

SIMTEX™ Conjugated Filament

Support new mobility challenges: find new smart materials for ergonomic, light and durable parts!



Self-reinforced composite fabric

Key benefits

- › Light-weight
- › Aesthetic freedom
- › Effective reinforcement
- › Strength

The Challenge

We all know that traffic is a problem in cities, pollution issues should be resolved as soon as possible and safety could be improved. These drawbacks have been existed for too much time now and fifty years ago, the believe was we would be moving with flying car in the 2000's! It seems that this innovation will be few years late but breakthrough innovations will happen very soon.

Indeed, researches, surveys and R&D from vehicles companies have **confirmed the mobility will be revolutionized**. The vehicles will be **autonomous**, will use **electrical energy** and the approach around a vehicle will also change: we will be more likely to **buy mobility** when needed instead of owning a vehicle.

These solutions aim at solving urgent problems like cities congestion, population increase and pollution. It will also respond to new consumption habits by managing human and good transports differently.

To do so, the new mobility will go beyond how we are used to move, there will be no boundaries, the way will be deployed outside wheels on roads. We will travel above water, in the sky and above all **the mobility will be smart**.

The mobility will be smart by exploring every possible route, using renewable resources, optimizing the vehicles' interiors. The possibility will be numerous including drones for good transports, river exploitation for public transport and car sharing for example.

What does it mean for materials and plastics industry?

To better help our community to position themselves to serve the new industry requirements, we have conducted a survey around **new mobility challenges and materials**. We found out that while mobility trends are very clear, there is a high uncertainty about materials solutions availability to support these upcoming needs. One thing is for sure, lightweight considerations will be extremely important and **other diversified considerations will merge. They will include batteries efficiency, recyclability and parts degradation reduction, especially for car sharing. Material innovations are needed** and to support these big challenges, mobility players will have to scout new technologies, select the right materials, partner with new suppliers and even find co-development partners.

The future is full of innovations and new opportunities for you, stay aware of new materials developments to be the first to propose solutions matching **new mobility trends!**

The Solution

While the challenges around mobility have been clearly identified, the struggle is found in solutions availability and our role is to make innovation happen thanks to our platform to enable exchanges between needs and solutions.

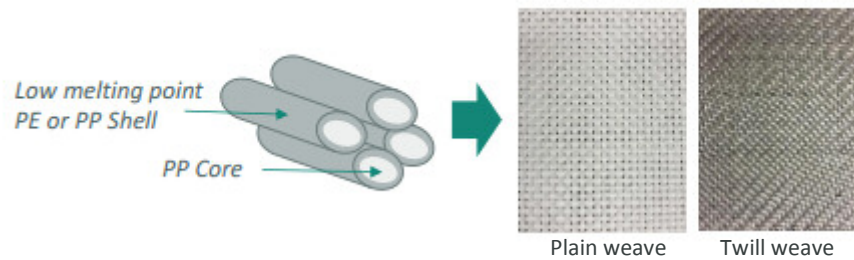
In this context, our mission being to help the plastic value chain to develop products, we have spotted an innovative material: a **moldable composite that is lightweight, stiff and recyclable. SIMTEX™**, this material stands out because it can support new mobility developments by offering an efficient balance between **lightweight and strength** to develop strong parts while staying in the requirement for light and recyclable elements. Indeed, **lightweight is still and will be one of the main focus in the industry** for environmental, design and ergonomic concerns.

› **Self-reinforced composite fabric: a lightweight material to reinforce your parts with an ergonomic design**

The solution is made of self-reinforced composite fabric composed of highly oriented polypropylene based fibers, weaved into a high strength thermoformable fabric.

This unique structure enhances the strength and stiffness of parts compared to unreinforced plastics. They have **improved recyclability (100% polyolefin) and reduced weight** compared to glass fiber-reinforced plastics.

SIMTEX™ conjugated filaments which are the bundle of conjugated filaments converged and welded in parallel enable to achieve both maximized mechanical properties by core fibers and mold-ability by shells enclosing core fibers.



This material enables moldability and aesthetic freedom for innovative shaped parts

- Through hot molding shaping to get any 3-dimensional shape
- Different process available for different part finish available (mat or glossy finish, textured, etc.)
- Color, design and patterns freedom

› Use less materials: Lightweight without compromise on performance!

The self-reinforced composite *fabric is very light*, as the material has a density of 0.78g/cm^3 (for PP(Shell) / PP(Core)), which is the **main benefit** of the material.

When used for parts reinforcement, the self-reinforced composite fabric provides strength while being light and overall less material is needed.

Also, lightweight enable better fuel efficiency and cost savings. Overall, **you have no increase in density while gaining a significant increase in properties!**

Cost saving can also be achieved as the process for thermoforming the parts from the sheets is very simple with **easy moldability and economic process conditions** (low pressures and moderate temperatures).

› Use materials longer: Strength, impact resistance and durability

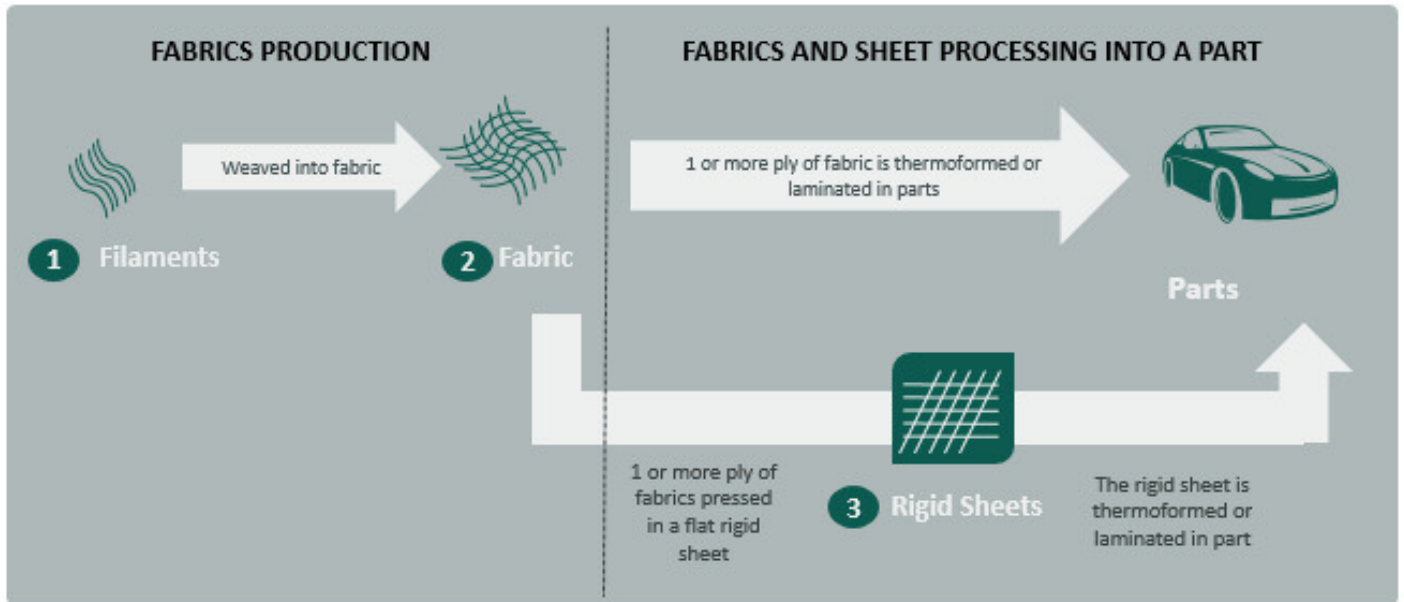
SIMTEX™ offers a good durability thanks to improved properties compared to standards: **strain to failure increased by 2 compared to PC** and dimensional stability due to thermal shrinkage of filament reduced by 2 compared to traditional PP fiber.

Consolidated sheet of the fabric has the following properties (*Data for a filament component PE(Shell) / PP(Core) 4 ply*):

- Tensile strength to yielding: 200 MPa
- Tensile strain to failure: 12.5%
- Flexural Modulus: 2500 MPa

› **Get easy processing for effective moldability and cost savings, aesthetic freedom and sustainability**

The fabric, made from **SIMTEX™ conjugated filaments**, can be shaped not only into a **consolidated sheet** but also into a **3-dimensional shape** directly by hot-molding, i.e. hot-pressing or pre-heating & cold-pressing.



Plain or twill woven fabric can fit the mold properly since intersections of the constituent fibers are not fixed in the fabric. Therefore, the fabrics have easy moldability that can be applied to diverse shapes by various forming processes.

Cost savings is achieved thanks to **easy moldability, simple processing and related process conditions** such as pressure and temperature. The fabric can be molded at the **lower applied pressure** compare to conventional FRP. Indeed, the shaped parts can be molded under a pressure of 1 to 2 MPa. This means that large products can be molded using a press machines with low load capacity.

Furthermore, the fabrics can **be molded at low pressures and moderate temperatures, shorter cycle times** and significant energy saving can be achieved by processing the fabrics to produce molded parts. Examples of molding temperature are 120~140°C for the fabric of PE(shell)/PP(core) and 140~160°C for the fabric of PP(shell)/PP(core). The mold temperature for cooling is below 50°C.

Sustainability is supported thanks to complete cycle life of material: recyclable (100% polyolefin material), short production cycle at lower temperature and also the fact that the lightweight enable less fuel consumption.

To answer the increasing need for aesthetic, **SIMTEX™** presents **naturally a regular and aesthetic weaved pattern** (several available), offered in white, clear gray, anthracite and pale colors. Depending on the chosen process, the aspect can be matt and textured of gloss and smooth.

You can also achieve **any specific design** as the material can support decor film lamination and plastic coating, to color-match other cast or injection parts of vehicles and **prevent degradation**.

Decorative painting



paint
primer
Fabric



Clear
paint
primer
Fabric

The future for mobility solutions is full of possibilities and will surely serve the population in smart ways, but it will only be possible if **the industry is able to propose innovative solutions**. New products like **SIMTEX™** can support these developments as they propose an **excellent balance between lightweight and reinforcement without compromise on cost**.