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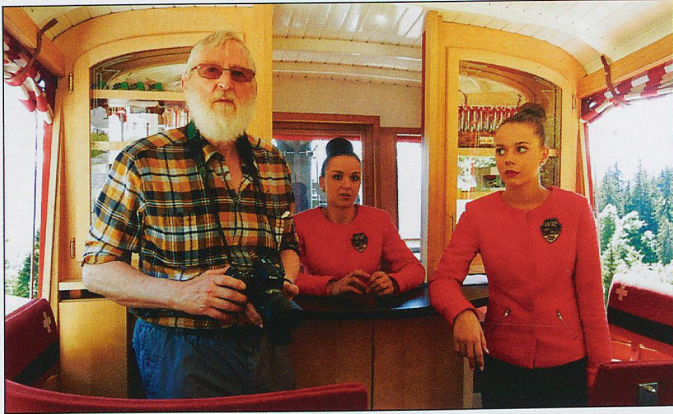
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TOP LEFT: John Jesson and the catering staff.  
*Photo: Rüdi Steinmann*  
 BOTTOM LEFT: The special train approaches Planalp.  
*Photo: Bryan Stone*  
 ABOVE: BRB's Simon Koller tests out the seat.  
*Photo: Bryan Stone*

## What Else Has Changed?

Neil Wheelwright takes a look at changes that have occurred on the SBB network in recent years.



RBe 4/4 No.1405 in the sidings at La Chaux-de-Fonds.

*Photo: David Edwards*

We often discuss the changes to the railways of Switzerland and perhaps, mourn the demise of the Ae6/6s or curse the identikit 'Class 186' locos appearing everywhere. However, we often overlook some deeper changes to Swiss (and other) railways. Such changes affect the railway infrastructure in ways that are both obvious (the trains are 'bigger') and easily overlooked (not many of us think about axle weights!). I have summarised some of the

main impacts, below. As sources differ I have tried to use what appear to be reasonable statistics from reliable sources such as the VöV and Litra websites. All weights are 'empty'.

### Train Frequency

The Taktfahrplan increased the frequency on the SBB routes; overall, train Km was up 34% from before 2004 to 2012. Since 1996 there has been an increase of 31% from

107 to 140 in the average number of trains per day per route. In 2014 an average of 128 passenger trains/kilometre travelled on the Swiss 3000km rail network.

We know that the intention of the Bahn 2000 project was to increase the number of trains operating on the network, so I looked at a few examples to see what that increase has meant. Using the 1987/8 Kursbuch between Thalwil and Zug on weekdays there were 60 trains/day in each direction - in the 2015 timetable there are 102 trains; between Nyon and Morges the daily change is from 96 to 131; and between Stein Sackingen and Frick the increase is from 68 to 112. In all three examples the number is not quite doubled, although in each case the all-stations 'stopping' trains have been lost in favour of heavier, longer distance services. The change also required many 'minor' lines to amend their timetables, to ensure the revised number of potential connections was met. This often required an increase in service provision and increases in rolling stock, as frequency rather than available trains was defining the timetable.

### Journey Time / Speed

The Taktfahrplan required an increase in train speed so as to reduce journey times and to improve connectional opportunities. This increase has been from a combination of new lines, improved junctions, higher speeds and better train acceleration. This has led to another change, which has been called 'Digital Driving' where the driving style required by the schedule is either full power or full brake in order to shorten journey time. The effect of increases in both track forces and energy consumption can be imagined.

### Train Weight

Whilst modern trains are often assumed to be lighter, in practice the weight increases resulting from air conditioning, more powerful motive power equipment, etc., has generally been more significant than any savings resulting from new construction techniques. In the mid-1980s a typical Zürich-Luzern train was an RBe4/4 plus six Mk I/II coaches forming a push-pull set. Total empty weight would be some 255t overall [72t + (5x30t) + 33t]. Today the trains are formed of a Class 460 plus nine IC2000 double-deck coaches at around 507t overall [84t + (9x47t)]. Additionally, the service is now half-hourly rather than hourly. In other words, the trains are twice as heavy and twice as frequent. Apparently, a coupled pair of the SBB 8-car double-deck IR200 & IC200 EMUs currently being built for use both within Switzerland and internationally will exceed the DB (German) 1,000t maximum weight for passenger trains!



TOP: SBB departure to Interlaken and Thun.  
MIDDLE: Zurich Hbf - SBB No.460 088 departs  
BOTTOM: Zurich Hardbrücke - SBB S-bahn double deck emu 514 009.  
All photos: Neil Wheelwright

### Axle Loads

One of the results is that axle loads have shown an inexorable rise over the last couple of decades. Whereas the



TOP: Rapperswil with SBB S-bahn double deck emu 514 050.

Photo: Neil Wheelwright

ABOVE: RBe 4/4 No.1405 at Luino station.

Photo: Mario Gavazzi

earlier generation of Swiss light-weight coaches (e.g. Mk I and II stock) have an axle load of around 9t, a Mk IV coach is 11t: an IC2000 double-deck coach has an axle load of 15t and a Class 514 double-deck (DTZ) S-Bahn EMU has an axle load of 20t on its power bogies and 17t on the trailer bogies. Even a 'lightweight' Stadler GTW EMU has 20t axle loads on the centre power-unit 'bogie'. However, locomotive axle weights seem to have been fairly consistent. An Ae4/7 had 19t on its driving axles; 20t on either Re4/4II or Re6/6 locos and 21t for a Class 460. The interesting difference is the amount of power being transmitted through the very small wheel/track interface when comparing an Ae4/7 at 600 Kw, or a modern BLS Class 465 at 1600Kw/axle. Additionally, maximum freight wagon axle loads had increased from 20t to 22.5t at the end of the last century (they are 25.5t in the UK, interestingly).

### Energy Consumption

More and heavier trains, better acceleration and higher speeds have led to greater use of energy to move those trains.

Efficiency helps, but you still need to move more tonnage faster, leading to an estimated 50% increase in energy consumption since 1996. To continue the example, two 2017 Zürich-Luzern trains at 507t and probably travelling 10-20kph faster, need much more energy to move than one 255t Zürich-Luzern train in the 1980s.

### Permanent Way

Wear and tear on the track is related to both weight and speed as well as the number of trains run over it, and we have seen that all three of these parameters have increased. Modern bogies can be assumed to be more track friendly – but the concomitant predictability of modern bogies also leads to consistent tracking through curves, leading to a higher risk of gauge-corner cracking (as at Hatfield in the UK), so not every improvement is without its risks. Historically there was 'cross-coupling' between bogies in the SBB Re4/4II and BLS Re4/4 classes, which helped steering and weight distribution, and the Class 460/465 bogie has a level of 'self-steering'. However, this is not installed on the modern Class 186 locomotives. Partly in the interest of increasing capacity, station entrance speeds have been increased from 30 to 40kph, which - apart from making it more difficult for standing passengers - also increases the load on track and the point work. Push-pull operation also produces higher forces on track where trains are pushed into curves. At the other end of the scale, tram operators are realising that their new low-floor trams without traditional bogies, have led to higher rates of wear and tear, and increased costs from more frequent track replacement.

### Accessibility

The integrated timetables with other public transport, a simple fare system (especially the GA – General Abonnement) and improved physical access – such as level, or almost, boarding and 'step-free' access through the stations - have made the use of the railway system far more straightforward especially for those with any form of mobility impairment. Compare the effort involved in getting a suitcase into an old-style local train in the Aigle station forecourt to getting it onto an IC2000 coach from a 'full height' platform today!


### Passenger Numbers

All this has done what it was supposed to do in that the number of passengers has increased substantially. Figures for combined rail and tram usage in 1980 were 666m passengers and 11,290m passenger/km. These increased to 1,146m and 19,177m passenger/km in 2010 - increases of 72% and 69.9%. However, the increase is not uniform – with, for example, passenger numbers through Mattstetten and Frauenfeld and over the Hauenstein and Heitersberg routes doubling, whilst traveller numbers on the Gotthard

have remained at the same level 25 years on. This reflects the fact that much of the rise is in longer distance commuting, which has also been – accidentally - encouraged by the (in Swiss terms) cheap GA.

However, is there a point when it all goes too far? We've seen Zürich HB in an almost permanent state of building work since the start of the Zürich S-Bahn work in the 1980s. Multiple tracking expands, with the then needed sound barriers. Some lines are at capacity, for example the RBS lines into Bern HB low-level where the only answer is a

complete new station at an (in UK) terms unimaginable, amount of investment. As a result, there is already talk of pricing fares to reduce growth (e.g., the half-fare card is going up in price faster than inflation and the three year discount removed). The Basel S-Bahn FLIRT EMUs are to have seats removed to increase standing space - something that sounds familiar to travellers in London!

*In summary, you now know why the SBB has been campaigning for more money to cover an increasing backlog of permanent way maintenance. *

# Swiss Steamship Survival

## Mario Gavazzi reflects on 50 years of the steamship renaissance



In 1972/3 'p/s Stadt Rapperswil' was the first saved and renovated steamer initialized by steamboat enthusiasts.

All photos: Mario Gavazzi

During this summer of 2017 the Swiss lakes (and 'almost-Swiss' Lago Como) boasted a fleet of some twenty steam-powered ships. Sixteen of these are two-deck 'Salondampfer' paddle steamers, three are 'Halbsalondampfer' (one and a half deck) paddle steamers, and one small screw propelled steamer. If all goes well by summer 2018 another screw steamer on the Thuner See will join these ships. Yet fifty years ago the situation regarding steam navigation in Switzerland seemed to be bad, as new diesel-powered ships replaced one 'Oldtimer' after the other. The general view was that there was no future for the last of the lake steamers. However, the decision in 1967 of the Bodensee operator 'Untersee und Rhein' (URh) to replace their last paddle steamer 'Schaffhausen' by a modern diesel ship, sparked a complete change in the public perception of these venerable old ships.

The last voyage of the famous and beautiful 'Schaffhausen' on the 24th May 1967 was

Today 'p/s Schaffhausen' can be seen only in pictures, films and as a model ('Seemuseum' Kreuzlingen, [www.seemuseum.ch](http://www.seemuseum.ch)).

followed by a decision of the URh to order her immediate scrapping at Romanshorn. This precipitate decision prompted the initial momentum to found an enthusiast movement for all the other steamers. Prominent in the early days was a Swiss TV personality Kurt Felix, who had produced a programme the previous year about the last days

