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Reduction of the Whole-Life Cost of Railway Car Body Structures Using Recyclable Polymer Composite Materials

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Reduction in the mass of railway rolling stock is considered as the most important factor in minimising the energy consumption and associated track maintenance costs that ultimately reducing the whole-life cycle cost of rail vehicles. These mass reductions can be achieved by integrating polymer composites into structural components (roof, sidewall, cabs, cantilever seats, intermediate vehicle ends and underfloor propulsion battery cases, etc.) of the existing railway car body structures.

Analysis of the literature suggests that there were several attempts to use composite materials for producing rail car body structures since late 1970's. However none of these projects were able to develop the required technology for manufacturing exterior body structures suitable for the current rail industry and market requirements. Different reasons were cited for the lack of uptake, with the most common being the inability to meet the existing fire-safety regulations without compromising the mechanical performance (impact and fatigue) and the higher cost of composites. For addressing the current barrier of higher cost associated with composite integration, it is important to encourage life cycle cost assessment based design methodology for rail vehicle structures.

A life cycle cost assessment methodology for the rail vehicles is discussed under this paper. This will be used in the identification of rail modules which have the highest potential of reducing the life cycle cost of rail structures by using Polymer Composite materials.

Keywords: rolling stock, whole-Life cost, polymer composite