
NISSAN MURANO HATCHBACK

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Agenda

- Project partners NISSAN – HITACHI – QPC
- References hatchback doors in thermoplastic materials & design features
- GMT/GMTex – Process & Material Properties
- Product information hatchback door Nissan Murano
 - Used materials and processes
 - Dimensions, Attachment parts assembly
 - Manufacturing process
 - Surface finishing & Simulations
- Advantages of using thermoplastic materials for hatchback doors



Hatchback Door Nissan Murano -
Development partners, references,
design features

Development partnership



Hitachi **Chemical**



NISSAN Motor Co., Ltd

HitachiChemical

QPC

OEM

- Design
- Specifications
- Economics

Tier 1

- Development
 - Molding
 - Assembly
 - Logistics

Material supplier

- Material recommendations
 - CAD support
 - Tooling support
 - Processing support

References for Plastic Back door Modules

Nissan Stagea, Murano, Infinity FX



Fig. 1 (source: www)

Nissan Stagea
Market: Japan
Volume: ~6.000 c/a

Fig. 2 (source: www)



Nissan Murano
Market: NA, EU, Japan, China/Taiwan
Volume: ~120.000 c/a



Fig. 3 (source: www)

Nissan Infinity FX
Market: NA
Volume: ~60.000 c/a

References for Plastic Back door Modules

Design features

Complex outer shape

Optional non visible antenna integration

1-part structural design

Encompassing or inlay door construction

- Soft edges
- No scrub boards



Optional flip window system

Aerodynamic spoiler geometries

Optional 1-part outer panel design

Fig. 4 Rear view Nissan Murano Hatchback door (Source: Nissan)



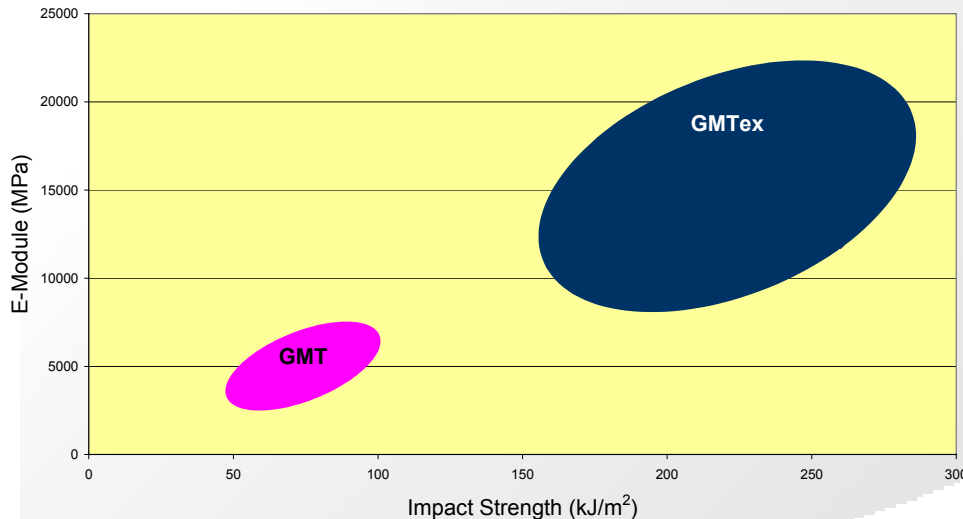
Hatchback Door Nissan Murano - Material basics structural inner part

GMT & GMTex material basics

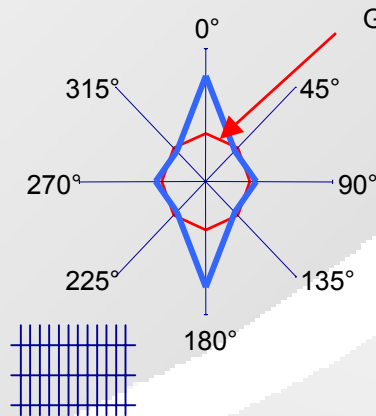
GMT → high strength, glass mat reinforced, flow pressing able thermoplastics

GMTex → thermoplastic composites with directional fiber reinforcement for extreme loads with additional weave inlays

Material Properties GMT / GMTex

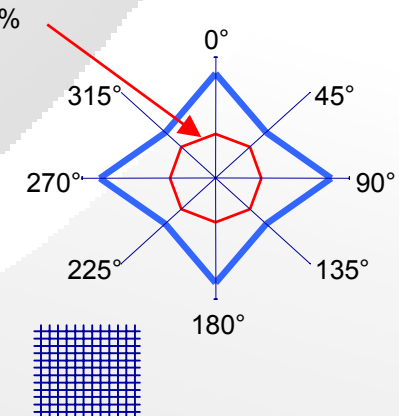


GMTex 4/1 40%



bidirectional orientation 4/1

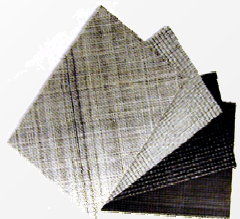
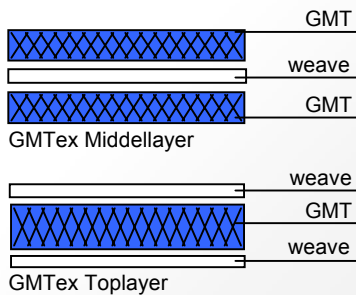
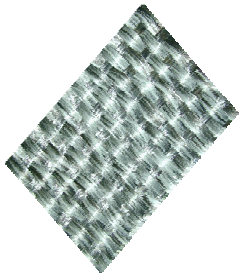
GMTex 1/1 55%



bidirectional orientation 1/1

GMT & GMTex material basics

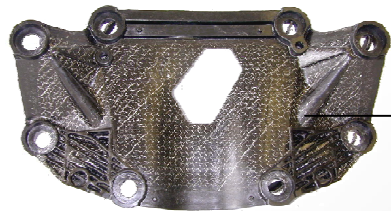
GMTex properties



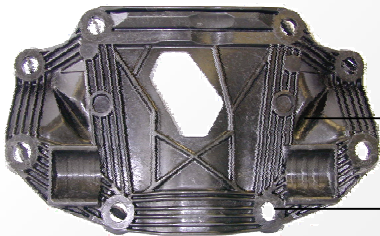
- Additional weave reinforcement (glass fiber, polyester, hybrids glass/aramid or PP/glass) in different orientations (e.g. bidirectional in 0° - $90^{\circ}/\pm 45^{\circ}$, unidirectional)
- Depending on specifications different material structures are applicable (Middle layer, Top layer, Top layer + UD fibers)
- Tailored GMTex formulations absolutely reliable producible

GMT & GMTex material basics

Economics (Example rear axle carrier & UBS)



Plane weave reinforcement



Geometrical reinforcements

Force transmission points

Rear axle carrier



GMTex weave inlay

Flow area GMT

Under body shielding

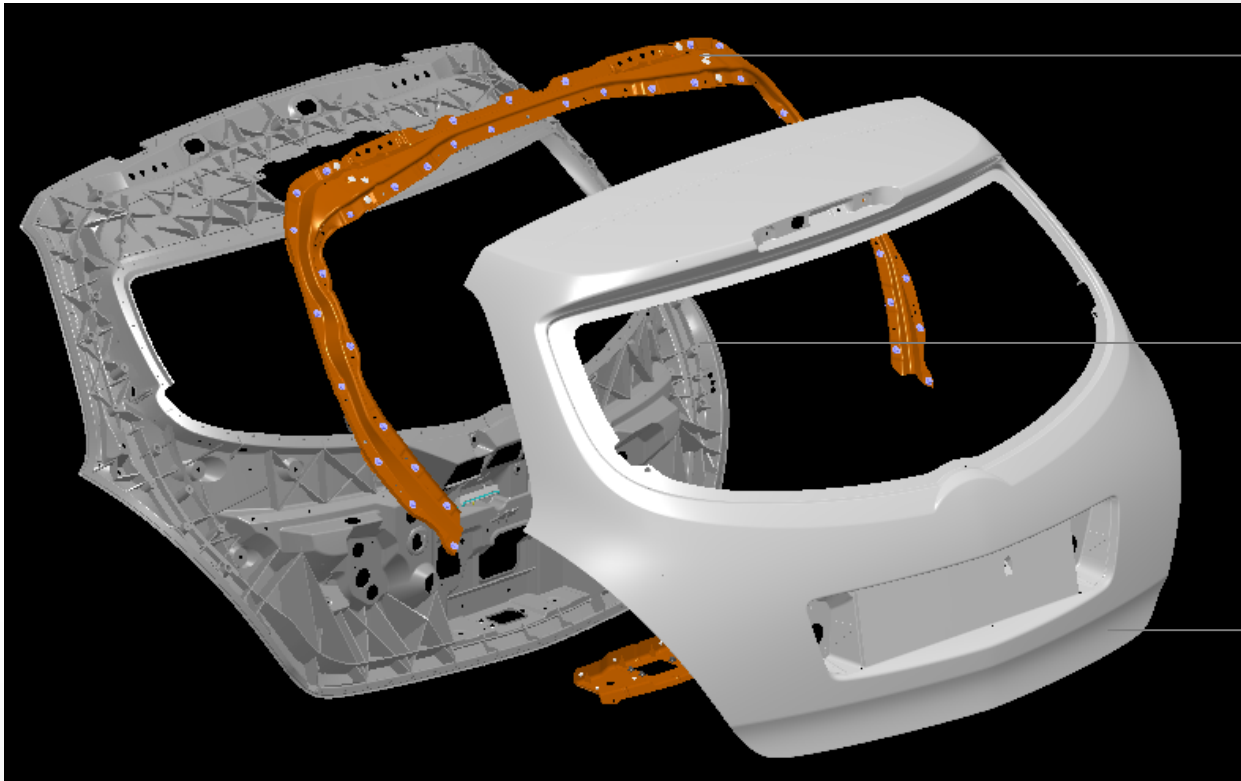
- Forming of complex shapes in one step
- No additional trimming after forming of the semi finished parts due to flow press process
- Tool filling also in critical areas (ribs, corrugations) with reinforced material
- Transmission of forces in GMT-flow press area constructive realizable
- Competitive cycles
- Functional integration in one process step (local reinforcements, screw domes, guiding, etc..)



Hatchback Door Nissan Murano - Product information

Hatchback Door Nissan Murano

Exploded view



Pillar reinforcements

- Material: Steel
- Process: Stamping

Structural panel

- Material: Glass mat reinforced PP
- Process: Compression molding

Outer panel

- Material: PA/PPE
- Process: Injection molding

Fig. 5 Exploded view Nissan Murano Hatchback door (Source: Nissan)

Hatchback Door Nissan Murano

Dimensions

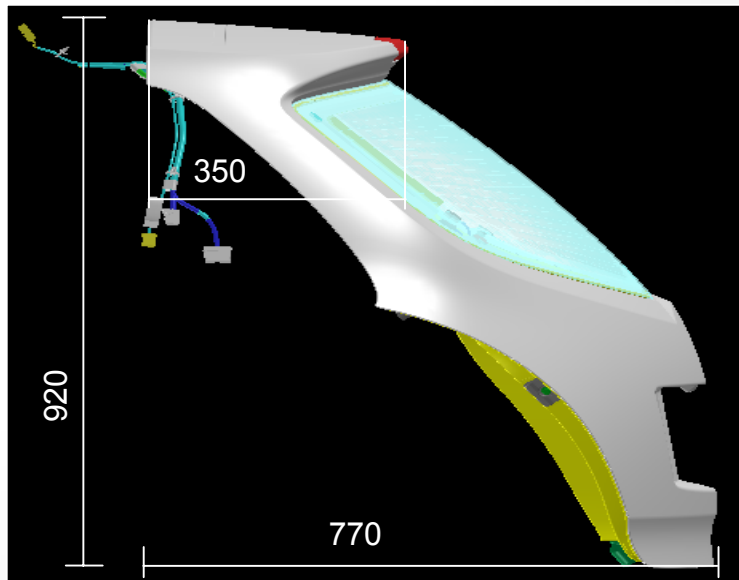


Fig. 6 Side view Nissan Murano Hatchback door (Source: Nissan)

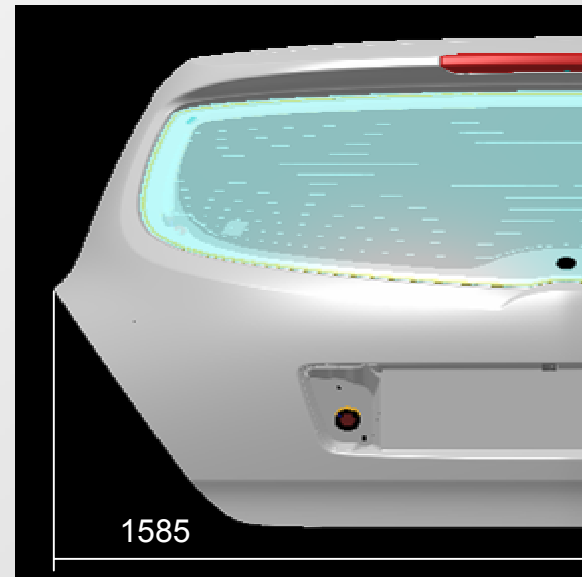


Fig. 7 Rear view Nissan Murano Hatchback door (Source: Nissan)

Hatchback Door Nissan Murano

Pre-assembly steps



Fig. 8 View inner part Nissan Murano Hatchback door
(Source: Nissan)

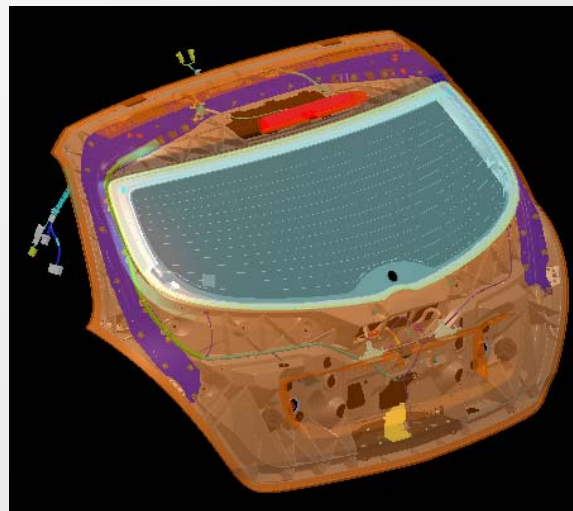


Fig. 9 View inner part Nissan Murano Hatchback door
(Source: Nissan)

Attachment assembly

- Hinges
- Wiring harnesses
- Metal reinforcements
- Lock
- Gas spring fixations
- Rubber stops
- High mount stop light
- License lump (2x)
- Rear window

Hatchback Door Nissan Murano

Manufacturing process

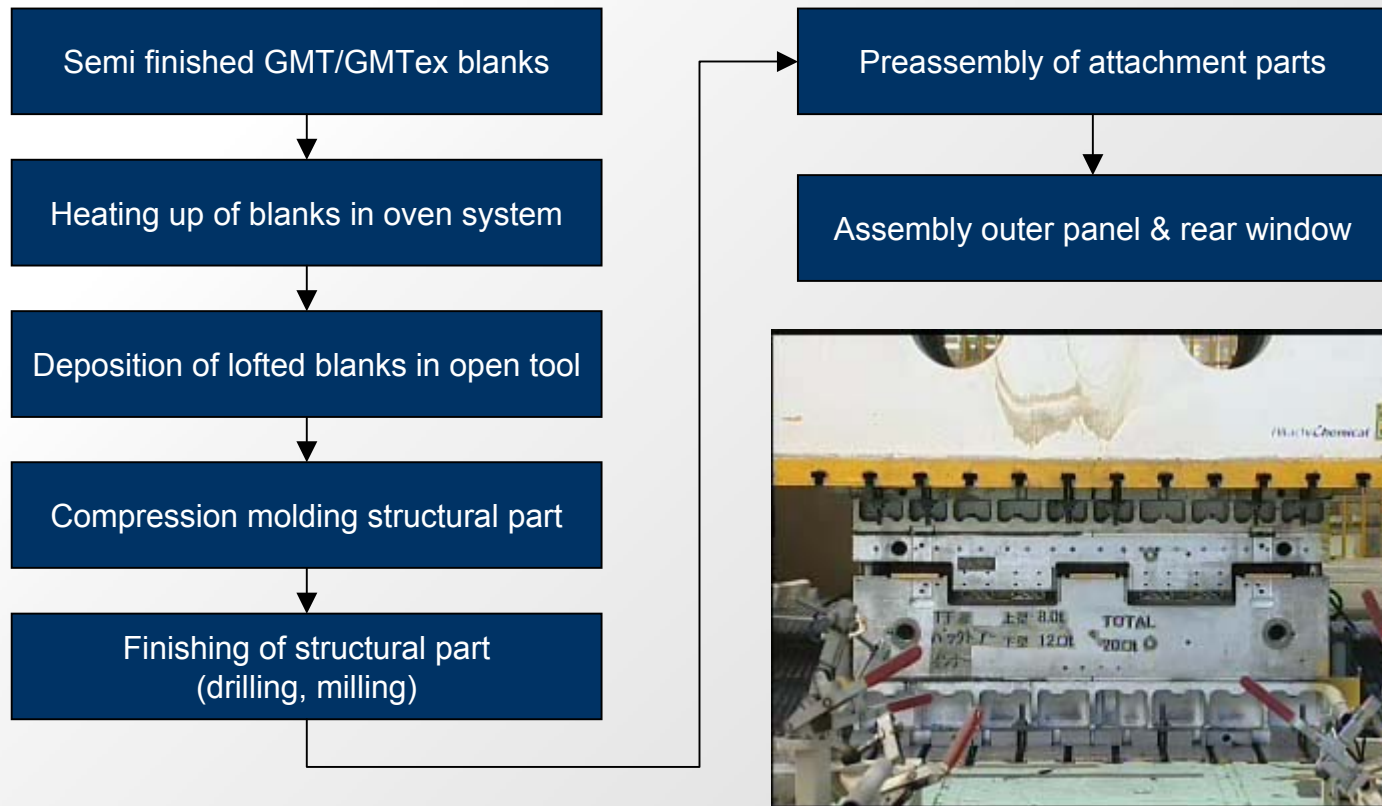


Fig. 10 Film sequence production line (Source: Nissan)

Hatchback Door Nissan Murano

Surface finishing



Fig. 11 Outer view structural panel (Source: QPC)

- less reinforcing ribs due to better glass filling (high flow GMT)
- less added weight due to improved height/thickness relation of the ribs
- decreased cooling times
- less warpage in the part



Fig. 13 Outer view door module (Source: QPC)

- Off-line painted outer panel
- 9 body colors
- Outer panel glued in border area to inner part
- Free thermal expansion in X-direction



Fig. 12 Inner view structural panel (Source: QPC)

- Grained surface for visible areas



Fig. 13 Inner view door module (Source: QPC)

- Off-line painted visible areas

Hatchback Door Nissan Murano

Simulations

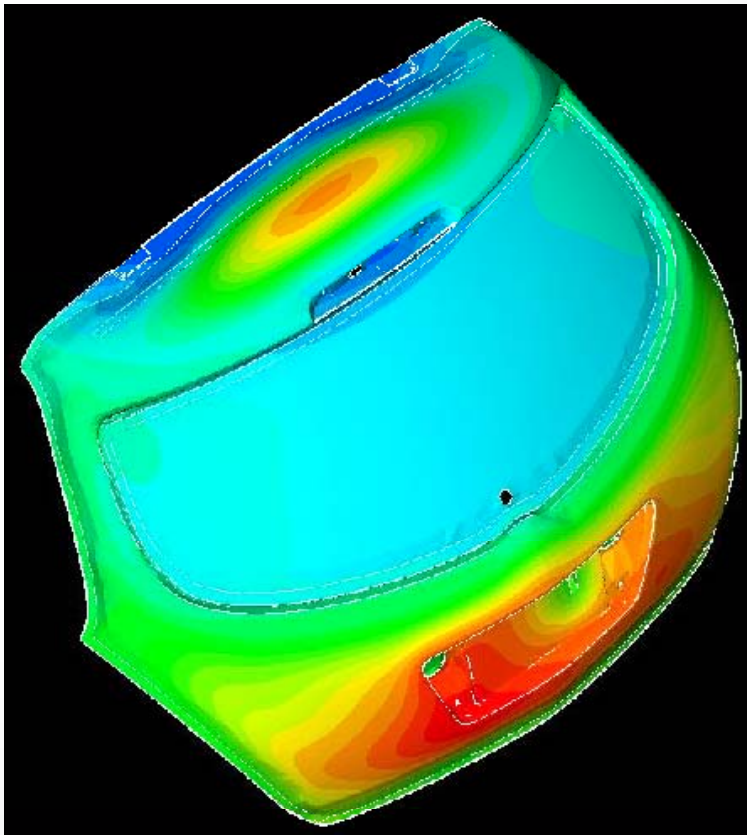


Fig. 15 View door module among thermal influence (Source: Nissan)

Simulation of thermal expansion

- Convex shape influences expansion positive
- 1-part outer design, i. e. no critical transitions
- Constant thermal expansion in X-direction shared to the complete surface area



Hatchback Door Nissan Murano - Summary

Hatchback Door Nissan Murano

Advantages of using thermoplastic materials for hatchback doors

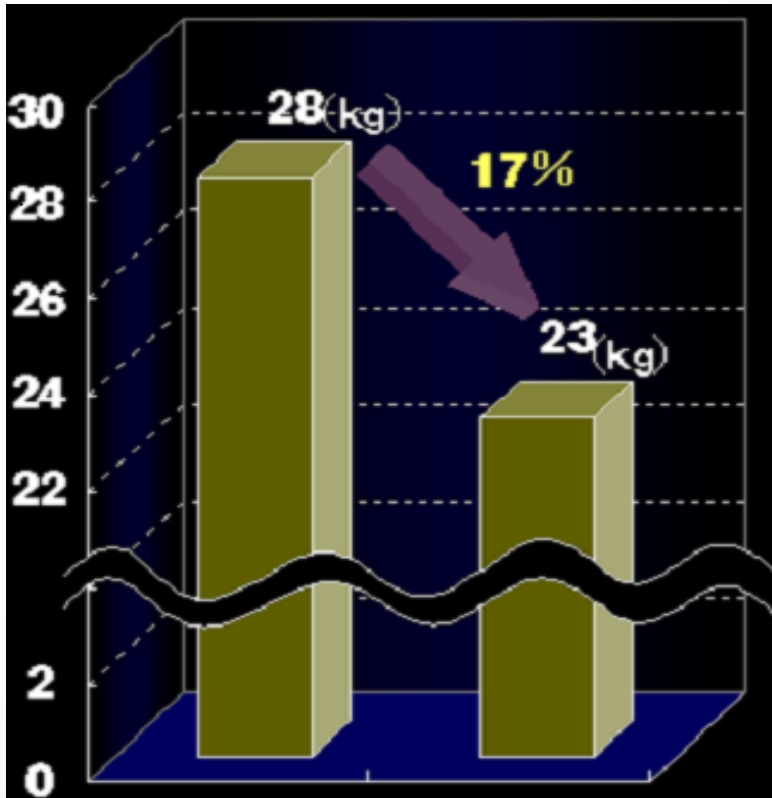


Fig. 16 Weight comparison steel / plastic (Source: Nissan)

Steel
(estimated)

Plastic

- Weight saving compared to conventional steel solutions
- Styling flexibility
- Cost reduction by integrating components
- High strength and rigidity
- Good crash behavior
- Excellent appearance

Hatchback Door Nissan Murano

QPC wants to thank



- NISSAN Co., Ltd.

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Hitachi **Chemical** - Hitachi

For allocating information for presenting

&

- SPE steering committee

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The audience for your attention!

