Abstract

The further exploitation of Liquid-Composite-Moulding Technologies (LCM) for the manufacture of Fiber-Reinforced-Plastics (FRP) relies on an eligible preforming process. Preforming of fibrous reinforcements aspires the manufacture of dry skeletons of the fiber assembly with the desired fiber orientation based on a pre-defined fiber type. The LCM processing must be maintained by the preforming technique. However, FRP part properties - given from fiber orientations - should not be affected.

Sewing technologies, in all their varieties, can be applied as very flexible preforming methods. Analogies between making-up dry reinforcement structures and the classical field of sewing, e.g. garment manufacture, led to a substantial progress in technologies available for preforimg as well as to increased economical benefits through the application of sew-preforming.

A comprehensive understanding of the application of sewing technologies for FRP – from the treatment of a semi-finished product to the infusion of a stitched preform – is the basis for the design of an all new process chain.

The present work classifies this new preforming method within the existing technologies. Furthermore, critical sewing machine elements are evaluated regarding FRP compatibility. Stitching parameters and their impact on the reinforcement quality as well as the FRP processing (LCM) are discussed.

Focusing on the economic efficiency of the sewing preforming technology, the critical number of parts for selecting the right preform technology is discussed. The new process chain enables the selection of the critical vertical range of preform manufacture.

The large variety of preform design parameters, e. g. stitch density, needle thread tension, seam type, sub-preform-structures etc., requires a “Preform-Engineering”, covering an interface between preform manufacturing and FRP-part design. This parallel engineering of part-, preform- and process-design leads to a global reflection of the LCM technology. Thus, FRP part quality can be raised.