**Plenary Session One**

**Presentation 1**

# Contribution of Periodic Motor Vehicle Inspection (ITV) to road safety in 2011: M1, N1 and motorcycle

**Jose Luis San Román García**

**Full Professor and Head of Mechanical Engineering,**
**University Carlos III, Madrid, Spain**

CITA

**2013 CITA CONFERENCE, 15–17th May, Sevilla, Spain**

# Strategies for Benefiting Roadworthiness

**Plenary Session One:** ***Challenges of new technology for technical inspection***

# Contribution of Periodic Motor Vehicle Inspection (ITV) to road safety in 2011: M1, N1 and motorcycle

**UNIVERSIDAD CARLOS III DE MADRID**

**JOSE LUIS SAN ROMÁN, FULL PROFESSOR**

*Instituto de Seguridad de los Vehículos Automóviles*

ISVA

# *Contribution of Periodic Motor Vehicle Inspection (ITV) to road safety in 2011: M1, N1 and motorcycle*

***Sponsor and Institutional Support:***

FITSA

***Presented by:***

*José Luis San Román García*

*Full Professor*

***16 of May of 2013***

1. **AIM.**
2. **ACTUAL PERIODIC MOTOR VEHICLE INSPECTION IN SPAIN.**
3. **RESULTS OF THE PERIODIC MOTOR VEHICLE INSPECTION IN SPAIN.**
4. **ESTIMATION OF THE REDUCTION OF THE NUMBER OF ACCIDENTS DUE TO PERIODIC MOTOR VEHICLE INSPECTION.**
6. **EVOLUTION AND CHANLLENGES OF THE PERIODIC MOTOR VEHICLE INSPECTION.**
6. **CONCLUSIONS.**

## 1. AIM

- This research is motivated by the increase of concern in Road Vehicle Safety in Spain.

- In addition, it is of paramount importance to outline the PMVI benefits and set the challenges in order to overcome the future global challenges in the European Transport.

- The impact and contribution of PMVI to accident reduction has been deeply analized.

- New types of vehicles have been introduced in this research.

- Not only passenger vehicles have been analized but also motorcycles, mopeds and light freight vehicles have been considered, highlighting inspection points against defects.

# ACTUAL PERIODIC MOTOR VEHICLE INSPECTION IN SPAIN

*16 of May of 2013*

*J.L. San Román*

Evolution of PMVI Stations and number of inspection lines per Autonomous Community (Updated to September 2012 vs. September 2007).

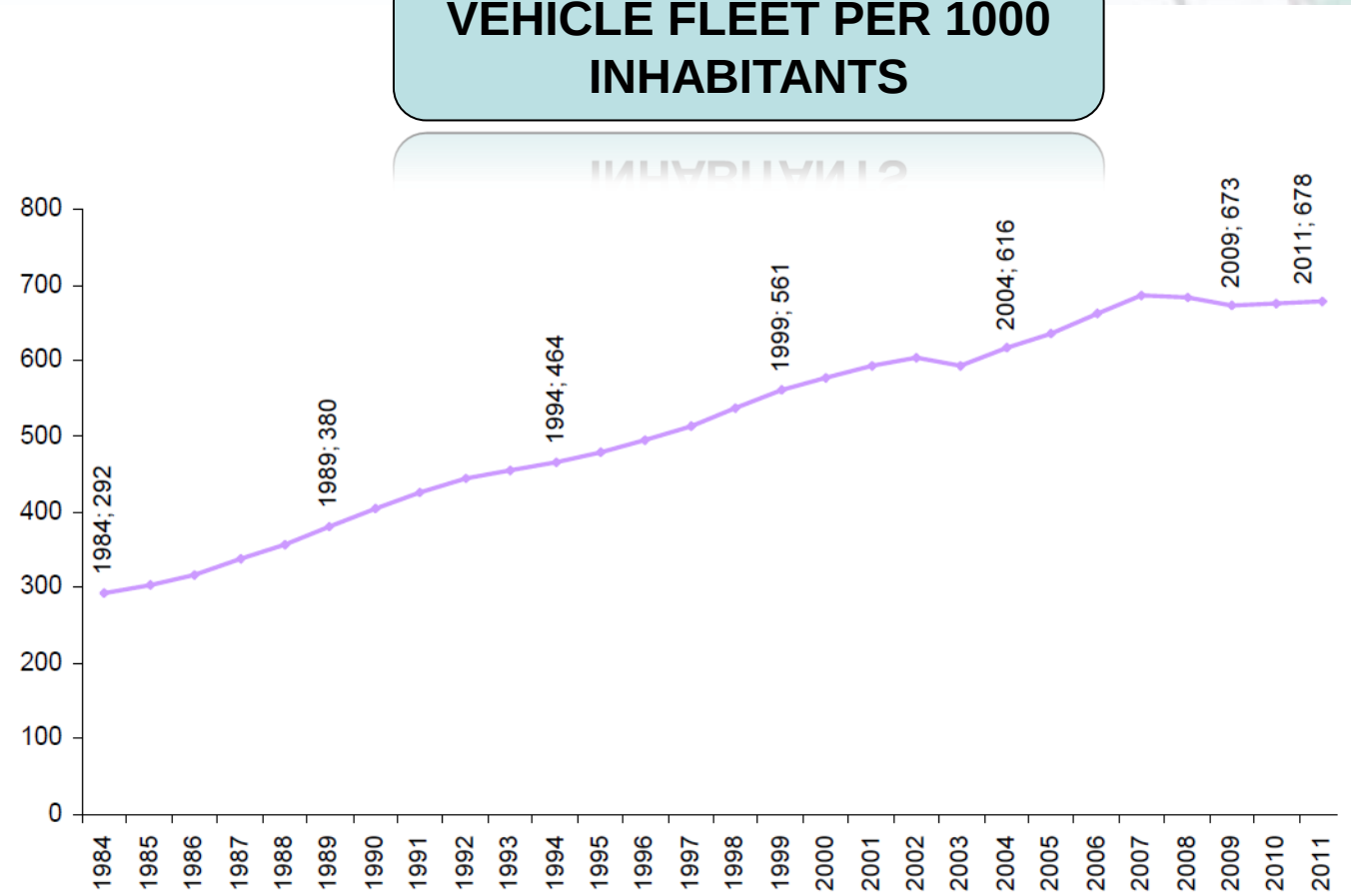
| Autonomous Community | Nº of stations 2007/2012 | Nº of lines 2007/2012 |
|---|---|---|
| **Andalucia** | 49/60 | 149/200 |
| **Asturias** | 8/9 | 26/40 |
| **Aragón** | 15/27 | 29/46 |
| **Baleares** | 7/7 | 16/16 |
| **Cantabria** | 3/7 | 7/18 |
| **Extremadura** | 10/12 | 17/21 |
| **Canarias** | 14/14 | 37/37 |
| **Castilla y León** | 38/40 | 65/74 |
| **Cataluña** | 44/47 | 93/102 |
| **Murcia** | 8/8 | 19/19 |
| **Castilla la Mancha** | 27/41 | 57/85 |
| **Madrid** | 17/23 | 66/85 |
| **Navarra** | 4/8 | 11/18 |
| **Rioja** | 4/4 | 7/7 |
| **Galicia** | 19/23 | 59/65 |
| **País Vasco** | 8/8 | 23/23 |
| **Ceuta** | 1/1 | 2/2 |
| **Valencia** | 25/26 | 83/87 |
| **Total** | **301/365** | **766/945** |

(Source: AECA)

Vehicle fleet attending to type of vehicle (Updated on December 2011).

| TYPE OF VEHICLE | VEHICLE FLEET ON 31ST DECEMBER 2011 | PERCENTAGE DISTRIBUTION |
|---|---|---|
| Trucks and vans | 5.060.791 | 16,18% |
| Busses | 62.358 | 0,20% |
| Passenger vehicle | 22.277.244 | 71,24% |
| Motorcycle | 2.798.043 | 8,95% |
| Industrial tractors | 195.960 | 0,63% |
| Trailer and semi-trailer | 415.568 | 1,33% |
| Other vehicles | 459.117 | 1,47% |
| **TOTAL** | **31.269.081** | **100%** |

# VEHICLE FLEET PER 1000 INHABITANTS




**Fuente cifras de población: INE.** Estimaciones de la población actual de España a 1 de enero de 2011 (Fuente utilizada por Eurostat)

# PMVI IN SPAIN

Law **Real Decreto 1987/1985** (replaced by RD 224/2008) defined the basic standards of PMVI stations with the aim of increasing the network created by the Ministry of Industry and Energy. This performance was part of the implementation of the National Road Safety Program (1981-1983), which began to require periodic motor vehicle inspection to every type of vehicle.

In Spain during year 1985 and after the experience adquired in public service vehicles and freight transport, it became mandatory that private passenger cars had to go through inspection.

**RD 224/2008**

Development of Anex II of directive 77/143/CEE (replaced by 2009/40/CE)

Mandatory periodic inspection and expiry dates depending on vehicle type were established.

The executive competences in periodic motor vehicle inspection (PMVI) lay on the Autonomous Communities that decide which management model should be applied (either public or private). This decision must be taken with complete independence and impartiality of the inspection activity with respect to other activities of the vehicle, such as, repair, vehicle insurance, etc.

# PMVI IN SPAIN

| Motocicletas, vehículos de 3 ruedas, cuadriciclos, quads, ciclomotores de 3 ruedas y cuadriciclos ligeros | Ciclomotores de dos ruedas | Turismos, autocaravanas y vehículos vivienda | Ambulancias, transporte escolar (hasta 9 plazas, incluido el conductor) | Transporte de mercancías ≤ 3.500 kg | Alquiler con o sin conductor y de escuela de conductores (hasta 9 plazas incluido conductor) (incluido motos) |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| 1ª INSPECCIÓN | 1ª INSPECCIÓN | 1ª INSPECCIÓN | 1ª INSPECCIÓN | 1ª INSPECCIÓN | 1ª INSPECCIÓN |
| Antes del 4º AÑO | Antes del 3º AÑO | Antes del 4º AÑO | Antes del 1er AÑO | Antes del 2º AÑO | Antes del 2º AÑO |
| SIGUIENTES INSPECCIONES | SIGUIENTES INSPECCIONES | SIGUIENTES INSPECCIONES | SIGUIENTES INSPECCIONES | SIGUIENTES INSPECCIONES | SIGUIENTES INSPECCIONES |
| + 4 años bienal | + 3 años bienal | 4 -10 años bienal | Hasta 5 años anual | 2 a 6 años bienal | 2 a 5 años anual |
| | | + 10 años anual | + 5 años semestral | 6 a 10 años anual | + 5 años semestral |
| | | | | + 10 años semestral | |

| Autobuses | Transporte de mercancías > 3.500 kg | Caravanas Remolcadas MMA >750 KG | Tractores Agrícolas | Especiales de obras y servicios velocidad > 25 Km/h | Estaciones transformadoras Maquinaria del circo |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| 1ª INSPECCIÓN | 1ª INSPECCIÓN | 1ª INSPECCIÓN | 1ª INSPECCIÓN | 1ª INSPECCIÓN | 1ª INSPECCIÓN |
| Antes del 1º AÑO | Antes del 1er AÑO | Antes del 6º AÑO | Antes del 8º AÑO | Antes del 4º AÑO | Antes del 4º AÑO |
| SIGUIENTES INSPECCIONES | SIGUIENTES INSPECCIONES | SIGUIENTES INSPECCIONES | SIGUIENTES INSPECCIONES | SIGUIENTES INSPECCIONES | SIGUIENTES INSPECCIONES |
| | | | | | |
| Hasta 5 años anual | 0 – 10 años anual | + 6 años bienal | 8 – 16 años bienal | De 4 a 10 años bienal | De 4 a 6 años bienal |
| + 5 años semestral | + 10 años semestral | | + 16 años anual | + 10 años anual | + 6 años anual |

*Fuente: RD 711/2006)*

# Reference documents in PMVI

***Manual of Inspection Procedure of PMVI Stations ("Manual de Procedimiento de Inspección de las Estaciones ITV"* Rev. 7ª ):** updated on **2010/48/UE**
Establishes the performance standards during the inspection, in order to unify criteria and procedure method to be followed by the different PMVI Stations.

Thus, the basis of this Manual are:

- Unifed inspection criteria.
- Identification of the applicable standard.
- Inspection method for each vehicle system.
- Inventory of the breaches of the Standards.
- Ratind importance.
- Validate with CITA.


http://www.minetur.gob.es/es-ES/Novedades/Documents/ManualITVMitycRevision7Enero2012web.pdf

**UNE-EN ISO/IEC 17020:2004:** General criteria applied for the operation of the different types of organism that perform inspection.

**INSPECTION: "Examination of the design of a product, service, process or installation and definition of its approval with specific or general requirements based on a professional and independent judgment."**

*Instituto de Seguridad de los Vehículos Automóviles*

# RESULTS OF THE PERIODIC MOTOR VEHICLE INSPECTION IN SPAIN.

*16 of May of 2013*

*J.L. San Román*

# Periodic Inspections of PMVI in 2011 (Source: MINETUR)

MINISTERIO DE INDUSTRIA, ENERGIA Y TURISMO — D.G. DE INDUSTRIA Y DE LA PYME

## DATOS ESTADÍSTICOS DE LAS INSPECCIONES PERIÓDICAS ITV DEL AÑO 2011

| DEFECTOS | | TIPO DE VEHICULO | | | | | | | | | TOTALES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MOTOCICL Y CICLOM | TURISMOS PART | RESTO TUR | MERCANC. PMA<3500 | MERCANC. PMA>3500 | AUTOBUS. | REMOLQ. Y SEMIRR. | AGRICOL. | OTROS | |
| | | FRECUENCIA DE DEFECTOS | | | | | | | | | |
| CAPITULO 1 (IDENTIFICACIÓN) | DL | 29.698 | 845.136 | 13.828 | 293.210 | 47.974 | 5.496 | 22.351 | 80.429 | 7.480 | 1.345.602 |
| | DG | 22.600 | 94.799 | 1.782 | 43.239 | 11.610 | 1.094 | 7.275 | 13.342 | 3.234 | 198.975 |
| CAPITULO 2 (ACOND EXT, CARROC, CHASIS) | DL | 21.313 | 1.071.915 | 18.506 | 505.142 | 92.387 | 14.550 | 27.509 | 84.210 | 8.906 | 1.844.438 |
| | DG | 23.294 | 193.455 | 4.287 | 121.768 | 29.776 | 4.660 | 10.927 | 16.799 | 3.421 | 408.387 |
| CAPITULO 3 (ACONDICIONAMIENTO INTERIOR) | DL | 9.787 | 198.196 | 1.463 | 104.544 | 17.577 | 3.019 | 7.597 | 20.742 | 1.358 | 364.283 |
| | DG | 12.656 | 222.666 | 3.611 | 77.541 | 7.930 | 2.988 | 2.994 | 179 | 1.061 | 331.626 |
| CAPITULO 4 (ALUMBRADO Y SEÑALIZACIÓN) | DL | 49.163 | 2.485.198 | 55.208 | 921.113 | 168.443 | 19.479 | 75.958 | 110.119 | 14.488 | 3.899.169 |
| | DG | 70.137 | 658.054 | 12.102 | 267.087 | 49.361 | 4.264 | 24.300 | 41.867 | 10.644 | 1.137.816 |
| CAPITULO 5 (EMISIONES CONTAMINANTES) | DL | 18.241 | 391.073 | 5.935 | 163.547 | 31.048 | 3.540 | 14.977 | 26.563 | 1.949 | 656.873 |
| | DG | 51.271 | 538.775 | 7.813 | 136.186 | 15.114 | 1.317 | 6.090 | 74 | 2.098 | 758.738 |
| CAPITULO 6 (FRENOS) | DL | 16.774 | 921.542 | 16.827 | 367.326 | 83.814 | 10.438 | 89.487 | 4.943 | 2.915 | 1.514.066 |
| | DG | 17.262 | 486.590 | 7.106 | 240.650 | 78.600 | 9.321 | 73.237 | 6.288 | 2.980 | 922.034 |
| CAPITULO 7 (DIRECCIÓN) | DL | 2.763 | 329.406 | 4.962 | 150.754 | 24.219 | 2.856 | 14.095 | 17.341 | 2.307 | 548.703 |
| | DG | 6.656 | 201.999 | 4.140 | 113.361 | 29.979 | 3.043 | 13.446 | 5.304 | 1.802 | 379.730 |
| CAPITULO 8 (EJES, RUEDAS, NEUMÁT, SUSP) | DL | 8.075 | 189.277 | 3.671 | 66.754 | 11.403 | 1.848 | 6.986 | 32.193 | 2.164 | 322.371 |
| | DG | 23.520 | 674.511 | 14.535 | 277.492 | 37.772 | 4.860 | 29.084 | 6.079 | 2.853 | 1.070.706 |
| CAPITULO 9 (MOTOR Y TRANSMISIÓN) | DL | 11.212 | 1.430.435 | 23.517 | 506.769 | 57.325 | 6.441 | 1.899 | 10.457 | 2.687 | 2.050.742 |
| | DG | 16.936 | 252.818 | 3.307 | 92.075 | 14.584 | 1.455 | 6.721 | 736 | 997 | 389.629 |
| CAPITULO 10 (OTROS) | DL | 4.744 | 215.015 | 2.660 | 115.017 | 9.990 | 1.435 | 3 | 5.974 | 495 | 355.333 |
| | DG | 39.529 | 136.721 | 4.335 | 53.882 | 29.810 | 9.725 | 2.249 | 3.227 | 4.496 | 283.974 |
| TOTAL DEFECTOS | DL | 171.770 | 8.077.193 | 146.577 | 3.194.176 | 544.180 | 69.102 | 260.862 | 392.971 | 44.749 | 12.901.580 |
| | DG | 283.861 | 3.460.388 | 63.018 | 1.423.281 | 304.536 | 42.727 | 176.323 | 93.895 | 33.586 | 5.881.615 |
| VEHICULOS TOTALES — PRIMERA INSPECC | FAVORABLES | 694.742 | 9.075.059 | 232.244 | 2.224.714 | 399.247 | 63.643 | 244.026 | 395.961 | 53.631 | 13.383.267 |
| | RECHAZADOS | 152.642 | 1.997.971 | 38.166 | 713.457 | 139.079 | 19.154 | 76.281 | 53.971 | 14.641 | 3.205.362 |
| | % DE RECHAZO | 18,01 | 18,04 | 14,11 | 24,28 | 25,84 | 23,13 | 23,81 | 12,00 | 21,45 | 19,32 |
| VEHICULOS TOTALES — OTRAS INSPECC | FAVORABLES | 133.193 | 1.800.523 | 39.710 | 634.977 | 126.088 | 17.629 | 66.531 | 45.473 | 12.809 | 2.876.933 |
| | RECHAZADOS | 6.583 | 108.103 | 2.333 | 44.351 | 10.553 | 1.620 | 8.696 | 951 | 721 | 183.911 |
| | % DE RECHAZO | 4,71 | 5,66 | 5,55 | 6,53 | 7,72 | 8,42 | 11,56 | 2,05 | 5,33 | 6,01 |

# Periodic Inspections of PMVI performed in 2011

| | FLEET | MAND. PMVI | NI | RR (%) | NO PMVI | ABS (%) |
|---|---|---|---|---|---|---|
| **PASSENGER CAR** | 22.277.244 | 14.388.299 | 11.073.030 | 18,04 | 3.315.269 | 23,04 |
| **V.T.M.L. (VANS)** | 4.159.237 | 4.923.508 | 2.938.171 | 24,28 | 1.985.337 | 40,32 |
| **MOTORCYCLES AND MOPEDS** | 5.027.461 | 2.120.283 | 847.384 | 18,01 | 1.200.000 | 60 |
| **TOTAL** | **31.463.942** | **21.432.090** | **14.858.585** | | **6.500.606** | |

- FLEET: Vehicle fleet of each type of vehicle in December 2011 (Source DGT)
- MAND. PMVI: Number of inspections that the fleet should have gone through considering the fleet inspection frequency.
- NI: Number of performed inspections (Source MINETUR)
- RR (%): Rejection rate in %.
- NO PMVI: Number of mandatory inspections not performed.
- ABS (%): Absenteeism

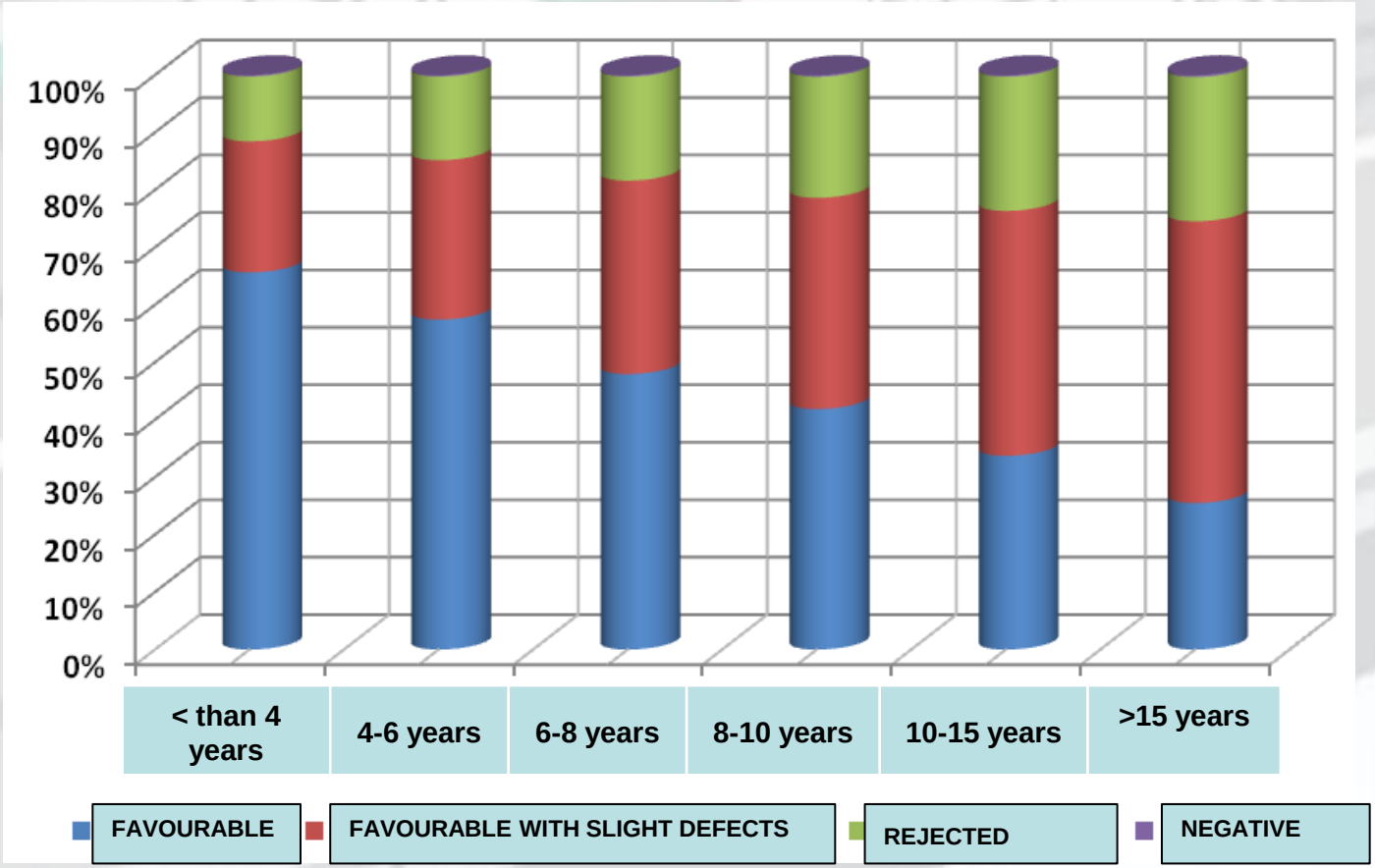
# ANALIZED SAMPLE INSPECTIONS CM 2011

- **Passenger** vehicles: **1.096.307 inspections** analized over a total of 11.073.030 inspections performed in Spain, thus, it represents a **9,9%** of the total.

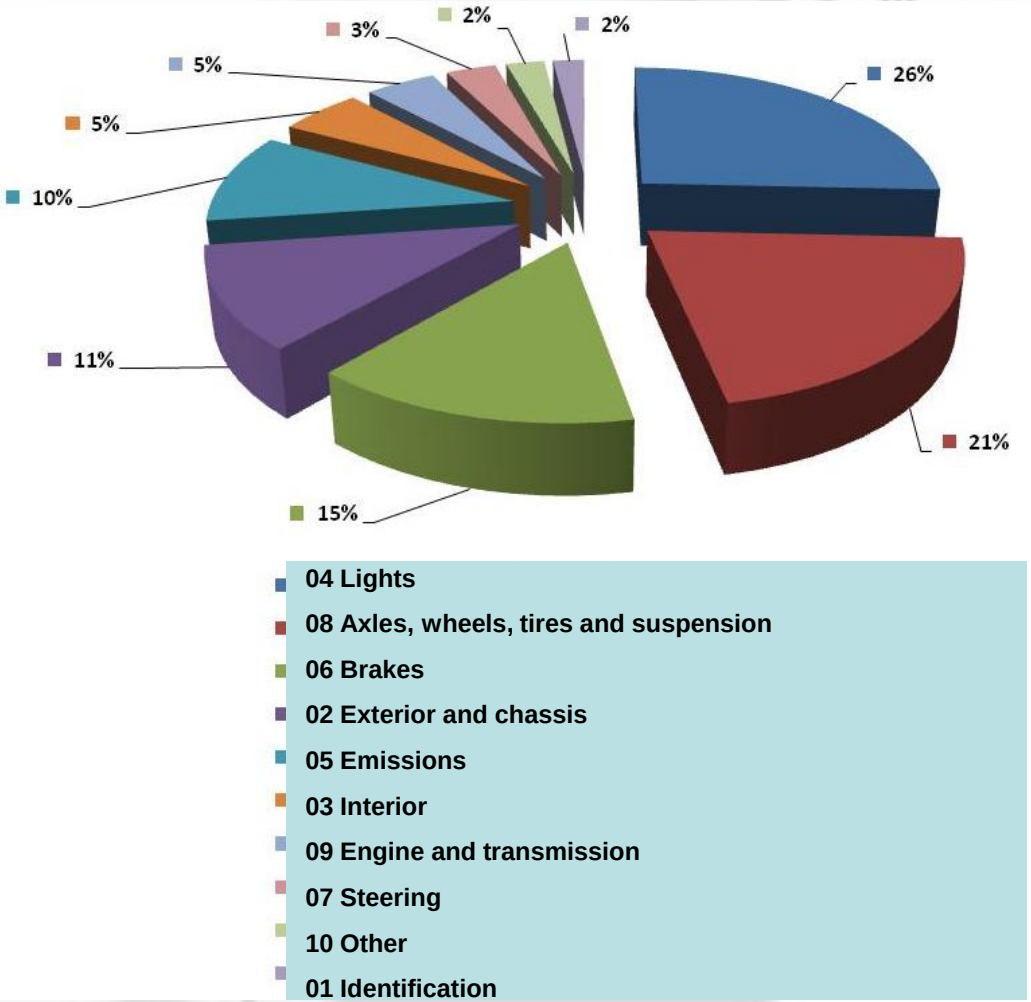
- **Motorcycles and mopeds**: **54.104 inspections** performed over a total of 847.384 inspections performed in Spain, thus, it represents a **6,4%** of the total.

- **Light freight vehicles**: **161.615 inspections** performed over a total of 2.938.171 inspections In Spain, thus, it represents a **5,5%** of the total.

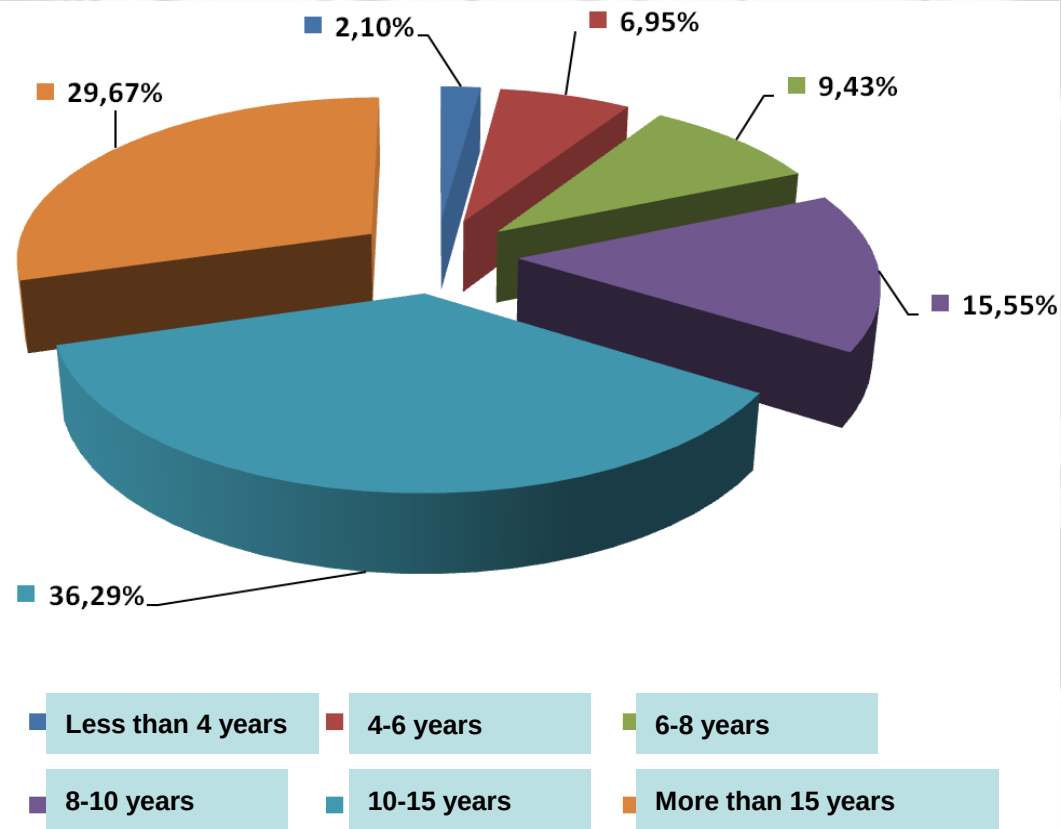
## Results of Inspections of passenger vehicles attending to vehicle antiquity



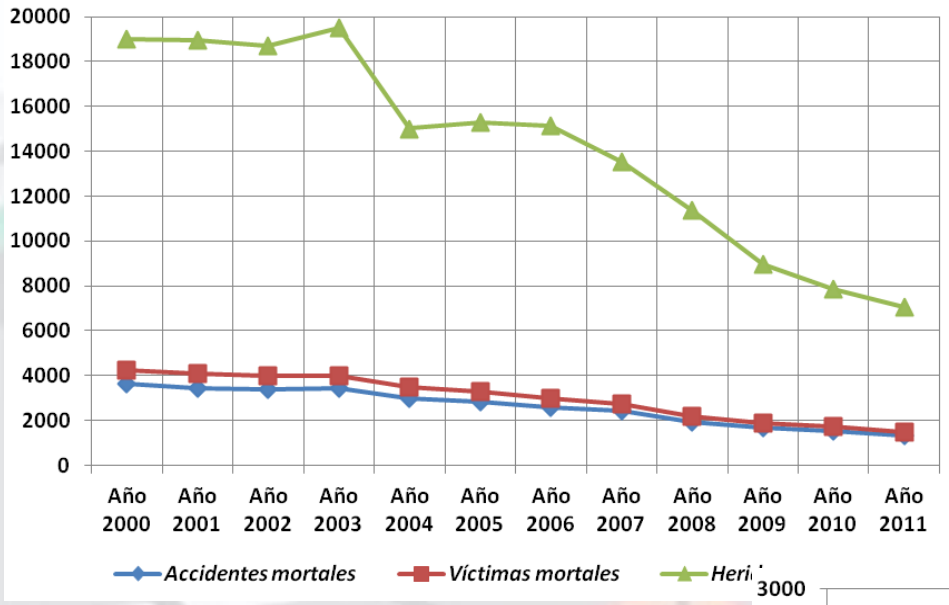
# Serious defects in light freight vehicles



## Temporal evolution of the percentage of serious defects of brake system in freight transport

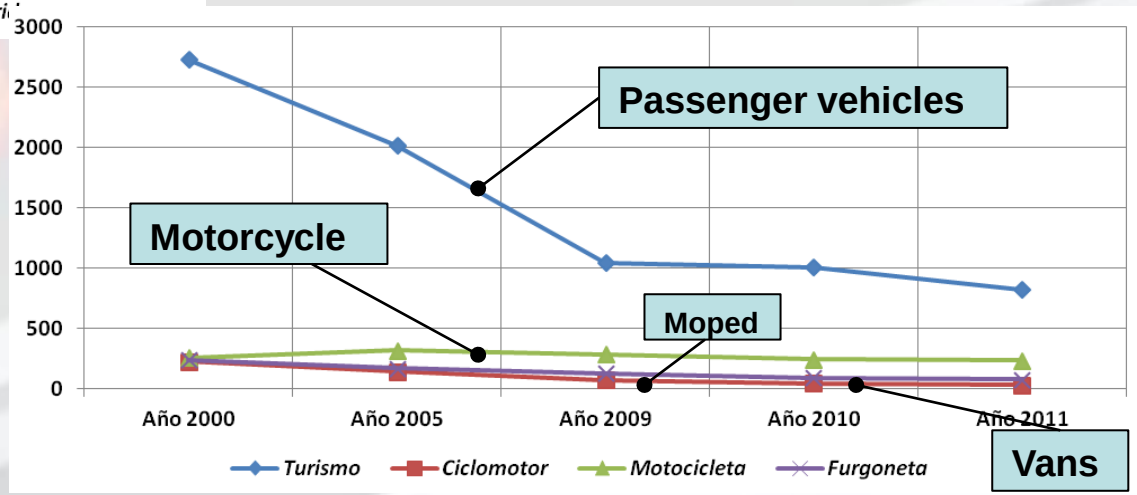


# TEMPORAL EVOLUTION OF ACCIDENTS WITH VICTIMS IN SPAIN




**Between 2001-2010 the number of victims in Spain have decreased 50%**

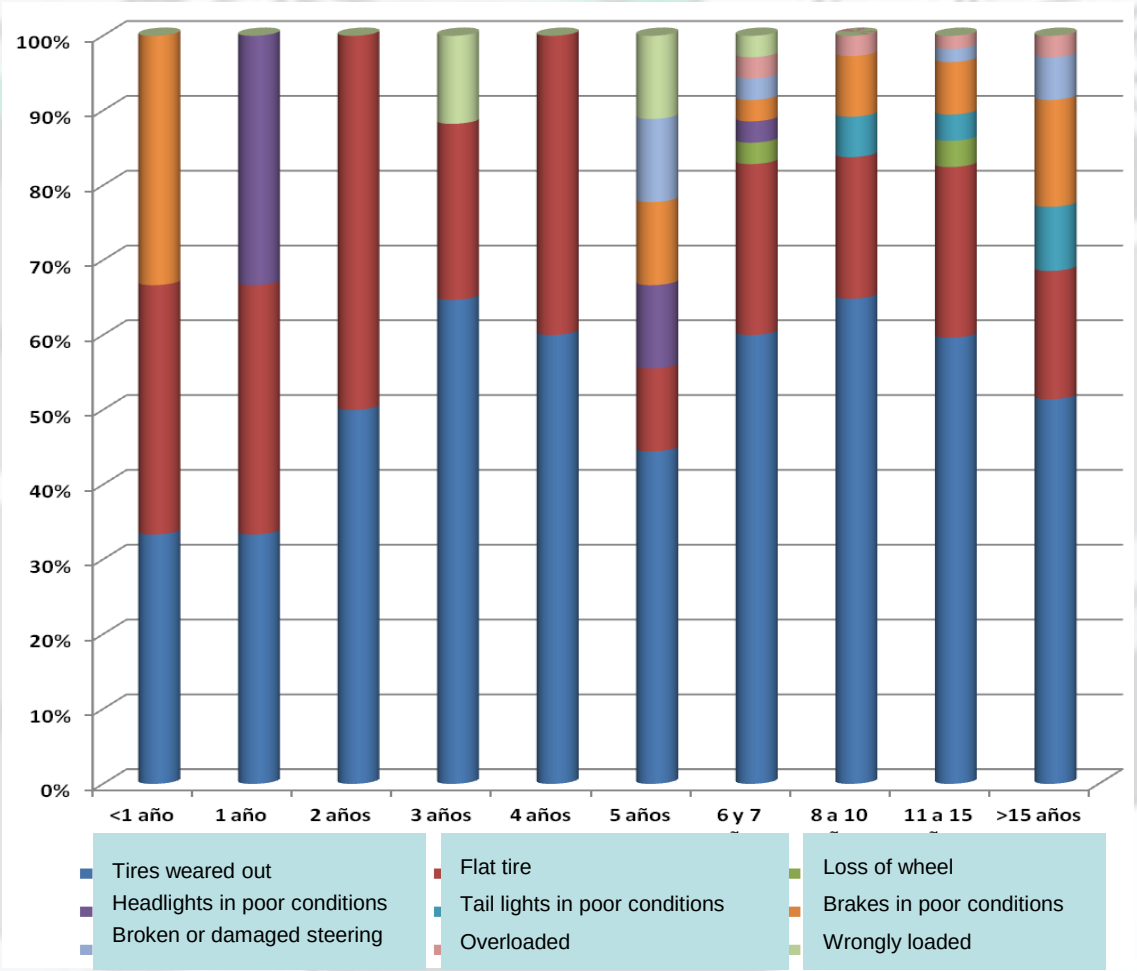
**During period 2010-2011 an additional 6%**




*16 of May of 2013*

*J.L. San Román*

## Condition of vehicles involved in road accidents as a function of vehicle age. (Sorce: DGT)



# AVOIDED ACCIDENTS ESTIMATION DUE TO PERIODIC MOTOR VEHICLE INSPECTION

**Mathematical model based on AUTOFORE proposed by study done by ISVA in 2007:**

**From accident statistics (Source DGT) the deaths per accidents were calculated (DA) and the wounded per accident were derived (WA).**

**Known the number of avoided accidents it can be calculated the number of deaths and wounded that could have been avoided by multiplying the number of avoided accidents by the number of deaths per accident and by the number of wounded per accident, respectively.**

**Certain ratios have been calculated:**
**number of death victims (fatalities) (F), wounded (W) and avoided accidents (AA) per vehicle inspection carried out and economic evaluation of avoided accidents in million €**

# Estimation of the avoided accidents (AA).

| | NI | RR (%) | AV | F/AV | W/AV | AA | AW | AD | COST |
|---|---|---|---|---|---|---|---|---|---|
| **PASSENGER VEHICLES** | 11.073.030 | 18,04 | 66.030 | 14,79 | 965,39 | 7.147 | 6.900 | 106 | 192,18 |
| **V.T.M.L. (VANS)** | 2.938.171 | 24,28 | 8.984 | 14,55 | 669,63 | 1.309 | 876 | 19 | 30,17 |
| **MOTORCYCLES AND MOPEDS** | 847.384 | 18,01 | 26.662 | 15,83 | 1045,83 | 2.881 | 3.013 | 46 | 83,36 |
| **TOTAL** | **14.858.585** | | **101.676** | | | **11.337** | **10.789** | **170** | **305,71** |

- NI: Number of performed inspections (Source MINETUR)
- TR (%): Rejection Rate in %.
- AV: Accidents with victims (Source DGT)
- F/AV: Fatalities per 1.000 Accidents with victims (Source DGT)
- W/AV : Wounded per 1.000 Accidents with victims (Source DGT)
- AA : Avoided accidents due to PMVI.
- AW: Avoided wounded due to PMVI.
- AD: Avoided deaths due to PMVI
- COST: Economic evaluation of avoided accidents in million € (Fuente: Informe BASMA 2006, FITSA).

Unitary Human Costs: 1.02569 million euros in the case of a fatality and about 12,140 euros in the case of an injured

## *¿How many accidents and victims would have been avoided if the vehicles that did not go to inspection would have been inspected?*

| | ABSENTEEISM | AA | AW | AD | COST (M€) |
|---|---|---|---|---|---|
| **PASSENGER VEHICLES** | 3.315.269 | 2.140 | 2.066 | 32 | 57,54 |
| **V.T.M.L. (VANS)** | 1.985.337 | 884 | 592 | 13 | 20,39 |
| **MOTORCYCLES AND MOPEDS** | 1.200.000 | 4.080 | 4267 | 65 | 118,05 |
| **TOTAL** | **6.500.606** | **7.104** | **6.925** | **109** | **195,97** |

The accurate accounting of the costs of accidents should consider additional parameters such as the loss of value of the vehicles involved, damage to public roads, the cost of emergency services, the additional time lost by other users by road congestion created by accidents, etc.

# EVOLUTION AND CHALLENGES OF PERIODIC MOTOR VEHICLE INSPECTION

***J.L. San Román***

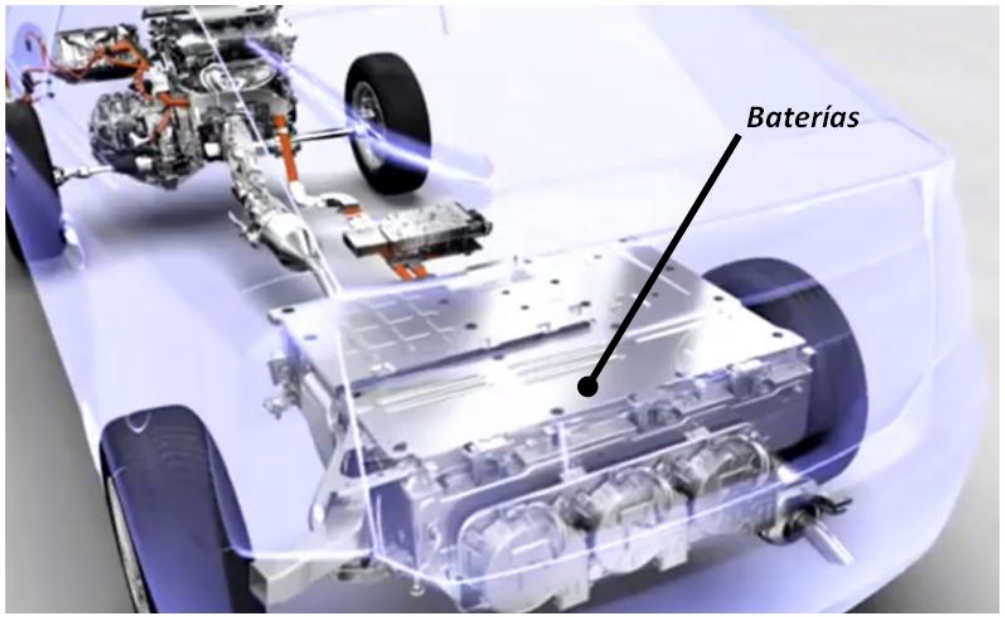
***16 of May of 2013***

# Electronic Diagnosis in PMVI


In 2009 ISVA, with sponsoring of FITSA, performed a deep study entitled "Research for including electronic diagnosis in PMVI passenger vehicles"

(*"Estudio para la incorporación del diagnóstico electrónico en las ITV de los turismos"*. )

# Inspection of Electric and Hybrid Vehicles




Electric and hybrid vehicles: possible changes in defects and inspection method.

Technology has substantially modified certain vehicle systems: Transmission, brakes, etc.

Need of possible modification of Manual for PMVI.


***16 of May of 2013***

***J.L. San Román***

# CONCLUSIONS

**1º. Year 2011: 14.858.585 vehicles inspected, 2.864.070 rejected (RR 19,27%).**

**SOCIAL BENEFIT:**

**2º. Contribution of ITV to road safety: 11.000 accidents, near 11.000 wounded and 170 deaths have been avoided. In terms of economic benefit it represents at least 300 M€.**

**3º. Absenteeism: If these vehicles would have been inspected at least 7.100 accidents, 7.000 wounded and 110 deaths could have additionally been avoided. This represents an additional saving of 200 M€. (IMPORTANT REDUCTION by applying project ITICI of the DGT)**

**4º. Demonstrated: In all of the analyzed vehicles the older vehicles have the largest amount of defects. Stadistically are more unsafe.**

**5º. Regarding lights, tyres and brakes it is the chapter that more percentage of serious defects accumulates in freight vehicles. In comparison with other vehicles they are unsafe.**

*Instituto de Seguridad de los Vehículos Automóviles*

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# *Contribution of Periodic Motor Vehicle Inspection (ITV) to road safety in 2011: M1, N1 and motorcycle*

***Sponsor and Institutional Support:***

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