

2.1 Interdependence of development

Railway and electric traction history is closely linked with the electro-technic development rhythms, in particular transformers, motors and semiconductors. Fashion, politic or strategic choices also influenced notably the evolution of electric traction.

On electrifications, technologically strong solutions were implemented until ones with higher efficiency found a sufficient reliability. After this, the last were used for new realizations as shown figure 2.1.

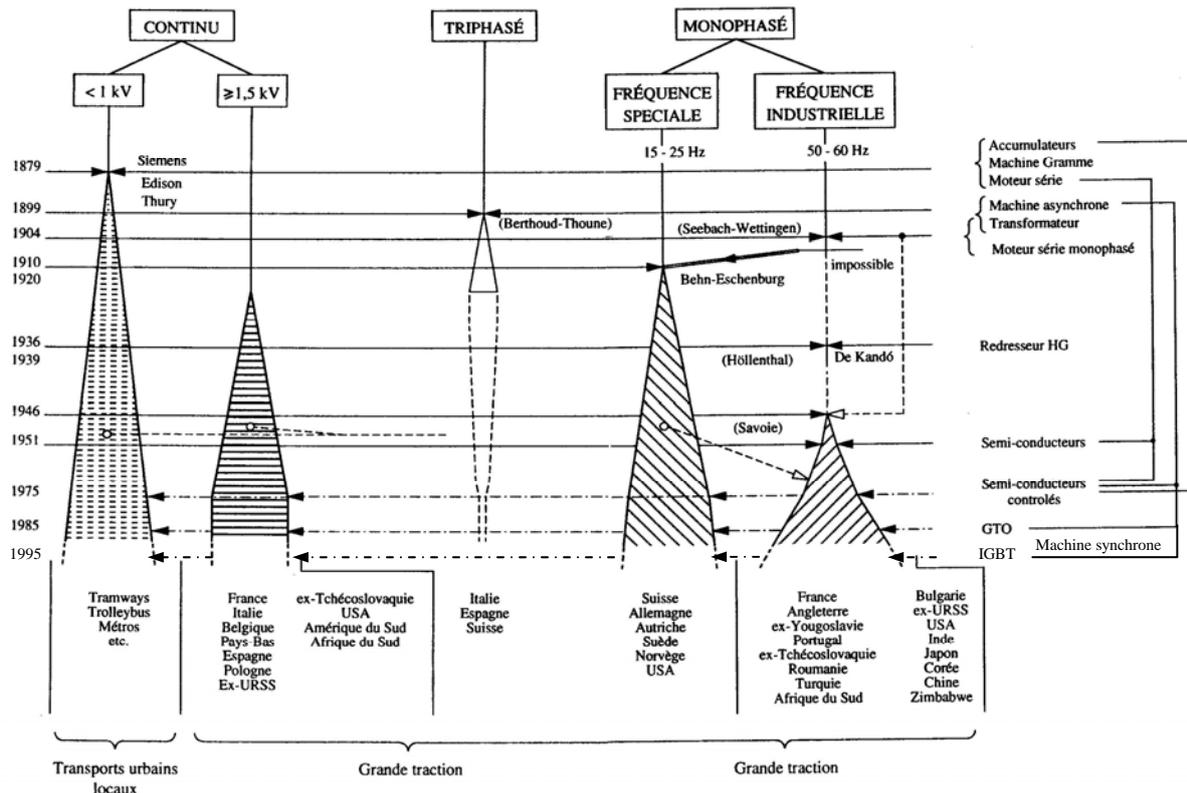


Fig. 2.1 Evolution of Systems.

2.2 Today's epoch

Today, only two systems are yet in full expansion: single phase with industry frequency for *great traction* and DC at low voltage for *mass transit*. Some infrastructures built long time ago with choices which will be different today; they are regularly used, and for long. As examples, the DC and AC at special frequency are only used on great traction because their replacements were too expensive.

Something is new in vehicle design. For three quarters of the century, the electric designer had quickly estimated the weight of electric part necessary to obtain the requested performances of the vehicle. The mechanical designer had to find the building solution in order not to exceed the maximal axle load. Mechanic and electric part were often built by different factories, perhaps by two independent divisions in the same company. Each partner had the challenge, not to exceed the designed weight. From seventies, the electronic

assistance for the driver took its place at the side of both electric and mechanic parts. At millenary's change, a revolution went. Locomotives and trains are globally designed, researching optimization of a final product including computers – electro-technics – mechanics. The developments in detail are supervised by a general designer who defines precise specifications for each equipment, and the interface between them... and their builders. The power supply of network and the track geometry are included in design procedure. With so a method, the weight and costs can be optimized in comparison with barely older vehicles of same function (Examples: *185* de Bombardier, *Citadis* de Alstom, *Flirt* de Stadler, *ICE3* de Siemens).