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The effects of the ERTMS introduction on the Hungarian railway workers

I'm István Gaskó, president of VDSzSz, the largest trade union of railway employees in Hungary. In my presentation, I whish to speak about the employee-related experience concerning the introduction of the ERTMS/ETCS systems in the context of the activity of a related European trade union project.

Some information about Hungary and the Hungarian railways. Hungary lies in Central Europe; it has been a member of the European Union since the 1st of May 2004. The density of its railway network exceeds the European average.

The following map illustrates the Hungarian railway network. The colored lines indicate the main lines of MÁV. Some of the marked main lines are parts of various European traffic corridors:

- TEN no. 4 – (Dresden/Nuremberg – Budapest – Istanbul) red
- TEN no. 5 – (Kiev – Budapest – Venice/Rijeka/Ploce) green
- TEN no.10 – (Budapest – Thessalonica) black

The section Budapest-Hegyeshalom constitutes a part of the corridor no. 4, where service level 1 of the ETCS system has been built up in recent years. Besides, building up is in the preparatory phase in further sections of corridor 4 and also in the sections of corridor 5 subject to modernization.

Among the traction engines, 16 electric locomotives of series V63 have been equipped with on-board equipment needed for using the services of the ETCS system.

Interoperability, the ETCS and the railway policy of the EU

It is a historic tradition in Europe that railways were organized on national bases in the 19th century. This is the reason why the various national railway companies still function with different technical and organizational backgrounds in terms of track, energy, safety and signaling system, traffic rules etc.

With the expansion of the European integration, demand for mutual transversability in European level i.e. interoperability is increasing. This means that the various sub-systems of railway operation shall be standardized in order to ensure that the trans-European traffic can flow without being interrupted by the need to stop, changing engine and personnel at national borders.

The development, designing and deployment of ETCS, the consistent European safety equipment system has been launched under this framework. In the planning process, the functions, services and the forms of display that comply with the above requirements had been defined step by step. The track and the on-board equipment performing standard functions had been produced by various manufacturers on the basis of this concept. This does not mean, as a matter of course, that the technical solutions applied by various manufacturers are identical, therefore, the specific trouble shooting and other activities concerning each type of equipment highly deviate. The development of the ETCS goes on under the ERA and we do hope on this basis that the depth and rate of standardization will continuously increase.

Services provided by the ETCS, just in brief

The services of the ETCS have been identified on three levels.

- **ETCS level 1:** Level 1 of the ETCS relies on the services of national safety installations. The line equipment of the ETCS deployed next to the track section signals along the track and interpreting the information of the image displayed on the signals transforms the same into a special message format and transmits them to the on-board computer of the vehicle via the balise. This information is displayed on the cab device in front of the loc driver. The services of the system are limited. In case of stop signal it stops the train.

- **ETCS level 2:** In case of ETCS level 2, the information necessary for the driver are transmitted directly from the computer system of the service center directing the train onto the on-board computer of the vehicle via a special-purpose GSM-R network. From these data the on-board computer of the engine displays the necessary information for the driver. In case of ETCS level 2 the signaling devices along the route can be abandoned. The services of the ETCS level 2 are much wider and more comfortable in relation to ETCS 1 in terms of stopping the train or speed regulation.

- **ETCS level 3:** In ETCS level 3, the track sections on the railway route do not exist even virtually, the trains so to say take with them the safe „block distance" within which the train must not get. Adjusting itself to the movement of the first train the system automatically regulates the speed of the following train.

Common use of the ETCS

Two European countries can be mentioned in terms of wide-spread ETCS: Spain and Italy. In the past two decades, these two countries have established basically with the financial support of the European Union new high-speed railway networks primarily for passenger transport with the dominant deployment of the ETCS. These countries launched their supported railway investments with good strategic sense at good time, and have become through this „fields of reference" for the trial of the new system. The ETCS functions well and with acceptable safety in these countries.

In other countries possessing a considerable railway history like Germany and France, only experimental or test lines are available on which they try to gather experience in relation with the operation of the system, and no decision has been made yet concerning the building up a consistent network. The building up of these lines is virtually bound to the concepts of a European freight forwarding corridor outlined by the European Commission.

The system is being developed in other continents, as well; the largest deployment takes place in China in the framework of the dynamic construction of a high-speed railway network.

The Hungarian development follows this trend, in the course of which the ETCS level 1 has been installed on the Budapest-Hegyeshalom line in the second half of the 2000s.

About the projects mentioned

The project is aimed at foreseeing and influencing the changes caused (may cause) by the introduction of the ERTMS/ETCS technology in the railway sector, collecting preliminary information about the installation of the ERTMS/ETCS technology in European countries and the experience of introduction, identifying the jobs concerned and the impacts on the working conditions of employees.

The final purpose of the project is the elaboration of a special European trade union strategy to minimize the negative impacts of the introduction of the ERTMS/ETCS technology on railway employees. Railway unions of eight European countries are involved in the project. Project management falls within the responsibility of the Italian colleagues. Scientific support (labour sociology) to the project is provided by the staff of the University of Venice.

The conclusions of the presentation are based on the analysis of the data of a poll carried out in the course of the project, extending to several countries, and on the experience of national workshop meetings held with the involvement of the employees of the countries involved.

Dilemma of national railway and infrastructure companies

The various levels of the ETCS provide services of different standards. These services can be compared with that of the railway protection installations operated by a specific country.

As a rule, the safety standards of the ETCS level 1 services comply more or less with the „average" of services provided by the national railway protection installations. Among them, the services of some national systems are near to the ETCS level 2 services. Thus e.g. a considerable part of the domestic high-speed ICE passenger trains operated by the DB run safely under the LZB, the German national protection system.

The situation survey of these railway companies can be understood since if the new system does not really provide „added value" services in relation to the safety standards of the existing systems, why should they spend considerable amounts on the replacement of their current functional railway protection systems or finance the operation of two safety systems simultaneously.

Introduction dilemmas

With special regard to the economic world crisis and the difficult financial situation of the railway companies, the efficiency, cost effectiveness, and return aspects of the investment cannot be neglected. It is another issue, how and to what extent does the depressed freight market accept the inclusion of the cost increase entailed by the ETCS investment in the fee paid for track use.

The procurement costs of ETCS facilities and the installation expenses of the GSM-R system are very high, which may hinder the wider introduction of the system.

These dilemmas delay the making of decisions facilitating the wider introduction of the ETCS.

Deployment and operation compromises of the ETCS

Depending on the different levels of deployment referred to above, the use of the ETCS in the current phase is characterized by more or less compromises almost everywhere. The experience related to the operation of the system verifies that the errors and problems observed in the course of testing and introduction depend on the amount and rate of compromises applied in preparation, deployment and operation.

According to our experience, the main compromises applied and risks emerging in deployment and operation are the following:

- is it deployed on a high-speed or a conventional railway line;
- is there mixed traffic on the route (conventional – high-speed, passenger/freight forwarding);
- does the ETCS function on the route on an exclusive basis or parallel with the conventional national safety system;
- is ETCS level 1 or ETCS level 2 deployed and operated, do the two levels change on the route concerned;
- is the ETCS deployed in the whole length and every station of the railway line (route) concerned (incl. larger stations) or is it interrupted several times requiring change-over to the conventional national safety system;
- do all trains on the route use the ETCS or the trains running on the line use different types of safety systems depending even on the outfit of the vehicle?

The troubles, defects and handling difficulties emerging because of the above risks often refer to the ETCS as if these phenomena were attributes of the ETCS; the consequences of bad design, preparation or execution. In our opinion, the risks mentioned above should be treated with more emphasis in preparation of the deployment of the ETCS, through which the above problems could be avoided. According to our experience, special care should be taken in the regulation of change-over between different systems; these processes need more support, automation in order to radically reduce the number of troubles resulting from personal operation failures.

Our trade union supports the deployment of the ETCS with assuming a minimum amount of compromises so as in their daily work the employees perceive and enjoy the benefits and the services offered by the ETCS for the sake of enhanced traffic safety.

As a matter of course, the ETCS itself is good and safe in terms of functionality and services, and represents the trend of the future.

Impact on the activity of the engine drivers

The deployment of the ETCS affects most the activity of the engine drivers; their working practices and the circumstances of getting information will change. Concerning the activity of the engine drivers it should be taken into consideration that simultaneously with the surplus activities resulting from the deployment of the ETCS, the drivers have to cope with deviating energy supply and the frequency changes of the engine radio, as well. If these coincide in time with the surplus tasks resulting from the ETCS, this has to be taken into account by all means in establishing time demands.

A potential consequence of the application of the ETCS level 2 is the abandoning of the section signals along the track. This is a major change in relation to the earlier imprinted driving practice where the primary tasks of the engine driver used to be the observation of the track and the signaling devices. With the ETCS level 2, in an optimum case; all necessary information can be displayed on the on-board installations of the vehicle (DMI), which needs adaptability and accommodation from the driver. This requires change-over and attainment of new skills within a short time by using simulators.

Our recommendation is the use of simulators in the training and preparation of the engine drivers, where besides exercising the ETCS functions special emphasis is laid on the correct treatment of cases that may emerge concerning the risks listed earlier in order to ensure that these special functions become routine-like skills in the course of train driving.

Impacts on other jobs

In addition to the engine drivers, concerning other jobs, measurable impacts can mostly be identified on the activities of the traffic and train dispatchers, the vehicle repair and maintain staffs, and the track maintainers.
A significant change is in the jobs of the railway traffic regulators and dispatchers that the local, station tasks of one worker or a few workers will be centralized. Regional or national dispatcher centers shall be established where

the dispatchers carry out their work in teams in a tight hierarchic relation, which requires a basically different working culture along with the changed contents and technical conditions of the activity.

The track railway and safety equipment operation and maintenance activities are subject to profound changes, as well, since the technical/technological basis of the ETCS significantly differs from the systems applied to date. The knowledge of professionals of GSM technology as telecommunication background is easily convertible since firms in the mobile phone and internet scenarios apply the same.

The situation of the vehicle maintenance employees is very similar to this. On-board devices appear in the outfit of the vehicle, the operation and maintenance of which require different approach in relation to the activities performed earlier. There is no need for deep universal knowledge any more concerning the functions of the equipment, the „self-diagnostic" devices take over the tasks of trouble shooting and the defects shall only be read in the course of maintenance; even the replacement of any assembly is indicated by the equipment itself. The supplier shall repair or replace the dismounted assemblies, and this situation makes the staff used to the earlier working culture frustrated.

In accommodating to the changes in the activity, sooner or later the demand for organizational changes will emerge in every area and this may concern the relations of the employees, as well.

Summary

It is clear on the above basis that the proper handling of the human considerations of the discussed changes is inevitable for the successful introduction of the new technology. It is reasonable to design and implement the required human preparation, training and retraining in close relation with the compromises discussed earlier concerning the introduction of the ETCS.