

CASE STUDY

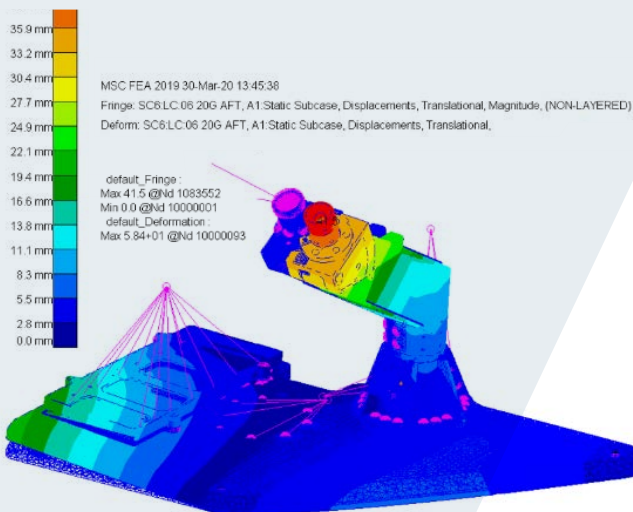
# Helicopter Multi-Weapon Gun Mount



## Task Objectives

Airframe Designs was engaged by GVH Aerospace to assist with the design, development, and certification of a multi-weapon mount to carry various types of general purpose machine guns in the cabin of a military helicopter.

The objective was to certify the weapon mount to meet both EASA CS-29 civil airworthiness regulations in addition to customer specified military airworthiness requirements. Additionally, the client required vibration (normal modes) assessment to support Permit to Fly conditions, and to enable flight testing of both the prototype and final production designs.



## Finite Element Modelling

A static strength assessment of the baseline design was undertaken using MSC NASTRAN Finite Element Code.

FE Models were built to represent the forward and aft mounts for both the stowed and deployed weapon configurations to cover the firing arc load envelope.

## Static Analysis & Testing

A design iteration and optimisation loop ensued, using the FEM results in combination with traditional hand calculations to ensure that all parts and joints were adequately sized to meet the necessary design criteria.

Following the prototype manufacture, a static test was defined, witnessed, and reported.

AFD compiled the Test Plan and assisted with the design of the test rig whiffle tree to ensure that loads were introduced to the Test Article in a representative manner.

Pass / Fail criteria were assessed during and after the test to ensure that the necessary compliance was achieved.



## Fatigue Assessment

A Mean Time Between Failure fatigue assessment was carried out to ensure that the design possessed the necessary durability when experiencing weapon firing recoil loads.

## Allowable Damage Assessment

An allowable damage assessment was carried out to establish the level of damage or material loss that would be acceptable in-service.

This assessment fed into the Instructions for Continued Airworthiness (ICA) and advised on both allowable damage limits and acceptable repair instructions.

// "AFD was engaged from start to finish in this programme, providing reliable specialist support in the Structures Topic.

During both the prototype and serial production phases, AFD supported both GVH UK and GVH AU in solving complex strength issues, preparing the ground for a successful certification campaign.

AFD offer a Turn-Key Structures solution for EASA DOAs by providing a team of experienced Stress Engineers backed up by independent Compliance Verification Engineers (CVEs)." //

**Gareth Dyer**  
GVH CEO

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