Zeitschrift: Swiss express : the Swiss Railways Society journal

Herausgeber: Swiss Railways Society

Band: 3 (1991-1993)

Heft: 6

Artikel: The Pilatusbahn. Part 2, Reprise and electric stock

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DOI: https://doi.org/10.5169/seals-855204

Reprise and Electric Stock

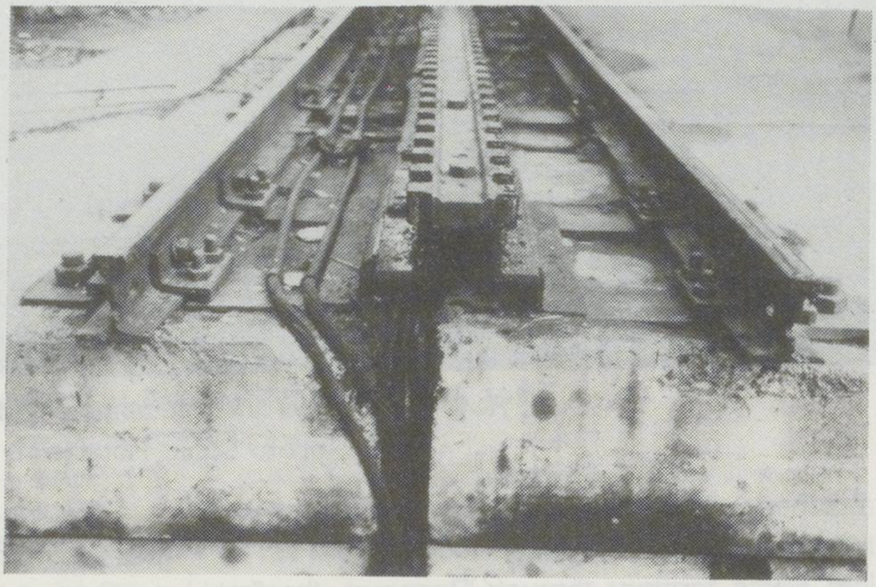
by A.J.Pike

Continued from p 16 December 1989 Swiss Express

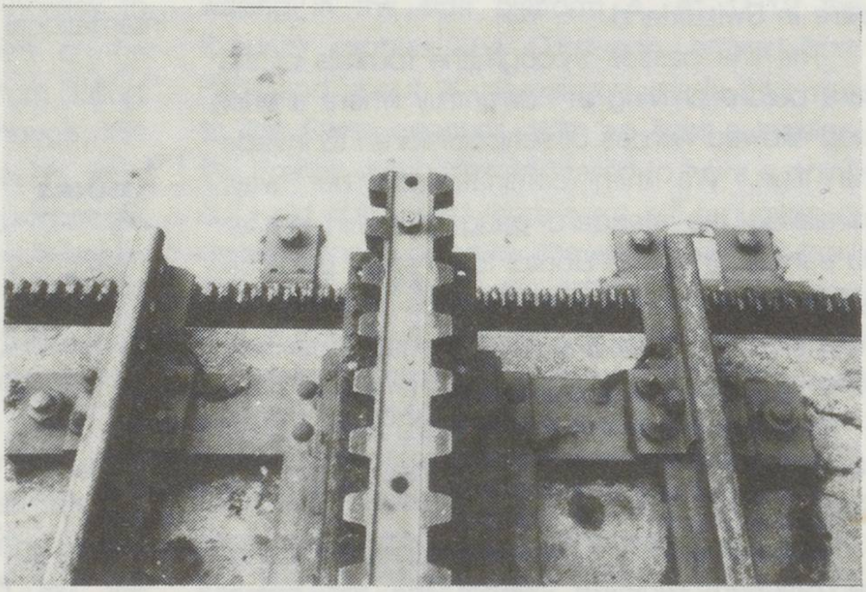
All photographs by the author

The first part of this article appeared in the December 1989 issue of Swiss Express, during the line's Centenary year (opened 4 June 1889). Both the Editor and Secretary have been pressing me to complete the story and, because of the lapse since Part 1, the Editor has suggested I begin with a brief resume of Part 1 for the benefit not only of members who have joined in the past two years, but for those others whose memories of the first part are a little dim.

Mount Pilatus, near Luzern, reaches a height of nearly 7,000 feet and, after the Jungfrau and Matterhorn, is probably one of the best known mountains in Switzerland. Perhaps because of its proximity to Luzern, it has been an attraction for tourists from days long before the advent of the railway. Two hotels were opened near the peak in 1860 and in 1868 no less a person than Queen Victoria paid it a visit.



Close up of the unique Pilatus rack rails.



The success of the Vitznau-Rigi in 1871 led to thoughts of a railway, but there were considerable obstacles to be surmounted, not the least that the severe gradient on the preferred route, almost 1 in 1. Because of Swiss Government regulation, existing rack systems could not be employed but, based on an idea by Riggenbach, Colonel Locher, engineer to the Pilatusbahn, designed a rack system where horizontally running guide wheels on the vehicles, rotating beneath the rack rail, not only prevent the toothed wheel on the rack from lifting off on the steeper sections, but also centre the vehicle on the track. This means that the outer wheels on the coaches and locos and the rails on which they run merely stabilise the vehicle. I hope that the photo gives you some idea of how they work.

It was clear that turnouts would be a problem. This was solved by the use of traversers and, in two cases, structures which could be rolled over to line up the tracks for diverging routes.

Traverser "points" at Aemsigenalp passing loop.

Eleven steam locomotives were built between 1886 and 1909. These were integral with the coach and one, No.9, is preserved in the Luzern Transport Museum.

As early as 1905, a scheme for electrification was drawn up but the technology of the time was inadequate to put it into operation. By 1931 the steam stock was becoming time expired so electrification was again considered and approved.

Lightweight cars, the first of their kind on Swiss mountain railways, were designed by SLM of Winterthur and eight Bhe1/2 cars numbered 21-28 went into service from the date of electrification, 15 May 1937. Traction current is 1550 V dc. Cars have two motors producing a total hourly rating of 210 hp. Overall length is 11.08m and weight in working order 9.65t. Each car seats 40 passengers, eight more than the steam stock. The light weight is one of the essential requirements of the design and, if you are wondering about the effects of high winds, worry not. You will recall that the Locher system locks the car to the rack rail (no pun intended).

In 1954 a most interesting car, designated Ohe1/2 was produced by SLM. Now numbered 31, it is 10.76 metres overall and has a weight in working order of 8.3t. It was designed for freight working but in 1962 a passenger coach body was purchased which can be fitted to 31's underframe in two and a half hours, when the car becomes Bhe1/2 No.29.

Another Bhe1/2, No.30 went into service in 1968 and is longer at 11.36m and heavier at 10.5t. It also has a higher hourly rating of 238hp, but the seating capacity of 40 is the same.

A true freight vehicle was delivered in 1981. Xhm1/2 No.32 is diesel powered to enable it to work when it would be impracticable to use electricity. This reflects the period of at last up to 1976, when steam No.9 was retained for such work. Again it was built by SLM but in co-operation with Stadler and BBC. It weighs 11.3t and the 428hp of its diesel motors provide a top permissible speed of 12 km/h, the same as the other units. It is appropriate to mention here that the maximum permitted speed on the descent is 9 km/h.

Speed and safety go together. There are several independent brakes on each vehicle. All the four pinions which engage with the rack rail can be braked. The lower pair has a band and block brake which can be applied from either cab. This is used as a service brake when ascending. The upper pinions have band brakes which are ratchet operated in such a way that in the uphill direction, the train cannot run back. When descending, the brake is applied instantly if the current is lost to the rheostatic brakes, if the driver releases the deadman pedal or if the speed exceeds 9 km/h+8%. The fully loaded train is brought smoothly to a halt even on the steepest gradient. Cars usually run downwards with the pantographs lowered, the heat generated by braking being dissipated through the resistances.

I was privileged to be present at a brake test on one of the cars during a visit to the line organised last year by the Schweizerischen Verbandes Eisenbahn Amateur, following their

Pilatusbahn sheds and workshops at Alpnachstad, 21 May 1991. Cars Nos. 26,21,31 & 32.

AGM. The car was well loaded with members of the SVEA as we climbed to the intermediate "station" at Aemsigenalp at an altitude of 1350m. This was as far as we could go because of snow. During the descent all three brake tests were carried out and I can testify not only to their effectiveness, but also to the remarkably firm but smooth way in which the emergency brake operated.

To be concluded

Pilatusbahn Xhm No.32 on the traverser at Alpnachstad.