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Date	24-4-2009 10:55
Reference	AH/02/03-369829
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Subject	Optimised Brake Blending Proposal UIC Energy Efficiency Conference 2009

Optimised Brake Blending,

In 2007 and 2008 NS Dutch Railways have executed tests with optimised brake blending on prototypes of two rolling stock series, mDDM and SGMm-III. The results of these tests were very positive: for the series an estimated additional energy regeneration of 13 GWh a year and significant cost benefits to be achieved by reducing maintenance of the friction interfaces. At the moment Dutch passenger operator NS are preparing the implementation of these successful energy saving measures. Beside that NS have also planned new tests with their most recent double-decker fleet VIRM.

Since 1999 NS has energy efficiency reduction goals written down in a covenant with the Dutch authorities. Goal is an improved energy efficiency of 11% in 2010 compared to 1997. NS have taken several energy saving measures in the last decade. One of the most recent measures is optimised brake blending. This appears to be an effective measure for part of the existing rolling stock fleet of NS.

Modern rolling stock with electric traction usually makes use of the dynamic braking capability of the traction system. Brake blending is the 'mixing' of the friction and dynamic brakes. The principle of optimised brake blending was to maximise the use of the dynamic brake. A technical modification was made so that in the lower brake steps the powered axles are used to brake the unpowered axles in the trainset. In this way more braking energy is available for regeneration purposes. Trains on the network near the regenerating train may use this energy for acceleration. In case of detected poor adhesion conditions the optimised / improved brake blending is inhibited to prevent wheel slip / slide and elongated brake distances.

After a theoretical study NS have executed tests with this optimised brake blending concept on prototypes of two rolling stock series:



The objectives of these tests were to: determine the realistic energy reduction during regular operation, verify the reliability and maintainability of the modified trainsets and finally determine the final feasibility of the optimised brake blending on these two rolling stock series. A very important aspect of the feasibility was the train driver acceptance test. Train drivers were given the opportunity to test the prototypes in the regular service to review the braking characteristics with optimised brake blending.

Het studies and tests have been executed by Lloyd's Register Rail Europe B.V. under the support of the Dutch Ministry of Economic Affairs, EOS: Demonstration regulation by SenterNovem.