

**BOMBARDIER**



October 4, 2007

Minister van Verkeer en Waterstaat

de heer Ir. C.M.P.S. Eurlings

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Dear Mr Eurlings

As agreed between you, Mr Aad Veenman, HSA/NS, and Mr Andre Navarri, Bombardier Transportation, we would like to summarize the development, the status and the perspective of the foreseen start-up of passenger service on the HSL Zuid with Bombardier TRAXX locomotives.

**Executive Summary**

When it got apparent to HSA mid of 2005 that the high speed trains of Ansaldo Breda would be delayed (due to the late availability of the ERTM specification) by more than one and a half years versus the scheduled start of service, HSA took the entrepreneurial decision to mitigate this delay by use of temporary rolling stock. In December 2006, HSA leased Bombardier TRAXX MS locomotives (TRAXX MS) from ATC to be combined with Dutch intercity coaches. This decision was made in close cooperation with the Minister at that time.

At that point in time, the TRAXX MS were ordered by ATC to be able to operate on the conventional networks in the Netherlands, Belgium, Germany and Austria as well as on the Betuweroute under ERTMS Level 2. As no final specification of the HSL Zuid signalling standard was available, the parties agreed to upgrade the signalling of the TRAXX MS in terms of a variation order once details would be available.

In parallel, HSL were negotiating with the wayside signalling supplier Infrasppeed (consortium including Siemens/Alcatel) to complete the HSL Zuid line to a functional ERTMS line, including Level 1 and Level 2. These negotiations resulted in an order as late as March 2007.

From beginning of 2006, HSA and ATC/Bombardier have actively promoted a close cooperation on technical level between themselves and HSL, respectively their contractors, which were supported by HSL from October 2006 on and resulted in joint a specification and a implementation scheme in February 2007. It was agreed to start with ERTMS Level 1 and then to implement ERTMS Level 2 subsequently.

In addition to the hindrances experienced with the HSL Zuid development, the delayed opening of the Betuweroute (originally scheduled 1<sup>st</sup> January 2007 to 16<sup>th</sup> June 2007 and the still ongoing works on the wayside signalling) continued to hinder the development and

the testing of the onboard ERTMS for the TRAXX MS, since the Bombardier EBICAB 2000 ERTMS is developed to operate on multiple corridors.

In July 2007, it had to be noted that the schedule for homologation of the TRAXX MS on HSL Zuid was getting critical as delayed activities now needed to be executed in parallel on Betuweroute as well as on HSL Zuid and mitigation was difficult as qualified resources with all parties were limited, namely administration, the Notified Bodies and within Bombardier. To increase the progress, Bombardier reacted immediately by co-locating specialist from all over Europe.

After assessment of the schedule, HSA informed on 20<sup>th</sup> August 2007 the Ministry about the criticality to start operation as scheduled on 10<sup>th</sup> December 2007. The Ministry took the lead to align all parties involved, i.e. HSL, HSA, ProRail, IVW, Notified Bodies, Infrasppeed and Bombardier, with regard to the processes and the remaining works in order to secure the scheduled start of HSA's operation.

Despite all willingness, all cooperation and all efforts of the stake-holders involved and due to the remaining risks related to the completion activities by all stake-holders, the parties assessed the likelihood to start operation on 10<sup>th</sup> December 2007 to be too little to recommend to you to take a GO decision for that date today.

Furthermore, HSA and Bombardier like to recommend to following the sequence set out as described in detail in the following detailed summary.

Sincerely yours,

**Dr. Karl Runge**  
**Vice President Project Management**  
**Division Locomotives**  
**Bombardier Transportation GmbH**

**Noi Döbken**  
**Managing Director**  
**High Speed Alliance**

**Detailed SUMMARY on DEVELOPMENT, STATUS and PERSPECTIVE of the START-UP of PASSENGER SERVICE on the HSL ZUID**

**Development**

In May 2004 HSA and NMBS ordered 19 train sets from Ansaldo Breda to operate on the Dutch-Belgium High Speed Line between Amsterdam and Brussels both international and domestic passenger transport services, starting from April 2007. Mid 2005, it became apparent that those train sets could not be delivered as contracted, due to the fact that the final ETCS specification (ERTMS version 2.3.0 Corridor) was not available in time. This specification was formally handed over on December 5, 2005 but no supplier in Europe was yet able to deliver an ERTMS system according to this specification.

HSA decided to try to mitigate this delay by looking for temporary rolling stock. The critical issue was to find rolling stock equipped with a (if necessary tailor made) ERTMS system available as early as possible that could be used on the HSL South. This solution was found by using the TRAXX MS concept together with existing Dutch Intercity coaches (ICR). Bombardier promised to deliver an ERTMS system based on the Betuweroute specification, with an ATB-STM and implementation of ERTMS in the TRAXX MS had already started.

Therefore, HSA took an entrepreneurial decision and leased in December 2005 twelve TRAXX MS from Angel Train Cargo (ATC). These TRAXX MS were ordered by ATC for international freight traffic in Germany, Austria, Belgium and the Netherlands on lines with conventional (national) signalling systems installed as well as on the Betuweroute, the new Dutch freight corridor connecting Rotterdam to the German railway network. The Betuweroute was designed for the new European Railway Traffic Management System with its release 2.3.0 (without Corridor additions) based on the so called Level 2. This decision was made in close cooperation with the Minister at that time.

Due to the fact that very limited experiences with the commissioning, the homologation (certification and approval process) and the interoperability of the new ERTMS was available in Europe and due to the unavailability of the specification of the HSL Zuid, Bombardier was not prepared to commit a fixed schedule for the homologation of the TRAXX MS and its onboard ERTMS system on the HSL Zuid.

At that time, negotiations between HSL, and their contractor, Infrasppeed, were ongoing on a variation order to complete the wayside signalling scope from ERTMS v2.2.2 to v2.3.0 Corridor. Due to the impossibility to install the full v2.3.0 Corridor in the locomotive (nowhere available as no certified wayside existing to prove), it was necessary to know which Change Requests had to be installed in the infrastructure at what time and to investigate which part of subset 108 could therefore be realized on board to realize a dedicated ERTMS solution for TRAXX MS on HSL Zuid.

From the beginning of 2006, HSA and ATC/BT asked for a close co-operation on the technical level to define this tailor made solution. Due to ongoing negotiations between HSL and their supplier, this common technical specification by Siemens/Alcatel and Bombardier was developed from October 2006 on. The result of this was a common agreement in February 2007 on a realization in two phases: (v2.3.0 Minus (wayside) on Release 1 (onboard) resp. v2.3.0 Corridor (wayside) on Release 2 (onboard)). The contract between HSL and its supplier was finalised in March 2007.

HSA, ATC and Bombardier agreed to closely co-operate on the homologation of the TRAXX MS and would conclude a variation order once the scope and the process would be clear to

both parties. ATC and Bombardier committed themselves to support HSA in the mean time with large efforts to upgrade the contracted Betuweroute version to the HSL Zuid ERTMS version.

While the HSL infrastructure and the HSA locomotive projects were progressing, more experiences in other European countries, namely Switzerland and Spain, were obtained. Interoperability issues were experienced, caused by the possibility of different interpretation of the standards, and typical technical problems to be expected once a new system is being implemented the first time. Due to these experiences and the lack of a final HSL Zuid specification, HSL, HSA and Bombardier decided not to go for ERTMS Level 2 the first place but to concentrate their effort on the ERTMS Level 1 being less complex, thus, expected to be more robust, as the ERTMS Level 2 operation would anyway only be required for running speeds above 160 km/h or having a higher density of trains which was not expected for the first years.

Parallel to the TRAXX MS for HSA, Bombardier have continued to manufacture and to homologate TRAXX MS for a number of customers for operation in countries, such as but not limited to Switzerland, Italy, Poland. Many of these locomotives will be equipped with the Bombardier EBICab 2000 ERTMS system to be homologated on Betuweroute and on various other lines in Spain and Switzerland.

It is important to understand that this development of a modular Bombardier EBICab 2000 ERTMS signalling system allowing to attach different national systems (so called STMs) could not be limited to the Dutch requirements or the requirements of a line like Betuweroute or HSL Zuid only, as most of the locomotives equipped with the same shall operate in international traffic. Taking this into consideration, it should be well understood that the delay of the Betuweroute - planned opening on January 1st, 2007, actual opening June 16th, 2007, and SW update planned for October 2007 - has shifted the works related to the testing and to the homologation to the end of 2007, now interfacing with similar works on HSL Zuid and other European lines as well as with other vehicle projects in hand of Bombardier.

Much of this information has been confirmed by the independent reports from the University of Delft and the Algemene Rekenkamer.

These parallel activities have resulted in a stretched resource situation with regard to ERTMS experts with Notified Bodies, with the administration and within Bombardier as the ERTMS experts are a rare resource anyhow, limiting the ability of the concerned parties to react to new requirements and to disturbances in the ongoing processes.

An internal assessment at Bombardier of the overall progress status in the light of the very dynamic development of the various delays induced for the different reasons described already, indicated as late as in July 2007 the criticality of the scheduled completion of the onboard ERTMS system for HSA's TRAXX MS locomotives. Even though the increased criticality was escalated during an internal meeting on July 10, 2007, by Bombardier to ATC and HSA, the delay could only be determined mid of August 2007 by Bombardier. Subsequently HSA have informed the Ministry in the high level meeting on August 20th.

In parallel, the issue was escalated to top management level inside Bombardier, and immediate mitigation actions were initiated by the two divisions involved, namely Locomotives and Rail Control Solutions (RCS):

- It was decided in July 2007 to co-locate experts from all over Europe in Mannheim to build a task force, now amounting to 100 specialists, to reduce the overall duration of the remaining works as well as to increase the probability of reaching the target.
- Bombardier required more detailed information on the ERTMS wayside, to be able to test the ERTMS onboard system in their laboratories and thus reducing the time required for field testing and for field test analysis.

To secure the start of commercial operation of HSA on December 10th, 2007, the Ministry called for a meeting of all parties involved - HSL, HSA, IVW, ProRail, Infrasppeed, Lloyds, ATC and Bombardier - which took place on August 20th, 2007

The major outcome of the meeting was the better alignment between the different parties involved in the processes to be completed before start of operation on HSL Zuid. Furthermore, the exchange of ERTMS wayside information on HSL Zuid between Infrasppeed/Siemens and Bombardier was agreed which should support Bombardier mitigation actions.

#### **Status as per today**

The TRAXX MS for the HSA are built according to schedule and two of them have been delivered through ATC to HSA. The TRAXX MS have received their homologation for the operation on conventional lines in the Netherlands, in Belgium, in Germany, in Austria, in Switzerland and in Poland. Thus, the locomotives as such are available and HSA have accepted 2 TRAXX MS for their testing and training purposes, as parallel to the signalling homologation, HSA have to prepare staff and equipment for the service on the HSL Zuid line.

Furthermore, the TRAXX MS and Diesel locomotives of different proveniences are equipped with the Bombardier EBICab 2000 ERTMS system and doing field tests on Betuweroute and on HSL Zuid in the Netherlands.

During the latest meeting, HSA and Bombardier have communicated their revised homologation strategy which shall allow to still meet the start of operation on December 10th, 2007. All parties agreed that the probability to match this schedule is limited, as no float is left in the schedule and as it is the first homologation of a locomotive on the HSL Zuid line with ERTMS signalling system, and as the ERTMS wayside is not certified yet the process maybe some more complicated.

Currently, a set of meetings on working level with all parties involved are taking place or are planned e.g. meetings to detailed specify the steps in the homologation process, for which as you know there is no common European and no Dutch base. This is cause by the fact that we are coping with a real innovation in the Railway sector.

The time planned for the execution of the implementation of ERTMS on the HSL Zuid is compared to the planning in other countries very limited: e.g. in Switzerland which was the first country to run an ERTMS line, the managing authorities have planned for similar activities to those to be completed in the Netherlands about twice as much time. By reducing the functionality on the HSL to ERTMS Level 1 and as on HSL Zuid no mixed traffic will occur and a number of generic field tests have been performed by HSL already, it is expected that the time required can be limited.

Since September 25th, 2007, Bombardier have received all required information on the HSL Zuid wayside and is now able to start with the HSL Zuid specific laboratory testing.

It is worth mentioning that the status of this project is not representative for Bombardier signalling projects in general. Please note that Bombardier have onboard and wayside ERTMS Level 1 equipment homologated and in commercial operation on a fleet of 729 trains of 22 vehicle types in Taiwan, proving the system's availability for the service. There, Bombardier is the single supplier.

#### **Perspective for the further development**

With regard to the anticipated start of operation of HSA, the following issues need to be completed:

- Field and laboratory tests have to be completed
- Homologation relevant safety qualification tests to be passed
- Safety case to be completed, thus an independent safety assessments has to be executed and certified (ISA statement) by a notified body
- Tests for infrastructure access, despite not yet being completely defined by ProRail, to be passed
- IVW have to certify the TRAXX locomotive for passenger service on the HSL Zuid

Due to the technical reasons explained before as well as due the limited time available, HSA and Bombardier recommend to stick to the sequence of ERTMS Level 1 and later Level 2 homologation.

Together with all parties, HSA and Bombardier are busy clarifying the necessary homologation steps on both working level and high management level. All parties involved are currently aligning their planning in order to achieve the start of service as early as possible.

On this basis, HSA and Bombardier can support the proposed approach with all parties managed by the Ministry and divided in 3 phases:

- (1) Test and homologation (output is a safe transport system)
- (2) Proefbedrijf (output is a reliable transport system)
- (3) Commercial operation (input is a reliable transport system and completion of all commercial preparations).

All the different process steps are containing specific risks for their timely completion. As main risks are regarded the following issues:

- Unknown ETCS interoperability issues between the infrastructure (Siemens/Alcatel) and the onboard signalling equipment (Bombardier)
- Time schedule allowing only for limited quantity of non conformities to be corrected
- Missing confirmation from ProRail and IVW for revised homologation strategy
- Required system stability (wayside and onboard signalling) for passenger operation

Taking the risks related to all stake-holders involved into consideration, the participants came to the conclusion during their meeting on September 20th, 2007, that the probability to start operation on December 10th, 2007 is too low to take a positive GO decision.

In stead it is advised to follow the phased approach as described and to review regularly, e.g. every month, the actual progress in order to come to a fully controlled start of the commercial transport services at the earliest possible moment.