

Case Study

Ultra-Lightweight Wheelchairs Produced With ACG's VTM[®]264 Prepregs



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Erik Kullgren, Elitkomposit Technical Director, said: "It took four years to develop the PANTHERA X™. We've spent endless hours of testing just to optimise the fibre directions and determine the right combination of fibre qualities."

Continuing, he said: "With ACG's assistance on material selection and applied technologies support, we have delivered a product which offers unparalleled benefits. We look forward to future collaborations."

Company:

Swedish wheelchair design and manufacturing company Panthera AB developed its ultra-lightweight wheelchair and approached ACG's agent Svenska Tanso AB for advice on a potential production partner. Composites manufacturing company Elitkomposit AB was recommended, and is now producing the frame and backrest of the ultra-lightweight Panthera X™ wheelchair. Panthera AB anticipates that it will build up to 900 units per annum for the world market.

Objectives:

To manufacture a wheelchair that is:

- Lightweight, with a frame and backrest that exhibit high strength, and excellent stiffness and torsion characteristics

Use prepregs that:

- Produce an excellent surface finish
- Eliminate reworking following demoulding
- Promote excellent bonding of the thermoplastic surface film to the components

Production Process:

Press moulded in heated aluminium tooling, incorporating high-pressure bladders.

Prepreg Features:

ACG's VTM[®]260 Series resin systems are toughened, flexible cure temperature epoxy resin matrices specifically developed for vacuum bag processing and the manufacture of large structures.

These resins offer excellent handling and processing characteristics

Improvements Gained:

With technical advice and support from ACG's Applied Technologies team, Elitkomposit decided to use ACG's VTM[®]264 unidirectional and fabric carbon prepregs. Elitkomposit's exceptional heated aluminium tooling, incorporating high-pressure bladders, and the unique viscosity profile achieved by press moulding VTM[®]264 prepregs, produced excellent results and repeatable fibre wet-out of the selected reinforcements. The light and medium weight unidirectional and fabric reinforcements, selected by Elitkomposit and Panthera, provided the requisite stiffness and torsion

across a range of reinforcements in both standard prepreg and ZPREG[®] selective impregnation formats.

VTM[®]260 Series resin systems and their associated, complementary adhesives, surfacing films and syntactic plies can be co-cured, and can be used for component and tooling applications.

characteristics for the frame and backrest. The characteristics of the VTM[®]264 resin led to superior bonding of the thermoplastic film to the components, providing an exquisite surface finish.

The combination of ACG's VTM[®]264 carbon reinforced prepregs, Panthera's design and Elitkomposit's expert manufacturing techniques means that the Panthera X™ wheelchair weighs only 2.1kg in its transportation state and 4.4kg when fully assembled, making it, by a margin, the lightest production wheelchair in the world.

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VTM®264 Prepreg:

- Outstanding vacuum-only processing capability on a wide range of reinforcement formats
- Flexible curing capability in a single prepreg system; low temperature (65 to 80°C) and medium temperature (80 to 120°C)
- Up to 30 days out life at 21°C
- 12 months freezer storage life at -18°C
- Service temperature up to 100°C
- VTM264 intermediate viscosity and tack - suitable for full impregnation of light and medium weight unidirectional and fabric reinforcements
- Available in ACG's ZPREG® selective impregnation formats
- Complementary range of VTM260 Series adhesives, surfacing films and syntactic plies
- All VTM260 Series resins are fully compatible and can be co-cured

VTM®260 Series Variants:

- VTM263 high viscosity, low flow variant - suitable for selective impregnation of fabrics or full impregnation of lightweight fabric reinforcements
- VTM264 is also available as a flame retarded variant VTM264FRB
- VTM266 low viscosity - suitable for the full impregnation of ultra-heavyweight fabric reinforcements up to 2400g/m²
- VTM267 - reduced temperature sensitivity and controlled tack for sided impregnation and film infusion. Flame retarded variant VTM267FRB also available



Tom Bernstein, ACG Technical Sales Representative, said:

“Our VTM®264 is a toughened, flexible cure temperature carbon prepreg specifically developed for vacuum bag processing and the manufacture of complex structures.”

“In this application, VTM®264 has revealed the true versatility of ACG's prepreps, delivering exceptional results for what was a technically demanding application.”



Photos © Panthera AB

Note:

The Panthera X™ is just one of a wide range of wheelchairs produced by Panthera AB at their factory in Stockholm, Sweden. Designed by Panthera AB, the frame and backrest of the Panthera X™ are manufactured by Elitkomposit AB. All other parts are produced in-house by Panthera AB or by specialist manufacturing companies, but the wheelchair is assembled by Panthera AB.

For further information about Panthera AB and Elitkomposit AB, please visit: www.panthera.se and www.elitkomposit.se

Panthera X™ is a trademark of Panthera AB

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