

## *Mills of the European administration grind slowly*

*Overloaded trucks damage highways, bridges, and tunnels. More critical, they can cause also more severe accidents.*



(Source: AdobeStock)

Every day, thousands of heavy-duty vehicles transport cargos on European roads. An overloaded vehicle not only causes damage to the infrastructure and to the vehicle, but it also puts the driver and other road users at risk. Vehicles react differently when the maximum weights, which they are designed to carry, are exceeded and the consequences can be fatal. Overloading puts massive strain on vehicle tires and makes the vehicle less stable, difficult to steer, and take longer to stop.

This is why the owners and drivers are fined, when their vehicles are overloaded. In Germany, driver and owner are fined, when the gross vehicle load is exceeded by more than two percent. The German fines for 7,5-t trucks starts from 30 euros (more than 2 percent overload) up to 380 euros (over 30 percent) for the driver and additionally 35 euros respectively 425 euros for the vehicle owner. The chance to be caught is not that high, because there are only a few calibrated measuring stations in Germany. Enforcers need to use their eyes to pre-select a vehicle and to bring it to one of the calibrated scales.

Already in the mid 90ties, the European Parliament released the Directive 96/53/EC, which regulates the on-board weighing equipment. This directive should enable enforcers to get the weight, when the vehicle is in motion. The truck should send wirelessly its weight to the enforcer's hand-held tool. Of course, this communication needs to be secured. Another considered solution was road-embedded sensors, but this was discarded.

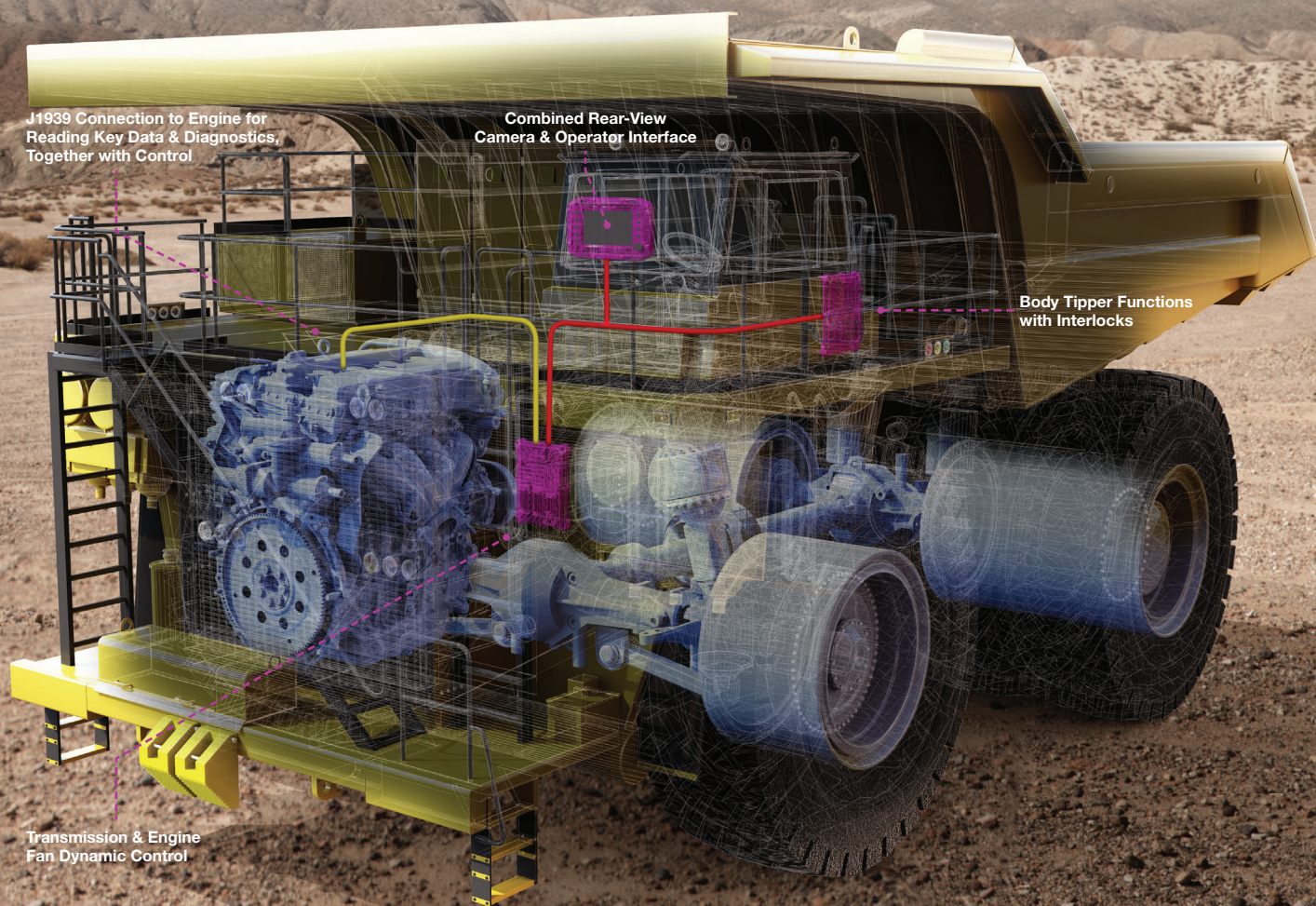
The main reason was that it could not be installed easily in existing roads and the costs are on the burden of the road owners.

Unfortunately, the mentioned directive is not mandatory for all European countries. The member states have the opportunity not to adapt the directive. This means trucks registered in countries not adopting the directive do not need to implement the on-board weighing equipment. The directive itself does not include any detailed implementation requirements. Therefore an implementation act was developed in the last couple of years – more than ten years later after the Directive 96/53/EC has passed the European Parliament. As usual, the mills of the European administration grind slowly.

The stakeholders, especially the original equipment manufacturers (OEMs) and the suppliers of load measuring devices, supported the development of the implementation act. They considered several technical solutions to measure on-board the weight of the vehicle. One option discussed was the CANopen-based load measurement systems compliant with the CiA 459 profile series for on-board weighing systems.

The CiA 459 on-board weighing system specification introduces three classes. Class-1 implementations are capable of monitoring the loaded vehicle weight and monitor optionally the loaded axle weight. Class-2 systems are able of performing non-LFT (legal for trade) transaction weighing. Class-3 supports certified LFT weighing. These on-board weighing solutions have been implemented ▶

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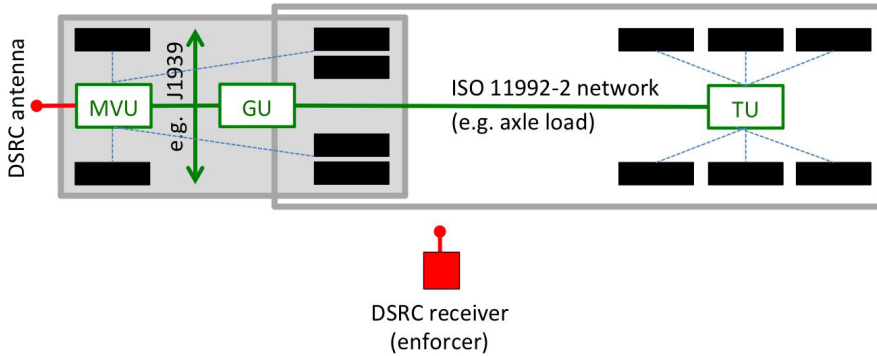


Figure 1: Implementation example (Stage 1) with the motor vehicle unit (MVU) securely connected to the DSRC sender and to the trailer unit (TU) via the gateway unit (GU) using the unsecured ISO 11992-2 CAN-based network (Source: CiA)

especially in special-purpose vehicles. Some of them are used to charge customers on the transported weight. One of the implementers is the CiA member VPG situated in England.

The participating truck manufacturers and the majority of the consulting stakeholders were in favor of another technical solution, which calculates the weight of the truck and its optional trailer or semitrailer by means of data, which is already available in the CAN-based in-vehicle networks. This could include the not secured measurement of speed, braking force, axle load, and so on. The algorithms to calculate the gross vehicle weight (GVW) and the axle load (AL) are OEM-specific. The OEMs claimed that this calculated data couldn't be manipulated easily, because it is double-checked with data provided by different ECUs (electronic control units). This solution seems to be less costly than secured sealed and secured load sensors, because it is just software-based and does not require any additional hardware. The calculated weight value is not that precise as with load cells. This does not matter, said the OEMs, because the GVW and AL values are only used for pre-selection purposes. An accuracy of  $\pm 10$  percent is required for Stage 1 (planned for 2021) of the implementation act. This is somehow the average value of overloaded vehicles and does not really hurt the truck owners. Enforcers will be only possible to pre-select heavily overloaded vehicles. In Stage 2 (planned for 2024) of the implementation act, an accuracy of  $\pm 5$  percent is required, when the vehicle is loaded at greater than 90 percent of its maximum authorized weight.

The secure communication between the motor vehicle (MVU) providing the calculated vehicle weight and the tool of the enforcer uses the well-known 5,8-GHz DSRC (digital short range communication). In Europe, it is also used for the tachograph. It is standardized in EN 12253, EN 12795, EN 12834, EN 13372, and ISO 14906 as referenced in Directive 96/53/EC.

First countries may adopt Stage 1 of the implementation act in 2021. The implementation act is still not released and there are some pending comments and concerns. ACEA, the European Automobile Manufacturers Association, has some concerns especially against Stage 2, which requires high-secure on-board weighing (OBW) systems as well as a highly secured communication between the vehicle and the enforcer's tool. Additionally, the GVW and

AL values need to be more accurate as in Stage 1 – less than  $\pm 5$  percent.

It seems that some stakeholders are not really interested to release the implementation act as it is currently. Of course, some truck owners like to overload their vehicles to make profit. Carrying 10 percent more load is roughly the same as a 10 percent saving. The fine when caught overloaded is relatively high (though this varies significantly from country to country), but the likelihood of being apprehended is low – even with the Stage 1 on-board weighing equipment. But even when caught overloaded once, ▶

## CAN Newsletter Online: Weighing

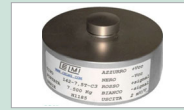


Bauma 2019

### Running gear controller with integrated weighing system

At Bauma 2019, BPW presents its weighing sensor, which transmits its data via Isobus to the driver's cabin and more important wireless from the drawbar axles wirelessly to the end device.

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CiA 461 series

### CANopen profile for weighing devices

The CiA 461 series part 1 and part 2 have been released CiA internally as Draft Standard Proposals. The profiles specify CANopen load cell devices.

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Load cell

### Used with CANopen converter as a digital weighing solution

The load cell Inteco from Minebea Intec is suitable for applications from fill quantity control to weighing of silos and containers. As a digital weighing solution with the CANopen-based converter Connexx, it offers signaling times and transparency in dosing and weighing processes.

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CANopen interface module

### Connecting up to 16 weighing scales

Dini Argeo (Italy) provides a CANopen interface unit, which communicates net and gross weight, weight status, as well as error conditions to the host controller.

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Digital load cell

### With integrated weighing function

HBM Test and Measurement has launched the CAN-capable PW15iA digital load cell, a practical multi-functional product for use, for example, in packaging machinery.

[Read on](#)

the cost of the penalty can be offset through additional overloaded runs. Road users like you and me are not represented in the working group discussing and drafting the Directive 96/53/EC related implementation act. Some OEMs seem to be afraid to displease their potential customers by a more restricting implementation act.

According to the implementation act, the on-board weighing equipment shall be subject to a periodic inspection by a dedicated workshop every two years following its installation in the vehicle or vehicle combination. This seems to be hard to achieve, if the GVW and AL values are OEM-specific calculated from different data sources. European member states adapting the Directive 96/53/EC and the related implementation act need to approve, to audit regularly, and to certify the dedicated workshops allowed performing inspections of on-board weighing equipment. This is another hurdle to implement successfully the Directive 96/53/EC. ◀



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