Digital Vehicle Handover in vehicle logistics

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ECG The Association of European Vehicle Logistics

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I. Introduction

The proliferation of digital vehicle handover (DVH) solutions (i.e. combination of hardware and/or software) is predicted for the Finished Vehicle Logistics (FVL) supply chain. With this recommendation ECG, representing the FVL sector, would like to make sure that the available solutions on the market are interoperable and able integrate the results of visual inspections. The recommendation is the outcome of an industry-wide project which ECG initiated in March 2021 and where LSPs, OEMs, claims handling specialists and also many providers of such vehicle handover technology participated.

The co-existence of visual and automated digital solutions is predicted for the near future in a 'hybrid model', due to the fact that some vehicle parts can't be inspected digitally (e.g. vehicle interior or the check for loose items), and that the digital handover solutions are still not widely used. They might not be taken up in smaller compounds or in dealerships, therefore the combination of hardware infrastructure and software products supplying supplementary handover data has to be envisaged, e.g. utilisation of tablets.

The first logical step that a dedicated ECG group took in the standardisation process was to work on the standard for the 'output' of the DVH tools, i.e. the images. These are very important elements as they serve as means for the retrospective review of vehicle status and the substantiation of damage liability. The images coming out of various solutions on the market (currently and in the future) shall be comparable in terms of quality, lighting and details, so that the vehicle's condition throughout the supply chain can be traced in a consistent and objective manner.

The proposed recommendation supposes a process in which the handover solutions are recording the vehicle status, but not identifying the damages themselves. Solutions using Automatic Damage Recognition (i.e. Artificial Intelligence, AI) are on the market already, mainly providing end-of-line inspection in car plants, where the vehicles are clean and are in a well-lit environment ideal for the damage recognition process. In the supply chain at the various handover locations obtaining such conditions is challenging and during the group's discussions it became apparent that this is a major challenge ahead of the deployment of the Automatic Damage Recognition technologies in Finished Vehicle Logistics.

Besides this, it was generally accepted that AI enabling Automatic Damage Recognition will not achieve sufficiently high levels of accuracy in the foreseeable future to directly replace visual inspection. Therefore, the group dedicated its time to the discussions to the solutions that propose a condition capture of the vehicle, as well as some basic principles on the hypothetical data sharing and visibility.

The vehicle condition capture could give a major efficiency benefit to LSPs and provide an easier claims handling process for the OEMs and their claims agents, therefore ECG sees the awareness raising on this as the most important next step of the project. The uptake of Digital Vehicle Handover solutions providing condition capture will be facilitated by the dedicated legal protocol, enclosed in Section IV, which was drafted by a transport lawyer and is free for anyone to use as an appendix or side-letter in a contract.

This recommendation focuses on cars and Light Commercial Vehicles. It was decided that the project covers not only new vehicles, but also used cars as the processes are very similar.

II. Output specifications

In any digital process the car needs to be identified and the digital record linked to the **VIN number**. This can happen by scanning the VIN label, having a picture on the label containing the full VIN, etc. Any data on the vehicle has to be stored in a manner where it can't be tampered with, i.e. it needs to be date and time stamped and contain the handover location.

Coverage of the vehicle:

- Digital exterior image documentation via vehicle handover device
  The following vehicle parts shall be included on the images:
  - All vehicle exterior panels at least once
  - Wheels & rims
  - Windows
  - Top view
- Interior images when necessary

Image colour:
Images shall be in colour, as opposed to black and white. But consideration has to be given to the fact that the system used for the handover process should allow for a method to identify dents and dings too which may be in black and white.

Zoom capability:
This feature means how many times one can zoom in on the photo without distortion of the content. There is no need to identify the zoom capability as long as the damage (scratch and dent/ding) of the defined minimum size is still visible. As an agreed standard people would expect to see any damage of a size of 1mm or above.

As technology evolves, even smaller damages will become visible on pictures after zooming in, but a minimum limit of transport damage has to be taken into account, i.e. even if a damage smaller than 1mm was identified, at this size it might not be classified as transport damage.

Image quality:
The standard doesn't provide a definition of this feature other than that the image shall be sharp and in focus. It is linked to the zoom capability: if the pre-defined minimum damage size can be identified on the picture it is of 'good quality'. The same logic has to be applied to dents as well.

The **underbody** inspection is not mandatory currently in vehicle distribution, but it might become a requirement throughout the supply chain, partly due to the proliferation of Electric Vehicles. Therefore it is a recommended good practice that any handover solution takes pictures of the underside of the vehicle.

As far as vehicle inspection locations are concerned, the **vehicle interior**, i.e. the driver's cockpit area, is usually inspected by a person. However, the same level of automation is not possible for taking images on this area as it is for the vehicle exterior. This is also the case with the **loose items** included in the vehicle. Some OEMs lock them up in the boot in a sealed bag. Carriers thus have to check whether the loose items are included in the vehicle, and checking for these items can only be done visually. Therefore, for these two areas, we can only propose ways to add images with an associated technology (e.g. smartphone) to the digital file containing the vehicle condition as part of the overall process.

III. Process description / IT aspects

If the vehicle handover is captured digitally, the image data should be shared forward with the vehicle through the supply chain. If AI is used at the handover point, the image data will also be shared forward but the AI-results will remain with the inspection data owner, unless otherwise agreed with the OEM.[1]

All image and AI data will be made visible to the OEM and their claims handler, who should use it to make an evidenced assessment of liability. After a specified period of time the raw data can be deleted. The intent here is to not increase the number of claims being made, but to ensure that liability is fairly apportioned.

This data should be handled securely and compliantly to ensure the correct parties have access but that all parties are protected, using blockchain or similar technology is recommended for this purpose. Any data, automated or not, can only be shared in agreement with the data owner.

Image data set:
The minimum data set generated via a DVH solution should include the following elements:

- Date of the inspection
- Time of the inspection
- Geolocation of the handover point
- 17 digit VIN number

Image data format & size:
It was decided not to have a pre-defined image file format. Only the output specifications are specified in Section II. It was agreed not to introduce a limit on image size as this is different in every use-case.

Data exchange & message types:
Communication with the OEM should always be done in accordance with their requirements. However, in case no specific OEM requirements are available, and as part of the standardisation of processes, ECG supports the standard digital messages developed with Odette and the VDA. Some applicable message types are noted below. Further details on them can be found in the 'Digitalisation of Finished Vehicle Logistics' joint ECG-Odette-VDA document.[2]

1. Damage report – message FV07/FV20
   In case of damage to a vehicle somewhere in the distribution chain, details of the damage should be communicated from the LSP to the OEM in a structured way. The damage information should include all relevant data enabling the OEM to initiate the necessary actions such as service/repair order, inform insurance companies, etc.

2. Service order – message FV05/FV18
   Service order completion – message FV06/FV18
   The service order initiates the actual service activities. It will confirm that the damage should be repaired, before the vehicle is processed further.
   After receiving the service order, the LSP must check whether it can perform the requested actions or not. The decision will be based on the requirements and capacities and perhaps on availability of necessary parts. This will lead to a service order response message which can either confirm or reject the service order. A service order response may also be sent to provide information on the status of the ordered service (Started, In-Progress, Completed…)
   If the service order is accepted, the LSP will certainly be required to send a service order response to the OEM to confirm that the work has been completed.
   If the service order is rejected (e.g. capacity shortages), the OEM must find an alternative solution (e.g. next compound or other time slots to fulfil the necessary activities).

[1] Even though the group decided not to elaborate on Artificial Intelligence, this possibility has been touched upon from the data visibility point of view.
[2] Document and its annexes can be downloaded from the ECG website:
https://www.ecgassociation.eu/publications-and-reports/digitalisation-of-finished-vehicle-logistics/

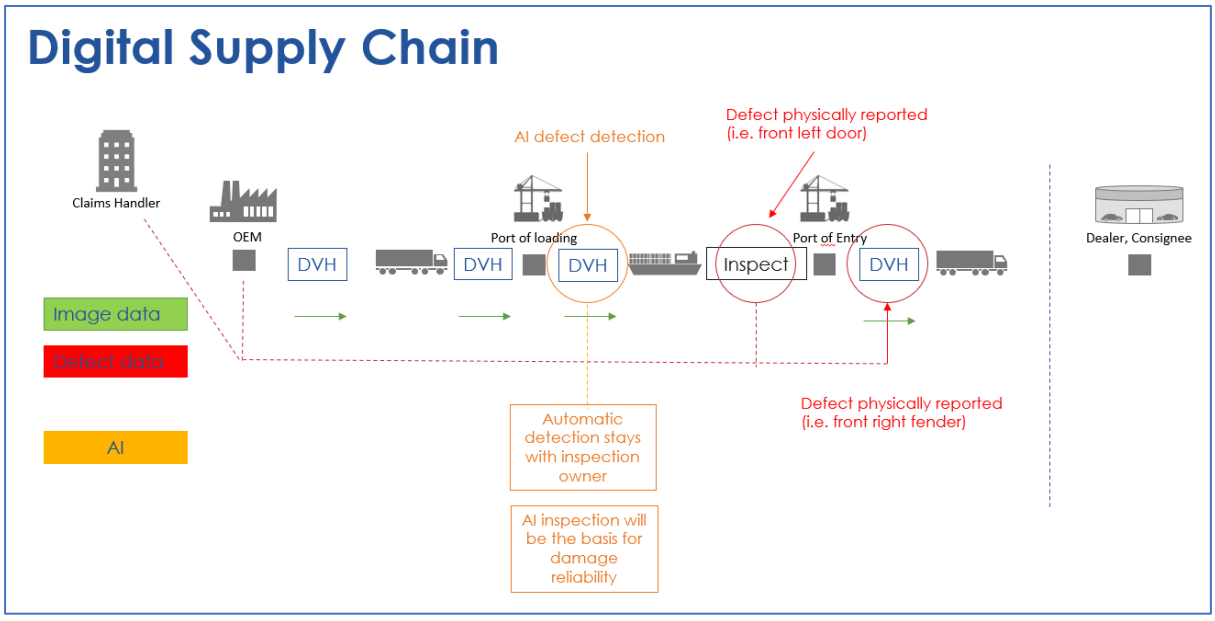
3. Insurance Release for damage repair
   This is a possible new message type which can be developed within the 'Digitalisation of Finished Vehicle Logistics' document if interest is expressed.

Visibility of the data:

On data visibility there should be a clear agreement between the parties on who should be able to see what. However, some general rules can be established as follows:

a) In case the vehicle handover is captured digitally, the image data should be shared forward with the vehicle through the supply chain.
   If damage is identified, this data should not go forward with the vehicle, as with visual handover inspections the 'fresh eye approach' is being favoured. Exceptions can be made to this rule in accordance with a prior agreement with the OEM.

b) If AI is used at the handover point the data will remain with the inspection owner. All image and AI data will be made visible to the OEM and their claims handler, who should use it to make an evidenced assessment of liability.[3]
   The intent here is to not increase the number of claims being made, but to ensure that liability is fairly appointed to all parties. This data should be handled securely to ensure the correct parties have access but that all parties are protected, therefore using blockchain or similar technology is recommended.



[3] Even though the group decided not to elaborate on Artificial Intelligence, this possibility has been touched upon from the data visibility point of view.

IV. Legal Protocol

Protocol relating to Digital Vehicle Handover (DVH) data, recommended by ECG for inclusion as an appendix to new logistics / storage contracts or an addition / side letter to existing logistics / storage contracts

Introduction

This Protocol arises as a result of the increased and increasing usage of digital / electronic methods for the periodic gathering of data (including but not limited to digital photographs) regarding the condition of finished motor vehicles at various points during transportation and/or handling and/or storage, for example where such vehicles are transferred from the custody of the sender to a carrier or storage provider, transferred between different carriers or storage providers, or transferred from a carrier or storage provider to the receivers.

Traditionally, such data has been captured manually, generally recorded on paper forms and printed photographs, with any damage found recorded in writing and/or depicted in such photographs accordingly.

However, there is now an increasing tendency, driven by new technology, for some elements of such data to be captured and recorded digitally, in some cases through the use of artificial intelligence software, sometimes used in conjunction with automated electronic inspection equipment, including handheld devices and fully automated electronic inspection booths. In general terms this is referred to as Digital Vehicle Handover (DVH) Technology and DVH data.

This Protocol addresses various issues relating to any DVH data which may be gathered during the inspection of vehicles at various points during the transportation, storage and handling chain. Since DVH Technology is relatively new, and has not been adopted universally, this Protocol is intended to establish a neutral shared position as between the various parties involved in transportation, handling and storage as to how DVH Technology is to be used, and how DVH data is to be collected, processed and used.

This Protocol is also intended to reflect the shared intention of various parties involved in transportation, handling and storage to embrace the new DVH technology and co-operate to utilise DVH data to their mutual benefit, whilst recognising that this new technology and the data generated by it was not anticipated when various longstanding international conventions and other legislation / regulations governing international transportation, handling and storage were drafted, so that some of the provisions in such conventions etc. may now need to be applied and construed in a manner more sympathetic to and reflective of the new technology.

For example, the use of DVH data instead of data gathered by traditional inspection methods is likely to deprive carriers or storage providers, when handing vehicles over to another party, of the opportunity – traditionally available with the use of paper handover documents – immediately to become aware of and “double check” any damage identified at the handover point. This may also mean that in some instances there could be an unavoidable delay in claims being notified to carriers or storage providers, perhaps outside the strict time limits stipulated in such conventions etc.

It is beyond the scope of this Protocol to address possible changes to such time limits, or to seek to vary the terms of such conventions etc, but it is within the scope of this Protocol to recognise that the new DVH technology may require all parties in the transportation, storage and handling chain to adapt some of their practices, and acknowledge that because the new technology does not always sit comfortably with longstanding conventions and practices, some new practices need to evolve.

Non-exclusivity

DVH Technology and equipment may never entirely replace traditional vehicle inspection methods, not least since some vehicle zones (for example parts of the interior) do not lend themselves readily to anything other than manual inspection, and in any event it is likely that the traditional and new methods will operate in conjunction together for some time.

This Protocol is therefore intended to apply insofar as DVH Technology is used at any stage of the transit/handling/storage supply chain, it being understood that for some movements there will be no DVH data at all, and for most movements there will be a combination of traditional data and DVH data.

Agreement reflected by this Protocol

Against the background set out above, the parties to the Contract or Agreement of which this Protocol forms part have agreed the following guidelines.

Collection and format of DVH data

For DVH data to be accepted by the parties as valid for the purposes of this Protocol, it must have been obtained in accordance with the recommendations set out in this Protocol, and must be presented in a broadly standardised form including:

a) Electronic date/time stamps;
b) Identification of the vehicle's standard 17 digit VIN number;
c) Clear identification of where the DVH was captured, and the precise equipment used to capture that data;
d) Standard parameters for digital photographs, including that they should be in colour (not black & white) and stipulating minimum image size (pixels) and lighting conditions
e) Standard parameters for the vehicle zones / parts which must be included in the inspection and covered by the DVH data
f) The minimum size of visible damage (scratches and dents / dings) which must be recorded in each inspection, as recommended in the Visual Inspection Guidelines issued by ECG, The Association of European Vehicle Logistics.

Storage and retention of DVH data

All DVH data obtained in relation to any vehicle to which this Protocol applies will be stored securely and in permanently non-editable format, ideally utilising blockchain technology, by the party capturing that data, and (always subject to continuing compliance with all relevant data protection guidelines) will be made available upon request to any other party involved in the relevant transportation / storage chain and with a legitimate interest in such data.

Such data will be retained, by the party capturing it, for such period as may be appropriate having regard to any convention or other legislation or regulation applicable to the corresponding transportation or storage, but it is recommended that in any event such DVH data will be retained for no less than 18 months from the date on which it was originally captured. If a claim is intimated or pursued in respect of any individual vehicle, or an extension of any applicable time limit for legal action granted in respect of any such claim, then all DVH data potentially relevant to that claim should be retained until such time as that claim is finally resolved.

Use of DVH data

In the event of any claim or dispute arising in relation to which the DVH data may be relevant, provided that DVH data complies with the minimum standards identified in this Protocol the DVH data will be treated as admissible evidence for such purposes, but not conclusive evidence. The evidential weight to be given to such data will be entirely within the discretion of such Court or other tribunal as may eventually determine any such claim.

Extension of this Protocol to other parties

Insofar as any of the transportation/storage services to be provided under any agreement of which this Protocol forms part are subcontracted, the relevant transportation/handling/storage provider will ensure that the terms of this Protocol are made known to any subcontractor and that such subcontractor has agreed to the terms of this Protocol.

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