

A THICK WALLED COMPOSITE TUBULAR AND METHOD OF MAKING

Abstract

A method and apparatus for forming a tubular 62 from a composite material. The composite material includes fibers 54, 56, 58 and epoxy resin 60 that are formed into plies 52_i that are wound around an axis to form an annular member. The fibers 54, 56, 58 in each ply are arranged axially and hoopwise. The axially oriented fibers 54, 56 are angled from about 10° up to about 20° with respect to an axis of the tubular 62. The hoopwise fibers 58 are wound in the plies 52_i ranging from about 60° at the innermost ply 52_1 up to about 90° in the outermost ply 52_n . The hoop fibers 58 in the intermediate plies $52_{i+1-n-1}$ are arranged at increasing angles with distance away from the innermost layer 52_1 . Transitioning the hoop fiber alignment in the successive plies better distributes hoop stress through the wall of the tubular 62 thereby reducing stress concentrations on the innermost ply 52_1 .

Figure 5