

ADVANCING AIRCRAFT TECHNOLOGY

Marsh Brothers
Aviation



Engineer | Design | Manufacture

Company Overview

With over 30 years of experience in the general aviation market, **Marsh Brothers Aviation** (MBA) develops and manufactures specialty bearings, seals and engineered mechanical components for the general aviation aircraft industry. We are focused on the development of innovative high performance products and quality services. Our self-lubricating polymer components improve performance, increase life, decrease weight and reduce maintenance downtime and costs.



Mission

'Advancing Aircraft Bearing and Sealing Technology'

Marsh Brothers Aviation is an industry leader in the revolutionary use of non-metallic self-lubricating bearing and polymeric seal components in the aerospace industry. We apply our experience, creativity and resources toward developing a better way to design, manufacture and deliver innovative aerospace products, services and solutions to our customers across the globe.

Vision

'To develop better products for the Aviation industry'

At **Marsh Brothers Aviation** we believe there is a better way. We envision a world with no more grease. We are driven to replace all the metal bearing and rubber sealing components for all aircraft. If we can't make a better product than the part it replaces, we won't sell it!

"BELIEVE IN A BETTER WAY!"

Core Values

Everything we do at **Marsh Brothers Aviation** is based on six core values.

INTEGRITY – We practice the highest ethical standards, we honour our commitments and we take full responsibility for our products and services.

SAFETY – We value human life, quality of life, and work pro-actively to prevent all workplace injuries, incidents and near misses.

QUALITY – The products and services we provide are of the highest quality standards without exception. We strive for first-time quality and apply the principals of continuous improvement in everything we do. At every step of the manufacturing process we aim to meet or exceed the standards of excellence that are required of us.

CREATIVITY – We foster a culture of innovation, and believe in a better way. We apply these principles to build the unimaginable. Our creativity and innovations are driven by the need for practical solutions to real world problems.

TRUST, RESPECT & INCLUSION – We value the skills and strengths of our diverse team, we foster a culture of openness, and promote collaboration and fairness to engage all of our employees to find innovative solutions for our customers that advance our common business objectives.

COMMUNITY STEWARDSHIP – We are respectful and responsible to all our stakeholders, neighbours and citizens, and the diverse communities and customers we serve. We believe in protecting the environment, engaging academia, and serving charitable causes.

Marsh Brothers Aviation is further governed by corporate values as outlined in the *Thomson-Gordon Corporate Values and Culture Comments* document. www.thomson-gordon.com

Our History

Marsh Brothers Aviation is part of the Thomson-Gordon Group which was founded in 1911. This connection has provided access to superior engineering, manufacturing and state-of-the-art R&D facilities that encourage innovation and the delivery of high performance products and quality service.

The story of how **Marsh Brothers Aviation** came to be, is a story of how a young man got tangled up with his passion with airplanes. Although founder George A. (Sandy) Thomson began this venture in 1991, it began well before that. Like many of you, Sandy's passion began with one miniature model airplane, eventually transforming into his first flight.

To read more, please visit: www.marshbrothersaviation.com/pages/history

◀ 1911

Thomson-Gordon Group was established.

Marsh Brothers Aviation starts designing and manufacturing components to support the warbird collection at the Canadian Warplane Heritage Museum; comprising of mostly seals and bearings for landing gear and propeller regulator repair and overhaul.

Marsh Brothers Aviation acquires Lectron Avionics.

1993

1996

2000

1991

Thomson-Gordon Group acquires Marsh Brothers Aviation.

1995

Marsh Brothers Aviation acquires Cheyenne engine upgrade STC from Jim Christy to produce the "Super Cheyenne".

1999

Operations are relocated to Burlington, Ontario in Canada.



A V-35 Beech Bonanza was acquired to lead the launch of Marsh Brothers Aviation first STC project consisting of landing gear system grease-free bearings.

2010

2010

2014

Transport Canada approval was achieved as Marsh Brothers Aviation became an Approved Manufacturer of aeronautical products.

Transport Canada and FAA approvals were also realized for the first STC to provide grease-free bearings for the Beech, Bonanza and Baron landing gear door hinges.

Achieved Transport Canada approval as an Approved Maintenance Organization.

2016

2017

Achieved Transport Canada and FAA STC approval for the complete Aerostar aircraft landing gear (grease-free bushings, seals & hydromechanical components).

Achieved Transport Canada and FAA STC approval for the non-metallic piston and lip seal design for the Aerostar aircraft hydraulic accumulator.

The 1st Full Landing Gear Upgrade kit was sold overseas to an international customer.

2018

2020

AeroTough GF

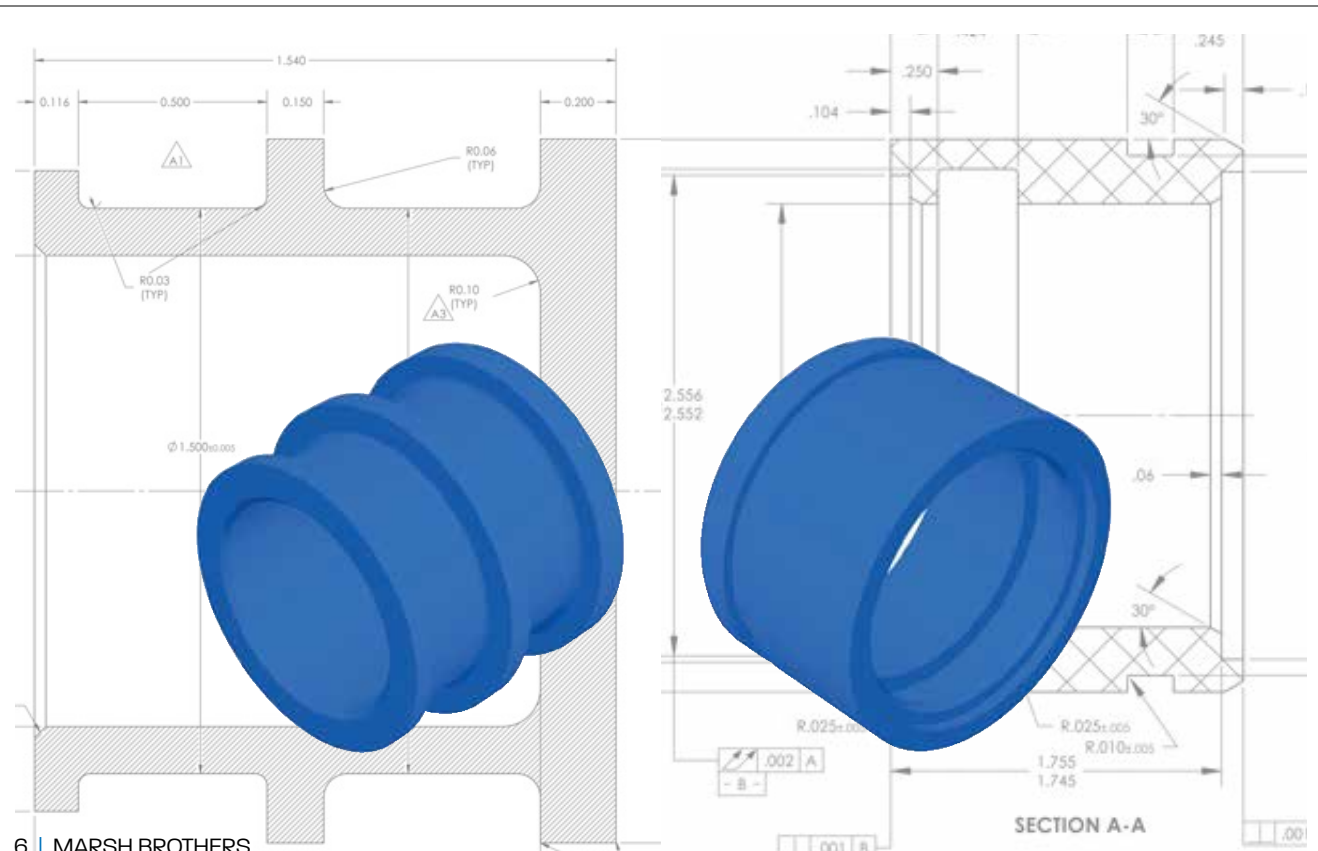
AeroTough GF is a proprietary non-metallic material that can replace existing metal bushings, providing a smooth grease-free operation. The lubrication is built into the polymer formulation, so no grease or oil is ever required for their operation. Our polymers will reduce your maintenance costs drastically, since no grease or oil is required, corrosion is eliminated and non-existent.

AeroTough GF is designed exclusively for aircraft and aerospace applications.

AeroTough GF comes from a long history of self-lubricating bearing applications developed by the Thomson-Gordon Group, a manufacturer of bearings, seals and engineered mechanical components for diverse global markets since 1911.

AeroTough GF is 1/7th the weight of equivalent bronze or steel parts, which provides additional savings through reduced fuel consumption. Contamination of the environment is eliminated and engine carbon emissions are reduced through improved energy efficiency.

Marsh Brothers Aviation's goal is to continuously develop and improve bearing technologies that will outlast all others. Replacing OEM parts with AeroTough GF bushings and Thorseals will reduce wear, weight, maintenance costs and corrosion, and will provide aircraft owners with a long life, maintenance free choice.



Features & Benefits

AeroTough GF Bushings for Dynamic Joint Applications

Eliminates the Need to Grease

AeroTough GF has its lubricant built in. During initial operation a thin film of material is transferred to the moving element (i.e. pin or bolt, etc.). Once this transfer has occurred, wear and friction stabilizes.

Zero Risk of Galvanic Corrosion

Replacing the metal bushing with a non-metallic bushing eliminates the risk of galvanic corrosion between the bushing and the housing, and the bushing and the pin. Use of corrosion inhibiting compounds to protect remaining metallic hardware from environmental corrosion is still required.

Reduces Maintenance Costs

By upgrading your landing gear to AeroTough GF, this ensures you will never have to spend money on repairs as a result of seized bushings.

Improves Aesthetic Appearance of your Aircraft

Excess grease makes landing gear appear dirty and grimy.



Provides a Smooth Operation

AeroTough GF is a non-metallic material. The risk of metal-to-metal contact (as typically seen with displaced grease or aged grease) is completely eliminated.



AeroTough GF will Never Seize

Use of the AeroTough GF polymer eliminates the risk of a seized joint due to inadequate greasing.



Reduces bushing weight by 1/7th compared to Bronze

In the case of an AeroStar aircraft this equates to a 12lbs weight reduction.



Current GA designs mostly date back 55-60 years.

Utilizing the latest materials technology development enables vintage aircraft to be updated instead of using traditional PMA after-market parts.

Aerostar Products

Landing Gear Upgrade Kit (M1003)

Avoid unnecessary and costly repairs by installing AeroTough GF polymer bushings and seals. This preventative maintenance solution will ensure that you will never have the complications associated with seized traditional metal bushings that traditional metal bushings can exhibit.

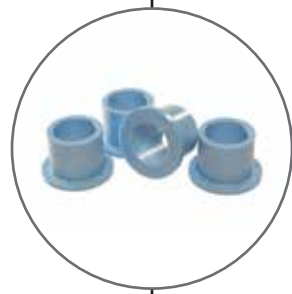
- ✓ Eliminate anxiety about damages to the supporting structure
- ✓ Never worry about lubricating tough-to-access locations
- ✓ Reduces the risk of corrosion between pin and bushing



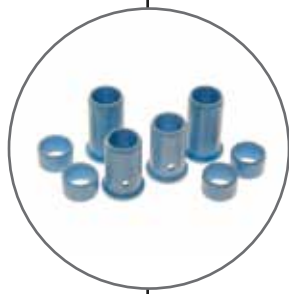
Maintenance Free

“After over a handful of inspections on the upgraded greaseless landing gear components every 25 hours, there were no issues. It’s nice to have peace of mind that I will not have to worry about my mechanics getting grease in all the pin point fitting. It’s much easier to keep everything clean. Going greaseless will produce significant cost savings as well.”

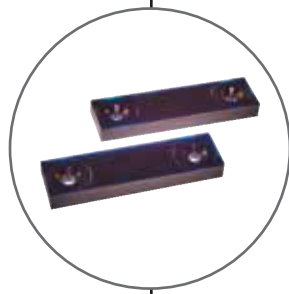
– J. Mullen



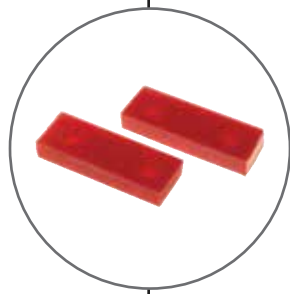
MLG Trunion Bushing Kit
(M1007)



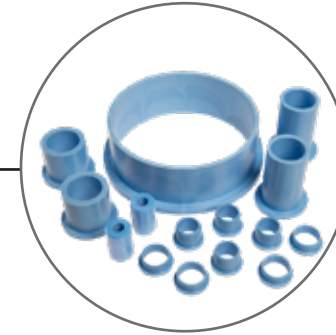
MLG Side Brace Bushing Kit
(M1008)



MLG Lower Bumpers (Blue)
(M1018)



MLG Upper Bumpers (Red)
(M1019)



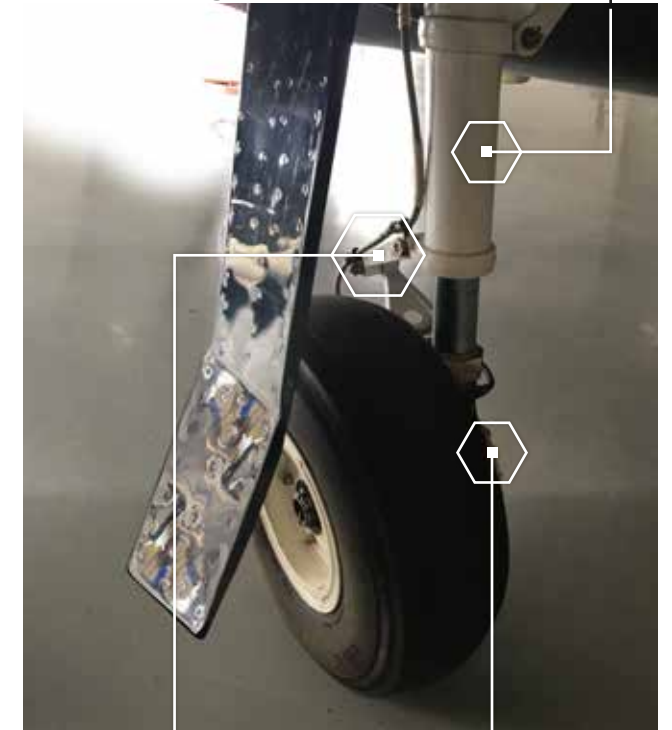
Wiebel NLG Bushing Kit
(M1012)

Nose Landing Gear (NLG)



MLG Oleo Kit
(M1004)

Main Landing Gear (MLG)



Wiebel NLG Torque Link Bushing Kit
(M1011)



Wiebel NLG Oleo Kit
(M1010)



MLG Torque Link Bushing Kit
(M1009)



Brake Bushing Kit
(M1006)

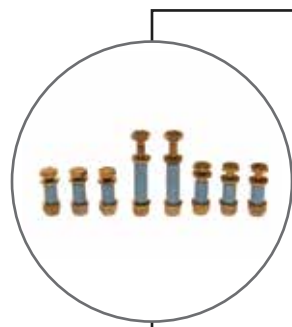
Bonanza/Baron Products

MLG & NLG Door Hinge Kits

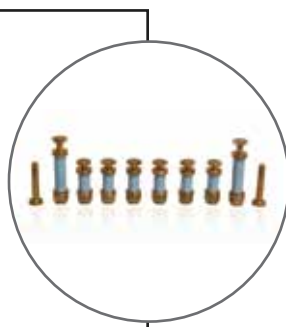
An essential part of your landing gear maintenance checklist is the need for periodic lubrication of hard to access door hinge bushings. Achieving proper lubrication is challenging because access is difficult. If these bushings are not lubricated regularly, corrosion will result. This could lead to an inoperable gear door or even damage to the aircraft structure.

Solution:

AeroTough GF polymer bushings can be easily installed and will provide smooth grease-free operation. AeroTough GF bushings are self-lubricating, so they will never require lubrication.



Bonanza MLG Door Hinge Kit (M1000)



Baron MLG Door Hinge Kit (M1001)



NLG Door Hinge Kit (M1005)



Door Hinge Bushing Installation Kit (M1002)

First Ever Grease-Free Landing Gear

Jimmy Mullen fell in love with Aerostars a long time ago. The relationship between Jimmy Mullen and Marsh Brothers Aviation was an obvious one. Jimmy was the ideal source for providing Marsh Brothers Aviation with a supply of landing gear.

A complete set of landing gear units were overhauled and upgraded for Jimmy's aircraft. An aircraft painter from a previous life, Jimmy chose to repaint and refit his 601P with a gear set previously supplied to Marsh Brothers Aviation from another Aerostar.

In June of 2017, Jimmy completed his paint work and stripped the gear from his airplane. The conversion required the removal of all bronze alloy OEM bushings, replacing them with Marsh Brothers Aviation AeroTough GF, which included the airframe trunnion bushings. Jimmy's aircraft no longer requires periodic greasing of its landing gear joints.

To read the full story, please visit:
www.MarshBrothersAviation.com



Quality

Marsh Brothers Aviation quality assurance program is consistent with the ISO9001:2008 standard and recognized by Transport Canada under our certifications as an Approved Manufacturer as an AMO (Approved Maintenance Organization). The US Federal Aviation Administration recognizes a Canadian AMO as equivalent to Part 145 Repair Station status. We are dedicated to the continuous improvement of our Quality Assurance Program processes to ensure that we continue to meet the requirements of our customers to the fullest.

Applications Engineering

Marsh Brothers Aviation engineers work closely with customers to provide innovative product solutions and designs. We maintain in-house design, CAD/CAM and proprietary design tools to correctly size custom seals. Our decades of experience enable us to offer the right technical support over the entire product lifecycle.

Research & Development

Marsh Brothers Aviation maintains extensive in-house new product development laboratory capabilities as well as established relationships with academic institutions, offering Marsh Brothers Aviation a diverse and powerful R&D resource pool.



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