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Research, Standards and Directives

- current research and future needs

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Research, Standards and Directives

- Review current research and future needs
- Consider implications of EC Directives and key standards work
- **Intend to discuss:-**
 - 1) Whole-body vibration on self-propelled forage harvesters
 - 2) Agricultural tractor – trailer braking
 - 3) Roll-over protective structure (ROPS) test criteria



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Whole-Body Vibration on Ag. Vehicles

- “Mechanical vibration that, when transmitted to the whole-body (when seated or standing), entails risks to worker health & safety”
- A recognised problem upon agricultural vehicles
- Regular, long-term WBV exposure has been shown to contribute to lower-back pain, but the precise risks are not well-defined
- Emission and daily exposure levels have been assessed on ag. tractors, S.P. sprayers & ATVs, but not upon self-propelled harvesters
- S.P. forage harvesters deemed likely to be a ‘worst case’



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WBV on Agricultural Vehicles





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WBV on Agricultural Vehicles





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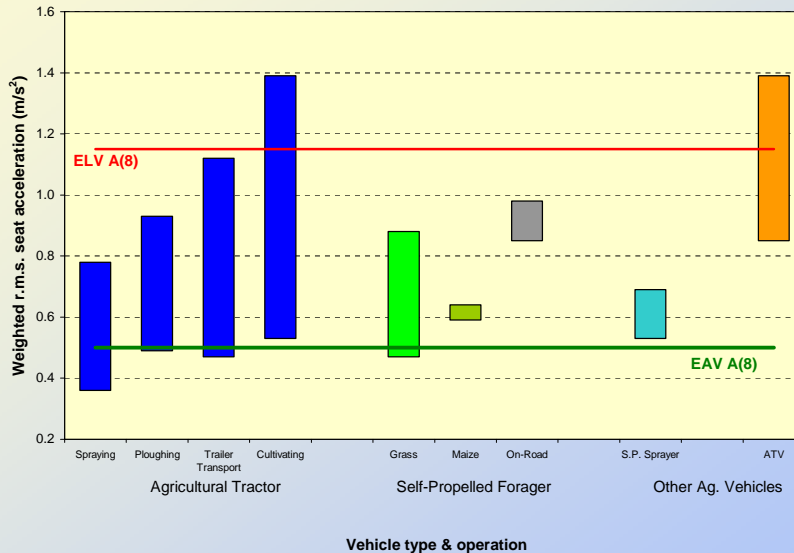
WBV on Self-Propelled Foragers



- 2nd Cut grass and maize silaging operations investigated



WBV on Self-Propelled Foragers



- ‘On-Road’ travel generates the highest levels but, overall, WBV is unlikely to be a great concern on s.p. foragers



PA(V)D Exposure Action & Limit Values

Exposure Action Value (EAV):-

- No strong evidence of health risk from exposure to WBV at or below the EAV
- If daily vibration exposure equals / exceeds the EAV:-
 - ➔ Must implement a programme of technical & organisational measures to minimise WBV exposure

Exposure Limit Value (ELV):-

- Must not be exceeded
- NOT a “safe” level of daily WBV exposure
- A high, undesirable exposure level to be avoided at all costs



Ag. Tractor – Trailer Braking

- “Safe On-Road, Safe Off-Road” an efficient vehicle braking system is a major contributory factor
- EC tractor & trailer braking requirement being revised:-
 - TRL commissioned by EC to undertake practical trials and revise the (76/432/EEC) ag. vehicle braking directive
 - Likely to become UK national requirement for new vehicles by ~ 2009
- Practical requirements include:-
 - Substantially greater trailer braking performance
 - Failsafe trailer brakes (upon accidental disconnection)
 - Trailer parking brake to be applied from tractor seat
 - Trailer & towed equipment braking systems be subject to Type Approval



Ag. Tractor – Trailer Braking

Problems to Resolve

- Legislation only applies to new equipment
- Braking performance of older trailers likely to be a problem (10 years before compliance is mandatory)
- Industry currently lobbying for ‘conventional’ : ‘fast’ tractor breakpoint to be 50 km/h (currently 40 km/h)
- Most tractor manufacturers now offer 50 km/h ‘Economy’ transmissions, but are they really driven at 40 km/h ?
- Current (legal GTW) tractor-trailer combinations generate 56% more energy when travelling at 50 km/h. Can older (ag. spec.) trailer braking systems cope?
- Ag. Spec drum brakes = 300mm x 90mm: ‘High-Speed’ brakes = 420mm x 180 mm





Ag. Tractor – Trailer Braking

Action Required

To ensure acceptable levels of Workplace safety:-

- Need to identify the extent of the problem
 - Can existing (in use) ag. trailers comply with forthcoming legislation?
 - What options available to enable existing equipment to operate safely
- Raise user awareness regarding:-
 - Economic & safety implications of selecting a trailer braking system of appropriate spec. at the time of purchase (especially given forthcoming legislation)
 - Need for regular maintenance of agricultural trailer braking systems
 - Ways to update existing trailers & towed equipment to meet the new regulations





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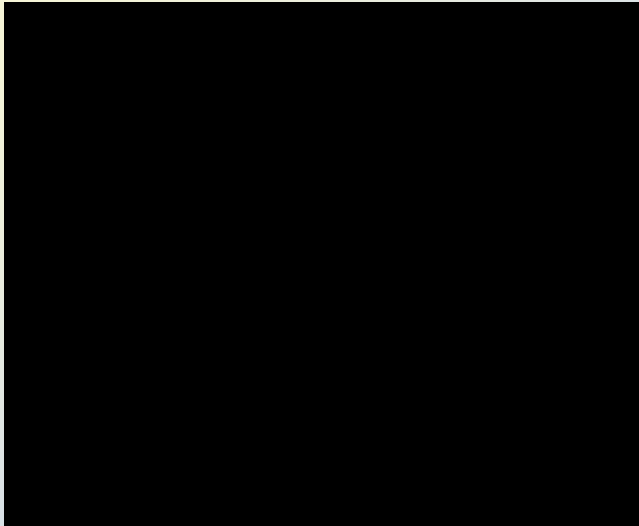
Roll-Over Protective Structure Testing (1)



- Early ROPS performance assessment & test method development



Roll-Over Protective Structure Testing (2)



- OECD 'dynamic' testing of safety cab & frame safety
- 'Rear impact', 'side impact' and 'vertical crush'
- Gradual 'static' load application methods used today



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Roll-Over Protective Structure Testing (3)



- Detailed simulation & measurement of tractor roll-over behaviour
- Supported development of 'static' ROPS testing methods used today



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Roll-Over Protective Structure Testing (4)



- 'Static' ROPS testing facility used today for testing vehicle ROPS to EC, OECD, ISO & SAE standards



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Ag. Tractor ROPS Test Criteria



- Recent catastrophic ROPS failure during overturn caused fatality
- An isolated incident or an indication of an underlying problem?
- Tractor ballasted to 7590kg excl. 2600kg brush-cutter. Unladen mass = 4050kg
- ROPS test reference mass (manufacturer selected) = 5600kg
- Determines strain energy levels ROPS must absorb during (EC/OECD) approval testing
- Can be as low as the unladen mass



Ag. Tractor ROPS Test Criteria

- Have changes in tractor design, engine power, linkage lift capacity and usage changed the typical unladen : max. permissible mass relationship over last 15 years?
- Modern tractor max permissible mass can frequently approach ULW + 60-80%
- Do current ROPS test criteria, based upon unladen mass (& less implement mass) continue to provide an adequate factor of safety to accommodate significantly higher max permissible masses?
- Does accident evidence exist to corroborate this suspicion?
- Is it appropriate to:-
 - Increase tractor ROPS test reference masses?
 - Limit tractor maximum permissible masses?
 - Tighten ROPS test criteria / requirements?
- Research urgently required to:-
 - Identify roll-over accident trends (if any);
 - Determine adequacy of current ROPS test criteria;
 - Identify tractor operational limitations (if necessary)