



Embedding ergonomic issues into the Delegated Acts for agricultural and forestry vehicles

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**ETUI Seminar
4 March 2013
Brussels**



Why am I here?

- Under the proposed new regulatory framework for the **type approval of agricultural and forestry vehicles** in Europe, various existing Directives are to be repealed and replaced with a smaller number of “**Delegated Acts**”.
- The **Annexes to the Delegated Acts will set out the detailed technical requirements and performance specifications** that agricultural and forestry vehicles must comply with.

- Those detailed technical requirements shall be such as **to increase or at least maintain the level of occupational safety provided for by the existing Directives, taking into account ergonomics**, including:

- protection against foreseeable misuse,
 - usability of control systems,
 - accessibility of controls to avoid their unintentional activation,
 - adaptation of the person/vehicle interface to the foreseeable characteristics of the driver,
 - vibrations
 - operator intervention.
- (Article 8)**

- The European Commission have appointed the UK’s Transport Research Laboratory, **TRL to analyse various safety topics and define appropriate performance specifications and test requirements.**
- Project started October 2012, ends **May 2013**

Why is ergonomics of interest?

- **A win-win:**

*“Good Ergonomics = Comfort, **Safety**, and Productivity, therefore Good Ergonomics = **Profitability**”*

*“In order to ensure a successful outcome it is important to understand both the **physical and cognitive** ergonomics of the system”*

- **But, a complex and rapidly evolving discipline:**

“The most pressing issue in off-highway ergonomics today is cognitive rather than physical in nature.

As feature sets expand, operators are presented with ever more information regarding system performance...The challenge for today’s product ergonomists is regulating information to that which is necessary to complete the task at hand and presenting it in a cohesive, usable format.”

W. Kyle Dooley, Ergonomics Centre of Excellence, CNH, ASABE Distinguished Lecture Series, February 2012



What am I interested in?

TRL topics	EC topics	
<ul style="list-style-type: none"> • ROPS for T/C3 & T/C4.1 • FOPS • Batteries • Fire safety • Stability • Vehicle structure integrity • Speed limitation via ECU • Devices to prevent unauthorised use • Electrical safety • Tyres • Spray-suppression 	<ul style="list-style-type: none"> • Noise • Protection of drive components • Seat-belt anchorages • Cab ventilation & filtration • Speedometer • Glazing • Lighting • EMC • Audible warning device • Tracks 	<ul style="list-style-type: none"> • Registration plate, statutory plate & marking • Masses & dimensions • Fuel tank • Rear protective structures • Lateral protection • Load platforms • Towing devices • Reverse gear • Vehicle exterior & accessories

- **Foldable ROPS**
- **Operating space, access to driving position**
- **OPS**
- **Controls, including emergency & automatic stop devices**
- **Mechanical hazards, including uncontrolled movement**
- **Guards & protective devices**
- **Information, warnings & markings**
- **Materials & products**
- **Driver information systems**
- **Heating systems**

- **Passenger seats**
- **Driving seat & position**
- **PTOs**
- **Safety belts**
- **Emergency exit**
- **Mechanical couplings**

- **Operators manual**
- **Steering**
- **Field of vision**
- **Mirrors**
- **Vehicle occupant protection**

Relevant to ergonomics?

What am I asking for, and why?

Question 1. Do you agree that the highlighted topics are relevant to ergonomics?

- *The Commission need to be sure that they're fulfilling their mandate and "taking into account ergonomics" wherever they should*

Question 2. Do you have any views on the adequacy of the existing Directives for agricultural or forestry vehicles in the relevant areas?

- *If existing Directives are already adequately taking ergonomics into account, we don't need to propose any changes*
- *But if not, we need evidence to justify new requirements*

Question 3. Are there existing additional codes, standards or other sources of technical (ergonomic) requirements that could be applied, and that would be likely to increase the level of occupational safety provided?

- *We can't develop detailed new test procedures or requirements, so can only propose changes if suitable standards exist and can be used or readily adapted*
- *We rely on you to tell us what's out there!*

How can you help?

- By responding to the **questionnaire** distributed before the event
 - Only one response thus far, but it's not too late!
- By **speaking up today or tomorrow**, raising any particular issues you think are relevant and contributing to an open discussion
 - On one or other of the following specific questions
 - Or on any other pertinent matter
- By **speaking to me** (or Dr Andy Scarlett) during the coffee break, this evening or tomorrow
- By **emailing me** over the next few weeks



Specific Questions...Folding ROPS

- Can be fitted to any category of tractor
- Intended only to permit operation in areas of restricted headroom
- Also fitted to 'medium'-sized tractors
- Test procedures / requirements are well-established
- Appears to be a problem 'in-use'
- **ROPS often stay in the 'folded' position & do not protect the operator**



- Are there practical / ergonomic issues with the physical effort required to fold / re-erect the ROPS?
- Or is it a simple operator failure to bother re-erecting the ROPS due to the needs of local operating conditions?
- How can the operator be encouraged to re-erect the ROPS?
 - **What are the options?**

Folding ROPS – possible options

- Need to ensure 'folding' ROPS provide operator protection in as many operating conditions as physically-possible
- Not acceptable for ROPS to remain folded-down in situations when they could be re-erected and provide operator protection
- **Need either to:-**
 - **Improve the convenience of ROPS folding / re-erection**
 - Remove the need to fold the ROPS
- Possible options include:-
 - Passive system to assist operator in manual folding / re-erection of the ROPS
 - **Active (*powered*) system to fold/ re-erect/ lock the ROPS on command**
 - Active (*powered*) system to automatically-erect / lock the ROPS under certain local conditions (*e.g. excessive side-slope*)
 - Provide low-profile, non-folding ROPS which automatically deploys during a roll-over event (*e.g. AutoROPS*)



Object Protective Structures - OPS

- Intended to protect operator against flying / penetrating objects
- 2010/52/EU cites ISO 8084:2003 forestry vehicle performance requirement
 - Only need meet the requirement **if provided**
- If used in forestry applications, 2010/52/EU requires tractor operators manual to provide information re.
 - Possible hazards
 - Optional equipment /guarding available
 - How / where to mount such guards
 - Level of FOPS protection provided
- **Is this sufficient for the risk?**
 - Probably?
 - Operators tend to install the protective devices needed to suit the application / implements being used
 - **Is there a case for any specific vehicle categories to be required to have OPS?**



Other specific questions...

- **Emergency & automatic stop devices, and uncontrolled movements**
 - Existing requirements seem inadequate in that devices can be and are over-ridden
 - Vehicles are used without operator in cab and falling objects/dogs activate controls
 - OPC systems are difficult to implement, but **what other options exist for improved safety?**
 - **What about autonomous driving systems?**
- **Access to driving position**
 - **Are existing requirements ok for preventing slips, trips and falls, e.g. from wide tractors?**
- **Materials & products**
 - **Are cab interior materials adequately designed to cushion the operator in the event of a roll-over or impact?**
- **Extreme temperatures**
 - **Should “hot” and “extreme temperature” be defined more closely, e.g. by ISO 13732-1?**
- **Vibrations**
 - **Are vibrations coming from the seat adequately dealt with?**
 - **What about other sources, e.g. the steering wheel?**
- **Driver characteristics**
 - **Do existing designs adequately cater for all drivers – young & old, tall & short, male & female, skinny and not-so-skinny?**
 - **Should they?**

Thank you!

ETUI seminar, Brussels, 4 March 2013

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