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Swiss Federal Railway (SBB)

Class 460 locomotives

The introduction of the new class 460 (Re4/4VI) is proceeding well. On 10 June 1992 locomotive 460.003 hauled IC 382, comprising 60 axles (15 coaches) and the 'dead' Re6/6, in all 787 tonnes on the 2.6% ramp from Biasca at Airolo at 80 km/h. This load is slightly lower than the drawbar limit of 800 tonnes assigned to an Re6/6 (7802 kW as against 6100 of class 460). How is this possible? The tractive force of class 460 is 275 kN (28000 kg), only slightly higher than the Re6/6 (226.8 kN = 27196 kg) but the factor of adhesion is 0.34 against 0.22 of the Re6/6, or an improvement of more than 50%.

So far, 650 tonnes has been fixed as drawbar load limit for the Re4/4 VI on 26‰. At Airolo the motor temperature was measured at 150° Celsius, well below the permissible heating. In view of these results, the question has been raised whether the drawbar load should be increased to 750 or 800 tonnes, ie the same as the nominally more powerful Re6/6. This would mean 2250 or even 2400 tonnes for each *Huckepack* train with three class 460 locomotives, or an increase of 23%. This means longer trains which in turn mean longer signal spacing and longer station sidings, etc and consequently, additional investment. But, in the long run, there would be a saving in train costs.

In connection with the class 460 locomotives it is worthwhile commenting on press reports which mention a very high number of modifications said to be necessary to the class, the original specifications having not been met. The contract specifications clearly define three levels of performance to be met;

1. The minimal requirements: to start and accelerate a 650 tonne train in a 26‰ ramp with curves of 300 m and to bring the same train on the same gradient to a full stop using only the regenerative brake.
2. The marginal requirements: such as reduced performance, but full function at an overhead voltage of 10 - 12 kV.
3. The requirements to be met beyond conditions 1 and 2: such as a free lateral acceleration of 1.8 m/sec2 in view of a possible use of tilting body technology in passenger service. In conclusion we have to differentiate between modifications needed to rectify below specification performance and those introduced to optimise the performance of the locomotive under conditions 2 and 3.

Whilst the basic requirements were met (with the exception of a few minor points), it became clear during the tests that the original performance calculations had erred on the safe side. Considerable reserves for optimisation were discovered during the test runs, such as excellent bogie stability at speeds up to 300 km/h on the test bench, whereas the calculated limit was 230 km/h. Therefore the partners decided, in accordance with the contract, to optimise in 40 test series applied to 13 component blocks on the original machines, 460.000 - 002, to allow all locomotives to reach the highest possible performance. Of the 435 modifications listed by the press, no less than 420 were part of this optimising process. A typical modification, the improvement of the cooling performance for the electric motors and auxiliary equipment does not solely concern the cooling system, it has a bearing on the design of the motors, control systems etc.

It is to my knowledge the first time that a railway company has dared to pass an order for 99 absolutely new locomotives with a value of SFr.515 million without first testing four prototype locomotives and leaving the construction details more or less to the manufacturers. For earlier models, the SBB always determined the design in collaboration with the production firms down to the last nut and bolt.

Accidents

During the last two years the SBB has suffered a disturbing rise in accidents, which in most cases resulted in considerable material damage and, on a few occasion, death and injury to passengers. If one attempts to analyse the accidents, one immediately finds one fact: almost all accidents occurred at stations with outmoded safety installations. The official reason given was always "human error".

In my personal opinion it is strange that officials, far removed from the front line of operation, do not realise that the train density, increased from year to year, the pressure exerted to improve punctuality, the decrease in staff numbers following rationalising programmes among operating staff (but not in the oversized administration), are the cause of enormous stress which can lead, in one fatal second, to an error with grave consequences. After a recent accident in which an S-Bahn train was involved (where the responsibility for train departure lies with the driver) and a closed signal was overrun, the SBB have decided to provide some S-Bahn trains with two drivers. Whilst this step may increase safety for the time being, it by no means removes the original reasons and indirectly confirms the criticisms of the locomotive engineers association that on certain S-Bahn lines the stress of observing signals in very short sequences, to observe the quais on the station platforms during the starting phase, as well as the departure signal and to keep to the very tight timetable are responsible for mistakes, the more so since reliable information on the state of the line ahead is not available.

During the seventies and eighties, the SBB had developed a train control system based on a track conductor (similar to an aerial sending out information to a line centre and receiving orders from the same centre about the state of the line 10-12 km ahead, the speed, the when and where of track changes, overtaking of other trains, etc,etc). The system tests were highly successful. This system of train control was somewhat more sophisticated than the *Linien-Zugbeeinflussung* of the German Federal Railways developed at the same time. Despite the fact that the system not only guaranteed a far higher safety factor than the present block system, but is capable of increasing the line capacity by up to 30%, the SBB management decided to stop development and to abandon any further investment on the grounds that safety was already high enough and far better than on the road.

Today the SBB is again working on a train control system, but this time one that is compatible with an European solution with a lower standard than the DB system, since it only has a point by point data transfer, whereas on DB lines the information flows continuously and is always updated to the line situation by a control and order information every 0.8 second. Whether this European control will be achieved is more than doubtful since both the DB and SNCF continue to expand their own systems vigorously and this despite their outspoken willingness to help develop the European system.

The German LZB system possesses the great advantage that it could be easily installed in Switzerland within two years, with a substantial increase in safety and line capacity. Austria has adopted the same system. Line capacity is an important factor, since it would be far less costly than to double track certain lines or to increase the number of tracks in stations. In addition, all block signals would become superfluous, since the line conductor gives the locomotive driver a precise picture of the line ahead for 10-12 km, the optimum running speed and brake points, all continuously calculated on the basis of speedmatically if any of the transferred orders were to be ignored. For once, all independent experts are unanimous: almost all of the recent accidents would have been avoided if the SBB had been in possession of the LZB train control system.

Pendolino

Despite official silence, more and more information regarding the Pendolino decision trickles through from various sources. The board of directors of the SBB will have to decide in October whether to buy the first batch of four

trains, together with the BLS, for the Milan - Simplon - Geneva run. In all, seven trains would be bought, three by the FS, 3.5 by the SBB and 0.5 by the BLS.

Huckepack

Work for the *Huckepack - Corridor* to be introduced in 1994 is now 50% complete. By a firm and very harsh cost control it has been possible to remain slightly below the budgeted SFr750 millions for 50% of all work. To remind members, the *Huckepack-Corridor* will increase the capacity of lorry or container transport to 500,000 consignments per year.

Private Railways

Regionalverkehr Bern Solothurn (RBS)

It may be of interest to learn of the rise in passenger traffic on the RBS from 1973-1991, another example of an innovative metre gauge system. Statistics are given in Table 1.

Table 1 Passenger Traffic on the RBS

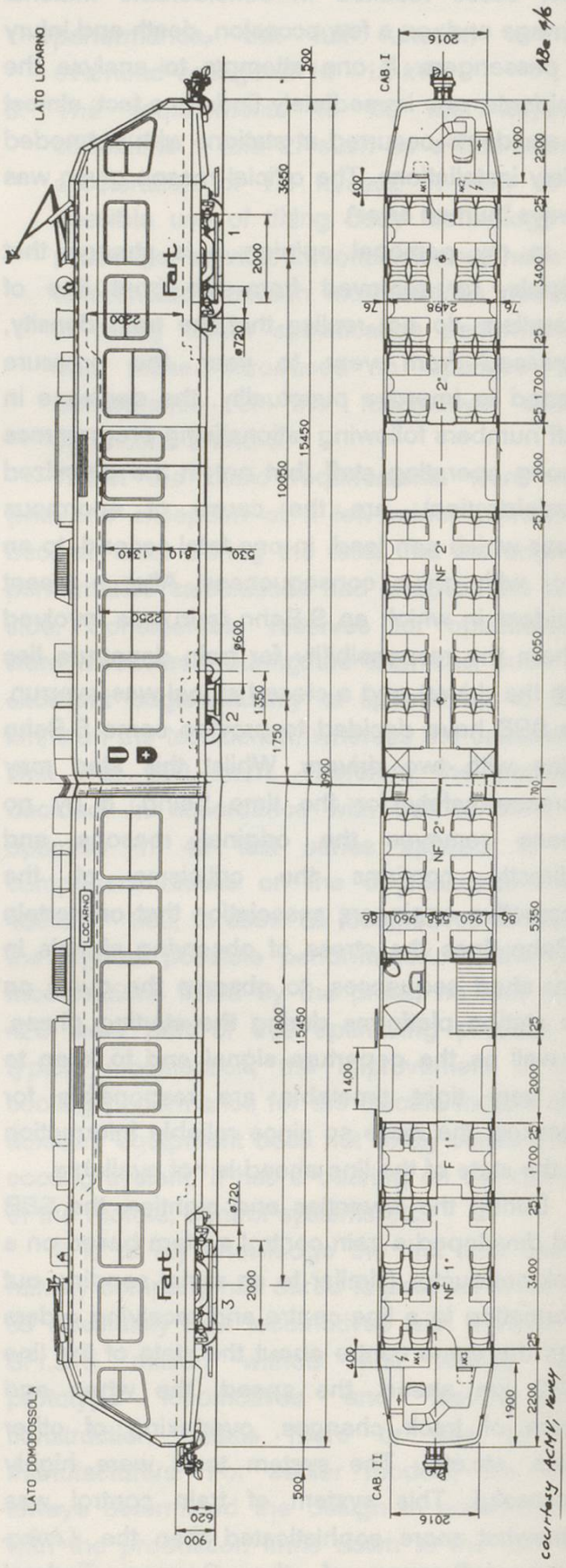
Year	Passengers carried	Passenger Train km	Traction Engine km
1973	10,664,431	1,825,165	1,860,379
1978	12,054,680	2,315,415	2,443,148
1983	13,310,412	2,487,744	2,749,751
1989	16,481,786	2,637,696	3,360,227
1991	18,256,874	2,652,722	3,380,078

Centovalli

The FART/SSIF (Centovalli Railway) has taken delivery of the first of the new low floor trains in September. A drawing of the new sets is appended.

Golden Pass

The idea to use moveable TALGO wheel sets for gauge changing at Interlaken Ost and Zweisimmen has been abandoned. In discussions with TALGO engineers, it became clear that the proposed solution would be even



costlier than the third rail. Whilst the difference between the Continental standard gauge and the Iberian broad gauge is 241mm (1435 to 1678mm), or 89mm between standard gauge and Russian broad gauge (1435 to 1524mm), the difference between metre and standard gauge is 435mm. The bogie design would be far more complicated and therefore much heavier. This signifies useless dead weight on the steep Brünig and MOB grades and thus a lower train capacity due to the drawbar load limits. On grades of 70‰ and 120‰, 10 - 20 tones more per train of 6 coaches may well mean a reduction of one passenger coach per train. Other problems to be overcome are stability of coach bodies, the coach length and riding qualities at high speeds.With the proposed mixed gauge it is possible to form metre gauge rakes of the present lightweight design and also avoid the time consuming gauge changing process.

In view of the reluctance of the Cantons of Bern and Luzern to subsidise the mixing of the gauge, a private group is now considering the formation of an independent *Golden Pass* society which would purchase and operate the trains and pay to the line owner (SBB, BLS and MOB) a quota of the cost for infrastructure and maintenance of the permanent way. The project is considered to be highly remunerative. In this connection it may be interesting to learn that the RhB is making preliminary studies for building coaches to be run from and to Kloten Airport with moveable wheel sets in standard gauge rakes under specified conditions.

Industry

ABB (Asea Brown Boveri), ACMV (Ateliers de Constructions Mechaniques de Vevey), SIG (Schweizerische Industriegesellshaft, Neuhausen), SLM (Schweizerische Locomotive- und Maschinenfabrik, Winterthur), and Schindler Waggonsfabriken, Pratteln have founded the Interessengemeinschaft Schwiezerischer Rollmaterialhersteller (Community for the promotion of the interests of Swiss rolling stock producers). The goal is to promote the sale of modern rail technology abroad and to develop complete projects.

Golden Pass

The proposed Talgo service over the MOB and Brünig is possibly the shortest lived rational railway project to date (See President's Report above). As the cost of the original mixed gauge proposal to link the lines appears to be ruling this out of court, perhaps it might be as well to ask why the link-up was thought to be necessary.

The *Golden Pass* is purely a tourist route, anyone needing to travel between Luzern and Montreux will find it quicker to go via Bern and Lausanne. Any pressure from a through service can only come from tour operators who presumably wish to load a party onto the train at Luzern and take them off at Montreux, or vice versa. It would certainly look wonderful in the brochure but I question whether it would be so wonderful for the tourist. I have used this route for many years, well before the Golden Pass was publicised. It is a delightful way of travelling between the Vierwaldstättersee and Lac Leman, providing of course, you have ample time. Far from finding the three changes onerous I usually throw in a fourth by electing to travel between Interlaken Ost and Brienz by lake boat, it only adds an hour, but provides an excellent break in what is by any standards, a long journey. Indeed, I can think of few things more tedious than to be stuck in the same coach in the same seat for a journey of this length of time - and I happen to be one of those nut cases who has travelled completely round the Circle Line for fun.

In my opinion, the best way to develop the route would be to introduce a reglar through Interlaken Ost - Zweisimmen service, probably by a judicious refurbishment and repaint of standard 4-car SEZ units. If the service were geared to include a trip on the PS *Lötschberg*, so much the better, this would enable travellers

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