

Plastics for Aircraft Interiors

Reduce Weight, Enhance Reliability,
Lower Maintenance Costs

Webinar Presented by Curbell Plastics



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PLASTICS

Today's Presenter:

Scott Reed, Senior Business Development Manager - Aerospace

With 18 years of plastics experience and a strong technical background in polymers, Scott specializes in helping aerospace manufacturers find the right materials to improve efficiency and safety.



Plastics for Aircraft Interiors

Improve Safety, Reduce Weight, Meet
Interior Regulations

Webinar Presented by Curbell Plastics



Recap: Previous Aircraft Applications Webinar

- Featured the 787 Dreamliner and its 25% weight reduction with plastics/composites - improved fuel efficiency and lowered operating costs
- Discussed:
 - Plastics vs. metals
 - Common aerospace plastic applications
 - Selection considerations
 - Growth of plastics in aviation

Agenda



- Plastics in aircraft interiors and safety standards
- Design freedom
- Unseen parts
- FAA Regulatory Compliance
- Testing methods



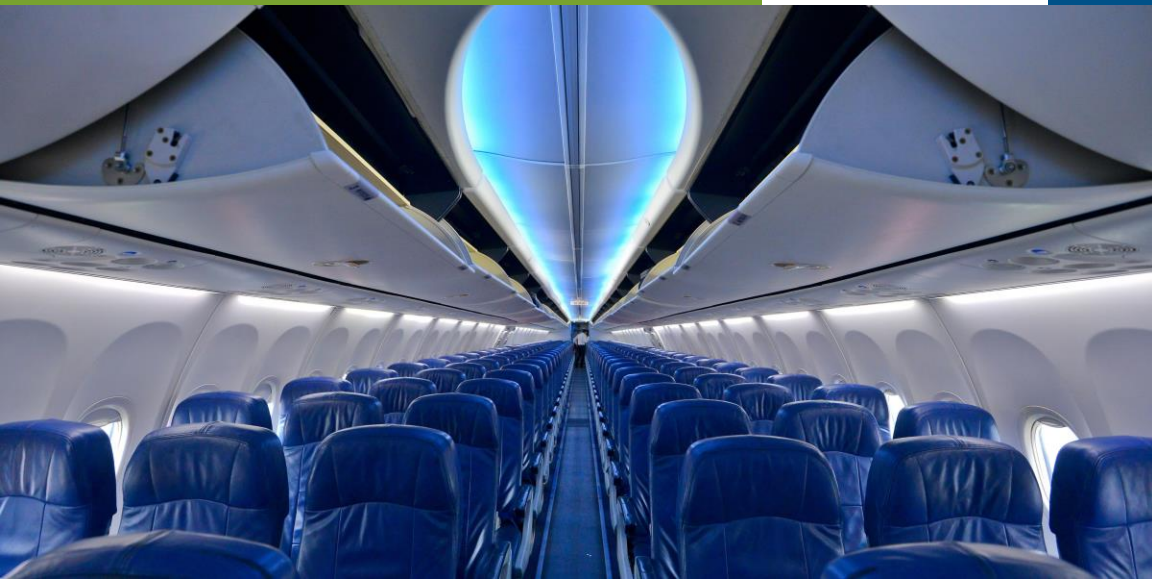
Plastics in Aerospace

According to Grand View Research Online*

- 2011 \$6.2B
- 2024 \$8.15B = 31% Growth
- Expected to grow through 2030 at 9.3% CAGR Approx. \$12.64B

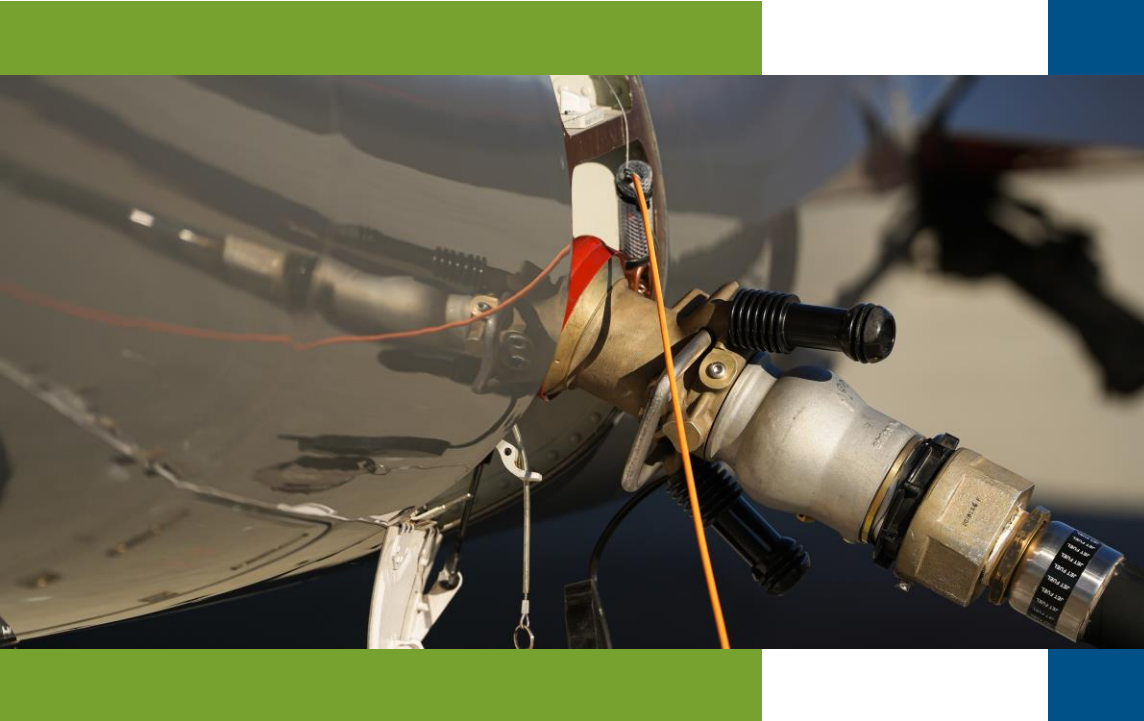
* **Source:** [Aerospace Plastics Market Size, Share, Growth Report, 2030](#)

Aircraft Interior Focus



- Cockpit
- Galley
- Lavatory
- Passenger seating area
- Windows and shades
- Latches – engineering plastics support

Market Drivers / Needs



Increased Efficiency

- Weight calculation x fleet x life
 - 1 kg or 2.2 lbs. weight savings = approximately \$98.12 per year in fuel savings per aircraft
 - A large commercial fleet of approximately 977 aircraft = \$97,825.64 savings in fuel per year
 - 11 years of operation saves approximately \$1,076,082.04 over life of fleet

Cockpit / Wiring



- PTFE and PEEK wire harness wrapping
- Mil Spec cast acrylic bezel
- Mil-P Poly 2000 acrylic windshields
 - Mil-P-8184
 - Mil-P-5424
- Radel® R for HUD
- TECANYL® VH2 PPE channels for instruments to slide in
- FR polycarbonate for visors



Galleys



- Silicone tubing for fresh water
- Nylon 6/6 drawer components and FST
- Acrylic/PVC & foams for carts
- Polycarbonate security mirror
- TECANYL® VH2 PPE drawer components and rub strips
- Vespel® locking fasteners



TECANYL® VH2 PPE

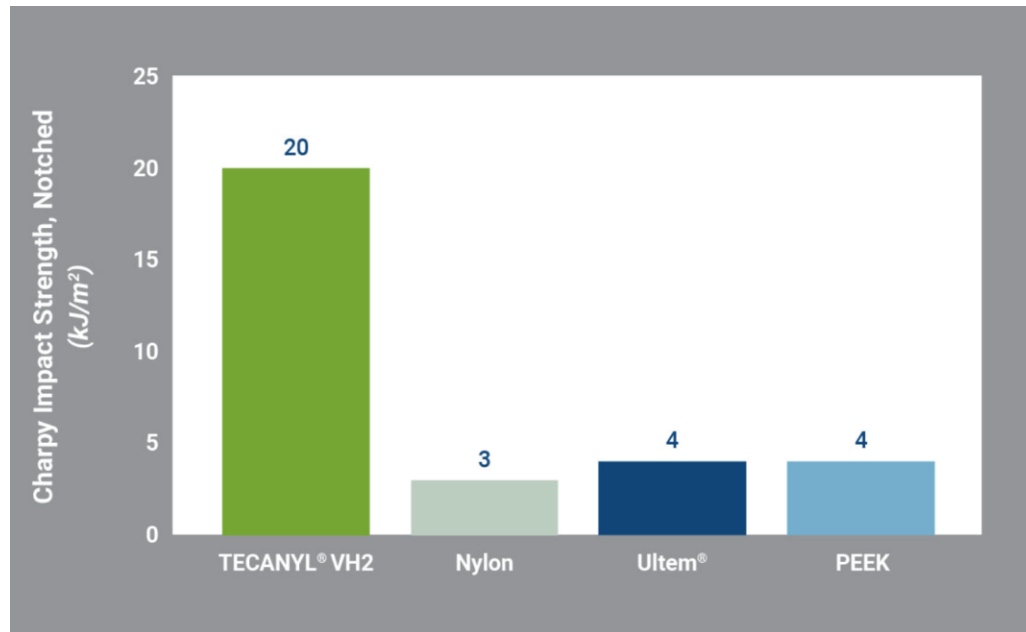


Benefits of TECANYL® VH2:

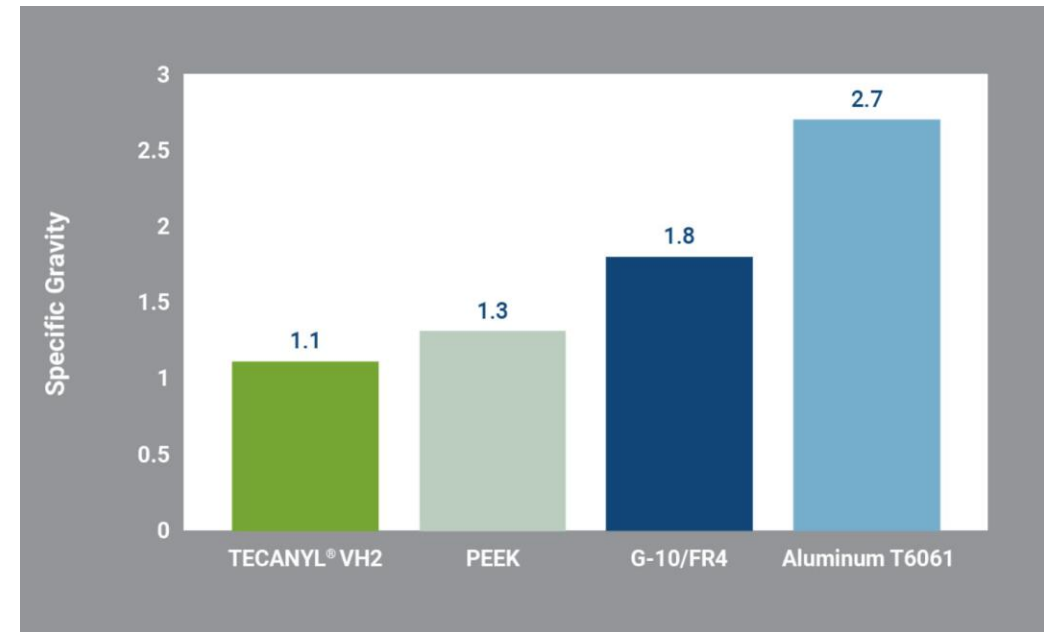
- Dimensional stability
- Toughness and durability
- Excellent flammability characteristics
- Lower cost than some other high performance polymers including PEEK and Torlon® PAI
- Lightweight, less than half the density of aluminum
- Can be recycled

TECANYL® VH2 PPE Comparisons

Charpy Impact Strength (Notched) of TECANYL® and Other Thermoplastics



Specific Gravity of TECANYL® and Other Materials



TECANYL® VH2 PPE Product Information: [Curbell TECANYL® VH2 Data Sheet](#), Article: [TECANYL® VH2 Aerospace-Grade PPE Thermoplastic](#)

Locking Fasteners



Vespel® advantages for locking fasteners:

- Torque retention
- High-temperature operation (up to 450°F)
- Reduced bolt damage from torque
- Good creep resistance

Galley Applications



Business Jet

- Tubing for fresh water
- Nylon rub strip would be better suited for TECANYL® VH2 PPE however under 17 Pass
- Urethane board build out



Lavatory



- FR polycarbonate for mirrors
- Acrylic/ PVC toilet shrouds
- PTFE ball valve seat
- Fresh water tubing
- FST foam for moisture barriers replaces paper honeycomb
- Antimicrobial



Passenger Seating Area



- Inner wall urethane foam FST
- Tooling – urethane foam
- Foam is also used for gap filler
- Nylon FST
- TECANYL® VH2 PPE – hidden supports

Passenger Seating Area



Acrylic PVC blends low MOQ custom options

- Seat shells / surrounds
- Armrest covers
- Seat backs
- Tray tables – antimicrobial
- Wall covering

In Flight Entertainment (IFE) & Monitors



Seat Backs

- Acrylic PVC
- PTFE gaskets
- Interconnects

Ceiling Mounts

- Motorized plastic gears
- Acrylic PVC housing
- Interconnects



Electronics



Several engineering plastics are used in this area especially for interconnects

- PEEK and glass-filled PEEK
- Ultem®
- Torlon® PAI
- PTFE for pins
- PPS
- TECANYL® VH2 PPE for panels, guides, and brackets

Lighting

- Signage
- FR Polycarbonate
- FR Frosted for lighting in older models



Interior Windows



- Outer pressure – resistant window
- Inner acrylic (Mil-P spec)
- Interior FR polycarbonate scratch layer or dust cover
- Acrylic Polycast® SolarControl™
*Studies with UV radiation on flight crew
- Acrylic PVC window shade UV block

* **Source:** [The Risk of Melanoma in Pilots and Cabin Crew: UV Measurements in Flying Airplanes - PMC](#)

Other



- Cradle covers and supports
 - Wall protection for installs using corner guards
 - Tapes, adhesives and films
- Custom cart protection
- Table protection for composite shops

Freighter Conversion



- Plastic rollers especially for threshold transition
- Vespel® locking fasteners
- FR polycarbonate lighting
- Thermosets in locking channels
- Acrylic PVC and FRP wall covering

Market Drivers / Needs Continued



- More capacity / weight (please, no more seats)
- Noise reductions
- Increased life of service
- Materials needed for:
 - Chemical resistance
 - Low MOQ
 - Temperature resistance and reliability
 - Fire resistance / non-smoke generating
 - Ease of manufacturing
 - Custom trendy choices



Critical Elements of Quality

Specifications

- ASTM
- Mil Spec
- FAR Specs – FAR 25.853
- Possible exceptions – Small Parts
- ABD 0031 – Airbus Smoke Toxicity
- BSS 7239 – Boeing Smoke Toxicity
- OSU 6565 / 5555 Heat Release Requirements
- FST – Flame Smoke Toxicity Compliance
- HIC Testing – Head Injury Criteria

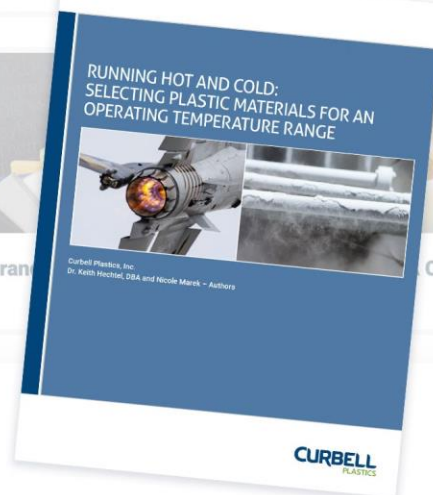
Material Selection Tools

Tools to help you select materials by plastic properties, chemical resistance, FDA compliance, brand, and more.

AGENTS, CONCENTRATION: WEIGHT-%	MATERIAL	ABS	Acetal (acetaldehyde)	Acetal (homopolymer)	Noryl	Nylon 6	PBT	PEEK	PET	Polybutylene	Polyethylene (homopolymer)	PPS	PPSU (molded R)	PSU (polysulfone)	PTE	PTFE	Ulen	Vespele SP-1
Acetamide 50%																		
Acetic acid, aqueous solution 5%																		
Acetic acid, aqueous solution 10%																		
Acetic acid, concentrated																		
Acetone																		
Ammonia solution 10%																		
Anone																		
Benzene																		
Benzine																		
Birumen																		
Boric acid, aqueous solution 10%																		
Butyl acetate																		
Calcium chloride, solution 10%																		
Carbon tetrachloride																		
Chlorobenzene																		
Chloroform																		
Citric acid, aqueous solution 10%																		
Clophen ASD, 50%																		
Capric sulphate 10%																		
Cyclohexane																		
Cyclohexanone																		
Decalin																		
Diesel Oil																		
Dimethyl formamide																		
Dioctyl phthalate																		
Dioxane																		
Edible fats, Edible oils																		
Ethanol 95%																		
Ethyl acetate																		
Ethyl ether																		
Ethylene chloride																		
Formaldehyde, aqueous solution 30%																		
Formamide																		
Formic acid, aqueous solution 10%																		
Freon, Freon, liquid																		
Fruit juices																		
Glycerine																		
Glycol																		
Glyoxalin, aqueous solution 40%																		
Heating oil																		
Heptane, Hexane																		
Hydrochloric acid, aqueous solution 2%																		
Hydrochloric acid, aqueous solution 36%																		
Hydrofluoric acid, 40%																		

Plastic Properties Table

Plastic Ma



Available at Curbell

- Material selector guides
- Chemical resistance data
- Plastic properties tables
- White papers
- Case studies
- Webinars
- Team of material and application experts to support you



Conclusion

- Thermoplastics continue to evolve and play a more critical roll in the construction and integrity of aircraft
- Weight and environmental considerations continue to drive innovation
- The current industry goal is a 10% weight reduction and 20% fuel savings
- With these types of initiatives, it is exciting to think how engineering plastics will be more and more relevant in the future of aviation

Thank you for your time today! Questions?



- Ask a Plastics Expert form on curbellplastics.com for help with your applications
- Ask about customized presentations
- Curbell Plastics toll free phone: 888-287-2355
- www.curbellplastics.com

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