



BOEDEKER PLASTICS, INC.

Solutions for the Aerospace Industry

Engineering Plastic Shapes & Precision Machined Parts

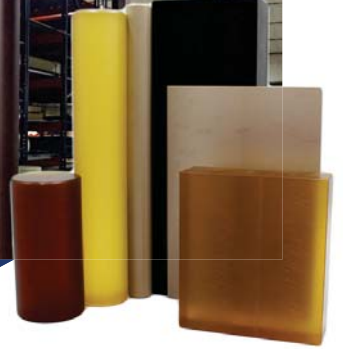
Lighter Weight & Higher Performance Materials



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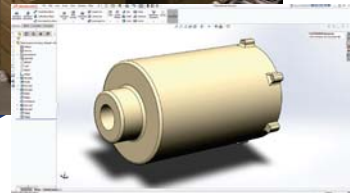


Aerospace Plastics & Composite Sheet, Rod & Tube

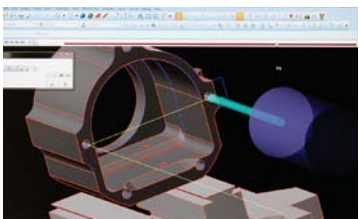
- American Owned & Operated
- 500+ Years Combined Plastics Experience
- High Performance Plastics
- Quadrant EPP Materials
- 10 Million Dollar Inventory
- Same Day Shipments & Cut to Size Service
- Entire Inventory is Coded for Full Traceability
- MFG. Certs. and C of C's Available Upon Request



Precision Machining & Technical Services



- 76 CNC Machines
- Prototype to Production Quantities
- Part Design Assistance
- Material Selection Services by Application
- Customer Inventory Programs | JIT Supply
- Specializing in Plastic & Composite Only Machining
- ISO 9001 & 13485 Certified | 21 CFR 820 Compliant
- ITAR Registered
- CAD Software | SOLIDWORKS & Pro/ENGINEER
- Metrology (CMMs, Vision Systems, and more)



Contact us, we stand ready to assist | 800.444.3485 | RFQ@BOEDEKER.COM

Serving the Aerospace Industry Since 1984

Plastics and composites offer significant advantages in the most challenging aerospace applications over traditional materials like aluminum, titanium and other metals. Offering significant weight reduction with a high strength to weight ratio, wide operating temperature range, improved chemical and corrosion resistance, lower friction and longer wear life along with many other advantages. Resulting in increased fuel efficiency, increased payload, and improved reliability with critical components.



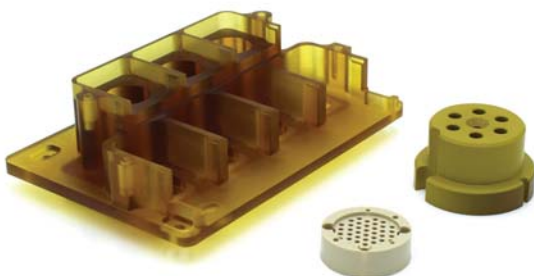
Commercial Aerospace Applications

- Interior Components
- Sensor Components & Housings
- Stand-Offs
- Wing / Control Components
- Electrical Connectors & Housings
- Wear Surfaces, Slide Pads, Rollers
- Bushings & Bearings
- Duct Seals & gaskets
- Pipe Brackets & More



Military & Defense | Space Applications

- Nacelle & Engine Components
- Fuel Components & Brackets
- Electrical Connectors & Housings
- Landing Gear Components
- Thermal Isolators
- Bearing Cages & Wear Strips
- Bushings & Bearings
- Seals & Gaskets
- Radomes & More





Propulsion

Challenge

Avoid abrasion of the metal engine housing caused by opposing expansion and contraction requirements due to extreme temperature differences between engine and nacelle housing. The nacelle houses the propulsion unit and engine.

Nacelle Wear Pads

Within this structure there is a requirement to compensate the differential expansion rate of the engine as it heats up and the nacelle as it is cooled by airflow.

This is achieved by the use of static wear pads that are fixed at certain locations within the nacelle structure.

The propulsion unit is then fixed in one area but allowed to expand against these wear pads in other areas.

The wear pad material needs to be extremely hard wearing, non-abrasive to contact surfaces, withstand vibrations and excursions to high temperatures, for short periods, during reverse thruster operations.



**Duratron® CU60 PBI
Nacelle Wear Pads**

Solution - Quadrant's Duratron® CU60 PBI

Key Requirements

- Avoid abrasion of the contact surface
- Excellent wear and frictional Properties
- Effective operation from $-40\text{ }^{\circ}\text{C}$ to $+300\text{ }^{\circ}\text{C}$
- Retention of mechanical properties for service life
- Low coefficient of linear thermal expansion

Result

- Duratron® CU60 PBI polymer wear pads protect expensive metallic or composite components from wear, even at high temperatures of more than $350\text{ }^{\circ}\text{C}$ the material maintains its excellent wear properties
- Good shock and vibration absorbing properties of Duratron® CU60 PBI help reduce noise
- Duratron® CU60 PBI noticeably extends service life between replacements compared to softer materials



Systems

Challenge

Provide new solution to reduce system complexity in wing flaps actuation and reduce maintenance and improve reliability. Flaps are devices used to improve the lift characteristics of an aircraft wing. They are mounted on the trailing edges of the wings of a fixed-wing aircraft to reduce the speed at which the aircraft can be safely flown and to increase the angle of descent for landing.

Wear Strip Supports | Aircraft Flap Mechanics

They shorten takeoff and landing distances by lowering the stall speed and increasing the drag.

They are normally actuated hydraulically, and consist of several moving parts. To monitor and maintain the operation of the moving parts, complicated mechanisms are installed, parts of which lubricate key areas to reduce wear and friction.

With the increase of high capacity airplanes with larger dimensions of the wings, the number and size of the flaps considerably grows, which again results in more complex systems and related costs.

In answer to the above demands the customer was looking for a simplified mechanism to ensure smooth and reliable movement of the flap with minimal amounts of auxiliary support and maintenance.



**Duratron® T4301
Wear Strip
Supports**

Solution - Quadrant's Duratron® T4301 PAI

Key Requirements

- Chemically resistant to aerospace fluids like fuel and Skydrol®
- Wear resistant in extreme temperature environments, between -60 up to 100 °C
- Low coefficient of friction for aerospace flap alloys
- Low abrasion when in contact with metals
- Minimum 20 years lifetime

Result

- Duratron® T4301 extended wear life and increased reliability results in higher flight safety
- Reduced complexity of the mechanism improved system reliability
- Reduced manufacturing and maintenance cost
- reduced weight



Duratron® is a registered trademark of the Quadrant Group. Skydrol® is a registered trademark of Solutia Inc.
NOTE: All information contained in this literature is intended for technical reference only and considered to be accurate for reference purposes only. Boedeker Plastics, Inc. makes no guarantee and offers no warranty for fitness in use and strongly recommends the user validate any plastic, machined part, or product in a specific application for fitness in use.



Interiors

Quadrant's New Nylatron® FST (Fire, Smoke, Toxicity)

For interior applications in aircraft materials must meet various requirements to be recognized. They must be lightweight, meet engineering demands, wear and design requirements, and in addition have fire-safety characteristics that meet aviation regulations and standards like FAR 25.853.

Meets FAR 25.853 Requirements

Its unique features make it the first engineering plastic product of its kind available as semi-finished shapes (rods and sheets).

Fire, smoke and toxicity (FST) retardant capabilities enable Nylatron® FST to withstand extreme temperatures up to 175 °C.

The material is particularly suitable for any kind application where metal parts (e. g. brackets, seal bushings, slide rails and duct seals) or high performance polymers have traditionally been specified.

Nylatron® FST offers engineers a safe material solution for critical aerospace interior applications.



**Nylatron® FST
Aircraft Interior
Wear Component**

Nylatron® FST - (Flame, Smoke, Toxicity) Retardant Grade

Key Benefits & Properties

- Reliable and constant flame, smoke and toxicity retardant compared to standard Nylon 66
- Balanced property profile
- Beneficial cost-performance-ratio
- Lightweight (60% weight saving compared to aluminum)
- Can withstand temps. up to 175 °C
- Friction & Noise Reduction
- Easy to machine
- Reduce wear on mating surfaces

Applications

- Brackets
- Slide Rails
- Seal Bushings
- Duct Seals



Structures

Challenge

Provide the customer with a true “one stop shop” solution, streamlining the existing time and resource consuming process with their current landing gear design.

Aircraft Landing Gear | Greaser Plug

The landing gear is a critical part of an aircraft, or spacecraft. Aircraft landing gear usually includes structure, actuating system, and the rolling assembly consisting of wheels, brakes, and tires.

On larger aircraft the landing gear is stowed away in the fuselage or wing compartments while in flight and therefore has to retract and extract from the undercarriage.

The system incorporates critical bearing joints that also mounts the landing gear to the undercarriage. The assembly consists of a bronze spherical bearing and a pintle pin which requires lubrication.

This internal lubrication is achieved by the use of a ‘greaser plug’ that fits within the pintle bore and facilitates the application of grease.



**Acetron® POM-H
Landing Gear
Greaser Plug**

Solution - Quadrant's Acetron® POM-H

Key Requirements

- Chemically resistant to the grease and other contaminants
- Material should not scratch the pintle bore
- Excellent machining properties to facilitate deep drill holes, combined with expert machining capability to drill deep & small diameters
- Must remain distortion free during assembly

Result

- Acetron® provided a weight savings of 5:1 compared to the alloy bronze system in replaced
- The new system reduced work in progress, simplified certification, reduced material cost and lowered overall costs significantly



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BOEDEKER PLASTICS, INC.

Invested in our personnel, facility, inventory, software and equipment to serve our customers with the highest levels of service and quality.

Headquartered in South Central TX with 100K+ square feet on a 21 acre campus



JIT PART INVENTORY SYSTEM



Some of the materials we stock and machine

QUADRANT ENGINEERING PLASTIC PRODUCTS

As an Approved Quadrant Aerospace Partner we stock and machine all commercially available Quadrant Engineering Plastic Products

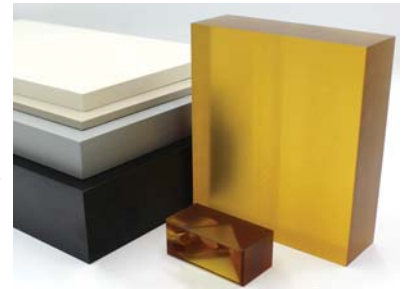
Acetron ® GP Grades
 Duratron ® CU60 PBI
 Duratron ® D7000 PI (Polyimide)
 Duratron ® D7015G PI
 Duratron ® T PAI (Polyamide-Imide)
 Duratron ® T4203 PAI (Electrical Grade)
 Duratron ® T4301 PAI (Bearing Grade)
 Duratron ® T5030 PAI (30% Glass)
 Duratron ® T7130 PAI (30% Carbon)
 Duratron ® U1000 PEI (Polyetherimide)
 Duratron ® U2300 PEI (30% Glass)
 Ertalylte ® PET-P (Polyethylene Teraphalate)
 Ertalylte ® TX PET-P (Bearing Grade)
 Fluorosint ® 135 PTFE
 Fluorosint ® 207 PTFE
 Fluorosint ® 500 PTFE
 Fluorosint ® HPV PTFE
 Ketron ® 1000 PEEK
 Ketron ® GF 30 PEEK (Glass Reinforced)
 Ketron ® CA30 PEEK (Carbon Reinforced)
 Ketron ® HPV PEEK (Bearing Grade)
 Nylatron ® FST - Flame, Smoke, Toxicity retardant for Aerospace Interior Applications
 Nylatron ® Extruded PA66 Nylon Grades
 Nylatron ® GS Extruded PA66 Moly Filled
 Techtron ® PPS Grades
 Techtron ® HPV (bearing grade PPS)
 TIVAR ® UHMW-PE Grades

Additional Materials

ABS (Acrylonitrile Butadiene Styrene)
 Acetal Homopolymer (Polyoxymethylene)
 Acetal Copolymer
 Boltaron ® PVC/Acylic Alloy Grades
 Celazole ® PBI (Polybenzimidazole)
 Celazole T-Series ® PBI-PEEK Blends
 Ceramic, Machinable
 CIP Composites™
 CPVC (Chlorinated Polyvinyl Chloride)
 Delrin ® (Acetal Homopolymer) Grades
 Delrin ® AF
 ECTFE (Ethylene-Chlorotrifluoroethylene)
 FEP (Fluorinated Ethylene Propylene)
 G-3 Glass-Phenolic Laminate
 G-5 Glass-Melamine Laminate
 G-7 Glass-Silicon Laminate
 G-9 Glass-Melamine Laminate
 G-10 Epoxy-Glass Laminate
 G-11 Epoxy-Glass Laminate
 G-30 Polyimide Laminate
 HDPE (High Density Polyethylene)
 Halar ® ECTFE (Ethylene-Chlorotrifluoroethylene)
 Kynar ® PVDF (Polyvinylidene Fluoride)
 LDPE (Low Density Polyethylene)
 Macor ® MGC (Machinable Glass Ceramic)
 Makrolon® PC (Polycarbonate)
 Nylon Type 6 (Cast) Grades
 Nylon Type 6/6 (Extruded) Grades
 PAI (Polyamide Imide)
 PAS (Polyarylsulfone)
 PBI (Polybenzimidazole)
 PEEK Grades
 PEEK HT (Hi Temp)
 PEI (Polyetherimide)
 PES CN (Conductive Polyethersulfone)

PETG
 PET-Polyester Film
 PFA (Perfluoroalkoxy)
 PI (Polyimide)
 PPO (Modified Polyphenylene Oxide)
 PPS (Polyphenylene Sulfide) Filled & Unfilled Grades
 PPSU (Polyphenylsulfone)
 PS (Polystyrene)
 PTFE (Polytetrafluoroethylene) Unfilled
 PTFE Bronze Filled
 PTFE Carbon Filled
 PTFE Graphite Filled
 PTFE Moly Filled
 PVDF (Polyvinylidene Fluoride)
 Phenolic C,CE (Laminates)
 Phenolic L,LE (Laminates)
 Phenolic X,XX,XXX (Laminates)
 Polyethylene (HDPE)
 Polyethylene (LDPE)
 Polyethylene (Pipe Grade)
 Polyethylene (UHMW)
 Polyketone
 Polyphenylene Sulfide (Unfilled)
 Polyphenylene Sulfide (Filled)
 Polyphenylsulfone
 Polypropylene
 Teflon ® DuPont™ PTFE
 Tefzel ® (ETFE)
 Torlon ® PAI Grades
 TF-60V PEEK-PBI (Glass-filled)
 TL-60 PEEK-PBI (Lubricant-filled)
 TU-60 PEEK-PBI (Unfilled)
 Udel ® Polysulfone
 UHMW (Polyethylene)
 Ultem ®
 Urethane

**Cut to Size
Same Day Shipping!**



**Licensed to Fly
Quadrant's Certified
Polymer Solutions
are AS9100C Accredited
ISO 9001
ISO 14001
OEM Approved
JAR/FAR 25.853 Tested**



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