

## Innovation and Partnership Prepared America for Space

### DUPONT

On July 20, as we celebrate the 50th anniversary of the Apollo 11 moon landing, we are reminded of how much work went into making sure that our NASA astronauts traveled to the moon and back safely. Apollo 11 showcases the unprecedented collective efforts of hundreds of companies and agencies to protect lives in space, a feat which could only have been achieved when innovative science and collaboration were put to the service of an important goal.

Since the birth of manned space flight, DuPont has been along for the ride with products essential for protection, lighter weight, reduced volume, durability and environmental resistance. On Earth, those innovations that led us farther into space continue to adapt and extend into new innovations for today and tomorrow. DuPont's purpose is empowering the world with the essential innovations to thrive, and innovation-led growth is core to the company's business strategy, working with customers around the world to power big things, like space telescopes, and small things, like smartphones.

For the Apollo 11 mission to the moon, 20 of the 21 layers in each space suit were made with DuPont inventions, including DuPont™ Nomex® fiber and Kapton® polyimide film. The first material to touch the lunar surface was Kapton®, and the U.S. flag placed on the moon was made of DuPont nylon.

Over 500 million people in more than 40 countries on five continents watched as Neil Armstrong stepped on the moon for the first time. When Armstrong and "Buzz" Aldrin walked out into the moon's

sunlight, the day's temperature could reach 253 F (123 C). At night, outside the lunar module the moon's temperature dropped to minus 387 F (minus 233 C). DuPont had the diversity of many high-performance materials in its portfolio to protect these space pioneers, and their spacecraft.

To meet today's challenges, we continue in the spirit of the Apollo era, as private enterprise and government work inclusively to achieve the remarkable innovations that benefit us all now. For example, DuPont's lightweight, flexible materials are remaking the cardiovascular system of satellites, putting global broadband within reach ([dupont.com/now](http://dupont.com/now)).

Today, communication companies are engaged in a new race as the Internet of Things, 5G, and other burgeoning technologies drive demand for high-speed communications. As scientists make that promise a reality, our semiconductor materials and products like Kapton® will remain key building blocks, and more revolutionary than ever. When it comes to smartphones and tablets, our materials enable faster, thinner, more powerful devices that can do more than ever before.

As satellites keep advancing, they change the technology landscape on Earth, from improving the GPS in your phone to providing first-time broadband to parts of the developing



world. When the James Webb Space Telescope launches in 2021, it will allow us to study every phase of cosmic history. We may not be the scientists who will be studying the telescope's findings, but we're the scientists who have researched and developed materials enabling them to do so. We're proud to say that in the James Webb there are two key materials that DuPont invented and manufactures: DuPont™ Kapton® and Kevlar® fiber.

And right now, NASA pillow-packs made with Kevlar® are making it possible for astronauts to grow their own vegetables in space. Those packs need to be light-weight, high strength and highly temperature resistant—attributes of Kevlar®, the same product that protects our first responders here on Earth.

As we remember Apollo 11, we salute the pioneers of space, along with the thousands of people and hundreds of companies and organizations who have and continue to work to advance innovation and protect those who journey there.

## W. L. GORE

W. L. Gore & Associates, Inc.'s contributions to space exploration began very early in our history. In just over ten years, we went from a Delaware basement where the company was founded, to the moon! It was a particularly proud moment for our young Enterprise to have multiple products contribute to the success of the July 1969 Apollo 11 moon landing. Gore wire and cable supported getting men to the moon, was involved in the seismographic experiments and sample collection on the moon, and helped the astronauts to navigate back home.

From the first seismographic testing on the moon through today, Gore has maintained an unwavering commitment to product performance in the aerospace industry. In the 50 years since the Apollo 11 mission, we have supported more than 100



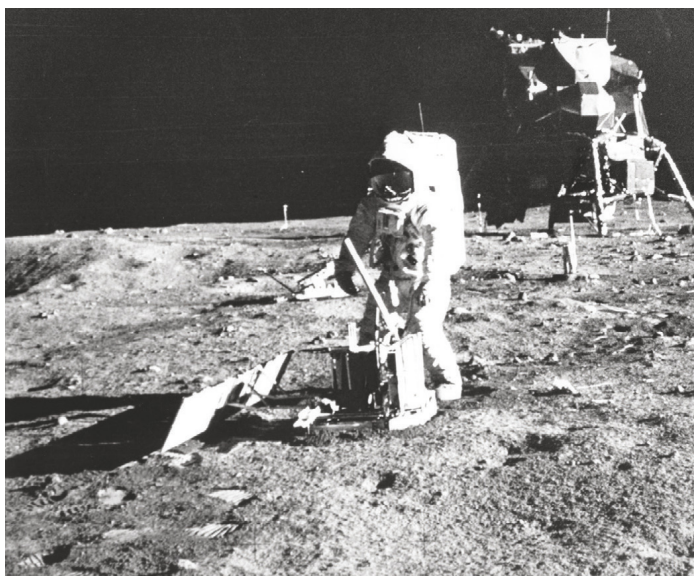
spaceflight programs, including manned spaceflight programs and satellites that provide communications and scientific

benefits to the world. Throughout all, our products have had a 100% success-rate in space.

- Buzz Aldrin, Jr. and Neil Armstrong installed seismographic equipment on the moon's surface that was connected to the lunar lander with Gore cable;
- Gore's MIL-ENE and Multi-Tet ribbon cable were used on the Apollo spacecraft guidance and navigation computer and Lunar Module (LM);
- The lunar rock-collecting shovel also included PTFE insulated wire;
- MIL-ENE insulated wire as well as other small gauge wire were also part of the ground support equipment—tracking radar, computers, and communication equipment to ensure a safe return home.

Just as our reputation in aerospace

has been built on quality and our material science expertise, we are committed to performance in all of our products. Though the applications and uses of our products are very different, they have in common Gore's decades of innovation and testing to create trusted solutions that reliably perform in the most challenging environments where the cost of failure is high.





# Member news & Notes

## ILC DOVER

ILC Dover is proud of its rich heritage, but it is particularly proud of the role we played in designing and manufacturing the Apollo space suits. This July 20th, we celebrate the 50-year anniversary of Apollo 11 when Neil Armstrong wore the ILC Industries Apollo suit as he took “One small step for Man, one giant leap for mankind.” By 1965, ILC had invested 15 years of research into the study of what a true space suit should be and won the contract from NASA after we demonstrated that we could meet the difficult challenges. ILC Engineers such as Mr. Leonard Shepard and George Durney, laid the groundwork in space suit development and were followed by many others who took great pride in the work they did. It was a unique marriage of pattern-makers, seamstresses, and engineers that all had to work closely together so that the suits fit the astronauts perfectly, but more importantly, were assured not to fail on the lunar surface, 250,000 miles from earth. The Apollo crews that walked on the moon all commented about their faith in the ILC space suits. No Apollo missions were ever cut short or compromised due to suit related problems. The vast majority of the materials selected for use in the Apollo



suits were DuPont materials developed right here in Delaware, adding to the significance of the role Delaware played in the Apollo program. Today, the much more diverse and growing company known as ILC Dover is

proud to honor this anniversary and looks forward to celebrating many more achievements not only in space but also in the support of many earth-bound challenges that we work to overcome for our customers each day.

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