COMPOSITES

MASS TRANSPORTATION

RAGHURAJ ANANTHOJ

RAILWAY & TRAMS INDUSTRY

- MOST EFFICIENT
- GREEN
- RELIABLE

- TECHNOLOGIES AND INNOVATIONS ARE FRUIT BEARING FOR TODAYS DEMANDS AND THEIR FUTURE

RAILWAY & TRAMS INDUSTRY

- COMPOSITIES ARE ABLE TO
- MEET STRINGENT REQUIREMENTS AND CONFORMANCE
- AESTHETICS
- ERGONOMIC DESIGNS AND VALIDATIONS

- SPECIAL FEATURES
- LOW LIFE CYCLE COST
- LONGER LIFE
- EASY TO MANUFACTURE
- LIGHT WEIGHTS
- MORE PERMUTATIONS AND COMBINATIONS TO MEET REQUIREMENTS

INTERNATIONAL SCENARIO

EUROPE & EURASIA

COMPOSITES ARE IN USE FOR PAST 25 YEARS IN RAIL INDUSTRY

SUCCESS RATE IS HIGH IN ALL IMPLEMENTED PROJECTS

ASIA

JAPAN, KOREA AND OTHER EASTERN AND SOUTH ASIAN COUNTRIES USE SCOMPOSITES

INDIA HAS BEGUN USING COMPOSITES MATERIALS SUCH AS FRP AND HONEYCOMBS BASED ON FRP AND ALUMINUM

DOMESTIC SCENARIO

EXAMPLE

- DELHI METRO
- IS AN ICON FOR METRO IN INDIA
- USES INTERNATIONAL STANDARDS AND COMPLIANCE FOR INTERIORS

- 36 CITIES IDENTIFIED TO IMPLEMENT METRO IN INDIA IN NEXT 20 YEARS AND IS EXPECTED TO GROW MORE

- LOCALIZATION OF MATERIALS AND EQUIPMENTS – A CLAUSE IN TENDERS , FOR WHICH THE METRO RAIL CORPORATIONS ARE SEARCHING FOR SUPPLIERS IN INDIA

- COMPOSITE INDUSTRY CURRENTLY HAS 2 COMPANIES IN INDIA FOR FRP INTERIORS CAPABLE OF CATERING A $1/10^{TH}$ OF REQUIREMENT

CURRENT FIGURES FOR METRO RAIL IN

- DELHI ----- 3rd phase is under bidding.
- CHENNAI ----- 1st Phase is already started building trains.
- BENGALURU ----- 1st phase ARE IN OPERATION.
- MUMBAI ----- 1st phase trial is already started.
- KOLKATTA ----- 1st phase is under way.
- HYDERABAD ----- 1st phase is under way.
- KOCHI ----- 1st phase tenders are getting prepared.
- AHMEDABAD----- 1st phase about to start.
- PUNE ----- 1st phase about to start.
- JAIPUR ----- 1st phase about to start.

For this 1st phase of Cities estimated volume of FRP business in the next 5 years is approx Rs. 1500 CRORE.

OTHERS MAINLINE AND SUR-URBAN TRANSITS
for FRP mass transit requirements in India

- INDIAN RAILWAYS REFURBISHMENT - 40000 coaches NEW INTERIORS.

- COST PER COACH 30Lac to 40Lac,
- TOTAL Rs. 14000crores, for the next 25 years in FRP business.
- Rs. 500 to 600 Crores for FRP industry for each year for next 5 years.

FRP PRODUCTS USED IN RAILWAY INTERIORS

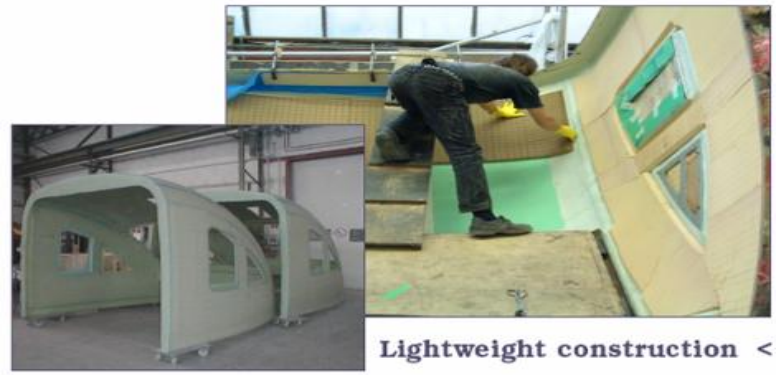
-Side walls / window panels/
-Door pillars,
-End walls,
-Electrical cubicles and doors,
-Partition walls,
-Cab interiors,
-Ceiling panels,
-Floor panels etc,.

DRIVERS CAB

-Driver's desk,
-Driver's cab interiors,
-Electrical cubicles,
-Partitions,

EXTERIORS

-Front mask,
-Front end with structural build up.
-Exterior panels like end fairings.
-Roof panels.



Lightweight construction <

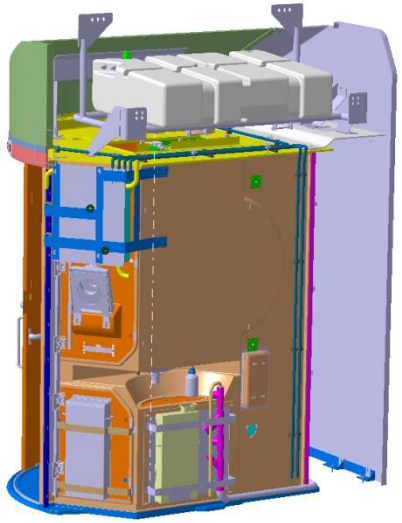
La rame Citadis 302 Alstom n° 09 du réseau valenciennois de *Transvilles* sur la ligne Dutemple-Université, à la station Gare SNCF, le 12/10/2006. Photo Willy Brock

SEATING SYSTEMS

-Seats and berths,
-Partitions,

TOILET SYSTEMS

-Universal Toilet systems.
-Standard toilet system.
-CREW toilet system.
-UIC comply toilet system.
-RVAR comply toilet system.
-TSI comply toilet system.



Different product areas FRP is used to Railway Industry:

-Interior paneling: Interior paneling, partition walls in FRP.

-Flooring: Composite floors for railway applications.

-Ceiling: FRP composite ceiling panels for DMU and Metro trains.

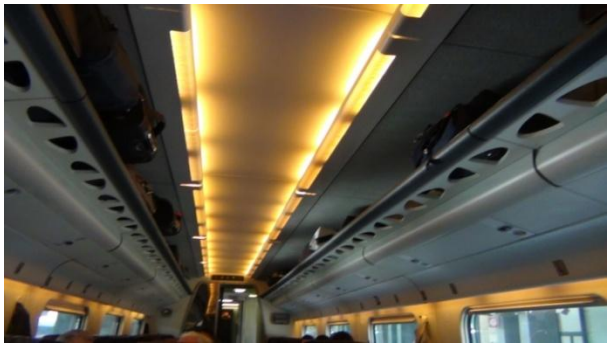
-Seats and Berths: Both Day and Night coach seating and berths design and manufacturing.

-Front End or Mask: Crash Worthy front ends and Metro Front masks.

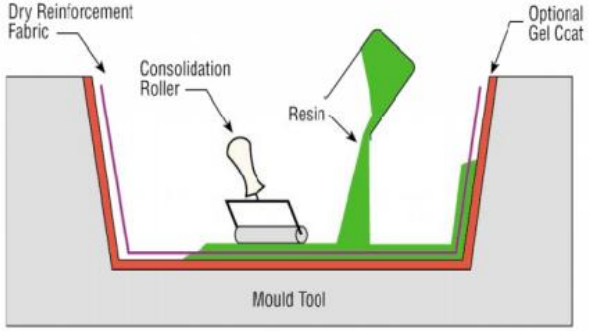
-Cab Interiors: Cab interior panels with arrangement for instrument panels. Drivers desk, and co-drivers arrangements.

-Toilet modules: Toilet modules comply to UIC, RVAR and TSI compliance.

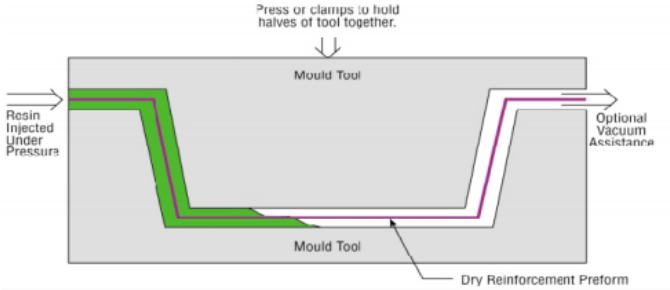
-Doors: Partition doors, Saloon entry doors.



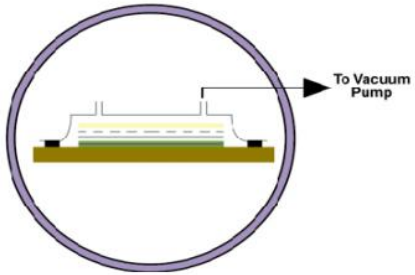
Manufacturing Processes used in Mass transport industry



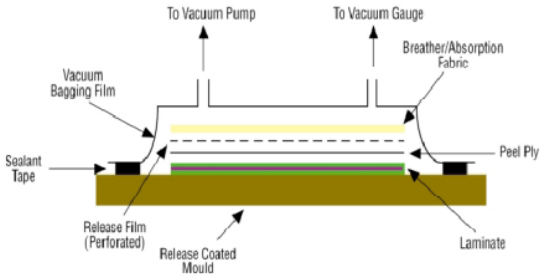
Hand Lay-up



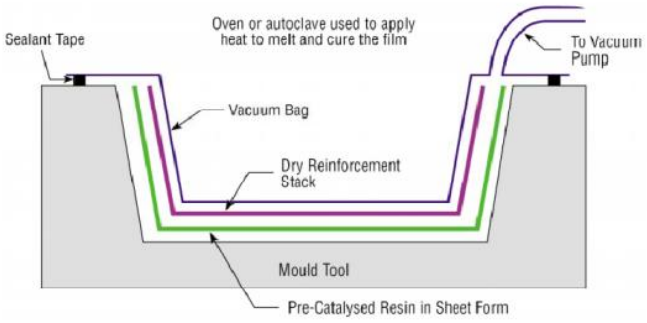
RTM



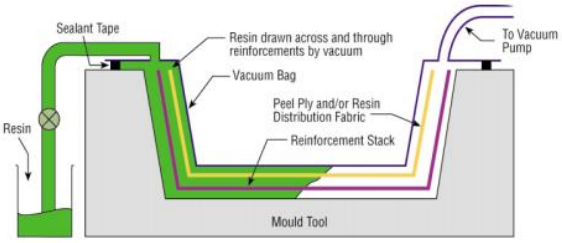
Prepreg



Vacuum Bagging



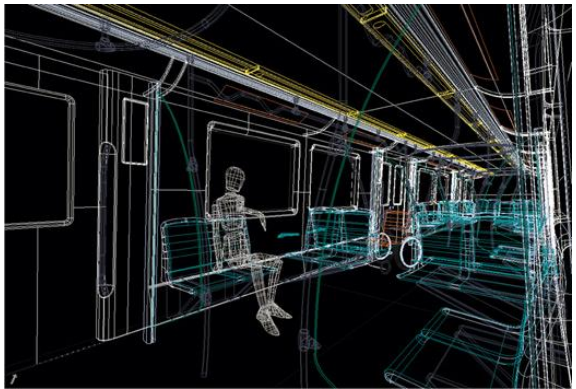
Silicon bagging

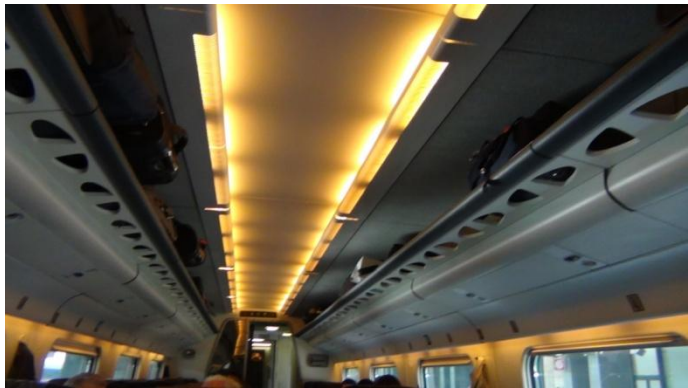


Silicon bagging
Resin Transfer tech.,

COMPLIANCE AND STANDARDS

-India market: RDSO, ICF, RCF, NFF, BS, ASTM etc.,
-Guidelines to be followed: UIC, RVAR, TSI etc.,
-Fire and smoke testing in approved laboratory based on customer list of approved lab.
-Specialty resins and Gel coats to be used to comply specification requirements.
-Customer based quality standards to be applied.





BASIC REQUIREMENTS

-Understanding the specifications and customer requirements.

-Strong project management capability.

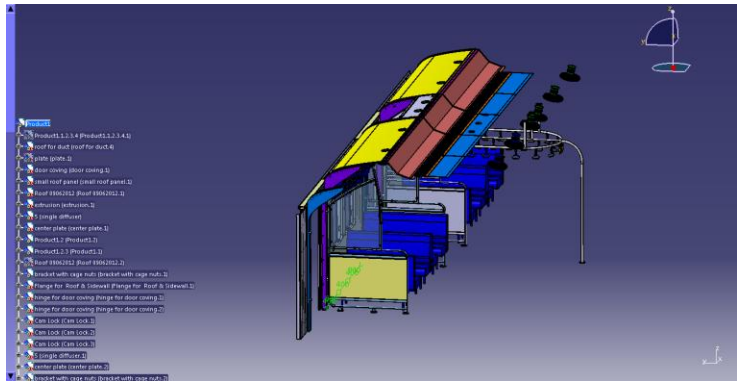
-Strong design capability.

-ISO Certified company.

-IRIS certification will give entry to major portfolio.

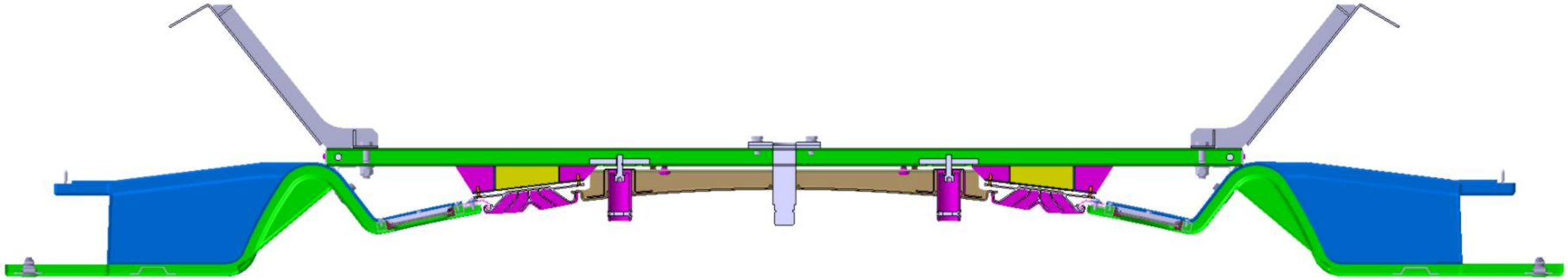
-Trial order executions.

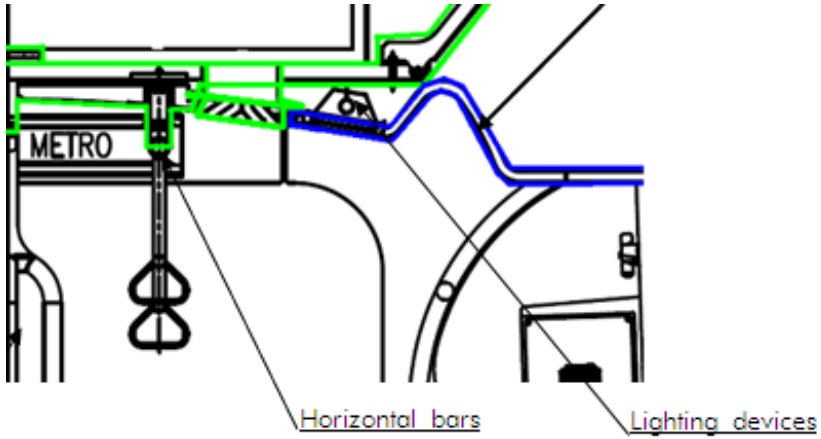
-References of similar products manufactured.

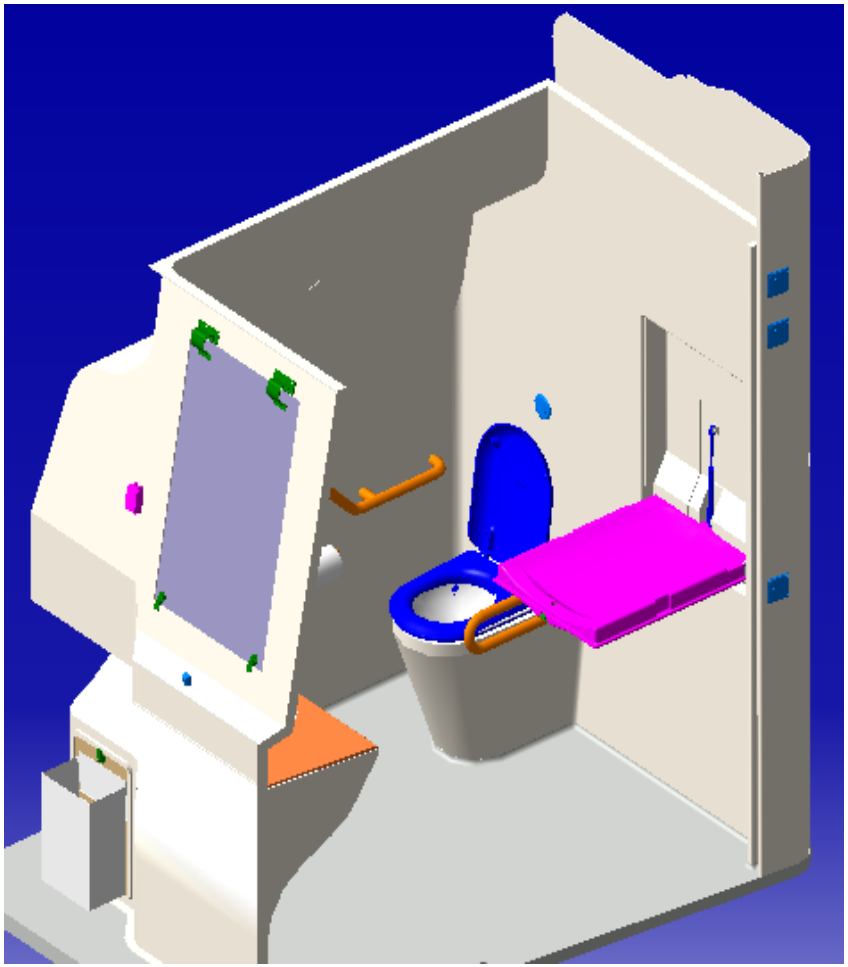


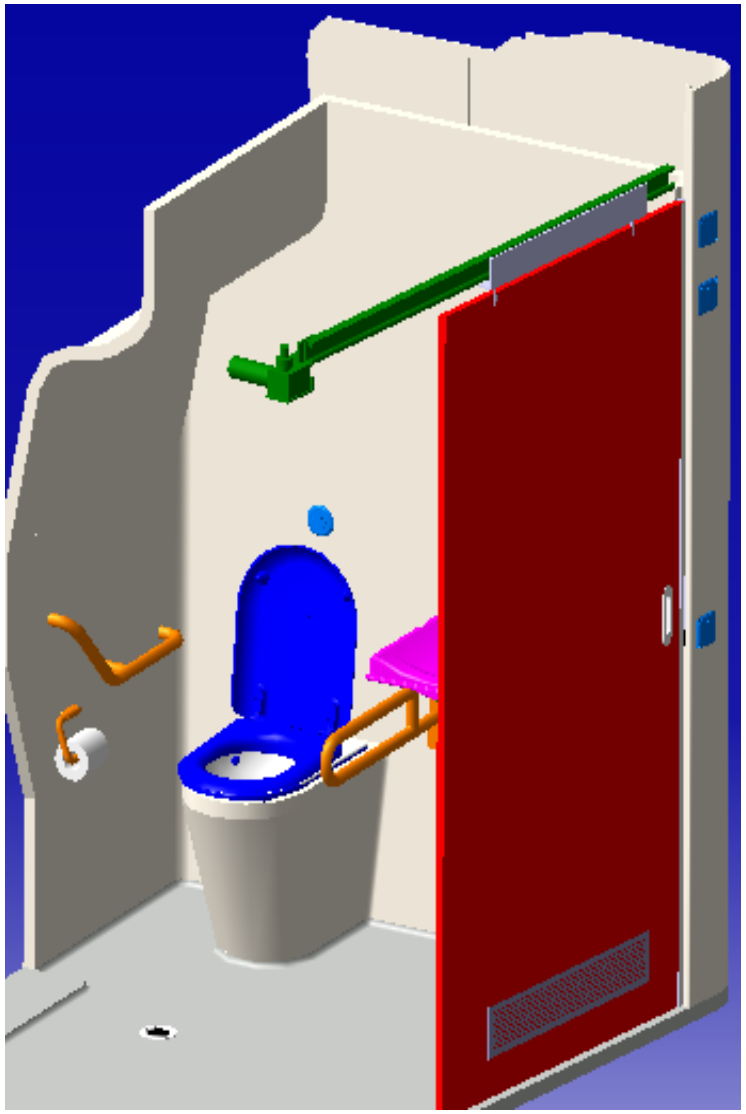
- Industrial design,
- Structural design,
- Mechanical design,
- Design Analysis
- Product development

DESIGN FOR METRO RAIL INTERIORS







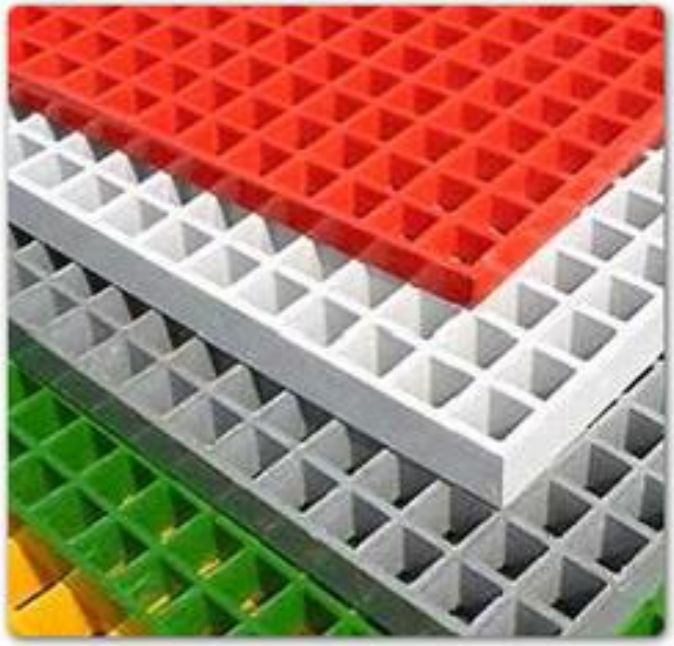


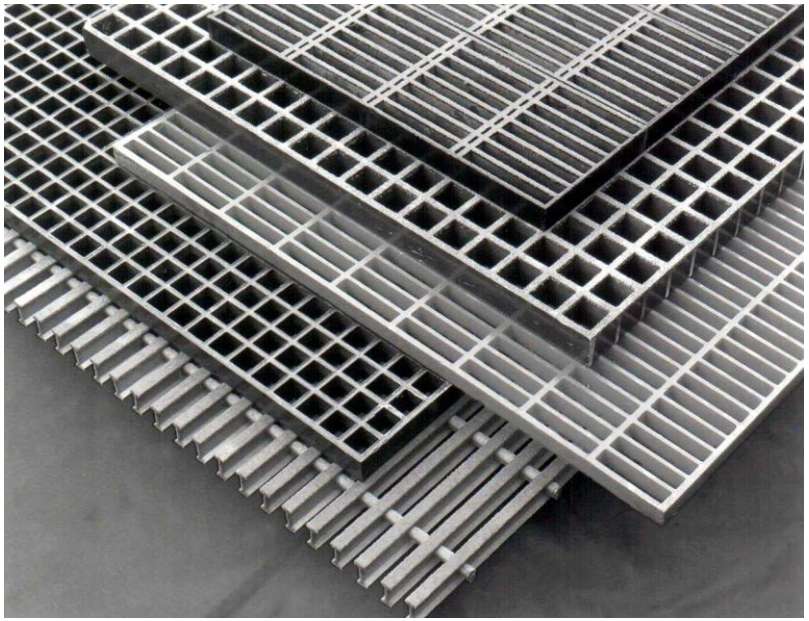
DISABLED PASSENGER CABIN
INTERIOR

INTERIORS

OTHER FRP PRODUCTS USED IN METRO RAIL STATIONS

-Metro stations requiring FRP products like claddings, gratings, handrails.
-Metro track sleepers can be made in FRP products.
-Metro station seats and Benches can be made in FRP with different concepts.
-Temporary shelters can be made in FRP to use during infrastructure development.





COMPOSITE SOLUTIONS GROUP IS A CONSULTANCY IN INDIA PROVIDES SOLUTIONS FOR MANUFACTURING, DESIGN AND DEVELOPMENT IN VARIOUS COMPOSITE PRODUCTS AND SOLUTIONS BASED ON THE STANDARD AND CUSTOM REQUIREMENTS IN THE VARIOUS FACETS FOR THE CLIENTS.

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REPRESENTATIVE
COMPOSITE SOLUTIONS GROUP