Bearing mode absorber – On the energy absorption capability of pulling a bolt through a composite or sandwich plate

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Abstract
An experimental study was conducted to investigate the energy absorption capability of continuously pulling a metallic bolt through a composite or sandwich plate (Fig. 1). The influence of various parameters like the fibre and matrix material as well as the fibre architecture and angle on the specific energy absorption under quasi-static and high-rate dynamic loading was assessed. The achievable quasi-static weight-specific energy absorption (SEA) values up to 164 kJ/kg are very promising compared to classical absorbers. Considerable strain rate effects led to significantly lower values under high-rate loading, though. The thin-skinned sandwich specimens used in this study were not competitive with lower SEA values.

Fig. 1. Image sequence of bolt pull-through test (left) and post-test specimen view (right).