

## Optimization of laminated structures considering manufacturing efforts

Markus Schatz<sup>1</sup>, Horst Baier<sup>2</sup>

<sup>1</sup> Technische Universität München, Lehrstuhl für Leichtbau, Germany, schatz@llb.mw.tum.de;

<sup>2</sup> Technische Universität München, Lehrstuhl für Leichtbau, Germany, baier@llb.mw.tum.de;

### Abstract

In many cases, structural design optimization highlights great weight saving potentials, but yet, engineers may face difficulties unlocking these potentials, since further economical and technical constraints need to be obeyed. This especially holds for the optimization of composites, because manufacturing techniques often not only imprint limits onto realizable parameter configurations for a given design, but furthermore differ considerably in the associated manufacturing effort level for different parameter configurations. This work mitigates this issue of inchoate designs, by introducing a method capable of quantifying expert knowledge regarding manufacturing effort at early design phases and, thereby, leveraging the optimization's significance by introducing technical aspects into the optimization responses. The method will be introduced and displayed at length and thereafter be presented for a structural design optimization task.

**Keywords:** composite design optimization; quantification of manufacturing effort; considering efforts associated with the prepreg lamination technology; ply waste algorithm.