

## CASE STUDY:

### Harrier & Tornado - Engineering Support

#### Project Overview

BAES have an extensive fleet of Harrier, Tornado & Typhoon aircraft currently in squadron service with Air forces around the world that require support on a continuous basis. BAES provide support this fleet of A/c through an ongoing programme of modifications, updates, continuous product development which is managed and administered through its Farnborough and Warton offices.



#### Customer Requirement

Customer strategy was to align a key 'prime supplier' to support the engineering needs of its Harrier / Tornado aircraft modifications and in service support programme based at Farnborough, Hampshire. This initiative, lead by BAES at a corporate level identified a number of aims, in summary these were:

- Secure engineering resources for BAES – more consistent & improved quality
- Secure competitive rates through BAES corporate negotiation
- Reduce 'poaching' and 'leapfrogging' of hourly rates
- Simplify off-site (work package) subcontracting
- Reduce BAES management overheads by reducing the number of suppliers
- Encourage key 'prime suppliers' to invest in training and facilities.

#### Engineering Support Provided by GKNAES

GKN Aerospace Engineering Services (GKNAES) was selected as one of six engineering subcontract service providers by BAES Corporate to support Military Aircraft programmes. GKN was aligned as the sole supplier to the Harrier A/c programme, this role has now grown to include other aircraft types such as Tornado and Typhoon.

In 1998 GKN set up a dedicated 'Harrier' design facility in Aldershot, Hampshire, two miles from our customers offices, equipped with fully compatible IT infrastructure and networked into the BAES site. The 60man team based at Aldershot provide a high level domain product knowledge on the customers programme supporting all aspects of upgrades, modifications and in-service support.

#### Summary of Engineering Support provided by GKN

GKNAES provide support to the programme in the following key areas:

##### Harrier (Design)

- Design support on Harrier GR9 replacement rear fuselage
- Support to Capability A programme, development of concept design schemes to full 'c' scheme status and full retro & detail drawing development
- WQN incorporation into design engineering data set
- GKN team members working on secondment at the customers Farnborough facility

##### Harrier (Structures)

- Support to design tasks within the Aldershot office
- Stores clearance – update software clearance of weapons pylon & up rated engine
- Finite element modelling of rear fuselage for Harrier GR7 including main equipment shelf
- Check stress relating to Harrier repairs
- Stress analysis for structural / fatigue investigations for in-service A/c
- Support to Harrier Weights database for Harrier 1 & 2 A/c

**Tornado**

- Scoping & design incorporation of various mods into the Italian MLU Tornado
- Stress analysis support on various mod tasks

**Typhoon**

- Generation of wiring diagrams & installation drawings utilising CATIA E3D for forward cockpit and ECS bay
- On-site liaison and shop support to the Electrical Loom shop during manufacture of forward fuselage wiring harnesses.
- DLRI – design of digital mock-ups line replaceable items
- Design & analysis of additional conformal fuel tanks into rear fuselage.

**Nimrod**

- MCR support – incorporation of mods and change requests

**Key Points**

- Resources drawn from GKNAES's UK & Australian facilities are deployed on above tasks
- An overall team size that peaked at 120 engineers were utilised within GKN facilities in both UK & Australia.
- Teams deployed at both GKNAES and BAES sites
- 'Value added' through high level of A/c domain product knowledge within GKN team
- GKN facilities fully networked into BAES sites - full connectivity.
- Seamless co-located working with BAES & GKN representatives at each facility
- Strategic direction for relationship set by a joint senior level 'Steering Team'.