



## References

As a general free-lance consultant in applied physics and consulting engineer (since May 1999) with emphasis on **thermo and aerodynamics in rolling-stock, general thermodynamics, physical chemistry and burners for special applications**, I do not have my own production facilities. Rather, the parts of my prototypes are manufactured externally and then assembled or fitted in my own workshop or in those of my customers. My **production partners** are renowned companies in the German federal state of **Bavaria** and in **Switzerland**, e.g. **MAN** for diesel engines in railcars and **KNORR-Bremse** Munich for brakes and compressed air equipment.

In railroad engineering, I have so far rendered comprehensive engineering services to the following rolling-stock manufacturers (in chronological order; small contracts not listed below):

### SLM Winterthur, Switzerland (now DLM):

Environmental protection test procedure and testing of the new rack tank steam locomotives **H 2/3** for **BRB** = Brienz-Rothorn-Railway (Switzerland), **MGN** = Montreux-Glion-Rochers-de-Naye-Railway (Switzerland), and **ÖBB** = Austrian Federal Railways, altogether 8 such locomotives were manufactured (left photo); adaptation of a stationary oil-firing system for extra light (No. 2) heating oil for use on a modernized old steam locomotive (**52 8055**, right photo) for tourist excursions, 1 locomotive was rebuilt.



### ADtranz Switzerland (now part of Bombardier Transportation):

Complete thermodynamic engineering of the diesel-hydrostatic track maintenance vehicle **Tm 234 'The Ant'** for **SBB** = Swiss Federal Railways and **MThB** = Mittelthurgau-Railway (Switzerland), altogether 132 such vehicles were manufactured.



### Stadler CH:

Partial thermodynamic engineering and thermodynamic approval tests of the diesel-electric railcar **GTW DMU-1 2/6** for **OSE** = Greek State Railways (standard and metre gauge versions), altogether 29 such railcars were manufactured (left photo);

complete thermodynamic engineering of the diesel-electric railcar **GTW DMU-2 2/6** for **STA** = South Tyrolean Transport Structures AG (Italy) as the first customer. These railcars contain one complete drive train (MAN diesel engine, generator, converter) per driven axle. So far 76 **GTW DMU-2 2/6**, 48 **GTW DMU-2 2/8**, 13 **GTW DMU-2 4/12** were delivered to railways in I, A, NL, and the USA. **Arriva Nederland** has ordered 13 **GTW DMU-2 2/6** and 11 **GTW DMU-2 2/8**.



### SBB Deutschland GmbH (German branch of Swiss Federal Railways):

Partial re-engineering of the GTW DMU prototypes Bm 596 572 and 573.



### FRUTIGER, Winterthur CH:

Design calculations and general outlay of the engine/gearbox-unit suspension of the SR 3000 TIGER scrapedozer. Prototype on the left, series production model on the right.



### Achenseebahn, Jenbach A:

Drastic emission reduction in 1988/89-designed steam locomotives in touristic service, achieved by alteration in combustion air supply and corresponding training of firemen.



### Zillertalbahn, Jenbach A:

Design calculations, engineering, manufacturing and delivery of a proprietary SePhys oil-firing system for smoke- and odorless combustion of #2 heating oil, diesel fuel, and fatty acid methyl ester (aka biodiesel). Note the crystal clear exhaust gas!



Additionally, **thermal and noise pollution problems** in railcars of **DB** = German Railways and **HLB** = Hessian State Railways (of the German federal state of Hessen) were **solved** under contract to the rolling-stock manufacturers.