International Standards and Product Globalization
“we’re not in Kansas anymore”

Club of Bologna
11 November 2013

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Introduction

- Global consolidation of agricultural machinery producers over the last 20 years has changed product development from region specific to a more global approach.
- Machinery producers now need to understand the regulatory compliance requirements in all the markets a machine may be sold during the planning stages of product development.
- When a product designer is confronted with meeting the conflicting requirements in these markets, managers might expect a look similar to this:
Introduction

Toto, I've got a feeling we're not in Kansas anymore

QuotesPics.com
Introduction

North America is trending away from developing and relying on national standards in favor of adoption of international standards because of:

- Increase in global information exchange opens global markets
- Larger, more productive agricultural machines produced in lower numbers encourages fewer variants
- Low government regulation and aggressive tort law drive common safety features across markets
Introduction

Examples in areas of standardization important to agricultural machines:

- General safety standards e.g. lighting and marking, visibility, braking, etc.
- ROPS: SAE, OECD, ISO, EN, ASABE, OSHA
- Safety of Electronic Control Systems: ISO 25119, EN 16590
- Testing and performance standards: communication to the market
- Off-road diesel exhaust emission regulations
- Future areas of standardization: Sustainability, Safety of Highly Automated Agricultural Machines, etc.
General Safety Standards

- In the U.S., ANSI/ASAE S318 is the current national standard that addresses the safety requirements of agricultural tractors and machines. Unless otherwise specified, it requires compliance with:
  - ISO 4254 series, Agricultural machinery—Safety
  - ISO 26322 series, Tractors for agriculture and forestry—Safety
- These are voluntary consensus standards not regulations or laws
- However, failure to conform to these standards is difficult to defend
General Safety Standards

- ISO 4254 series are being adopted directly or with deviations by at least:
  - EU (EN ISO 4254): conforms with Machinery Directive
  - USA
  - Canada
  - Russia / CIS
  - Australia
  - China

- Scope limitations are important:

  “This part of ISO 4254 is not applicable to hazards related to periodic service, machine conversion and repairs intended to be carried out by professional service personnel, environmental hazards, road safety (e.g. steering, braking), or to the power take-off (PTO) drive shaft; neither is it applicable to guards of moving parts for power transmission except for strength requirements for guards and barriers”
General Safety Standards

- For Tractors and the road safety aspects of trailers and towed machinery in Europe, EU Directive 2003/37/EC Type Approval and the single directives below it apply currently.

- Requirements in ISO 26322 are harmonized with like requirements in the EU Type Approval:
  - Two documents, possible interpretation/update issues
  - Type approval used inside EU, ISO 26322 used outside

- New regulation coming 167/2013: TMR
  - Initially a copy of tractor directives
  - Possible future transition to refer to EN ISO Standards, OECD Codes, UN ECE regulations
General Safety Standards

- Road Safety
  - ANSI/ASAE S279 Lighting and Marking is a legal requirement in North America for new machines
  - In the EU, member state laws specify requirements and EEC directives approximate the contents of these
  - ISO 16154 provides requirements for components and locations but only informs the variety of their use
### General Safety Standards

#### EEC requirements

<table>
<thead>
<tr>
<th>Device</th>
<th>Tractor</th>
<th>Self-propelled machine</th>
<th>Trailer, trailed or mounted implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dipped-beam headlamp</td>
<td>R</td>
<td>R</td>
<td>NP</td>
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<tr>
<td>Main-beam headlamp</td>
<td>O</td>
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<tr>
<td>Work lamp</td>
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<td>Reversing lamp</td>
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<tr>
<td>Front-position lamp</td>
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<tr>
<td>End-outline marker lamp</td>
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<tr>
<td>Stop lamp</td>
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<tr>
<td>Front direction indicator lamp</td>
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<tr>
<td>Hazard warning signal</td>
<td>R</td>
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<tr>
<td>Special warning lamp</td>
<td>O/R</td>
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<tr>
<td>Rear registration-plate lamp</td>
<td>R</td>
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<td>Front fog lamp</td>
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**R**—Required; **O**—Optional; **NP**—Not permitted; **NR**—No requirement

- **a** Colour shall be white for front facing devices.
- **b** Distance from outer edge shall be no greater than 400 mm.
- **c** Required if the distance between the outer edge of the towed vehicle and the outer edge of the position lamp of the towing vehicle exceeds 400 mm.
- **d** One required if width <1,20 m; two required if width > 1,20 m.
- **e** Not permitted if width <2,10 m; optional if width > 2,10 m.
- **f** Tractors and self-propelled machines designed to tow trailers shall have turn indicator tell-tale(s) to indicate trailer turn indicator operation.
- **g** Tell-tale for hazard warning shall be red.
- **h** Dependent on national regulations.
- **i** Shall have two different positions to provide indication of the operation of the turn or hazard warning signal.
- **j** Colour shall be amber.
- **k** Required only if the self-propelled machine is designed to tow a trailer or trailed implement.
- **l** Not less than 500 mm apart. This distance may be reduced to 400 mm if the overall width is less than 1,400 mm.
- **m** May be fitted on centre of wheel(s).
- **n** Required on vehicles > 2,55 m. wide.
- **o** Arrangement (see Directive 78/933/EEC, Appendix 3).

### North American requirements

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**R**—Required; **O**—Optional; **NP**—Not permitted

- **a** Required if the rear position lamp on the propelling machine is obtained.
- **b** If the corresponding lamp on the propelling machine is obtained.
- **c** Required if the width of the trailer, trailed or mounted equipment is greater than 3,70 m in road transport configuration, or the equipment extends more than 7,55 m to the rear of the hitch point, or the equipment extends more than 6,20 m to the right or left of the centre line of the right or left extremity of the propelling machine.
- **d** Required if the trailer, trailed or mounted equipment extends more than 1,20 m to the rear of the hitch point of the propelling machine, or of the equipment, including the front wheel(s), extends more than 1,20 m to the right or left of the centre line of the right or left extremity of the propelling machine.
- **e** Dependent on national regulations.
- **f** Arrangement (see Directive 78/933/EEC, Appendix 3).
Braking

- For Tractors, EU harmonized Directive 76/432/EEC, circa 1996, addresses up to 40 km/h
- Above 40 km/h, trailers, towed machinery, and self-propelled machinery requirements are defined by national type approvals
- New delegated act in TMR is being developed for braking of tractors, trailers, and towed machinery
- ISO 12933 (under development) also provides direction for tractors. Its development is on hold pending TMR
- In NA, ANSI/ASAE S365 defines requirements for all agricultural equipment
- Parking brake test requirements are 2.5 times higher in NA
Rollover Protection Systems (ROPS)

- ROPS is a true success story in improvement of product safety in the agricultural industry.
- For unspecialized tractors, ROPS requirements are technically similar worldwide.
- Regulations/laws that detail requirements vs. reference standards are difficult to update.

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<td>OECD</td>
<td>Code 3(196-)</td>
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ISO 25119, Safety-related parts of control systems, is a recently developed standard series dealing with the approach to the design and assessment of safety-relevant electrical and/or programmable electronic components used in tractors and agricultural machinery.

Did not start as a regional or national standard but began life directly as an international standard.

CEN created a parallel EN 16590 standard to meet needs to serve as a presumption of conformity for the machinery directive and possible reference in TMR.

TC23 SC19 WG8 created to update ISO 25119 and hopefully create a CEN harmonized EN ISO 25119.

Structural changes in ISO to increase speed of updates.
Testing and Performance Standards

- PTO, drawbar, and hydraulic power, hydraulic lift, and fuel consumption tests are all examples of standardized data that help farmers make informed buying decisions.
- Globally standardized information has fostered competition and driven improvements in desired features.
- Long standing standards need to keep up with changes in emphasis in the market, e.g. fuel economy vs. power.
Off-road Diesel Exhaust Emissions

- Europe, North America, and Japan currently have almost harmonized their regulations for non-road diesel engine exhaust emissions.

- Globally, there is general agreement on what each emission level’s requirements are and the fuels and testing to support those levels.

- Current emission levels in regulations and the timing of implementation of more stringent emission levels in important agricultural markets are far from harmonized.
Global Emissions Regulations.

Leading Emissions

- Dark Green

Lagging Emissions

- Light Green

- Green

*Projected or proposed nonroad emissions regulations may vary by horsepower rating and application.
Off-road Diesel Exhaust Emissions

- Stage IIIB and Stage IV technology engines have had a large effect on tractor and agricultural machine design.
- These engines and emissions equipment added significant cost to the product.
- Manufacturers have added new features and benefits to offset the costs of emission improvements.
- New dilemma: continue producing previous lower feature designs alongside new designs with the explosion of parts and logistics that creates; or re-certify de-tuned new designs at higher emission levels.
- Harmonization of the implementation timing of a global standard is important to reduce variation.
Future Areas of Standardization

- Sustainability (ISO CD 17989-1): This standard focuses on three performance indicators of sustainability: economic, environmental, and social in the design, development, and production of agricultural machinery.
- This is a standard that will be designed to encourage continual improvement.
- ISO WD 18497, Highly Automated Agricultural Machine Safety: involves safety aspects of agricultural machines that can operate without an operator present.
- Properly developed, this guidance will not only be useful to developers of these machines but also help define the regulations that will undoubtedly arise in this area.
Future Areas of Standardization
Conclusions

- Scope of a standard is an important device that can at best define the limits and breadth of the standard and at worst be used to carve out regional exceptions to harmonization.
- The more exceptions and deviations a standard has, the more variations are created, and the more explanations that are required to an uninformed judge or jury.
- If a standard competes with regulations, its usefulness is maintained only as long as harmonization is maintained.
- Differences in implementation timing between markets can affect true product commonality and market barriers.
- The communication revolution has provided the tools needed to engage global stakeholders in standards development and to more readily maintain and develop relevant global standards.
Acknowledgements


[5] ISO 26322 (all parts), Tractors for agriculture and forestry—Safety, ISO, Geneva, Switzerland


Acknowledgements


THANK YOU