13th International Research/Expert Conference
"Trends in the Development of Machinery and Associated Technology"
TMT 2009, Hammamet, Tunisia, 16-21 October, 2009

ANALYSIS OF THE DATA RELATED TO THE PROPER TECHNICAL FUNCTIONING OF THE VEHICLES IN THE FEDERATION OF B&H

Dr. Sc. Safet Brdarević
Dr. Sc. Sabahudin Jašarević
Universit of Zenica
Fakultetska 1,72000 Zenica, B&H

Fuad Klisura, dipl.inž.,
Muhamed Barut, dipl.inž.,
IPI Institut, Fakultetska 1,
72000 Zenica, B&H

ABSTRACT
Regular and preventive inspections of the vehicles may be considered to be the preventive maintenance on the constant date. Their proper performance may contribute the reduction of the number of vehicles on our roads, being technically out of order. In Bosnia and Herzegovina, particularly in the Federation of B&H, the activities in arranging the functioning of the stations for technical inspection have been going on within the last two years and since May 2009 the real time video-surveillance system has also been introduced. In this paper there is a brief analysis of the data related to this issue for the first six months of 2009.
Key words: video-surveillance, information system, station for technical inspection of the vehicles

1. INTRODUCTION

In 2000, Federation of B&H disposed of ten stations for technical inspections (STI) that met all the requirements and were approved by the Federal Ministry of Transport and Communications to perform technical inspections of the vehicles, and presently there are 156 of them. Insurance companies, agencies for registration of the vehicles, business companies dealing with sale and calibration of the equipment as well as the individual interests had a decisive influence in the field of proper technical functioning of the vehicles. According to the provisions of the Article 219 of the Law on transport safety on the roads of Bosnia and Herzegovina, the minsitries of the two entities and the Cantonal ministries issued the approvals for work and supervision of the stations for technical inspections.

Due to the not yet harmonized and dual competence (Ministry of Internal Affairs and Ministry of Transport and Communications) there was a need to implement better order, better quality of inspections and proper technical functioning of the vehicles, but it did not give significant results. The Government of the Federation of B&H made a regulation on temporary management supervision of the organization of work in the stations for technical inspections. This created the prerequisites for introducing better order in the inspections of proper technical functioning of the vehicles by strict implementation of the regulations and the listed activities according to the procedures stipulated by the law, and according to the standards and directives of the European Union.

2. A SINGLE INFORMATION SYSTEM - INTRODUCING

The State project to enter all the registered vehicles on the territory of Bosnia and Herzegovina into a single data base together with the Ministries of Internal Affairs and IDEE (CIPS) was in line with the decision of the Government of FB&H and the selection of the professional institution IPI- Institute for Business Engineering doo Zenica to establish the integral information system (IIS). In coordination with the Federal Ministry of Transport and Communications (FMP&K), IPI-Institute, while developing IIS, worked on a number of tasks: it took part in solving a number of insufficient stipulations in the law regulations as well as in defining the project task, real time Web applications based on the solutions of some countries of EU. They established the cooperation with the head-office of CIPS, legal entities, the owners of the stations for technical inspection of vehicles, concerns and the like.

Information infrastructure was rather undeveloped. To perform their activities, the stations for technical inspection were obliged to be connected to the internet throughout all the effective work time. In coordination with the Federal Ministry of Transport and Communications two applications were created for real time work:

- a|TEST real time web application as the final integral solution operates on the principle of web service and for its functioning only the web browser and the corresponding internet connection on the computer are quite sufficient.
- a|TEST smart application is also web-based; however it saves some of its components locally, while it disposes of the data integrally. It is faster and more difficult for maintenance and it is used as a „reserve" in case of occurrence of some problems with the a|TEST web application.

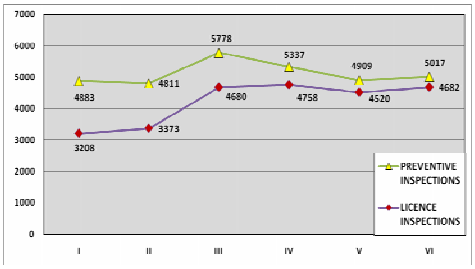
LAN network on the premises of IPI-Institute in Zenica is a system with the central server, according to the procedures of ISO 27001:2005, where the copies of the data base are made in order to keep the information safe. Each station in the Federation of B&H is connected, which may be applied from the entity of the Federation of B&H to the entire B&H and even to the broader neighbourhood. The users are connected to all important state and professional institutions in the country. Since 1st may 2009 video-surveillance of STIs has started in the Federation of B&H and it is the first one in the countries of former Yugoslavia and South-Eastern Europe.

3. STATISTIC INDICES OF STI WORK THROUGH a|TEST APPLICATION

The analysis of the data for the period from 1.1.2009. to 30.6.2009. shows continuous increase of the number of the „observed" malfunctions on the assemblies and parts of the vehicles, noticed during the technical inspections, which indisputably shows the process of improvement of the quality of the work performed.
In January 2008. (38.374 all kinds of inspections) more inspections were performed than in the same period in 2009. (37.248 all kinds of inspections). It is obvious that there is a decrease in the number of inspections in January 2009 as the nearest neighbourhood was also affected by the recession. According to the official data in January 2009 in Croatia there was 32% less technical inspections of vehicles. In March 2009 significant increase of the number of the vehicle inspections was noted compared to the same period in 2008, and the same case was with the number of preventive inspections compared to the same period in 2008. This increase is particularly significant in the stations where the members of the professional supervisors warned about that problem during the period of professional supervision. If we analyse the number of the performed regular, technically exploitative and preventive inspections per each station for technical inspection, it can be observed that some of the stations have the disproportion between the number of the preventive inspections performed and the number of regular inspections and inspections related to meeting the requirements for technical and exploiting conditions.

Table 1. Number of all types of inspections performed within the first six-month period in 2008 and 2009

2008 (I-VI)	Total number of inspections	Number of preventive inspections	Number of regular + irregular inspections	Number of technically exploitative
	185.927	13.150	156.298	16.479
2009 (I-VI)	Total number of inspections	Number of preventive inspections	Number of regular + irregular inspections	Number of technically exploitative
	278.877	30.735	222.927	25.215



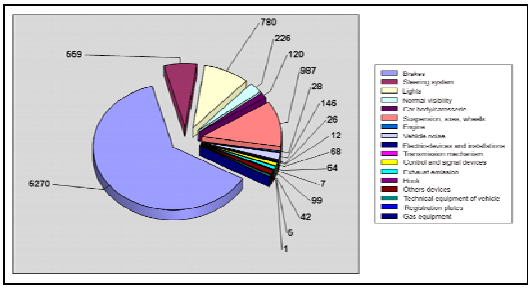
Graph 1. Preventive and T-E inspections, fluctuation of the number of inspections per each month in Federation B&H

Statistic indices from the application a|TEST, the use of this application and its continuous improvement shows all the problematic issues in this activity as well as the serious approach taken by the professional institution IPI in this activity. The constant improvement and following the new indices related to the work of the stations for technical inspection is certainly one of the novelties that can serve as the example for the others in their own activities.

The data on the number of the observed malfunctions which, within the last year, amounted to 1188, have „rapidly“ increased to 8.440 observed malfunctions. We consider that this method of supervision will largely reduce the number of the vehicles out of order and force the owners to think again how they treat their „pats“ before they bring them to the technical inspection. The number of the vehicles being out of technical order, as indicated by the repeated technical inspection, has no tendency of increase compared to the previous periods. This is one of the most important statistic indices showing the proper technical condition of the vehicles as well as the quality of the work performed by the stations for technical inspection. It should be pointed out that this is one of the rare statistic indices showing the negative trend compared to other analytical reports which show considerable tendency of increase. This may be the good basis for future inspection checkups stipulated by the Law.
The total number of the vehicles out of order at the first inspection at all the stations for technical inspection in Federation B&H within this six-month period amounts to 4.322 vehicles, and the increase in the number of the observed malfunctions showed up after the video-surveillance systems had been introduced starting from 1.5.2009. Table 2. provides the overview of the number of the vehicles out of order at the first and at the repeated inspection.

Table 2. Number of the malfunctioning vehicles at the first and the repeated inspection within the period 1.1.- 30.6. 2009.

	Number of the malfunctioning vehicles at the first inspection	Number of the malfunctioning vehicles at the repeated inspection
TOTAL	4284	38



Graph 2. Total number of malfunctions presented by the diagram; period 1.1.- 30.6.2009.

The number of the noted malfunctions/defects that are, most frequently discovered during the technical inspection is presented in the Graph Nr 2. Malfunctions classified into individual groups which were discovered during the process of technical inspection are as follows:

- brakes 5.270 malfunctions;
- shaft suspension 987 malfunctions of which
- wheels – 351 identified defects;
- lights malfunctions – 780 identified defects.

Total number of all malfunctions per individual groups of defects is 8.440 within the first six months of 2009. Compared to the previous periods there is a considerable increase of the number of the identified malfunctions, but it should be noted that this trend of the increase in number of the malfunctions identified during the technical inspection is not followed by the considerable increase of the number of rejected vehicles in the repeated technical inspection.
The age of the vehicles for this six-month period is presented in the Table 3 and the indices do not essentially differ from those for 2008. In checking the data entry into the application it has been noted that there were several mistakes in selection of the age of the vehicle, and such mistakes directly influence the average age of the vehicles.

Table 3. Average age of the vehicles per type of the vehicle and year of manufacture (1.1.-30.6.2009.)

Type of the vehicle	Designation	Average age	Type of the vehicle	Designation	Average age
BUS	M_2-M_3	17,11	TRAILER WITH THE CENTRAL SHAFT	O_1-O_4	12,90
FOUR-WHEEL DRIVE CYCLE	L	1,42	PASSENGER CAR	M-M_1	14,74
VAN	-	15,75	WORKING MACHINE	-	12,13
LIGHT TRAILER	O_1	9,48	WORKING VEHICLE	-	20,60
MOPED	L	3,14	LOAD VEHICLE	N-N_3	13,95
MOTOR-CYCLE	L	8,38	TRACTOR	-	20,62
SEMI-TRAILER	O_1-O_4	10,43	THREE-WHEEL DRIVE CYCLE	L	13,71
TRAILER	O_1-O_4	18,14	TRACTION VEHICLE	-	8,11
ARTICULATED BUS	M_2-M_3	17,17	-	-	-

After the warning about the need to check the data entries referring to the age of the vehicles, the staff working at the stations for technical inspection paid more attention to these data entries so that there is much smaller number of the vehicles with the wrong data about the age.

Table 4. Number of the inspections performed in Federation B&H in the first 6 months of 2009

	regular inspections	Preventive inspections	Inspections for TEU
Federation B&H	**222932**	**30735**	**25221**

Nevertheless, taking into consideration the existing constraints on the import of vehicles, i.e. for passenger vehicles up to seven (7) years of age and for load vehicles up to ten (10) years of age and on the basis of the data from the first three months of 2009 it can be concluded that, if this trend continues within the remaining period of the current year, there will be the decrease in the age of the vehicles in Federation B&H. However, the realistic situation in the field shows completely different trends and that is the „idea" to temporarily cancel the constraint on age regardless the fact that B&H is certainly one of the rare countries in Europe not having the professional institution for homologation nor does it dispose of the established system for homologation.

The overview of the performed technical inspections as to the type of request in Federation B&H for the first semi-annual period of 2009 is presented in the Table 4, and the total amount of inspections is 278.885. As to the type of the selected fuel during the performance of the technical inspection (RE and TEU inspections) for all types of the motor vehicles, the percentage is as follows:

- selected fuel DIESEL at 59,8 % of all types of the motor vehicles,
- selected fuel PETROL at 40,19 % of all motor vehicles, while
- for other selected fuels and their combinations the percentage is minimal.

5. CONCLUSION

With the strict obedience of the by-laws and application of the computer solution accompanied by the wish to fully implement the electronic form solution (which is postponed by the decision of the Ministry for Transport and Communications of B&H because of the slowed-down implementation in the other entity of RS in this field), definite order would be introduced according to the European standards in this field, and this would greatly disable the illegal activities of the individuals and organized groups that accompany this activity. The great step made by the system of the professional institution, IPI-Institute for Business Engineering doo Zenica, with the sub suppliers and in coordination with the Federal Ministry for Transport and Communications is an immeasurable contribution to introducing law and order in the very neglected field of proper technical condition of vehicles as an essential factor in safety of traffic. This is the incentive for other accompanying activities to be put under control by means of the electronic solution, such as different tax payments in registration of the vehicles, contributions to the budget and the like.

6. REFERENCES

[1] Brankovic, N., Klisura, F.: "The analysis of the technical state stations in Federation of Bosnia & Herzegovina and integration in informatica unique system" ,12 International Research / Expert Conference "Trends in the Development of Machinery and Associated Technology", Istanbul, Tyrkey, 26-30 .08.2008

[2] Mustafic, I., Ahmic, A., Sevo, I., Klisura, F.: Stručni vodič za voditelja stenice za tehnički pregled vozila, IPI-Institute za privredni inženjering. Zenica, (2007)

[3] Barut, M., Penza S., Klisura, F.: Stručni bilten IPI IV, IPI-Institute za privredni inženjering. Zenica, 2008

[4] Klisura, F., Barut, M., Lindov, O. :(2009) Stručni bilten IPI VII, IPI-Institute za privredni inženjering. Zenica, (2009)

[5] Mustafic, I., Jašarević, S. Klisura, F., Matoc, Ž.: "Quality training to staff employee technical inspection stations in 2008 in the Federation of Bosnia and Herzegovina",VI International Conference "Quality 2009". , Neum, 04.-07.06.2009.

[6] Brdarević, S., Klisura, F., :"Analysis of the technical inspection stations and assembly into a unified information systems in FBiH",4th International Conference on Engineering Technologies - ICET 2009 with Novi Sad, Serbia, 28-30 April, 2009

[7] Klisura, F., Jašarević, S ., Petkovic, D.,: "Statistical analysis of data from the field of technical inspection vehicle Federation BiH" Conference of maintenance, CODE 2009, organized by the Society funds maintainer of Montenegro, Center for Quality-Faculty of Mechanical Engineering Podgorica, Montenegro, Union engineers, Bar, Montenegro, 24-26.06.2009,