PROJECT DRAFT FOR A FAMILY OF “INTELLIGENT” RAILCARS
THE NORTH AMERICAN RAIL FREIGHT COMPANIES AS MODEL

The railroad is expensive. This is due to the expensive track system. A running kilometer of a new high-speed line costs 20 – 25 million $. The railroad is extremely “track-oriented”. 90 % of the invested capital are in the infrastructure, only 10 % in the rolling stock. For lots of money, national economies can only afford little railroad. Therefore this traffic carrier is continually losing in modal shares and is depending more and more on government subsidies.

Not so in the USA: The private rail freight companies dominate in the ground traffic, they relinquish government subsidies and nevertheless they realize profits. For they focus consistently on cost-effective track systems. An American railroad line consists of railroadd ballast, crossties and rails – and nothing else. It hardly deflects from the topography, avoids expensive dams, cuttings, viaducts and tunnels and does without overhead contact lines and stationary signalization. The USA could realize the cost-effective railroad system, because it developed “intelligent” railcars: Six-axle diesel-electric engines, which manage big longitudinal inclinations, but also go through narrow curves.

The higly efficient US rail freight companies can become a model for all kinds of railroad traffic. However, this is only feasible, if there are “intelligent” railcars also for local, regional and long-distance passenger traffic, especially for high-speed traffic. Insofar it is necessary to expand the narrow segment of “freight train diesel engines” into a whole family of railcars. These must comprise the following “intelligent” design features:

– *Diesel-electric drive without overhead contact line, specific output for railcar train-sets 20 – 25 HP, for engines 50 – 60 HP per gross ton (world record!), in case of railcar train-sets this ensures 300 – 350 km/h top speed, high balancing speeds at drags and high acceleration capacity;*

– *Active tilting technology, especially for high-speed railcar train-sets; this minimizes curve ratings for new lines; so these can follow the existing topography or the existing traffic routes more easily; this reduces the construction cost enormously;*

– *All-axle resp. mutiple-axle drive for railcar train-sets in order to manage big longitudinal inclinations in adhesiion operation; this in turn facilitates adaption to the topography;*

– *Wireless signalization and control, so expensive line installations are not required.*

Railcars which meet these requirements make do with a track system that can be produced at very low cost. Thus a new high-speed line can be realized for 4 – 6 million $. This equates cost savings of up to 80 %. Lines for mixed service for lower speeds become even more cost-effective. So the family of “intelligent” railcars to be developed should reasonably comprise

– *a high-speed railcar train-set with tilting technology for 300 – 350 km/h top speed,*

– *railcar train-sets for local and regional passenger traffic in various overall lengths with and without tilting technology for at least 160 km/h top speed and*

– *a six-axle multi-purpose diesel engine with 7,000 – 7,500 HP gross, 120 – 130 tons service weight and for at least 160 km/h top speed.*

If the cost for the track system and consequently the inhibition threshold for demand decreases, the railroad will take off. For it will be more cost-effective in comparison with other traffic carriers and therefore more competitive. A nice side-effect for the railcar manufacturer: The investment funds for acquisition resp. replacement do not go back mainly into the infrastructure, but into the rolling stock. After all the railcar manufacturer does not make a profit by constructing dams, cuttings, bridges or tunnels, but by selling engines and railcar train-sets. To this some examples in figures:

1. *An "intelligent" high-speed railroad network to be built in the US American-Canadian five-city area of Quebec – Boston - Washington – St. Louis – Milwaukee is 6,000 to 9,000 kilometers long and costs 30 – 45 billion $. The manufacturer of "intelligent" rolling stock supplies "intelligent" high-speed railcar train-sets for 10 – 15 billion $ for first acquisition. If it were designed in the traditional way, this network would cost 120 – 180 billion $. Neither the USA nor Canada could afford that. They would only build a fraction of the high-speed lines, and in consequence thereof less high-speed railcars would be required.*

2. *Bombay and Calcutta are connnected by an "intelligent" high-speed railroad line of about 2,000 km length in the amount of 10 billion $. Due to the high affinity to the railroad and density of settlement structure in India, a high traffic frequency can be expected. So the manufacturer of "intelligent" railcars may also supply these in the amount of 10 billion $. If planned in the traditional way, this line would cost 40 billion $. Nevertheless the necessary trains would only amount to 10 billion $. If 50 billion $ were available from the outset, the railcar manufacturer could sell rolling stock in the amount of another 15 billion $ on the further 3,000 km of "intelligent" high-speed railroad lines (e.g. Bombay – Madras and / or Madras – Calcutta). So the manufacturer would achieve a turnover of 25 billion $, while competitors with traditional trains on traditional railroads would only achieve 10 billion $.*

3. *If the Indian subcontinent (approx. 1.4 billion inhabitants) is to reach the quality of the German railroad infracstructure, the current network length has to be increased seven-fold minimum. More than 400,000 km of railroad lines have to be constructed, not only in the high-speed segment, and railcars have to be acquired for this purpose. A family of "intelligent" rolling material would meet with a market for first acquisition amounting to 1,000 to 2,000 billion $ only for the first acquistion with the prospect of a replacement volume of 20 – 50 billion $ per year.*

The global market for railcars is gigantic – provided the track system and therefore the railraod on the whole becomes more cost-effective. Currently an important "ceteris paribus"is still missing for an exact market analysis: It cannot be predicted by how much national economies will increase their budgets in case they are offered a cost-effective railroad system, whether they will build fewer roads, airports or seaports insteaid or whether they will simply demand more traffic and operate it preferably on the railroad.

The supplier of rolling stock that is the first to recognize the financial connections between railcar and railroad can kick off the global railroad market with a family of "intelligent" railcars. For this purpose the manufacturer has to consider the **railroad system on the whole,** i.e. cooperate in determining the track system and designing it in a cost-effective and "intelligent" way. Moreover the manufacturer should advertise their "intelligent" railcars offensively:

Markets are not served – they have to be created!

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