Safe Habitus

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TECHNICAL NOTE 9

Germany

Making tractor seat belt use easy and routine

Tractors in agriculture

The tractor is the most important machine in agriculture. It is used universally in almost all areas of agriculture and in all seasons, with numerous attachments and implements for sowing, harvesting and soil cultivation.

The use of tractors and machinery primarily increases efficiency and is therefore highly valued in agriculture. As a result, its use is continuously increasing, especially in light of rising labour costs and labour shortages. As an unintended but welcome effect in the wake of this development, occupational safety is also being improved through the increased use of technology. This is reflected in EU Occupational Safety Directive 89/391/EEC (known as the 'Framework Directive on Occupational Safety'), which stipulates that technical measures for occupational safety take precedence over personal measures.

Looking at market developments, it is clear that tractors are becoming larger, more powerful, faster and also more comfortable. Fully glazed, soundproofed driver's cabs quickly became popular in the mid/late 1970s and were de facto standard equipment in new standard tractors in Western Europe in the 1980s. Since the 2000s, the unladen weight of tractors has ranged from 6 to 10 (or even 12) tonnes. The average engine power of newly registered standard tractors in Europe has also continued to rise, reaching ~169 hp in 2024 (CEMA, 2025).

The development of these larger, heavier and more powerful tractors also requires appropriate technical safety measures. This Technical note describes the safety challenges surrounding tractor seat belts.

Tractor roll-over safety – history and applicable regulations

A milestone in reducing fatal tractor accidents was reached with the introduction of ROPS in the early 1970s. Until 1970, approximately 200 people died each year as a result of tractors overturning and rolling. Thanks to the joint efforts of politicians, industry and accident insurance providers, the mandatory installation of rollover protection structures (ROPS) on new tractors was introduced in Germany in 1970. From 1975 to 1977, it was then mandatory for all tractors in use to be retrofitted with rollover protection structures. The introduction of rollover protection structures on tractors reduced the number of annual fatalities caused by tractor rollovers by well over 90 per cent between 1969 and 2010 (Schauer, 2012). From 1977 to 1987, EEC directives followed, harmonising ROPS requirements for different types of tractors (77/536/EEC; 79/622/EEC; 86/298/EEC; 87/402/EEC).

Germany

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Closed tractor cabs introduced in the 1980s provided significantly better protection for drivers. In addition to protection from the weather, noise and vibration reduction was now also possible. With regard to noise, this began in 1977 with binding EU limits for the noise level perceived by the driver in tractors (EEC Directive 77/311/EEC) and continues with the currently applicable OECD Code 5. The application of and protection against harmful whole-body vibration is regulated on the machine side in Directive 2002/44/EC, which must be supplemented by further employer measures (Directives 2003/10/EC, 2002/44/EC).

The seat belt as a live-saving device

If, in the event of a rollover, the tractor with ROPS remained on its side and did not overturn, the driver could still be thrown from the seat and out of the cab, resulting in serious injury (Image 1). One of the first ROPS (rollover protection) studies was conducted in 1956 at the University of California at Davis. This study laid the foundation for the principle of 'ROPS + seat belt keeps the driver in the protective space' to prevent painful injury in the event of a rollover (Murphy, D.-J., 2022).

Image 1: The ROPS is only effective when the seat belt is fastened - Used with permission

Safety requirements for tractors with regard to seat belts

Experts continue to identify the life-saving importance of using seat belts (Luger, E., 2020). Despite the scientific consensus, it took over 60 years (new tractors without seat belts were still permitted until 31 December 2018) for seat belts to become mandatory in all new tractors. Unfortunately, in reality, drivers do not always use the seat belts available on tractors. Unlike in cars and lorries, where seat belt use in Germany is over 95% in cars and well over 80% in lorries (Federal Highway Research Institute, 2020), this is generally not the case for tractor use (Image 2).

Image 2: Unfortunately, wearing a seatbelt when travelling on a tractor is the exception rather than the rule - Used with permission

There are no clear academic results on seat belt use rates in tractors due to a lack of studies on this topic, but there are numerous indications that point to a low usage rate (German Insurance Association, 2023). The Social Insurance for Agriculture, Forestry and Horticulture (SVLFG) comes to similar conclusions, stating: 'Although lap belts are now standard equipment in modern tractors, many drivers do not use them' (Social Insurance for Agriculture, Forestry and Horticulture, 2020).

This finding was the reason for including the topic of 'tractor seat belts' in the German needs register: This report illustrates how supposedly simple and clearly defined topics can be quite complex and problematic from the perspective of situational and behavioural prevention. With this in mind, possibilities for improvement from a technical and personal perspective will be explored. The question of why seat belts are not equally common in tractors as they are in cars will also be examined. This report explores what can be done to create positive incentives for wearing seat belts on tractors?

Interviews with farmers, farming network and safety experts

Farmers who use tractors in their daily work were interviewed in semi-structured interviews. The aim of the farmer survey was to find out how important seat belts are in everyday work and what is needed to make wearing a seat belt in tractors as common a behaviour as in cars.

The head of the Agrarscouts network is a member of the German CoP. The network comprises young farmers who act as multipliers in society with the aim of providing authentic insights into everyday agricultural life, promoting dialogue with the public and thus conveying a realistic picture of modern agriculture. A survey of the network was also conducted via Instagram.

In addition, two safety experts who deal with the topic of seat belts on tractors from a technical perspective and with current developments were interviewed in personal meetings. The safety experts were interviewed on technical issues, the current state of development and where there is room for improvement in order to increase the use of seat belts on tractors.

The scope and additional information on the surveys can be summarised as follows:

- Framers: 5 participants, 2 female, 3 male, aged between 32 and 54 years, online, written notes
- Agrarscouts: 64 participants, survey on Instagram poll, digital images
- Safety experts: 2 participant, 2 male, 41 and 59, mechanical and agricultural engineers, personal meeting, written notes

Questions for the three focus groups

Questions for the selected farmers and the Agrarscouts network:

1. What comes to mind when you think of seat belts in tractors? Name three terms that spontaneously come to mind.
2. How do you use your seat belt (how often, when)?
3. It is an open secret that seat belts are not widely used in tractors, unlike in cars. What would it take for you to use your seat belt in a tractor as you would in a car?
4. How would you describe the comfort of the seat belt in a tractor? What do you find particularly good or particularly bad?
5. If there were a subsidy for retrofitting tractors with more comfortable belts, would you take advantage of it? Or would a comfortable restraint system be a factor in your purchase decision?

Questions for the two safety experts:

1. The seat belt in the tractor, together with the ROPS, should be seen as a technical protection system for the driver because...?
2. Why has so much time passed between the realisation that a seat belt in the tractor significantly increases safety and the implementation of seat belts as standard in tractors?
3. How do you assess the current situation regarding seat belts in tractors?
4. Where is there currently a need for action on the part of the regulatory authorities?
5. How do manufacturers view the issue of seat belts in their products?
6. Are there other industries that have the same problems or are already further ahead??

Findings of farmers surveyed

The findings of the five farmers revealed that seat belts in tractors are rarely used and are generally considered to be a hindrance. Although there is an awareness of potential dangers such as accidents or rollovers, the decision to wear a seat belt is largely influenced by practical everyday working conditions. In field operations, where constant movement, turning around to the attached machine or accessing controls are necessary, the seat belt is almost never used. On the road, however, especially at higher speeds or on longer journeys, it is occasionally worn – however, this remains the exception, which indicates a lack of situational awareness in terms of safety perception.

The reasons for the low acceptance rate also lie in the design of the lap belt. It significantly restricts freedom of movement, becomes too tight during frequent movements in the tractor and increases physical strain such as back pain. In addition, the repeated effort of fastening and unfastening the belt in the vicinity of the farm or on short trips to the fields is perceived as impractical and annoying. The only positive aspect highlighted was the safety aspect in relation to children, who are consistently strapped in by the respondents. Otherwise, negative assessments predominate, which are the result of selective safety awareness and perceived shortcomings in practicality.

Financial incentives or retrofit systems were considered by respondents to be better, but not sufficient, as long as the seat belt restricts the flow of work. Instead, it was repeatedly emphasised that only technical enforcement systems – such as acoustic warning signals or the blocking of driving functions – could lead to more consistent use.

In summary, it is clear that acceptance of seat belts in tractors depends not only on individual safety awareness but also, in particular, on the lack of practicality of current belt systems. This applies regardless of age or gender. In order to achieve regular use, belt systems would have to be developed that offer safety without restricting the freedom of movement necessary for agricultural work. Only with such an approach would a greater willingness to use seat belts consistently be realistic.

Findigs of Instagram poll by the Agrarscouts network

On 10 September 2025, the Agrarscouts network, in cooperation with the German SafeHabitus CoP, conducted a survey on Instagram on the topic of 'Seat belts in tractors'.

The results show a clear conflict between safety awareness and actual behaviour. When asked about spontaneous associations with seat belts in tractors, respondents cited both positive terms such as 'important' and 'essential' and negative attributes such as 'useless', "annoying" and 'disregarded' (Image 3). The majority of respondents (83%, n=64) stated that they never fasten their seat belts, while only 3% always do so. The perceived comfort of the belts is also predominantly negative: 84% of participants (n=50) rate it as a 'flop'. The free-text responses make it clear that various conditions would have to be met for regular use, including a better fit, greater awareness of the possible consequences of accidents, or technical measures such as acoustic warning signals. Another aspect concerns willingness to invest: even if more comfortable belts were available, 53% of respondents (n=32) do not see this as a relevant reason to buy them; 34% would only upgrade with a subsidy, and only 12% considered this an incentive to buy on its own.

Summary of farmers' and Agrarscouts' views

In summary, the survey of farmers and Agrarscouts network show that the acceptance of seat belts in everyday agricultural work is low, even though their importance for safety is well recognised. There is a marked discrepancy between knowledge and action, which is exacerbated by a lack of comfort and incentives to use them. For future prevention strategies, this highlights the need to combine technical improvements to seat belts with greater awareness-raising. Only by addressing both ergonomic requirements and personal risk perception can a lasting change in usage behaviour be achieved.

Image 3: Word cloud of terms from open-ended responses (question 1 see above) with the Agrarscouts network and selected farmers:

Safety experts' view

The responses from safety experts show that the driver in the tractor cab is only sufficiently safe when wearing a lap belt, as this will keep them in their seat in the event of a rollover, preventing them from being thrown out of the cab, and will also keep them in the structural protection space (deflection limited volume, dlv) in the event of deformation of the cab.

In retrospect, the introduction of seat belts in tractors was delayed for a long time because tractors used to be smaller, slower and less dangerous, and accidents were largely accepted. With the introduction of rollover protection systems in the 1970s, this protection was initially considered sufficient, as seat belts also posed practical

problems in open cabs. It was only with growing safety awareness that the issue came into sharper focus. International standardisation processes and EU directives finally made seat belts mandatory, but this was a very lengthy process. Seat belts have been mandatory since 2016/2018, but are still rarely used by drivers today.

The current situation shows that, while seat belts are mandatory in new tractors, they are missing from many older vehicles that remain in use. Where belts are fitted, they are rarely used. They are usually simple lap belts, which provide only limited protection at today's road speeds. In addition, many drivers find them uncomfortable, as the common ALR retractors continually tighten the belt and greatly restrict freedom of movement. Better solutions, such as three-point belts or ELR retractors, are necessary to combine safety with day-to-day practicality.

At present, action is needed because the Tractors Regulation (EU) No 167/2013, unlike the new Machinery Regulation (EU) 2023/1230, sets only inadequate requirements for restraint systems. While the latter already provides for warning systems and restrictions in the event of non-use, such provisions are entirely absent for tractors. Moreover, only a lap belt is required, without specifying the belt type or taking ergonomic aspects into account, which severely limits acceptance and use. A revision and alignment of the Tractors Regulation to reflect current circumstances would therefore be necessary.

Manufacturers generally implement only the legal minimum requirements for seat belts and take their lead from customer preferences, which among farmers are low when it comes to belts. Only one premium-brand manufacturer fits superior ELR retractors, while other makers and imported products often offer only simple or rudimentary systems without a retractor. The passenger-car sector is the most advanced and should serve as a model for the EU type-approval of tractors. In construction machinery there is a comparable risk to the driver from rollovers. Because construction machinery falls directly under the Machinery Regulation, these machines will be equipped with better belt systems than tractors, which represents a worrying inconsistency in technical safety requirements.

Conclusions

Seat belts in tractors are an essential safety device for the driver, protecting them in the event of an accident. Manufacturers have been required since 2018 to equip tractors with a belt. Many older machines have no belt. Where belts are fitted, comfort is often poor because ALR retractors are installed instead of ELR retractors. Simple belts without a retractor are found especially on imported tractors. Farmers regard belts as bothersome, uncomfortable and unnecessary, which results in low rates of belt use. The causes of low belt use therefore have both a technical and a behavioural component, which interact negatively. Owing to the low use of belts, tractor drivers are not adequately protected in the event of an accident, as is repeatedly evident from relevant accident cases.

To improve the situation, and based on the findings identified here, we recommend the following measures:

- Raising awareness among farmers through targeted initiatives, information and campaigns (Image 4 and 5)
- A national or EU requirement to retrofit older tractors.
- Financial support for replacing inferior seat-belt systems with more comfortable ELR retractors.
- Harmonisation of the Tractors Regulation with the Machinery Regulation.
- Development of intelligent seat-belt systems for tractors that offer high comfort, incorporate a technical requirement for use (e.g., reminders/interlocks), and take agricultural workflows into account.

Image 4: Roll-up banner for an agricultural trade fair on tractor seat belts - Used with permission

Image 5: “Titling cab”: a technical rig designed to simulate a tractor rollover, allowing participants to experience the effectiveness of the seat belt - Used with permission

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