

Shell Aviation



AEROSHELL GREASE



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The AeroShell portfolio of aviation oils, greases and fluids is one of the most trusted and extensive in the industry. Its grease range includes advanced multipurpose products and specialist greases with high-load carrying, extreme-temperature and corrosion-inhibition properties. Together with AeroShell turbine and piston engine oils, and fluids, these products fulfil a wide spectrum of aviation fluid and lubricant needs.



"IN MANY YEARS OF USE, WE HAVE NEVER HAD A GREASE-RELATED PROBLEM WITH AEROSHELL GREASE 33 AND AEROSHELL GREASE 33MS.¹ WE CONTINUE TO USE THESE PRODUCTS BECAUSE OF THEIR CORROSION AND WEAR PROTECTION, AND GREAT OVERALL PERFORMANCE."

Sello Douglas Maroleni, Senior Manager, South African Airways Technical

¹AeroShell Grease 33MS has been renamed AeroShell Grease 64

UNDERSTANDING YOUR NEEDS

Reducing operating costs

Are your operating costs too high? Poorly performing greases can lead to high component replacement costs, grease consumption and maintenance requirements.

AeroShell specialist and multipurpose aviation greases are designed to cut your operating costs by helping to protect components from wear. The greases also perform for longer and thus help to reduce grease consumption.

Simplifying maintenance

Do you spend too much time and money on maintenance or manage a large grease inventory? Are you concerned about the risks of product misapplication?

The AeroShell grease portfolio contains products designed to help reduce costs and improve safety by simplifying maintenance. These multipurpose greases satisfy a wide range of performance specifications, which means you need fewer grease types. The result is simpler maintenance procedures, smaller inventories and reduced risk of product misapplication.

Giving you peace of mind

Are your greases approved by aircraft manufacturers and flight proven? Do they meet or exceed minimum standards?

AeroShell greases are designed to give you peace of mind. They are widely approved by manufacturers, meet or exceed industry standards, and have provided many decades of trouble-free performance. For example, in June 2015, AeroShell Grease 33 celebrated two decades of service and has more in-service time than any other grease in its class. It is also approved by leading airframe manufacturers and is a factory-fill product for equipment manufacturers, including Boeing.

Wide distribution network

Can you guarantee having the right lubricants where and when you need them? Do you have local support in aircraft on-ground situations? Are your logistics and inventory costs too high?

Shell Aviation has a reliable global distributor network built to match your operational footprint and supported by blending plants and Shell's global supply chain.

GREASES

UNIVERSAL AIRFRAME

AeroShell Grease 33

- Simplified inventories
- Easier maintenance
- Lower labour costs
- Less misapplication risk

EXTREME PRESSURE

AeroShell Grease 64¹

- Extreme protection – 5% molybdenum disulphide
- Excellent corrosion and wear protection
- Proven AeroShell Grease 33 technology

VERSATILE MULTIPURPOSE

AeroShell Grease 22

- Severe operating conditions
- Long component life
- Versatile

MULTIPURPOSE HELICOPTER

AeroShell Grease 14

- Outstanding fretting and corrosion protection
- Wide temperature range
- Approved by leading helicopter manufacturers
- Calcium soap thickener

GENERAL-PURPOSE AIRFRAME

AeroShell Grease 6

- Use in anti-friction bearings, gearboxes and plain bearings
- Good water resistance
- Low noise capability
- Mineral-oil based
- Microgel[®] thickener

ADVANCED MULTIPURPOSE AIRFRAME

AeroShell Grease 7

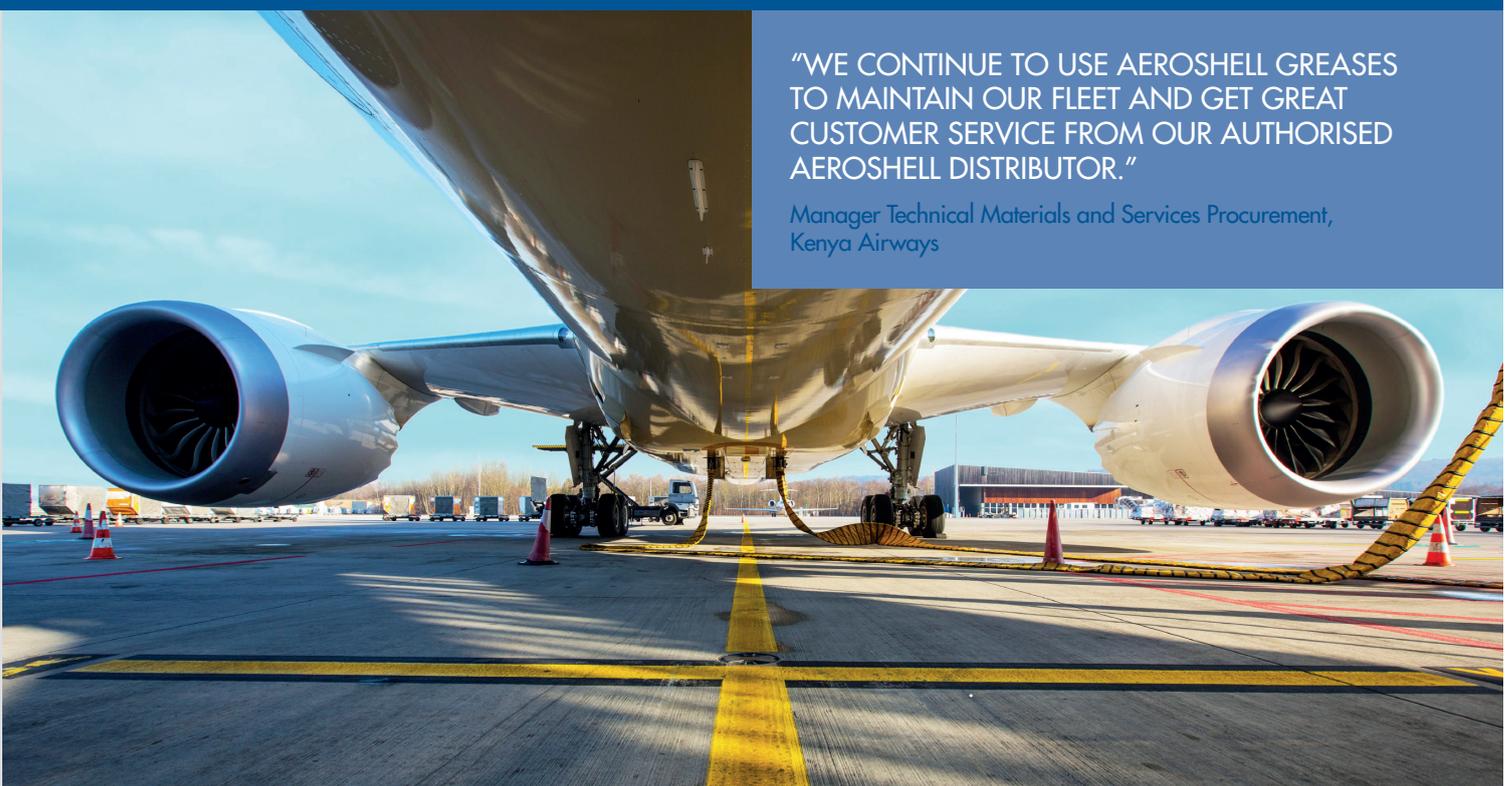
- Good corrosion protection
- High load-carrying capacity
- Wide temperature range

WHEEL BEARING AND ENGINE ACCESSORY

AeroShell Grease 5²

- High load-carrying capacity
- Good water and heat resistance

¹Formerly AeroShell Grease 33MS
²AeroShell Grease 5 will remain available in the Americas only. In all other regions, AeroShell Grease 22 replaces AeroShell Grease 5.



EXTENDING COMPONENT LIFE

The right grease can help to reduce operating costs by protecting components from wear. Take wheel bearings for example. During a long flight, aircraft wheel bearings can become extremely cold. They are motionless until the instant the aircraft's wheels touch the tarmac, when they rapidly accelerate to high speeds, become very hot and are often subjected to rain and runway de-icing fluids. The bearings may then sit in this hot, wet, corrosive environment over night before a similar experience on the next flight.

AeroShell Grease 22 is designed to protect aircraft wheel bearings operating in these severe conditions. It can help to extend component life and reduce maintenance costs through its excellent load-carrying capacity and resistance to wear, corrosion, oxidation and water washout.

INNOVATION YOU CAN TRUST

Shell is at the forefront of grease innovation and has a strong record of pioneering and rigorously testing new grease technologies for aviation applications.

For example, we introduced Microgel[®], an inorganic grease thickening agent based on hectorite clay. This technology is at the heart of AeroShell Greases 5³, 6, 7 and 22. When compared with conventional clay thickener, Microgel has

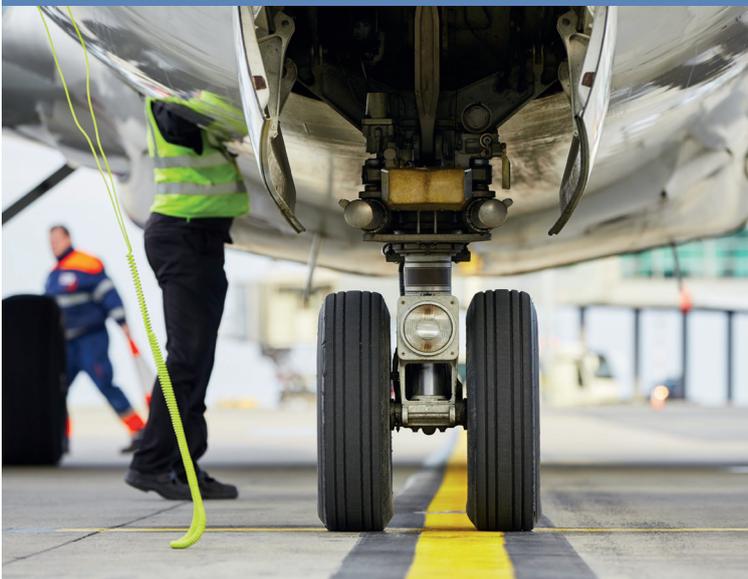
- no melting point within any usual temperature range to which aircraft greases are likely to be subjected
- very little change in consistency with temperature
- extremely good load-carrying capacity without needing extreme-pressure additives
- excellent water resistance through exclusive waterproofing agents developed by Shell
- low oil separation or bleeding thanks to its high gelling efficiency.

In the 1990s, we launched AeroShell Grease 33, the first aviation grease manufactured by Shell to use lithium-complex thickener technology for improved high-temperature and mechanical properties. Like all AeroShell greases, this product was rigorously tested in the laboratory and evaluated in the air to give customers confidence in its performance.

³Only available in the Americas

"S7 ENGINEERING IS ONE OF RUSSIA'S LARGEST MAINTENANCE, REPAIR AND OPERATIONS ORGANISATIONS. WE USE AEROSHELL GREASE 33 BASED ON ITS IMPROVED CORROSION RESISTANCE AND WEAR PROTECTION, AND HAVE NEVER HAD A GREASE-RELATED PROBLEM OR FAILURE."

Alexey Petin, Head of Purchasing Department, S7 Engineering

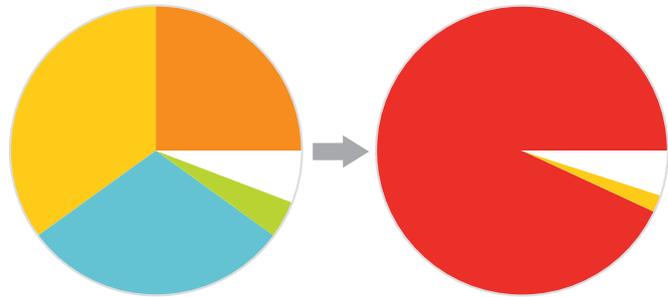


SIMPLER AND SAFER MAINTENANCE

The logistics of stocking greases for varied aircraft applications can be complicated. With numerous products, it is easy for the wrong grease to be used. An unsuitable grease may fail to protect components adequately and may even be unsafe.

To simplify maintenance and reduce product-misapplication risk, Boeing created its BMS 3-33 specification. A grease meeting this standard would replace a range of greases, and extend component life and lubrication intervals.

Following a testing period by Boeing, AeroShell Grease 33 was the only product to meet all the requirements of the original BMS 3-33 specification. It can be used on all but 9 of the 359 grease application points on a Boeing 737. This greatly simplifies the maintenance of this and many other aircraft and enhances safety by reducing the risk of product misapplication.



- AeroShell Grease 33
- AeroShell Grease 64
- Miscellaneous

MULTIPURPOSE PERFORMANCE. Before AeroShell Grease 33 simplified maintenance, multiple greases were used on the Boeing 737 and other aircraft (left). Now AeroShell Grease 33 covers over 95% of application points. With its partner AeroShell Grease 64 (formerly AeroShell Grease 33MS), an extreme-pressure grease, over 98% of application points are covered (right).





PROTECTING COMPONENTS FROM WEAR

AeroShell greases can help to extend component life and reduce maintenance costs by preventing wear and corrosion. For example, in industry tests, AeroShell Grease 33 showed

- a smaller wear scar in a wear test than a MIL-PRF-81322G-specification grease⁴
- no corrosion in saline solution, whereas a bearing with MIL-PRF-81322G-specification grease showed corrosion between the rollers and the race.⁵

Its partner, AeroShell Grease 64 (formerly AeroShell Grease 33MS) is designed to provide similar benefits for the protection of heavily loaded sliding surfaces such as the bogie pivot pins on landing gear assemblies. It contains 5% molybdenum disulphide for exceptional load-carrying and extreme-pressure performance.

⁴ASTM D2509 test, in which a cup rotates at 800 rpm on a block under an 18-kg load for 10 min while being continuously fed with fresh grease

⁵Modified ASTM D1743 test, where lightly loaded greased bearings are rotated while submerged in a 3% saline solution and then stored at 52°C and 100% humidity for 12 h

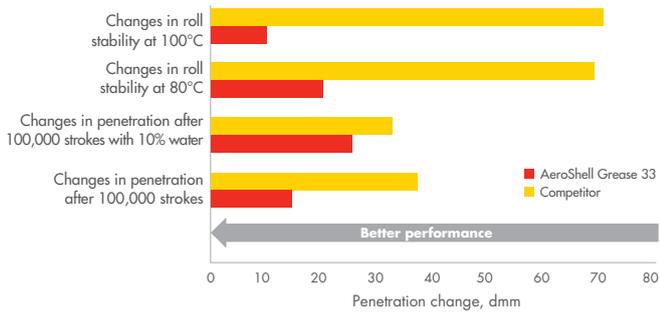


MULTIPURPOSE HELICOPTER GREASE.
AEROSHELL GREASE 14 OFFERS OUTSTANDING
FRETTING AND CORROSION PROTECTION.



LONGER LUBRICATING LIFE

To protect components, a grease needs to maintain its mechanical stability to stay where it is needed. To lubricate effectively, a grease's base oil needs to be released from the thickener in a slow, controlled manner. If the oil separation is too fast, the grease may become too hard to provide adequate protection. If the separation is too slow, the grease may fail to lubricate efficiently and allow excessive component wear.

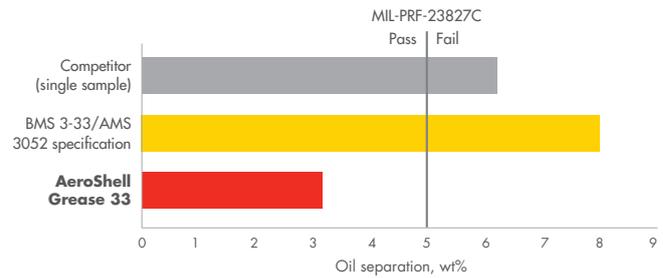


STAYING WHERE YOU NEED IT. AeroShell Grease 33 offers superior mechanical stability after being worked in two ways and when mixed with 10% water.⁵

⁵Mechanical stability is measured as the change in penetration by a cone dropped onto a grease sample before and after it has been repeatedly worked. The samples were squeezed through holes in a plate for more than 100,000 double strokes in the extended ASTM D217 test, and sheared for over 50 h at 80 and 100°C by turning a tube containing a heavy solid roller in the ASTM D1831 test. The first test was repeated with 10% water mixed into the grease.

⁷Industry-standard test ASTM D6184, which runs for 30 h at 100°C

AeroShell Grease 33 has better mechanical stability compared with other currently approved products, which means it stays where it is needed.⁶ It also offers lower oil separation⁷ to help to ensure efficient lubrication throughout its life.



CONTROLLED RELEASE. AeroShell Grease 33 offers lower oil separation to help to ensure efficient lubrication throughout its life.⁶ The oil separation is about 1.6 wt% better than the maximum allowed in the MIL-PRF-23827C specification. This is better than another currently approved grease.



BENEFITS AND SPECIFICATIONS

Product	Benefits	Specifications and approvals (Full approval details can be obtained from your AeroShell representative.)
Universal airframe		
AeroShell Grease 64 (formerly AeroShell Grease 33MS)	<ul style="list-style-type: none"> ■ Extreme protection – 5% molybdenum disulphide ■ Excellent corrosion and wear protection ■ Proven AeroShell Grease 33 technology 	<ul style="list-style-type: none"> ■ MIL-G-21164D
AeroShell Grease 33	<ul style="list-style-type: none"> ■ Easier maintenance ■ Lower labour costs ■ Less misapplication risk ■ Simplified inventories 	<ul style="list-style-type: none"> ■ Airbus AIMS 09-06-002 ■ Boeing BMS 3-33B ■ MIL-PRF-23827C Type 1 ■ Can be used for virtually all grease points currently using greases with MIL-PRF-23827C, MIL-G-21164D, BMS 3-24, MIL-PRF-81322G, SAE AMS 3052 and AIMS09-06-002 specifications
Advanced multipurpose airframe		
AeroShell Grease 7	<ul style="list-style-type: none"> ■ Good corrosion protection ■ High load-carrying capacity ■ Wide temperature range 	<ul style="list-style-type: none"> ■ MIL-PRF-23827C (Type II)
Versatile multipurpose		
AeroShell Grease 22	<ul style="list-style-type: none"> ■ Severe operating conditions ■ Long component life ■ Versatile 	<ul style="list-style-type: none"> ■ MIL-PRF-81322G ■ DOD-G-24508A
Wheel bearing and engine accessory		
AeroShell Grease 5 ⁸	<ul style="list-style-type: none"> ■ High load-carrying capacity ■ Good water and heat resistance 	<ul style="list-style-type: none"> ■ MIL-G-3545C (obsolete)
Multipurpose helicopter		
AeroShell Grease 14	<ul style="list-style-type: none"> ■ Outstanding fretting and corrosion protection ■ Wide temperature range ■ Approved by leading helicopter manufacturers ■ Calcium soap thickener 	<ul style="list-style-type: none"> ■ MIL-G-25537C
General-purpose airframe		
AeroShell Grease 6	<ul style="list-style-type: none"> ■ Use in anti-friction bearings, gearboxes and plain bearings ■ Good water resistance ■ Low noise capability ■ Mineral oil based ■ Microgel thickener 	<ul style="list-style-type: none"> ■ MIL-PRF-24139A

⁸Only available in the Americas

A COMPREHENSIVE AND PROVEN RANGE

AeroShell is a comprehensive and proven product range; all new products undergo extensive testing. Our experts can also offer helpful and problem-solving technical support.

Whatever you fly or maintain, we can provide a full range of AeroShell products to meet your needs, including

- **AeroShell turbine engine oils**, such as AeroShell Turbine Oil 560, for proven performance
- **AeroShell piston engine oils**, such as AeroShell Oil W 15W-50 semi-synthetic, multi-grade oil for fastacting, all-year-round protection
- **AeroShell hydraulic**, preservative and other fluids, including AeroShell Fluid 31 "super-clean", fire-resistant, synthetic hydraulic oil.



CONTACT US

For more information, please contact your AeroShell representative or visit www.aeroshell.com.

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