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wascosa **infoletter**

Latest news for the freight wagon industry

Freightopia – the renaissance of rail transport

In 2037 the rail freight industry is booming and reports record profits. In retrospect, the steady stream of innovations, the agreement of common standards for all rail industry players, the introduction of autonomous rail vehicles and the production of customised consumer goods using 3D printers have revolutionised rail transport and brought it back into pole position.

by Dr Thomas Sauter-Servaes, expert in mobility research and Head of Studies for Transportation Systems at the ZHAW School of Engineering, Winterthur.

At its annual conference in 2037, the European Rail Freight Association announces record revenues for its members for the third consecutive year. Andreas Meyer, Honorary Chairman of what has since become the most influential rail lobby association (and former CEO of SBB AG), is delighted to be given the chance to personally announce the latest jump in profits. Daimler's CEO Johann Jungwirth (former Chief Digital Officer of the Volkswagen Group) is also attending the conference for the first time, having played a pivotal role in the establishment of Daimler Rail Cargo Services (DARC). In 2031, exactly 30 years after selling off its rail equipment division,

Continued on page 2

Dear Reader

We all know how difficult it is to make innovations in European rail freight traffic. If you've already achieved this, then congratulations. I am constantly surprised by the EU's obsession with standardisation: overbearing authorities, outdated regulations, etc. make innovation a real challenge in the rail sector.

But that's just one aspect: in many cases there is a lack of imagination and courage to break new ground. Our lead article, "Freightopia", therefore takes you on a journey into the future. Decide for yourself what to make of it. But in 20 years' time, don't claim you hadn't read it and thus had no idea of the possible future of rail freight.

We believe in the exciting new possibilities created by technological progress. "If we want things to stay the way they are, everything has to change." The comments by the famous Italian author Giuseppe Tomasi di Lampedusa are a very fitting description of our industry's current status.

In response to popular request, we have once again included the "RID News" and "GCU News" sections in our newsletter. Digitalisation is still a hot topic as well, along with telematics. And finally: Are you aware of the major global differences in the maximum speeds and weights of freight trains? Then read on!

We hope you enjoy this issue.

Philipp Müller
Chairman of the Board of Directors

Continued from page 1

Adtranz, the former carmaker turned digitalisation specialist has signalled its return to the flourishing rail market by investing billions in DARC. At the same time, DARC has copied Daimler's successful concept for its in-house mobility platform moovel and combined its own transport offerings with a broad range of services from its co-operation partners, especially the provider of freight wagon solutions, Wascosa. Like many rivals, Daimler's cargo platform now relies on the railway as the backbone for its service offering in long-haul transportation. Twenty years ago, such a renaissance of rail freight seemed unlikely. Things might well have turned out very differently.

Slaughterhouse scenario for rail freight traffic

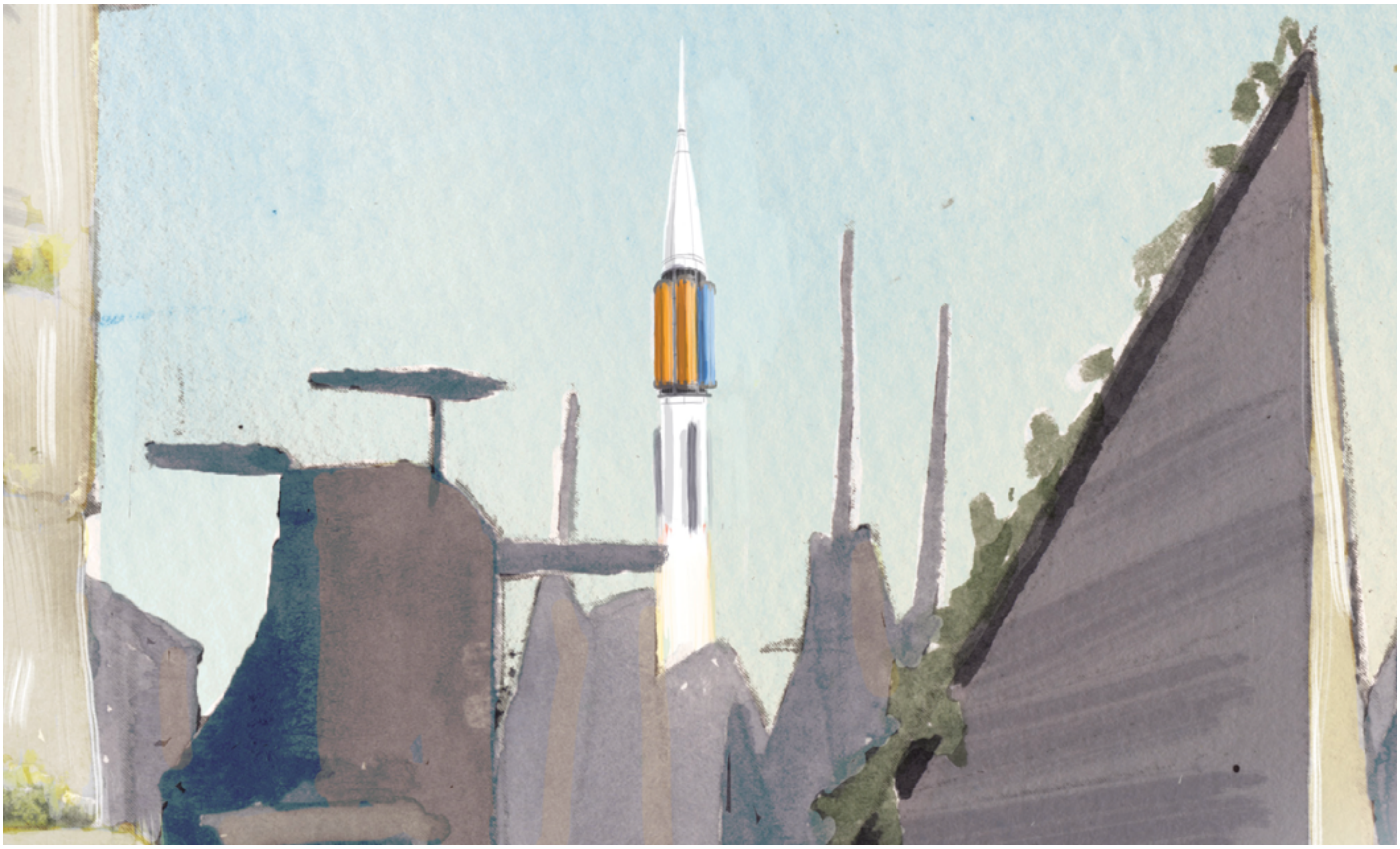
New York's meat packing district is buzzing with life. But the neighbourhood has nothing in common with the former slaughterhouses that originally made it famous. The philosopher Richard David Precht predicted a similar trend for all slaughterhouses in the coming future years. "At some point slaughterhouses will simply be memorials visited by school pupils", he wrote in 2017 in the magazine supplement NZZ Folio. Modern culture is changing, slaughtering animals to produce meat will no longer be necessary – or even desirable. Nowadays many start-ups are trying to come up with ideas about how to produce meat or meat substitutes more efficiently than traditional cattle rearing. And they have been successful, as we now know – some 20 years later.

At the time, it was quite probable that Precht's thesis could have equally applied to rail freight: "Freight yards will eventually be memorials visited by school pupils". Back then, there was much talk of the «Jurassic Parc mode» railway, an expensive legacy system for which such a simple alternative was appearing on the horizon with the hype surrounding autonomous vehicles: a single system consisting of an elementary concrete infrastructure and intelligent vehicles able to transport everything everywhere, door-to-door on rubber tyres. Such prospects sounded very appealing to politicians with subsidy fatigue and were often enthusiastically championed in leading daily newspapers such as the Neue Zürcher Zeitung. The fact that the mass efficiency of such a system would not be sufficient could well have proved to be an illusion. In terms of consignment volume – rather than mass – rail only represented a single-digit percentage of the modal split in freight transport at the end of 2010. Moreover, growth was not concentrated in the transport of bulk goods, but in courier services transporting lightweight packages for the likes of Amazon, Zalando and others, delivered by van.

Freight rail facing a perfect storm

During this period, rail freight traffic experienced a phenomenon known as "The Perfect Storm". The term is taken from Sebastian Jungers' bestseller of the same name in which he describes a destructive hurricane that hits America's east coast and takes down the fishing boat Andrea Gail. Three very rare weather events combined to create the extreme destructive power of

"Freight yards will eventually be memorials visited by school pupils."



With the three-stage "Apollo Programme" adopted by the European Parliament in 2025, visions gradually became reality.

"the perfect storm". Since then, this turn of phrase has been used to describe any worst-case scenario.

Applying the same situation to the rail freight industry of that period, three factors emerge that combined to produce an equally damaging impact:

- Consumers' growing appetite for personalised services. The scale of logistics became smaller and products "turned over" more rapidly.
- Competition on the roads became even more cut-throat. Through alliances, a platform economy and technological advances, costs fell significantly thanks to generous risk capital.
- Digitalisation worked as an accelerant for both the trends mentioned above.

Roads more like railways – but the rail network stagnates

So how did the road haulage industry take full advantage of the powerful megatrend digitalisation? – By becoming more like a railway. It increasingly combined the benefits of road transport such as flexibility, smaller container sizes and global standardisation with the original strengths of rail freight: the formation of convoys, space efficiency and environmentally friendly electric motors. The result was a truly massive challenge to rail freight – one that even threatened its existence. Road freight transport became even cheaper, capacity problems on roads could be clearly reduced through autonomous vehicles and the environmental impacts of road freight declined both locally and globally. In addition, road safety was improved enormously, as the system's biggest source of error – the driver – was eliminated.

So how did the railways respond? Did they manage to become more like roads? Progress on the railways was extremely slow compared with the road haulage industry. Autonomous vehicles capable of making their own way in the last few kilometres to the railway siding and the customer had already been tested, but were not yet commercially viable. The "5L" initiative attempted to resolve this by bundling together technologies designed to make rail freight traffic more competitive. "5L" stood for five key improvements: quiet, lightweight, smooth running, logistics-compatible and conscious of life cycle costs. The "5L" demonstrator train consisted of container flat wagons equipped with a variety of innovative components, such as radially adjustable wheelsets on the bogies, disc brakes, automatic coupling, telematics, sound-damping measures and sensor systems. The concept of the "Competitive Freight Wagon" took a similar approach. While these were certainly important projects, contemporaries had the feeling that these technologies were ones already presented to students 20 years earlier as innovations and saviours of rail freight transport.

The "NGT Cargo" concept created by the German Aerospace Centre (Deutsches Zentrum für Luft- und Raumfahrt e. V. [DLR]) was a giant leap forward. This autonomous freight train could supposedly be assembled as required from individual wagons and powerful traction units that couple together automatically. The individual wagons had their own electric drive (battery powered), so they could shunt themselves. Several traction units could be combined during the journey to form a virtual association, but with no physical coupling. Compatibility with the high-speed passenger train "NGT HST" allowed passenger and freight transport to be bundled together in order to fully exploit existing route capacities.

Apollo programme for rail freight transport

Anyone familiar with rail freight traffic in those days knows that the "NGT Cargo" study was light-years ahead of the day-to-day running of the rail network, even though the technologies used in the concept were far from futuristic at the time and in many cases had already been tried

3D printing caused a reversal of the goods structure effect and thus a turnaround.

and tested. But an enormous effort would have been required to establish these technologies across the entire network.

To bridge the gap between vision and practice no less than an "Apollo programme" was required for the rail freight industry. And this is exactly what the European Commission decided in 2025. Like the Saturn V rocket used for the moon mission, the programme had three stages to reach its goal. The starting point was a genuine European standardisation. This was the basis for the subsequent implementation of innovative technologies to improve efficiency, but which ultimately had to contribute to the new ecosystem to be created around rail transport. So the question arose: What was the story of freight rail 4.0? New technical answers alone were not enough: new questions were needed, i.e. practical applications after the goods structure and logistics effects had swept away the old ones.

Via the Silk Road and 3D printing to the renaissance of rail transport

One of these successful new applications for rail freight transport was the reactivation of the Silk Road with all its network branches to Iran and India, etc. At that time, the "global workshops" migrated from the Chinese coastal regions to the interior. The distances to the ports steadily increased. In 2017, sea transport from the Far East took two to three times longer than rail transport and, as already mentioned, the greater distances of Chinese cross-country traffic as well as reloading times and costs in the ports added to the problem. Thanks to the "Apollo programme", the freight railway soon managed to cut transport times from 12 to 6 days, as fast as passenger traffic operating on this route. The key point was that the previous speed problems were due less to technical constraints than massive organisational failings.

The next central application was the final turning point in favour of rail transport. Up to then, consumers' increasing search for individuality had been the railway's greatest enemy. Shipment sizes shrank, and same-day deliveries became standard. The subsequent level of personalisation, on the other hand, brought the railway into a much better competitive situation. The creation of customised consumer goods based on 3-D printing encouraged the transport of basic materials that could be transformed into all types of goods in centralised print shops. The goods structure effect was suddenly reversed.

Successful triad of the Apollo programme

The Apollo programme has had three main achievements:

... Develop visions: Only through new images was the railway able to transform itself into a solid pillar of a post-fossil, green and sustainable transport vision. On the logistics side, the rail industry successfully addressed themes such as 3D printing early on. At the same time, important fundamentals such as standardisation were not overlooked. A very tricky balancing act, but a necessary one.

... Bundle together strengths: Admittedly, the road network was much bigger, able to benefit from enormous economies of scale and engage with other parts of the labour market. It therefore had a totally different political dimension. Collectively, however, rail industry players managed to establish an even playing field – through common standards, procurements and priorities. This alone had the scale of an "Apollo project" and would never have been achieved by market forces alone.

... Implement technology: The rail network definitely had no technology deficit, but rather an implementation problem. Autonomous travel by rail is much more straightforward than on roads. In addition, modern technology was able to replace a lot of expensive muscle power, which was also potentially more unreliable and time-consuming.

European rail industry has managed to avert the slaughterhouse scenario just in time. Andreas Meyer and Johann Jungwirth announce another record result for 2038.

Breaking out from the niche at top speed

Since the COP21 climate conference in Paris in 2015, it has become clear that transportation also has a part to play in reducing greenhouse gas emissions. Simply paying lip-service is not enough. The simplest and fastest means of achieving this would be to make rail freight transport "zero emission", through electric traction with green energy, and greatly increasing its market share of freight transport as a whole. Good environmental credentials will be meaningless, however, unless rail freight breaks out of its current niche existence. Transportation speeds will play a major role in achieving this.

by Professor Markus Hecht, PhD-Ing., Head of Chair of Rail Vehicles, Department of Land and Sea Transport Systems at the Technical University of Berlin, Germany.

Rail freight transport has suffered a steep fall in revenues over recent decades. Whereas in the 1960s the majority of railway revenue in a given country was generated by rail freight, now it accounts for only around 10% or less.

However, the annual transport capacity in kilometre tonnes has changed only very little. The decline in transport volumes has been compensated by an increase in transportation distances. Of particular significance here was the traffic from sea ports to inland destinations. What has largely disappeared is more rapid freight transport such as express goods and postal deliveries that used to be linked to passenger traffic. Exceptions to this rule are Switzerland, the UK and Sweden, where there are still residual revenues from these sources. Today, the fastest delivery service in Europe is the ICRF express parcel service in the UK.

Transition from today to tomorrow

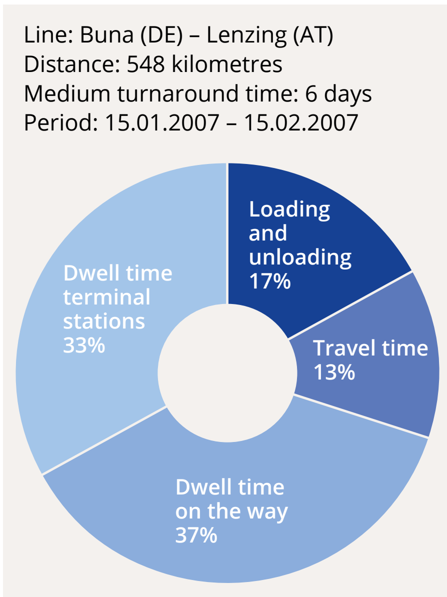
A comparison of the world's major freight transport systems (see table page 6) shows that the American railways' principal routes offer the highest rail freight speeds, despite their long and heavy trains and their comparatively simple braking technology. This is possible thanks to the very long braking distances and the lack of mixed traffic with passenger services.

UK railway postal service at a terminal, DB Cargo UK class 325 EMU for 25 kV 50 Hz, Vmax 160 km/h, max. four wagons with automatic buck-eye coupling using multiple-unit train control, on the East and West Coast Mainline (photo: DB Cargo (UK) Limited)

The Chinese and Russian railways have a slightly lower maximum speed, but longer daily routes than the European railways. This is because they make fewer intermediate stops due to a reliable infrastructure, digitalisation and wayside monitoring (stationary diagnostic stations). As a result, rail freight volumes between China and Europe increased fourfold to 180,000 TEU between 2014 and 2016.

RFID for "wayside monitoring" has long been standard for Russian freight wagons (photo: the author, 2014)

In Europe, freight transport is still associated with long waiting times. The situation regarding wagonload traffic between Germany and Austria is a prime example (see chart): only one third of the turnaround time is taken up by travel, loading and unloading. The remaining two-thirds is time spent waiting.



Wagon turnaround time for chemical tank wagon, shuttle traffic between Germany and Austria [1]

Even now, these turnaround times are still timetabled very generously, so as to allow for "the unexpected". For the most part this refers to disruptions due to infrastructure, but to a lesser extent due to wagon or locomotive malfunctions. Speeding up in turnover time should reduce waiting times in the first instance, before travel speeds are increased. One promising measure, which is already having an effect in many European countries, is the integrated interval timetable. Nonetheless, punctuality is a precondition for greater efficiency here.

Three starting points for improving transport speeds

In the first instance, **idling periods** should be reduced. Efforts are already being made across the board in this area. In all probability, wayside monitoring, which is common in most other parts of the world, will be replaced by vehicle-based monitoring in Europe, which is without doubt more comprehensive due to the fact that it is continuous, and can also easily provide derailment detection, for example.

A second approach would be **increased travel speeds,** to make rail freight more attractive for **CEP** (courier, express and parcel) **services.** CEP services remain a growth market, and in the past this traffic used to travel by rail as a matter of course, as mentioned in the introduction. They must once again be won over to the railways on the basis of new technology. This type of freight is not only very time-critical, but also very lightweight, which significantly simplifies wagon braking. In addition to travel time, turnover time also plays a major role [2].

Thirdly, freight trains **must travel faster in mixed traffic situations**, so that they do not block the line. Here the focus is on infrastructure, particularly in long tunnels such as the Gotthard, the Lötschberg and the Channel Tunnel. The infrastructure itself can create incentives through lower route prices for faster trains, which may have to travel as fast as passenger trains, thereby increasing the line capacity. More importantly, however, a further incentive may be that for longer periods during the day, additional lines will be provided exclusively for trains which can travel as fast as passenger trains.

An obvious step would be to combine the second and third approaches, in other words to provide lines for CEP trains on bottleneck sections. These trains would need to reach speeds of 180 to 200 or even 300 km/h, as planned by Mercitalia from October 2018 for the route between Naples and Bologna with ETR 500 optimised for container traffic [3], presumably with axle loads of only 15 to 17 tonnes.

Speeding up to meet the customer's needs

In future, rail freight wagons will vary far more in terms of their technology than at present, depending on their application. If growth is an environmental necessity, rail freight transport's offering must meet the needs of customers to an even greater extent than it does today. Fast trains with low tonnages but higher revenues will become essential.

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The practical uses of telematics: innovation – industry standard – scalable platform

Since it was first presented as an innovation at the Wascosa Asset Intelligence Day 2015, telematics has become the standard: it has passed the "point of no return" in the rail freight industry. Now the challenge is to automate data usage and further optimise business processes.

by Markus Lechner, Managing Director, Kasasi GmbH

An articulated truck can transmit up to 400 different data records every 100 seconds. There is also a wealth of useful data available in the rail freight industry, such as information on location, mileage, cargo status, indoor and outdoor temperature, and sudden impacts ("shocks"). The task is to gather, process and display these data and create a pool of valuable information using intelligent software tools.

Integrating telematics data as a base for analysis in a system

Open and manufacturer-independent integration portals, such as Kasasi's NIC-base, offer a solid technological platform for this. Established in the market since 2009, this telematics platform visualises data from more than 100 connected telematics systems in just one application – independently of the type of vehicle, brand or manufacturer. This allows the entire fleet to be displayed with just one click, including all modes of transport. NIC-base not only processes data from standardised interfaces, such as the current ITSS Rail interface or RSRD2, but also from proprietary standalone solutions. The know-how and experience of a neutral provider like Kasasi is particularly useful if non-standardised systems need to be integrated in a rapid, uncomplicated manner.

Telematics data enable comprehensive analyses of the entire fleet, as well as allowing the fleet to be monitored according to defined parameters. Freight wagons can therefore be deployed more efficiently and reliably, and transport quality improved. Manual handling can also be reduced, and productivity and competitiveness increased at the same time.

Potential applications for everyday use in the freight transport industry:

- **Analysis of mileage by country:** NIC-base uses GPS data to calculate the total number of kilometres travelled within individual countries. The analysis can be performed over different time periods and gives wagon keepers very detailed analyses that can be used as a basis for route credits or noise reimbursements.

- **Total mileage:** Maintenance costs can also be optimised, as workshop visits can be planned more precisely in advance, based on mileage. The wagon even books itself into the workshop, as has long been standard for passenger carriages.

- **Downtime analysis:** The system detects whether a freight wagon is moving or stationary, and for how long. In combination with user-defined points of interest (POIs), to create geofences, the user can draw conclusions about the duration of workshop stays, unloading times at customers' premises or inefficient downtimes, for example at marshalling yards. This makes it possible to increase usage times.

- **POI alarm for number of freight wagons:** To assure an optimal loading procedure, it's a good idea to always have a specific number of freight wagons within a point of interest. As soon as this number falls below the threshold, an alarm alerts a dispatcher, so they can procure a replacement freight wagon as soon as possible.

Automate processes and link them to third-party systems

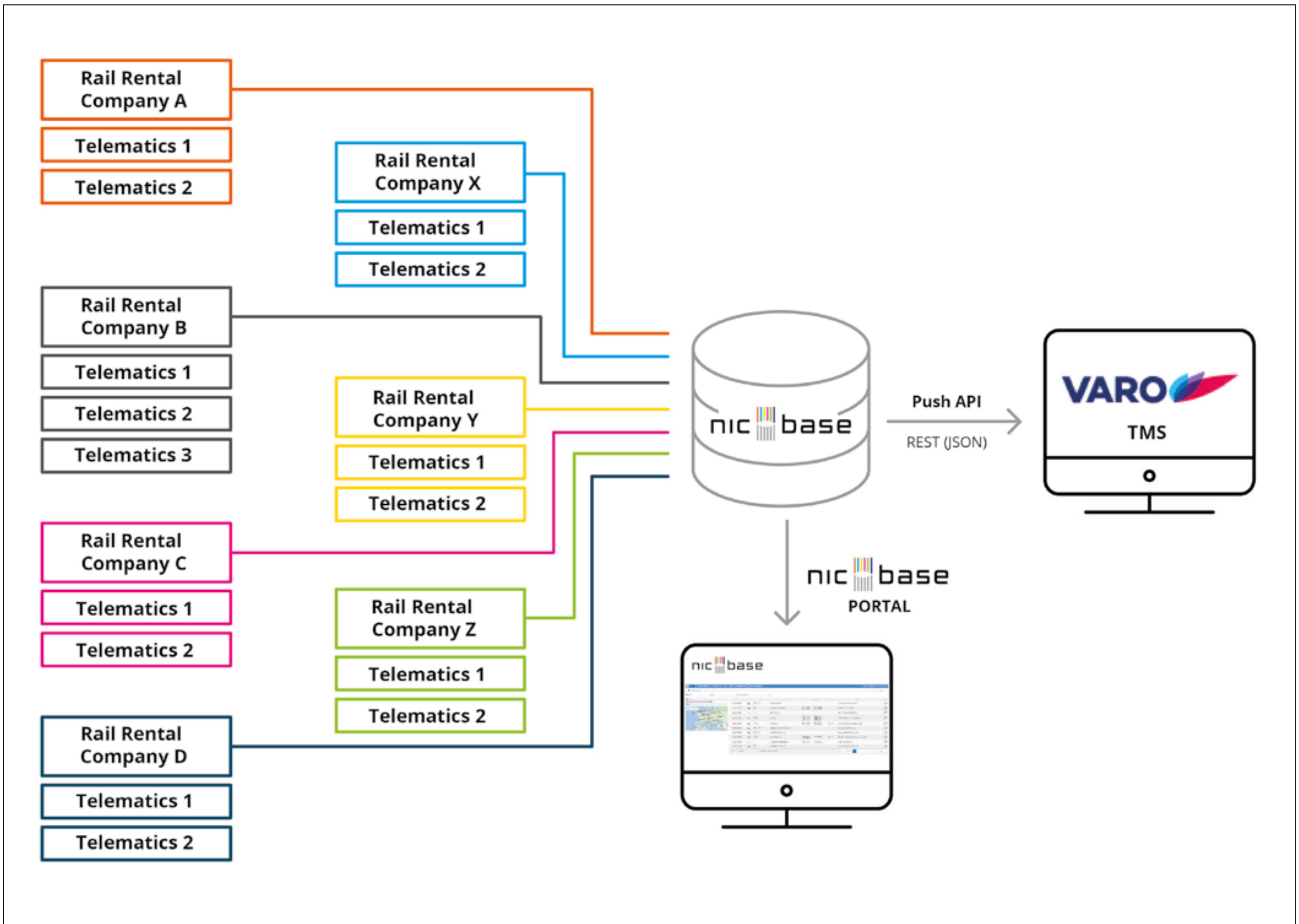
Nowadays, integrating telematics data is no longer enough. Rather, the aim is to automate procedures and to process and monitor transports on a route basis, thus visualising an intelligent and transparent digital transport process. This applies not only to the firm's own equipment but also to subcontractors' third-party devices along the entire supply chain, with no media discontinuity.

Kasasi's "TMS Connect" is the ideal solution to meet these requirements. The interfaces to third-party systems, especially production systems such as the TMS or ERP system, provide seamless integration. This allows telematics data to be linked to order, route or master data, and to be monitored automatically across the board. For example, delayed arrival times (ETAs), temperature deviations or violations of various safety aspects, such as unauthorised door openings or route deviations, can be identified. The data, results or triggered alarms are forwarded to the company's master system via PUSH-API and displayed or further analysed there. At the same time, the NIC-base web portal can be used to view additional details.

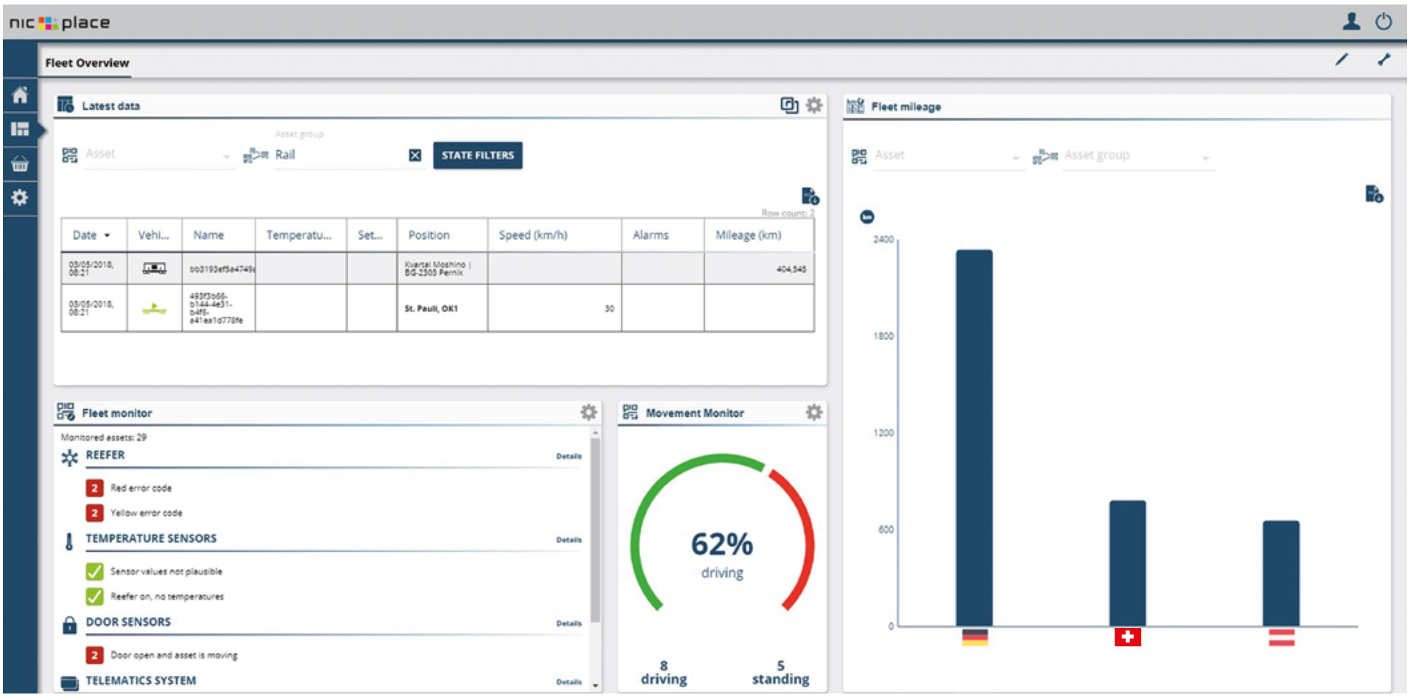
Case studies

Some 1,400 clients now rely on Kasasi's expertise. They include well-known players in the rail freight industry such as DB Cargo, Dettmer Rail, TXLogistik, Varo Energy, Vinnolit and Wascosa.

Varo Energy, a supplier of high-quality fuels, has been a customer since 2017 and uses NIC-base to integrate the telematics data of different hardware providers and freight wagon rental companies, which are then forwarded to their TMS. The data are made available via different channels: on the one hand straight from the existing



Processing and forwarding of data through the NIC-base database and visualisation in the NIC-base web portal. Source: Kasasi GmbH



Screenshot of NIC-place dashboard with the latest data, fleet check, mileage per country, and position tracking.
Source: Kasasi GmbH

NIC-base portals of the wagon lessors (e.g. Wascosa), and on the other hand via Kasasi's proprietary rail interface "SRS Rail" (e.g. Dot Telematik, Savvy Telematic Systems) or the standardised ITSS 1.1 interface (e.g. VTG). NIC-base processes all the data received and forwards them via an interface developed especially for Varo Energy (PUSH API) to the TMS (Oracle JD Edwards). On top of that, all the freight wagons are visualised in the NIC-base portal.

Using NIC-base and the interface to its TMS enables Varo Energy to visually track and monitor its entire rail logistics. This includes, for example, information when freight cars arrive or depart. Downtimes and feed times are identified. The fleet mileage is assessed automatically. In addition, the data can serve as a basis for efficient maintenance programmes: waiting times are recorded, sudden impacts (shocks) are identified and workshop throughput times are reduced.

By replacing standalone solutions, Varo Energy only has to deal with one support partner for all its freight wagons and can achieve additional cost advantages with fitting their wagons with telematics hardware that is not manufacturer-dependent. This investment argument is one of the main reasons why it is worth using a neutral telematics platform.

Outlook: networking along the entire supply chain

A data record provides important information on the different parts of the entire logistics process. In future it will become increasingly important to network the various transport partners. This includes, for example, sharing data sensibly and in compliance with data protection laws, and making them transparent for all to use, in order to complete transport quickly, punctually, process-oriented (just-in-time or just-in-process), reliably, cost-effectively and in an environmentally responsible manner.

Optimal data sharing requires a neutral and independent base to avoid any brand or manufacturer dominance. In this way, customers can find the corporate competencies of different competitors bundled on one platform and can choose freely between the offers.

The open logistics platform NIC-place provides the perfect solution for this. In addition to integrated telematics data, it also offers an open marketplace where software modules and services, as well as hardware products, from different suppliers (usually based on telematics data) can be booked as required. Like an app store, the platform is therefore always tailored to individual company and sector requirements.

As the individual solutions can be combined and networked with each other, the complete logistics process can be modelled within just one application, and any incidents during transport quickly identified and rectified. For example, a dispatcher can view all estimated arrival times (ETAs) and give the customer more accurate delivery times. These are calculated by an external provider based on extensive weather and traffic analyses. The dispatcher receives alerts from the system as soon as temperature deviations are detected that could damage the cargo. It can display the cheapest fuelling station on the route within the next 100 kilometres and forward the location directly to the driver. This helps to reduce the fleet's overall running costs. Alternatively, the dispatcher can receive maintenance recommendations based on specialised wear-algorithms so as to avoid costly breakdowns.

All added values can in turn be freely placed, displayed by size and position, within the new, user-configurable dashboard. The goal is to achieve maximum benefit, overview and customisation with telematics data and thus make the job of managing the fleet easier, while also improving its efficiency.

The GCU digitalisation offensive

Digital networking is rapidly permeating our world. It is also changing today's processes and communication channels around the General Contract for the Use of Wagons (GCU). Digital transformation creates enormous opportunities to consistently improve the rail freight transport business.

by Christian Kuehnast, GCU Consultant at DB Schenker Cargo

Three industry bodies – the European Rail Freight Association (ERFA), Union internationale des chemins de fer (UIC), and the International Union of Wagon Keepers (UIP) – have decided to launch a joint project for the digitalisation of the GCU, in order to exploit the new technologies and implement a common standard in the sector.

A central platform for all wagon keepers and rail transport companies

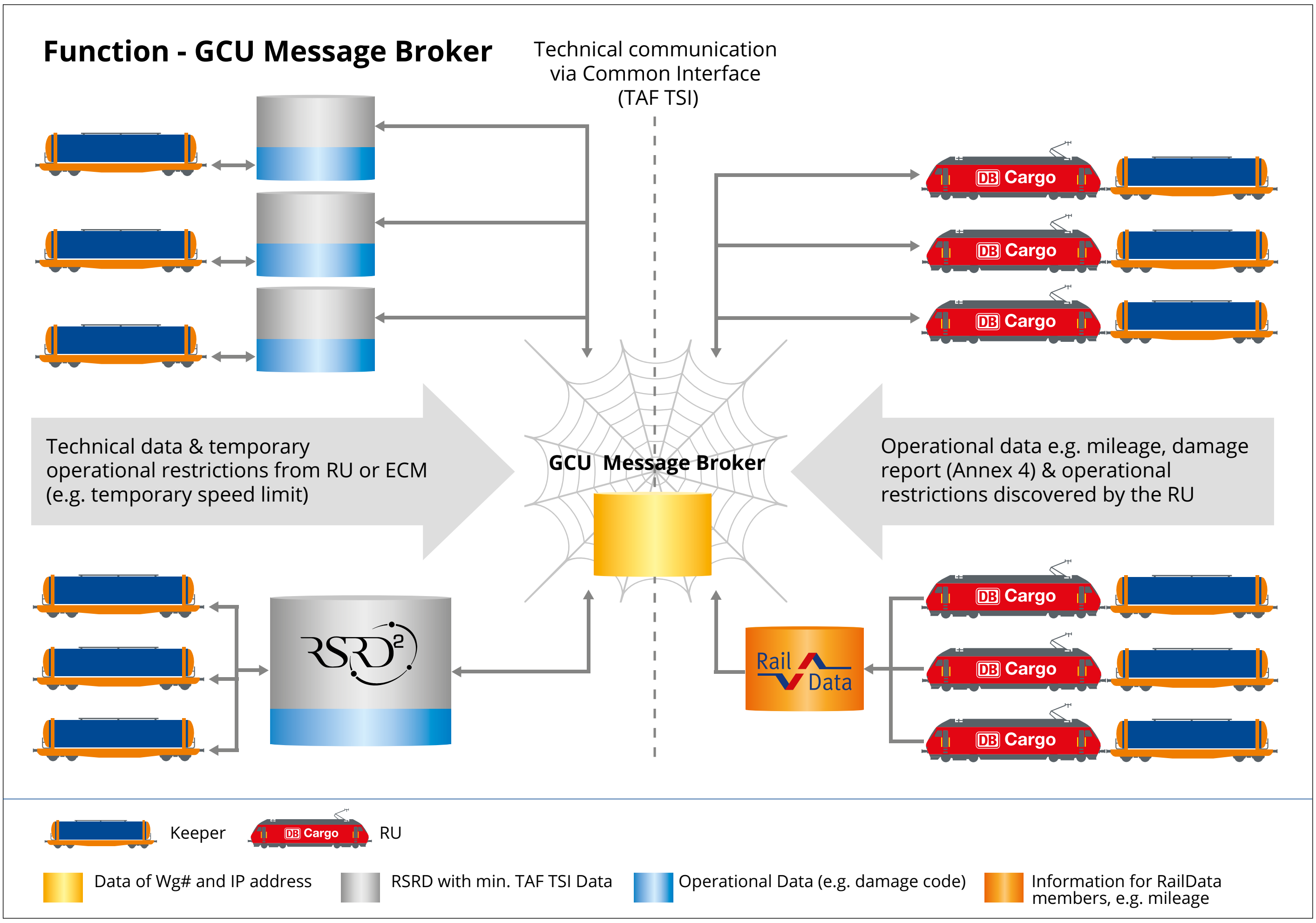
The "GCU Message Broker" is to become the standardised, central IT interface for the network of over 660 GCU signatories (wagon keepers and/or railway undertakings) from 28 countries. The "GCU Message Broker" thus supports, expedites and fulfils the GCU contractual obligations as well as all legal requirements and regulations (e.g. COTIF, ECM, TAF TSI). In future, members will only have to implement one IT interface between their own system and the GCU Message Broker in the data network. Smaller members without IT can alternatively access, upload and download data via a web platform. Digital data exchange allows information to be processed and stored faster and more effectively

Pilot system to launch in Q3 2018

In the first development phase, the mileage data and damage reports will be transmitted via the broker from the GCU railway undertakings to the GCU wagon keepers. The GCU undertakings can retrieve the current technical wagon data from the GCU wagon keepers at any time through the broker. Here no data are physically stored on the GCU Message Broker – the inquiry and the information are simply forwarded to the correct database. In the case of inquiries, the responses are collected and then bundled and made available to the inquiring system. Pilot operation is scheduled to start in the third quarter of 2018 and the "GCU Message Broker" is due to go live on 1 January 2019. The changes will require amendments to be made to the GCU contract wording. These are currently being prepared and will ready to be approved as of July 2018.

Further expansion planned

In addition, further development stages are planned for the message broker, such as the transmission of short-term operational restrictions identified by service personnel or sensors on the freight wagon, and the transmission of the maintenance services performed (CU coding in accordance with Appendix 10, Annex 6).



Kerosene or aviation fuel?

Safe transport of dangerous goods demands, not least, clear rules and unambiguous labelling of the materials transported. The example of aviation fuel shows that the current situation falls short of what is needed. Greater clarity is urgently called for.

by Ernst Winkler (Dipl.Ing. FH), Managing Director of GEFAG Gefahrgutausbildung und Beratung AG

Aircraft with jet or turboprop engines are fuelled with "Jet A-1" kerosene. This is simply UN 1223 kerosene with special qualities. The fuel used to power aircraft is transported by tank wagons from the refineries to storage tanks at the airport. From there, either it is carried via underground pipes and pumped into the aircraft's tank by special dispenser vehicles, or the aircraft is refuelled by tank trucks.

The tank wagons which supply the storage facilities are usually labelled UN 1863, which denotes aviation fuel. However, the dispenser and tank trucks often carry the UN number 1223 (kerosene), while others are marked UN 1863 for aviation fuel. Even though it is exactly the same fuel, the markings are different. Both substances, UN 1863 and UN 1223, are single entries, although UN 1863 is more in the nature of a generic entry according to 2.1.1.2 "B". A curious transformation!

What is "aviation fuel"?

UN 1863 comprises four single entries, covering different types of aviation fuel. Moreover, packing groups I, II or III are distinguished depending on the flash point and vapour pressure (packing groups indicate the danger level of a particular substance). Kerosene, however, is a fairly well-defined substance of UN 1223 PG III.

Based on UN recommendations and the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID) (see section 2.1.2. of the Principles of Classification), substances must be assigned to corresponding single entries whenever possible. Petrol, for example, though mixed with additives, must be assigned to UN 1203 PG II, rather than the collective entry UN 1268 PG II for petroleum distillates n.o.s. This applies regardless of whether it is used in aircraft or lawnmowers.

With UN 1223 kerosene, the question is whether it can be assigned as aviation fuel to UN 1863. As can be seen at many European airports, especially in the case of kerosene, UN 1863 PG III is increasingly used in practice. Presumably this is to distinguish the kerosene used in aircraft from the common type of kerosene used in oil lamps, paraffin heaters and the like. From a practical point of view this is understandable, but under the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID) it is at least open to question. The incorrect classification is now duplicated in sub-sections 1.8.3.13 and 5.3.2.1.3 of the RID, and thus also in the national regulations of RID member states, including the Dangerous Goods Risk Prevention Officer Ordinance (Gefahrgutbeauftragten-Verordnung – GGBV).

Light-sport aircraft being filled with aviation fuel UN 1203 (Avgas). Not to be confused with Jet A 1 – the consequences could be disastrous!

A common sight at airports: the tanker is labelled as UN 1863 rather than UN 1223 kerosene. This tanker was spotted at Brindisi airport.

Miraculous transformation: UN 1863 in the storage facility suddenly turns into UN 1223 kerosene. This fuel is Jet A 1, which is classified as kerosene according to RID rules.

Delivery of fuel tanks with kerosene, but here not marked as UN 1223 but as UN 1863 marked by the refinery,

Labelling on tanker at Zurich airport is bang on: it contains kerosene (Jet A 1) for refuelling aircraft with jet or turboprop engines.

IB C with kerosene on a delivery van for mobile helicopter refueling. However, written with UN 1863 jet fuel.

The holder of an identification card certifying that the holder is a Risk Prevention Officer according to Class 3, 1.8.3.13 RID, fifth indent, thus has the following entry in their training certificate: "UN Numbers 1202, 1203, 1223, 3475 **and aviation fuel assigned to UN Number 1268 or 1863".** Quite absurd! Luckily, no mix-ups have yet occurred in day-to-day flight operations, but the consequences could be disastrous!

RID provides no clarity

Even if the translation error is corrected in RID 2019, the question remains as to whether the fuel used in jet aircraft is UN 1863 or, more feasibly, UN 1223. Even in the case of aviation fuel for piston engine aircraft, RID does not use different technical designations to distinguish between applications. The term "aviation fuel" does not appear in the unofficial directory of RID or anywhere else in RID. RID regulates the transport of dangerous goods according to their type and hazard and not their intended use. The basis of the classification can be found in sub-sections 2.1.1.2, 2.1.2.3 and 2.1.2.5.

To summarise: whether used as jet fuel for aircraft, lamp oil or fuel for stationary turbines, kerosene is simply kerosene.

Extract from the Dangerous Goods Risk Prevention Officer Ordinance

1.8.3.13 The contracting parties may provide that candidates who intend to work for undertakings specialised in the transport of certain types of dangerous goods shall be tested only on matters related to their activities. These types of goods shall be

- Class 1
- Class 2
- Class 7
- Classes 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 6.2, 8 and 9
- UN Numbers 1202, 1203, 1223, 3475 and aviation fuel assigned to UN Number 1268 or 1863.

The training certificate pursuant to sub-section 1.8.3.7 must clearly indicate that it is valid only for types of dangerous goods referred to in this sub-section and on which the Risk Prevention Officer has been examined in accordance with the requirements defined in sub-section 1.8.3.12.

Understanding ATEX

Digitisation is making rapid advances in the logistics industry as well. While the use of telematics equipment has been commonplace in road haulage for years, it is now also gaining acceptance in rail freight transport. For the use of telematics systems in potentially explosive areas – in the transport of hazardous goods in general and in the chemical industry in particular – only approved GPS devices carrying “ATEX certification” have been permitted since 30 June 2003.

by Philipp Tarter, chartered engineer, CEO and owner of Dot Telematik und Systemtechnik GmbH, Vienna

Many freight and tank wagons not only travel on the open track, but also within industrial facilities. Especially in larger industrial complexes, the route to the filling or discharging station often leads past production and storage facilities for all types of chemicals. This applies mainly to tank wagons, but also in principle to other wagon types such as intermodal wagons or sliding-wall wagons that may carry hazardous cargoes. While freight wagons were not fitted with “active” devices in the past, the move towards digitisation under “Industry 4.0” has suddenly encouraged the equipping of wagons with telematics systems. These active telematics systems fall under the ATEX Product Directive 2014/34/EU, which requires all electrical equipment to be labelled. Compliance with the ATEX Directive in potentially explosive atmospheres is mandatory and should be given more careful consideration when fitting telematics equipment in freight wagons.

What is ATEX?

The term ATEX (abbreviated from the French: **AT**mosphères **EX**plosibles) is shorthand for “Directive 2014/34/EU on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres”. It governs the fitting of devices which will be used in potentially explosive areas. Ensuring compliance is the sole responsibility of the manufacturer and must be certified by an accredited third-party notified body with the issue of a certificate of conformity with a harmonised standard (such as EN60079-0:2012-A11:2013).

What are the certification requirements?

ATEX certifications are usually labelled according to a specific zone (see overview). On the one hand a distinction is made between the type of hazardous substance: gas “G” or dust “D”. It is generally known that gases are flammable (e.g. from a gas grill), but it is less well known that dust – such as normal household flour or sawdust in a carpenter’s workshop – can also trigger violent explosions in certain air-gas mixtures. A simple Internet search quickly provides clear examples. On the other hand, the zones are categorised according to the frequency of occurrence of hazardous substances. The more frequently the explosive medium occurs, the higher the requirements.

Zones for combustible gases, vapours, mists

APPENDIX I/2 ATEX 137

Zone 0
A place in which an explosive atmosphere consisting of a mixture with air of combustible substances in the form of gas, vapor or mist is present continuously or **for long periods** or frequently

Zone 1
A place in which an explosive atmosphere consisting of a mixture with air of combustible substances in the form of gas, vapor or mist is likely to occur in normal operation **occasionally.**

Zone 2
A place in which an explosive atmosphere consisting of a mixture with air of combustible substances in the form of gas, vapor or mist is not likely to occur in normal operation but, if it does occur, will persist **for a short period only.**

Zones for combustible dusts

APPENDIX I/2 ATEX 137

Zone 20
A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or **for long periods** or frequently.

Zone 21
A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation **occasionally.**

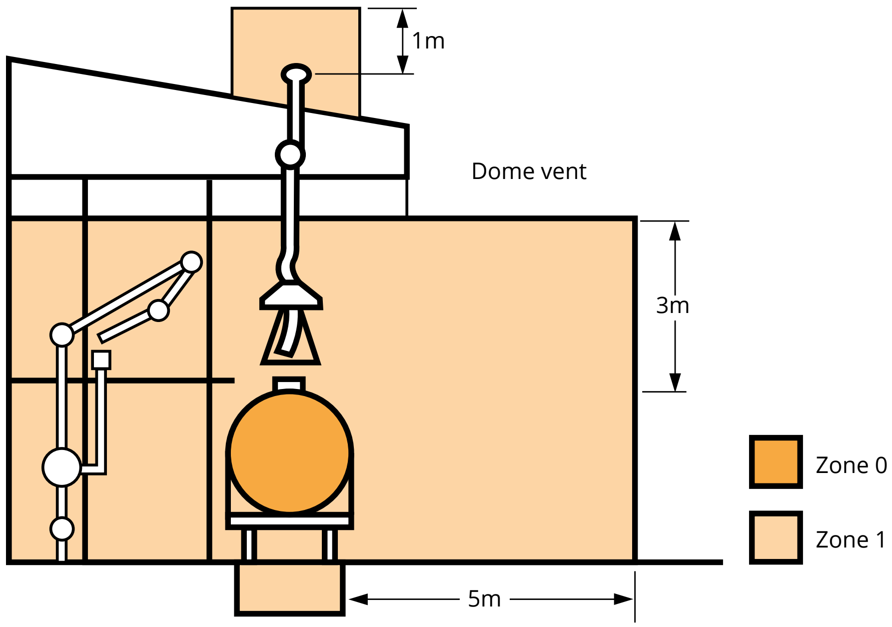
Zone 22
A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist **for a short period only.**

Source: Suva Safety at work, explosion protection principles, minimum zone requirements, August 2015 (revised edition), order no. 2153.d, page 26

Switzerland's biggest provider of accident insurance, Suva, has plotted typical zones around facilities for filling tank wagons with hazardous substances (see illustration). The requirement to use telematics systems certified for Zone 1, for example, is because the tanker wagons are being filled without vapour return technology. Certification only to Zone 2 would therefore lead to practically unworkable restrictions on such facilities. On the other hand, a Zone 0 certification is not necessary, as telematics systems are not installed inside the containers (in the tank). For freight wagons, the ATEX Zone 1 certification therefore seems to be a reasonable standard from a regulatory point of view as well as in daily use.

(Source: Adapted version by Wascosa of graphic published in Suva Safety at work, explosion protection principles, minimum zone requirements, 1999 edition)

Typical zoning areas around filling stations



Did you know?

For the past three years, Wascosa has been busy systematically fitting its fleet with telematics systems. Right from the start, only systems certified for ATEX Zone 1 were used, irrespective of the wagon type. Almost a third of Wascosa's wagons currently transmit data regularly, in some cases straight to the customer's own IT systems.

In addition, more detailed requirements exist which are shown in the ATEX labelling (see illustration) and which may depend on specific product properties. For example, the explosion group "IIA" in combination with the temperature class "T4" is sufficient for acetaldehyde (→ certification for gases).

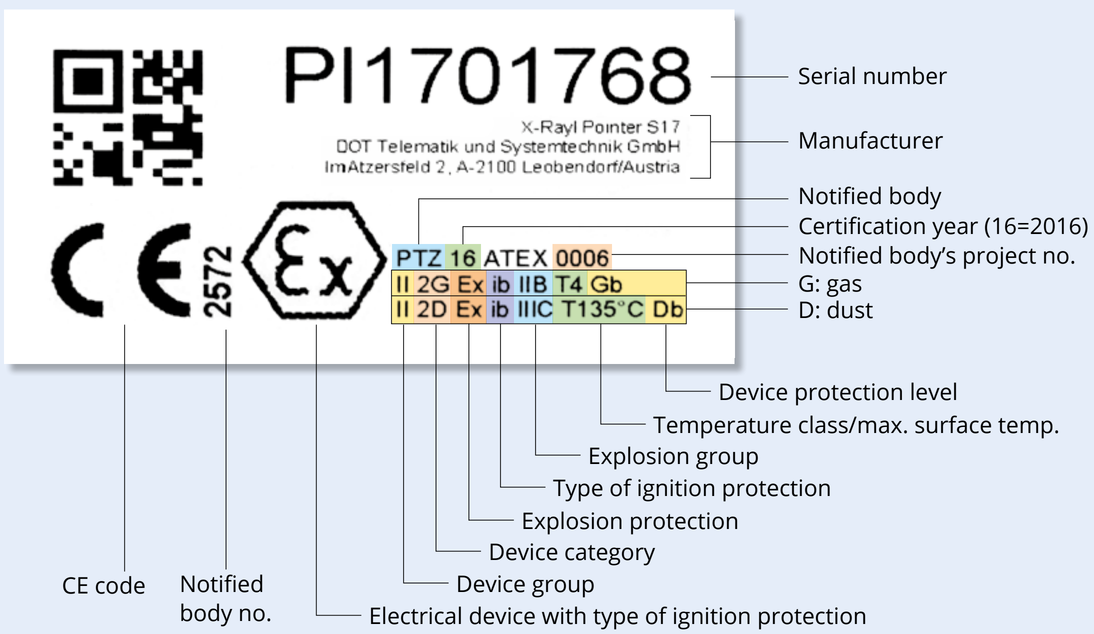
What do the ATEX markings mean?

The label must include numerous details, such as the manufacturer's name, serial number, etc. In the example shown, the label indicates that the X Rayl Solar Pointer S17 telematics device from Dot is certified for use in Zone 1 without additional restrictions

Conclusion

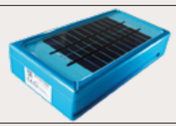
Systems with adequate ATEX certification are now available for almost all rail transports and therefore no longer represent a hurdle. Most concerns can be addressed by talking directly to the customer. If required, higher accreditation levels are also possible.

Typical labelling of a device certified for use in Zone 1 without additional restrictions



Source: Dot Telematik und Systemtechnik GmbH / Wascosa AG

Telematics systems currently in common use in rail transport and fully certified for ATEX Zone 1 use

Manufacturer		Type	ATEX certification	Website
Asto Telematics (formerly Eureka)		aJour ATEX Telematik	Ex II 2G ib mb IIB T4 Gb Ex II 2D ib mb IIIC T130°C Db	www.asto-telematics.de
Cognid Telematik		TrackCube Ex	II 2G Ex e ib [ib] mb IIB T4 Gb III 2D Ex [ib] tb IIIB T125 °C Db	www.cognid.de
Dot Telematik und Systemtechnik		X-Rayl Pointer S17	II 2G Ex ib IIB T4 Gb II 2D Ex ib IIIC 135°C Db	www.dot-telematik.com
Savvy Telematic Systems		CargoTrac Ex	II 2G Ex ib IIB T4 Gb II 2D Ex ib IIIC T135°C Db	www.savvy-telematics.com

Calendar of events

Date	Event	Location	Website
16. – 20.06.2018	19th International Wheelset Congress	Venice, IT	www.iwc2019.com/
18. – 21.06.2018	UIC Security Week	Paris, FR	uic.org/
19.06.2018	30 Years CER	Brussels, BE	www.cer.be
20.06.2018	VPI General Assembly	Hamburg, DE	www.vpihamburg.de
20.06.2018	VPI Get Together	Hamburg, DE	www.vpihamburg.de
21.06.2018	19th Technical information event	Hamburg, DE	www.vpihamburg.de
19. – 21.06.2018	UNIFE General Assembly	Warsaw, PL	www.unife.org.
26. – 28.06.2018	6th Global Rail Freight Conference "Modal Integration at the service of Global Distribution"	Genua, IT	uicgrfc.org/
28.06.2018	Accelerate Rail Infrastructure	London, UK	new.marketforce.eu.com/ accelerate/
27.08.2018	CRSC information event	Krefeld, DE	www.crsc.eu.com
28.08.2018	CRSC General Assembly	Krefeld, DE	www.crsc.eu.com
31.08.2018	VAP General Assembly incl. transport policy podium "Rail freight transport 4.0 – An indissoluble contradiction?"	Berne, CH	www.cargorail.ch
06.09.2018	UIP Executive Board Meeting	Brussels, BE	www.uip.org
18. – 21.09.2018	Innotrans 2018	Berlin, DE	www.innotrans.de
24. – 26.09.2018	CRITIS 2018, 13th International Conference on Critical Information Infrastructures Security	Kaunas, LT	www.lei.lt/critis2018/
16. – 22.09.2018	European Mobility Week		www.mobilityweek.eu/
25. – 26.09.2018	OTIF General Assembly	Berne, CH	otif.org
04. – 06.10.2018	Expo Petro Trans, International Trade Fair for Logistics, Transportation and Handling in the Petroleum Industry	Kassel, DE	expopetrotrans.de/
07. – 10.10.2018	EPCA Annual Meeting	Vienna, AT	www.epca.eu
11./12.10.2018	44th IBS-Congress	Edinburgh, UK	www.ibs-ev.com
16./17.10.2018	1st Rail Connection Conference	Berlin, DE	www.vdv.de
23. – 24.10.2018	18th Technical information event (Date B)	Oberhausen, DE	www.vpihamburg.de
06. – 08.11.2018	Transport & Logistics, Trade fair for transport and logistics	Rotterdam, NL	www.easyfairs.com
15. – 16.11.2018	Global Debate on Mobility Challenges for Future Society	Warsaw, PL	www.uic.org
21.11.2018	PCS Day 2018	Vienna, AT	www.rne.eu
November 2018	Railtech Intelligent Rail Summit	Malmö, SE	www.railtech.com

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Maximum speed and train weight: An international comparison of rail freight standards (2018)

Sphere	Vmax empty (km/h)	Vmax laden (km/h)	Maximum axle load (t)	Maximum train length (m)	Maximum train weight (t)	Minimum braking distance (m)*	Current LAeq (dB)	Post-2020 LAeq (dB)	Maximum fault clearance time (hrs)
EU / ERA	120	100	22.5	740	4,000	700 – 1,000	92 – 96	80 – 84	1,200 (Rastatt 2017)
USA / AAR	112	112	32.5	2,400	15,000	3,000	80	80	100
China	100	100	23.5	900	5,000	1,600	80	80	80
Russia	90	80	25	1,000	7,200	1,060	82	82	80
Australia / HH	80	70	40	2,500	30,000	3,000	82	82	24
Germany / RWE	60	60	35	300	3,100	300	74	74	4

ERA — European Railway Association
AAR — American Association of Railroads
HH — Heavy Haul: Data from Fortescue Metals, Australia / Conditions for Heavy Haul: Axle load > 25 t, train weight > 5,000 t, transport distance > 150 km
RWE — RWE Power AG
*Minimum braking distance — Distance from approach signal to main signal
LAeq (dB) — Equivalent continuous sound pressure level at 80 km/h at 7.5 m transverse distance from track centre