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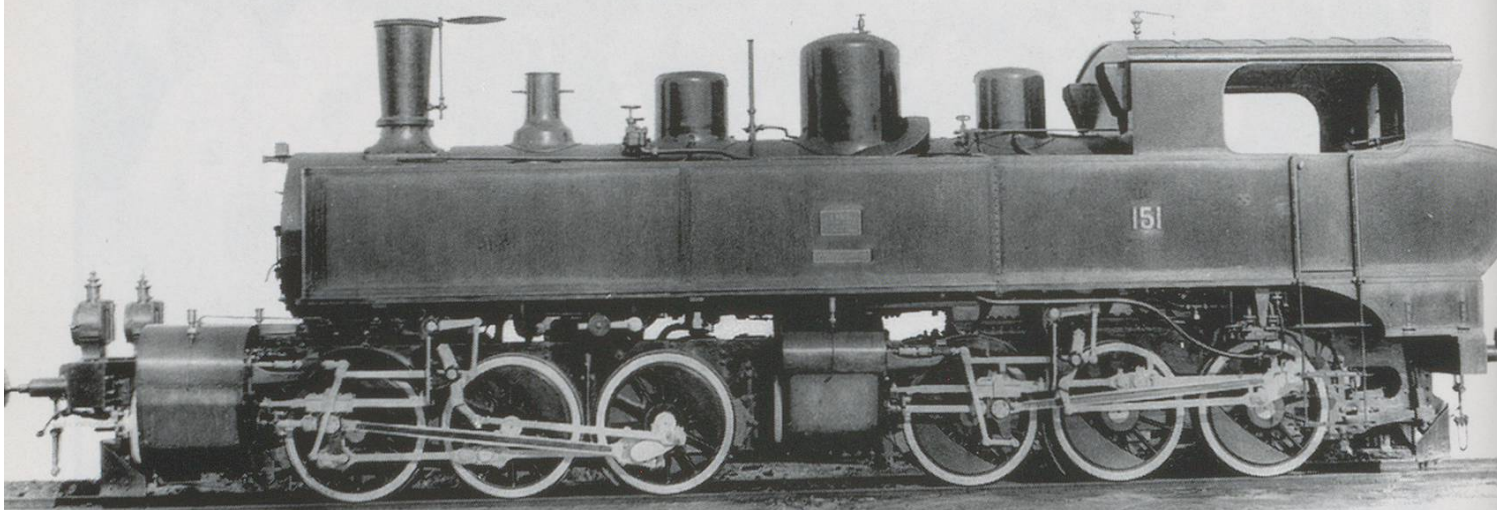
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## **PART 1 - GOTTHARDBAHN FREIGHT LOCOMOTIVE.**

### **TYPE ED 2x3/3**



*Photo: Hardy Randall EAB Collection*

The 15th International Conference held in Bern in 1869 was shown reports from both the Gotthard Railway company and the Swiss Federal government giving estimates of the freight that would be handled by the Gotthard route in its first year of operation. The Gotthard Railway Co. calculated a gross tonnage of 400,000 tonnes and the federal government 520,000 tonnes. Up to June 1883, at the end of the first year of operation the gross tonnage was 450,000, but just ten years later that figure had almost doubled. Also, the number of passengers carried had almost doubled to just under 2 million, and the forecast was that both freight and passenger traffic would continue to grow at a very high rate - today the freight gross tonnage figure is approx. 25,000,000. It was with these figures in the mind, that the Gotthard railway company directors - in 1889 - discussed plans to obtain new motive power more able to handle the heavier trains that would be required on this important Alpine crossing.

During 1890 the manufacturer J. A. Maffei of München, at the request of the Gotthardbahn, built a locomotive based on a design by the French locomotive designer Mallet using the Duplex system for propulsion. The Mallet locomotive, classed as type D6 ( Ed

2x3/3 ) Mallet No.151, was the first of its type in Switzerland. As the classification shows, the locomotive consisted of two six wheeled power units fed by a common boiler. The design of the boiler for the proposed locomotive was based on that used on the D 4/4 of the VSB ( United Railways of Switzerland ).

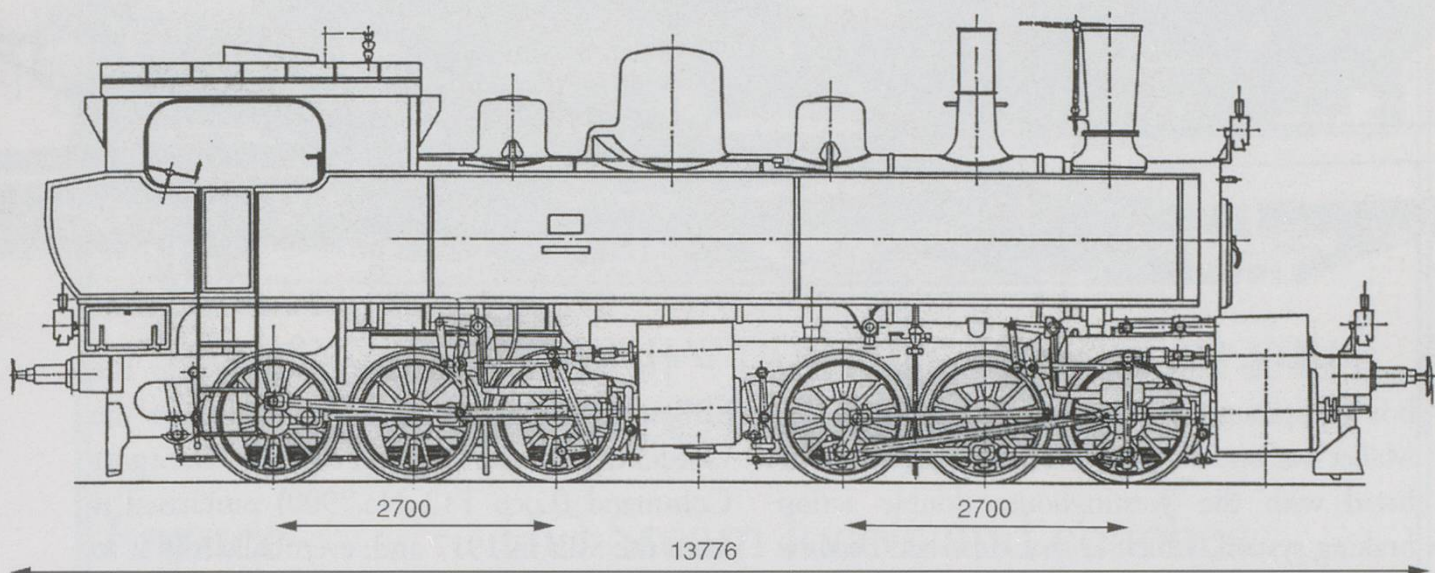
The four cylinder compound locomotive measuring 13,776 mm overall, was the largest and strongest of its type in Europe at this time and was able to haul heavy trains over the steep inclines of the system. Locomotive No.151 rated at 368kW, with its boiler pressure of 12 bars could develop a tractive effort of 83.38 kN. This enabled it to haul trailing loads of 200 tonnes at 20 km/h over the 26 per cent gradients of both the Gotthard and Ceneri Ramps.

High pressure wet steam was fed, via a slide regulator located in the large steam dome, to the two rear mounted cylinders measuring 430 mm in diameter, from where it passed into the two front mounted low pressure steam -580 mm diameter -cylinders where it was mixed with a small amount of fresh steam. The front section of 3 driving axles were pivoted at a point close to the boiler support, the rear three axles supported the firebox.



Unfortunately the locomotive did not prove to be very successful during long runs with heavy trains over the Gotthard mountain line, due mainly to a substantial loss in steam pressure caused by a boiler that was unable to keep up with the continual high demand. The power brake system, the non automatic Hardy vacuum

type, operating on axles 1 and 3 of both power units, was replaced in 1894 by Steam Brake equipment. Simultaneous with this work, the locomotive underwent a refit, during which time fitting of the Klöse speed indicators along with the carriage steam heating system took place.



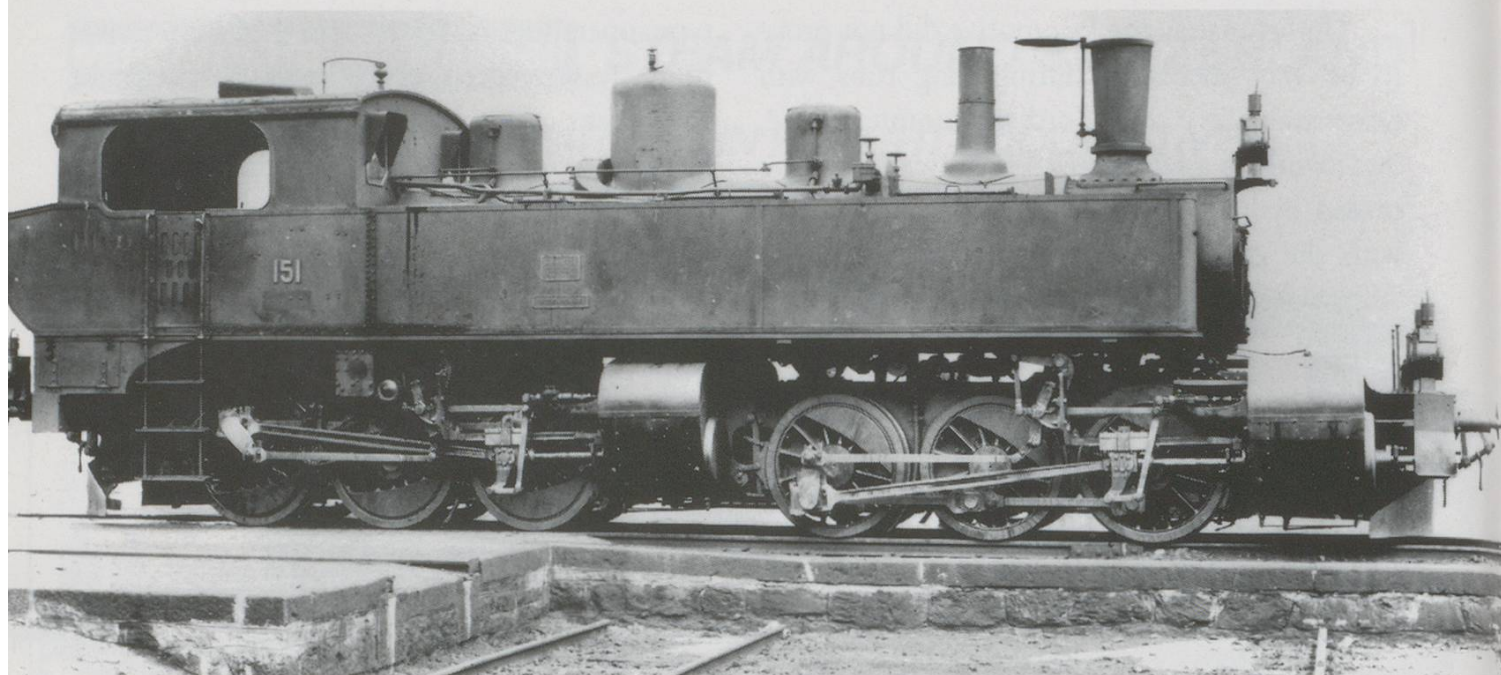
*A general arrangement drawing of the D6 Mallet.*

*Diagram courtesy: Maffei*

## Locomotive Data

<b>GB Type:</b> D6 - No.151		<b>SBB Type:</b> Ed 2x3/3 - No.7699	
<b>Built by:</b> Maffei (München, Germany), Works No.1547			
<b>Date built:</b> 1890		<b>Date in Service:</b> 1890	
<b>Power:</b> HP500 - kW366		<b>Date out of service:</b> 1917	
<b>T/E at wheel rim:</b> kN83.38			
<b>Speed maximum:</b> km/h 45		<b>Speed Indicator:</b> Klöse	
<b>Driving wheels:</b> Diameter 1,230mm			
<b>Rigid Wheelbase:</b> 2,700mm		<b>Total wheelbase:</b> 8,130mm	
<b>Length overall:</b> 13,776mm		<b>Height:</b> 4,400mm	
<b>Loco weight:</b>		<b>Empty:</b> 69.40 Tonnes	
		<b>Service:</b> 87.20 Tonnes	
<b>Minimum:</b> 77.40 Tonnes		<b>Adhesion:</b> 87.20 Tonnes	
<b>Water capacity:</b> 7.00 m3		<b>Coal capacity:</b> 4.3 Tonnes	
<b>Brakes:</b> Steam, Hardy vacuum, Screw			
<b>Cylinders:</b>		<b>Number:</b>	
		<b>Low pressure:</b> 2 Horizontal - Bore 640 mm / Stroke 580 mm	
		<b>High Pressure:</b> 2 Horizontal - Bore 640 mm / Stroke 400 mm	
<b>Boiler:</b>		<b>Operating pressure:</b> 12 Bars	
		<b>Length:</b> 4,500 mm	
<b>Tubes:</b> 190		<b>Firebox:</b> 9.30m2	
		<b>Grate area:</b> 2.10 m2	
<b>Trailing load:</b>		<b>Gradient:</b> 10 % - 500 tonnes @ 20 km/h	
		26 % - 200 tonnes @ 20 km/h	
<b>Construction cost:</b> SFr 90,200			

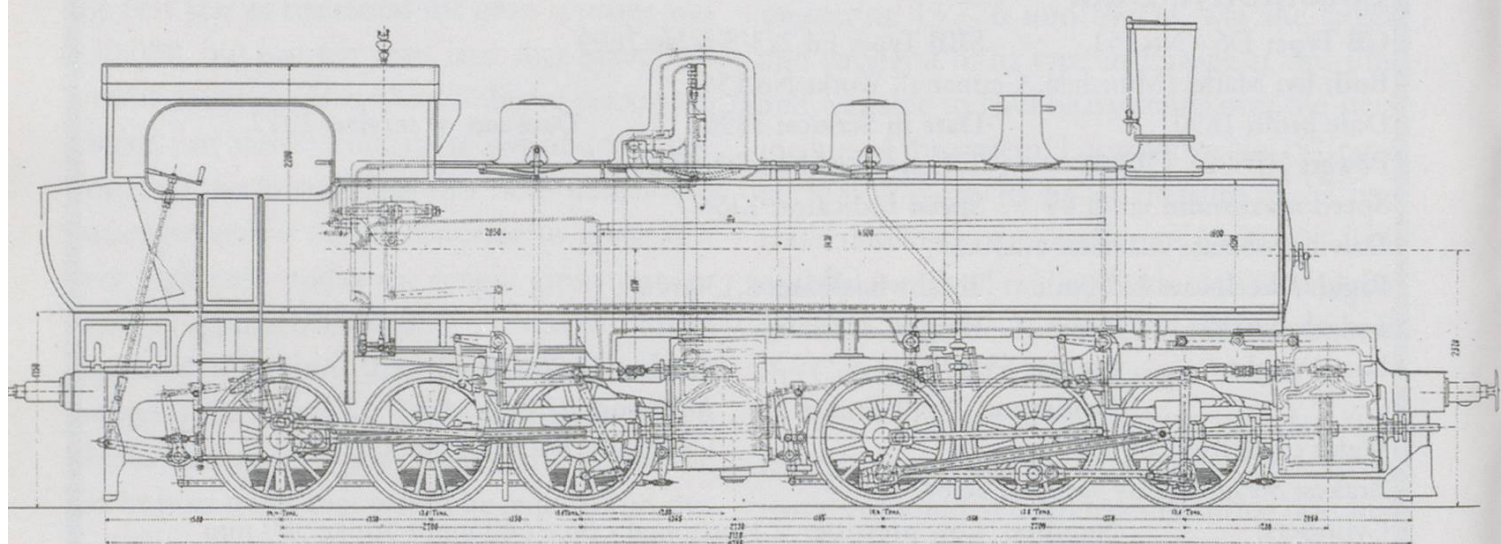




*Photo: Hardy Randall EAB Collection*

Later the workshops fitted the Langer fire-box equipment to improve combustion. The Mallet was one of the few locomotives not to be fitted with the Westinghouse double action braking system, which at that time had become standard fittings on most of the Gotthard Railway Company fleet.

The Mallet locomotive transferred to the SBB in 1902 and remained in service on the Gotthard until the German Military Transport Command (Loco T13 No.7900) purchased it from the SBB in 1917 and, eventually sold it to the Polish State Railways (Tkii No.101 -1) to be given a somewhat ignominious end as a stationary engine.



*Detailed drawing.*

*Courtesy: Maffei*

*The next article in this series will focus on the Gotthardbahn Heavy Freight Locomotive, type C 4/5*