



The private railway company **Heavy Haul Power International** transports large quantities of bulk material by rail. Although this type of transportation is already one of the greenest, HHPI constantly seeks and introduces new initiatives to find and leverage additional improvements for the health of people and the environment.

As part of these activities, HHPI put the enzyme fuel additive through its paces to explore the potential for improvement. Over a period of 4 months, **Xbee** was used in a heavy freight locomotive, a Class 66. Before and after the use of **Xbee**, exhaust emission tests were performed in Bremen with the help of **SGS TÜV Saar** and **Deutschen Bahn AG**.

Only 3 weeks into the trial period, a clearly noticeable reduction of visible soot in the exhaust gas plume was observed. Comprehensive tests after 4 months of using **Xbee** yielded notable comparison values: with the use of **Xbee**, soot emissions decreased by a remarkable 38%.

**SGS**

SGS  
**TÜV**  
SAAR



**Description of the test locomotive:**

**EMD diesel locomotive Class 66.** The locomotive has a 12-cylinder two-stroke V-engine with turbocharge with 2,420 kW (3,245 hp).

The three-phase alternator EM AR8/CA6 feeds six electrical nose-suspension motors, one on each axis.



Summary of the parameters and results of the Xbee tests:

1. **Dates of measurements:**
  - First measurement (without Xbee) 23 Oct 2013
  - Second measurement (with Xbee) 26 Feb 2014
2. **Parameters of the testing period**
  - Fuel: diesel in accordance with EN 590
  - Mileage during the test: 20,600 km
  - Operating hours during the test: 1,015 hours
3. **Measurement results:**
  - Reduction of the soot content by up to 38%
  - Reduction of diesel consumption by 6.5%, measured by the output of the electric generator

4. **Further observations by HHPI:**
  - Motor runs more quietly
  - Motor has a better light-off performance
  - Lower noise load in the driver's cab
  - The oil analysis yielded very good values

Due to this excellent evidence of the capabilities of **Xbee** enzyme technology, **Xbee** is used in the daily operation at HHPI and has been extended to the entire fleet.

Engines and fuels guarantees:

α **Xbee** is in compliance with the **CEC** tests, recognized by the **ACEA** that represents 13 of the main European vehicles manufacturers. 

α On the other hand, **Xbee** respects the European regulation EN 590 Diesel norm.

**Heavy Haul Power International**

Matthias Plückhahn  
Steigerstrasse 9  
DE-99096 Erfurt

-  +49 (0) 361-262 9970
-  matthias.pluekhahn@hhpi.eu
-  <http://www.hhpi.org/>