

Filament Winding of TISIC

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TISICS is manufacturing continuous SiC fibres with a reported strength of approx. 4 GPa and an E-modulus of about 400 GPa. The fibres are used to reinforce titanium or aluminium matrices. The metal matrix composites (MMC) are aiming for space and aerospace applications to achieve mass saving in the range of 30 to 70% by either direct material substitution or in conjunction with component design optimisation. At present the (TISICS) technology used to manufacture the composite parts consists of manual lay-up of sheets and fibres (or coated fibres). The manual manufacturing process has been successfully used on flat parts (two-dimensional structures) but is inappropriate for complex 3D-shaped parts like High Pressure Vessels (HPV), landing gears, etc..

Therefore TISICS is working with partners automating the current technology by robot assisted lay-up (within an ESA funded programme) incl. the winding of filaments for rotation-symmetrical parts. This new manufacturing route will guarantee the required accuracy for the positioning of the fibres hence bringing TISICS into a position to manufacture 3D-structures. This combined with a diffusion bonding process allows TISICS to manufacture repeatable net-shape parts, reducing both material wastage and reducing lead-times whilst at the same time minimising final machining/finishing operations. The diffusion bonding technology also allows incorporating pre-machined solid metal features like brackets, mountings, etc. leading to the manufacturing capability of complex parts, adding functionality.