The effect of automotive side member filling on car frontal impact performance

ABSTRACT

To achieve lightweight design while retaining its crash performance, an aluminum alloy component filled with foam has been adopted as an alternative lightweight material. In the paper, the effect of different types of filling on the automotive side member is studied. Impact performance is compared in terms of the automobile energy absorbing capability and also its occupant safety, measured in terms of head injury criteria (Manning) and chest severity index (CSI). It is shown that the partially filled side member with values of 513.6 (HIC15), 677.3 (HIC36), 807.2 (CSI) and a weight of 5.45kg is found to yield lower potential of injury, and higher specific energy absorption (SEA) compared to an empty side member. It can be concluded that, even though the fully filled side member shows remarkable performance in terms of HIC, it increases the chances of injury to the chest. Future study can include different types of foam for performance improvement.

Keyword: Impact; HIC; CSI; SEA