

Uniform EU approvals for motive power units – an absolute prerequisite for railways without frontiers

Europe is growing – and so too is the pressure on and from the roads. If Europe's railways are not to fare second-best by an increasing margin in competition with HGVs, buses, private motorcars and aircraft in the face of the unimpeded further swelling of traffic flows, they need uniform approvals for locomotives, multiple units, railcars and power cars for train sets throughout the European Union – and they need them more urgently than ever before. The approvals procedure must not only satisfy practicability, and economic and uniform European standards of interoperability, but also generally binding and strict yardsticks as regards quality and safety.

1 Vision and reality: Liberalization of the European Union's railway market

Despite the fact that this is going to mean that certain powers will be shifted to EU bodies, the national approval authorities, who have enjoyed far-reaching autonomy to date, are still going to play a decisive role in the integration of their railway infrastructures, each one with its technical peculiarities, resulting from its own unique history, to form a pan-European set of provisions for the approval of motive power units. In this process, the real stumbling blocks to a European-Union railway without frontiers (i.e. an interoperable one) are less the differing rail gauges and power-supply systems and more the diversity of conventional train-protection and command-and-control systems. Alongside the approval of motive power units, the introduction of the uniform European

digital train control and protection system, ETCS/ERTMS, and ensuring its compatibility with the pre-existing systems constitute crucial challenges for a properly-functioning, liberalized EU railway market. The formal legal right of free network access, which has been the route so far favoured by the European Commission, does not, of itself, go far enough for attaining this objective.

Since the European Union was enlarged from 15 to 25 member states in the spring of 2004, Europe's railways have been facing even tougher competition from HGVs, buses and coaches, inland shipping, private motorcars and aircraft than they ever did before. With a total population that is now just short of 450 million, the exchange of goods and the movement of people within the Union is increasing very considerably. According to an expert report commissioned by the German Federal Ministry of Transport, the volume of freight transported in Germany alone seems likely to grow by up to 65 % by the year 2015, when it might be as

much as 700 billion tonne-kilometres per year. The situation in Austria is not much different from this either. There is, however, one difference: since 1999, the railway has succeeded in maintaining its share in the freight market at 34 %. In other words, its growth has kept pace with the overall growth of the Austrian freight market.

Taking the European Union as a whole, experts reckon the growth in freight will be around 37 %. As far as European rail freight is concerned, not only the European Commission's white paper (in its option C) but also the "European Transport Report 2002" submitted by the Swiss Prognos Institute forecast what at first sight appears to be considerable growth of 30-40 % between 1998 and 2010 and 2015 respectively. This would mean an improvement in rail's market share from 13.5 % (1998) to 14.5 % (2015). Considering the longer timeframe of 1991 to 2015, however, road haulage remains the clear winner in the fight for kilometres and tonnage. It ought to have increased its



Dr. Karl-Johann Hartig

Ministerialrat, Head of the Rail Group in the Austrian Federal Ministry of Transport, Innovation and Technology

Address: Bundesministerium für Verkehr, Innovation & Technik, Sektion II, Gruppenleitung Schiene, Radetzkistrasse 2, A-1030 Wien

E-mail: karl.hartig@bmvit.gv.at



Dipl.-Ing.
Edmund H. Schlummer

President Locomotives and Freight

Address: Bombardier Transportation, Holländische Strasse 195, D-34127 Kassel

E-mail: edmund.schlummer@de.transport.bombardier.com



Dr.-Ing.
Andreas Thomasch

Head of Rail Vehicles and Operations at the German Federal Railway Agency (EBA)

Address: Eisenbahn-Bundesamt, Vorgebirgsstr. 49, D-53119 Bonn

E-mail: thomaschA@eba.bund.de

volume of business by at least 100 % – concludes Prognos.

The development trends are even more divergent when it comes to the transport of passengers. "It is as if the whole of Italy were to go off on holiday all over again", is how Prognos' CEO, Nikolai Lutzky, summed up all the future scenarios for passenger transport back in 1990, in the middle of the foundation euphoria of the new borderless Europe. The figures, which he presented at the time, included the forecast that by 2010 passenger transport in Europe would swell by 74 % or 25 million "trips". The much-feared wave of ordinary travellers and commuters, he warned at the time, would flood not only the centrally located Germany, Austria and Switzerland (who sometimes see themselves as stairways used by everyone in the European building) but also Yugoslavia, even with its reduced territory, as well as Poland and the Czech and Slovak Republics.

Reality has, long since turned out to exceed by far all the forecasts made at that time. That was quite clear when Germany (the most important transit country in the entire European Union) produced an interim balance five years ago. According to the figures in the "Transport Report 2000", which were based on 1997 as the reference year, the total annual distance covered by passenger transport was 943 billion passenger-kilometres. Clearly number one in the modal split was transport by private motorcar, with 740 billion passenger-kilometres. Far behind it, came public transport by road with 83 billion passenger-kilometres, whereas rail was only in third place with 74 billion passenger-kilometres. The least used mode was flying, with 36 billion passenger-kilometres. Reacting to this empirical finding, the German Minister of Transport arrived at the assumption that there would be further increases of at least 20 % in passenger transport in the years between then and 2015, when there would be an annual total of 1130 billion passenger-kilometres.

The volume of freight traffic flowing in the alpine republic of Austria swelled by nearly 50 %, especially in the east-west direction, following the opening of the "Iron Curtain" and the enlargement of the European Union. The most recent forecasts are saying that there will be an increase of an additional 25 % by 2015. It is easy to see what the consequences are going to be: east-west transit traffic is going to be superimposed on the already heavy north-south flows. This is going to lead to an intolerable situation not only for the inhabitants of the narrow alpine valleys but

also for those living in the major conurbations.

Up until the present, nothing has changed really radically in this scenario. Motorways and other trunk and secondary roads are still prey to a veritable HGV invasion, while the railway has unused capacity. There are

several underlying reasons for this predicament. Firstly, the production side of transporting freight by rail is still considered to be too expensive; secondly, the railways are still generally operating in the red; and, thirdly, they still have to pay for their competitive drawbacks compared with transport by road or air (such as the

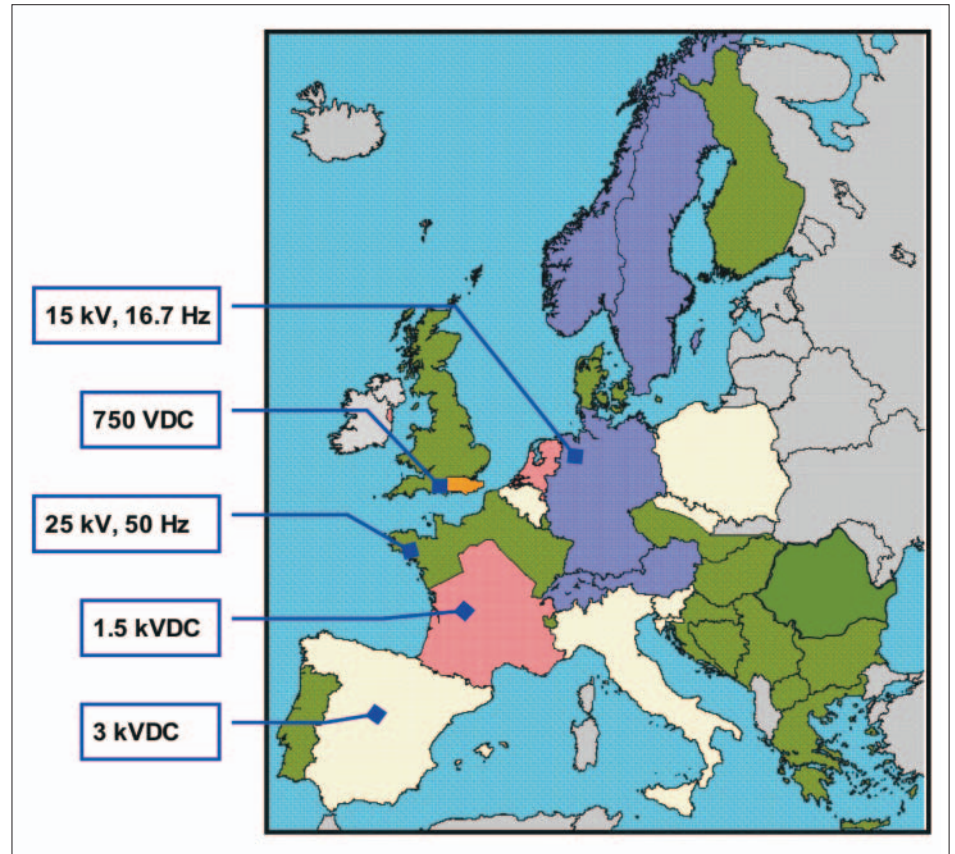


Fig. 1: The various power systems on the railways of Western and Central Europe

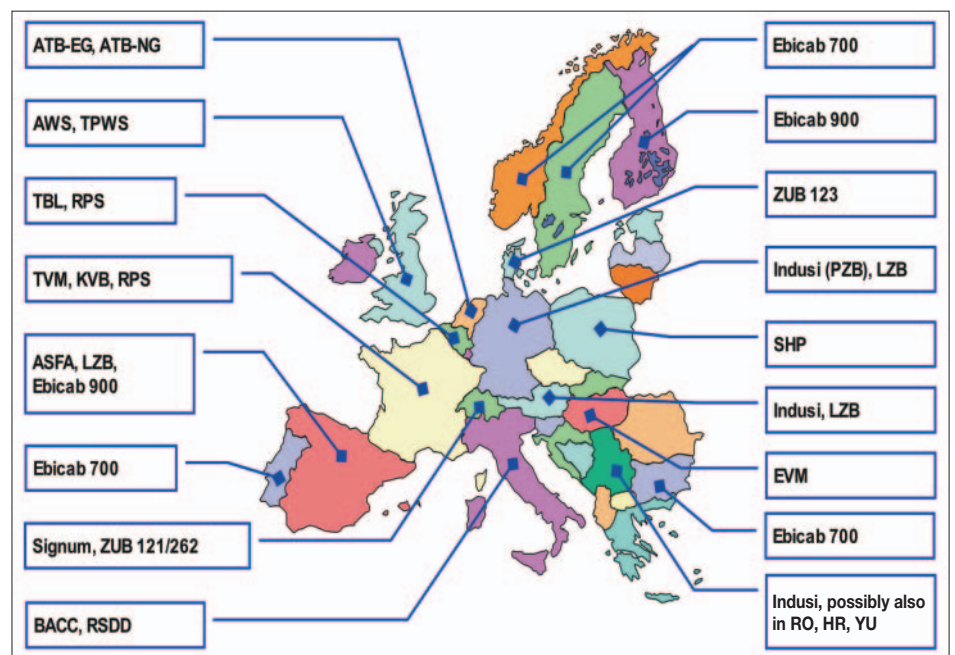


Fig. 2: The most important train-protection systems in Europe

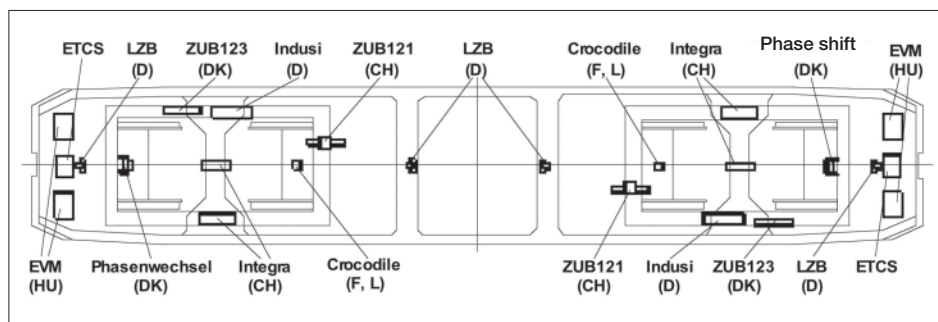


Fig. 3: It is problematical trying to find underfloor space for installing the many antennae needed by the various train-protection systems

taxation of fuels and infrastructure costs) out of their own pockets.

In addition to this, the railways also have to pay too much for motive power units for hauling trains across borders. A modern electric locomotive costs on average three million euros, and around 33 % of this price tag is accounted for by factors “not related to traction” – according to a costing carried out by the railway-supply industry. This includes, in particular, the costs of obtaining multiple approvals, occasioned by the varying national signalling and train-protection systems. These mean 20-40% additional costs for the capital employed (a far from negligible figure!). Seen purely in engineering terms, coping with the five main power-supply systems that dominate European railways (Fig. 1) and more than a dozen train-protection systems in active use ceased a long while ago to constitute serious problems for the manufacturers of locomotives, multiple units, power cars, and so on (Figs. 2 and 3). The other side of the coin is that the drawn-out national approval procedures and the extensive technical equipment for operating with various train-protection systems inevitably push up the price for multi-system motive power units.

From the perspective of the railway-supply industry, there have been manifest contradictions in the development of the motive-power market, its general framework and its constraints since the fall of the political borders in Europe, the attainment of the single European market and the beginning of the process of opening up the market. On the one hand, the state railways have gradually lost their monopoly rights as sole users of the network and have realigned themselves more and more as entrepreneurially-thinking and acting train operators in public ownership. On the other hand, this whole situation has led to a recasting of the roles of the railways and the manufacturers, whose relationships had been steady and perfectly understood by all for many decades. Instead of being the recipients of the mandatory development

and production provisions for motive power units handed to them by the central offices of the old state railways, the manufacturers must now fight tooth-and-nail for the award of contracts, for which no more than the requirements profile is defined prior to the submission of bids.

This shift in paradigm and the emergence of competition, which began to bite perceptibly halfway through the 1990s, led to a collapse in prices, problems with quality, numerous half-baked ideas for trains and frequent inconsistencies in procurement policies. This eventually resulted in the now-predominant requirement in the new situation: what the railways expect above all else from the industry supplying them are ready-to-run motive power units, which must satisfy the requirements for each individual country (which are sometimes extremely divergent) and must also have obtained all the necessary official approvals. The market for railway vehicles is also demanding low-cost motive power units, but ones that are characterized by top values for both reliability and availability. Equally indispensable, claim the train operators, are short delivery times, so that they can react quickly to any new market requirements. In this environment, the railways prefer to put their faith in competitive, thoroughly tested and economic package solutions for new locomotives, multiple units, railcars and power cars.

Although fifteen years have gone by since the starting signal was given for the New Europe, whose thoughts and actions were to be unrestrained by national borders, its most apparent contradictions still frequently come to the fore:

- ▷ rapidly growing transport volumes, but rail denied a “level playing field” with the other transport modes,
- ▷ deregulation of the transport markets, but with inadequate competition rules, and
- ▷ advancing European integration, but still no more than a fuzzy framework for the European Union’s transport policy

and, at best, no more than the initial steps towards harmonized technical standards and guidelines for the railways.



2 Formalistic and overregulated: interoperability on Europe’s rails

What was it then that went awry on the European Union’s transport markets? Was it a lack of liberalization vision, a lack of political willpower? Or were there spanners in the works of national and pan-European interests, making it impossible for governments to keep pace with the market?

In the beginning (hardly had the political borders fallen) was the (written) word. It was the vision of borderless mobility for European freight and passenger transport on land, by water and in the air. The European Commission followed words with actions and proposed a directive on the development of European railways, which was adopted by the Council of the European Communities on 29 July 1991 (91/440/EEC). It was the first item of legislation that introduced, albeit sketchily, the idea of free access for all the community’s railways to the networks of all the other railways. The directive also contained measures for the provision of transport services and the operation of infrastructure to be separately managed and to have separate accounts. Four years later, the European institutions adopted a set of deregulation aims by laying down the framework for the use of the railway infrastructure and by describing procedures such as safety certification, train-path assignments and access prices. Not a single word, however, did they spare at the time for the oh-so-urgent technical harmonization.

Numerous member states, then still with highly integrated former state railways, were showing little interest in further deregulation steps and even found ways of stopping them in the European Union’s machinery. To make matters worse, even railways which had been divisionalized as relatively autonomous undertakings in the course of their national railway reforms performed U-turns towards the end of the 1990s and started to move back under the umbrella of integrated groups. This development ran counter to the intentions of the European Commission, which had clearly underscored its insistence on free-market principles once again in its 1996 whitepaper. As the Commission put it, the only way of sustainably strengthening the competitiveness of the railways compared with the roads

and of finally contributing to revitalizing them was through train operating companies without state monopolies, open and largely deregulated markets, the complete separation of infrastructure and operations and railway companies in competition with outsiders.

Acting on the basis of political objectives enshrined in the treaty establishing the European Community, which include interoperable trans-European railway networks, the European Union went on to take further steps in charting a strategic course. It adopted the “Community guidelines for the development of a trans-European transport network” (the principal axes of the European Union’s future infrastructure), decided for the first time on the components of a number of directives on the technical harmonization of national provisions and, in 1999, adopted the first directive on railway interoperability, which, to begin with, only covered the high-speed segment.

Initially, very little of this was actually noticed on the ground, especially on the European freight railways. Competition did not really develop properly, and the voluntary agreement to create so-called “freight freeways” on a number of the most important freight corridors crisscrossing Europe, which was arrived at after endless haggling, did not result in anything better than patchwork. The hope, cherished in particular by the European Commission, that the freeways would have a domino effect, triggering numerous similar projects, remained a dead letter. The European Commission’s reaction was to “take the bull by the horns” and to create a package, into which it stuffed all the ingredients it considered essential for a liberalized railway market, defining the aspiration and the legal framework with greater precision than ever before.

In this package, the European Union summarizes the essential characteristics of the open railway market as:

- ▷ creating equality of opportunities and effective competition between the railway companies,
- ▷ promoting market and network access for new railway undertakings,
- ▷ dependable access to the railway infrastructure for all entitled operators,
- ▷ protection of railway undertakings in competition with one another against abuse through market domination, and
- ▷ two-way links between the network providers and the train operators to create the greatest possible benefits for railway customers.

In order to ensure implementation of these essential components, the European

Commission demanded that four decisive powers be removed from the individual railway companies and vested in a neutral institution:

- ▷ issuing franchises,
- ▷ establishing charges for use of the infrastructure,
- ▷ issuing safety certificates, and
- ▷ assigning train paths.

While those in Brussels were still locked up in debate, the market created a situation of *fait accompli*. Shippers and providers of logistic services had already reacted to the Europeanization of merchandise flows a long time previously. In addressing Bombardier customers in 2004, Professor Uwe Clausen, Head of the Fraunhofer Institute for Material Flow and Logistics in Dortmund, presented the analysis that, for companies like DaimlerChrysler, and indeed for European automotive suppliers as a whole, the old national borders had ceased long before to constitute barriers to the optimized distribution of goods.

No one ought thus to have been surprised that it was above all the freight railways of the United Europe that resorted to self-help measures. With the backing of the UIC (International Union of Railways) and its “Trans-European Rail Freight Network” (TERFN) project, they signed the Rail Net Europe (RNE) framework agreement in 2002. Since then the “one-stop-shopping” principle has been applicable on Europe’s freight tracks: no matter how many national railway networks a given freight consignment has to use, international freight customers have to deal with just one partner.

Nevertheless, there was once a time when the only promising way of surmounting these hurdles on the way to a European railway without frontiers appeared to be multi-system electric locomotives and (more in the longer term) the uniform digital ETCS/ERTMS (the European Train Control System/ European Rail Traffic Management System), which was (and still is) in the process of being built up (Fig. 4). According to the UIC, it is going to take at least another 10-15 years for this system to be introduced comprehensively throughout Europe and only then will it be really operationally and economically relevant. It is after all a significant agenda item, with a total of 30 000 motive power units and a good 165 000 kilometres of track needing to be equipped, as the European Commission’s whitepaper on transport ascertains. The total capital requirement for ETCS, taking the infrastructure providers and train operators together, has been estimated at as much as EUR 15 billion, which represents a

considerable financial challenge. The dual-system and four-system electric locomotives, which are needed for the smooth operation of both freight and passenger trains on the most important north-south trunk lines cost 10-25 % more than the railways’ comparable single-system locomotives.

In 2004, after numerous controversies, the European Union finally published a set of measures known as the “second railway package”. One of the items in it was the long-overdue directive 04/49/EC, which for the first time formulated the requirements for a uniform safety level for the railways undertakings and the infrastructure managers – initially just for the trans-European networks. Another important item in the package was the regulation setting up the European Rail Agency (ERA), whose future responsibility is to be to coordinate the maintenance of safety, technical compatibility and interoperability on railway tracks throughout the European Union. Thirdly, it included another directive aimed at streamlining the previous mixed bag of interoperability standards.

This package was followed, something over a year later, in June 2005, with the “Regulation on the interoperability of the conventional trans-European railway system”, which built further on a directive of the European Parliament and the European Council adopted in 2001 essentially on the same subject.

Meanwhile, the keystone to the whole structure is formed by the third railway package, which to date only exists in the form of a draft. This contains basic principles concerning the uniform European train driver’s licence and opening up the market in passenger services by 2010. So all the important components for a legally binding set of rules for the European Union’s interoperable railway system (on matters such as system safety and the technical harmonization of rolling stock and infrastructure) exist as drafts or adopted texts on the table of the European house.

As far as the trans-European rail networks are concerned, European-Union law is replacing the approval procedures, which used to be based on purely national legal provisions. What will then apply will be those interoperability measures, which, in the view of the EU member countries, guarantee not only the technical compatibility of motive power units, interfaces and infrastructures throughout the entire railway system, but also free access to networks and markets, as means to this end.

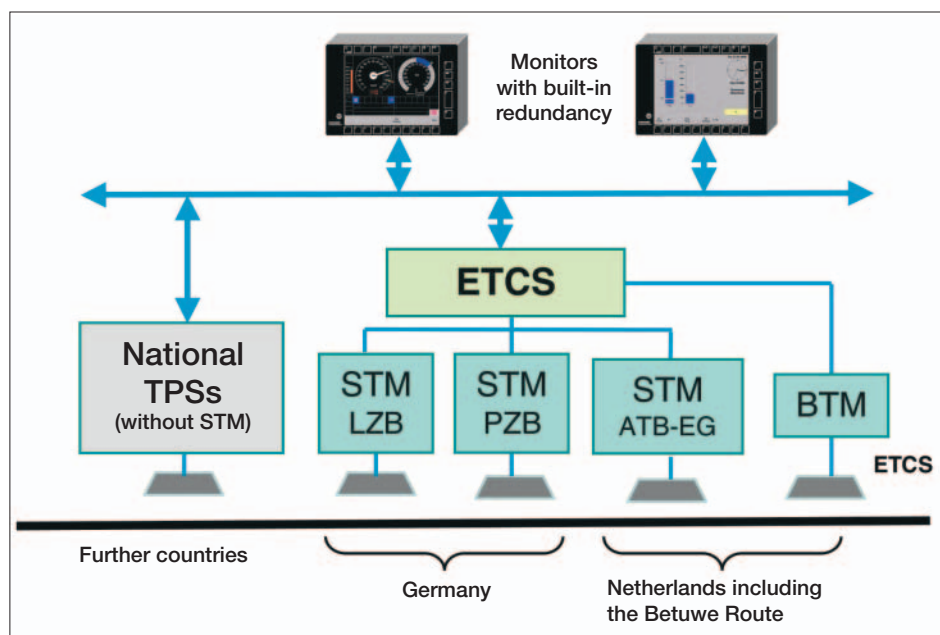


Fig. 4: Bombardier's modular ETCS system for Angel Trains Cargo's class-186 cross-border TRAXX locomotives. This makes it possible to operate with both ETCS and the conventional train-protection systems (TPSs)

The unshakable fundamental requirements also include safety, reliability, availability health and environmental protection. The guidelines, in turn, are based on the mandatory provisions of technical harmonization, whose substantive substructure is formed by the TSIs (technical specifications of interoperability). These TSIs lay down key harmonization values that are compatible with the trans-European networks in the form of technical specifications, norms and standards. In combination with the railway-safety directive, they establish the standards that must be met by interoperable railway technology as well as motive power units throughout Europe.

The TSIs for high-speed trains came into force throughout the European Union on 1 December 2002. Individual documents deal with vehicles, command and control systems, train protection, signalling, energy and infrastructure. The first package of TSIs for the European Union's conventional railway system has also been adopted. The individual documents here cover freight wagons, train control, train protection, signalling, operations, traffic control, noise and telematics for freight trains. These are due to be published in all the appropriate languages in the Official Journal of the European Communities, and the national approval authorities have been waiting for them since the start of the year.

It is envisaged that the second, third and fourth railway packages could be adopted between 2007 and 2009. These contain the TSIs on tunnel safety, handicapped transport, motive power, passenger stock,

energy, infrastructure, maintenance and telematics for passenger trains.

A group of experts has been given the task of defining catalogues of requirements for each of the pending TSIs; its membership is made up of representatives of railways, railway manufacturers and suppliers. All standardization work in the strict sense of the term is the exclusive preserve of the European standardization bodies, CEN (European Committee for Standardization) CENELEC (European Committee for Electrotechnical Standardization) and ETSI (European Telecommunications Standards Institute).

In their work, these organizations are guided by four fundamental principles, which were adopted in a Council resolution back in 1985 (OJ 85/C136/01):

1. limitation of harmonization to essential safety requirements
2. drawing up of technical specifications and standards
3. voluntary nature of the basis for the use of technical specifications and standards
4. conformity with the general guidelines in the application of specifications and standards.

These guidelines have been of fundamental significance insofar as (technical) standards complying with these four fundamental principles are contributing decisively to deregulation and are freeing governments, businesses and the people from superfluous detailed provisions impeding development. This is

in line with the principles of the new European approach to technical harmonization and standardization. According to this, the guidelines only lay down what fundamental requirements rail vehicles must satisfy for entering service but not how these are to be achieved in technical terms. What this means (no more and no less) is that if technical standards are to be elevated to the status of statutes they must be limited to just what is strictly necessary.

In order to attain the objective of interoperability on Europe's railway lines, however, it is necessary to replace the general principle that the use of standards is a voluntary matter with legislative acts that are binding. This is the case for all European standardization tasks resulting from the interoperability directives or their subordinate technical specifications (TSIs). A whole edifice has been constructed on top of this foundation of laws and guidelines – that of the European procedures for testing, certifying and commissioning standard-gauge railway vehicles, including locomotives, multiple units, railcars and power cars for train sets. Its cornerstones are the so-called essential requirements and the procedures for performing inspections, analyses and evaluations and for placing trains in service: anyone wanting to place motive power units on the market throughout the European Union in future is going to have to document their safety, reliability and interoperability, to have them certified as being in conformity with EU provisions through certification offices known as notified bodies and to be in possession an authorization for putting them into service issued by the railway safety authorities of the member states (which, in the case of Germany, for instance, is the Federal Railway Authority, EBA). Currently, there is one notified body in Germany, the independent Eisenbahn-Cert (EBC). It works together with other accredited inspection bodies, product and quality certifiers and inspection laboratories.

In Austria, several accredited notified bodies have been entrusted with inspection activities. They also work both with one another, through an Austrian and a European network, and with accredited inspection bodies and test laboratories.

In addition, the Austrian railway authority is currently working with the railways to produce a set of specifications for EC testing of subsystems, in order to provide the notified bodies with a form of inspection manual.

Even if the contours of the new situation are now becoming clearer and clearer, it is still likely to take many years until the



Fig. 5: The class 185's driver's console for hauling trains between Germany and France. Given the lack of interface uniformity, the operating elements for the French train-protection system have had to be placed on top of the regular monitors



Fig. 6: Thanks to close cooperation between all the bodies involved, very little time was needed to obtain the approvals for the Swiss Federal Railways' class "Re 482" and BLS's class "Re 485" for working between Germany and Switzerland. The two classes are identical

harmonization of railway technology and the transposition of the EU's legal framework for the railways have made their way into laws and ordinances throughout the European Union, causing a coexistence of old rules and new ones (Fig. 5). It is by no means least on account of the unexpectedly long migration phase for ETCS/ERTMS, with the renewal, refitting and retrofitting of rail vehicles and the subsystems, that, for the time being, the core remains intact of those national provisions that cater for the technical, topographic and operational peculiarities of each individual country. Examples of this are a switchable version of the Integra permanent magnet needed for the Swiss ZUB train-protection system and the requirement on steep alpine railway lines in Austria for it to be possible to reapply brakes without fully releasing them first as well as particularly tough fire-prevention precautions on motive power units.

At the same time, weaknesses and shortcomings are showing up in the process of technical harmonization. On the one hand, they threaten to move away from the once pragmatic approach of "harmonization, homologation and European approvals only where necessary" and to expand the approvals procedures into something much more bureaucratic, taking up more time and costing more money – on top of the problems already existing with ETCS. On the other hand, they evoke the danger of blunting the instruments of technical harmonization through overregulation and multiple testing. That is precisely what has happened with the accreditation of inspection and certification bodies both for the railway as a whole and individual subsystems and specialized parts and subassemblies within those subsystems,

resulting in a large number of certifiers and testers. If those national bodies that are responsible for safety are to be able to validate whole and part systems definitively, both the content of such certification bodies' work and the procedures they practise must thus be coordinated and harmonized at the pan-European level.

Yet another situation that seems to be at least as problematic is the safety evaluation of certificates and test results issued by inspectors and certifiers in parts of the world not subject to European Union laws or the laws of its member states. Once again, there are large numbers of exceedingly different inspection bodies and certifiers. There may well be justified grounds for considering that there are differences in the quality of their inspections. This state of affairs causes considerable difficulties for notified bodies and safety authorities alike. In the final analysis, after all, the safety authorities, in granting authorizations for vehicles or their part systems to be placed in service, also assume overall responsibility for the safety evaluation of them.

Despite all this, there is actually no viable alternative to the route embarked upon of European "harmonization, homologation and approval" for motive power units too. There is a broad measure of agreement on this point amongst manufacturers, train operators, infrastructure managers, the national and European authorities and governments. The question, however, is: can goodwill alone suffice to cure the harmonization process that is on the move from its flaws and even to accelerate it, considering the complicated, longwinded participation of the 25 countries that are now EU members?



3 Compromise and pragmatism: cross-acceptance in the German–Austrian–Swiss triangle and beyond

Time is not on our side. Bombardier, for instance, as the world-market leader in the development and construction of electric locomotives, knows what time and money has to be spent on obtaining approvals even for the most modern, interoperable TRAXX platform of electric locomotives with their multi-system capability. In some countries the approval procedure, especially for locomotives for hauling cross-border freight trains, can drag on for months – even for years. In such cases, for instance in France, the additional costs incurred run into millions of euros. It is generally the case that the national authorities exploit their decision-making latitude to the full in favour of the approval-granting body.

Bombardier is one positive example of a manufacturer that has succeeded in very considerably reducing the time needed for its locomotives to complete the approval procedure. It has achieved this by carefully analyzing its experience in recent years, by maintaining a sustainable presence in each of the countries concerned and also by practising a lively exchange of information with the particular authorities and train operators (Fig. 6). It took an exceptionally short period of time at the end of 2004 (faster even than scheduled) to obtain approvals for Italy and Switzerland for its TRAXX F140 MS multi-system locomotive, known as Swiss class "Re 484" (Fig. 7). Another locomotive belonging to the same platform, TRAXX

F140 AC1, which has been running dependably for Railion in Germany as class 185.1, obtained its approvals for operating between Germany and Austria or in the triangle comprising Germany, Austria and Switzerland thanks to making the most out of this particular know-how. At the time of writing, Bombardier is the only manufacturer with an AC locomotive in its portfolio that is authorized for Germany, Austria and Switzerland. Given that there is a fundamental and direct correlation between the duration of approval procedures and their costs, speeding up the procedures as just described also reduces the financial outlay incurred by them.

An extremely valuable and advantageous step for bringing about close liaison and coordination between the manufacturers and the competent national authorities as regards approval activities came about with the setting up of “AG CH/D/I/A”, a practical international consortium concerned with approvals. The competent authorities involved in it are those from Germany (EBA), Austria (Federal Ministry of Transport, Innovation and Technology, BAV) and Italy (Cesifer), and they have recently been joined by the Dutch IVN.

“Cross-acceptance” (or “mutual recognition”) is the term that has been coined for the approval pragmatism, which has been expressly welcomed by the railways and the industry supplying them. The cooperation, which EBA, BMVIT and BAV launched towards the end of the 1990s, has the effect of simplifying, harmonizing and unifying the homologation of all the test, validation and approval

processes to be carried out, and its aim is their multilateral recognition. Since then, Germany (D), Austria (A) and Switzerland (CH) (sometimes called the “DACH countries”) have been pursuing the principle that, if a particular motive power unit for cross-border operations has already been approved in one of the three countries, the others will fundamentally accept and recognize its essential safety evaluations and documentation for the other countries too.

Given its success, on account of its economic efficiency and lean organization, the cross-acceptance procedure can actually trace its lineage back to the inter-governmental regulations governing the international exchange of freight wagons, RIV and RIC, which were adopted many decades ago. What is immediately striking is the practical focus of the technical safety requirements for the approval of motive power units as agreed by the DACH countries. They have adopted the same clear demarcation lines as regards the responsibilities of the manufacturers, operators and national authorization bodies in charge of safety. Thanks to the fact that these approvals provisions do not go beyond harmonizing those matters that are essential for free market access and do not set out to harmonize everything that might possibly be harmonized, they ensure the technical compatibility and interoperability of vehicles on the transport markets, but at the same time leave the manufacturers the necessary latitude for bringing innovative, low-cost designs of vehicle onto the market. In doing this, both the manufacturers and the approval/ authorization authorities know that their position is underpinned by clear-cut

minimum safety requirements in accordance with the latest recognized state of the art. Equally clear definitions apply to the approval documents, test reports and expert opinions which a manufacturer must submit for obtaining the necessary overall safety evaluation for a motive power unit from the authorization bodies. Of course, there has also been homologation of the minimum documentation required for appraising interfaces and evaluating the interplay between a given motive power unit and the other subsystems making up the railway.

The manufacturers, the railways and the approval authorities all conclude that the cross-acceptance procedure for the approval of locomotives, multiple units, railcars and power cars for fixed train sets has been positive in each of the countries concerned. One point they all stress, in particular, is that the processes that have been specified and qualified in this way have led to a very considerable cost optimization for all of the parties involved.

This pragmatic, efficient minimum-homologation approach, which achieves homologation and approval in a single process thus has the best possible credentials for being applied directly throughout the European Union. More than that: the rail-vehicle manufacturers, those purchasing rail vehicles (be they train operators or leasing companies) and the approval authorities in both the European countries directly concerned and outside of Europe could thus soon be handed a uniform approval formula that has been proven to work in practice. Given the rapidly advancing industrialization of rail freight and the strong competitive pressure on it coming from the roads, it is urgently waiting for unbureaucratic, low-cost and dependable approval standards. So nothing could be more self-evident than to implement the technical harmonization objectives step-by-step and country-for-country along the European Union’s most important freight corridors on the basis of mutual recognition.

It is the view of the approval authorities involved that the substantive test and validation provisions for motive power units must be worked out in several stages in the context of a common homologation procedure for the EU countries still to be agreed upon. These stages might look like this:

- ▷ agreement on common safety requirements (uniform safety objectives)
- ▷ agreement on compatibility requirements (essential minimum compatibility)
- ▷ harmonization of process design and management (scale and substance)



Fig. 7: An SBB/CFF/FFS Cargo class-“Re 484” locomotive hauling a shuttle freight train between Switzerland and Italy

- of the test processes, avoidance of unnecessary/redundant tests)
- ▷ elimination of the obstacles caused by national legal provisions (reduction in national administrative constraints and avoidance of unnecessary ones)
- ▷ clear demarcation lines between the responsibility of the manufacturers (product liability), train operators (operator liability) and the approval authorities' in charge of safety
- ▷ clear-cut definition of the minimum safety requirements demanded by the authorities granting authorizations and for the approval documentation, test reports and expert opinions needing to be submitted for the overall safety evaluation, and
- ▷ clear-cut definition of the minimum documentation required for appraising interfaces and for the evaluation of the vehicle's coherence with the other subsystems.

Important as what has been presented above may be, however, the technical harmonization on Europe's railway tracks depends at least to the same extent on whether or not the European Union and its member states manage a radical acceleration in the rate at which ETCS is introduced on the most important long-distance freight and passenger routes. Since the conversion of numerous legacy vehicles is by no means the smallest factor in pushing up the costs of migrating to ETCS, any targeted financial aid made available by the European Union will more than pay for itself in the medium term; interoperability ought to be seen as investing in the long-yearned-for competitiveness of the European railway system. The long-cherished dream of the locomotive that can work from Copenhagen to Naples just as easily as its competitor on the roads would finally come true.



4 Concluding summary and prospects

Up until the end of the 1990s the main reason that only sluggish progress was made in the liberalization of the European railways was the absence of technical harmonization of the rolling stock and infrastructure. Since then, the European Commission, confronted by massive increases in traffic, especially on the roads, has put an intensive effort into establishing a complete set of provisions to be applicable throughout the whole of the European Union, especially for the approval of interoperable motive power units.

This whole process, however, runs the risk of grinding to a standstill not only on account of the complicated process of arriving at agreements amongst the EU's 25 member states but also due to conflicting national and European interests. The zealous overregulation by the European Union's regulatory authorities is turning out to be another obstacle of similar proportions.

It is the opinion of the authors that the process of cross-acceptance in the homologation and approval of motive power units that is already being successfully practised by the approval and authorization bodies in Germany, Austria, Switzerland, Italy and the Netherlands, in close coordination with big locomotive manufacturers like Bombardier, constitutes a genuine alternative to the current European homologation practice. Firstly, cross-acceptance promises clear-cut and economically efficient rules. Secondly, it avoids duplicate and even triplicate procedures. Thirdly, it is optimally suited for practical use and has the further advantage that it could be implemented speedily within the European Union.

Notwithstanding all these benefits, such a step would still be impossible without the goodwill of all concerned. Such a procedure of short, direct communication overcoming borders would make everybody into winners: the train operators, the infrastructure providers, the manufacturers of railway equipment, the approval and authorization bodies, both European and national, and, by no means least, the railway's customers.

Recommended further reading

SCI/Verkehr: Der Weltmarkt für Bahntechnik (summary), Cologne 2003.

UIC: European Rail Research Integration, Paris 1998.

Haase, Dagmar: Rail Net Europe. Gateway to European Rail Infrastructure, lecture held at "Transport 2003", Munich 2003.

Rail Liberalization Index 2004, including for the first time the new member states of the European Union, Deutsche Bahn press communiqué, 11 July 2004.

Bahn frei für Europa. Allianz pro Schiene e.V., Berlin 2002.

Leenen, Maria; Neumann, Lars: Der deutsche Bahnmarkt – Marktanalyse 2004 bis 2009. In: Internationales Verkehrswesen (56) 9/2004, pp. 395-398.

Clausen, Uwe: Verkehrsströme und Logistikanforderungen im Europa der Zukunft. Grenzenloser Schienengüterverkehr in Europa, lecture manuscript, Deidesheim, 05 May 2004.

German Concrete Information Centre (publisher): Prospects and Concepts for Mobility and Infrastructure, Cologne 2001.

German Concrete Information Centre (publisher): Statistical Compendium on Mobility, Mobility Congress, Cologne, 2000.

Prognos AG (publisher): Transport in the New Europe, Basel, 1990.

German Transport Forum: Mobility for Germany. Facts and Demands, Berlin 2005.

UIC position paper on the effects of directive 91/440/EEC and the provisions derived from it in the countries of Central and Eastern Europe, Paris, 1999.

Pan-European Corridors and Pan-European Network, UIC paper, Paris, 2000.

UIC + Deutsche Bahn AG (publishers): UIC ERTMS Conference 2003, Leipzig 2003.

VDB: internal newsletter, No. 1, Berlin, 2005, pp. 7 ff.

Das Ziel einer gerechten Anlastung der Infrastrukturkosten wird deutlich verfehlt. VDV position paper, Cologne, 2003

Neue wirtschaftliche und administrative Hürden würden die Integration des europäischen Eisenbahnmarktes behindern, VDV position paper, Cologne, 2004

Regelwerk auf Europakurs. Projektbericht. In: Brunel Newsletter 17, No 3, 2004, p. 4

Vitins, Janis: Bombardier erweitert seine Lokomotivfamilie Traxx. In: Elektrische Bahnen, 3/2005.

Honegger, Peter; Walther, Jörg: Wettbewerbsvorteil Länder-Zulassungen. In: Güterbahnen, 2/2005.

European Commission white paper: A Strategy For Revitalising The Community's Railways, COM (96) 421 of 30 July 1996.

Council Directive 91/440/EEC of 29 July 1991 on the development of the Community's railways. Published in the Official Journal of the European Communities 24 August 1991, L 237, p. 25.

Decision No 1692/96/EC of the European Parliament and of the Council of 23 July 1996 on Community guidelines for the development of the trans-European transport network: Published in the Official Journal of the European Communities of 09 September 1996, L 228, p. 1.

Council Resolution of 7 May 1985 on a new approach to technical harmonization and standards (85/C 136/01): Published in the Official Journal of the European Communities of 04 June 1985, pp. 1-9.

Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system: Published in the Official Journal of the European Communities of 17 September 1996, L 235, p. 6.

Directive 2001/16/EC of the European Parliament and of the Council of 19 March 2001 on the interoperability of the trans-European conventional rail system: Published in the Official Journal of the European Communities of 20 April 2001, L 110, p. 1.

Directive 2004/49/EC of the European parliament and of the council of 29 April 2004 on safety on the Community's railways and amending Council Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification (Railway Safety Directive): Published in the Official Journal of the European Communities of 30 April 2004, L 164, p. 44.

DIN EN 50126: Railway applications. The specification and demonstration of reliability, availability, maintainability and safety (RAMS). Beuth Verlag, Berlin, March 2000.

Guide on drafting directives based on the new approach and the global approach. Publications Office of the European Communities, Luxembourg, 2000.

Council Decision 93/465/EEC of 22 July 1993 concerning the modules for the various phases of the conformity assessment procedures and the rules for the affixing and use of the CE conformity marking, which are intended to be used in the technical harmonization directives: Published in the Official Journal of the European Communities 30 August 1993, L 220, p. 23.

Thomasch, Andreas: Sicherheitsanforderungen an Schienenfahrzeuge und europäischer Harmonisierungsprozess. In: ZEVrail Glasers Annalen 128 (2004), SFT proceedings, Graz, pp. 28-47.