

Effect of hole dimension on the impact load path distribution of composite multi-bolt joint

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Abstract

The aim of this study is to evaluate the influence of composite multi-bolt joint holes' dimension on low velocity impact load distribution using the drop tower. Laminates containing four holes in different diameter and different position were tested, then the damage morphology was obtained by using C-scanning and was compared with laminate without hole. It was found that presence of holes increases the energy absorbed by damage as well as the damage areas, while the typical curves of load- displacement and load-time history nearly kept the same. This clearly shows that the presence of laminate hole has little influence on out of plane load carrying capacity. At the same time, with the increasing of hole diameter and decreasing of distance between impact point and hole position, the crack initiates near the hole edge and then propagates towards the impact point. But laminates without hole the crack initiates near the impact point. This indicates the load path distribution was changed due to the presence of laminate hole. So with the constrain of out of plane load capacity, the load path distribution can be easily designed by using the holes in the right place.

Keywords: load path distribution, composite multi-bolt joint, impact damage, C-scanning