

## Developing a hybrid, carbon/glass fiber-reinforced, epoxy composite automotive drive shaft

### ABSTRACT

In this study, a finite element analysis was used to design composite drive shafts incorporating carbon and glass fibers within an epoxy matrix. A configuration of one layer of carbon–epoxy and three layers of glass–epoxy with  $0^\circ$ ,  $45^\circ$  and  $90^\circ$  was used. The developed layers of structure consists of four layers stacked as  $[+45\text{glass}^\circ/-45\text{glass}^\circ/0\text{carbon}^\circ/90\text{glass}^\circ]$ . The results show that, in changing carbon fibers winding angle from  $0^\circ$  to  $90^\circ$ , the loss in the natural frequency of the shaft is 44.5%, while, shifting from the best to the worst stacking sequence, the drive shaft causes a loss of 46.07% in its buckling strength, which represents the major concern over shear strength in drive shaft design.