



DESCRIPTION:

In the 1980s, the Canadian Air Force purchased a number of CL600 Challenger Aircraft for VIP transport and electronic war fare. These aircrafts were certified to the Federal Aviation Regulations (FAR) part 25. Specific CF requirements made it necessary to modify these aircrafts. Among other changes like avionics and wiring, cut-outs were made in the tailcone structure for an infrared sensor, a ram air intake, as well as a chaff dispenser.

After the CF decided there was no further need to operate the CL600 Challenger aircraft, three CL600 aircrafts were sold to a private operator who contracted out the removal of the modifications installed by the CF. The contractor was tasked to re-certify these aircrafts to FAR 25. The cut-outs remaining after removal of the tailcone modifications were considered as damage and repair schemes had therefore been developed to re-establish the structural integrity of the original tailcones. Martec Limited was therefore tasked by the contractor to analyze the proposed repair schemes and to modify the repair schemes as required to ensure the structural integrity and durability of the repairs.

The tailcone structure consists mainly of Kevlar 49 prepreg material for the skins and Nomex honeycomb of variable thickness for the core material. Local ply-build ups and changes in core thickness are used to account for local loads in the tailcone design.

The proposed repair schemes were analyzed and modified as required ensuring the structural integrity of the tailcone structure for the environmental conditions in which the aircraft operates. Technician experience as well as inspection limitations were considered in the repair design and analysis, providing a sufficient margin of safety. The performed analyses were based upon traditional classic lamina analysis theory (CLA), basic engineering methodology, as well as lamina analysis software. The repairs were executed by the contractor and the aircraft has successfully been re-certified to FAR 25.
