Weight reduction II

Composites for Indian Railways –

- **Composite Interiors for Railway Passenger Coaches**
- **(3 + 3 + 2 berths) module for AC-III tier coach**
- **Coach to be furnished with composite main doors & modular toilet units**
- **Crash worthiness, absence of sharp edges/corners to avoid injury in case of accident**
- **Improved looks & comfort**

Composites for Indian Railways –

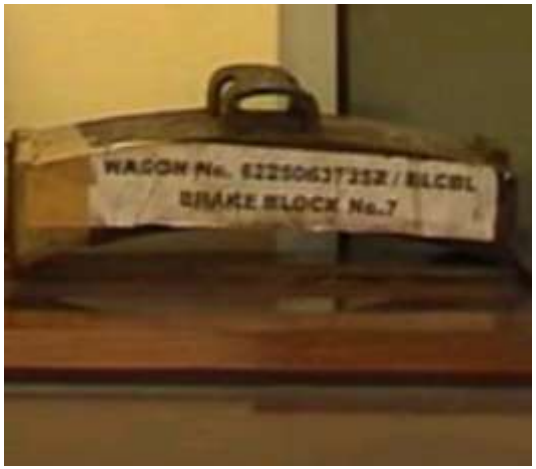
- **FRP Main & Sliding Doors for passenger & EMU coaches**
- **FRP door designed with strength identical to that of steel door**
- **Steel frame around the door for fastening window bars, hinge pins, door handle and locks**
- **Bottom part of the door made of a single skin composite layer and top made of sandwich construction with polyurethane foam inside for rigidity and impact resistance**
- **The doors fabricated by resin transfer moulding process**

Composites for Indian Railways –

- **Composite Pressure Vessels**
- **Filament wound under-slung composite water tanks for railway passenger coaches as per BS:4994 to replace SS tanks**
- **Multi-axis filament winding system designed & fabricated indigenously**
- **Sacrificial sheathing to withstand ballast hits**
- **Apart from considerable weight savings, composite tanks proven superior in corrosion resistance, as well as in cost effectiveness**

Composite in Indian Railways – Present scenario

- In Indian Railways, use of composite in carriage, wagon and Track are significant as per as money value is concerned
- The total amount of composite used in carriage, wagon and track of Indian railways are around Rs.134 crores per annum
- The item which contributes most is the Composite brake blocks for wagons & carriages, which value around Rs. 49 crores per year



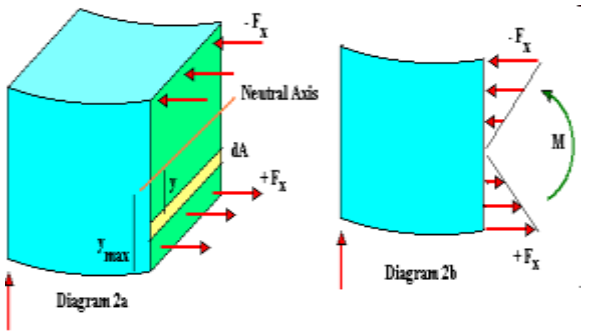
Composite Brake Block

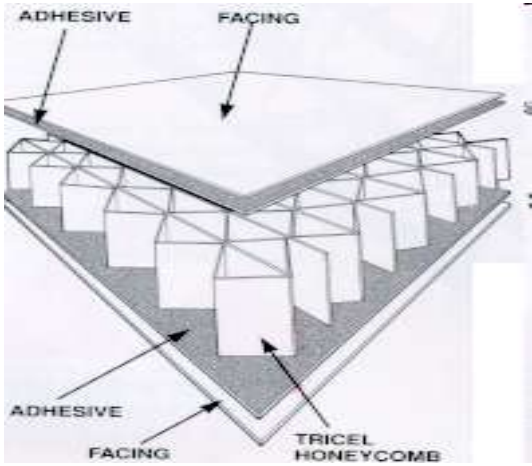
Composite in Indian Railways – Present scenario

S.No	Area	Component	Crore per year(App)
01	Wagon	Brake block	40.00
02	Carriage	Brake block	9.00
03	Carriage	Interior items	100.00
04	Track	GFN Liners	16.00
05	TI	Insulators	9.00
TOTAL			134.00

Future Applications

- The use of composite for truly structural or critical applications in Rail vehicles is, however, still uncommon
- Composite materials, such as fiber reinforced plastics and sandwich panels, have considerable potential for use in the next generation of transport structures
- Approach is to be adapted for manufacturing Hybrid vehicles containing significant proportions of both composite and metallic materials





Problems in application of composites in Rail Industries

- Composite materials always pose recycling problems. Certain PUs of Indian Railways like ICF is already facing this problem
- We should design for long life composite vehicle so as to reduce disposal problem
- Composites need to be cost-competitive with metals within the framework of the rail industry's normal costing practices.

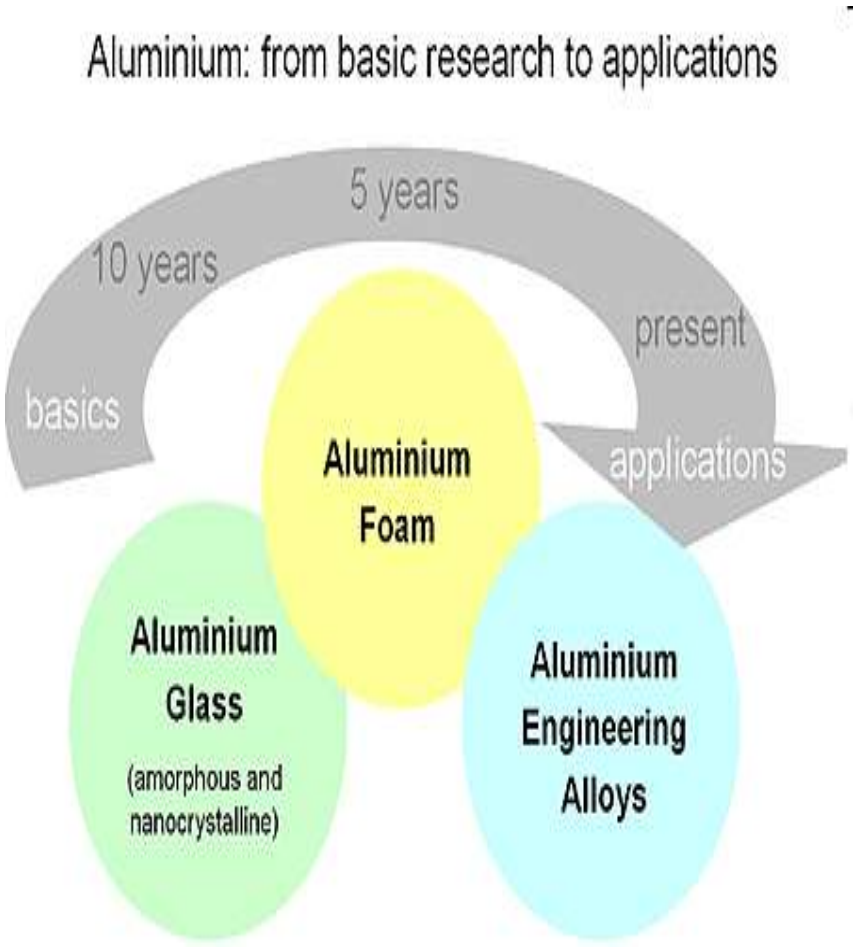
Problems in application of composites in Rail Industries

- The standardization of procedures for the inspection, detection and repair of damaged composite parts is to be evolved.
- Efficient and effective non-destructive testing procedures for the assessment of bonded joints in composite and hybrid structures are to be developed.
- Improved understanding of composite material damage mechanisms and failure modes, and the integration of this understanding within commercial finite element analysis software

Recent Light Weighting Materials

Recent light weighting materials

- Age hardenable aluminium engineering alloys: these are already being applied, but improvements of age-hardenability are required to promote their application potential
- Aluminium foams: are on the verge of industrial application but implementation of mass applications will take another estimated 5 years from now
- Amorphous and nanoncrystalline aluminium alloys: are in an early stage of development and industrial uptake will start at the earliest in estimated 10 years



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for your
questions
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