

LIGHTWEIGHT INDUCTION MOTOR FOR HOLLOW AXLES - A DESIGN STUDY

This report describes the results of a design study to examine the use of an AC induction motor as a simple wheel motor for driving a railway train. It is proposed to house the motor inside a tubular axle, avoiding the need for a final drive and sharing material with the axle itself. Advances in thyristor control make the use of an induction motor practicable, and this type is more suitable for an axle environment than the traditional DC motor.

The additional weight and performance of an induction motor fitted inside a hollow axle depend to a great extent on the form of rotor conductors. It has been shown that a slotted rotor with shaped teeth has significant advantages over simpler constructions.

The report shows that a 155kW motor wheel, able to provide 5kN tractive effort at low speed, can be fitted within a wheelset for a mass penalty of 450kg. In relation to Advanced Passenger Train knowledge, such a powered wheelset should have an unsprung mass of no more than 1500kg. A train having all axles similarly powered would achieve a balance speed of 200km/h.

Subject to a satisfactory cost-benefit ratio, it is recommended that a research and development project be conducted to more fully validate the above conclusions.