
 - L1 = Distance from front axle to vehicle CG (in horizontal direction)
- $SSF = T/2H$
- $Kst = ((Tf \times L) + (Tr - Tf) \times L1)/(2LH)$
- If $Tf = Tr$, then Kst equals SSF

Kst

- Developed by CPSC
- Deals with off-road vehicles (ATVs)
- Used as static stability criteria for 20 years
- Voluntarily agreed to by manufacturers
- Includes effects of different front vs. rear track width and CG fore/aft position

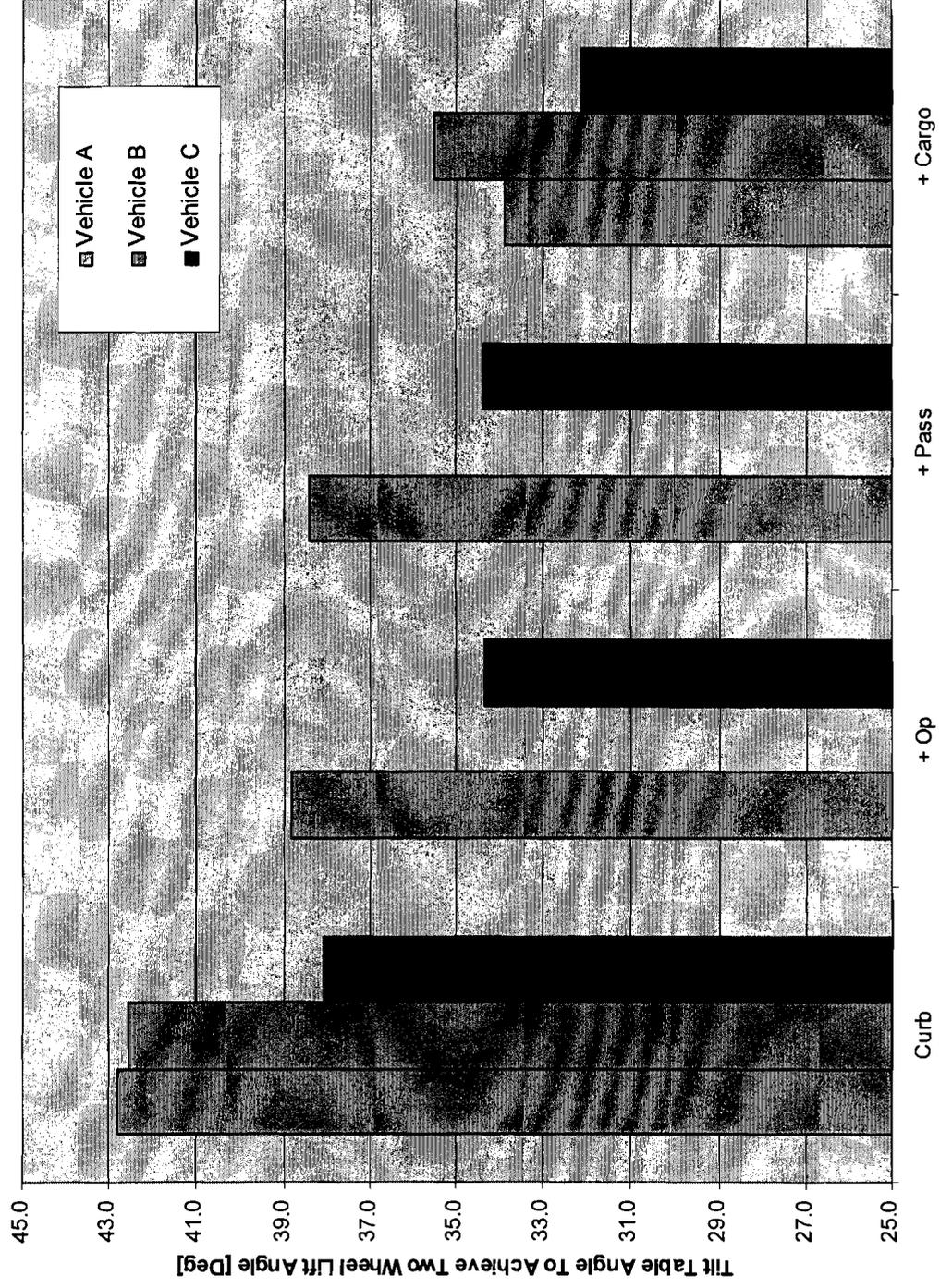
Note: Differences in CG measurement methodologies may yield different Kst results

SSF vs. Kst

	Curb		+ Op		+ Pass		+ Cargo	
	SSF	Kst	SSF	Kst	SSF	Kst	SSF	Kst
Vehicle A	1.12	1.12	1.06	1.06	1.02	1.02	0.96	0.96
Vehicle B	1.05	1.05	1.01	1.01	0.97	0.97	0.95	0.95
Vehicle C	1.02	1.02	0.97	0.98	0.97	0.97	0.93	0.93

Note: Operator and passenger are 215 lbs each (95th percentile male)

Comparison of Tilt Table Results



Vehicle Occupant Protection

- Currently in draft standard:
 - Occupant Protective System
 - Occupant Protective Structure (OPS)
 - Occupant Restraints
 - Handholds
- Other Committee Considerations
 - Warning light for seat belt use
 - Features related to intended use

Next Steps