

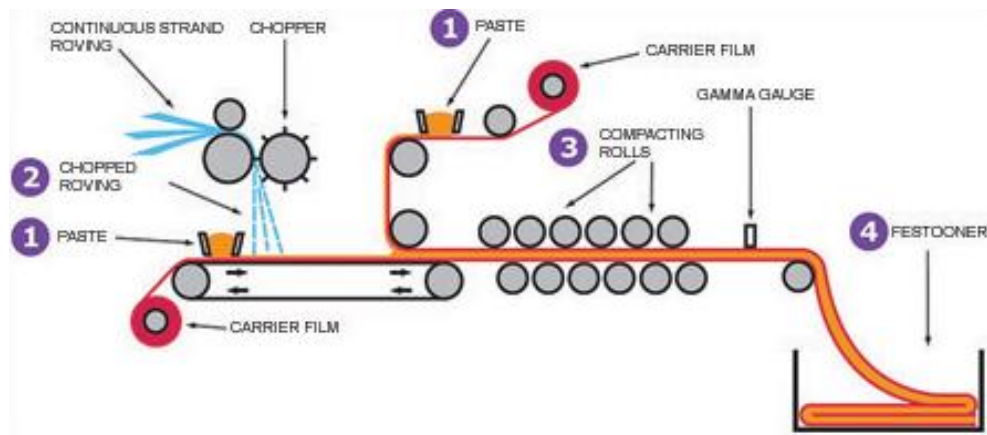
The SMC Renaissance

Have you ever heard of the term SMC (Sheet Molding Compound)? In case you haven't, don't worry, the concept is relatively new to me as well. Recently, an article published by Composites World [1] drew my attention to this manufacturing process once again. I have to say that I was very impressed by Lorenz Kunststofftechnik's new organic sheet molding compound, which can accommodate natural fillers and fibers like ground sunflower seed shells and reeds. To demonstrate this new technology the company managed to produce an automotive rear spoiler. Pretty impressive!



A rear spoiler produced with a new organic SMC [1].

But what exactly is SMC? SMC is a fiber-reinforced thermoset material, a mixture of polymeric resin, fillers, and fiber reinforcements (which are usually chopped). The manufacturing of SMC's is a continuous process that starts when a paste is spread uniformly in a carrier film (made of polyethylene or nylon). Then, chopped fibers are randomly deposited onto the paste. The top film is introduced and the sandwich is rolled into a pre-determined thickness. [2]



SMC manufacturing process [2]

The advantages of using this manufacturing process include good mechanical parts (which enable very light parts), the possibility to extract parts with complex shapes, great surface appearance, and electrical insulation. But the most important feature is that SMC's are easy to produce and can be manufactured in high volume, making it a very economical process. This allows for an upscale in production, which has been a major bottleneck for the widespread adoption of composite materials.

Before studying more about SMC's, I thought to myself that it was a relatively new technology. Further research showed that I was completely wrong. I eventually stumbled across an amazing article named "SMC: Old dog, new tricks", written by Peggy Malnati. That was when I realized that this technology has been commercially available since the early 1960s! At that time, it was utilized a lot by the transportation market. This technology showed steady improvement until its peak during the 1990s. At this point, you must imagine that something might have gone wrong, am I right? During the 1990s, SMC's were exposed to a much broader range of E-Coat and paint line temperatures at plants owned by multiple automakers. There followed the much-publicized blistering and "paint-pop" issues that developed at many plants. These became such a problem that several OEMs threatened to stop using the material [3]. These problems were solved by the early 2000s, however, the programs that included the SMC technology had already been canceled.

Fast forward to 2012, and the demand for sustainability, recyclability, and low greenhouse gas emission spiked the renaissance of the SMC's. But this time, the composite materials are much more established (and cheaper). Huge advances in material technology enable higher mechanical resistance, thinner parts, and a more controlled process. Another

important area of work in the SMC field has been the continuous quest to reduce SMC's specific gravity (SG) [3]. Recent breakthroughs in thermoset SMC technology made it possible to reach an SG of 0.95, which is so light that a molded part will float in water! Even though floatation sounds cool, this was not the focus of the development teams. Lower density improves the strength/weight ratio of a molded part and is highly valued by product manufacturers.

As per the analysis conducted by Market Research Future, the Global Sheet Molding Compound Market is anticipated to acquire a market value of US\$ 2.04 Billion while expanding at a CAGR of 4.79% during the forecast period from 2018 to 2023 [4].

Are SMC's here to stay this time? Only time will tell. But the future looks bright!

References:

- [1] Article: Natural fiber-reinforced SMC targets industrial applications
<https://www.compositesworld.com/news/natural-fibers-reinforced-smc-targets-industrial-applications>
- [2] <https://idicomposites.com/smc-bmc-overview.php>
- [3] Article: SMC: Old dog, new tricks
<https://www.compositesworld.com/articles/smc-old-dog-new-tricks>
- [4] Sheet Molding Compound (SMC) Market Research Report By Type (General Purpose, Flame Resistance, Corrosion Resistance, Electronic Insulators, Others) and By Application (Automotive, Building & Construction, Electrical & Electronics, Others) - Global Forecast to 2023
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