Low density SMC Case Study

Auto OEMs are undertaking different programs to enhance the vehicular fuel efficiency; and “Lightweighting” is being adopted as a major strategy. A 10% reduction in vehicle’s weight can increase its fuel efficiency by 6-8% for combustion engines bringing down the CO$_2$ emission level by nearly 10 g per km of car travel. For battery operated vehicles this can increase the travel range by as much as 10%. Standard automotive composites in use today offer about 20-25% weight savings against steel parts. Besides, these materials offer other advantages such as corrosion resistance, improved NVH performances, resistance against denting, part integration leading to lower tooling cost and high speed to market (due to lesser tooling lead time). With advanced light-weight composites, nearly 30 to 70% weight savings over steel are possible. We have developed low density sheet molding compound (SMC) formulations and a process of preparation thereof. The materials are molded into light weight composite body panels suitable for automotive applications. The lightweight composite parts offer nearly 30 to 55% wt. saving (density in the range of 1.2 to 1.6 g/cc) against steel parts and up to 15-35% wt. saving against the standard density SMC parts. The low density SMCs are developed through a successful marriage of nanotechnology and composite technology. Parts molded with these SMCs exhibit superior performances and yet they are commercially more attractive than the competitive SMCs of similar densities.