



MINISTERUL TRANSPORTURILOR SI INFRASTRUCTURII  
AUTORITATEA FERROVIARA ROMANA - AFER

ORGANISMUL DE INVESTIGARE FERROVIAR ROMAN



## INVESTIGATING REPORT

of the railway accident occurred on  
02.08.2010 on the non-interoperable running section Timișoara Vest - Crucești



*Final Edition  
11 October 2010*

## NOTICE

As regards the railway accident occurred on **02.08.2010**, at **04.00** o'clock on the activity area of **Railway County CFR Timișoara, current line at km 37+600 on the non-interoperable running section Timișoara Vest - Crucești (managed by SC RC-CF Trans SRL Brașov)** by the **derailment of axle no.4 from the passenger motor driven AMX 97-0566-6**, forming the passenger train 14489 (owned by railway transport operator SC Regiotrans SRL Brașov), the Romanian Railway Investigating Body developed an investigating action according to the provisions of the Law no.55/2006 on railway safety and of the **Inquiry Regulation of accidents and incidents, development and improvement of railway safety on the railways and on the metro transport network in Romania**, approved by GD no.117/2010. By this investigating action, were collected and analyzed information on the railway accident occurrence and also were established the conditions and was determined the cause.

The action of the Romanian Railway Investigating Body didn't have as purpose to establish the guilt or the responsibility in this case.

Bucharest, *11.10.2010*

*I give my positive opinion*

**Director**

Dragoș FLOROIU

*I find the observance of the legal provisions on the development of the investigating action and drawing the present investigating report that i'm proposing for approval.*

**Chief Investigator**

Sorin CONSTANTINESCU

***The present Notice is a part of the Report for investigating the railway accident occurred on 02.08.2010, at 04.00 o'clock, on the activity area of Railway County CFR Timișoara, current line at km 37+600 on the non-interoperable running section Timișoara Vest - Crucești (managed by SC RC-CF Trans SRL Brașov) by the derailment of axle no. 4 from the passenger motor driven AMX 97-0566-6, forming the passenger train 14489 owned by railway transport operator SC Regiotrans SRL Brașov.***

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## I. PREAMBLE

### I.1. Introducere

On **02.08.2010**, at **04.00** o'clock on the activity area of **Railway County CFR Timișoara, current line (at km 37+600) on the non-interoperable running section Timișoara Vest - Cruceni (managed by SC RC-CF Trans SRL Brașov)** an accident occur due to the **derailment of axle no.4 from the passenger motor driven AMX 97-0566-6**, forming the passenger train no. 14489 (owned by railway transport operator SC Regiotrans SRL Brașov), in accordance with the **Inquiry Regulation of accidents and incidents, development and improvement of railway safety on the railways and on the metro transport network in Romania**, approved by GD no.117/2010, here in after referred to in the investigating report as „**Regulation**”, represents an accident that is found in article 7, paragraph (1), letter b), for which the inquiry started to prevent some accidents with similar causes by establishing the conditions and determining the causes.

The OIFR's investigating action didn't have as purpose to establish the guilt or the responsibility, its aim being to improve the railway safety and to prevent the railway incidents or the accidents.

### I.2. The investigation process

On 02.08.2010 through the approval sheet no. 239/02.08.2010 of the Regional Inspectorate for Traffic Safety within the Railway County CF Timișoara, drawn up at 16.10 o'clock from the time of the accident occurrence at 04:00, The Romanian Railway Investigatin Body was notified that on the non-interoperable running section Timișoara Vest - Cruceni managed by SC RC-CF Trans SRL Brașov on 02.08.2010, at km 37+600, the derailment of the right wheel from the intermediate axle of the passenger motor driven AMX 97-0566-6 forming the passenger train 14489, occur.

Taking into consideration the fact that SC Regiotrans SRL Brașov didn't observe the provisions of art.22 from the **Regulation**, on accidents and incidents approval, ISP Timișoara applied a civil penalty to the economic operator, according to the law no. 200 / 2003.

Under article 19 (2) of the Law no. 55/2006 on railway safety, corroborate with article 48 (1) of the **Regulation**, taking into account that the railway event fit as accident, according to the provisions of article 7(1), the director of OIFR decided to open an investigation action concerning the railway accident and by decision no.28 of 03.08.2010, appointed an investigating commission composed of:

- Drăghici Marian - main investigator,
- Oltenacu Livius - investigator,
- Păiș Luca - investigator.

## **A. SUMMARY OF THE ACCIDENT**

### **A.1. Short description**

The passenger train no. 14489 (owned by the railway transport operator SC Regiotrans SRL Braşov), composed of the trailer vehicle no. 57-0366-5 and of the motor coach 97-0566-6, (8 axles, 80 tones, braked tonnage requested 64 tones, real 120 tones), was dispatched from the railway station Timișoara Nord on 02.08.2010 at 03.09 o'clock with +9 min. against the hour on the timetable. At 04.00 o'clock, on the activity area of Railway County CFR Timișoara, in current line, at km. 37+600, (on the non-interoperable running section Timișoara Vest - Cruceni, managed by SC RC-CF Trans SRL Braşov), occurred the derailment of axle no.4 from the passenger motor driven AMX 97-0566-6.

Following the accident occurrence, one record damages to the passenger motor driven, at the track and trains cancellations on this running section.

Following this accident there were no loss of human lives or injured.

### **A.2. Direct cause, underlying and root causes**

#### **A.2.1. Direct cause**

**The direct cause** of the accident occurrence consists of decreasing the distance between inside faces and the parallelism modification of the wheel rims of the two wheels of axle no.4, causing the fall of the right wheel, in the running direction, between the stretch of rails.

This occurred due to the non-observance of the assembly technology on insurance the tightening between the cast wheel boss left side and axle center wheel-seat, which in time led to a quota increase of the conic bore of the wheel boss with approximately 3-4 mm due to frictions arising from the relative displacement of the two surfaces.

**Contributing factor** to the accident was the fact that there were no visible markings with paint capable to detect the relative displacement of the wheel boss against axle center, fact that could be noticed by the service personnel before the appearance of the abnormal wears and the axial movement of the wheel.

#### **A.2.2. Underlying causes**

Repairs to the passenger motor driven type X 4500 and trailer vehicles type XR 8300 wheelsets were performed by the SC KRON - TRIEM SRL personnel, the railway technical agreement hadn't a documentation and specific technological equipment for replacing the axles and wheels.

#### **A.2.3. Root cause**

Execution of repairs at the axles put on in working points for which the railway technical agreements are not obtained according to OMT 290/2000.

### **A.3. Severity level**

According to the provisions of article 7, point 1, letter b) of the *Regulation*, the event through its consequences, is defined as railway accident.

#### **A.4. Safety recommendations**

The railway undertakings, holders of this rolling stock type, will follow that, works for accidental repairs and planned type RR, RG, to be performed with economic agents that holds a railway technical agreement in which to be stipulated the repair works performed by taking to pieces and mount the wheel on the axle center.

Until the development of the technical specification, the completion of the existing technical specification for planned inspections and accidental repairs and planned type RR, RG, as to be provided the repair works performed by taking to pieces and mount the wheel on the axle center, will proceed to the implementation by the SC KRON-TRIEM SRL economic agent of a paint marking, at all axles, between the screwed nut and wheel boss and the railway transport operator will establish, for the operating staff, the obligation to check and record their status in the sheet of the passenger motor driven incident record.

Obtaining without delay, by the SC KRON-TRIEM SRL economic agent, of the railway technical agreement for work points in which are performed technological processes for planned inspections and accidental repairs.

The Romanian Railway Safety Authority will monitor the implementation of these safety recommendations.

This investigation report will be sent to Romanian Railway Safety Authority, to Romanian Railway Notified Body, to the public railway infrastructure manager CNCF „CFR” SA, to the non-interoperable railway infrastructure manager RC - CF TRANS SRL Braşov, to the railway undertaking SC Regiotrans SRL Braşov, to the economic agent SC KRON-TRIEM SRL, and other interested railway undertakings.

## **B. INVESTIGATING REPORT**

### **B.1. Description of the accident**

On 02.08.2010 the passenger train no. 14489 (owned by the railway transport operator SC Regiotrans SRL Braşov), was dispatched from the railway station Timișoara Nord at 03.09 o'clock with a delay of 9 minutes against the timetable, the driving of the train was performed from the trailer vehicle cabin no. 57-0366-5.

The train had run on the distance Timișoara Nord - Timișoara Vest on the non-interoperable running section on basis of the automatic section block, stopping in the railway station Timișoara Vest at 03.18.

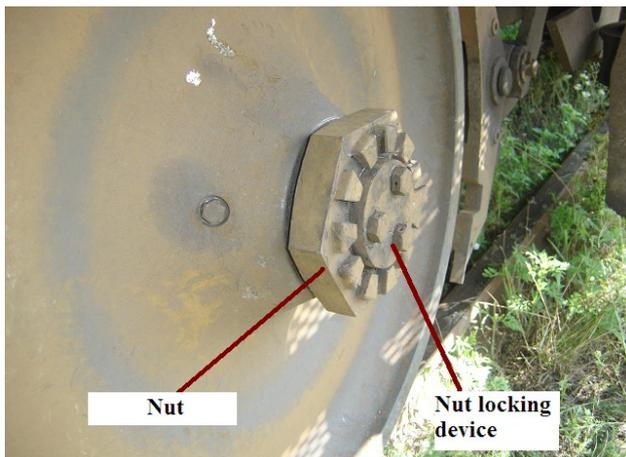
From the railway station Timișoara Vest, the train departure at 03.19, running on the distance Timișoara Vest-Cruceni, non-interoperable running section owned by the infrastructure manager SC RC-CF Trans SRL Braşov.

At 03.49, the train stopped in the railway station Peciu Nou until 03.51 o'clock and then it departed to the stopping point Cruceni, section end.

**At 04.09, at the km 37+570, at a speed of 38 Km/h (the timetable speed was 50 km/h), on the circular curve with right deviation in the running direction (R=295 m), occurred the derailment of axle no. 4 by falling of the right wheel between the stretch of rails and the left wheel climb over with the flange of wheel over the head of the curve exterior stretch. After a distance of approximately 3 meters, the left wheel derailed in the exterior of the curve, the axle no. 4 had run in this position until km 37+630, a distance of 60 meters.**

The locomotive - passenger motor driven driver, was in one man driving and took notice about the abnormal trepidations while running, he took rapid braking measures. After the train stopped, the conductor remained in the driving position, and the driver went to inspect the train observing that the intermediate axle no.4 from the motor coach AMX 97-0566-6 was derailed, for which he notified the movement inspector from the railway station Timișoara Vest and the traffic controller (belonging to the railway transport operator SC Regiotrans SRL Braşov) on duty.

After the railway transport operator SC Regiotrans SRL Braşov - Timișoara working point representatives arrived on-site, they **found that the intermediate axle no. 4 of the passenger motor driven AMX 97-566-6 was derailed at a distance of approximately 10 cm against the rail and the left wheel of the same axle had axial and radial clearance.**



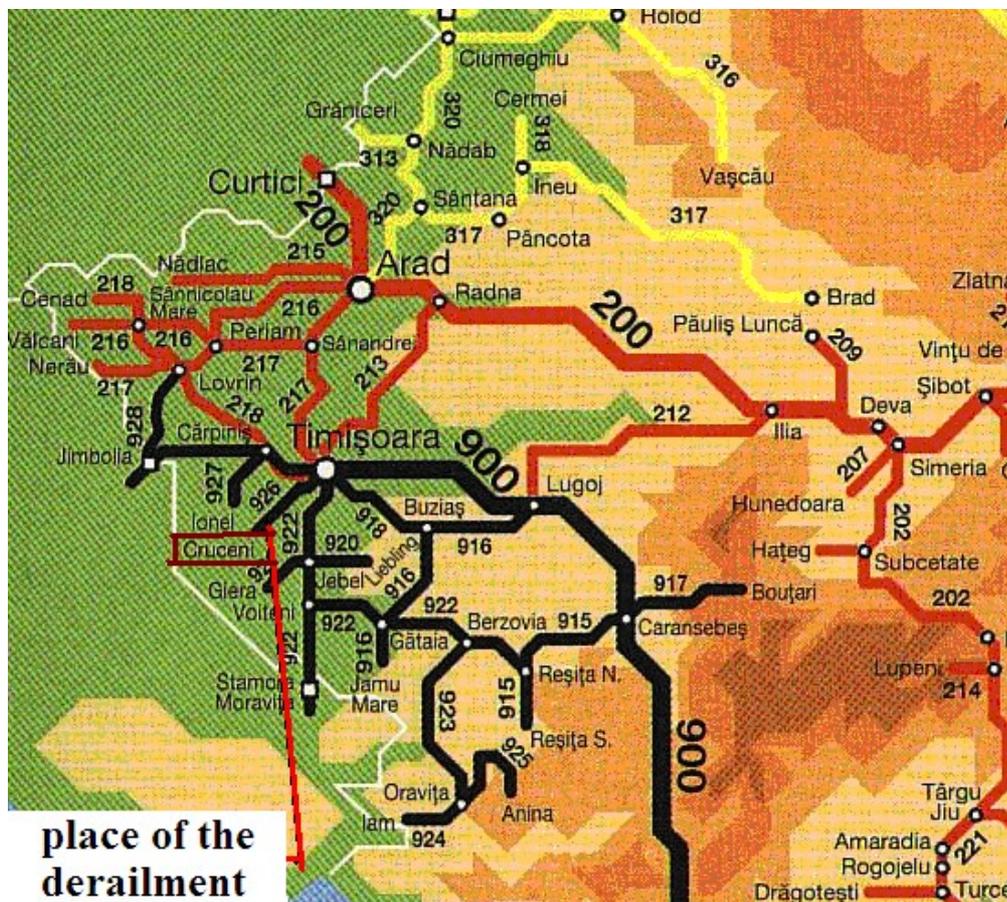
The wheel fixing nut and nut locking device inspected right after the derailment were in the normal montage position without any marks of movement or degradations.

There were no paint markings to emphasize the wheel boss rotation against the axle.

After lifting the passenger motor driven and replacing the axle no. 4 on tracks, with own means, the train was guided with a maximum speed of 5 km/h to the stopping point Cruceni.

There were no injured, damages were recorded at the tracks and at the passenger motor driven AMX 97-0566-6.

The running line Timișoara Vest - Cruceni was closed from 02.08.2010 at 04.09 o'clock until 02.08.2010 at 10.52 o'clock.



## B.2. The accident circumstances

### B.2.1. Involved parties

The running section Timișoara Vest - Cruceni (non-interoperable section, managed by **SC RC-CF Trans SRL Brașov**), is maintained by its employees.

The passenger train traffic of the railway transport operator **SC Regiotrans SRL Brașov** will be performed under the Operating Regulation No. 23/3/1 A /363/15.07.2008 of the running section Timișoara Vest – Cruceni, drawn up by the infrastructure manager **CF Timișoara Regional Branch - Traffic Division**.

The passenger train no. 14489, composed of the trailer vehicle no. 57-0366-5 and of the motor coach 97-0566-6, owned by the railway transport operator **SC Regiotrans SRL Brașov** being examined in route and maintained by its employees.

The planned inspections and accidental repairs are performed at the economic agent working points Arad and Vasiova authorised as railway supplier, **SC KRON-TRIEM SRL Brașov**.

The inquiry commission had questioned the involved employees in the passenger train no. 14489 running, the locomotive - passenger motor driven driver and the conductor, employees of **SC Regiotrans SRL**

Braşov, the locomotive - passenger motor driven inspector who participated at the latest technical revision type PTh 15 performed on 27.07.2010, employed by SC Regiotrans SRL Braşov, and the workshop personnel involved in the rolling stock maintenance (the workmans that changed the wheel of the passenger motor driven AMX 97-566-6 during the technical inspection type PTh 15 from 02-03.06.2010, employees of SC KRON-TRIEM SRL Braşov working point Arad).

The inquiry commision didn't questioned other persons attended at the accident occurence (passengers, other witnesses) since this wasn't necessary to establish the causes of the accident.

### **B.2.2. Composition and equipments of the train**

The passenger train no. 14489, composed of the trailer vehicle no. 57-0366-5 and of the motor coach 97-0566-6, (8 axles, 80 tones, braked tonnage requested 64 tones, real 120 tones) having running trace on the distance Timișoara Nord – Cruceni.

The safety and vigilance equipments (DSV), the equipment for the punctual control of the speed and autostop (INDUSI) of the hauling locomotive were in service and operated according to the instructions, the automatic brake was active.

### **B.2.3. Means of communications**

The communication between the locomotive-passenger motor driven driver and the movement inspector from the railway station Timișoara Vest was ensured through radio-telephone equipments and with the traffic controller on duty from SC Regiotrans SRL Braşov – working point Timișoara, by mobile phone.

## **B.3. Accident consequences**

### **B.3.1. Losses and casualties**

None.

### **B.3.2. Material damages**

At the passenger motor driven AMX 97-0566-6 beside axle no. 4 there were no other damages.

The value of the material damages at the passenger motor driven according to the estimation no. 391/14.09.2010, is 646,64 lei.

At the railway infrastructure were affected 6 timber sleepers.

The value of the damages at line according to the estimation no. 1126/08.09.2010, is 1923,43 lei.

The total value of the material damages = 2570,07 lei.

### **B.3.3. Accident consequences for the railway traffic**

As a result of this accident, the current line Timișoara Vest - Cruceni was closed between 02.08.2010 at 04.09 o'clock until 02.08.2010, at 10.52, when the passenger motor driven was replaced back on the line and hauled to the stopping point Cruceni.

For guidance to the Arad working point, in order to fix the damages, the workshop staff undertook a temporary intervention in the stopping point Cruceni, at the wheel o the left side, to include an addition to compensate the abnormal play between the wheel boss and the axle center.

It was put into service as train no. 15900, at 05.08.2010 on the distance Cruceni – Timișoara Nord with a maximum speed of 30 km/h on direct line and in current line, and of 15 km/h on deflecting section and it was accompanied by specialised personnel of **SC KRON-TRIEM SRL Braşov** economic agent. On the mentioned route, there were no incidents and no technical irregularities in running the axle.

For repairs in Arad working point, on 09.08.2010, the passenger motor driven was placen into operation as train no. 15901-2 on the distance between Timișoara Nord – Arad, in the same running conditions, without any specialised personnel and it run without any running safety observations.

On the route between the railway stations Arad and the depot Regiotrans, when the passenger motor driven cross-over the switches 138/150, the derailment of the axle no. 3 and 4 from the passenger motor driven AMX 97-0566-6 occured, having as cause the axial play from the wheel boss, left side of axle no. 4 reappeared after the addition expulsion that was introduced at the technical intervention before the guidance from the stopping point Cruceni.

The railway incident was defined according to the **Regulation** at Art. 8, group B, point. 2.4 and one proceed to the investigation, completed with the report no. 4/3/10/ 2010 Regional Inspectorate for Traffic Safety within the Railway County CF Timișoara.

Following the accident from 02.08.2010, the passenger trains no. 14489 on the distance Rudna - Cruceni and no. 14490 on the distance Cruceni - Timișoara Nord, were cancelled.

**B.4. External circumstances**

On 02.08.2010, between 03.00 – 05.00 the visibility was good, clear sky, specific brightness at night.

In the area of the railway accident, at km 37+570 on the running section Timișoara Vest - Cruceni, the track is made by rail type 40, on timber sleepers with direct fastening.

The railway accident spot is on the area of the constant-radius curve with radius R=295 m with a cand of the track h= 75 mm and widening of the gauge s = 15 mm.

This constant-radius curve had the following characteristic points, according to the album curves: AR-km 37+277, RC- km 37+347, CR- km 37+727 and RA- km 37+797.



The current line, in the area of km 37+570 is, in profile in long, on the flat, and in transversal profile in excavated material, joint profile.

**Findings and measures at the line immediately after the accident occurence**

Inspections with the gauge measure at gauge and transversal level of the track from km 37+570 to km 37+540 from 2,5m to 2,5 m, were performed, the measured were recorded in the technical inspection, so:

**Table 1**

Km punct	37+570	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	37+540
E	+10	+16	+8	+10	+8	+10	+15	+14	+12	+10	+10	+12	+12	+13	+14	+14	+10
N	74	73	67	67	73	73	68	70	69	67	68	70	69	70	69	69	72

On the same distance were also measured the track deflections (f) from 10 m to 10 m with a beam length of 20 m, resulting the following values: km 37+570 f=150 mm, km 37+560 f=160 mm, km 37+550 f=158 mm and km 37+540 f=152 mm.

## **Analysis and interpretation of the measured at the line**

1. The measurement after the derailment (on 02.08.2010 by the inquiry commission) according to table no. 1 shows that the values of the gauge on the area before the accident are according to the tolerances of chapter 1, Article 1 point 1 and 14.1.c from the Instruction no. 314/1989 of norms and tolerances for track construction and maintenance – tracks with normal gauge.
2. The measurement after the derailment (on 02.08.2010 by the inquiry commission) according to table no. 1 shows that the difference of level values of the track on the area before the accident are according to the tolerances of chapter 1, Article 7 A1 and 4 from the Instruction no. 314/1989 of norms and tolerances for track construction and maintenance – tracks with normal gauge.
3. The measurement after the derailment (on 02.08.2010 by the inquiry commission) at the track deflection shows that the track deflection values are according to the tolerances of chapter 1, Article 7 B1 from the Instruction no. 314/1989 of norms and tolerances for track construction and maintenance – tracks with normal gauge.

The visibility of the colour-light signals on the distance Timișoara Nord-Timișoara Vest was according to the provisions of the specific regulations in force and on the distance Timișoara Vest - Cruceni the traffic is according to the system “free railway” without signals, with the switches from the stopping point Cruceni locked on direct position (+).

## **B.5. The investigation development**

### **B.5.1. The summary of the testimonies of the railway personnel**

#### **B.5.1.1. Operating staff belonging to the railway transport operator SC Regiotrans SRL Brașov**

**The locomotive-passenger motor driven driver stated:**

- he took the passenger motor driven composed of the trailer vehicle no. 57-0366-5 and of motor coach 97-0566-6 on 01.08.2010 at 15.45 o'clock in the railway station Timișoara Nord, in good running conditions without observations concerning the technical defects or running safety;
- at the inspection performed with the locomotive-passenger motor driven driver, that he replaced, he didn't find anything special, cast wheels, the nuts to ensure the wheels on the axle and the nut locking devices were in good condition;
- in the running of the passenger train no. 14495/14496;14497/14494 from 01.08.2010 on the route Timișoara Nord – Cruceni - Timișoara Nord the passenger motor driven has performed well, without irregularities in operation;
- in the hauling of the train no. 14489, near the railway station Rudna where, according to the timetable it had passing, in curve, he notified together with the conductor, next to him in the trailer vehicle cabin, that at the train appeared bumps and abnormal noises, and then the rapidly took braking measures;
- after the train stopped, he left the conductor in the driver's cab and he went next to the train in order to find the cause;
- at the inspection he find the derailment of axle no. 4 of the passenger motor driven AMX 97-0566-6;
- he report the passenger motor driven AMX 97-0566-6 as out of order, the notified the movement inspector from the railway station Timișoara Vest and he requested emergency locomotive;
- he contact by phone, the traffic controller on duty from SC Regiotrans SRL Brașov – Timișoara working point, telling him what happened.

**The conductor stated:**

- he was onboard the train no. 14489 on 02.08.2010 from the railway station Timișoara Nord, with stops in the railway stations Timișoara Vest and Peciu Nou;
- being next to the driver in the driver's cab of the passenger motor driven trailer, in the curve near the railway station Rudna he felt a jerk and the driver braked suddenly;

- in the 1st class compartment from the trailer were two passengers who haven't suffered injuries;
- he remained in the passenger motor driven until the arrival of the emergency locomotive;

**The locomotive-passenger motor driven inspector** stated:

- he performed checkings after the inspection type PTh 15 from 27.07.2010;
- he checked the nuts and the nut locking devices from the axle no. 4 and he didn't find irregularities;
- when he take the passenger motor driven to perform the inspection type PTh 15 he didn't observe anything special at the running and there were no additional orders at the running gear.

**Chief operating manager** stated:

- in the working point Arad within SC KRON - TRIEM SRL Braşov, at the rolling stock belonging to SC Regiotrans SRL Braşov, planned maintenance works and accidental repairs are performed;
- at the investigation action date, on 10.08.2010, at Arad working point, the documentation, specification or technical norms for the performed works could not be presented;
- the checkings of the works for replacing the wheels and the measures specific to wheelset and running profile, at the passenger motor drivens type X4500 are performed by the specialised and authorised employee within Arad engine shed belonging to SNTFC „CFR Călători” SA;
- referring to the accident cause he reported that the wheel axial clearance on the axle was possible due to the loss of the tightening between the wheel boss and the axle center wheel-seat, favoured by the dinamic forces and brakes during running, which overlapped the imperfect montage when replacing the wheel;
- for the subsequent disposal of such cases, he suggest equipping the repairing personnel with necessary devices and appliances to establish a corresponding tightening.

**B.5.1.2. The economic agent SC KROM - TRIEM SRL Braşov personnel that was asked about the repairs and inspections at the passenger motor driven AMX 97-0566-6.**

**The electrician and 2 depot drivers that participated when replacing the wheels at axle 4 on 02-03.06.2010,** stated :

- in the mentioned data, the passenger motor driven was send in Arad working point for inspection type PTh 15 and removing the noises from axle no. 4 (shelling were found on the running surface), for which one replaced the wheels of boghie no. 2.
- after hydraulic jacking-up the bogies and axles from the rails, the existing wheels were depressed, the oil was removed from the axle journal and wheel boss to be installed surfaces, one checked to be no scratches or superficial cracks;
- pressing the wheel on the axle center con area, was performed by tightening the nut end with a two arms key in which one hit with a sledge hammer until when hitting the wheel a full noise was heard;
- they were not aware of any technical requirements regulating the operations and checks that should be made when replacing the wheels;
- they can not explain the loss of the tightening and the axial movement of the wheel left side of the axle no. 4.

**Technician specialized in the mechanical part that participated when replacing the wheels of axle no 4 on 02-03.06.2010,** stated :

- the operation mode to replace the wheels of the axle from bogie no. 2, was the one stated by the above questioned technician;
- during the past two weeks specialization at SC KROM - TRIEM SRL Braşov workshops, was trained under the same operation mode, pressing the wheel by tightening the nut until its blocking and installing the nut locking devices;
- he is not aware of any technical requirements regulating the operations and checks that should be made when replacing the wheels;
- he can not explain the loss of the tightening and the axial movement of the wheel left side of the axle no. 4.

### **B.5.2. Quality management system and railway safety**

At the moment of the accident, **SC Regiotrans SRL Braşov**, had established and implemented its own railway safety management system.

No problems were identified in the application of its provisions.

The economic agent SC KRON – TRIEM SRL Braşov has implemented its own quality management system approved by the Direction for Certification of Environment / Quality Management Systems within AFER, by CERTIFICATE series SMC, no. 309 valid until 13. 11. 2010.

### **B.5.3. Norms and regulations**

In the investigation of the railway accident one took into account:

- the technical specification ST-01REV/2007 drawn up by SC KRON-TRIEM SRL Braşov and the list of works NL-01 REV on inspections type PTh 15, RT, R1, R2, 2R2 at the passenger motor driven formed from motor coach X 4500 și trailer vehicle XR 8400;
- the operating regulations of Timișoara Vest - Cruceni running section no. 23/3/3/1A/363/15.07.2008;
- Instructions for the locomotive staff activity in the railway transport no. 201/2007.

### **B.5.4. Sources and references for investigation**

- photos taken at the accident spot and at the railway station Cruceni;
- photos taken during the removal and examination of the axle by the inquiry commission members;
- the technical report no. 224/769/16.09.2009 ended during the removal of axle no. 4 from the passenger motor driven 97-0566-6 la SC KRON - TRIEM SRL Braşov, Arad working point;
- the documents of the inspections and repairs performed at the passenger motor driven AMX 97-0566-6;
- the documents of the train no. 14489 running on 02.10.2010;
- questionnaires taken from involved employees.

### **B.5.5. The rolling stock functioning**

#### **B.5.5.1. The passenger motor driven AMX 97-0566-6**

##### **B.5.5.1.1 Technical characteristics**

The passenger motor driven is provided by SNCF France and it holds the railway technical agreement series AT no. 131/2004 composed of one motor coach and one trailer vehicle.

- diesel engine type Poyaud rated 450 HP;
- length between buffers 21240 mm;
- height 3740 mm;
- distance between bogies centers 18057 mm;
- bogie pitch 4350 mm;
- wheel diameter in new / used condition 868 / 820 mm;
- minimum radius for curve entry 80 m;
- maximum constructive speed 120 km/h;
- axle load carrying bogie passenger motor driven 9500 kg

### B.5.5.1.2. Inspections and repairs on the passenger motor driven

The inspection and repair works were performed by the SC KRON – TRIEM SRL Braşov employees, inside Arad working point according to the technical specification **ST – 01 REV** drawn up and approved in January 2007 including the works list **NL – 01 REV**.

- inspection type R1 on 10.05.2010 at SC KRON – TRIEM SRL Braşov, Arad working point;
- inspection type PTh 15 on 02.06.2010 continued with accidental repair (RAD) during which the wheels of the bogie no. 2 were replaced – works performed in the SC KRON – TRIEM SRL Braşov workshop, Arad working point.

### B.5.5.2 Derailed wheelset

#### B.5.5.2.1. Conclusions on the wheelset due to its removal from the locomotive on 10.08.2010

- at the bogie frame on which the axle in question was mounted and on the axle wheel-seat area, track of friction were found due to the wheel position change on the axle centre;



- the wheel fixing nut had intensive traces on the contact surface with the wheel boss.



- at the left wheel of axle no. 4 one found friction tracks with increasing the quotas of the conic bore of the wheel boss with 4,3 mm at the big diameter, 2,5 mm at the small diameter and the reduction with 1,8 mm of the length.



## B.6. Analysis and conclusions

From the analysis on the derailed axle and from the examinations performed in the Arad working point workshop belonging to SC KRON – TRIEM SRL Braşov the following can be concluded:

- the derailment of the passenger motor driven occurred due to the reduction of the distance between the wheels inside surfaces of axle no. 4;
- the axial movement of the right wheel on the axle journal was possible due to the bore increase through friction due to tightening loss;
- one can't identify documentations or technical means to certify a appropriate assembly at the wheelset replacement works;
- because the wheels doesn't have a series or manufacturer number, they can't be identified to be followed in operation;
- recovery by turning of the wheel running profile with their removal from the axle carries the risk of tightening failure by incorrect assembling (uncleaned contact surfaces; different wears at the hub bore or axle-center wheel-seat) that does not compensate the specific demands of operating;
- wrong working mode by avoiding the paint marking between wheel boss and axle to highlight the tightening loss and rotating the axle in the wheel boss.

## B.7. Measures taken or adopted due to the incident



Following this railway accident, SC KRON – TRIEM SRL Braşov and SC Regiotrans SRL Braşov management teams ordered, for this rolling stock, to be marked with paint to highlight the axle spins in the wheel boss.

## B.8. The accident causes

### B.8.1. Direct cause

**The direct cause** of the accident occurrence consists of decreasing the distance between inside faces and the parallelism modification of the wheel rims of the two wheels of axle no.4, causing the fall of the right wheel, in the running direction, between the stretch of rails.

This occur due to the non-observance of the assembly technology on insurance the tightening between the cast wheel boss left side and axle center wheel-seat, which in time led to quotas increase of the conic bore of the wheel boss with approximately 3-4 mm due to frictions arising from the relative displacement of the two surfaces.

**Contributing factor** to the accident was the fact that there were no visible markings with paint capable to detect the relative displacement of the wheel boss against axle center, fact that could be noticed by the service personnel before the appearance of the abnormal wears and the axial movement of the wheel.

### B.8.2. Underlying causes

Repairs to the passenger motor drivens type X 4500 and trailer vehicles type XR 8300 wheelsets were

performed by the SC KRON - TRIEM SRL personnel, the railway technical agreement hadn't a documentation and specific technological equipment for replacing the axles and wheels.

### **B.8.3. Root cause**

Execution of repairs at the axles put on in working points for which the railway technical agreements are not obtained according to OMT 290/2000.

## **C. SAFETY RECOMMENDATIONS**

The railway undertakings, holders of this rolling stock type, will follow that, works for accidental repairs and planned type RR, RG, to be performed with economic agents that holds a railway technical agreement in which to be stipulated the repair works performed by taking to pieces and mount the wheel on the axle center.

Until the development of the technical specification, the completion of the existing technical specification for planned inspections and accidental repairs and planned type RR, RG, as to be provided the repair works performed by taking to pieces and mount the wheel on the axle center, will proceed to the implementation by the SC KRON-TRIEM SRL economic agent of a paint marking, at all axles, between the screwed nut and wheel boss and the railway transport operator will establish, for the operating staff, the obligation to check and record their status in the sheet of the passenger motor driven incident record.

Obtaining without delay, by the SC KRON-TRIEM SRL economic agent, the railway technical agreement for work points in which are performed technological processes for planned inspections and accidental repairs.

The Romanian Railway Safety Authority will monitor the implementation of these safety recommendations.

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This investigation report will be sent to Romanian Railway Safety Authority, to Romanian Railway Notified Body, to the public railway infrastructure manager CNCF „CFR” SA, to the non-interoperable railway infrastructure manager RC - CF TRANS SRL Braşov, to the railway undertaking SC Regiotrans SRL Braşov, to the economic agent SC KRON-TRIEM SRL, and other interested railway undertakings.

Members of the investigation commission:

Drăghici Marin - main investigator \_\_\_\_\_

Oltenacu Livius - investigator \_\_\_\_\_

Păiș Luca - investigator \_\_\_\_\_