Project specification

Bogie engineering requires comprehensive know-how, especially for the challenging design of low-floor, powered bogies for HKL’s new three-section trams in Helsinki. The harsh Finnish winters, with temperatures of −35°C, pose demanding requirements. In addition, the tram’s low floor limits the space available for bogies. In sum, PROSE AG faced with the special challenge of developing a bogie that does not derail, runs stably under these conditions and guarantees rider comfort even on uneven or uncleared track.

Our approach

In this project, PROSE provided a full range of engineering services, including running-gear design for the whole vehicle, calculation of structural strength and durability, and detailed design. Simulation and analysis of running behaviour and measurements on Helsinki tram lines yielded important information on structural stability and durability and on load distribution. For this purpose, PROSE equipped an infrastructure test vehicle with measurement devices and was able to collect relevant data on track geometry and topography over the whole line network. On the basis of these results, PROSE dimensioned and designed components for manufacture in-house and by suppliers. To verify the design, PROSE specified and evaluated component tests and later static and dynamic tests on the vehicle with bogie measurements during line runs. PROSE then brought together all the results to prepare the acceptance process for the vehicles.

The foundation of PROSE’s engineering of bogies is profound knowledge and experience in their design. Also of critical importance are knowledge of applicable rules, exceptional experience in the measurement and appraisal of structures and management of risk in all project phases.

PROSE uses appropriate software packages to simulate running behaviour and study structural strength and durability. For detailed design, PROSE uses well-proven CAD software and specific dimensioning tools developed in-house.

Customer benefit

The result of the eight-month development period for the customer is a compact and robust powered bogie that is specifically suited to both Helsinki’s weather and the tram’s low-floor concept. In this process, the customer was able to concentrate fully on his core expertise, manufacturing, while PROSE took charge of developing all necessary documents. As a corporately independent service provider, PROSE offered the customer system-oriented skills for the full life cycle of a rail vehicle.