

Realizzazione e Certificazione di allestimenti di Cabina

DT-PPT-15-072_REV0

Ing. F. Liccardo

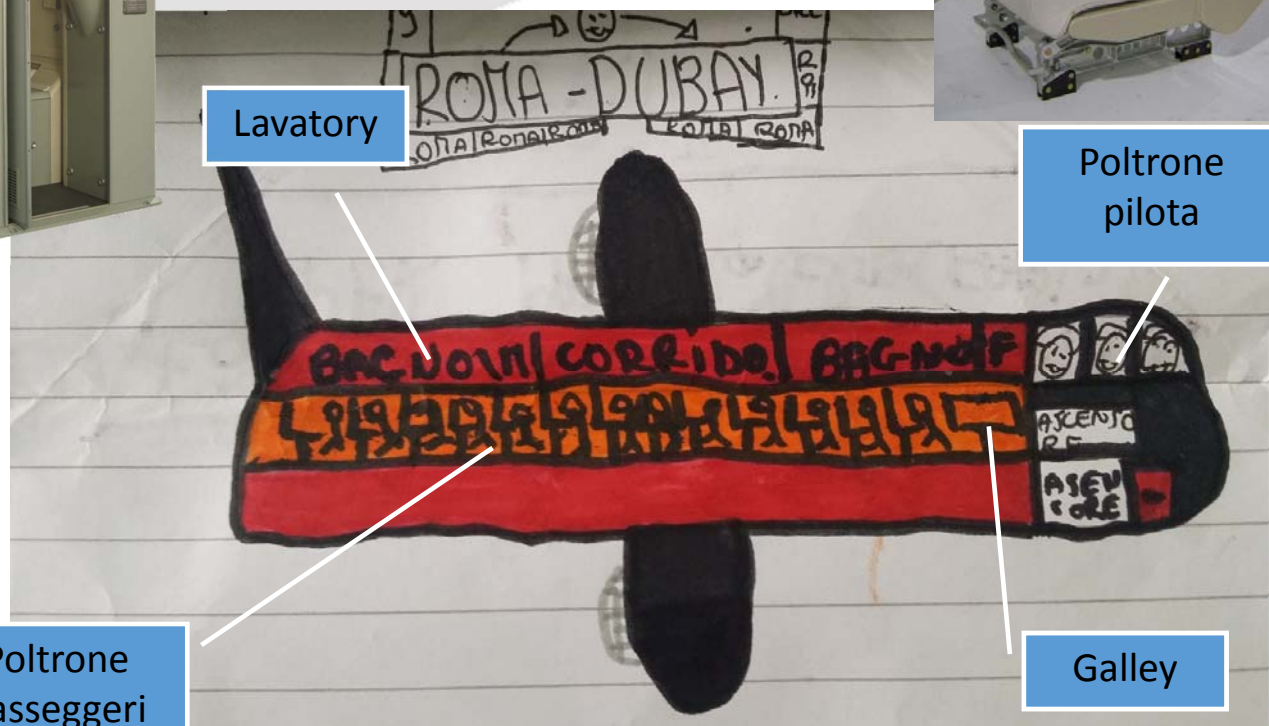




Lavatory



Poltrone
pilota



Poltrone
passeggeri

Galley



Introduzione - *Geven*



L'azienda Geven s.p.a. opera attualmente in tre divisioni, Aeronautico, Navale e Ferroviario.

L'attività prevalente della Geven è orientata verso il comparto dell'Aeronautica.

I prodotti certificati Geven sono destinati all'arredamento degli aerei commerciali, militari, business jet, VIP&Corporate.

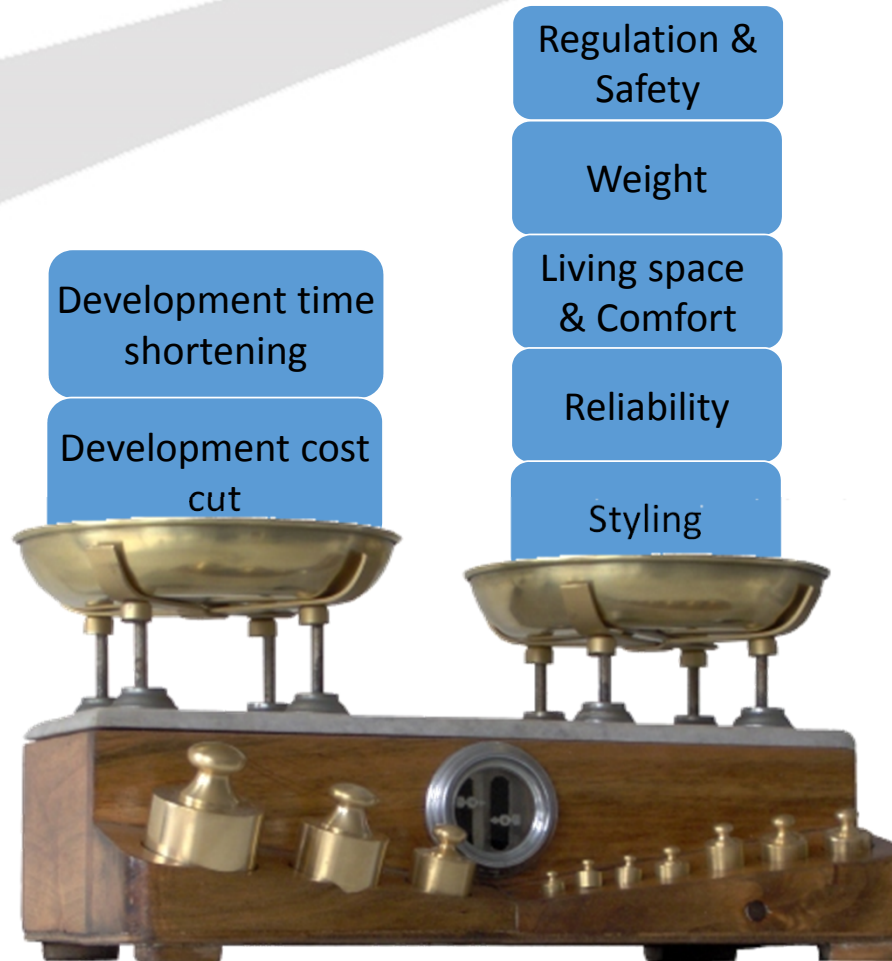
Le principali linee di business della Geven sono:

- **Poltrone per passeggeri**
- **Poltrone per piloti**
- **Altri arredi di interni (Lavatory&toilet, Galley, Guardaroba)**
- **Pannelli di rivestimento interni**
- **Sistemi pallettizzati**
- **Strutture/finiture e isolamento termoacustico della Cabina**

L'ampia gamma di poltrone per passeggeri e piloti comprende le seguenti classi:

- **Classe turistica**
- **Business Class**
- **VIP Class**
- **Military seats**

Poltrone aeronautiche – *La Sfida*



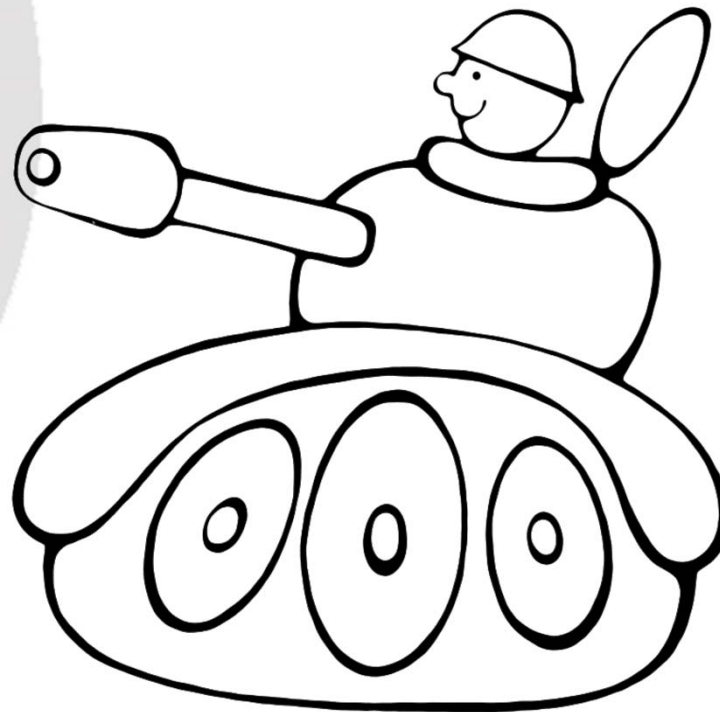
A large, light gray, stylized bird icon is positioned in the background, spanning across the left and center of the slide. It has a curved body and a pointed beak.

Regulation & Safety

Aircraft Seats — *Regulation & Safety*



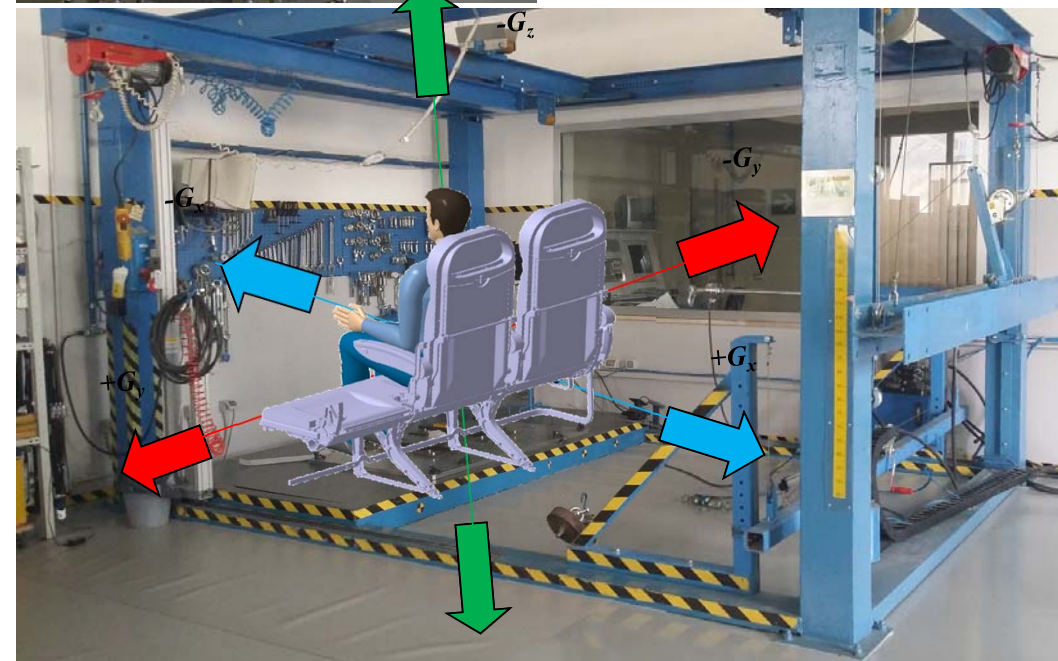
Safety: come la pensa il passeggero



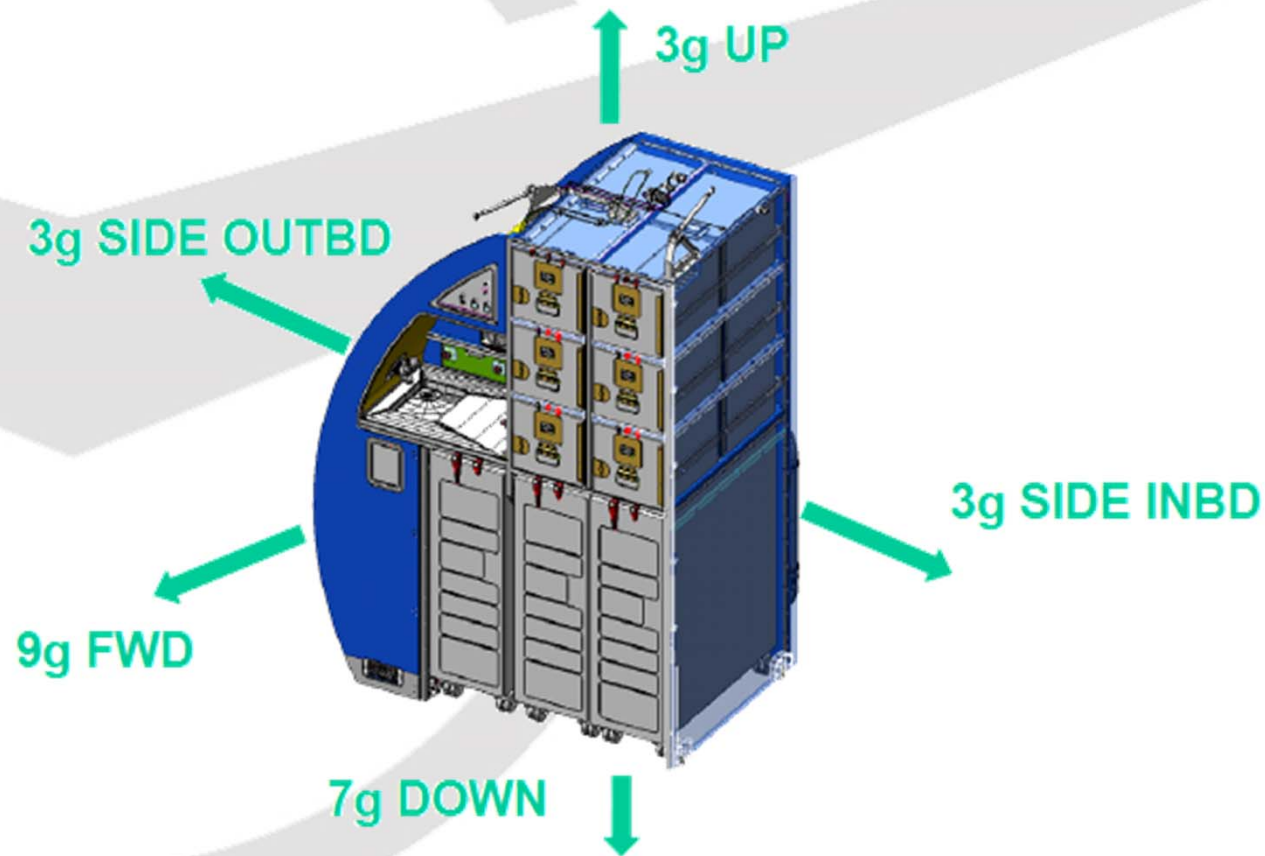
Aircraft Seats — Regulation & Safety



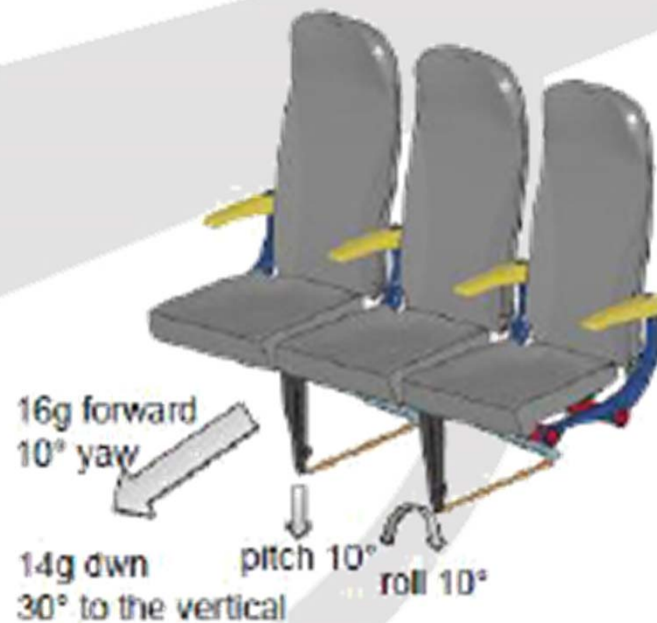
DIRECTION	AIRBUS Requirements	BOEING Requirements	ETSO-C127a SAE AS8049B
FORWARD	9.0 g	---	9.0 g
DOWN	8.6 g	6.5g	6.0 g
SIDE	3.0 g	---	4.0 g
UP	5.4 g	3.5g	3.0 g
AFT	1.65 g	---	1.5
FWD+DWN	---	1.5 g + 3.75 g	---
SIDE+DWN	---	3.0 g + 1.5 g	---



Interiors — *Regulation & Safety*



Aircraft Seats – Regulation & Safety



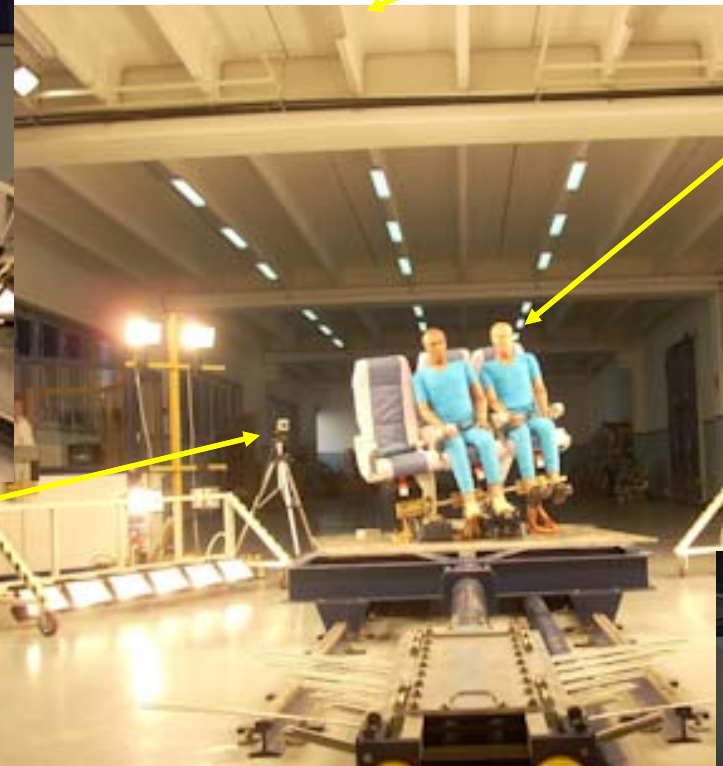
DYNAMIC TEST REQUIREMENTS	PART 23	PART 25	PART 27
TEST 1			
Test Velocity - ft/sec	31 (9.5 m/sec)	35 (10.7 m/sec)	30 (9.2 m/sec)
Seat Pitch Angle - Degrees	60	60	60
Seat Yaw Angle - Degrees	0	0	0
Peak Deceleration - G's	19/15	14	30
Time To Peak - sec	0.05/0.06	0.08	0.031
Floor Deformation - Degrees	None	None	10 Pitch/10 Roll
TEST 2			
Test Velocity - ft/sec	42 (12.8 m/sec)	44 (13.4 m/sec)	42 (12.8 m/sec)
Seat Pitch Angle - Degrees	0	0	0
Seat Yaw Angle - Degrees	±10	±10	±10
Peak Deceleration - G's	26/21	16	18.4
Time To Peak - sec	0.05/0.06	0.09	0.071
Floor Deformation - Degrees	10 Pitch/10 Roll	10 Pitch/10 Roll	10 Pitch/10 Roll
COMPLIANCE CRITERIA			
HIC	1000	1000	1000
Lumbar Load - lb	1500 (6675 N)	1500 (6675 N)	1500 (6675 N)
Strap Loads - lb	1750 ¹ /2000 ² (7787N ¹ /8900N ²)	1750 ¹ /2000 ² (7787N ¹ /8900N ²)	1750 ¹ /2000 ² (7787N ¹ /8900N ²)
Femur Loads - lb	N/A	2250	N/A

¹ - passenger ² - pilot

Aircraft Seats — Regulation & Safety

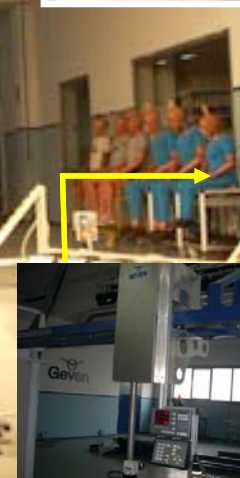


Over head camera



"dummies",
manichini
strumentati

Automatic
camera
position
system



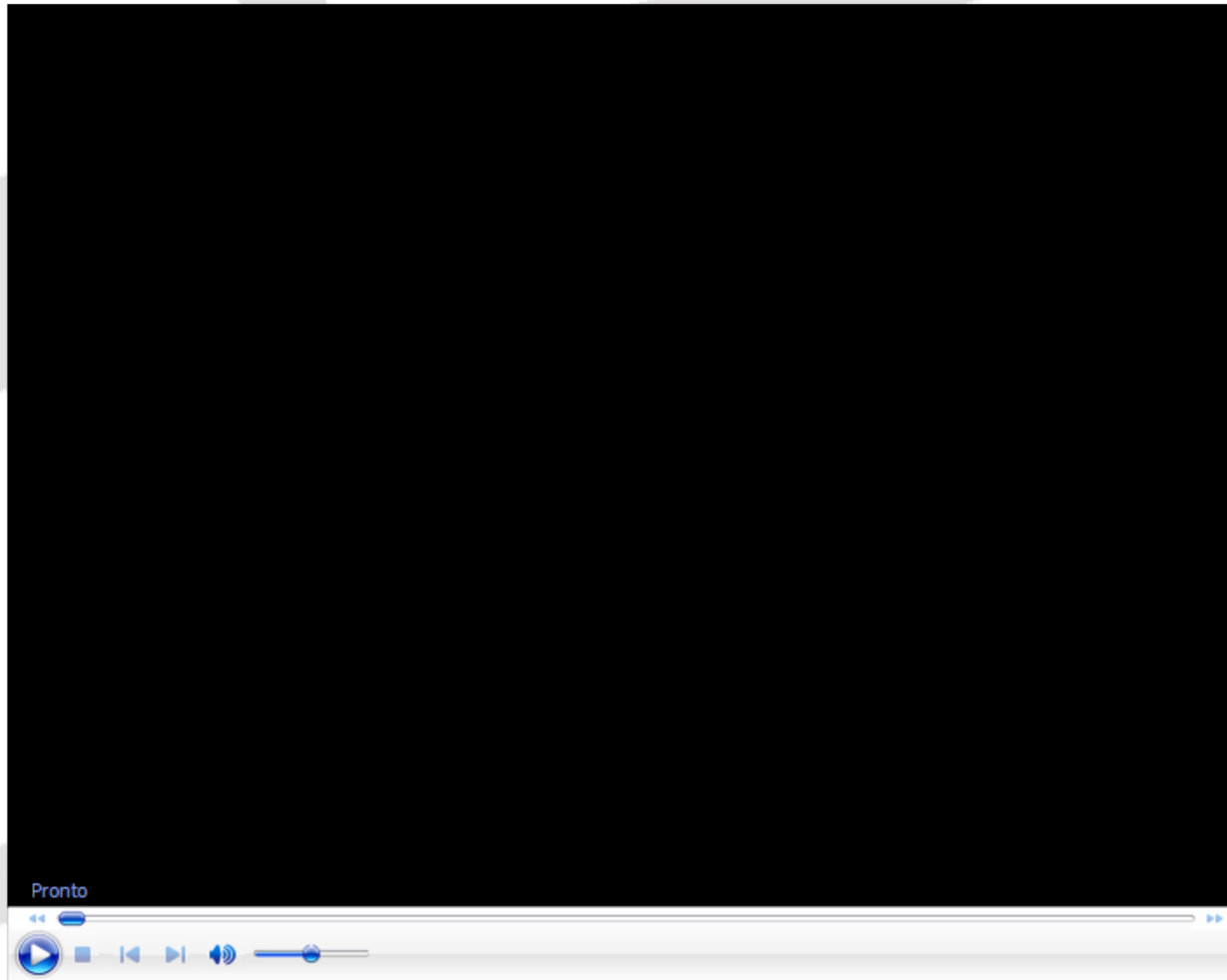
Test aeronautici:
Decelerazioni: fino a 30 g
Velocità all'impatto : ~ 50 km/h



Optional view camera

Aircraft Seats — *Regulation & Safety*

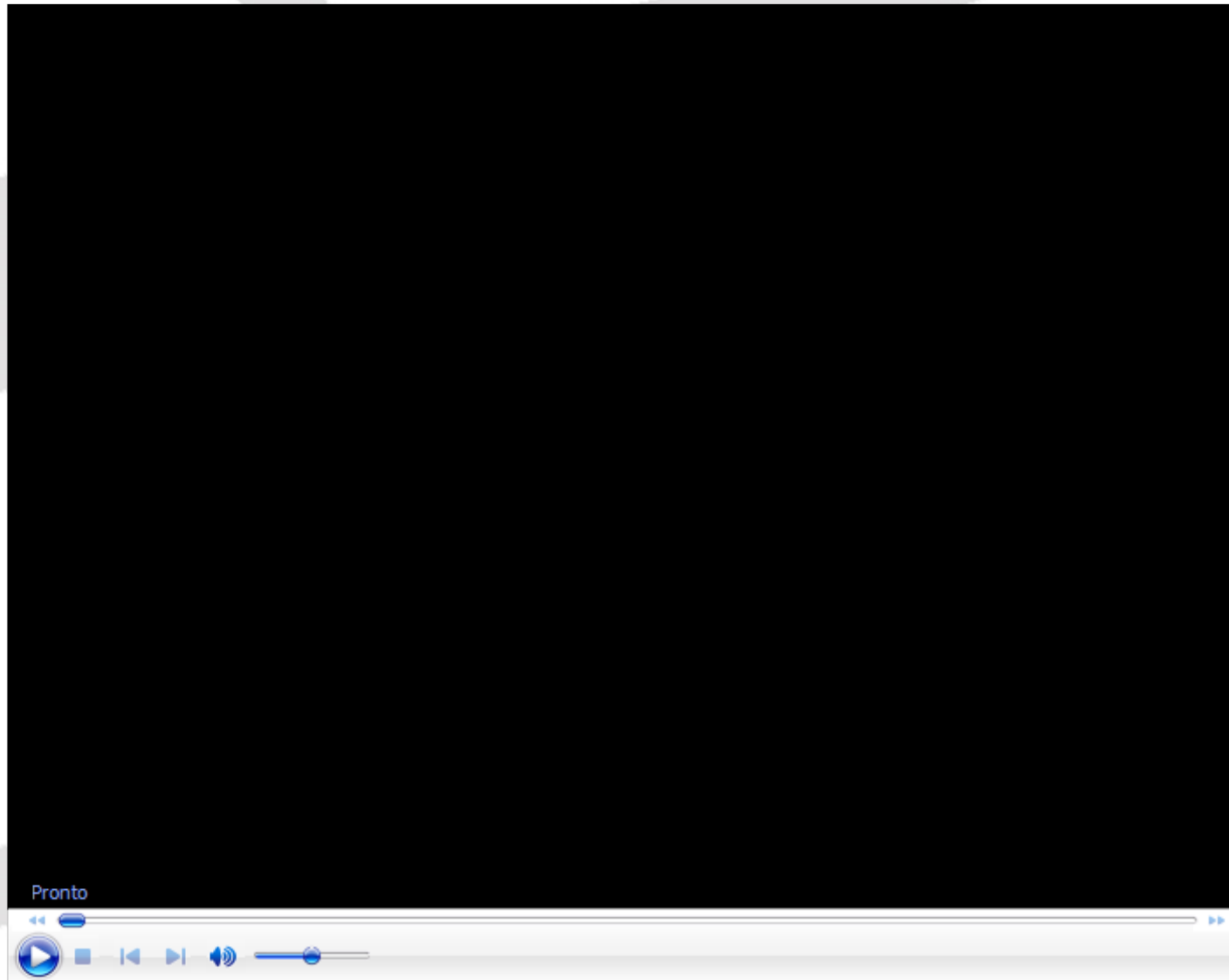
- 16g Forward (type 2)



Aircraft Seats — *Regulation & Safety*



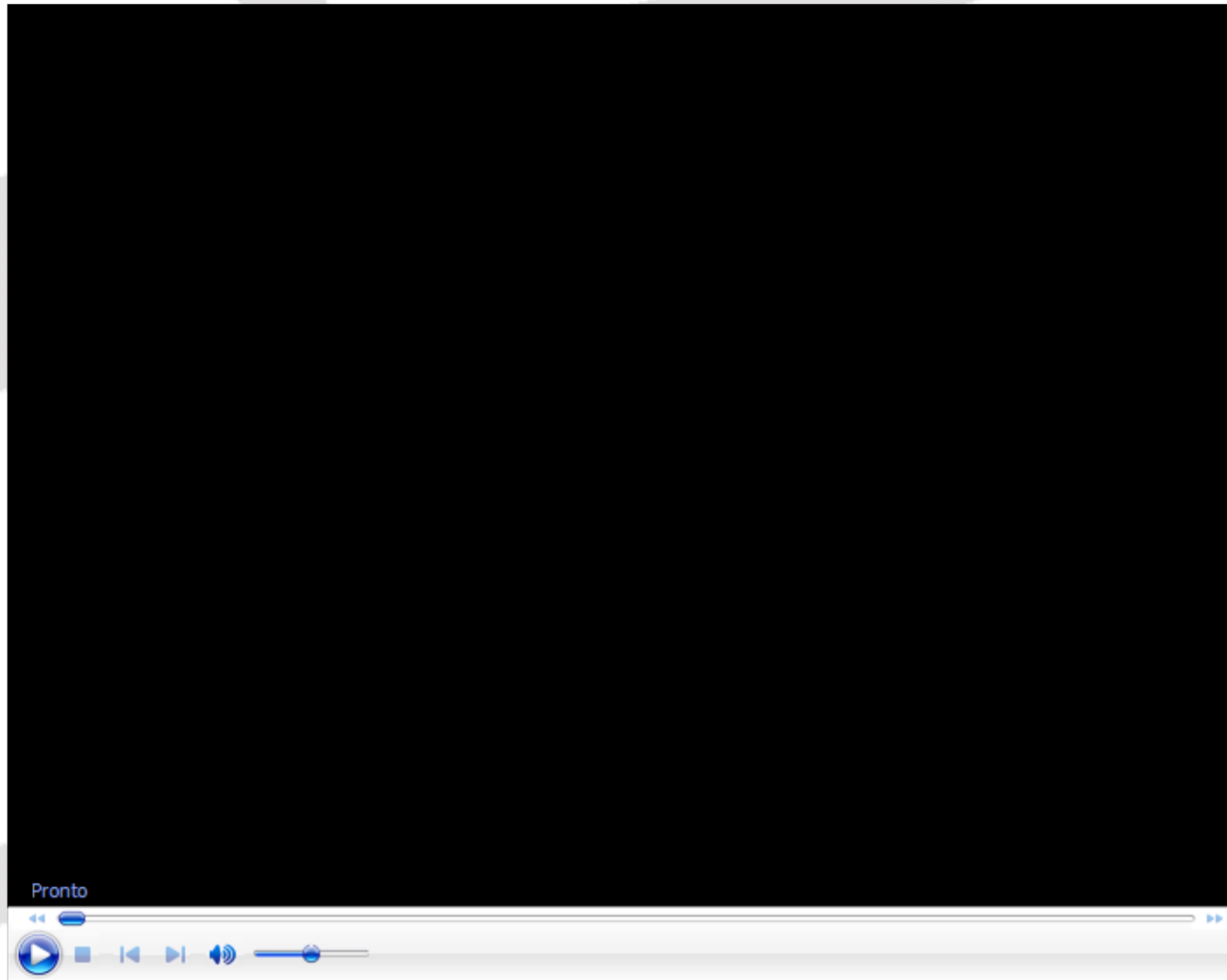
- 14g Down (Type 1)



Aircraft Seats — *Regulation & Safety*



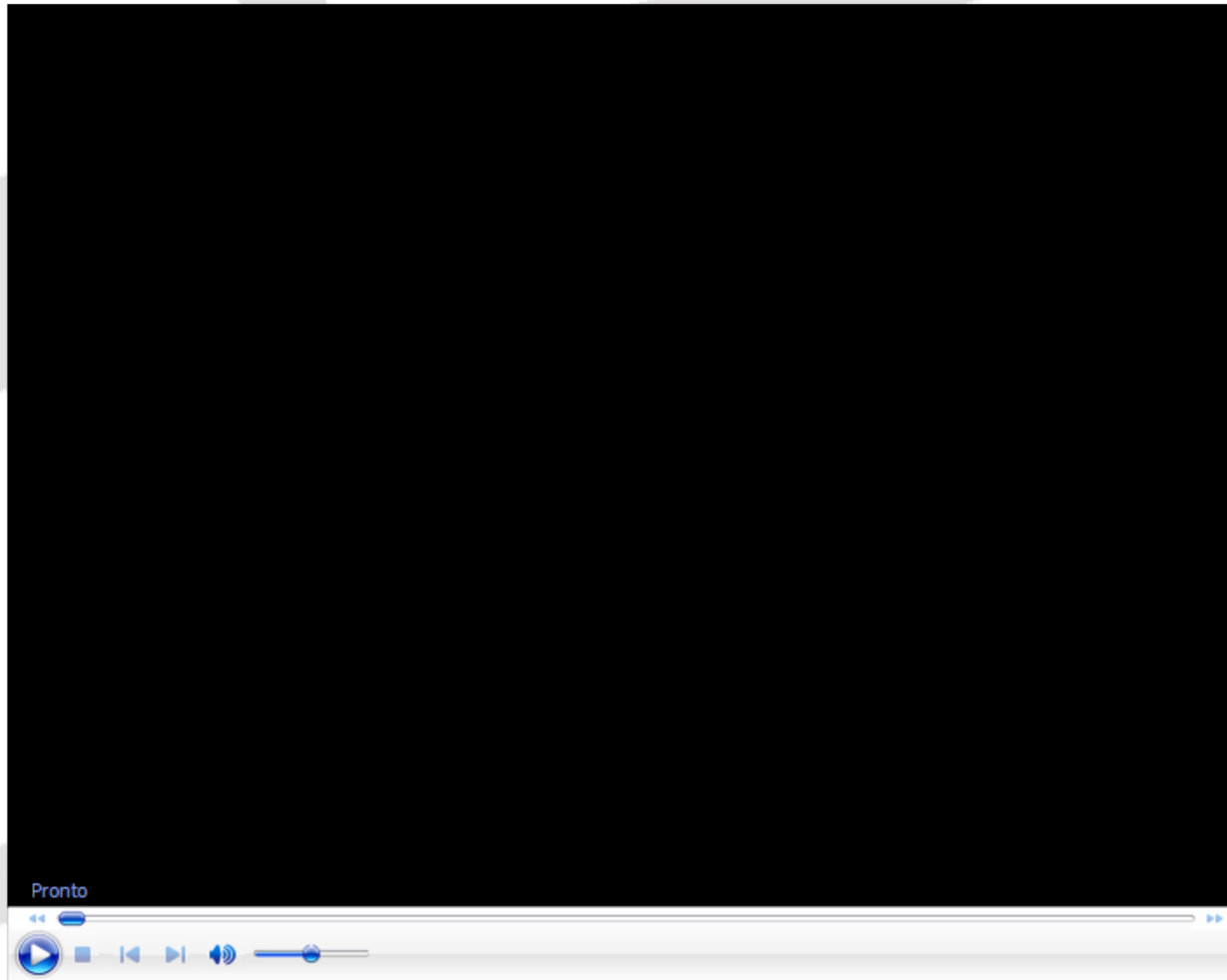
- 16g HIC row to row



Aircraft Seats — *Regulation & Safety*



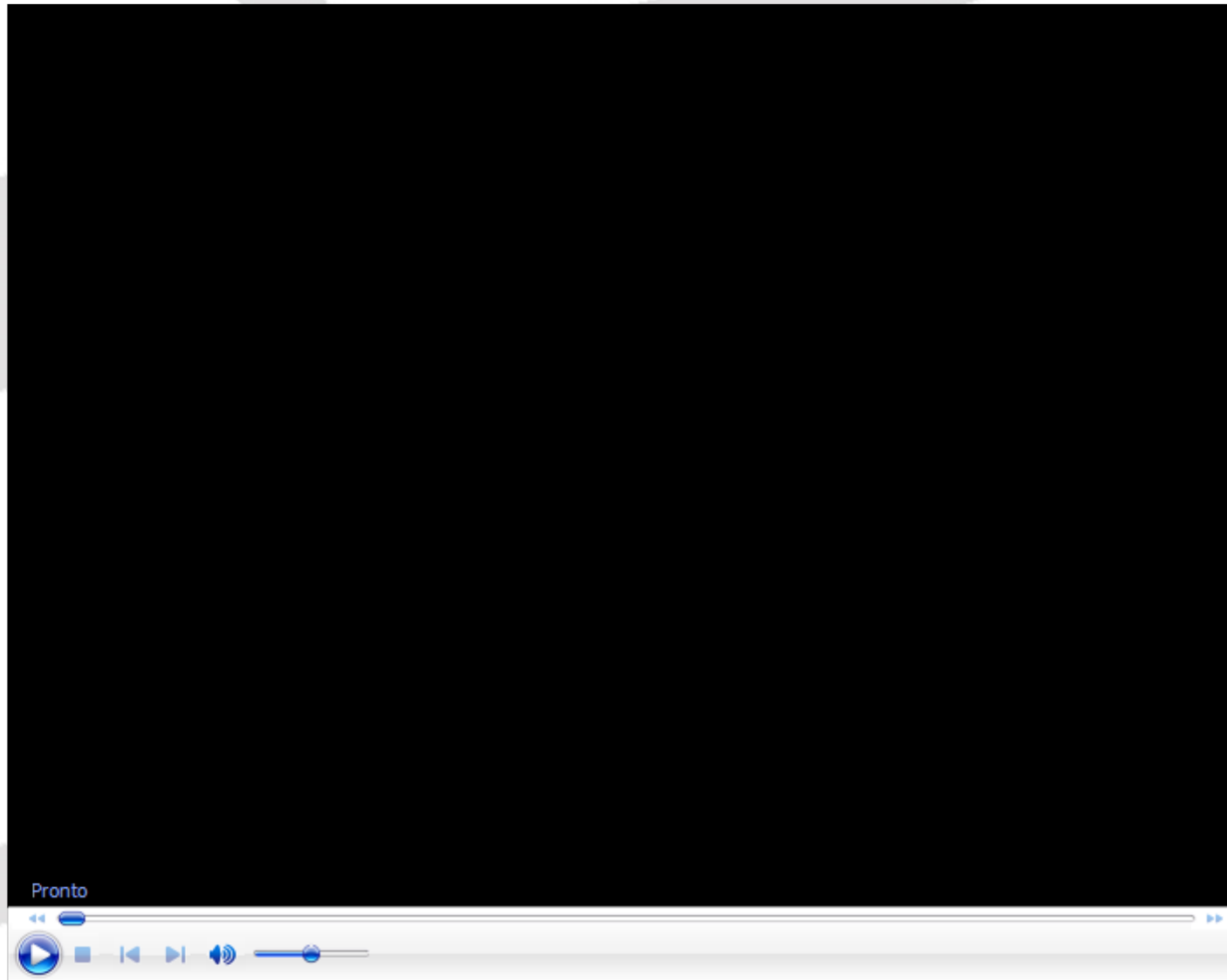
- 16g HIC row to row



Aircraft Seats — *Regulation & Safety*



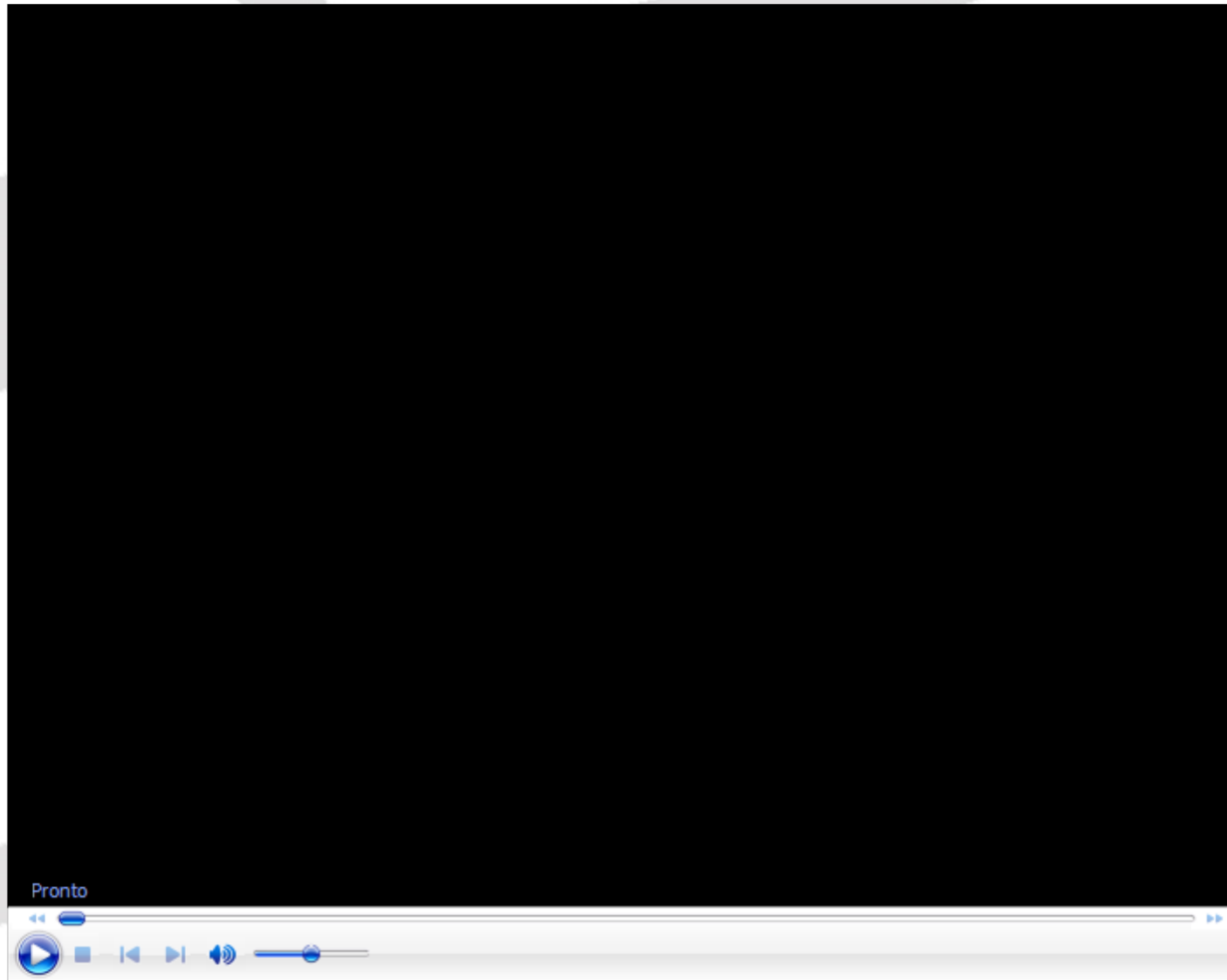
- 16g Hic front row



Aircraft Seats — *Regulation & Safety*



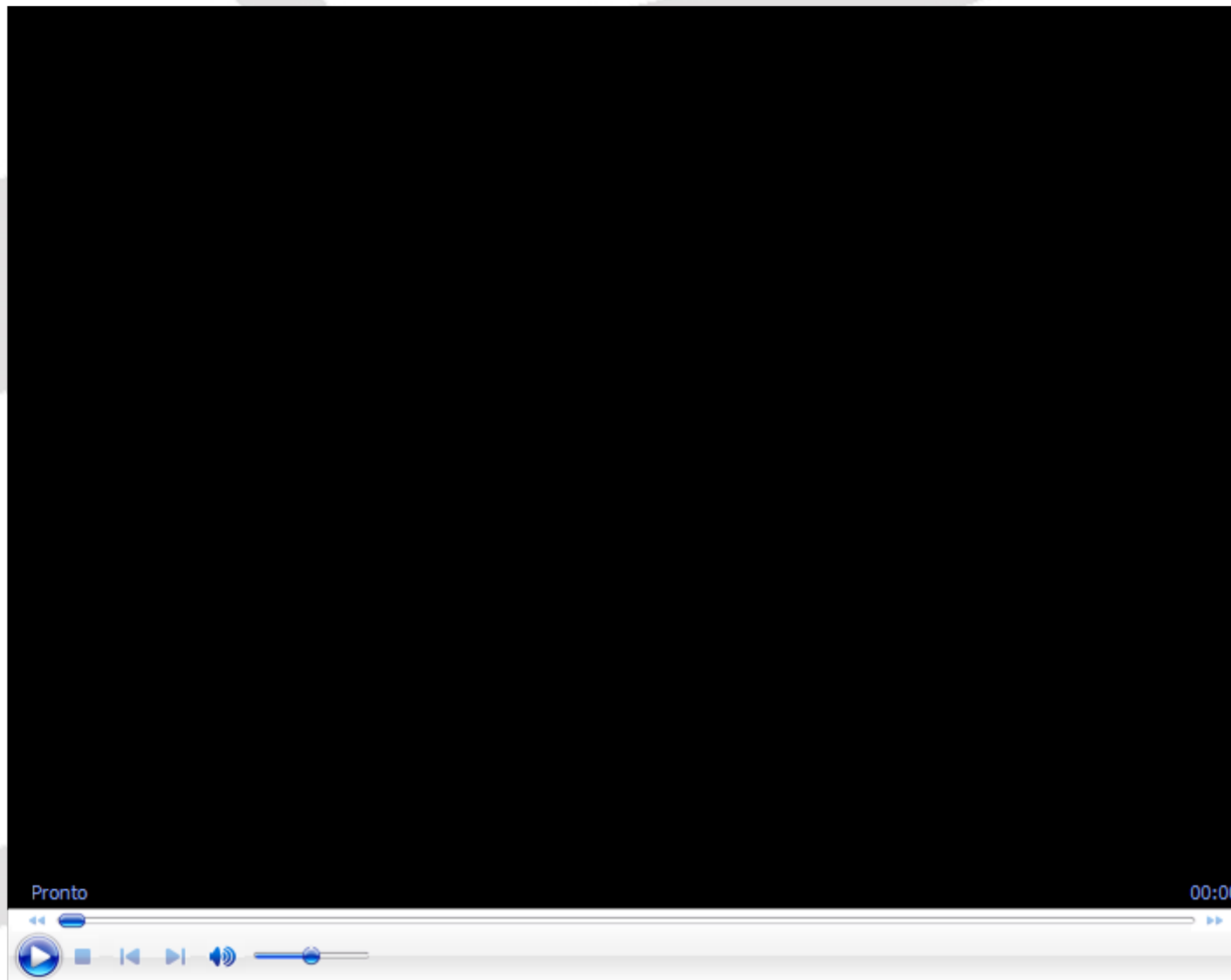
- 26g Forward (type 2) – CS 23



Aircraft Seats – *Regulation & Safety*



- 16g Forward (Type 2) – Airbag Deployment



Aircraft Seats – Regulation & Safety



Vertical 60 Test

according to 14 CFR 25.853(a) and App. F Part I(a)(1)(i);
CS 25.853(a) and applicable portions of App F to CS – 25;



Vertical 12 Test,

according to 14 CFR 25.853(a) and App. F Part I(a)(1)(ii);
CS 25.853(a) and applicable portions of App. F to CS – 25;



Smoke Density Test

according to 14 CFR 25.853(d) and applicable portions of App. F Part V; CS 25.853(d) and
applicable portions of App F to CS – 25 and
according to NTA 96053 or ASTM F814;



Heat Release Rate Tests

according to 14 CFR 25.853 (d) and App. F Part IV; CS 25.853(d) and applicable portions
of App F to CS – 25 and according to NTA 99350;



Toxicity Test

according to NTA 96054



Fire containment Test

According to CS.853 (h) and AC25-17A

**Misura della densità ottica
dei fumi e analisi della
loro tossicità** (FAR 25 / App.F,
ABD0031, BSS7239, ASTM E662



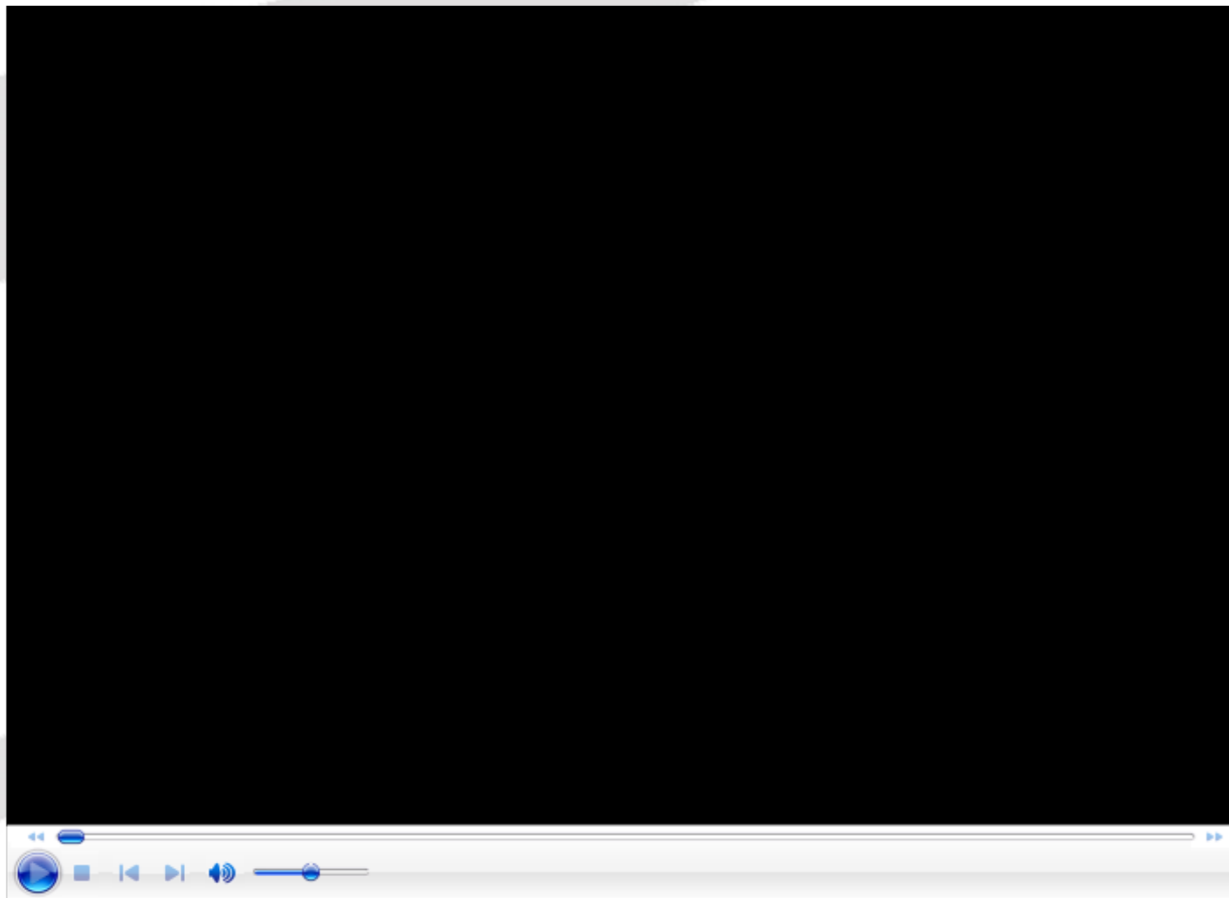
**Prove di estinguenza (small e
large part) mediante bunsen
verticale/orizzontale/45°** (FAR25
App.F)



**Prove di estinguenza
cushions di poltrone**
(FAR/JAR/CS 25 app F part II-
ABD0031)



Aircraft Seats — *Regulation & Safety*



A blue rounded rectangle with a subtle gradient and a thin white border, containing the word "Weight" in white. The rectangle is positioned in the center of the slide, overlapping a large, faint, light-gray background graphic that resembles a stylized 'G' or a winged figure.

Weight

Aircraft Seats — *Weight*



Optimitazion by means of FEA

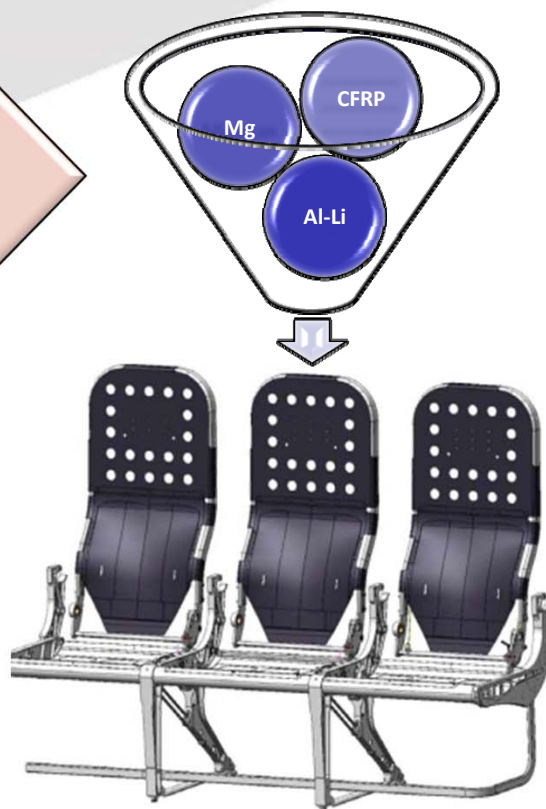
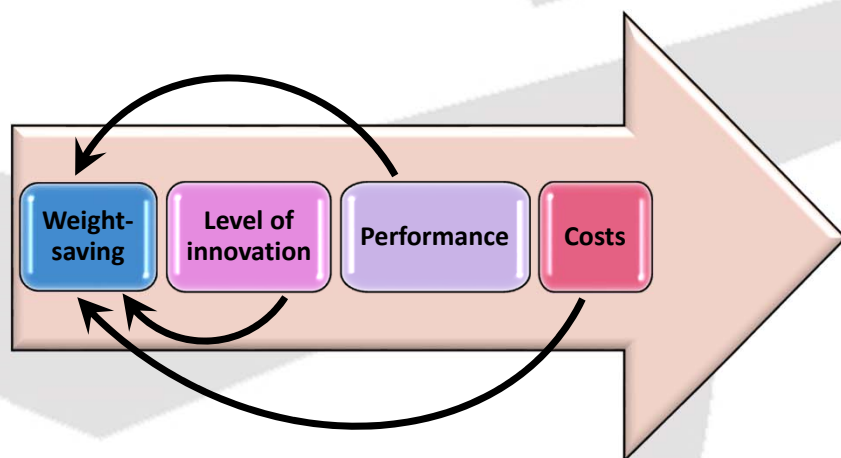


Artistic Design Integration



Aircraft Seats – *Weight*

• Materiali Innovativi



Aluminium Lithium:

- Weight saving of approximately 7-10%
- Higher stiffness 10-15%
- Mechanical properties possibly anisotropic
- Cost factor 3-5 to conventional aluminium

Magnesium:

- Weight saving of approximately 20 % compared to AL
- Material properties are in the range of AL 6060/6080
- Relative strength exceeds AL 2024, getting close to 7075
- Forgings, castings, plates available – raw material usage essential to get a benefit

CFRP:

- Use Composites for large surface parts, with distributed load introduction
- Avoid local high load introduction (lugs, rivets, etc.)
- Anisotropic layup for parts with clear load directions
- Parts subject to high deformations not suitable for composite application
- Susceptibility to impact damages (test with artificial damages)
- Backrest, Armrest, Shells, Tension rods (use UD-layers) are adequate for composite application

Avoid change of load direction



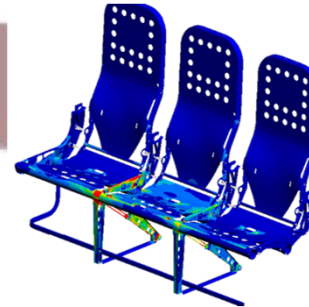
Aircraft Seats – *Weight*



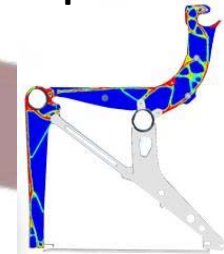
Baseline Model



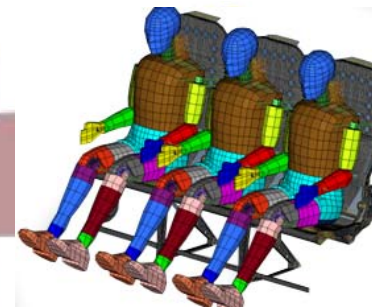
"Stress" Assessment



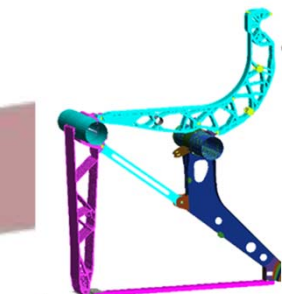
Topology&Size Optimization



- *Weight-saving*
- *Cost reduction*
- *Accelerated design cycle*
- *Part Design Optimization*

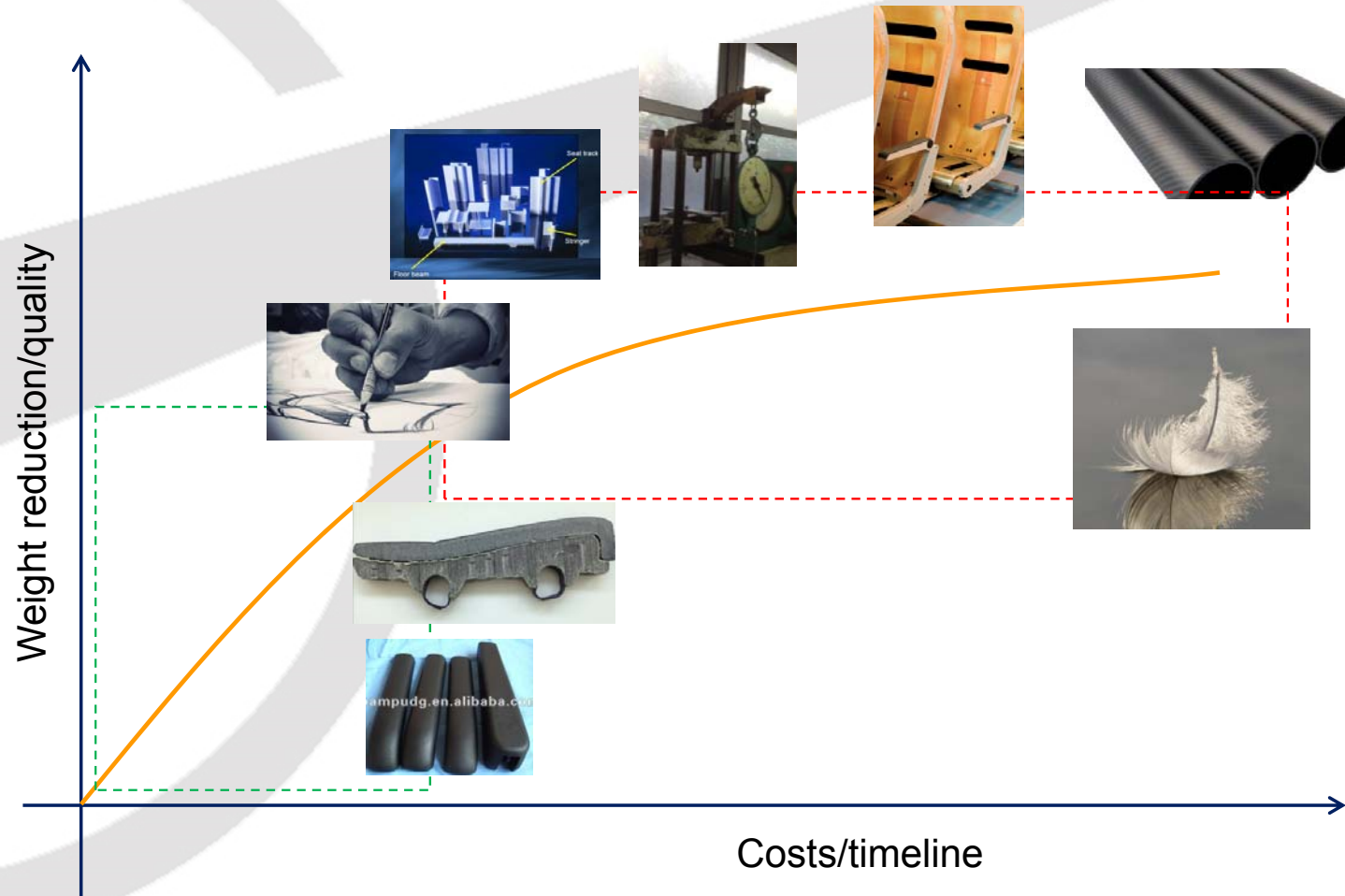


Validation of the new design



Conceptual Design Solution

Aircraft Seats – *Weight*



The background features a large, light gray, stylized graphic on the left side, resembling a large 'G' or a wing. A blue rounded rectangle is centered over this graphic.

Living space
& Comfort

Aircraft Seats – *Living space & Comfort*



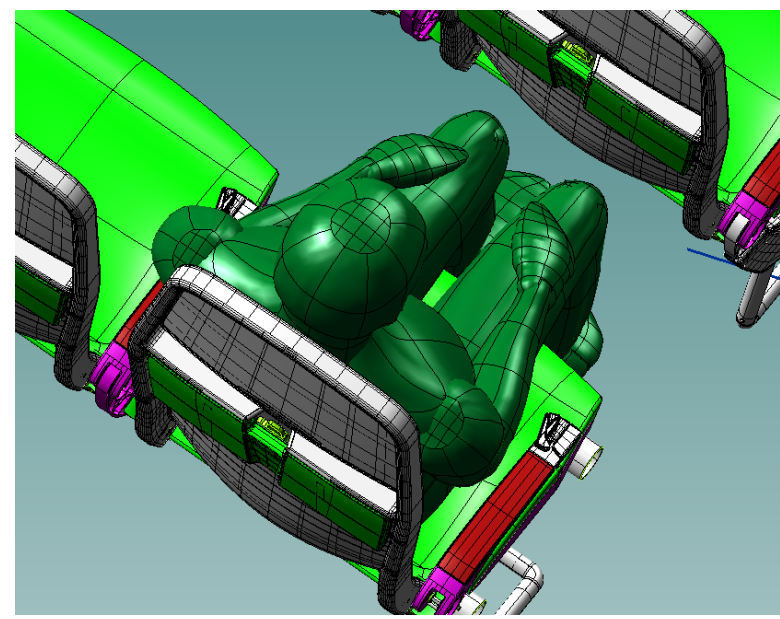
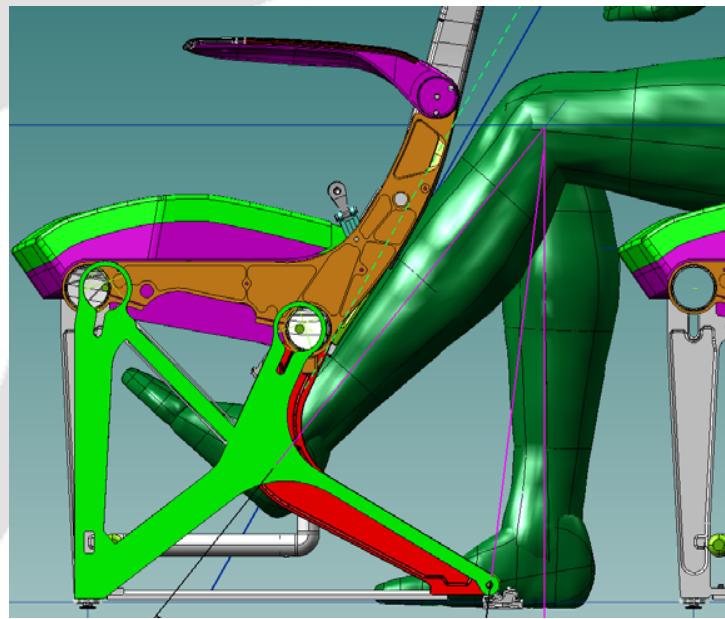
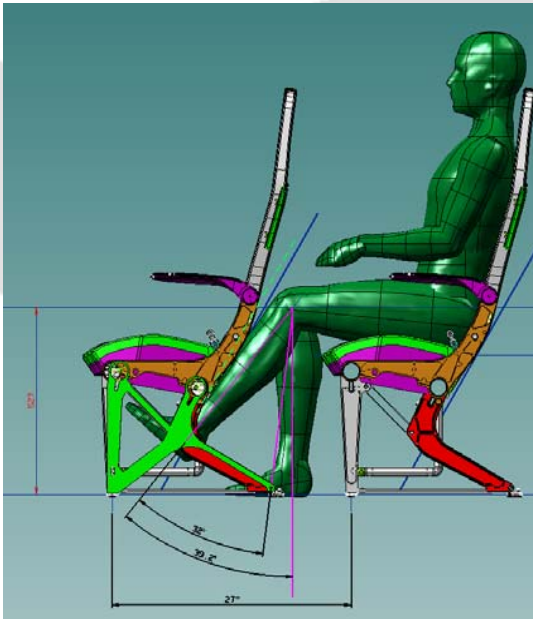
- COMFORT: come lo desidera il passeggero...



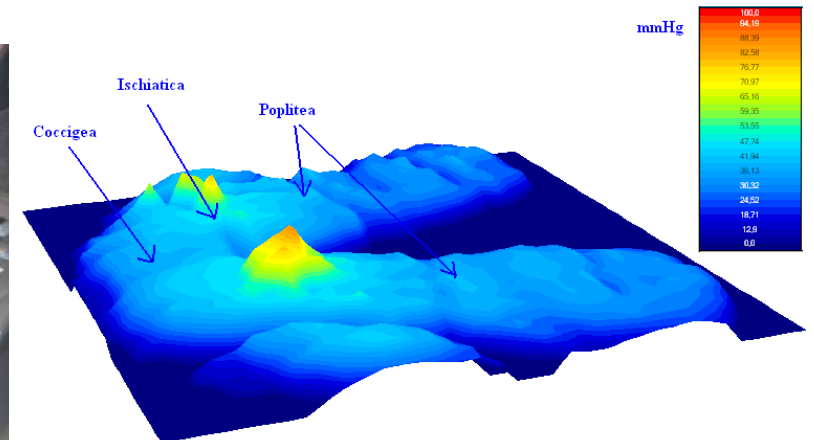
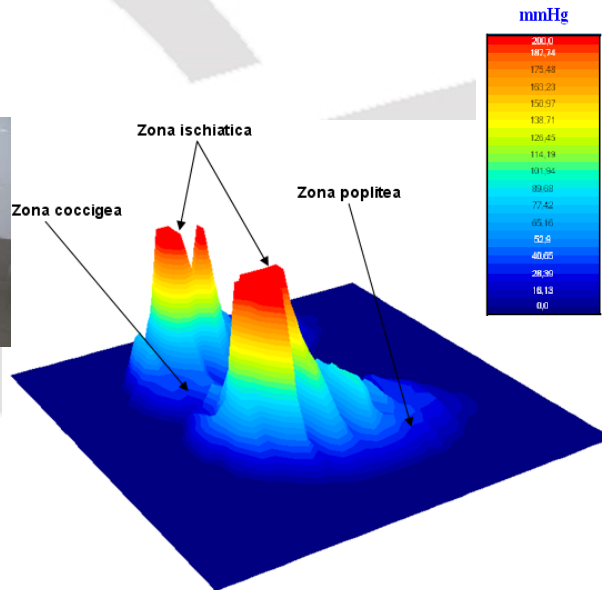
Aircraft Seats — *Living space & Comfort*



Aircraft Seats — *Living space & Comfort*



Aircraft Seats – *Living space & Comfort*



A blue rounded rectangle with a slight gradient and shadow, containing the word "Reliability" in white, bold, sans-serif font. The box is positioned in the center of the slide, overlapping a large, faint, light-gray background graphic that resembles a stylized 'G' or a large arrow pointing right.

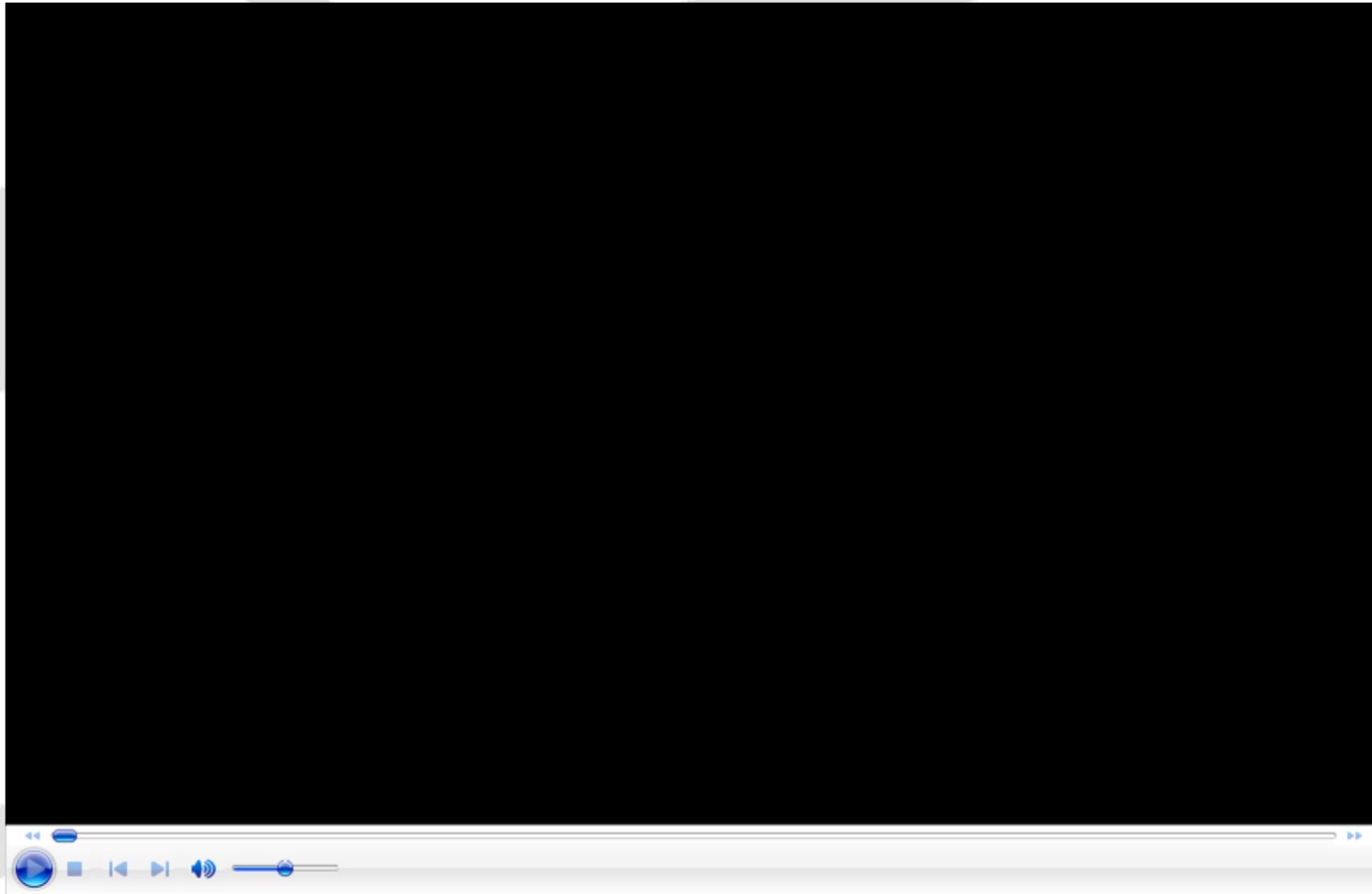
Aircraft Seats – *Reliability*



Aircraft Seats – *Reliability*

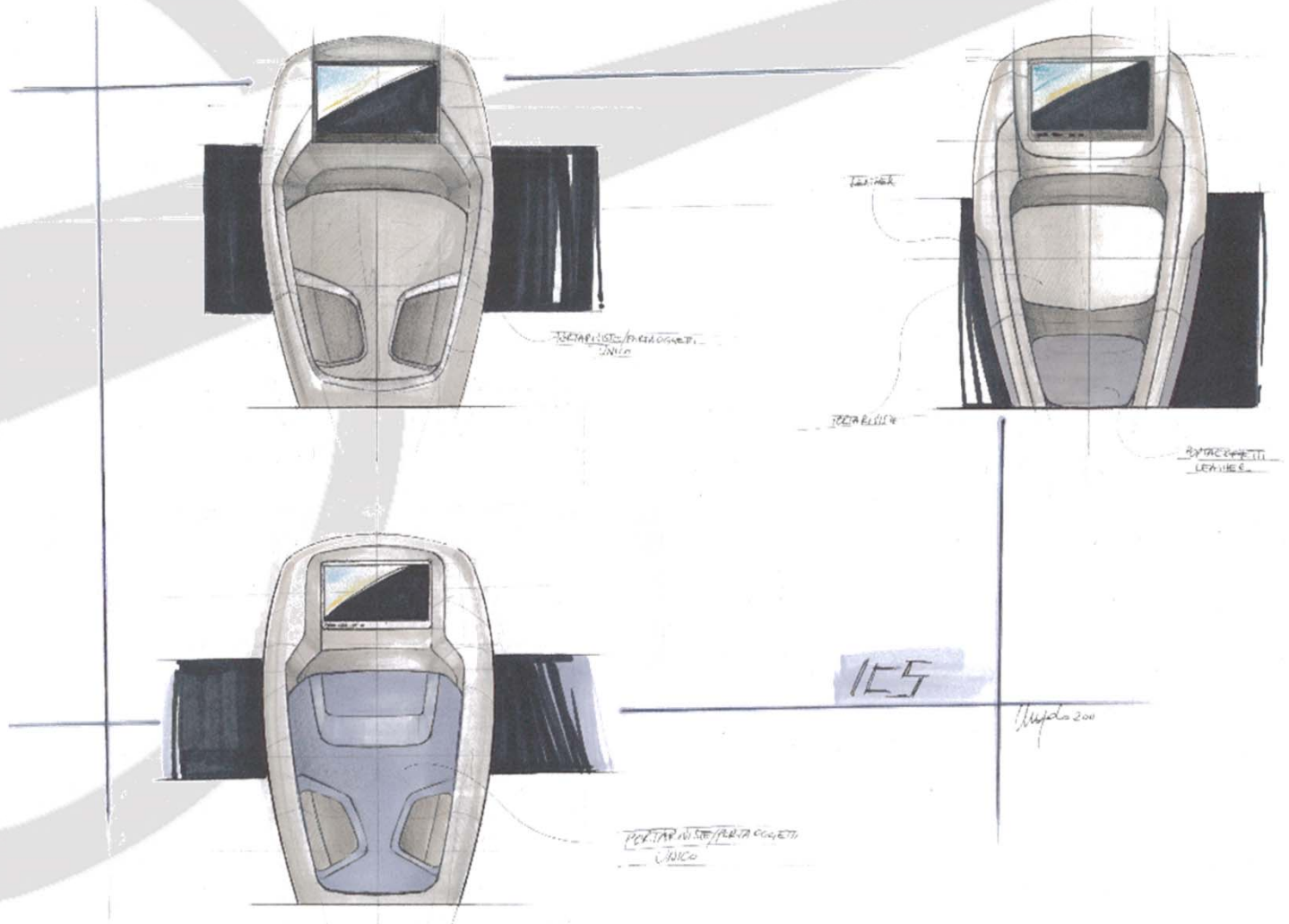


Aircraft Seats – *Reliability*



Styling

Aircraft Seats – Styling



Aircraft Seats — *Styling*



Aircraft Seats — *Styling*



Aircraft Seats — *Styling*



Aircraft Seats — *Styling*



Aircraft Seats – *Styling*



Interiors – *VIP Version*



Caratteristiche principali **Lavatory**

- Toilet Recirculating Type with external servicing panel
- Fresh Water System
- Waste System
- Electrical System
- Electrical Grounding Mass
- Smoke Detector
- ECS Ventilation
- Loudspeaker
- Removable Trash Container
- Fitting for Installation on A/C



Interiors –VIP Version



Caratteristiche principali **Galley**

- Hot Jug
- Cold Jug
- Hot Cup
- Half Size Trolley
- Convention Oven
- Refrigerator
- Misc. Stowage
- Drawers
- Electrical System
- Control Panel
- Work Light
- Water Faucet and Basin
- Working Table
- Foldable table
- Waste Container (removable)
- Fitting for Installation on A/C



Interiors –VIP Version

Caratteristiche principali **Wardrobe**



Interiors – *MILITARY Version*



Caratteristiche principali **Lavatory**

- Toilet Recirculating Type with external servicing panel
- Fresh Water System
- Waste System
- Electrical System
- Electrical Grounding Mass
- Smoke Detector
- ECS Ventilation
- Loudspeaker
- Removable Trash Container
- Water Heater System
- Tanks water level sensor
- Fitting for Installation on A/C

Interiors – *MILITARY Version*



Caratteristiche principali **Galley**

- Beverage Maker
- Convention Oven
- Refrigerator
- Misc. Stowage
- Electrical System
- Control Panel
- Work Light
- Basin
- Working Table
- Waste Container (removable)
- Fitting for Installation on A/C

Principali materiali utilizzati

- Honeycomb Sandwich : Flat or Formed Panel
- Alluminum Alloy : AA 2024, AA 7075, AA 2014 etc....
- Steel and Stainless Steel
- Polycarbonate Lexan : Termoformed parts
- Thermoplastic parts
- Extruded Decorative Profile
- Decorative Finishing : Film, Paint, Satin Finish and Deep Print

Interiors – *Lining Panel*



Sidewall

Ceiling



Interiors – *Sistemi pallettizzati*



VIP Module



FWD Module with Galley



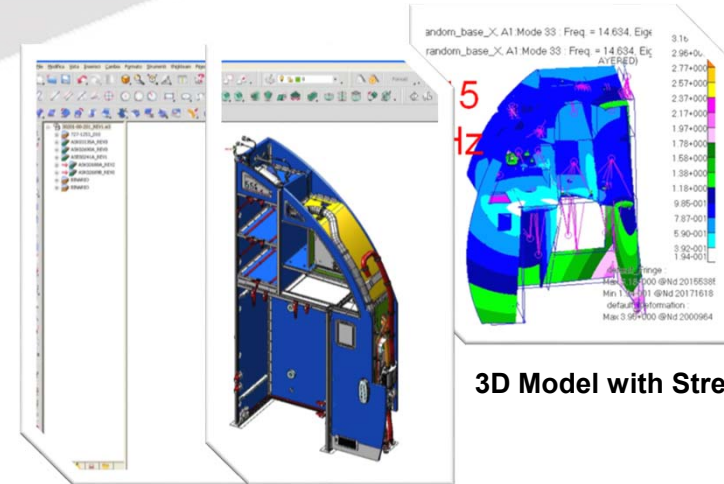
AFT Module



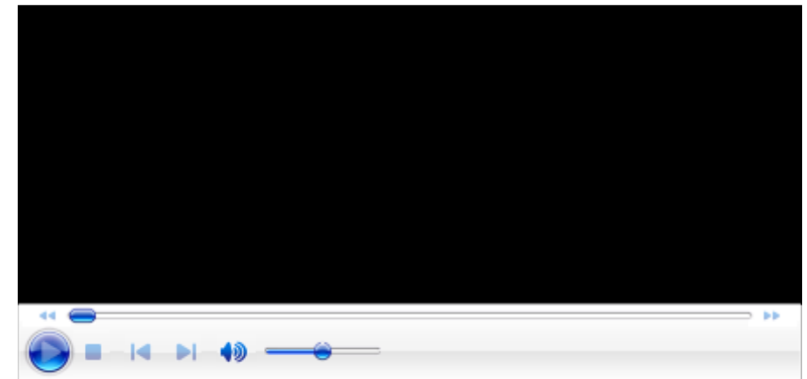
Attività correlate ai Prodotti – *Certifica/Qualifica e Validazione*



- Test Plans and Reports
- Stress Analysis
- Electrical Load Analysis
- Finite Element Analysis
- FMEA
- Weight and Balance Analysis
- Structural Test Plans
- Interface Load Analysis



3D Model with Stress Analysis



Design Validation with FEA approach



...Non chiamatela semplicemente sedia

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