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**Autor:** Edgley, Hugh  
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# Protecting the Swiss against Rail Noise

## Background



07.20 on 8th March 2006 - 11429 with a stone train for Fluelen with 11166 behind the "wall" in the depot yard.

Photo: by David Adams

### **Railway noise reduction in Switzerland has gone through four phases:**

**PHASE 1:** For decades the SBB was in denial that noise was a genuine problem and therefore took no measures to minimise it. Since the 1950s, railways in other countries have purchased low-noise passenger coaches, whilst the SBB still purchased locos, coaches and wagons that could have been quieter running.

**PHASE 2:** The concerned population began to protest due to inaction against overly noisy trains. Finally the Federal Government grasped the issue and in 1983 environmental legislation was passed. The legislation gave the SBB until 31st March 2002 to sort out the train noise problem.

**PHASE 3:** Briefly before the turn of the century the politicians realised that the 2002 deadline had become unachievable. The Government had to act quickly to avert a political disaster. Firstly the plan needed to be

better specified and controls put in place. Specialists determined all points in Switzerland at which the current or future noise levels would be at critical levels. The concept showed that approximately 300 kilometres of noise protection walls were necessary in order to bring noise pollution for approximately 250,000 persons to under the legally prescribed level. The Federal Government also came to the conclusion that noise protection walls on their own could not solve the problem. The problem needed to be tackled at source; lower noise rolling stock was required.

**PHASE 4:** Revised legislation concerning reduction of rail noise was implemented on 1st October 2000, to be funded by income from fuel tax. With a total budget of SFr 1.854 billion (approximately half for rolling stock and half for noise protection walls, insulated windows etc.) the law is to deliver the following:

By end of 2004: All Swiss coaches to meet

noise limits

**By end of 2009:** All Swiss wagons to meet noise limits

**By end of 2015:** All noise protection walls and sound-insulating windows to be fitted

The noise protection legislation specified emission limit values for different types of areas:

**I =Recreation areas;**

**II =Populated areas;**

**III =Mixed Populated/Business Areas;**

**IV =Industrial Areas**

| Area Type | Planned |       | Emissions Limit |       | Alarm Worthy |       |
|-----------|---------|-------|-----------------|-------|--------------|-------|
|           | Day     | Night | Day             | Night | Day          | Night |
| I         | 50      | 40    | 55              | 45    | 65           | 60    |
| II        | 55      | 45    | 60              | 50    | 70           | 65    |
| III       | 60      | 50    | 65              | 55    | 70           | 65    |
| IV        | 65      | 55    | 70              | 60    | 75           | 60    |

As an Example, in Erstfeld the noise protection measures began in August 2003. The SBB provided altogether 2,470m of noise protection walls, 2,200m from wood and 270m from concrete. The walls are up to two metres high starting from rail upper edge. The work by the SBB lasted into the summer 2004. Altogether the SBB invested SFr 6 million. Night work was avoided as much as possible, but in a few cases when work had to happen at night the population was informed in advance. The SBB worked hard to keep noise emissions during construction to a minimum.

#### **Reduction at source**

The most effective way to reduce rail noise is to minimise it at source; loco, coach and wagon wheels and brakes. In general, measures on the rail vehicle are 8 to 10 times more effective than measures on the infrastructure. Wagons and older coaches were to be particularly targeted. Their conventional cast iron brake shoes roughen the running surface of the wheels with each brake application, which in turn leads to increasing noise. Brake lining research has found a range of materials which preserve the smooth running surfaces of the wheels and thus the train runs up to 10 decibels quieter when converted. Due to the heavier loads involved, wagon brakes are made from different materials compared to coaches which

now have disk brakes.

Due to Switzerland's central position in Europe's railway network, up to two thirds of the wagons on Switzerland's rails come from other countries. The SBB therefore has the complication that it does not have direct control over all its noise emissions. By re-equipping solely SBB wagons, only a limited noise-reduction can be obtained. Therefore the SBB can only solve goods traffic noise through international co-operation.

The SBB is an active member of various international working groups covering railway noise. The goal of these international efforts is effective noise protection measures, without worsening the railways' competitiveness. An example of such European co-operation is the development of synthetic "k-shoe" brake blocks for goods trains. Switzerland is an excellent test track for operational testing of the new, low-noise brake systems as the brake linings are exposed to extreme loads on the transalpine routes.

In mid-2006, the internationally valid "Technical Specification for Interoperability" (TSI) noise standard of the UIC (International Union of Railways) came into force across Europe. The TSI specifies noise limits for new freight wagons, and wagons to be refurbished. But these limits are not achievable with the traditional cast-iron pads. With the introduction of the TSI, trains all over Europe will be quieter.

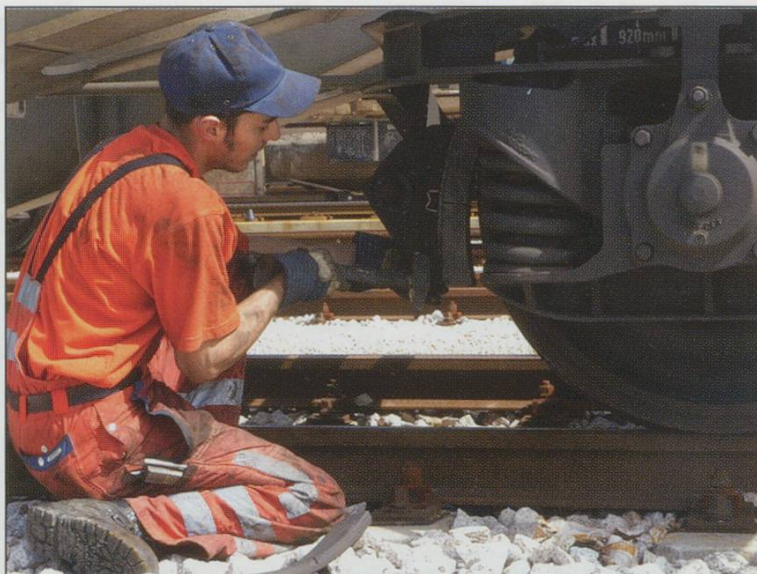
#### **An Operator's View**

Hupac is systematically adapting its wagon fleet to meet noise abatement requirements. 65% of wagons for unaccompanied traffic and 100% of Rola wagons are fitted with low-noise brakes made with synthetic materials. Hupac is therefore on course to meet the Swiss federal law on noise. The noise limits set in the international TSI Noise standards were implemented by Hupac several years ago.

At the end of 2005 Hupac owned 2,300 low-noise rail wagons. This represents about 70% of Hupac's existing fleet of 3,300 wagons. The low-noise wagons are fitted with "whisper brakes". "Ever since 1999 we have been acquiring new wagons with synthetic resin

composite brake pads”, explains Michael John, Hupac rolling stock manager. Hupac is now working to refit all wagons currently in use. This is made possible by financial support from the Federal Office of Transport.

Hupac takes a pioneering role in the development and implementation of whisper brakes. The operational trials on Hupac wagons have been running large wagon series with high running performance in shuttle compositions, and under severe conditions on the demanding transalpine stretches. This provides good conditions for the early detection of weaknesses, and the rapid technical and economical optimisation of the newly developed brake pads. “The know-how gained is also available to other wagon owners and railway enterprises,” emphasises Mr John. Using various technical and operational optimisations, Hupac wants to go on



Hupac wagon brake adjustment. Photo: Hupac

improving the efficiency of the synthetic pad in the future. The goal is to achieve an approximately equal cost level for the synthetic pad, compared with the traditional cast iron pad.

*Collated by Hugh Edgley. Source SBB/Hupac/Litra*

## **REOPENING THE FRONTIER** Ron Smith



Photo: Ron Smith

A good example of international co-operation that bodes well for future joint working is the reopening of the 1.6-km single track line from Boncourt in Switzerland to Delle in France. The line was closed 11 years ago, and this is the first stage of the full reopening to Belfort that is programmed for completion in 2011. This will

connect with the LGV Rhin – Rhone at the new station that is to be built at Belfort and will provide many new travel opportunities. SBB “Kolibri” emus operate up to 12 trips per day from Biel/Bienne, via Moutier, Delémont, Porrentruy, Boncourt and on across the border to Delle. This station has been very attractively