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## The effect of worn profile on wear progress of rail vehicle steel wheels over curved tracks

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**Abstract**

Dynamic performance, safety and maintenance costs of railway vehicles strongly depend on wheelset dynamics and particularly on the design of wheelset profile. This paper considers the effect of worn wheel profile on vehicle dynamics and the trend of wear in the wheels as a result of the vehicle movements. ADAMS/RAIL is used to build a multi-body system model of the vehicle. The track model is also configured as an elastic body. Measured new and worn wheel profiles are used to provide boundary conditions for the wheel/rail contacts. The fleet velocity profile taken during its normal braking is also used for the simulation. Wear numbers are calculated for different sets of wheels and the results compared with each other. Outcome of this research can be used for modifying dynamic performance of the vehicle, improving its suspension elements and increasing ride quality. It can also be further processed to reach to a modified wheel profile suitable for the fleet/track combination and for improved maintenance of the wheels. A major advantage of the computer models in this paper is the insertion of the wheel surface properties into the boundary conditions for dynamic modelling of the fleet. This is performed by regularly measuring the worn wheel profiles during their service life and by the calculation of the wear rate for individual wheels.

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**Engineering controlled terms:** Automobile bodies; Boundary conditions; Dynamics; Maintenance; Model structures; Rail motor cars; Rails; Surface properties; Vehicles  
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