From Design to Production

We have the ability at Penso to reduce manufacturing times of composite components to just minutes. This allows us to produce parts quickly and cost effectively.

Penso has successfully produced a lightweight, press formed and phenolic composite rail door. Our design creates a mass saving of >10kg from the current aluminium door.

The following scope of work has been completed at our dedicated composite facility in Coventry, UK:

- Door engineering design to meet Fire, Smoke and Toxicity requirements (GMRT 2100 and BS6853 Category 1A)
- Tool design for press forming
- Tool manufacture (modifications easily introduced)
- Coupon (plaque) trials for testing
- Prototype production using press forming technology
- Fit and function test

Once the testing is completed, Penso's fully certificated door is ready for mass production.

Manufacturing lighter products is the future in all industries, we aim to make sure the UK is at the forefront of such developments.

Can we help?

Do not hesitate to get in touch with Penso today:

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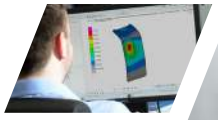
BRITISH ENGINEERING



PENSO
TECHNOLOGY : DRIVEN

The Challenge

- To manufacture a composite door leaf assembly
- To ensure equivalent or better performance
- To improve reliability and maintainability
- To deliver substantial mass savings per door leaf
- To present a bolt-in window cassette solution
- To reduce the risk of water ingress

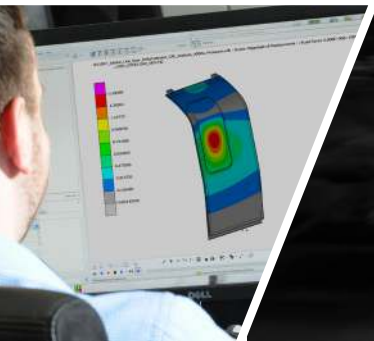
Scope of Work

- Reverse engineer the current aluminium door
- Generate CAD model to replace 2D line drawings
- CAE analysis against 92TS technical specifications
- Manufacture composite sandwich panel test coupons
- Perform Fire, Smoke and Toxicity testing
- Demonstrate manufacturing feasibility of a press formed composite door through prototype build
- Fit and function checks on in-service stock at Transport for London depot
- Design a test rig to ensure prototypes are compliant with deep tunnel 92TS load cases

The Outcome

- Successfully press formed a phenolic pre-preg composite door with an integrated core sandwich panel
- Design integrates door furniture to reduce mass and Bill of Materials
- Prevents water ingress due to a closed cell core structures

DESIGN & ANALYSIS



TOOL DESIGN & MANUFACTURE

DOOR MANUFACTURE

TESTING & MASS PRODUCTION

RAIL DOOR KEY FACTS

45kg dressed

-37% components

>10kg mass saving

OVERALL BENEFITS

Improved Durability

Weight Savings

Reduced Track Wear

Technical Benefits

- Reduction in overall carriage mass
- Less track and wheel wear
- Fewer unscheduled maintenance occurrences
- All stipulated strength and deflection targets met
- Reduced energy and increased transformer capacity
- Fire, Smoke and Toxicity compliant
- Mass saving of >10kg from current aluminium door