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2182D-1027-821/HSM-4 (DTAES 4)

10 Sept 2012

Distribution List

TAA RECOGNITION OF MARSHALL AEROSPACE UK

References: A. DTAES Visit to Marshall UK, Cambridge, 11-14 Sept 2006
B. TAA Recognition of Marshall Aerospace UK Technical Disposition, 31 August 2012, AEPM RDIMS 579411

1. At reference A, DTAES staff conducted an airworthiness due diligence visit to Marshall Aerospace UK (MA UK) to evaluate the engineering capabilities supporting the Marshall Canada (MAC) Accredited Technical Organization (ATO). Reference B documents these capabilities and describes how MA UK's engineering certification processes meet the requirements of the Technical Airworthiness Program.

2. Based on the reference B recommendation, Marshall Aerospace UK is now recognized under the DND Airworthiness Program as an approved engineering data supplier for the CC130 E/H models. MAC may now treat data generated from acceptable MA UK processes as approved data and issue airworthiness approval on MA UK approved design changes developed on foreign C-130 platforms by using the Type Design Examination (TDE) process. MAC may also use MA UK engineers as finding authorities supporting CC-130 E/H modification and repair projects.

3. With this recognition, Marshall Aerospace UK and Marshall Canada commits to maintaining an acceptable level of safety for all airworthiness related activities conducted. MAC is required to update their Engineering Process Manual to enable the acceptance of approved data and use finding authorities from MA UK.

Dave Hurst
Directorate of Technical Airworthiness and Engineering Support 4
Manager Accreditation and Audit
For Technical Airworthiness Authority

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Distribution List

Action

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Airworthiness/Technical Disposition
DTA 4-06-18

Title: TAA Recognition of Marshall Aerospace UK
File Number: 2182D-1027-821/HSM

References: A. Granting of AW Accreditation to MAC ATO, 27 March 2009 RDIMS #813491
B. MA UK Regulatory Approval Certificates, AEPM RDIMS 1151638
C. TAM, C-05-005-001/AG-001, Change 5
D. Marshall Canada Engineering Process Manual file HS-06-0017-RPT

1. AIM / OBJECTIVES

1.1 This Airworthiness/Technical Disposition provides an overview of DTAES' due diligence visit to Marshall Aerospace UK (MA), Cambridge from 11 to 14 September 2006. The purpose of this visit was to gain sufficient knowledge of MA engineering and support services available to Marshall Aerospace Canada (MAC) in order to justify TAA recognition.

2. LIST OF ATTENDEES

2.1 The following individuals met with DTAES 4 team (Mr. Dave Hurst and Mr. J.P. Gagné) as per reference B schedule:

2.2 Mr. Graham W. Redgrave – Chief Structural Engineer/Head of Airworthiness MA
2.3 Mrs. Sandra Merritt – Senior Design Engineer MAC
2.4 Mr. Hugh Haddow – Head of Avionics Design
2.5 Mr. John Ramsell – Quality Manager MA
2.6 Mr. Rob Kempsell – Section Manager Quality: Design and Manufacture
2.7 Mr. Bill Hanley – C130 Engineering Manager
2.8 Mr. Mark Palmer – Head of Repair
2.9 Mr. Dave Hudson – Head of Training (Engineers and Mechanics)
2.10 Mr. Duane Kritzinger – Principal Safety and Certification Engineer
2.11 Mr. Grayhame Fish – C130 Post Design Service (PDS) Engineer and MAC POC
2.12 Mr. Stephen Rogers – Project Manager

3. BACKGROUND

3.1 At reference A, DTAES granted full accreditation to the MAC ATO in support of the CC130 E/H models. As a semi-autonomous organization, MAC is backed up by specialist elements in MA UK, particularly in the low utilized, but highly specialized

disciplines. These design activities include structural, mechanical, electrical, avionics, fluid systems together with supporting disciplines, stress engineers, computer driven finite element as well as computational fluid dynamics modeling/analysis, load analysis, weights and balance, component test and flight test. In order for MAC to accept data from MA UK without performing additional certification activities, formal recognition is required.

4. DISCUSSION

The following are the results of the 11-14 September 2006 MA UK site visit:

4.1 **Company Description** - As one of Europe's leading privately owned Aerospace companies, MA operates from its own Airport in Cambridge, England. MA has all the proven capabilities of an OEM to carry out the design, integration, overhaul, modification, maintenance, repair and test of civil and military aircraft with EASA/TCCA/FAA design and maintenance approvals, including heavy transport and wide body aircraft. Design, manufacture, maintenance, modification and logistics support are covered in-depth by a workforce of just under 1,800 and a unique range of facilities and equipment housed in more than 1.2M square feet of production and hangar space. MA has been involved in C-130 engineering and maintenance in excess of 38 years and currently supports the C-130 fleets of 12 Nations. MA has also orchestrated over 600 major modifications on the C-130 aircraft.

4.2 **Regulatory Approvals** - MA UK has received the following regulatory approvals:

a. The Ministry Of Defence (MoD) has recognized MA as the Design Authority for its UK Hercules aircraft and as such is responsible for all major inspections and engineering activities of the RAF C-130K models (reference B);
b. European Aviation Safety Agency (EASA) 21J (Approved Design Organization) with a scope of approval for all aircraft in the following areas: (1) structure, (2) Performance, (3) Cabin Interiors, (4) Galleys and Interiors Equipment, (5) Electrical Systems, (6) Avionics, (7) Installation of Avionics Equipment, (8) Software, (9) Environmental Systems, (10) Hydro-mechanical Systems, (11) Fuel Systems and (12) Flight Test (reference B);
c. EASA 21G (Approved Manufacturing Organization);
d. EASA 145 (Approved Maintenance Organization);
e. United Kingdom Civilian Aviation Authority (CAA) as a Design and Flight Test Organization (reference B);
f. USA FAA Foreign Repair Station;
g. Approved by Lockheed Martin to Manufacture hologram parts; and
h. Approved by over 20 National Aviation Authority including TCCA.

4.3 **Quality System Management** - DTAES 4's team found the existing quality management system at MA to be very mature. MA is ISO 9001:2000 and AS/EN 9100 B Registered. Full registration audits occur every 36 months and include additional visits from the registrar every 6 to 12 months. MA's audit cycle is from June to June. Their audit consists of auditing by elements, however specific procedures and work

instructions are mapped to the respective element. Every element is audited within a 12 month cycle with every section being audited at least every 36 months. This program ensures compliance with various "standards" (i.e., AS9100, EASA, FAR, CAR, etc.) and provides independent feedback to management on the adequacy of the published procedures. The Quality Manager at MA manages the audit schedule for all the off-site locations (i.e., Australia and Canada) and the parent organization (i.e., United Kingdom, Cambridge). Once published, the activities associated to the respective schedule and closure of corrective action plans (CAP) are monitored weekly. In addition, the QM closes all major observations raised once the respective manager has filled out the preventive and corrective actions to address the non-compliance.

4.3 **Engineering Authorizations** - MA uses a "Target Skills and Experience Necessary To Attain Level" table to highlight the minimum knowledge and experience required prior to be assigned additional responsibilities within the engineering department. The Engineering Director, through the Chief Designer/Chief Structural Engineer, has the overall responsibility for career progression. The head of Support is responsible for the training and development, including documentation of competency. At the time of the visit, the associated policies and work instructions on career progression were still under development and were not reviewed by TAA staff. However, their present authorization matrix is very well managed with only limited number of people being authorized within the different speciality areas and engineering tasks as follows:

a. Approval of Clearance Documentation, including: MOD sheets, Load sheets, Aircraft Weighing, recommendation for C of A, Publications, etc.
b. Approval of Engineering/Technical Reports which include: Structures, Stress, Flight Test, Aerodynamics, Loads, Test, Design Specifications and SOW (final approval), etc.
c. Approval of Drawings including: Interiors, Systems, Structures, Avionics/Electronics, quality control, etc.
d. Compliance Verification Engineers (CVE) for area such as: Stress, Structures, Flight Dynamics – Loads, Flight Dynamics – Flight Test, etc.

4.4 **Modification Management** - All modifications for both civilian and military aircraft are managed using processes that fulfil EASA requirements (i.e., basis of certification, compliance checklist, safety assessment, approval authority). The only exceptions are the approval authority and the design certificate. Depending of the categorization of the modification (design), the final approval and its level of involvement are decided by the customer. Design certificates are not issued for military aircraft, however the sign-off sheet, which contains that final approval, contains a company statement that meets the approval requirements of reference C.

4.5 A senior engineer, with the status of CVE (Compliance Verification Engineer), is assigned to each project by either the Chief Designer or the Chief Structural Engineering. A Senior Engineer independent review is compulsory for every modification. This review must be carried out by a CVE that has zero involvement with the project. This review is documented by signing the "Checked By" on the final sign-off sheet. For very minor projects, the chief designer and chief of airworthiness

may decide to waive this independent review. In these circumstances, their decision is documented within the modification documentation. In addition to the CVE signature, a very tightly controlled pool of individuals certifies modification. This final approval is recorded by signing the "Approved By" block. During this visit, only the Chief Designer and the Chief Structural Engineer could certify the release of a modification.

4.6 **Repair Management** – MA UK had access to Legacy Hercules design data for developing and approving acceptable repairs as per the Design Organization Exposition that is maintained by the Quality Department. The TAA staff were satisfied with the existing engineering repair capabilities demonstrated during the on-site visit.

5. RECOMMENDATIONS

5.1 Based on the aforementioned review of MA UK, DTAES 4-5 recommends that MA UK be recognized as a design organization for the CC130E/H models and MA UK data be deemed approved data by Marshall Canada in accordance with reference D manual. In support of this recommendation, the follow document has been prepared and required TAA signature to officially recognize MA UK:

a. 2182-1027-821/MAC-4 (DTAES 4); TAA Recognition of MA UK ADO.

Prepared by: **Wayne Hylarides**	Reviewed by: **Lt. Jason Rubie**	Approved by: **JP Gagné**
Date: 31 Aug 2012	Date: 31 Aug 12	Date: 31 Aug 12

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