Statement of Shane E. Weyant

President and CEO of Creative Pultrusions, Inc.

(on behalf of the American Composites Manufacturers Association)

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Chairman Latta, Ranking Member Schakowsky and members of the Subcommittee on Digital Commerce and Consumer Protection, thank you for the opportunity to testify before you today. My name is Shane Weyant, and I am the President and Chief Executive Officer of Creative Pultrusions in Alum Bank, PA. On behalf of our company and my fellow members of the American Composites Manufacturers Association (ACMA), I appreciate the opportunity to testify before you today.

Creative Pultrusions is one of over 3000 manufacturers of fiber reinforced polymer (FRP) composites in the United States that are represented under the umbrella of ACMA. The organization provides representation, education, and technical support for companies like mine – almost all small businesses provided good jobs in small towns across America.

We have been in business for over 44 years and have seen numerous changes to the industry over the years. While some applications for composites are widely known – like fiberglass boats for example – the industry has great potential to disrupt traditional infrastructure and construction markets where legacy materials dominate the materials market – holding approximately a 98% market share. The composites industry is a key player in a multitude of high performance segments, such as aerospace, automotive, defense, sports and recreation, and healthcare, but it is our applications within the infrastructure space which have the greatest actionable potential to disrupt current practices and address an immediate and endemic national challenge.

Composites are combinations of fiber reinforcements, most commonly glass or carbon among many other materials, and tough engineered polymers. The resulting material combination is

stronger than the constituent materials individually. Composites are formulated to provide characteristics specifically tailored for maximum performance in a host of different applications.

Key Structural Characteristics of Composites

Strong

Per pound, composites are stronger than other materials such as steel, concrete and wood. The two primary components of composites – fibers and polymers – contribute to their strength. Fiber reinforcements carry the load, while the polymer network distributes the load throughout the composite part as designed.

Lightweight

Composites are light in weight compared to most woods and metals. But why is lighter better? Lighter objects, ranging from utility poles to bridge decks, are more energy efficient and easier to transport, assemble and install. Both of these features result in lowering costs.

Resistant

Composites resist damage from exposure to weather and harsh chemicals that can degrade other materials. This makes composites a superior choice for applications that face constant exposure to salt water, corrosive chemicals, extreme temperature and other severe conditions.

Design Flexibility

A wide range of material combinations can be used in composites, which allows for design flexibility. The materials can be custom tailored to meet performance requirements or fit unique specifications of each application. Composites can also be easily molded into complicated shapes, reducing the number of individual components resulting in faster assembly and a reduced potential for damage during service life.

Durable

Structures made with composites are robust with a long life that will require little or no maintenance. Many products made with composites have been in service for more than half a century.

Environmentally Friendly

Composite structures require significantly lower amounts of energy to be produced than traditional construction materials such as steel, aluminum and concrete. In addition, the resulting structure is chemically inert and will not degrade or leach harmful substances into the environment.

The Pultrusion Process

There are dozens of ways to manufacture composites. At Creative Pultrusions we utilize the pultrusion process, a unique method that we have spent decades perfecting for maximum performance of our products.

Continuous fiber reinforcements such as glass fiber, carbon fiber or basalt fiber roving, mat, and a surfacing veil are positioned on a rack at the beginning of the process, and a complex series of tensioning devices and guides direct the roving into the die which is impregnated with resin and then pulled (therefore the term *pul*-trusion) through a steel die by a powerful tractor- pull mechanism. The steel die consolidates the saturated reinforcement, sets the shape of the product, and controls the fiber/resin ratio. The die is heated to rapidly cure the resin. The process is automated and operates continuously.

In the following sections, I will elaborate on some specific, but by no means all, examples of the capabilities composites bring to key infrastructure applications. It is important to note that while specific examples from Creative Pultrusions product lines are offered here, many companies offer similar products around the country and around the world.

Capabilities for Electricity Infrastructure

American lives rely on continual and reliable access to power. While the energy economy has moved into the 21st century, the underlying infrastructure supporting the national electric grid has changed very little since the 1800s. With hundreds of thousands of wood poles and cross arms nearing or past their functional service life, now is the time to think critically about strengthening the infrastructure that powers the American economy and our daily lives.

The economic damage caused by grid failures is significant, and extends far beyond the grid itself. Property damage from electric grid failures includes not only damage to the power infrastructure and equipment, but residual losses of food and pharmaceuticals, an inability to move manufactured goods, and nonfunctioning critical services such as those provided by hospitals. An outage-induced lack of mass transit, traffic lights, electronic tolling stations, and retail cash registers are only a few of the costly interruptions to the normal flow of business. Finally, losses also come in the form of recovery costs related to backup power provision, temporary housing, litigation and other expenses.

Through our Powertrusion line, Creative Pultrusions is one of several manufacturers of composite utility poles and cross-arms. Electric grid systems that rely on FRP composite utility

poles and cross arms find superior performance on every front—durability, strength, flexibility, service life and resistance to natural weather threats. Maintenance-free composites can revitalize and harden the electric grid, making it more reliable and resilient in the face of storms, reducing outages, and enabling faster service restoration after storms and other natural events.

FRP composite poles are the best choice in environmentally sensitive areas such as coastal areas, wetlands and bogs, because they will not leach toxic preservatives into the environment. Composites are also resistant to rot, termite and ant damage as well as destruction from other pests. FRP poles are resistant to one of the primary threats to wood poles--woodpeckers. Because FRP poles are immune to these factors, they are the most environmentally sound, long-term solution in environmentally-sensitive areas.

Wildfires, especially common in the Western U.S. during summer months, can run rampant through dry bush, destroying wood poles and causing interruptions to the power grid.
In areas that experienced wildfires, wooden utility poles are burned to the ground but the composite poles are still standing, with their structural integrity still intact.
An additional key attribute is non-conductivity. This non-conductivity is particularly important when comparing FRP poles to other utility pole materials--wood is potentially conductive, especially when wet; steel is conductive; and concrete is conductive because of its steel reinforcement. The low conductivity of FRP makes them safer for linesmen, especially when speed is essential to restore grid operations.

Some FRP composite poles can cost more to purchase than wood poles, however, when

amortized over the life cycle of the pole, FRP composite poles are a better long-term solution and help utility companies realize significant savings. FRP poles not only last two to three times longer than wood poles, they also create savings in during installation, maintenance, repair, transportation, replacement, and disposal. One FRP composite pole with an approximate service life between 60 and 80 years, equates to about two to three wood poles that have an estimated service life between 20 to 40 years.

Composite poles can prevent what is known as a cascading effect. If a wood pole is blown down by wind, the attached wires can pull down adjacent poles, and this effect can cascade for a distance along a line. By replacing as few as one of every five wood poles with a composite pole, the entire line is strengthened and cascading will be prevented.

FRP composite cross arms are another key application. They do not need to be replaced as frequently as wood cross arms, which are more prone to deterioration and mechanical damage. Linemen also have an easier job replacing lighter FRP composite cross arms. Wood cross arms are heavier and may be unwieldy, especially if the lineman is working at the top of a pole. As a result, repairs to wood poles and cross arms may create a workplace hazard risk that is mitigated with lighter and safer composites.

Capabilities for Surface Transportation Infrastructure

As the American Society of Civil Engineers notes in their Infrastructure Report Card (www.infrastructurereportcard.com), the state of roads and bridges around the country is woefully inadequate. Traditional materials used to build, repair and maintain our infrastructure

are failing to provide the long-term performance and reduced maintenance costs needed to support a 21st century population and economy.

The structural capabilities of composites give these materials the ability to disrupt 150+ year standard for building bridges in this country, a disruption welcomed by many other countries including our Canadian neighbors. Creative Pultrusions has installed numerous bridge decks and bridge reinforcement components over the last few decades, as have a multitude of other composite manufacturers. Pultruded or molded bridge decks made of composites have traditionally been anchored by short and medium span structures, however additional materials research and standards development are increasing the capability for their use in longer spans. Composites bring the advantage of extended service life and superior performance through inherent resistance to corrosion and structural degradation. When traditional materials such as steel reinforced concrete crumble and spall, composites remain undamaged. Composite rebar used to reinforce concrete bridge superstructures is another key application in this market. Composite rebar is cost competitive with standard epoxy coated steel rebar, with the added advantage of complete corrosion resistance. When concrete bridges are seen in crumbling disrepair it is generally due to corrosion of the underlying steel reinforcements that cause the bars to expand and the concrete to crack. Composites avoid this problem and add decades of service life to critical infrastructure.

An additional benefit for composites in the bridge market is the speed of production and installation. Traditionally, bridges take several weeks, and even months, to build onsite. With prefabricated composites, the same bridge can be fabricated offsite and installed in less than a

day, often in just a few hours. This reduction of construction time results in reduced disruption of traffic and commerce that can be critical, especially in rural and remote areas.

The Innovative Bridge Research and Construction Program (IBRC), a former US Department of Transportation program authorized from 1998 through 2003, funded the construction of approximately 150 bridges that deployed composites in one way or another among more than 300 bridges deploying a host of other innovative materials. The Fixing America's Surface Transportation Act of 2015 directed the Federal Highway Administration to contract with the Transportation Research Board to study the performance of the IBRC bridges. The results of the study will be critical to demonstrating authoritatively how innovative materials like composites can disrupt traditional construction and build stronger infrastructure.

Capabilities for Water Treatment Systems and Distribution

The recent events in Flint and other locales illustrate a major problem with respect to our water infrastructure. Even in the United States, the delivery of clean drinking water remains a significant problem for federal, state and local agencies. Water and wastewater treatment facilities and water delivery networks in many municipalities are in need of a complete overhaul. Even in systems that are better than others, maintenance costs continue to climb as conventional materials like steel and wood fail to perform adequately in an environment predominated by highly corrosive chemicals.

Composite technologies have the capacity to revolutionize water systems around the country because of their corrosion resistant properties. While composites have been used successfully in

water and waste water applications for decades, they remain under-deployed as many authorities continue to replace aging infrastructure with outdated, and often inferior, technologies. Pultruded grating, baffles, and panel systems fully withstand any degradation from corrosive chemicals. Because of their properties, composite pipes are also used in desalination plants, particularly in drought prone areas.

In addition, a unique process called Cured In-Place Pipe allows for a new composite pipe to be produced onsite within the walls of the failing pipe structure. This system is a transformative change from traditional methods of water distribution rehabilitation, as it can create several hundred feet of new pipe from a single small opening and eliminates the need to tear up roads and curtail traffic and commerce.

Capabilities for Maritime Infrastructure

Composites also have game changing potential in water infrastructure and Congress has recognized this potential. At the end of last year, a provision within the Water Infrastructure Improvements for the Nation Act of 2016 directed the US Army Corps of Engineers to study the performance of composites and other innovative materials in water infrastructure projects (such as dams, locks, levees, and more) and make recommendations on their further use.

Because of their anticorrosion properties, composites provide superior performance in wet and high salinity environments. Creative Pultrusions offers a variety of solutions in this sector, as do many other composites manufacturers. Our SuperLoc sheet piling system is one example, designed to rehabilitate deteriorated waterfront structures subjected to harsh marine

environments. Advanced ultraviolet additives protect coastal reinforcements from sunlight and heat degradation and are coupled with composites' proven ability to withstand corrosion and structural degradation in fresh and salt water environments These properties allow for extended service life along with reduced maintenance costs.

Our pipe piling system brings the same property advantages to docks and piers with fender and bearing piles. Unlike wood structures, they are inert to degradation from salt, wood borer, fungi or microbial attack. In addition, they require no external chemical treatment that could ultimately leach and pollute adjacent water sources. A similar product, our fender pile system, was used to rehabilitate the service dock at the Statue of Liberty in the wake of Superstorm Sandy.

Breaking Down Barriers

Noting the performance benefits of composites and the fact that the various composite products discussed here have been used in infrastructure projects for many years, it is fair to ask why they remain such a small fraction of the materials market. The answer is a difficult one. Engineers and asset owners tend to the use of new materials, technologies, and methods of construction, even when it is clear the new technologies offer important advantages. We can appreciate the appeal to an engineer of using tried and true methods and materials when designing and building structures. However, composites have a proven track record of success in a broad field of applications. Congressional and federal agency leadership should not miss an opportunity to encourage engineers, contractors, and governmental asset owners to think differently and critically about the way structures are built in America and to not simply rely on methods and materials of the past.

Standards are another crucial issue. Our industry has made strides in the last few decades toward promulgating design standards and test methods, but a gap remains in the utilization of standards and this fact inhibits greater adoption of composites. The Federal Government has been instrumental in the development of standards for other material industries. Given the potential composites bring, and the significant investments being made by other governments around the world, now is the time for Federal agencies to work with industry to assess the state of standards and work with our industry as we work to standardize many of our applications. The National Institute of Standards and Technology has already begun an effort to make strides in this area, one that Creative Pultrusions and my fellow ACMA members applaud and support.

While in some cases composites can have an increased front end purchase when compared to traditional materials, their extended life and performance means that the lifetime costs can be significantly lower. Further, as demand increases and composites become more regularly used, costs will likely fall.

Conclusion

America, and frankly the world, is moving into exciting times with respect to innovative materials, such as composites. Traditional materials like wood and steel have dominated the materials marketplace for centuries – arguably back to when wood was used in structures during the Stone Ages. These materials have served us well will continue to hold a prominent role in the materials space going forward. However, as this hearing is focused on disrupters, composites are leading the evolution of materials and are a disruptive force. Composites, through their use of technology and science, have corrosion resistance and lightening properties (to name a few)

that make them attractive in modern applications. In fact, the ability of composites to meet nearly any design challenge makes them highly utilized in high tech and performance driven applications.

These structural characteristics have led to market adoption in broadening fields year in and year out from armoring military vehicles to lightening the cars we use to commute to work. While evolution is always a disruptive force, the advancement of science and technology holds benefits for our society. American composite manufacturers like Creative Pultrusions are at the forefront of this field. Nearly every key development in our industry since its inception was piloted in the United States, but other countries have accelerated research and development and reaped the rewards. This hearing, on disrupters, is an important opportunity to showcase not only the disruptive force of innovation, but should also highlight the need for government to ensure that these disrupters have a framework and an environment to encourage their continued advancement and market adoption. Thank you for the leadership to hold such a hearing and for the invitation to share composite's role as a disrupter in the materials space.

America faces critical challenges. Whether in infrastructure as discussed here, energy, automotive, defense, aerospace, marine or a host of other sectors, Creative Pultrusions and our fellow composites manufacturers represented by the American Composites Manufacturers Association are ready to provide solutions that work. We all need to look toward solutions that are smarter, more innovative, more sustainable, higher performing and overall better investments. Our safety, stability, and economic prosperity, and that of our children and

grandchildren is at stake. We in the composites are industry are prepared to work with you to provide 21st Century materials for a 21st Century infrastructure.