Advancements in Lightweight Design and Innovative Features in Plastic Steering Wheel

Overview:

In today's automotive industry, steering wheels have evolved far beyond their basic function of controlling the direction of your vehicle. Engineering is done for the lightweight design of the steering wheel with glass-filled thermoplastic, provision for switch bezel and canister assembly, string ribbing for enhanced strength and durability, and the ability of PU over-molding and back cover. These advancements not only elevate the driving experience but also contribute to significant weight reduction, up to 40-48%.

Challenge:

Changing the existing conventional material of aluminum to lightweight material with enhanced performance and significant weight reduction. Virtual evaluation of composite wheel should be analyzed with automotive standards.

Engineering Solution:

Design:
The glass-filled thermoplastic materials will be used to redesign the current sheet metal components to reduce weight, attain higher strength-to-weight ratios, and pass automotive tests.

Head Impact and Frontal Crash:
Multiple head impact tests are carried out at different places to confirm the safety of the passengers in case of accident/ crash while also focusing on frontal impacts to verify the deployment of an airbag for improved passenger protection.

NVH Analysis:
NVH analysis was carried out to understand all the possible dynamic behavior of the steering wheel.

Mold Flow Analysis:
This simulation is carried out in order to find any possible manufacturing defects like cracks, or any voids present in the part before going to actual manufacturing.

Conclusion:

Every simulation step demands design optimization and correct material selection from which we achieved around 40-48% of weight reduction.