# Technical Visit to the Golden Pass Railway in Montreux

by Christian Elfeber

As a technical adjunct to the administrative formalities of the Swiss Section's (first!) Annual General Meeting a technical visit was arranged to the Golden Pass Railway (Goldenpass Bahn) with the theme "Gauge Changing Systems".

The "Grand Hotel Suisse Majestic", opposite Monteux Station, where Members and Guests assembled at 1pm on 7th March 2012, has Lake Geneva and endless snow capped mountains on one side and the architecturally imposing railway station on the other. This genuinely dignified, almost fairy tale, location provided just the right ambience to welcome the (then still) President Elect, Francis Howe on his first visit to the Swiss Section.

Of equal import were also our speakers, Monsieur Jean-Marc Forciaz of the Golden Pass Railway, and Herr Jochen Helmlinger from the Rolling Stock Engineering Company, Prose AG who were to enlighten us about "Gauge Changing Systems" and in particular the " Projekt Spurwechseldrehgestell", i.e. designing the Dual Gauge Bogie Type EV09.

goldenpass / Montreux - Berner Oberland – Bahn (MOB)
figure 1 (Quelle:Goldenpass)

## The Railway(s)

The Golden Pass Route starts in Montreux and winds its way via Zweisimmen and Spiez, to Interlaken before continuing over the Brünig Pass to Luzern, a distance of 189 km in total. Of course, observant passengers immediately realise that the Golden Pass Route actually consists of three distinctly different railways.

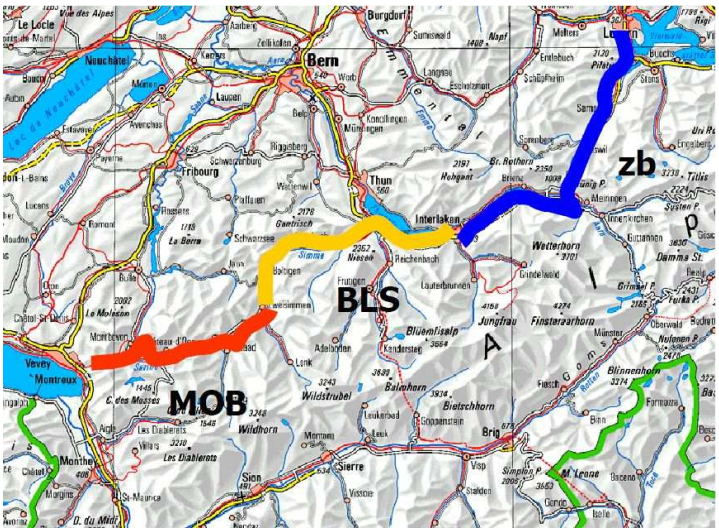


figure 2: railway system (Quelle:Goldenpass)

The MOB (**M**ontreux-**B**erner **O**berland **B**ahn) Railway takes the Route from Montreux to Zweisimmen on **metre gauge** tracks.

From Zweisimmen to Interlaken Ost the **standard gauge track** of the BLS AG (Bern Lötschberg Simplon) Railway is used and thereafter the **metre gauge** rails of the Zb (**Z**entral**b**ahn) are necessary to reach Luzern.

Readers will have immediately recognised that a minor technical problem arises for those passengers who wish to remain firmly seated for the whole journey.

Legend has it that some tourists, finding themselves inconvenienced by the cross platform interchange at Zweisimmen and Interlaken Ost, have complained bitterly about the inability of Swiss Engineers to plan their railways in a proper manner! The fact that these three railways were originally built, some hundred years ago, by independent companies to fulfil very different requirements and that, each of them are themselves feats of engineering as impressive as the magnificent scenery around them, is apparently of little consolation to the Dowager Ladies and pampered Film Stars who inflict themselves on the polite travellers who constitute the majority using the route!

## To Build or to "Beam"

The wish to follow the Golden pass route without changing trains is not new. More than ninety years ago, as tourists realised the attractiveness of doing the complete route, solutions were being sought to this problem. At that time however, the "dual gauge bogie", as a solution, was more improbable then as Captain Kirk's "Beam me Up" is today.

The idea of modifying the permanent way to allow trains of one gauge to travel the whole route was that followed by many and various plans and feasibility studies throughout the last ninety years.

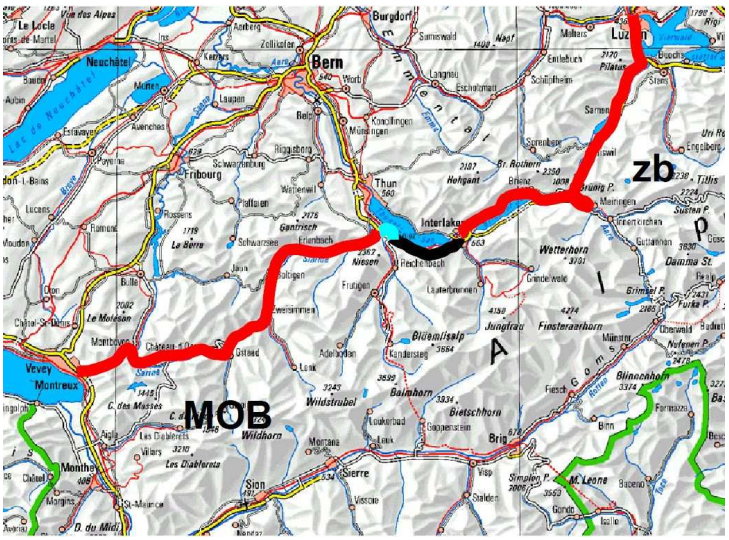


figure 3: railway conzept (Quelle:Goldenpass)

Examination of the route (figure 2) immediately shows that it's the centre portion between Zweisimmen and Interlaken, with its **standard gauge track**, which is the main cause of the problem. The gradient profile also shows that this section presents the least geological obstacles to gauge conversion and, in addition, it would seem sensible to modify one third of the route, rather than two thirds!

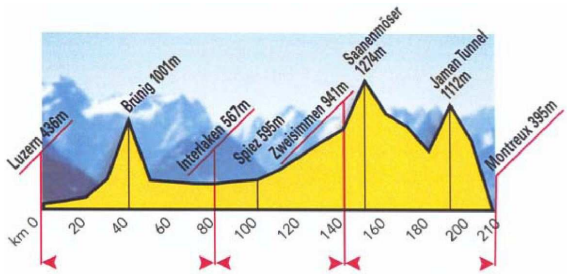

figure 4 (Quelle:Goldenpass)

The most recent scheme is illustrated in figure 3. This shows conversion of Zweisimmen to Spiez to **metre gauge** to give a continuous metre gauge railway of some 171 km. In Spiez a metre gauge underpass would be provided to avoid the standard gauge Lötschberg Line, after which 18 km of dual gauge track would enable the route to reach Interlaken Ost.

This, apparently simple, scheme was however, finally rejected in autumn 2006 as the estimated cost of 255 million Swiss Francs, which includes both infrastructure and rolling stock provision, is not financially viable. This fact didn't remove the wish to provide a "through" service, so the Swiss Engineers were to examine other alternatives. In the meantime promising research has indeed been done into "Beaming", but this solution is incompatible with observing and enjoying the scenery along the way, and was therefore not considered further.

## New Start!

The new project "Trans-Golden-Pass" was officially launched in 2007 with the objective of finding an alternative solution to satisfy those wishing to remain (more) firmly seated between Montreux and Luzern.

So, if modifying the  track is too expensive, can we modify the vehicles. Of course, such solutions are not new. Gauge Changing Bogies and Wheelsets are long since common place on rolling stock used in traffic with Spain and Russia. These systems are all Standard to Broad Gauge solutions with the benefit of a relatively small gauge delta in a relatively large profile. The Golden Pass application has a gauge difference of 435mm to achieve and , to avoid the cost of new rolling stock and infrastructure modification, this must be possible within the metre gauge profile. A "small" additional problem to contend with, is the 200mm difference in platform height between the metre and standard gauge systems.

figure 5: conzept (Quelle:Goldenpass/PROSE)

A feasibility study produced a concept for a dual gauge bogie suitable for the task and as a result the MOB contracted Prose AG to construct such a bogie (figure 5).

## The Challenge

Herr Jochen Helmlinger, from Prose AG explained to the meeting the exacting requirements with which they were confronted. For the bogie these included:

- Not be heavier than the existing metre gauge bogies.
- Compatible with the existing passenger vehicles.
- Have provision for the addition of a "Rack-Rail-Brake-Wheel" and a Magnetic Rail Brake
- Suitable for Vmax 100 km/h
- Bear a 16t axle loading.
- Preferably be without "Active" components such as hydraulic rams etc.
- Be suitable for the existing tight track radii and reverse curves.
- Be suitable for the prevailing weather conditions, i.e. not be at the whim of the "wrong kind" of snow!
- Provide at least the existing level of passenger comfort, even during the gauge changing process.

Furthermore the system should provide:

- A "speedy" gauge change process.
- The ability for locomotives to pass through the gauge changing equipment without changing gauge!

Of course, the prevailing technical standards and legal requirements for both metre and standard gauge passenger railways must also be complied with.

## The Gauge Changing Bogie

The resulting design follows closely that which was proposed in the feasibility study (Figure 5 / Figure 6).

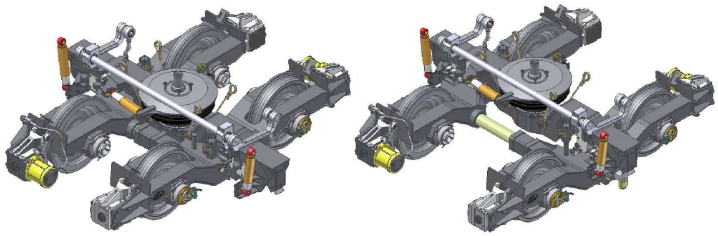
figure 6: construction (Quelle:Goldenpass/PROSE)

Herr Helmlinger explained to the meeting that even early models used in the concept phase gave very promising results. Computer analysis was used to optimise the wheel to rail dynamics and safety factors for a comfortable ride.

The gauge change itself is achieved by lifting the vehicle body on retractable beams operated by the train driver.

Figure 7: change study (Quelle:Goldenpass/PROSE)

These remove the weight from the bogie and allow the wheels to be released from their current position. A guide rail on the ground then pushes the wheels into their new position after which the reapplication of the vehicle weight holds them in position. Retracting the lifting beams then locks the wheels in their new position.

## Site Inspection of the Equipment

Monsieur Jean-Marc Forciaz led the meeting into the MOB depot behind Montreux Station to view both the fixed gauge changing equipment and a vehicle fitted with the Type EV09 bogies.

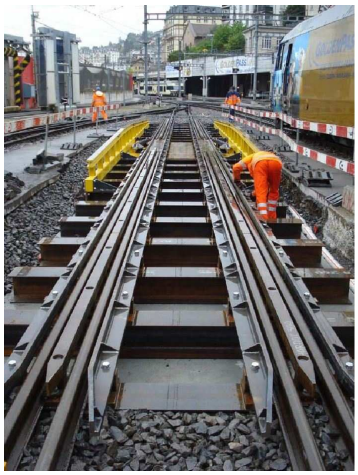

figure 8: test facility (Quelle:Goldenpass)

Unfortunately we were unable to see the equipment in operation as a fault had developed on the equipment that very morning before our visit. However, close inspection of both the ground equipment and the bogies fitted to a passenger coach was possible for all members and guests present. Herr Forciaz explained that at present the installation was being tested at a maximum speed of 10 km/h. The results obtained so far showed that the intention of using the equipment at higher speeds could be achieved. The simplicity of the equipment was apparent to all present, as it requires no complex hydraulic or moving parts. Figure 9 shows clearly both the ramps for lifting the vehicle and the guides for repositioning the wheels.

To date the prototype equipment has completed 54‘000 km on the metre gauge and 800 km on the standard gauge, without incident, as well as having completed some 120 gauge changes.

## The "New" Concept

Having seen the very interesting technology the question remains as to whether it can fulfil the requirement to eliminate changes of train along the route, at an acceptable cost.

The current plan is to fit the equipment on two platforms at Zweisimmen. This work has started and should be completed and commissioned in 2016. With this installation passengers on the Golden Pass Route will be able to be travelled from Montreux (MOB) to Interlaken Ost (BLS) without changing trains.

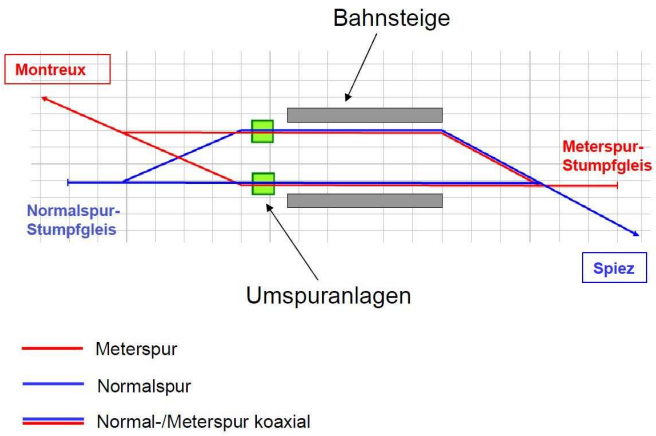


figure 9: railway station Zweisimmen (Quelle:Goldenpass)

The decision about fitting similar equipment at Interlaken Ost to allow the complete through journey has been deferred to a later date. Firstly to allow experience with the equipment to be gained in service and secondly because recent research has shown that 95% of passengers on the route choose to break their journey in Interlaken anyway!
(Dowager Ladies and pampered Film Stars please note, Interlaken also has impressive scenery, tasty cuisine and comfortable hotels, as verified by IRSE Members in 2006!)

As far as costs are concerned, the project is in budget and the current projection is that the total project cost will be 75 million Swiss Francs. This will provide a viable regular through service from Montreux to Interlaken Ost. In other words, 30% of the 255 million estimated for previous schemes will allow 60% of the journey to be undertaken "firmly in your seat".

## Résumé

The "Trans-Golden-Pass" Project is a good example of what can be achieved by the pragmatic application of innovative development to an age old problem!

The meeting thanked both Jean-Marc Forciaz of Golden Pass und Jochen Helmlinger from Prose AG for their informative presentations and enthusiastic explanations in response to the many questions posed by the members on site, not only about the Dual Gauge System but also about other interesting MOB equipment seen as we passed through the yard and depot.

## Note

The web page *http://www.goldenpass.ch* has a tab entitled "TRANSGOLDENPASS", where further information can be seen about the project.



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