

Challenge Accepted.

AGILE MOBILITY



» CASE STUDY: PLASTICOMP™ COMPLET™ LONG FIBER REINFORCED STRUCTURAL THERMOPLASTICS





REVOLUTIONIZING WHEELCHAIR MOBILITY WITH LIGHTWEIGHT COMPOSITE CASTER WHEELS

THE CHALLENGE

Comfort should never be sacrificed when it comes to wheelchair mobility. But people who use wheelchairs can experience discomfort and fatigue due to the jolts and vibrations caused by everyday obstacles such as cracks and uneven surfaces. Recognizing this challenge, Frog Legs Inc., an innovative wheelchair component manufacturer, found that the rough ride primarily stems from the wheelchair's front casters.

In 1997, the Frog Legs team developed an innovative alternative to the rigid casters commonly used for the front wheels. Departing from fixed forks that bounced the occupant when encountering obstructions, they designed forks with a patented pivot point and wedge-shaped shock absorber made from lightweight aluminum. This groundbreaking design allowed the wheelchairs to glide smoothly over obstacles, akin to airplane landing gear.

In 2016, Frog Legs set out to enhance their product further by reducing weight. Aware of the profound impact additional weight has on individuals with disabilities, they sought alternatives to traditional machined aluminum. Their pursuit led them to carbon fiber composites and, subsequently, to Avient, a leading supplier of long fiber-reinforced thermoplastics and technologies. Avient not only provided suitable material, but also extended invaluable assistance to ensure a successful transition.

THE SOLUTION

Moving away from machining, the Frog Legs team embraced injection molding, enabling them to create more intricate shapes.

Using PlastiComp™ Complēt™ carbon fiber composites offered remarkable design flexibility. Frog Legs emphasized the collaboration with PlastiComp was pivotal.

The second-generation caster wheels developed by Frog Legs incorporate two Complēt long carbon fiber-reinforced composite materials. The wheel forks utilize a long carbon fiber-reinforced nylon 6/6 composite, while the wheel hub comprises long carbon fiber-reinforced thermoplastic polyurethane. Avient engineers also formulated the reinforced polyurethane to chemically bond seamlessly with the urethane used for the outer rolling surface of the wheel. With an aluminum hub, the dissimilar materials never fully bond and can slip.

After six months of intensive development, the new design underwent rigorous testing, surpassing RESNA industry standards for impact and drop forces. The resulting Frog Legs casters, crafted with fiber-reinforced thermoplastics, are an astounding 33% (280g) lighter than the conventional aluminum casters. Moreover, this innovative product effectively reduces vibrations not only in wheelchairs but also in various caster-equipped rolling equipment.

THE IMPACT

Avient's collaboration with Frog Legs has revolutionized wheelchair mobility by introducing lightweight composite caster wheels. The company's dedication to creating superior products and partnership approach with clients like Frog Legs demonstrates its commitment to enhancing the lives of individuals with disabilities. Avient is proud to be at the forefront of innovation, continuously striving to positively impact mobility and comfort.

Interested in learning more? Contact us at **+1.844.4AVIENT** or visit **www.avient.com**.