



Carbovar - Nanovate-NV Surface Composite Tooling



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Carbovar is an innovative composite tooling technology jointly developed by Advanced Composites Group Ltd. (ACG) and Integran Technologies Inc. A combination of ACG's lightweight composite carbon fibre prepreps and tooling expertise with Integran's Nanovate-NV surface coating has led to the development of mould tool technology that has all the advantages of a composite tool (low thermal mass, light weight, low self-weight deflection, short lead times, lower cost, etc.) combined with the surface durability and hardness of a metallic tool.

Advanced Composites Group Ltd is a market leader in high performance composite tooling for aerospace, automotive, space and marine applications using the Group's own prepreg materials and engineering expertise.

Integran Technologies Inc's expertise lies in the development and manufacture of nanostructured metals and coatings. Nanovate-NV is a nickel/iron alloy with a nano-crystalline grain structure which gives a metallic coating with a low coefficient of thermal expansion (CTE), a high yield strength and a hardness approaching that of tool steel.

Developed over the last five years, initial investigations looked at different ways of applying the Nanovate-NV coating to carbon fibre tooling

laminates in order to obtain high and reliable bond strengths after repeated thermal cycling.

Further work looked at optimising the coating composition and laminate lay-up to match the coating CTE with the CTE of carbon laminates in order to minimise thermally induced distortions. Techniques for accurately applying the coating around complex geometries have been developed and optimised with finite element modelling of the coating process.

The demonstration tool is for an Airbus A320 wing to fuselage fillet fairing. To date, three of these tools have been manufactured, each with small improvements and changes in the manufacturing process in order to optimise the technique.

At an average cost of £250,000 per tool for the Dreamliner alone, the potential market value for tooling over a 4-year period is in the region of £250 million. Converting just 10% of these "safe" metallic mould tools to a Nanovate surfaced composite mould tools could equate to a possible saving of over £5 million.

ACG and Integran are eager to evaluate tooling manufactured using this innovative technology and would welcome enquiries from interested parties.

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