

Abstract for SPE ACCE 2021

***Pushing Carbon Fiber Sheet Molding Compound Forward
by Next-gen Production Line 'CUBE', in-depth Process Simulation and Ongoing
Development of Raw Materials***

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Sheet Molding Compound (SMC) offers excellent characteristics in terms of complex part geometry, function integration, material utilization and productivity at economical cost. Thus, it is well known in industry and widely used. However, it is rarely used for structural applications. This is based on several points: Lack of knowledge about processing parameters during production of the semi-finished materials as well as fiber transport during mold filling leads to a high degree of uncertainty in component design and production monitoring. The specific mechanical properties of commercially available carbon fiber SMC only just beat aluminum and the gap to continuous fiber prepreps seems large. The presentation will provide an overview about recent developments in the field of carbon fiber SMC focusing on recent technology breakthroughs:

- Styrene free, structural resins to prepare the material system for future legal boundary conditions.
- Digitalization of manufacturing the semi-finished material by novel line control and extensive implementation of sensors that monitor and store all quality-critical process parameters.
- New technical solutions to homogenize resin application and fiber bed as well as solutions to deaerate the compound.
- Prediction of compression molding processing defects for complex component geometries by novel direct bundle simulations. These defects could be fiber matrix separation in ribs, knit-line formation at metallic inserts or miss-alignment of fibers in confined regions.

Summarized, the presentation covers the recent inventions of this established but multifaceted technology and will give insight into the promising future of CF-SMC.