

NOTICE

According to the provisions of the Regulation for the investigation of accidents and incidents, for development and improvement of the Romanian railway and subway safety approved by the Government Decision no. 117/2010, Romanian Railway Investigating Body performed an investigation concerning the railway accident occurred on 07.04.2013, at 12:25, on the Branch of the Regional Center for Operation, Maintenance and Repairs Timișoara, in the freight train running no.60832-1 (belonging to the railway undertaking SC Transferoviar Grup SA), between the railway stations Baru Mare and Pui, by the derailment of the first bogie in the running direction of the wagon no.31555972602-3, the 5th wagon from the locomotive in the train composition.

Through the performed investigation, the information concerning the occurrence of this accident were gathered and analyzed, the conditions were established and the causes determined.

The investigation of Romanian Railway Investigating Body did not aim to establish the guilty or the responsibility in this case.

Bucharest, 18th of July 2013

Approved by

Director,
Cristian-Marius MOȘ

*I ascertain the compliance with the
legal provisions concerning the investigation
and the drawing up of this investigating report that*

I submit for approval

Chief investigator

Eugen ISPAS

This notice is part of the Investigating Report of the railway accident happened on the 07th of April 2013, at 12:25 hour, on the Branch of the Regional Center for Operation, Maintenance and Repairs Timișoara, in the freight train running no. 60832-1 (belonging to the railway undertaking SC Transferoviar Grup SA), between the railway stations Baru Mare and Pui, by the derailment of the first bogie in the running direction of the wagon no.31555972602-3, the 5th wagon from the locomotive in the train composition. .



INVESTIGATING REPORT

of the railway accident occurred on 07.04.2013 on the Branch
of the Regional Center for Operation, Maintenance and Repairs Timișoara,
between the railway stations Baru Mare and Pui.



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A. PREAMBLE

A.1. Introduction

The Romanian Railway Investigating Body, hereinafter OIFR, performs investigation actions according to the provisions of the Law no.55/2006 on the railway safety, hereinafter Law on the railway safety and also the Regulation of investigating the accidents and incidents, of developing and improving the railway safety on the Romanian railways and on the subway transport network approved by the government decisions no.117/2010, hereinafter Investigating Regulation.

The purpose of the investigating action of OIFR is to improve the railway safety and to prevent railway incidents or accidents.

The investigation is performed independently by any judicial inquiry and in any case isn't in charge with establishing the guilt or the responsibility.

A.2. The process of investigation

On the basis of article 19, paragraph 2 of Law on the railway safety, OIFR, in case of occurrence of some railway accidents or incidents has the obligation to open investigation actions and to compose investigation commissions for collecting and analysis of technical information, establishing the occurrence conditions, including determining the causes and, if case, issuing some safety recommendations in order to prevent similar accidents and to improve the railway safety.

Taking into consideration the informative note of the general inspectorate of traffic safety within CNCF "CFR" S.A. of April 8, 2013 and also the approval sheet of the regional inspectorate of traffic safety within the Branch of Regional Center of operating, maintenance and repairs Bucuresti, hereinafter CREÎR Timișoara, on the accident occurred on April 7, 2013, 12 :25 hour, on the running of the freight train no.60832-1, belonging to the freight railway undertaking SC Transferoviar Grup SA, on the activity area of the Regional Center of Operating, Maintenance and Repairs Timisoara, between Baru Mare and Pui railway stations, by derailment of one bogie to the fifth wagon from the locomotive of the train and taking into consideration that the railway event is qualified as accident according to the provisions of article 7, paragraph 1, item b of the Investigating Regulation, the OIFR director decided to open an investigating action and to appoint the investigating commission.

Therefore, by decision no.111 of April 8, 2013 of OIFR director, was appointed the investigating commission composed of personnel belonging to OIFR, ASFR (ISF Timișoara) and to SC Transferoviar Grup SA hereinafter TFG, as follows:

Țena Lucian	Head of department SIAFG-OIFR	- main investigator
Afanase Mitu	investigator – OIFR	- member
Oltenacu Livius	investigator – OIFR	- member
Suru Mihai	territorial inspector – ISF Timișoara	- member
Morar Ioan	director M.R. - SC Transferoviar Grup SA	- member

B. SUMMARY OF THE INVESTIGATING REPORT

On 7th April 2013, around 12:25 hour, on the activity area of CREÎR Timișoara, on the running of the freight train no.60832-1 (belonging to the freight railway undertaking SC Transferoviar Grup SA), between Baru Mare and Pui railway stations, occurred a railway accident that consisted of derailment of the first bogie in the running direction of the wagon no. 31555972602-3, the 5th in the train composition from the locomotive, the wagon being the property of the railway undertaking „Rail Cargo Hungary”.

Following the occurrence of this accident, on the line I the railway traffic between CF Baru Mare – Pui railway stations was closed starting with the hour of the railway accident occurrence to 00:30 hour of April 8, 2013.

4 freight trains delayed with a total of 647 minutes.
It weren't registered losses of human life or injured people.

Direct cause, factors that contributed

Direct cause :

- Removal of the wheels no.4 and 5 from the guiding axle of the wagon no. 31555972602-3 following the decreasing in time of the tightening force carried out by the wheel hub on the wheel seat from the axle.

Factors that contributed

- appearance in depth of rust on the entire circumference of the axle pressing sections on a variable width between 22 – 38 mm respectively rust points in depth on a portion with an irregular shape with a surface of almost 500 mm², by damaging the tightening force of the wheel hub on the wheel seat on the axle caused by a non-conformity in the process of assembling the wheel-set.

No underlying causes were identified.

No root causes were identified.

Level of severity

According to the classification of accidents foreseen to article 7 of Regulation of investigating accidents and incidents, of developing and improving the railway safety on Romanian railways and subway transport network, approved by government decision no.117/2010, taking into consideration the activity in which it took place, the event is qualified as railway accident according to article 7(1), letter b.

No safety recommendations were issued.

C. INVESTIGATING REPORT

C.1. Description of accident

On April 6, 2013, the train no. 60832-1 was put at disposal to CFR Râureni railway station

composed of 25 wagons Eas-y series (loaded) , 100 axles, 400 meters for technical inspection when composing the train and complete braking test that were performed by an examiner belonging to SC Transferoviar Grup SA.

After performing the technical inspection at composition and the complete braking test, the train is leaving from CFR Râureni at 18:03 hour and arrives to CFR Caracal railway station in the same day when is put at disposal for performing the technical inspection in transit , operation that is performed by an examiner belonging to SC Transferoviar Grup SA.

After performing the technical inspection in transit and the continuity brake test, the train left from Caracal railway station at 23:30 hour and on 7'th April, 2013 around 12:22 hour arrives to CFR Baru Mare railway station. The train was running on the direct line no.3 (section 034), km 50+931 where occurs the derailment of the first bogie in the running direction of the wagon no. 31555972602-3, the 5'th from the locomotive in the train composition.

The place where the accident took place



Figure no.1

Following the occurrence of this accident, the railway traffic between CF Baru Mare – Pui railway stations was closed on line I from the hour of the railway accident occurrence to 00:30 hour of April 8, 2013.

Following the occurrence of this accident, 4 trains delayed 647 minutes.

Following the occurrence of this accident, no victims or injured people were registered.

The derailed wagon was lifted at 00:30 hour of April 8, 2013 and the railway traffic between CF Baru Mare – Pui railway stations, on the line I being reopened.

Following the notification of this railway accident, performed according to the specific regulations, the representatives of Romanian Railway Investigating Body, Romanian Railway Safety Authority, railway infrastructure manager - CNCF „CFR” SA Bucharest and railway undertaking SC Transferoviar Grup SA went to the accident site.

C.2.Accident circumstances

C.2.1. Involved parties

The railway infrastructure and superstructure where the railway accident occurred are under the administration of the railway infrastructure manager - CNCF „CFR” SA - CREÎR Timișoara Branch. The railway superstructure maintenance is performed by specialized staff from the Lines District no. 5 Pui - L9 Simeria Section.

The interlocking system from the railway station Baru Mare is maintained by the Section CT4 staff, Deva - CREIR Timișoara.

The hauling locomotive EA 622-7 belongs to SC Transferoviar Grup SA, the locomotive from the rear of the train (isolated) rented by SC Transferoviar Grup SA from railway undertaking Constantin Grup and the wagons from the train composition nr. 60832-1 are owned by Rail Cargo Hungary under contract with railway undertaking SC Transferoviar Grup SA.

The communication equipment onboard the hauling locomotive is owned by the railway undertaking SC Transferoviar Grup SA and maintained by its employees.

C.2.2. The train composition and equipments

The freight train no.60832-1, composed from 25 wagons (loaded) owned by Rail Cargo Hungary (under contract with railway undertaking SC Transferoviar Grup SA), 100 axle, 1940 gross tonnes, length 400 m, was hauled by the locomotive EA 622-7 owned by the railway undertaking SC Transferoviar Grup SA and banking locomotive DA 1635-6 (isolated) owned by the railway undertaking Constantin Grup (rented by SC Transferoviar Grup SA).

C.2.3. Description of the involved railway equipment at the accident site

C.2.3.1. Lines

The path description

From the departure station until the derailment site, the train ran approximately 360 km. The accident site is in the “ CREÎR CF” Timișoara, in the railway station Baru Mare, on direct line 3 (section 034), of running line I, the path is in curve with radius of 515m, cant of the track 80mm, and slope 14,2‰.

Description of the track superstructure

The derailment occurred on running line I, current line Baru Mare - Pui.

In the derailment area the rail is of type 60, manufacturing year 1997, welded, without defects with concrete sleepers type T 17A manufacturing year 1980 with indirect fastening type K complete and active, track without joints, curved line.

The curve characteristic points are:

- radius = 515 m;
- cant of the track = 80 mm;
- over-widening = 0 mm;
- AR = 50+630, RC = 50+730, CR = 50+900, RA = 51+020.

Longitudinal profile: the accident site is in slope of 14,2‰ (line in gradient towards the Pui railway stations).

The line running speed is 60km/h for the freight trains.

C.2.3.2. Equipments

The traffic from the railway station Baru Mare towards the railway station Pui is based on automatic block line BLA.

C.2.3.3. Wagons

Technical characteristics of the wagon no.31555972602-3

- wagon series	Eas-y;
- automatic brake type	KE1aSL;
- bogie type	Y25Cs ;
- distance between the bogies pins	9,00 m;
- wagon length	14,04 m;
- buffing	circle buffers;
- draft gear	discontinuu;
- wagon tara	27,700 tones;
- load capacity	52,3 tones;
- date of the last planned repair performed	RP 15.10.2012+3M – MS;
- maximum repair period	6 years.

C.2.4. Communication means

The communication between the engine driver and the station movement was ensured through the radio equipments.

C.2.5. Starting the emergency plan

Immediately after the railway accident occurrence and the starting of the emergency plan for damages removal and the train running restoration one achieved according to the Regulation for accident and incident investigation, approved through the Government Decision no. 117/2010, at the railway accident site come the representatives of the public railway infrastructure manager CNCF „CFR” SA, railway undertaking SC Transferoviar Grup SA, Romanian Railway Authority – AFER and of the Operative Department of the Railway Police.

C.3. Accident consequences

C.3.1. Fatalities and injures

Following the occurrence of this accident, no fatalities or injured people were registered.

C.3.2. Material damages

The value of the material damages according to the estimates made by the railway undertaking, of intervention means and by the railway infrastructure manager, is the following:

Material damages	- Ron -
Transport of replacing bogie for the wagon – according to the invoice no.38513 of SC ORIENT SRL	1.984,00
Disconnect from power supply – according to the invoice no.TM 04 380371_13 of Deva Electrification Center	4.371,68
Intervention crane – according to the invoice of SC CRAN BT HD SRL	16.740,00
At equipments – according to the estimate no.307/2013 of Section CT4 Deva	6.025,86
At line – according to the estimate no.1012/2013 of Section L9 Simeria	450.020,42
TOTAL	479.141,96

C.3.3. Accident consequences in the railway traffic

Following the railway accident a number of 4 trains have delayed with a total 647 minutes. Following this railway accident there were no incidents or environmental accidents.

C.4. External circumstances

On 07.04.2012, at 12.22, the visibility was good.

The visibility of the color-light signals was according to the provisions of the specific regulations in force.

C.5.The investigating

C.5.1.The brief of the involved staff testimonies

The driver of the hauling locomotive EA 622 of the train 60832-1 stated the following:

- he received the locomotive EA 622, in transit, from the railway station Craiova on 07.04.2013 at 04:00 to haul the train 60832-1;
- between the railway stations Craiova and Baru Mare the train has circulated in normal conditions, in running safety conditions;
- in the railway station Baru Mare he pass, with the activation of the equipment "Attention Indusi", the entry signal was yellow, after which he took measured to stop the train in the railway station Baru Mare, when the movement inspector from this railway station notified him by radiotelephone equipment to continue the route with reduce speed because the exit of train no.2704 from station and one didn't desire the occupation of the platform by the freight train;
- after reducing the speed to approximately 10km/h, he notice the change of the exit signal from the railway station Baru Mare in „green” and after the movement inspector confirmation he continue the route passing through the railway station;
- after the train pass the railway station, the movement inspector notified him that the “train is in good condition and is signaled accordingly”;
- after the hauling locomotive pass the level crossing with Deva – Petroșani road and the automatic block line signal, on route, indicating “green” he observe, although he didn't activate the brake, a decrease in the train main air brake pipe, at that time he took action of quickly braked;
- short time before the train stop he is noticed by the locomotive driver from the rear of the train that he, also, took action of quickly braked because he notice a hit at the locomotive running gear;

- he send the driver's assistant to ascertain the cause of the stop. During this time the driver from the rear of the train notice that the fifth wagon from the rear of the train is derailed by one bogie, he ensure the train against running with hand brake and notify the accident according to the regulations in force.

The driver's assistant of the hauling locomotive EA 622 of the train 60832-1 stated the following:

- he received the locomotive EA 622 on 07.04.2013, at 04:00, in the railway station Craiova;
- between the railway stations Craiova and Baru Mare the train has circulated in normal conditions, in running safety conditions;
- in the railway station Baru Mare the train driver pass, with the activation of the equipment "Attention Indusi", the entry signal was yellow, after which he took measured to stop the train in the railway station Baru Mare, when the movement inspector from this railway station notified him by radiotelephone equipment to continue the route with low speed because the exit of train no.2704 from station and one didn't desire the occupation of the platform by the freight train;
- after the train pass the railway station, the movement inspector notify that the "train is in good condition and is signaled accordingly";
- after the hauling locomotive pass the level crossing with Deva – Petroșani road and the automatic block line signal, on route, indicating "green" after 2-3 seconds he observe, although he didn't activate the brake, a decrease in the train main air brake pipe, at that time the train driver took action of quickly braked;
- short time before train stop the locomotive driver from the rear of the train notify that he, also, took action of quickly braked because he notice a hit at the locomotive running gear;
- following the driver's request, he went down to found the cause of the stop. During this time the driver from the rear of the train notice that the fifth wagon from the rear of the train is derailed by one bogie;
- after reaching the derailed wagon, he notify the driver, by mobile phone, about the findings;
- he took actions to ensure the train against running with hand brake according to the train driver order.

The driver of the locomotive DA 1635 from the rear of the train 60832-1 stated the following:

- he received the locomotive DA 1635, in transit, in the railway station Craiova on 07.04.2013, as locomotive is not in action from the railway station Craiova to the railway station Târgu Jiu, banking locomotive between the railway stations Târgu Jiu and Banița and from the railway station Banița to the accident site as locomotive is not in action, at the rear of the train, coupled to the train and to the brake system;
- between the railway station Banița until the accident site he was on the front driver's cab;
- at the exit from the railway station Baru Mare, at 50 m before the exit signal, he smelled "hot iron" moment in which he try to contact the hauling locomotive driver and also take actions to brake the train;
- after the train stopped, he went down from the locomotive and move beside the train notifying that the fifth wagon from the rear of the train is derailed by one bogie, notifying the hauling locomotive driver, by mobile phone, about the findings.

The driver's assistant of the locomotive DA 1635 from the rear of the train 60832-1 stated the following:

- he received the locomotive DA 1635, in transit, in the railway station Craiova on 07.04.2013, as locomotive is not in action from the railway station Craiova to the railway station Târgu Jiu, banking locomotive between the railway stations Târgu Jiu and Banița and from the railway station Banița to the accident site as locomotive is not in action, at the rear of the train, coupled to the train and to the brake system;

- at the exit from the railway station Baru Mare, he smelled “hot iron” moment in which he enter the engine room to check if the smell is coming from the locomotive and driver’s cab opposite to the running direction he observed “dust coming from under the locomotive”;
- he notify the locomotive driver about the findings, the locomotive driver took brake measures and notify the banking locomotive driver, requesting him to stop the train;
- after the train stopped, he remain onboard the locomotive and the driver went down to ascertain what happened.

The examiner that made the technical inspection at the arrival and composition in the railway station Râureni and in transit in the railway station Caracal of the train or.60832-1 stated the following:

- he performed technical inspection when the train no. 60812-1 arrived in the railway station Râureni on 05.04.2013 and didn’t find any failure at the wagon 31555972602-3;
- he performed technical inspection at composition of the train no. 60832-1 in the railway station Râureni on 06.04.2013 and didn’t find any failure at the wagon 31555972602-3, finding at two wagons within the train composition lacks which did not affect the traffic safety;
- due to the technical inspection at the composition in the railway station Râureni he wrote in the operating statement referred to in operating plan of railway station;
- he performed technical inspection in transit at the train no.60832-1 in the railway station Caracal on 06.04.2013 and didn’t find any defect at the running gear at the wagon 31555972602-3, mentioning in the station record that “the technical inspection in transit was performed and the train can be routed in traffic safety conditions”.

C.5.2. Safety management system

At the moment of the railway accident occurred, CNCF „CFR” SA as infrastructure manager of the railway had implemented its own safety management system, according to the provisions of the Law no. 55/2006 concerning the railway safety which transposes the Directive 2004/49/CE concerning the safety on the community rails, and the Ministry’s of Transport and Infrastructure Order no.101/2008 concerning the granting of the safety authorization to the Romanian railway infrastructure manager/administrator.

At the moment of the railway accident occurred, SC Transferoviar Grup SA as railway undertaking had implemented its own safety management system, according to the provisions of the according to the provisions of the Law no. 55/2006 concerning the railway safety which transposes the Directive 2004/49/CE and the Ministry’s of Transport and Infrastructure Order no. 535/2007 (modified by Ministry’s of Transport and Infrastructure Order no. 884/2011 and completed by Ministry’s of Transport and Infrastructure Order no.2179/2012) concerning the granting of the safety certification in order to perform railway transport services on Romanian railway.

C.5.3. Norms and regulations. Sources and references for investigation

At the railway accident investigation were taken into account the following norms and regulation:

- Regulations for train traffic and the shunting of railway vehicles no.005, approved by Minister of Transports, Constructions and Tourism Order no. 1816 from the 26th of October 2005;
- Instructions on the technical inspection and the maintenance of the wagons in operation no. 250, approved by Minister of Transports, Constructions and Tourism Order no. 1817 from the 26th of October 2005;
- Instructions for the locomotive staff of railway transport No 201. approved by Minister of Transports, Constructions and Tourism Order no. 2229 from the 23rd of November 2006;

- Instruction of norms and tolerances for construction and maintenance of the standard gauge tracks no. 314/1989;
- Instruction regarding the deadlines and the order in which the track revisions should be made no.305 approved by OMT no. 71/17.02.1997;
- SR EN 13260+A1 Pair of wheels. Product requirements
- Railway technical norm NTF 81-002:2004- Railway vehicles. Pair of wheels, terms of quality;
- Instruction for repairing the pair of wheels from the railway vehicles no.931/1986.

At the railway accident investigation the followings sources and references were taken into account:

- copy of documents submitted as annexes to the investigation file;
- photos taken soon after the railway accident by the members of the investigation commission;
- documents concerning the maintenance of the tracks, put at the disposal by the responsible with their maintenance;
- results of the measurements made after the accident at the superstructure and derailed wagon;
- Inspection and interpretation of the technical condition of the elements involved in the accident: infrastructure, railway equipments and train.
- Inquires of involved staff in the railway accident.

C.5.4. Functioning of technical equipments,, infrastructure and rolling stock

C.5.4.1. Data found on lines

Findings and measurements of the track after the derailment

1. corresponding concrete sleepers, complete and active fastening, metal plates with no traces of movement trace on sleepers;
2. broken stone prism partially clogged;
3. from climbing point in the opposite running direction of the train pegs were marked on the ground of 2.5 meters in 2.5 meters, in the resulted points measurements of the gauge and transversal level were made with the measurement gauge. The values of the measurement gauge were the following:

Peg	0	1	2	3	4	5	6	7	8	9	10
E(mm)	15	10	8	8	4	6	11	11	11	9	5
N(mm)	74	68	65	60	57	55	49	51	53	51	51

4. There were no wear of metal parts of the turnout, to determine derailment.
5. Following the checking by measurement of the gauge and transversal level in the characteristics points of the switch no.1 there were no values above the allowed tolerances admitted in the Instruction for norms and tolerances for constructions and maintenance of track – line with normal gauge no.314/1989.314/1989.

C.5.4.2. Data found at functioning of rolling stock and its technical equipment

Findings performed on the wagons of the train composition

- exchanger „Freight– Passengers” and „Empty – Loaded” were in proper positions to the status of the wagons, respectively positions „Freight” and „Loaded”;
- the train had in its composition one wagon with isolated automatic brake,

- wagons was proper coupled;
- functioning coupler of the traction gear was proper tightened for freight trains;
- no uninsured parts were found which can jeopardize the safety running.

Findings performed on the derailed bogie of the wagon no.31555972602-3 in the Wagon Factory Aiud:

Bogie - type Y 25 Cs

Bogie frame and brake rigging

Stamps

- had paint inscriptions (3,4,5,6) to identify the wheel number;
- next to the wheel 4 – bogie branding „2 IOB”;
- next to the wheel 5 – there is a board applied by welding on which the number 06420 is stamped.

Damage following the derailment to the bogie frame and brake rigging

- the suspension support next to the wheel 6 broke from welding;
- triangular brake axle and safety stirrup-pieces (outside the bogie) corresponding to wheels 4-5– broken and deformed;
- triangular brake axle and safety stirrup-pieces (inside the bogie) corresponding to wheels 4-5– broken and deformed;
- triangular brake axles and safety stirrup-pieces corresponding to wheels 3-6– deformed.

Axles of the bogie composition

Axle with wheels 4-5 (first bogie axle in the running direction).

Tip osie: OR1-1

- Axle series 902831.
Other inscriptions ZB 11.12 43911/061 EA 1 N.
- Wheel 4 (the right wheel in the running direction)
 - complete displaced and axially movable towards middle of the axle;
 - wheel seat of the axle next to the axle box presents profound rust , over the entire circumference on a variable width between 22 – 38 mm. The area has a rugged appearance with damage of the surface and at the same time the tightening (photo no.3);
 - On the rest of the pressing area were noticed rust traces and scratches as a result of the wheel axially movable towards the interior;
 - The entire running surface of the wheel presents hits and deformations as a result of the interaction between wheel and track components.
- Wheel 5 (the left wheel in the running direction)
 - complete displaced and axially movable towards middle of the axle;
 - wheel seat of the axle next to the axle box presents rust in depth in points on a section with irregular shape with a surface of approximately 500 mm²(photo.no.2);
 - On the rest of the wheel seat were noticed rust traces and scratches as a result of the wheel axially movable towards the interior;
 - The entire tread wear surface of the wheel presents hits and deformations as a result of the interaction between wheel and track components.

Axle with wheels 3-6 (the second bogie axle in the running direction)

Type axle: OR1-1

- Axle series 56423
 - Manufacturer IOB
 - Year of fabrication 02 80
- Other stamps RCH 16354 31337 MS 96

- The measurement of the distance between the inner sides wheels was performed in 3 points resulting the following values:
 - 1375,6 mm
 - 1374,3 mm
 - 1375,3 mm

After comparing the results of these measurements above the maximum allowable - 1363 mm and as a result of viewing the wheels resulted that both wheels moved towards outside. For measurements was used DVI 206-99 certified and available 03. 2014.

- The entire running surface of the wheels presents hits and deformations as a result of interaction between wheel and track components.

There were no stamps on the solid wheel of this bogie.



photo no.2



photo no.3

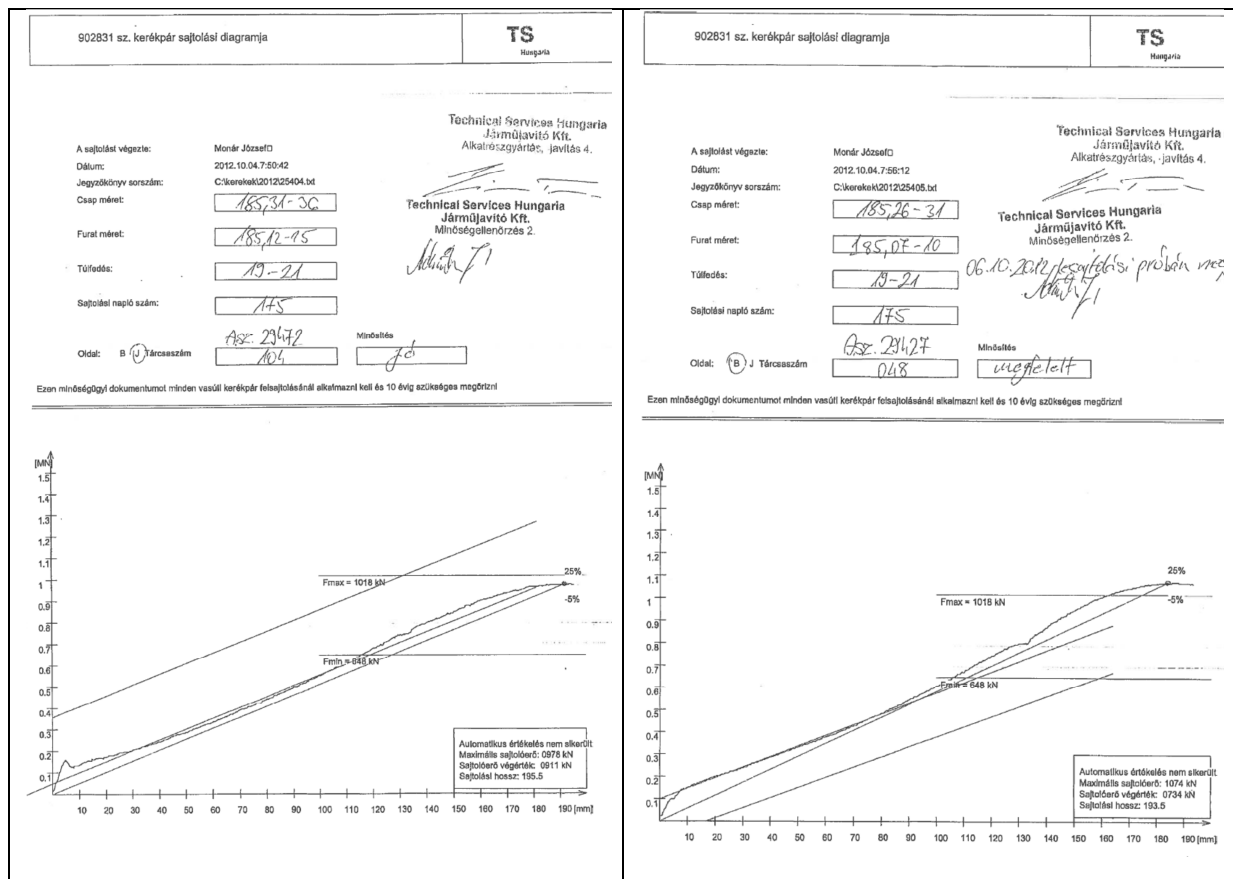


photo no. 4

From the data provided by the Transportation Safety Bureau Railway Department Hungary the following refer to:

- The manufacturer of the wheels fitted on the axle with series 902831 is Bonatrans, data of fabrication:07.2007;
- The number of the batch of wheels is 29427/048 and 29427/104;
- The axle with series 902831 was fitted on 04.10.2012 in the Miscole workshop, the charts for assembling the wheels on the axle are presented in photo no.4

C.6. Analysis and conclusions

C.6.1. Conclusions on the technical condition of the rail suprastructure before derailment

Given the characteristics of the line described in Chapter C.2.3.1. *Lines* presented in description of rail equipment involved in the accident as well as findings and measurements to the line, after the derailment, presented in chapter C.5.4.1. - *Data found on lines*, we can declare that the technical condition of the superstructure lines and switches could not influence the derailment.

C.6.2. Analysis and conclusions regarding the derailment of the train

From the analysis of the findings of the accident site, the technical state of the involved wagon bogie, of the photos made on the site and of the Wagon Factory Aiud, as well as the testimonies of the involved staff, it can be concluded that the railway accident occurred in the following conditions:

- first trace of the derailment, occurred at the fifth wheel of the left axle with wheels no.4-5, is noticed that between rail tracks (left side in running direction), at km 50+931, inside station Baru Mare, on direct line no. 3 (section 034), related to running line I ;
- at approximately 200 mm of the first trace of derailment is noticed the beginning of a climbing trace on the straight line by the right wheel of the axle 3-6 (wheel no. 3), which is running about 5 m with the lip of the head of the rail after which derails outside track along with the corresponding wheel derailment (wheel no.6) inside;
- After approximately 107 m it is noticed the appearance of the derailment traces it is noticed still inside the rail tracks performed by wheel 4 of the right axle (4-5);
- the specific derailment traces are noticed on a distance of 1381 m, between km 50+931 and km 49+550;
- on the occurrence of the axle derailment with wheels no. 4-5 of wagon no. 31555972602-3 the running speed on running line I, current line Baru Mare - Pui was about 60 km/h;
- at axle 4-5 it is noticed:
 - a) on the wheel seat of the axle corresponding the wheel no.4, the existence of a section with rust, old, in depth, over the entire circumference on a variable width between 22 – 38 mm, area having rust appearance;
 - b) on the wheel seat of the axle corresponding the wheel no.5, in the side next to the axle box, profound rust points on a section with irregular shape with a surface of approximately 500 mm².
- at axle 3-6 it is noticed:
 - a) the distance between inner sides of the wheels about 1375mm;

b) both wheels displaced towards outside.

Following these findings, we conclude that at the time of the accident the tying force of the wheels no.3-6 on the axle body was insufficient to ensure the track gauge of the fitted axle, this reduction of force may have multiple causes: manufacturing, geometry and assembly.

D. ACCIDENT CAUSES

D.1. Direct cause, factors that contributed

Direct cause :

Removal of the wheels no.4 and 5 from the guiding axle of the wagon no. 31555972602-3 following the decreasing in time of the tightening force carried out by the wheel hub on the wheel seat from the axle.

Factors that contributed

Appearance in depth of rust on the entire circumference of the axle pressing sections on a variable width between 22 – 38 mm respectively rust points in depth on a portion with an irregular shape with a surface of almost 500 mm², by damaging the tightening force of the wheel hub on the wheel seat on the axle caused by a non-conformity in the process of assembling the wheel-set.

No root causes were identified.

D.2. Underlying causes

No underlying causes were identified

D.3 Root causes

No root causes were identified

E. SAFETY RECOMMENDATIONS

None.

The present Investigating Report will be transmitted to the Romanian Railway Safety Authority, railway public infrastructure manager CNCF „CFR” SA, railway freight operator SC Transferoviar Grup SA and Transportation Safety Bureau Railway Department Hungary .

Members of the investigation commission :

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Afanase Mitu	Investigator – OIFR	- member
Oltenacu Livius	Investigator – OIFR	- member
Suru Mihai	Territory of state inspector – ISF Timișoara	- member
Morar Ioan	Director M.R. - SC Transferoviar Grup SA	- member