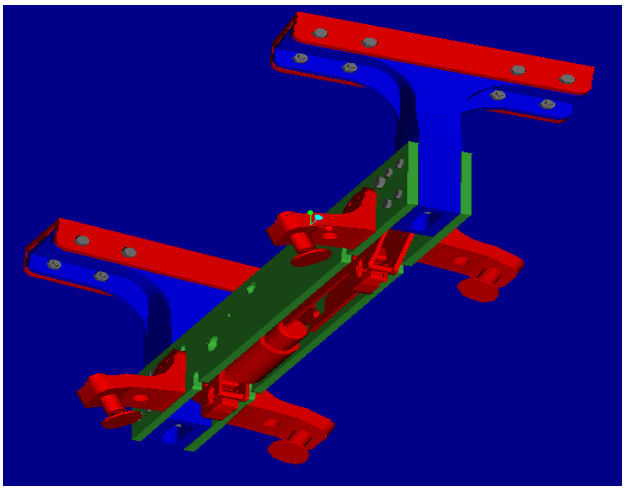
MARTEC™

CT133 WING PYLON REDESIGN, GROUND TEST & CALIBRATION



DESCRIPTION:

The Canadian Forces EWT-33 wing pylon structures were modified to reinforce the forward and aft pylon legs to increase their load carrying capability. The modification was required to enable the safe carriage of new and heavy stores, such as the ALE-503, needed to support the aircraft various electronic warfare roles. The structural modification consisted of the addition of gusset plates that are welded to each of the pylon legs. Problems associated with the embodiment of the structural modification and quality of the welds had resulted in added maintenance burden for the maintenance personnel.

Martec Limited was contracted to perform a loads analysis and calibration of the modified EWT-133 wing pylon and to perform the redesign of the pylon structure to reduce the maintenance burden associated with the weld inspection and to increase its overall performance. Also, the new pylon was required to interface with an existing bomb rack currently in the inventory to improve its maintainability.

The project initially required Martec to develop a Finite Element model of the pylon/store structure. Early FE analyses had concluded that the original pylon could not sustain required maneuver loads consequently the pylon was strengthened through the addition of gussets on both sides of each leg.

Following its instrumentation by the Aerospace Engineering Test Establishment (AETE) with support from Martec, the modified pylon was ground tested by Martec at the Technical University of Nova Scotia (TUNS) in order to validate the FE model, calibrate the instrumentation, and derive strain/load transfer functions which were used to determine flight test limits. The pylon was mounted upside down on a rigid structure with a structurally representative dummy store attached to it. Known loads were applied at various locations/ directions on the dummy store and measurements from the strain gauges on the pylon and lugs as well as the load cells under the swaybraces were recorded. The results of the ground test permitted the derivation of 11 “Pylon Bending Moment” transfer functions each using a different set of strain gauges. Martec identified pylon bending moments as a critical flight test variable thus a large number of transfer function permitted the use the most accurate function while maintaining numerous alternate functions in the event of gauge failure(s). In fact, once programmed into the flight test computer, the transfer functions could be interchanged within a few minutes, even during flight.

Overall, the CT-133 wing pylon ground test offered good correlation with the FE model and its calibration provided accurate transfer functions essential to the proper conduct of the subsequent flight test.