

# KISS Polymers MegaGuard Ultra\*

## Product Summary

---

### ***The Latest Technology in Non-Stick Protective Coatings***

MegaGuard Ultra\* is the latest technology in low-drag protective surface coatings. MegaGuard Ultra protects a vehicle's surface from chemical attack and environmental degradation, reduces drag, repels rain, and improves ice release. MegaGuard Ultra contains patented KISS Self-Bonding Polymers (KSBP\*) polymers which bond to a vehicle's surface and provide a long-lasting non-stick surface that protects from damaging sun rays, fuel & oil spills, and will not migrate, chip, peel, or discolor with age. MegaGuard Ultra's protective and drag-reducing properties have been proven in independent laboratory and field tests.

### ***Not a Wax, Not a Polish***

MegaGuard Ultra is not a wax or polish. MegaGuard Ultra is a uniquely formulated surface treatment that has most of the same properties as silicone and Teflon: temperature, pressure, and chemical resistance, water and ice repellent capabilities, yet it adheres to the surface and will not migrate and can only be removed with an abrasive.

### ***Easy to Apply***

Unlike Teflon, MegaGuard Ultra is easy to apply and requires no pre-application treatments or post-application curing. If the coating is scratched it can be easily reapplied; repair of Teflon is difficult and costly. MegaGuard Ultra is applied by simply wiping it on with a soft cloth, then lightly buffing the surface with another clean soft cloth to remove any excess. No machinery is required, and no more removing wax residue around rivet heads with a toothbrush.

### ***A bonded long-lasting finish***

Conventional silicone coatings and waxes last a predictably short time before migrating off the surface. The base chemical for MegaGuard Ultra is poly(dimethyl siloxane) which is modified through a patented process so that it bonds to the surface, cannot migrate, and can last years.

### ***A little goes a long way***

Applied according to directions, MegaGuard Ultra is a mono-molecular layer that follows the contours of surface. Additional layers of the polymer add no value and will actually negate the non-stick aspects of the coating. The thinner the coating the better it works.

A little MegaGuard Ultra goes a long way. Since the coating is one molecule thick and bonded to the surface, one (1) ounce will cover approximately 500 square-feet. Four (4) fluid ounces of MegaGuard Ultra will easily coat 6-8 full-size automobiles, or an entire Mooney or C-172 aircraft.

\* KSBP, MegaGuard Ultra, and KISS are trademarks of  
Kent Integrated Scientific Systems (K.I.S.S.) Inc.  
U.S. Patent No. 4,839,456.

# Product Benefits

---

## ***Protection from fuel, oil, and damaging sun rays***

MegaGuard Ultra resists, and therefore protects treated surfaces from most acids, bases, solvents, damaging rays from the sun, and fuel and oil spills. Additionally, the non-stick surface makes dirt, grime, soot, and bugs wash off quickly and easily.

MegaGuard Ultra surface protecting properties can greatly extend the life of a painted surface. Unlike other protective coatings, MegaGuard Ultra will not chip, peel, or discolor with age.

## ***MegaGuard Ultra reduces drag and improves vehicle efficiency***

MegaGuard Ultra increases vehicle performance by reducing skin friction drag. Pilots of light single engine aircraft report cruise speed increases of approximately two knots. Business jet vehicle can realize a fuel consumption decrease of approximately 0.5% to 1%. Formula One Grand Prix racers advance 6-8 starting pole positions from MegaGuard Ultra's reduction of wind drag on the car exterior.

## ***Rain sheds rapidly***

Water beads readily on MegaGuard Ultra treated surfaces allowing air to blow the beads off quickly. Used on the windshield, MegaGuard Ultra will improve visibility. MegaGuard Ultra is an excellent water repellent that makes using other current water and rain repellent products unnecessary.

## ***Reduces Ice & Frost adhesion***

In the same way that MegaGuard Ultra's non-stick surface repels water it also reduces ice adhesion. MegaGuard Ultra improves the ability of de-icing boots and other surfaces to shed ice on aircraft. Because MegaGuard Ultra is bonded to the surface and does not migrate, it makes current ice release coatings obsolete.

MegaGuard Ultra reduces the ability of ice to adhere to treated surfaces; however, it is not a substitute for anti-icing and de-icing equipment. Always use approved anti-icing and de-icing equipment and procedures when flying in icing conditions.

## ***Long-lasting protection***

MegaGuard Ultra provides long lasting protection. The typical user will apply MegaGuard Ultra once a year. With regular washing, and depending on vehicle use and local conditions, MegaGuard Ultra can last even longer. Use of MegaGuard Ultra Cleaning Liquid will refresh the coating during routine washings.

# Drag Reduction

---

## ***Improved performance through reduced skin friction***

Skin friction drag can make up over 40% of the total vehicle drag; therefore, a small skin friction reduction can result in a substantial performance improvement. Skin friction drag, which results in boundary layer momentum loss, consists of two elements: surface roughness and surface energy. Surface roughness can easily be reduced by polishing the surface. Surface energy is reduced by applying MegaGuard Ultra.

It is easy to understand that a rough surface has more drag than a smooth one. The higher the surface roughness, the higher the drag. Standard vehicle production paint is generally considered aerodynamically smooth. This means that polishing the surface to further reduce the roughness height will not significantly reduce the drag. Paint that is old or worn can have much greater roughness height and, in this case, polishing your vehicle will allow the air to flow with less resistance.

MegaGuard Ultra has a very low surface energy, comparable to that of Teflon, which allows the air molecules to slip at the surface. This partial slip condition increases the air velocity at the surface and reduces the drag.

On untreated or waxed surfaces the air molecules bond to the surface. This creates a no-slip condition at the surface interface which slows the air velocities near the surface and increases the drag.

In a typical boundary layer profile the air velocity at the surface is zero and increases exponentially until, at the outer edge of boundary layer, it is the same as the free-stream velocity. The shape and magnitude of the boundary layer velocity profile determines the momentum loss, which corresponds to the drag. The higher the velocity near the surface, the lower the drag. The figure below shows typical boundary layer velocity profiles on an aerodynamically smooth surface with and without MegaGuard Ultra.

0100090000037800000002001c0000000000400000003010800050000000b020000000050000000  
c02dd02dc04040000002e0118001c000000fb021400090000000000bc02000000001020222537973  
74656d0002dc040000d6fc00008c3b110070838239902cdc010c020000040000002d0100001c000000  
fb02ceff0000000000000900100000000440001254696d6573204e657720526f6d616e000000000000  
0000000000000000000040000002d0101000400000002010100050000000902000000020d00000  
0320a2d000000010004000000000dc04db0220a61600040000002d010000300000000000

*Wind tunnel tests show the change in the boundary layer profile.*

# Test Data Summary

---

## ***Wind Tunnel Tested***

KSBP has been tested in many facilities for drag reduction in both air and water. These tests, as well as many other field tests, confirm the drag reducing properties of KSBP products.

### ***The faster you fly, the better it works***

The drag reduction benefits of MegaGuard Ultra were demonstrated in two independent wind tunnel tests. A high-speed wind tunnel test conducted at the University of Cambridge, England, showed that MegaGuard Ultra provided a 2% drag reduction at a Mach number of 0.88. At the University of Southern California, a low-speed test showed that, at an air velocity of 56 mph, KSBP MegaGuard Ultra reduced the drag by approximately 0.8%.

Water and other tests also show drag reduction. KISS's MegaGuard Ultra is widely used in high performance car, boat and plane racing. Baier and Gucinski of the University of New York at Buffalo measured 1-2% surface friction reduction in small diameter fluid flow test cells. At the Wolfson Institute, Southampton, UK water tank tests showed a 2-7% drag reduction.

Various field tests and reports from KSBP product users show KSBP's impact in the real world. For example:

- | Cessna 172's show cruise speed increases of approximately 2 knots.
- | Mooney's show cruise speed increases of up to 4 knots.
- | Allan Brown of *Pleasure Boating Magazine* reported a 2 mph speed increase on his Cigarette Decathlon powered by twin 225 Johnsons.
- | John Connor's *Gentry Eagle* Trans-Atlantic boat noted a 2 knot speed increase.
- | *Kiwi Magic*, the America's Cup contender from New Zealand, reported a 7% speed increase downwind.
- | Lightfield Ammunitions, Inc. coated the front of munitions and noted a 10% increase in muzzle velocity.
- | Golf balls treated with KSBP increase drives by up to 18 yards.

*Due to individual vehicle characteristics and configurations,  
your performance improvement will vary.*

# Chemical Background

---

## ***New Patented Self-bonding Non-Stick Polymer***

The physical and chemical properties of a surface determine how it interacts with the environment. The chemical reactivity of a material is related to its surface energy. Materials with a low surface energy tend to be non-reactive and inert, those with high surface energy tend to be very reactive. The non-aesthetic purpose of a coating is to stop a surface from interacting with, and being affected by, what contacts it.

The very characteristics that make inert materials desirable also make them difficult to handle and apply. How can a non-reactive material be bonded to a surface?

Slightly reactive materials, such as PTFE, can be bonded using surface etching, heating, primers and pressure - all of which are costly - some with limited success. These materials generally have poor wear resistance and are prone to migrate, causing unwanted contamination of surrounding materials. Silicones, especially poly(dimethyl siloxane), have a very low surface energy, and are the most inert and chemically stable materials known. They are so non-reactive that they cannot be bonded to a surface, until now.

A new patented catalytic process makes these highly inert polymers partially reactive. The resulting KSBP material has a reactive side of the polymer which forms a very secure bond with the substrate while its inert outer surface is both passive and resistant to chemical and environmental attack.

## ***KSBP Development***

The critical step was to develop a catalytic process that makes a part of the poly(dimethyl siloxane) polymer chain reactive, so that a secure bond forms between the coating and the substrate.

The manufacture of silicone rubber involves extensive cross-linking between chains of a polymer. As the reaction proceeds, the reactive sites on each chain react with each other, forming a highly cross-linked network. Silicone rubber is made by letting this cross-linking reaction proceed until all the reactive sites are linked.

KSBP materials are made by a patented process that modifies the cross-linking process. Special inhibitors are added to the polymer to halt the cross-linking process prematurely at a pre-selected point. This leaves many highly reactive sites on the polymer chain that are now available for bonding to the substrate. The non-reactive side of the cross-linked chains forms the inert face with the un-reacted sites reacting with the substrate to bond the inert layer to it (see Figure 2).

# Chemical Background, Continued

---

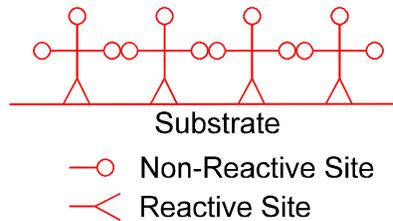


Figure 2

*KISS Self-Bonding Polymers (KSBP) have their reactive (sticky) side bound to the substrate, leaving only non-reactive portions exposed to the environment.*

## **KSBP Attributes**

The KSBP family of materials are a uniquely formulated type of surface treatment that has most of the same properties of the silicone base polymer: temperature, pressure, and chemical resistance, water and ice repellent capabilities, yet it adheres to the surface and will not migrate and can only be removed by removing the surface layer of the substrate to which it is bonded.

Unlike Teflon, KSBP is easy to apply and requires no pre-application treatments or post-application curing. If the KSBP coating is damaged it can be easily reapplied; repair of Teflon is difficult and costly.

Conventional silicone coatings last a predictably short time before migrating off the surface. KSBP is bonded to the surface, it cannot migrate, and can last years. Depending on local conditions and vehicle use, a KSBP MegaGuard Ultra treated surface will last 1 - 2 years. The typical vehicle owner will reapply KSBP MegaGuard Ultra once a year.

Correctly applied, KSBP is a mono-molecular layer approximately 120 Angstroms (0.012 microns) thick. The coating intimately adapts to the surface of the substrate and causes no significant changes in the dimensions or surface topography of the coated product. Additional layers of the polymer add no value and will actually negate the low surface energy aspects of the coating. The thinner the coating the better it works.

# MegaGuard Ultra Application

---

## ***Applying KSBP MegaGuard Ultra to Your Vehicle***

1. Thoroughly wash your vehicle. Remove all grime, oil, bugs, soot, etc.
2. For best results, polish the surface to reduce the surface roughness and remove old wax residue. Be sure to use a polishing product that does not contain wax or silicone compounds. If your vehicle's surface is reasonably smooth or relatively new, and the previous wax job is several months old, then polishing the surface is not required. MegaGuard Ultra enhances the color of your vehicle. Therefore, it is important to remove all blemishes in the finish prior to applying MegaGuard Ultra, otherwise these blemishes will stand out and detract from the vehicle's appearance.
3. For best results apply MegaGuard Ultra on cool surface out of direct sunlight. Apply a small amount of MegaGuard Ultra to a soft clean cloth. Then, using gentle pressure, wipe on to spread a thin film over the surface. A small amount covers a large area - one dab will easily spread to cover a 4 foot by 4 foot section. Let dry a few minutes.
4. With another soft clean cloth, remove the excess MegaGuard Ultra. Wipe thoroughly, turning the cloth frequently until the surface is smooth and slippery. There should be no streaks or hazing. Use of a non-abrasive adsorbent powder will help to remove excess MegaGuard Ultra, if too much has been applied to the surface.
5. Repeat Steps 3 and 4 until entire vehicle is coated. Apply MegaGuard Ultra to the entire exterior of the vehicle from the front to back, top to bottom, coating all exposed surfaces, including the windshield and windows., plastics, rubber and all painted and un-painted metal.
6. Keep the KSBP MegaGuard Ultra application cloth sealed in a plastic bag to keep it clean for future use and surface touch-ups.

# MegaGuard Ultra Maintenance

---

## ***Maintaining Your KSBP MegaGuard Ultra Surface***

Once KSBP MegaGuard Ultra has been applied, never use an abrasive or polish to clean the vehicle. Simply wash the vehicle with water and MegaGuard Ultra Cleaner (specially formulated to clean and rejuvenate MegaGuard Ultra treated surfaces) using a soft clean cloth to wipe the surface completely dry.

**Do not apply a wax or silicone product over a KSBP MegaGuard Ultra treated surface.** This will negate the benefit of MegaGuard Ultra, and the wax or silicone will wear off rapidly.

KSBP MegaGuard Ultra bonds to the surface and will last nearly as long as the surface it is applied to. However, natural abrasion, from dust and dirt, will expedite the wear of leading edges on aircraft and other high performance vehicles. Therefore, the wing, tail and propeller leading edges may require periodic touch ups.

Wash treated surfaces at least once a month with MegaGuard Cleaning Liquid. Treated surfaces may also be cleaned by wiping with a damp cloth or washing with a mild soap, such as Lemon-fresh Joy, Dawn dishwashing soap, Head & Shoulders Shampoo, or a similar soap that does not leave a soapy film.

With regular washing, and depending on the amount of vehicle use and local conditions, MegaGuard Ultra should be reapplied every 1 to 2 years.

### ***Cautions and Emergency Information***

MegaGuard Ultra contains KSBP and petroleum distillates. MegaGuard Ultra meets California air quality regulations.

CAUTION: USE WITH ADEQUATE VENTILATION! IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH WATER AND CONSULT A PHYSICIAN.

