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Team Airborne Laser (ABL) has begun fabrication of the ABL's revolutionary, high-energy laser weapon system turret assembly at Lockheed Martin Space Systems' Sunnyvale, Calif., facility.

Boeing leads an industry team selected by the U.S. Air Force to develop and demonstrate a revolutionary Airborne Laser weapon system. Team ABL includes the U.S. Air Force, Boeing, TRW and Lockheed Martin.

The turret assembly, located on the nose of the system's modified 747-400 Freighter aircraft, houses a rotating 1.5-meter telescope designed to locate hostile missiles while in their boost stage. The turret assembly is one part of Lockheed Martin's overall Beam Control/Fire Control (BC/FC) system that ensures the laser is accurately aligned and pointed at its target. It is housed in a "roll shell" that allows it to rotate 150 degrees in order to track the moving missile. The complete roll shell is to be delivered to Boeing for integration into the modified 747 in the spring of 2001.

Work recently was completed on the first half of the roll shell. Production on the second half of the roll shell is under way with overall completion date set for this summer. The roll shell is part of the overall turret assembly and supports the turret ball with internal optics. It is a critical element of the roll and yaw gimbal assembly that directs the laser to its target.

"The biggest challenge the team faced was applying the large sheets of graphite epoxy cloth laminate over the small corners of the roll shell mandrel," said Steve Pieracci, Lockheed Martin ABL engineer. "The engineering and manufacturing team worked this aggressively by perfecting six design patterns, which were then repeated until the final ply."

The roll shell consists of 36 layers of graphite-epoxy cloth laminate, with an outer layer of Astrostrike copper mesh for lightning and static build-up protection. Each layer is applied to the roll shell mandrel to form the final part. Fabrication of this first half took 29 days to complete, and one day to cure in a high-temperature autoclave. The roll shell half will undergo ultrasonic inspection and will be trimmed to its final dimensions. It then will be integrated to internal components and then integrated into the final turret assembly.

ABL is a megawatt-class laser weapon system carried on a 747-400 Freighter aircraft designed to autonomously detect, track and destroy hostile theater ballistic missiles. ABL will operate at altitudes above 40,000 feet where it will acquire and track missiles as they are launched using an infrared search and track system. The BC/FC system then will accurately point and fire the laser with sufficient energy to destroy the missile while it is still in the highly vulnerable boost phase of flight -- before separation of its warheads.

Boeing is the team lead for weapon system integration, and supplies the 747-400 Freighter aircraft and the battle management, command, control, communications and computers. TRW provides the chemical-oxygen-iodine laser and ground support. Lockheed Martin Space Systems is designing, developing, and building the BC/FC system.

The first 747-400 Airborne Laser flying platform recently was delivered to the Boeing modification center in Wichita, Kan., where it will be transformed over the next 18 months into America's first directed energy weapon system. A series of demonstrations lead to a test in 2003 against a boost-phase theater ballistic missile. Upon demonstration, America will have emergency capability if needed to respond to the growing threat from these ballistic missiles as soon as 2003.

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