

Taking advantage of new 5-axis CNC machining technology

U.S. based AGC Composites & Aerostructures Group is a global supplier of technologies, systems and services that support key military programs and branches. When they began manufacturing parts for United States Army helicopters, they turned to Diversified Machine Systems to help design and implement 5-axis CNC machining centers to keep pace with the demand.

Two companies of AGC Composites & Aerostructures Group, Unitech Composites and Integrated Composites, each utilize Diversified Machine Systems' 5-axis CNC machining centers in their operations. Their high-quality products and systems support the commercial and general aviation market, as well as a wide range of military platforms.



Fig. 1: CH-47 Chinook helicopter

Composite Universal Weapons Pylon

Located in Marina, California, Integrated Composites manufactures the lightweight Composite Universal Weapons Pylon (CUWP), which is mounted on the sides of the Bell OH-58D Kiowa Warrior, an armed scout attack helicopter. The CUWP was an original design by their team

in order to help reduce weight on the aircraft. They have since transitioned into high-volume manufacturing, as demand has grown within the US Army.

The CUWP provides an important attack capability for the pilots, and the carbon composite material reduces the weight load on the helicopter. Initially, profiling the ends of the composite pylon tube was done by hand, which was very time consuming, and this created a dilemma as they faced increasing demand for the product. One solution was the Diversified Machine Systems (DMS) 5-axis CNC machining center, which proved to be the cost-effective way to trim the carbon tube profile for bonding the inboard and outboard titanium fittings of the CUWP.



Fig. 2: Composite Universal Weapons Pylon (CUWP)

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Maintenance walkway panel

Unitech Composites (Hayden, Idaho) manufactures products such as the maintenance walkway panel for the Boeing CH-47 Chinook, a twin-engine, tandem rotor heavy-lift helicopter used for cargo and troop transport. Located at the rear of the helicopter directly below the rear rotor assembly, the panel can be opened and extended down to serve as a maintenance platform for the aircraft maintenance personnel to stand on to do their work.

The company manufactures over 150 panels a year for CH-47 aircraft. In the past, they used to cut these parts manually, which was very labour intensive and caused excessive scrap. This prior approach limited the ability to produce large volumes of parts.

Labour savings

As the complexity and precision of composite parts increases, advanced manufacturing capabilities are necessary to remain competitive within the aerospace industry.

When the company implemented the DMS 5-axis CNC machining center, it provided substantial savings in labour, as well as greater accuracy of the trimmed part – which in turn reduced scrap. Moreover, they don't use their machine



Fig. 3: DMS 5-axis CNC router machining a panel for the CH-47 Chinook helicopter at Unitech Composites

to rotate into position; they use all 5 axes at the same time during the cutting. They can keep their cutter true to the design of the engineers, so that manual processes are minimized. Their capacity has more than doubled since adding the 5-axis machine.

Inspection process

Another problem with the manual approach in the past was evident in the time-consuming inspection process. Unitech Composites also utilizes their DMS 5-axis machining center to inspect parts. The only true way to check the measurement of a flexible fiberglass part trim would be to leave it on the fixture in the position it was trimmed. Using a Probe attachment and Delcam software, they are able to mimic the machine movements and create the surface placement

in space, without allowing it to move into a new position. In the past, the company had to try and recreate the holding scenario in QA. Now, it can be checked in its natural state without moving the part; each point can be probed and compared to the model. The accuracy is within 0.002" and the measurement data is formatted into a document that is provided to the customer as a first article inspection report. The requirement for state-of-the-art technology is apparent in the aerospace industry. The company is fully committed to the highest standards of quality and continuous improvement in serving its customers, and tangible evidence of this is how it utilizes the DMS solution in manufacturing. ■

More information:
www.dmscncrouters.com
www.AGCAerospace.com