P-2-268

# STRENGTH PREDICTION OF CONTINUOUS FIBRE REINFORCED PLASTICS CONCERNING THICKNESS EFFECTS

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Extreme lightweight applications are realised with laminates made of continuous fibre reinforced plastics.With those continuous fibres the fibre alignment can be defined very precisely. So the outstanding mechanical properties of the composite can be completely exploited. Usually modern strength analysis of laminates made of continuous fibre reinforced plastics is conducted layer by layer. Therefore, basic strength values are concerned as constant material properties which are experimentally determined on single-layered, unidirectional specimens. However, former experimental results indicate that layers behave differently when they are integrated into a laminate layout. Especially when using brittle matrices the layer strength might depend on the layer thickness and on the stiffness of adjacent layers. For instance it can be assumed that the layer strength increases when the layer thickness decreases. Extreme lightweight applications are supposed to be designed more efficient concerning these effects. This paper deals with a systematic experimental test programme focussing on inter fibre fracture of carbon fibre reinforced epoxy and the subsequent development of a strength prediction model. The experimental tests are to clarify the existence and to show the magnitude of the thickness influence. The analytical model is supposed to be integrated easily into modern strength analysis software, since there is no need of additional material parameters. It bases on existing models which deal with the fibre transverse tensile strength and shear strength. The model is extended to the dependency of the fibre transverse compressive strength on the layer thickness. The realisation of this model is implemented into the modular programme code of the software ALAN (Advanced Laminate Analysis), which has been developed at IKV. Therefore it is possible to account for the influence of layer thicknesses within a usual laminate analysis as an option.