Operational Evaluation Board Report

Hawker Beechcraft Corporation
Hawker Beechcraft 4000 (HBC 4000)

Report
27 February 2012

European Aviation Safety Agency
Postfach 10 12 53
D-50452 Köln, Germany
Hawker Beechcraft 4000 (HBC 4000)
Operational Evaluation Board (OEB)

Revision Record

<table>
<thead>
<tr>
<th>Rev. No.</th>
<th>Content</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft</td>
<td>New Evaluation</td>
<td>08 October 2009</td>
</tr>
<tr>
<td>First Issue</td>
<td>New Evaluation</td>
<td>11 December 2009</td>
</tr>
<tr>
<td>Rev 1</td>
<td>Block Point Upgrade</td>
<td>27 February 2012</td>
</tr>
</tbody>
</table>
Contents

Revision Record ................................................................................................................... 2
Contents ................................................................................................................................. 3
Acronyms ............................................................................................................................... 5
Terminology ........................................................................................................................... 5
Executive Summary ............................................................................................................ 6
OEB team composition ........................................................................................................ 7
Operational Review Items (ORI) ....................................................................................... 7
Operational Evaluation Report ......................................................................................... 8

1. Overview ......................................................................................................................... 8
2. OEB Evaluations ............................................................................................................... 8
3. Pilot License Endorsement and determination of pilot type rating ................................. 9
4. Operational Suitability .................................................................................................... 9
5. Aircraft Approach Category ............................................................................................ 9
6. EU-OPS Subpart K and L Compliance .......................................................................... 9
7. Master Differences Requirements (MDR) ...................................................................... 10
8. Operational Differences Requirements (ODR) ............................................................. 10
9. Specifications for Pilot Training ....................................................................................... 10
   9.1 HBC 4000 Initial Type Rating Course ......................................................................... 10
      9.1.1 Prerequisites ........................................................................................................ 10
      9.1.2 HBC 4000 Initial Type Rating Course Content ................................................... 10
      9.1.3 Training Areas of Special Emphasis (TASE) ....................................................... 10
   9.2 HBC 4000 to HBC 4000 BPU Differences Training Course .................................... 11
      9.2.1 Prerequisites ........................................................................................................ 11
      9.2.2 Differences Training Course Content ................................................................ 11
      9.2.2.1 Differences Course Footprint ........................................................................ 11
      9.2.2.2 Ground Training ............................................................................................. 11
      9.2.2.3 Flight Training ................................................................................................ 12
      9.2.3 Training Areas of Special Emphasis (TASE) ....................................................... 12
10. Recurrent Training ......................................................................................................... 12
11. Specifications for Checking .......................................................................................... 12
    11.1 Skill Test .................................................................................................................. 12
    11.2 Recurrent Checking ................................................................................................ 13
    11.3 Line Checks .............................................................................................................. 13
12. Specifications for Recent Experience and Currency .................................................... 13
    12.1 Recent Experience .................................................................................................... 13
    12.2 Currency .................................................................................................................. 13
13. Line Flying Under Supervision (LIFUS) ....................................................................... 13
14. Electronic Flight Bag (EFB) .................................................................................................................. 13
   14.1 Electronic Approach Charts .............................................................................................................. 13
   14.2 Electronic Checklist .......................................................................................................................... 13
15. Training Devices .................................................................................................................................... 14
   15.1 Full Flight Simulator (FFS) .............................................................................................................. 14
   15.2 Cockpit Procedure Trainer (CPT) .................................................................................................... 14

Appendices*
Appendix 1 – HBC 4000 ORIs
Appendix 2 – HBC 4000 Aircraft Regulatory Compliance Check List (EU-OPS Subpart K and L Compliance Checklist)
Appendix 3 – HBC 4000 Pilot Initial Type Rating Training Course syllabus
Appendix 4 – HBC 4000 to HBC 4000BPU to ODR tables

*Appendices are available on request to Hawker Beechcraft Corporation
**Acronyms**

AFM....................Airplane Flight Manual  
APU....................Auxiliary Power Unit  
AT....................Auto throttle  
BPU....................Block Point Upgrade  
CAS....................Crew Alerting System  
CCD....................Cursor Control Device  
CPD .................Common Procedures Document for conducting Operational Evaluation Boards, dated 10 June 2004  
CPT....................Cockpit Procedures Trainer  
CVR....................Cockpit Voice Recorder  
EFIS....................Electronic Flight Instrument System  
EGPWS.................Enhanced Ground Proximity Warning System  
EPU....................Estimated Position Uncertainty  
EU-OPS...............Annex to COMMISSION REGULATION (EC) No 859/2008  
FADEC.................Full Authority Digital Engine Control  
FDR....................Flight Data Recorder  
FFS....................Full Flight Simulator  
FMS....................Flight Management System  
GA....................Go-around  
GPS....................Global Positioning System  
GPWS..................Ground Proximity Warning System  
IPT.....................Integrated Procedure Trainer  
Lab Session........Ground training with use of IPT  
LNAV..................Lateral Navigation  
LOF....................Line-Oriented Flying  
LPV.....................Localizer Precision with Vertical guidance  
MAU....................Modular Avionics Units  
MFD....................Multi-Function Display  
ND ....................Navigation Display  
ODR.....................Operational Differences Requirements  
ORI.....................Operational Review Item  
RAAS..................Runway Awareness and Advisory System  
RNP.....................Required Navigation Performance  
SBAS...................Satellite Based Augmentation System  
TCAS..................Traffic Alert and Collision Avoidance System  
VGP....................Vertical Glide Path  
VPTH...................Vertical Path  
TOLD..................Take-off and Landing Data  
VNAV...................Vertical Navigation  

**Terminology**  
*Currency* means the experience necessary for the safe operation of aircraft, equipment and systems.  
*Recent experience* means the recent experience described in JAR-FCL 1 and EU-OPS.
EXECUTIVE SUMMARY

An initial operational evaluation for the Hawker Beechcraft HBC 4000 aeroplane was performed during the period 11 - 28 August 2008 by a team of two OEB experts at Flight Safety International (FSI) Training Centre in Wichita, KS (USA).

A further evaluation addressing the HBC 4000 Block Point Upgrade (BPU) which introduces a new avionics suite, was conducted upon request by Hawker Beechcraft on 23 March 2011.

These evaluations have been performed in accordance with the Common Procedures Document (CPD), EU-OPS and JAR- FCL1.

The OEB did not evaluate the use of optional equipment or functions such as Head-up Displays, Enhanced / Synthetic Vision Systems (E/SVS), etc.

This report specifies the EASA recommendations for training checking and currency requirements of the HBC 4000 and HBC 4000 BPU, as specified in JAR-FCL 1 and EU-OPS.

This report also contains findings of operational suitability and compliance with Subparts K & L of EU-OPS.

The MMEL is issued as a specific report in form of the FAA MMEL with the addition of the EASA Supplement.

The simulator qualification has been covered by the Portuguese Civil Aviation Authority INAC.

The OEB recommends the approval of:

- Hawker Beechcraft referenced ODR tables;
- Hawker Beechcraft proposed initial pilot type rating training course for the HBC 4000; and
- Hawker Beechcraft proposed pilot differences training course from the HBC 4000 to the HBC 4000 BPU.

The OEB recommends a single licence endorsement “HA4T” for the HBC 4000 and the HBC 4000 BPU aircraft.

The HBC 4000 is an aeroplane with complexity and with capabilities which can be compared to larger transport aeroplanes, and it is operated in the same environment. It is therefore recommended that AOC and non-AOC holders follow the recommendations of this report.

Note on references and reference texts:

Where references are made to requirements and where extracts of reference texts are provided, these are at the amendment state at the date of publication of the report. Readers should take note that it is impractical to update these references to take account of subsequent amendments to the source documents.
OEB Team Composition

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Name</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPS/FCL</td>
<td>1. Adalberto da Silva OEB Chairman</td>
<td>INAC, Portugal</td>
</tr>
<tr>
<td></td>
<td>2. Pascal Augst</td>
<td>DGAC/France</td>
</tr>
<tr>
<td>MMEL</td>
<td>1. Pascal Augst Focal Point</td>
<td>DGAC France</td>
</tr>
<tr>
<td></td>
<td>2. Thierry Vandendorpe</td>
<td>EASA</td>
</tr>
<tr>
<td>Simulator</td>
<td>1. Adalberto da Silva Focal Point</td>
<td>INAC, Portugal Flight Inspector</td>
</tr>
<tr>
<td></td>
<td>2. Don Irving</td>
<td>Technical Inspector</td>
</tr>
</tbody>
</table>

Operational Review Items (ORI)
The following Operational Review Items (ORIs) have been issued by the OEB as a basis for the HBC 4000 evaluation:

ORI 1 .............Type Rating determination, training, checking, and recent experience requirements
ORI 2 .............EU-OPS Subpart K/L compliance
ORI 4 .............Master Minimum Equipment List (MMEL)
ORI 5 .............FSTD A qualification
ORI 6 / 8 .........Operational Evaluation / Operational Suitability Flights

Copies of the above listed ORI’s are provided in Appendix 1.
 Operational Evaluation Report

1.  Overview

1.1  The HBC 4000 is a low wing aircraft, built in a league of metal and carbon fibre, two rear turbofan Pratt & Whitney engines, maximum take-off weight 39500 Pounds, maximum speed 0.84M, maximum range of 3100 miles, and certificated maximum operation pressure altitude 45000 feet. In this new type, the rudder system with “Fly by Wire” is introduced for the first time by the Hawker Beechcraft Corporation.

1.2  The HBC 4000 Block Point Upgrade (BPU) provides new intended functions and changed functionality with installation of Honeywell EPIC software Load 20.0 and Sundstrand software Load 18.0

2.  OEB Evaluations

2.1  On behalf of EASA, two OEB members have performed an evaluation of the initial type rating course (T5 test) from 11 - 28 August 2008 at Flight Safety International (FSI) Training Centre in Wichita, KS (USA).

2.1.1  The OEB team members participated in the HBC 4000 initial pilot ground training course, provided by FSI, Wichita, Kansas, USA. The ground training was carried out as classroom instruction and computer based training. Additionally, supplemental “Lab sessions” on a Graphical Flight simulator (GFS) were carried out. These Lab sessions are designed to reinforce classroom instruction, as well as to introduce crews to the use of the FMS and to actual operation of the aircraft.

One pilot performed the skill test in the simulator and the other pilot performed the skill test in the aeroplane. Subsequently the OEB team flew the aeroplane to complete 4 take-offs and landings (in accordance with ORI 1).

EASA recommends the pilot initial type rating training course referenced as Hawker Beechcraft 4000 Initial Type Rating Training Course.

2.1.2  Operational Suitability flights in accordance with ORI 8, were performed on 29 August 2008.

2.2  An evaluation of the differences from the HBC 4000 to the HBC 4000 BPU was performed during the period from 14 - 16 October 2011. The following items were addressed:

2.2.1  Ground training and evaluation including:


   b.  Briefing from HBC flight test on the operation of the new functions and demonstration in static aircraft by HBC flight test on the operation of new functions:

      •  Electronic Charts

      •  Electronic Checklist

      •  Display selection for new features

      •  FMS selections

      •  Selection and Set-Up for new approach capabilities and annunciations

         ➢  WASS/LPV

         ➢  LNAV/VNAV

         ➢  Baro-VNAV and Temperature Compensation

         ➢  RNP (if approved by the Authority)

         ➢  CAT 2 (if approved by the Authority)

         ➢  Go-Around Auto LNAV

   c.  TOLD data; and

   d.  FADEC CAS messages and TLD
2.2.2 In accordance with the CPD the following “T test” process was followed:
   a. T1 Test. A T1 test has been waived and integrated in the T3 test;
   b. T2 Test. A T2 was successfully conducted by analysis. Aircraft wings, fuselage, and engines are the same between the HBC 4000 and the HBC 4000 BPU, so that handling qualities are unchanged with the BPU installation applied.
   c. T3 Test. A T3 test was successfully conducted on a HBC 4000 BPU full flight simulator. EASA OEB pilots received the proposed HBC difference training course from the HBC 4000 to the HBC 4000 BPU. Appropriate portions of the proficiency check and LOF was administered.

3. Pilot Licence Endorsement and determination of pilot type rating

EASA recommends that the same pilot type rating (single licence endorsement) is applied to the HBC 4000 and HBC 4000 BPU. Consequently, EASA recommends a single license endorsement “HA4T” for all HBC 4000 and HBC 4000 BPU series aircraft as shown in the following table.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>2 Aeroplanes</th>
<th>3 Licence Endorsement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawker Beechcraft Corporation</td>
<td>4000 Hawker 4000</td>
<td>(D) HA4T</td>
</tr>
<tr>
<td></td>
<td>4000 BPU Hawker 4000 BPU</td>
<td>(1) (2)</td>
</tr>
</tbody>
</table>

(1) The differences training course is valid from the Hawker 4000 to the Hawker 4000 BPU for crew members previously qualified on the Hawker 4000.
(2) Differences training courses from the Hawker 4000 BPU to the Hawker 4000 have not been assessed for the time being.

4. Operational Suitability

Operational suitability flights were conducted on the HBC 4000 during the initial evaluation. The HBC 4000 and HBC 4000 BPU are found operationally suitable when following the recommendations of this report and the training areas of special emphasis addressed herein.

5. Aircraft Approach Category

With reference to EU-OPS Appendix 2 to 1.430(c) the approach category for the HBC 4000 / HBC 4000 BPU is as follows:

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBC 4000</td>
<td>C</td>
</tr>
<tr>
<td>HBC 4000 BPU</td>
<td></td>
</tr>
</tbody>
</table>

Normal flap setting is 35 flown from FAF to landing.

6. EU-OPS Subpart K and L compliance

The OEB reviewed the EU-OPS Subpart K and L aircraft type compliance list provided for the HBC 4000 and confirmed compliance with EU-OPS of the specified items (Appendix 2). Operator specific items have not been evaluated.
7. Master Differences Requirements (MDR)

MDR tables for the HBC 4000 / HBC 4000 BPU variants are shown below. Definitions of the various levels for Training/Checking/Currency are those used in the CPD.

<table>
<thead>
<tr>
<th>License endorsement:</th>
<th>FROM AIRPLANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO AIRPLANE</td>
<td>HBC 4000</td>
</tr>
<tr>
<td>HBC 4000</td>
<td>- -</td>
</tr>
<tr>
<td>HBC 4000 BPU</td>
<td>C / C / C ¹)</td>
</tr>
</tbody>
</table>

¹) The Level C training device must incorporate a Cursor Control Device (CCD) with form, fit and function equivalent to the CCDs used in the aircraft. Proficient pilot use of the CCD is critical to operation of the Honeywell EPIC avionics system.

* Differences training courses from the HBC 4000 BPU to the HBC 4000 have not been assessed for the time being.

8. Operator Differences Requirements (ODR)

ODR tables are used to show an operator’s compliance method. Hawker Beechcraft generic ODR tables concerning differences between the HBC 4000 and the HBC 4000 BPU are on file with EASA. These ODR tables are provided as Hawker Beechcraft generic and therefore may not include items that are applicable to particular operators. The ODR tables assume that pilots are current and qualified on the base aircraft.

The HBC 4000 / HBC 4000 BPU ODR tables have been developed in accordance with EU-OPS 1.980 and TGL 44 AMC & IEM to Appendix 1 to OPS 1.980.

These ODR tables have been found acceptable by EASA. They represent an acceptable means of compliance with MDR provisions for the aircraft evaluated, based on those differences and compliance methods shown. These tables do not necessarily represent the only means of compliance for operators with aircraft having other differences.

Operators using more than one variant must have approved ODR tables pertinent to their fleet.

9. Specifications for Pilot Training

9.1 HBC 4000 Initial Type Rating Course

9.1.1 Prerequisites

The HBC 4000 Initial Type Rating Training Course requires the trainee to have previous experience in operating EFIS/FMS and multi-engine turbo-jet aeroplanes. For pilots without previous experience in EFIS/FMS and/or multi-engine turbo-jet aeroplanes, additional requirements may be appropriate as determined by competent Authority.

9.1.2 The OEB reviewed the HBC 4000 Initial Type Rating Training Course and found it to be compliant with JAR-FCL 1. The OEB recommends this course as a baseline for the HBC 4000 type rating training and checking. Appendix 1 shows the footprint of the evaluated course, including the course duration and training devices used.

9.1.3 Training Areas of Special Emphasis (TASE)

The following items are critical to the safe operation of the aircraft and should receive special emphasis during the HBC 4000 initial type rating training course:
• RVSM, TCAS, Windshear functions and procedures
• Long Range Navigation / Extended Overwater flights, as applicable
• in-flight and on-ground icing awareness
• CRM and CFIT procedures
• the rudder fly-by-wire system, procedures and failures, including:
  ➢ piloting techniques specific to the HBC 4000 rudder fly-by-wire system
  ➢ awareness of the sensitivity of the rudder pedal input
• Modular Avionics Units (MAU) and associated failures
• the characteristics of the Honeywell Primus Epic system and flight management system concept, including:
  ➢ use and interpretation of colour code of avionic System
  ➢ use of flight path symbol
  ➢ use of acceleration symbol
  ➢ interpretation and use of the Crew Alerting System (CAS)
  ➢ use of Cursor Control Device (CCD)
• aircraft performance during light-weight take-off and go-around

A supervised Pre-flight inspection shall be performed before the pilot can perform unsupervised Pre-flight inspections.

Operators may add additional elements as required by their operation, and these will vary.

Training organisations should review their training courses when applicable aircraft modifications occur. Training organisations may add additional elements as required by the operator.

9.2 HBC 4000 to HBC 4000 BPU Differences Training Course

9.2.1 Prerequisites

The HBC 4000 to HBC 4000 BPU differences course requires the trainee to either hold a valid HBC 4000 type rating or to perform a HBC 4000 initial type rating course, up to but excluding the license proficiency check flight.

9.2.2 Differences Training Course Content

The OEB reviewed the Hawker Beechcraft HBC 4000 to HBC 4000 BPU differences course and found it to be suitable in accordance with applicable regulations and respective ODR tables.

Any variations to this course should be evaluated by the Competent Authority or through an OEB evaluation. This serves to ensure that an equivalent level of training and safety are maintained

9.2.2.1 The differences course evaluated consisted of the following footprint:
  • 4 hours ground course; and
  • 3 hours Cockpit Procedure Trainer (or by default a fixed base simulator without visual facilities) or 2 hours full flight simulator for each crew member.

A pre-study course should be available containing the HBC 4000 Block Point A differences client guide.

9.2.2.2 Ground Training

The ground course syllabus should include:
  • PDF Imagery (Trend vectors, VNAV altitude, RNP/EPU, LPV Annunciator)
  • MFP Imagery (Charts, Graphical Weather, Electronic Checklist, Vertical Profile)
- FMS (GA Auto LNAV, Told Data, Temperature Compensation, GPS Navigator, VGP vs. VPTH descent, LNAV/VNAV approaches, SBAS approaches, RNP approaches, FDR/CVR updates, EGPWS Windshear, RAAS)
- Systems (Aircraft General, Master Warning, Electrical, Lighting, Fuel APU Powerplant, Fire and Overheat, Protection Ice and Rain, Pressurization, Hydraulics, Landing Gear, Flight Controls, Oxygen, Performance)
- Documents (AFM Vol. 1,2,3 and Checklist Vol. 1,2,3)

The ground course is completed by a written test (20 questions).

9.2.2.3 Flight Training

The flight training syllabus should include:
- Electronic Charts
- Electronic Check List
- Display selection for new features
- FMS selections
- Selection and Set-up for new approach capabilities and annunciations (WASS/LPV, LNAV/VNAV, Baro-VNAV and Temperature Compensation, RNP, Go-Around LNAV)
- TOLD data
- FADEC
- CAS messages and TLD

The flight training should be performed in a CPT (3 hours) or in an FFS (2 hours) and completed by a skill test covering the new functions.

9.2.3 Training Areas of Special Emphasis (TASE)

The following items should receive special emphasis during the HBC 4000 to HBC 4000 BPU differences course:
- use of the CCD of the Honeywell EPIC avionics system
- use of the electronic approach charts (IAPs, SIDs, STARs, Airport Diagrams)
- during DATA LOADING privilege, use of the GPU instead of the APU to prevent power cut and loss of DATA
- Consider the AFM as the reference in the preamble when no electrical power is in use if no paper check list available (practice in simulator recommended)
- use of the Electronic Check List
- use of electronic chart display and CCD
- proficiency in QFE operation. QNH must be used for FMS settings; this has to be confirmed (check LM 24 note 3 volume 1). Practice during ground school or in simulator for one take-off and landing phase.
- contaminated runway operation: selection of manual speed; when using Flaps 20 for take-off use HEADING-PITCH 8° instead of TOGA. Perform one take-off for training in simulator.

10. Recurrent Training

Recurrent training should be performed as specified in JAR-FCL 1 and EU-OPS.

11. Specifications for Checking

11.1 Skill Test

As required by Appendix 1 and 2 to JAR FCL 1.240 and 1.295.
11.2 Recurrent Checking

Proficiency Checks must be conducted in compliance with JAR-FCL 1.245 and EU-OPS 1.965.

11.3 Line Checks

As specified in Appendix 1 to EU-OPS 1.965.

12. Specifications for Recent Experience and Currency

12.1 Compliance with EU-OPS 1.970 or JAR-FCL 1.026 as appropriate is required for recent experience.

12.2 To maintain currency on the HBC 4000 and/or HBC 4000 BPU the following applies:
   a. If a pilot has not flown on one variant for more than 6 months, he must perform a self-review on that variant prior to flying on that variant
   b. If a pilot has not flown on one variant for more than one year, he must perform a minimum two hours Cockpit Procedure Training (CPT) session on that variant, covering the differences between the HBC 4000 and the HBC 4000 BPU
   c. If the HBC 4000 BPU has not been flown within a period of 2 years following the differences training, further differences training or a proficiency check on that variant is required
   d. If the HBC 4000 has not been flown within a period of 2 years, the pilot shall meet any refresher training requirements as determined by the Competent Authority and complete a proficiency check in accordance with Appendices 1 and 2 to JAR–FCL 1.240

13. Line flying Under Supervision (LIFUS)

In the case of an initial pilot type rating on the HBC 4000, a minimum of 10 sectors plus a line check is recommended for LIFUS.

14. Electronic Flight Bag (EFB)

The following EFB applications were evaluated on the HBC 4000 BPU:

14.1 Electronic Approach Charts (IAPs, SIDs, STARs, Airport Diagrams)

Electronic charts (approach charts only) are added with Honeywell Load 20. Chart use is menu driven on the MFD using the respective CCD. Cursor control of electronic charts is workload intensive due to cursor positioning for selections, panning and formatting display for the charts. Crew coordination is necessary to organize MFD information to simultaneously display electronic charts, the Electronic Checklist and navigation display information.

14.2 Electronic Checklist (Normal, Abnormal and Emergency)

An Electronic Checklist is added with Honeywell Load 20. Checklist use is menu driven on the MFD using respective CCD. The Electronic Checklist does not alleviate the need for the printed Pilot Checklist due to lack of MFD availability at all times during flight operations and some Abnormal Procedures not code-able in electronic format. Electronic Checklist is suitable for use when available. Some Electronic Checklist procedures direct user to use the printed Pilot Checklist. Printed Pilot Checklist is required to be available for use at the pilot station in all phases of flight.
15. **Training Devices**

15.1 **Full Flight Simulator (FFS)**

The OEB recommends the use of a HBC 4000 full flight simulator qualified as a minimum to Level C according to JAR-FSTD A for the HBC 4000 initial pilot type rating training course.

The Hawker 4000 full flight simulator, located in Wichita, Kansas, USA, has been assessed by the INAC team according to JAR-FSTD A and qualified to Level D.

15.2 **Cockpit Procedure Trainer (CPT)**

For the purpose of HBC 4000 to HBC 4000 BPU differences training, a CPT is a training device which represents the cockpit environment including the cockpit controls, displays and computer programs necessary to represent the aircraft in ground and flight operations to the extent that the systems appear to function as in an aeroplane.

The purpose of the CPT is to allow learning the functioning of the controls and displays as well as practicing CRM principles and application of procedures.

A CPT is based on software issued from FFS simulation, with the exception of avionics, which is re-hosted from the aircraft software; it is validated for its intended use.