



Compounding Lines

Your Global Compounder of Custom Engineered Thermoplastics



Reinventing the Wheel

New geared wheelchair wheel system makes uphill travel easier and safer for chair-bound people

A good wheelchair can be of tremendous benefit to a person otherwise unable to get around due to illness or injury. Most of us don't realize just how much pain and risk can be involved in their day-to-day use.

"Wheelchair propulsion is a highly complex movement that requires short, fast, continuous effort with both hands and both arms; the stress on the shoulders and wrists can be significant, and can cause people intense pain," explained Mechanical Engineer, Paulo Rodi of **Plásticos Mueller**, a successful injection molding company in Brazil. The biomechanical hazards, he notes, are greatly intensified as the user tries to climb a slope, with gravity increasing the effort required for movement, as well as adding the very serious danger of rolling backwards.

In late 2009, **Mueller** saw an opportunity to significantly improve wheelchair design with a new type of wheel system that, like a multi-

speed bicycle, could use a gear system to make hill climbing easier. The wheel would automatically brake if the chair began to roll backwards providing a higher degree of safety.

"Our calculations suggested that we could increase safety and reduce the torque needed to move the chair by upwards of 50%," explained Rodi. *"This would greatly improve the mobility and quality of life for many people."*

But the **Mueller** team's mission quickly reached an impasse: the gears needed to stand up to extreme friction and stress.

To ensure long-term operation, the need for a specialized, super-tough, lightweight material was evident. Similarly, they soon realized that they would also need a specialized, high strength-to-weight material to ensure that the superior wheels could be maintained at about the same weight as the conventional wheels they planned to replace.

Fortunately, Rodi knew of **RTP Company** and made a call.

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"I have been in engineering for over 30 years and worked with many companies, and I have never seen a response like I got from RTP Company," said Rodi. "From the very beginning, they told us that they would put all of their resources at our disposal to solve this challenge, and they did."

Working alongside Mueller personnel both in Brazil and in China during the tryout phase, RTP Company soon developed compounds that met all of Mueller's criteria. These included an RTP Company compound with 30% long glass fiber, and RTP 4005 TFE 15 glass-filled polyphthalamide with PTFE lubrication. *"The local support of RTP technical staff to perform additional lab tests was remarkable during that phase."*

The result was dubbed the Mueller easyMOB® system, a geared 24" wheel designed to be fitted to most commercial wheelchairs. Rodi notes that Mueller established an extensive array of validation tests, and that the prototypes made with RTP Company compounds passed them all with flying colors.

"We ran the wheel on a dynamometer under heavy load at the typical 200,000 cycles, and were amazed at how little wear there was," he said. "So we ran it up to one million cycles, and it still performed brilliantly."

With wheelchair users delighted with the new easyMOB® wheels and high levels of interest in the system from wheelchair manufacturers around the world, Mueller is planning to create an expanded line of wheels using the same compounds and know-how they developed with the help of RTP Company.

"They are a fantastic partner, dedicated to succeeding by helping us succeed," noted Rodi. "Their expertise and willingness to help were just extraordinary. I don't think we would have had this level of success with any other supplier."

easyMOB® Wheelchair Gears

Market: Medical

Compound: RTP 4000 series glass fiber reinforced Polyphthalamide (PPA) with PTFE lubrication for excellent wear resistance.

easyMOB® Wheelchair Wheels

Market: Medical

Compound: RTP 100 series Very Long Fiber glass reinforced Polypropylene (PP).



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