NOTE OF THE CIAF ON THE INVESTIGATION OF THE ADAMUZ ACCIDENT: UPDATE ON INFORMATION AVAILABLE IN THE FIRST HOURS AFTER THE EVENT

The purpose of this note is to supplement and update the information provided in the note published by the CIAF after the first 24 hours. It will describe the actions taken at the accident site by the CIAF team after the publication of that note, and it will expose the initial findings of the Investigation, and the next steps to be taken.

Latest actions at the accident site

On 20th January, the site where the Iryo train began to derail was re-inspected. A graphic record was made of the area where the rail broke, corresponding to a weld between two rail sections. During the morning, there were determined the rail samples to be cut and analysed in the laboratory:

- Sections corresponding to the area of the breakage, on both sides of it (taking one metre of rail on each side).
- A fragment of about 40 cm detached from the breakage area.
- Rail samples from areas not affected by the breakage, on both sides (one metre in length for each sample).
- A rail section from the other rail of the track, including the weld parallel to the broken weld, taking one metre of rail on each side.

These samples were taken on the afternoon of the 20th, under the supervision of the judicial police and CIAF personnel, and placed under custody of the CIAF.

Furthermore, throughout the day 20th January, the on-board recorders from the Iryo and Alvia trains were also removed, again in collaboration with the judicial police.

Both the rail samples and the train recorders were transferred late on the 21st of January to CIAF facilities in Madrid, where they will remain under custody. One of the CIAF investigators accompanied the transfer to Madrid.

On 21st January, a thorough on-site inspection of the wheels on the right-hand side (in the direction of travel) of the Iryo train was carried out, and a photographic report of the evidence found was also made.

Also on this day, an inspection was carried out of the infrastructure area prior to the point of derailment, including the tunnel before the station, without finding any evidence related to the accident.

The CIAF investigation team concluded its work of evidence collection at the accident site on 21st January 2026 at around 7 p.m.

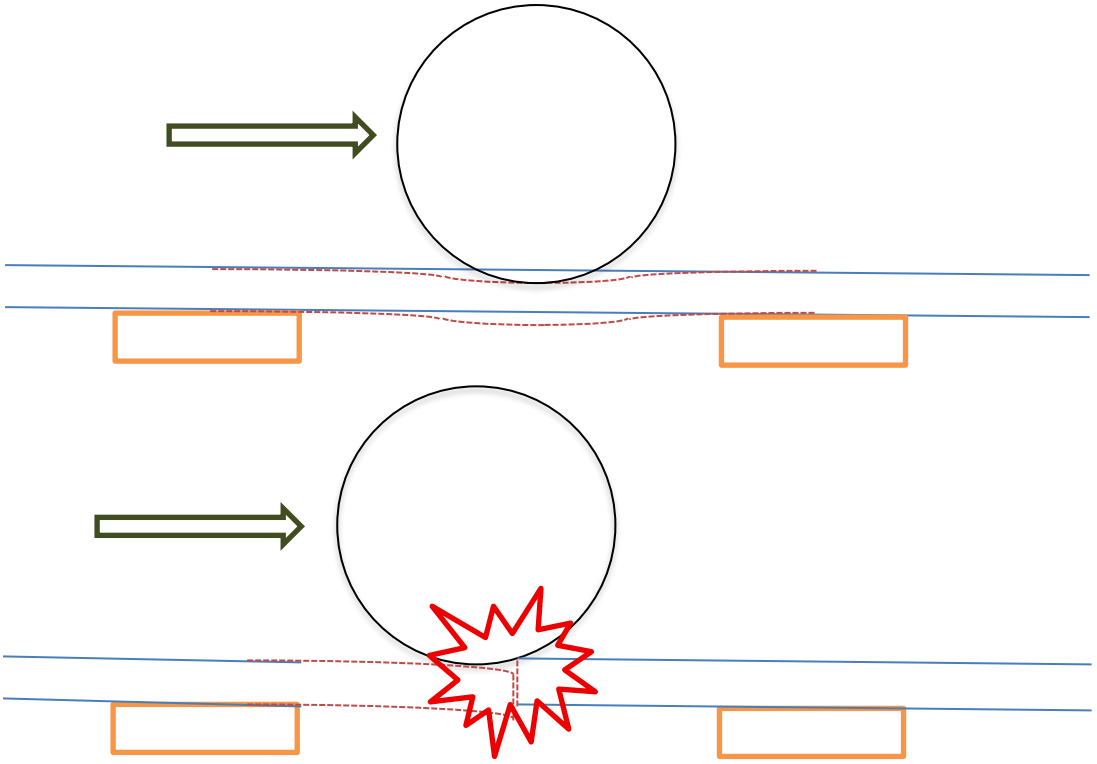
Initial findings

During the inspection of the Iryo train, notches were detected on the tread of the wheels on the right side of carriages 2, 3, 4 and 5. The notches are present on all wheels corresponding to the odd axles of these carriages.

The notches have a uniform pattern in carriages 2, 3 and 4 and are consistent with an impact on the rail head. A visual comparison between the notches on the wheels and the broken section of rail at the derailment site yields presumably matching results:

1: Notches found on the right wheel of axle 13 of the Iryo train (4th carriage, first axle of the first bogie) and possible point of collision with the rail head.

These notches on the wheels and the deformation observed on the rail are consistent with the fact that the rail was fractured: as the continuity of the rail was interrupted, the part before the break would initially receive the total weight of the wheel, causing that part of the rail to drop slightly. As the part of the rail behind the break would not be acting in solidarity with the part in front, a step would momentarily be created between the two sides of the fracture, which would strike the wheel rim.



*2: Possible mechanism for the formation of marks on the wheels in the event of a break in the continuity of the rail (consider this a **WORKING HYPOTHESIS**). Above, normal operation (deformation is exaggerated for clarity): the entire rail deforms uniformly under the weight of the wheels. Below, the effect produced by the break in the rail: only the part under the wheel deforms, creating a step that the wheel hits.*

Furthermore, the fact that the notches are only present on the wheels of the odd axles of the train is consistent with the fact that the first wheel of each bogie received the impact of the broken rail head, as described above. After that first impact, the struck rail also deforms and descends, due to the impact and to the weight of the first wheel. At speeds of around 200 km/h, the second wheel passes so quickly (around 0,03 seconds later) that the impacted rail does not have time to recover from this deformation and therefore does not strike the second wheel of the bogie as it did with the first.

In any case, this hypothesis to explain the marks on the wheels and the rail will have to be corroborated by detailed calculations and analysis.

The notches present on car 5 (right wheels of axles 17 and 19) have a different pattern to those on the other cars, but they match each other. These notches consist of a mark on the outer edge of the tread, consistent with an impact against the rail head in a position that is not continuous with the area prior to the fracture. The fact that these notches are found on car 5, and that car 6 was the first to derail from the train, is consistent with the rail tipping outwards (right side in the

direction of travel) during the passage of car 5, so that car 6 derailed due to a complete lack of continuity in the running gear.

3: Notch present on the right wheel of axle 19 of the Iryo train (carriage 5, first wheel, second bogie)

4: Rail lying on its side, after the point of breakage. Traces of the train wheels can be seen on the rail web.

In fact, it was observed on site that the rail, after the point of breakage, had ended up tilted outwards and with marks of having been run over sideways by a wheel, once the rail had fallen over.

The wheels of carriages 6, 7 and 8 were not considered because, having travelled a long distance derailed and hitting ballast, sleepers and other elements, they were so badly damaged on their surface that any marks or traces would have

been erased. Furthermore, in the hypothesis put forward, these carriages would presumably have derailed without touching the rail head after the breakage.

In addition to the notches found on the derailed Iryo train, notches with a compatible geometric pattern have been detected on the treads of some right wheels of three different trains that had travelled through the area prior to the accident. These trains are as follows:

- Renfe Viajeros train 130: passed through Adamuz at approximately 7:09 p.m.
- Iryo train 109-003: passed through Adamuz at approximately 7:01 p.m.
- Iryo train 109-011: passed through Adamuz at approximately 5:21 p.m.

Based on the available information at this time, it can be hypothesised that the rail fracture occurred prior to the passage of the Iryo train involved in the accident and, therefore, prior to the derailment.

In any case, the hypotheses put forward in this note should be considered provisional and pending verification through additional tests that are planned to be carried out in the next phases.

Next steps in the investigation

As a continuation of the investigation, the rail samples will be sent to a metallographic laboratory in order to determine the possible causes of the breakage. **No hypothesis regarding the causes of the rail breakage is being ruled out.**

In the coming weeks, the on-board recorders of both trains will also be downloaded and analysed.

Once the causes of the breakage have been determined, new lines of investigation derived from them can be established.

Acknowledgements and condolences

The CIAF wishes to state that the collaboration with the other entities present in the area of the accident has been absolute. The authority and independence of the CIAF as national railway accident investigation body has not been hindered or compromised at all during the fieldwork, and the investigators have been able to carry out all the necessary tasks for the technical investigation in coordination with the judicial authorities.

The work of the emergency personnel of the Regional Government of Andalusia, the fire brigades, the Military Emergency Unit, the Civil Guard, the National Police, the Judicial Police, the Civil Guard's criminal investigation department, ADIF, ADIF-AV, Renfe, Iryo, Actren and Hitachi has been decisive in ensuring that the collection of evidence was carried out in the shortest possible time and with the maximum guarantees. The CIAF would like to express its gratitude to the staff of all these entities.

Finally, the CIAF would like to express its condolences to the victims of this tragic event and their loved ones, and remains at their disposal under the terms established by its regulations.

WARNING:

- **The information presented in this note does not constitute definitive conclusions about this accident.**
- **During the investigation process, new findings that modify the hypotheses presented may emerge.**
- **The only valid conclusions will be those included in the final report.**
- **Investigations carried out by the CIAF are regulated by Royal Decree 623/2014 and Law 2/2024.**
- **Technical investigations carried out by the CIAF have, according to EU and national legislation, the sole objective of contributing to the improvement of safety, preventing future accidents or mitigating their consequences.**
- **In accordance with EU and national legislation, the CIAF will in no case seek to determine blame or responsibility for the events it investigates.**

Madrid, 23rd January 2026