SCS

PARYLENES

FOR THE UAV MARKET

SPECIALTY COATING SYSTEMS™

A KISCO Company

SCS Parylenes for the UAV market

Competition in the emerging UAV marketplace will require reliable technologies to keep drones flying through rough weather conditions.

Our lightweight conformal coatings protect drone technologies operating in harsh environments.

The commercial use of unmanned aerial vehicles – or drones – is expected to grow exponentially in the next several years as technologies continue to advance and regulatory and logistical hurdles are overcome.

Amazon, UPS and Google-parent Alphabet have already won Federal Aviation Administration approval to operate drone fleets for package delivery, but smaller companies are also seeing niche opportunities in the emerging UAV space. Beyond e-commerce package delivery, other potential applications include:

- Medical supplies and prescription deliveries
- Irrigation monitoring and other agricultural uses
- Aerial inspection of sprawling industrial sites
- Surveying and mapping
- Filming and photography

In order to achieve sustainable success, UAV enterprises will need to ensure reliable operation in all conditions. As they are designed to carry out tasks in varying climates around the world, the extensive electronic content in UAV systems will be exposed to a range of harsh environments in their day-to-day operations. Owners and operators cannot afford to have their UAV fleet grounded because of bad weather or have drones fail to complete their tasks due to circuitry damage.

REQUIREMENTS FOR UAV ELECTRONICS PROTECTION

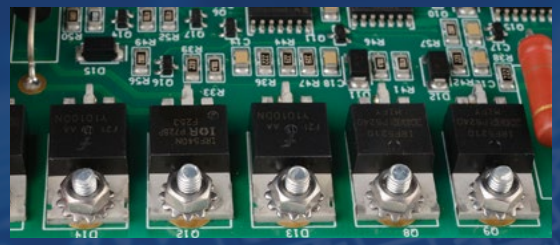
Whether human-controlled or autonomous, UAVs rely on multiple electronics components such as onboard circuit assemblies, sensors, light controllers, mission payload controls, communications and a variety of cameras. Failure of any one of these components can mean failure of the drone's mission.

For much of their history, electronics manufacturers have used various conformal coating methods to protect components from exposure to moisture, dust and other contaminants. However, some of these traditional methods are ill-suited for UAV use.

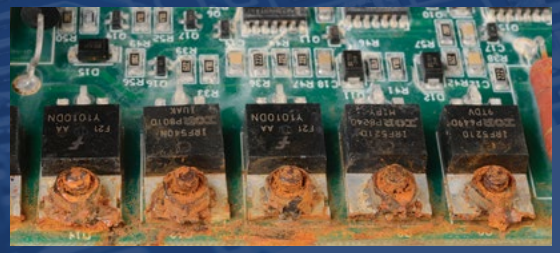
To keep their UAV fleets operating dependably in all environments, designers and manufacturers need to identify a conformal coating solution that:

- Is lightweight to ensure maximum payloads.
- Is evenly applied to ensure complete protection.
- Exhibits exceptional reliability in all weather conditions.
- Protects components from moisture, dust and chemicals.
- Possesses electrical properties that do not interfere with radio frequency communications.

SCS Parylenes meet all of these requirements and more.



Coated with SCS ParyFree®



Uncoated

Circuit boards coated with ParyFree® were salt-fog tested by an independent facility. The coated boards exhibited no corrosion, salt or heavy iron oxide deposits after 144 hours of exposure in accordance with ASTM B117-(03). Boards coated with SCS Parylene C and Parylene HT® exhibited similar results.

WHY SCS PARYLENE COATINGS ARE SUPERIOR

Parylene is the name of a unique series of polymers first developed by scientists at Union Carbide, the company that eventually founded Specialty Coating Systems.

The raw material used in the Parylene coating process begins as a solid material called dimer. The material is heated, sublimating it into a vapor. The vapor then enters a room-temperature vacuum chamber and completely envelops the surface to be protected, one molecule at a time, forming an ultra-thin coating that conforms evenly and flawlessly to every surface, crack and crevice – no matter how tiny or complex the device may be.

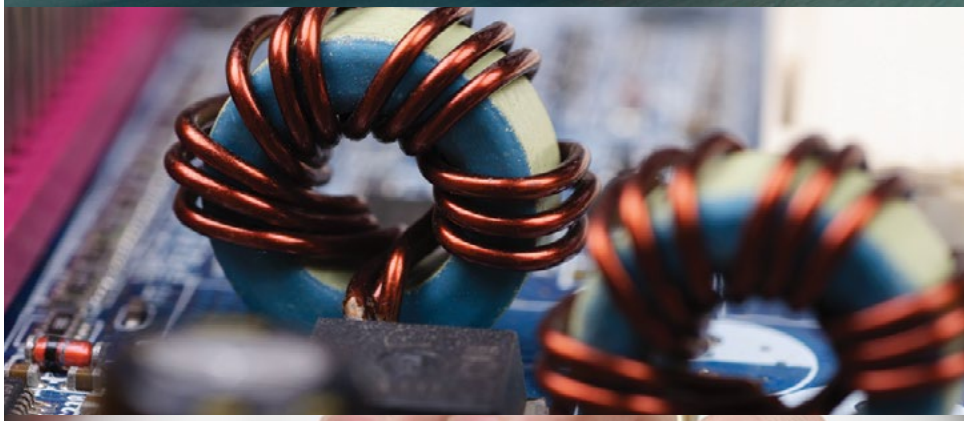
As a result, SCS Parylene coatings provide complete protection, while also adding minimal weight compared to liquid-based applications that can leave voids and require greater thicknesses.

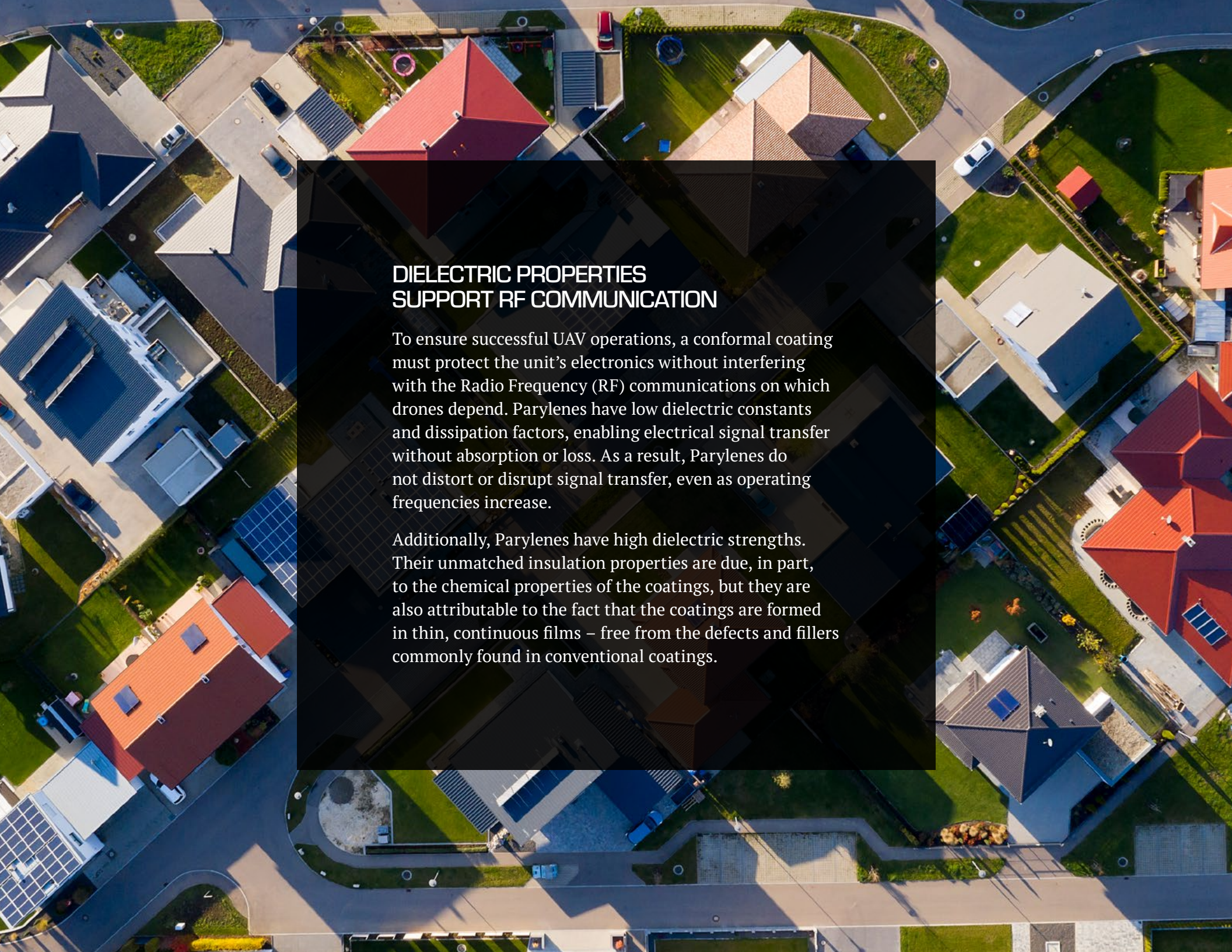
SCS PARYLENES: PROVEN IN THE FIELD

For nearly half a century, SCS has worked with major manufacturers in the aerospace, defense, industrial and consumer electronics, transportation and medical device industries, designing custom solutions to protect electronics and other delicate technologies from exposure to water, dust, chemicals and other hazards.

In the aerospace and defense industries, SCS Parylene coatings have been used on aircraft where electronics are exposed to extremes in temperature and vibration far beyond what low-altitude drones will ever be exposed. NASA has used SCS Parylene coatings on satellites and space probes where components are exposed to thermal cycling and electrostatic discharge. Down on earth, SCS coatings are used on electronics in heavy trucks and oil drilling equipment – and even on medical devices implanted in the human body.

It is unlikely that UAVs will encounter any conditions against which SCS Parylenes have not already been proven many times over.





DIELECTRIC PROPERTIES SUPPORT RF COMMUNICATION

To ensure successful UAV operations, a conformal coating must protect the unit's electronics without interfering with the Radio Frequency (RF) communications on which drones depend. Parylenes have low dielectric constants and dissipation factors, enabling electrical signal transfer without absorption or loss. As a result, Parylenes do not distort or disrupt signal transfer, even as operating frequencies increase.

Additionally, Parylenes have high dielectric strengths. Their unmatched insulation properties are due, in part, to the chemical properties of the coatings, but they are also attributable to the fact that the coatings are formed in thin, continuous films – free from the defects and fillers commonly found in conventional coatings.

PARYLENE VARIANTS AND GREEN TECHNOLOGY

Over the years, SCS has developed a number of Parylene variants that have specialized attributes. For example, Parylene HT® can withstand heat exposures up to 450°C.

SCS' newest variant, ParyFree®, was developed in support of the global initiatives that continue to drive toward the elimination of halogens in electronics. ParyFree is ideal for electronics that are produced in high volumes, which also potentially have a greater environmental impact when disposed at the end of their lifespans.

SPECIALTY COATING SYSTEMS™
A KISCO Company

SCS PARTNERS WITH CUSTOMERS

To maintain the highest quality and performance, SCS employs some of the world's foremost Parylene specialists who perform their work at state-of-the-art coating facilities in 11 countries worldwide. For nearly half a century, our scientists and engineers have worked with clients on customized solutions to address their individual requirements — including cost-control and high-volume production needs.

SCS is trusted by many of the biggest names in the aerospace, defense, electronics, transportation and medical device industries to provide critical protection of their advanced technologies.

To learn more about Parylene conformal coatings and how SCS can help provide solutions to your protection challenges, contact us today.

Global Headquarters
7645 Woodland Drive
Indianapolis, IN 46278, USA

P 317.244.1200
TF 800.356.8260
F 317.240.2739

scscoatings.com/UAV