

Low-Friction, Low-Noise DuPont™ Delrin® Unleashes the Power in OPPO's Smartphone with Pivot-rising Camera



Project

Through partnership with the OPPO Research and Development team, DuPont learned that this global smartphone maker was designing an innovative pivot-rising camera that would slide up from a hidden position on the top of a smartphone in 2018, the series we now call Reno.

The pivot-rising camera is the hallmark of OPPO's new Reno flagship model, a truly bezel-less phone that offers an immersive full-screen display. The mechanism to raise and lower the camera had to work in under one second without noise. Plus, it needed to be durable enough to withstand over 200,000 uses.

OPPO had tested other materials for the pivot hinge but they all failed on repeated, rigorous reliability tests.

After the DuPont technology team stepped in and studied the performance requirement, the DuPont™ Delrin® product line was recommended to the OPPO team for the pivot-rising components that move the camera into position for taking pictures and stow it away inside the phone when not in use.

Challenges

OPPO's pivot-rising camera needed to be integrated seamlessly with their smartphone design. OPPO designers wanted to deliver a "wow" experience for consumers with sophisticated camera movement and excellent photo-taking performance without losing screen area for the embedded camera. This unique new shark fin-like pop-up module brings greater camera zoom capability than previous OPPO models.

Reliability with repeated use

Smartphone cameras must be reliable in a world where over 100 million photos and videos are uploaded to Instagram each day. OPPO required that the camera slider work flawlessly for the five-year life of the phone; that meant at least 200,000 cycles of use.

Smooth, quiet operation

The movement of the camera had to be fast and quiet. Friction had to be minimized, if not eliminated.

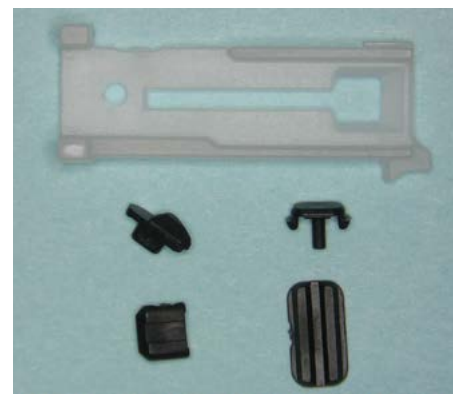
Compact size

The slider mechanism had to fit within the confines of a smartphone. The OPPO Reno measures just 7.43cm wide and 9mm thick. Designers needed a material to enable a hinge design that was thin, lightweight and with a low coefficient of friction.

Solution

Two grades of DuPont™ Delrin® acetal homopolymers succeeded in delivering the performance OPPO required for the compact, sliding component that pivots the camera up from the top edge of the Reno smartphone.

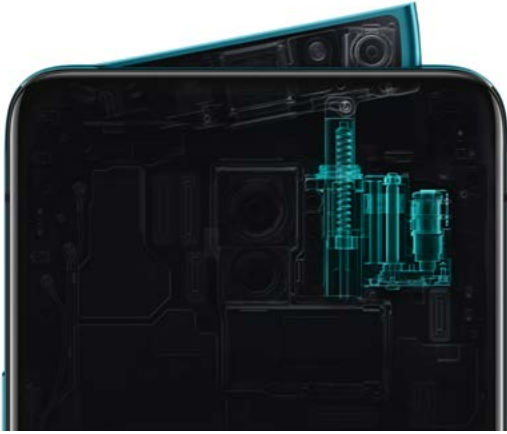
In-lab testing that simulated smartphone use proved that where other products like copolymers had cracked and failed, Delrin® materials remained strong and operated smoothly.



DuPont™ Delrin® reliability for wear resistance and low friction allows the OPPO pivot-rising smartphone camera to operate 200,000 times without fail or noise.

Delrin® 100AL was the solution for the sliders. Delrin® 500AL was employed for the brackets that hold the slider. Both grades have an advanced self-lubricating characteristic in addition to the superior properties of low wear, low friction, and low noise against metals and plastics. The performance of Delrin® materials allowed the pivot mechanism to deliver reliable operation for at least 200,000 cycles. When the OPPO Reno camera goes into action, it rises from the smartphone in just 0.8 seconds. The pivot movement is intricate, first moving fast then slow.

With Delrin® 100AL's extremely low coefficient of friction, the camera components move without a sound. If the phone is dropped while the camera is up, it automatically recedes.



DuPont™ Delrin® is the key to reliable and smooth operation of OPPO's unique shark fin pivot-rising camera.

The phone has been well received by critics who praise the camera's design and performance. The pivot-hinge component of the Reno includes a selfie camera on the front. On the back, it features powerful zoom features and a flash. These features complement the standard camera built into the back of the smartphone.

OPPO has developed an innovative contender that has grabbed the attention of consumers in Asia, the Middle East and Europe – making OPPO the fifth largest – and growing – smartphone provider globally. DuPont is proud of the roll it played in optimizing the pivot-rising camera.

Why DuPont™ Delrin® is the Industry Standard

For over 60 years, DuPont™ Delrin® acetal homopolymers have been the industry standard for plastic gears because they provide superior properties such as:

- Increased design flexibility
- Thinner wall sections at same physical part performance
- Lighter parts and less material usage
- Improved mold filling
- Shorter molding cycle times

Delrin® 100 resins are distinguished by their high viscosity versus other acetal grades. This, along with their natural high crystallinity, yields materials that have:

- Toughness, ensuring high impact strength and high resistance to repeated impact
- High elongation to allow higher deformation
- High mechanical strength and rigidity for high-loading applications
- Outstanding creep resistance and long-term fatigue endurance helps enable lifetime performance

Delrin® 100AL and Delrin® 500AL both contain an advanced system of lubrication designed for low wear, low friction, and low noise against metals and plastics. Delrin® 100AL has very high mechanical properties to ensure lifetime performance and Delrin® 500AL's better flow helps improve productivity and facilitates design freedom.

dupont.com



Transportation & Industrial

DuPont™, the DuPont Oval Logo, and all trademarks and service marks denoted with ™, SM or ® are owned by affiliates of DuPont de Nemours, Inc. unless otherwise noted. © 2019 DuPont.

The information set forth herein is furnished free of charge and is based on technical data that DuPont believes to be reliable and falls within the normal range of properties. It is intended for use by persons having technical skill, at their own discretion and risk. This data should not be used to establish specification limits nor used alone as the basis of design. Handling precaution information is given with the understanding that those using it will satisfy themselves that their particular conditions of use present no health or safety hazards. Since conditions of product use and disposal are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. As with any product, evaluation under end-use conditions prior to specification is essential. Nothing herein is to be taken as a license to operate or a recommendation to infringe on patents.

Form No. 001-20177-HMC0719