

Introduction.

In meeting three Mr Gunneriusson drew attention to a number of coupler failures in Sweden with the loss of the trailer from the tractor.

It is unclear if the failure was due to

- a) The mechanical failure of the coupling.
- b) Operator error.
- c) Failure of the safety latches to engage.

To militate against possible cause b and c, it is proposed that an indicator is in position in the field of vision of the driver to confirm if the system is fully locked or open. This is a logical step forward in further promoting safety,

The following paper is intended as a starting point for discussion.

Research problem statement.

How do we know if the coupling system is Fully locked or Open ?

“If the coupling is remote operated there must always be a remote Indication to indicate the open or closed position of the coupling in the field of vision of the driver”

Scope.

What coupler systems are needed to be covered in this proposal?

Discussion.

Construction industry.

Experience in the construction industry has been largely positive in this area and involved a process of collaboration between the Regulatory authorities, Machinery manufacturers and Attachment manufacturers. The process started in 2009 and is near completion. Due to geographical and time constraints the process involved two meetings per year.

The Role of the group was to identify solutions that were acceptable to each market from a number of perspectives including Health and Safety, Commercial, Product Functions and Design.

During the process the group considered the following.

- What was right for the industry and the respective markets?
- What was achievable ?
- What was cost effective?
- Release of patents for the common good .

What worked well ?

- Educating different jurisdictions on the types of systems in operation
- Consensus on existing problems
- Consensus on solutions for the different markets including an understanding of the market and safety needs in each jurisdiction.

Many people consider that the Construction industry is in many ways ahead of agriculture in health and safety however paradoxily it is largely self regulating and a Dynamic or static independent test is not required on the coupling.

Existing Systems

There are currently at least 12 coupler manufacturers' supplying many of leading OEM customers.

Many of them currently employ mechanical indicator systems on the primary and secondary latch systems. While some of these are in the field of vision others are not.

Reviewing current systems on the market, in the main the procedure to latch the hitch correctly is as follows.

- Couple the tow hook to the trailer eye
- Lift the trailer off the ground – 1 or 2 inches.
- Pull the hitch (cassette) in $\frac{3}{4}$ way.
- Fully lift and latch the hitch. – the release handle in the cab clearly indicates if the hitch is latched in or not due to its position (this may be further emphasised by additional notices in the cab next to the lever)

- The final part of the process is to further retract the cassette to its closed position, when the cassette is fully retracted a clearly audible click is heard to indicate to the operator that the cassette has been locked, further emphasis is placed on the operator to perform an in/out check on the hydraulics that control the cassette, this further indicates to the operator that the cassette is fully locked in.

Observations show – that the hitch release handle in the cab (if of a certain design- *this design and operation may need to be standardised in the interest of safety and conformance*) clearly indicates if the hitch is fully up and latched in the vertical position when performing the coupling operation.

Consideration must now be given to the extendible – push out feature – in latching this part a clearly audible click can be heard, this is followed up by a check with the hydraulics that the cassette cannot move.

Additional features can be added to the hydraulic cylinder to ensure there is no creep in the hydraulics (such as is used in the construction coupler) which will provide extra safety, additional features may need to be added by the tractor manufacturers such as diverter valves which shut off the supply to the pick up hitch when it is fully latched and also when not in use , this is currently employed in some manufacturers models and may need to be extended to all manufacturers and it could be suggested that the process is automated to improve safety.

In the context of failures in Sweden consideration must also be given to the various trailer breakaway systems and the use of safety chain systems, Some coupler systems already make it easy for the farmer to install such systems.

These systems may need to be critiqued further to establish what benefits they bring.

Introduction to the market.

Consideration must be given to the timing to introduce any technology to the market, Will it be introduced to new models of tractors from a stated date.

After sales tractors need to be considered.

- a) New tractors that might not have a factory fitted coupler but require one on delivery or at a future date.
 - a. Would it have to be the factory approved

- b. Would it discourage competition in this market
 - c. Could a separate control system be supplied in this instance (like in the construction industry)
- b) Older tractors – there is a sizeable after market for couplers for tractors that are not in current build – would these be exempt? Would it be cost prohibitive to provide such a system for these?

Integration

Possible options include the following,

- Integrate with the OEM VDU system
- Suppliers to provide own VDU system for OEM or after market fit.

Advantages.

- Indicate to the operator if the coupling system is open or closed.
- Provide an extra element of safety to the current systems.
- Add value to each product.

Possible implications and limitations

- Never truly give the operator time to cope with sudden catastrophic failure of the system
- The operator may become too dependant on the system and possibly not carry out recommended other safety checks.
- Wrong or false signals may be given to operator.
- Would the system be too difficult to maintain or would the operators simply switch of the system (do we need a lock out if the system is not working or has been turned off).

Maintenance of the systems.

In the context of the example in this report, maintenance of the proposed system may also be needed to broadened out to include servicing of the whole coupler and attachment coupling points. Consideration must also be given as to who is to carry out maintenance on the system.

Conclusion.

Emphasis on the group at this stage to draw conclusions.

Way Forward

1. As manufactures work together with the regulatory groups and OEMS to a Consensus on solutions for the different markets. (How long would this take and are there time constraints?)
2. Accept a broad frame work for the proposal (or the current proposal) and work with the different OEM manufacturers and jurisdictions separately on each individual proposal.
3. Optional with each jurisdiction and or market deciding to adopt the proposal or not.

End.