

Research Update for 20 November 2012 HSRMC Meeting:

Note: Item numbers correspond to the joint industry HSRMC research programme.

1 HUMS

All work on the advanced HUMS VHM data analysis using Advanced Anomaly Detection (AAD) techniques has been completed, and the overall final project report delivered and accepted. The CAA version of the final report has been completed and has been published on the CAA's website as CAA Paper 2011/01. The summary of the HSRMC-funded S61 and S.Puma MRGB seeded defect testing will be produced and published separately in due course.

Overall the project has been very successful and Oil & Gas UK are progressing implementation. AgustaWestlands have licensed the GE system for the AW139; CHC and Bond are close to signing up. AgustaWestlands will be giving a presentation at the 11 December 2012 ASTG meeting. Eurocopter is developing its own version of AAD initially for implementation on MARMS HUMS on the EC225 and EC175; presentations were given at the Oil & Gas UK ASTG meetings on 14 December 2011 and 18 September 2012. Sikorsky is developing an equivalent system for the S92 for which some information has been received.

Related AAIB Safety Recommendations:

- Aircraft Accident Report 2/2011, G-REDL near Peterhead, Safety Recommendation 2011-041.

2 Side-Floating Helicopters

Ditching, Water Impact and Survivability: The launch meeting for EASA review of the regulations and advisory material on ditching and water impact (Rule-making task ref. RMT.0120(27&29.008)) has been set for 22, 23 and 24 January 2013. BMT Fluid Mechanics, the CAA's contractor for most of the related research, has been contracted to provide support. The CAA, BMT and C-NLOPB have been confirmed as participants. UK industry participants include Steve O'Collard from CHC and Les Smith from Bristows.

The initial scoping study commissioned by C-NLOPB at Oceanic Consulting Corporation in Newfoundland has been completed and reported. The S92 wave tank trials are now being commissioned. These will involve benchmarking the testing against Sikorsky results, evaluating the addition of scoops to the sponson floats, and evaluating a number of side-floating configurations and failure cases. The UK CAA will be assisting with the monitoring of this project.

EBS Specification: The example draft technical standard for EBS contained in CAA Paper 2003/13 has been developed into a full specification. This will be published as a CAA Paper for voluntary use by industry and will also be offered to EASA for development into an ETSO. EBS will be considered by the forthcoming rulemaking task led by EASA (see above). The TSB in Canada has recommended that EBS be

mandated for overwater flights in its Aviation Investigation Report (A09A0016) on the March 2009 S92 fatal accident; compressed air-type EBS has now been introduced.

All work has been completed and the overall project report was circulated to the Industry on 30 March for comment by end April 2012. A modest amount of feedback was received; no major issues have emerged, although some additional work may be needed to 'convert' the specification into ETSO style. A response document has been produced and was circulated on 10 September 2012 together with the revised report and draft foreword for the CAA paper version of the document. A small number of comments have been received which are presently being considered. Presentations on the work have been given at the 11 May 2010 HSRMC meeting, the 8 June 2011 Oil & Gas Aviation Symposium and the 5/6 December 2011 EASA workshop.

3 Operations to Moving Decks

The initial sea trials on the Maersk GP III commenced on 13 February 2012 and were temporarily suspended at the end of May 2012 pending review of the results with trials participants and other key industry representatives on 17 July 2012. The trials have been reported by Atkins, the research contractor, and the main issue identified was the conspicuity of the repeater lights on the helideck. Modifications to the system to address this aspect and other developments have been agreed which will be evaluated in further trials, hopefully during the winter 2012/13 period.

The current plan is to launch an initial advisory only system in CAP 437 at the next major update later in 2013. The scope of this system is to be discussed with the HCA Technical Committee at their 26 February 2013 meeting. The following elements will be considered:

- Helideck repeater lights - misreporting of deck motion accounts for about a third of the related MORs.
- Relative wind monitoring - this could address up to another third of the related MORs.
- Initial MSI/WSI advisory only limits – will probably comprise S.Puma and S76 limits and a generic lower bound limit.
- New heave rate measure (SHR) – the modified version of this (hysteresis added) has been tested off-line on data from the Foinaven; it should ideally be trialled further before being introduced.

The status of the other work streams is as follows:

- 1) Reporting – the project report is being updated to incorporate new work completed and will be restructured to facilitate future updates.
- 2) Definition of initial system for roll-out – the technical specification for HMS is to be finalised following discussions with HCA and tender issued for production of equipment. Also need to tender for the development of the repeater lights.
- 3) GP III trials – analysis of vessel motions and helicopter FDR data collected during the trials to be analysed in detail; task defined and Atkins being tasked.
- 4) Further development of MSI/WSI – additional tasks have been identified, agreed and costed with Atkins and are being contracted. Further work is likely to emerge under the collaboration with AgustaWestlands presently being worked up.

- 5) Calculation of helicopter type-specific limits – this is currently expected to be progressed with AgustaWestlands.

It is envisaged that once a validated type-specific limit is available for a helicopter and incorporated in its Flight Manual, it will then be permissible to take credit for the MSI/WSI and consider relaxing the pitch/roll/heave rate limits for touchdown (provided that the MSI/WSI is within limits). In this case, the MSI/WSI will become a red 'do not land' limit.

The HELIOS Joint Industry Project (JIP) on operations to moving decks has been established by MARIN in the Netherlands and was launched at the FPSO Research Forum on 22 March 2011. The CAA has joined the JIP and has contracted Atkins to provide technical support to its input to the JIP. The last project steering group meeting was held in Buzios in Brazil on 22 October 2012 although neither the CAA nor Atkins attended. The main sponsors are MARIN, NLR and the Dutch Government. AgustaWestland, Amarcon, Petrobras and Cramm HLS have joined the JIP. A presentation on the HELIOS JIP was given by MARIN at the 11 May 2010 HSRMC meeting.

Presentations on this project have been given by Atkins at the Oil & Gas Aviation Seminar in September 2010, by the CAA at the EASA Rotorcraft Forum in December 2010, and by Atkins at the September 2012 European Rotorcraft Forum.

Related AAIB Safety Recommendations:

- Aircraft Accident Report 3/2004, G-BKZE at the West Navion drill ship, Safety Recommendations 2003-133 and 135.

4 Helideck Lighting

The first production version of the touchdown position marking circle and H lighting was successfully installed on the Centrica CPC-1 platform in Morecambe Bay during the first half of October 2012. To date, six proformas have been received from Bond Helicopters flight crews and all are very positive. The CAA presently plan to conduct a demonstration flight on 27 November to evaluate the system. A second system is to be installed on the BP Miller platform; this has been delayed by about 12 weeks due to a manufacturing issue.

The update to CAP 437 in the 7th Edition has been published together with CAA Paper 2012/03 which covers the development of the specification and includes the current version of the specification. This document was circulated to industry for comment and a response to the industry feedback issued. The CAA Paper will be updated and re-issued once the production version of the system has been fully evaluated. Once the CAA is confident that the production version of the system is satisfactory, the CAA will write to the industry recommending implementation of the new lighting.

Presentations on this project have been given by the CAA at the 10 June 2008 Oil & Gas UK Aviation Symposium, the 11/12 June 2008 RAeS Maritime Operations of Rotorcraft conference, the 22-24 March 2010 CHC Safety & Quality Summit, and the 21/22 September 2010 OGP Aviation Sub-Committee.

Related AAIB Safety Recommendations:

- Aircraft Accident Report 5/88, G-BHYB near the Fulmar A oil platform, Safety Recommendation 4.4.

- Aircraft Accident Report 1/2011, G-REDU at the ETAP Central Production Facility platform, Safety Recommendation 2011-053.

5 HOMP

The remaining HOMP research is the provision of a measure of low airspeed for use in the ground-based analysis system. This work has been using a database of Bristow S.Puma data including low airspeed as measured by a HADS. As a result of the work completed to date, it has now been established that this data is unreliable due to the HADS sticking. Although it is now clear that flight trials will need to be performed to generate a new database, the more recent analysis performed by GE Aviation has demonstrated significant potential of the concept. The final report on the GE work has been completed and accepted. Bond Helicopters have agreed to support the trials and the next step will be to arrange a meeting between GE, Bond and the CAA. This is presently on hold due to the workload at GE related to the implementation of AAD (see item 1 above). Note that EASA are tendering a research project to develop a low airspeed sensor for helicopters; if this is successful, it could negate the need for this work.

6 Offshore Approaches

Work completed and reported to date comprises:

- Trials of Differential GPS (DGPS) guided offshore approaches – see CAA Paper 2000/05.
- Follow-on studies to DGPS trials - see CAA Paper 2003/02.
- Effect of helicopter rotors on GPS reception; data collection trials and analysis – see CAA paper 2003/07.
- Three-phase hazard analysis covering en-route navigation, WXR approaches and GPS enhanced WXR approaches - see CAA Paper 2009/06.
- The EU 6th Framework GIANT work including the design, hazard analysis and simulator trials of the SBAS Offshore Approach Procedure (SOAP), and EGNOS reception trials – see CAA Paper 2010/01.

The current stage of the project, called HEDGE, forms part of an EU 7th Framework project. The work essentially comprises the production and trials of a demonstrator SOAP system and the following additions to the project have been identified:

- integration of AIS into the navigation display;
- demonstration of the integration of SOAP with the enhanced helideck lighting;
- safety assessment of the visual segment; and
- addition of RNAV guidance to assist shuttling.

The AIS work package (first bullet above) and the demonstration of the integration of SOAP with the enhanced helideck lighting (second bullet above) have both been contracted. Work on the safety assessment of the visual segment (third bullet above) is being addressed by a PhD student at Imperial College; a presentation on Felipe Nascimento's work was given at the 11 May 2010 HSRMC meeting.

The first set of flight trials were performed over the weekend of 29/30 January 2011; the CAA were briefed on the results on 7 March 2011. Of particular note, the AIS was well received by the pilots and found to be very helpful in improving situational awareness. Some refinements to the trials system were identified and implemented for the second set of daylight trials which took place over the weekend of

12/13 November 2011. A report on the evaluation of AIS and an interim report covering the second set of daylight trials has been produced and accepted. The report on the first set of daylight trials has been produced for the EU and will be incorporated in the final report for this project. Night trials will be considered when a helideck fitted with the new lighting system (see item 4 above) is available in the North Sea, currently expected to be the BP Miller platform.

In the meantime, Helios Technology have been awarded further EU Framework project called HEDGE NEXT. This will involve simulator trials to further develop the approach procedure focussing, in particular, on the visual segment and interfacing the procedure to low level RNAV routes. A workshop has been arranged by Helios for 3 December to discuss this work and identify how the CAA can engage with and contribute.

Discussions with Eurocopter were held on 26 October 2011 concerning the design of an interim approach guidance system. This scheme included many features of SOAP and would pave the way for the future implementation of SOAP. Sikorsky are known to have developed a similar system for the S-92.

Presentations on this project have been given by Helios at the 10 June 2008 Oil & Gas UK ASTG Symposium and at the 11/12 June 2008 RAeS Maritime Operations of Rotorcraft conference, and by the CAA at the 2-3 December 2009 EASA Rotorcraft Symposium and the 22-24 March 2010 CHC Safety & Quality Summit.

Related AAIB Safety Recommendations:

- Aircraft Accident Report 5/88, G-BHYB near the Fulmar A oil platform, Safety Recommendation 4.4.
- Aircraft Accident Report 7/2008, G-BLUN at the North Morecambe gas platform, Safety Recommendation 2008-033.

7 Helideck Friction

The programme of work comprising a review of the current helideck friction measuring techniques has been completed by NLR. In essence, the work confirms that devices like the Finlay Irvine GripTester are the most appropriate type of device for measuring helideck friction. The main problem with these devices is their portability but, while the research was being conducted, a smaller more portable friction tester employing the same measurement principle as the GripTester was identified (T2GO, manufactured by ASFT in Sweden). Finlay Irvine has also produced a 'Micro GripTester' which was demonstrated to the CAA on 24 September 2009. It is understood that this will replace the current GripTester. The final report was circulated with a CAA foreword for industry comment/consultation and all responses have been answered. The report will be published as a CAA paper together with the ongoing work on aluminium decks and helideck nets when this has been completed (see below).

The contract with NLR was extended to add the work on establishing a new test criterion for aluminium helideck surfaces. This involved full scale testing of five different types of aluminium deck surface using actual S61 and S76 wheels mounted on a test rig. All variables expected to be relevant were exercised. The work has been completed and the report delivered, accepted and circulated to the five aluminium deck manufacturers known to the CAA for comment by end November 2012. The results indicate that none of the aluminium decks tested met the minimum μ value of 0.65 stipulated in CAP 437, despite evidence of acceptable GripTester results. The full scale test results were found to vary significantly with tyre

contact pressure and it is suspected that this may explain the favourable GripTester results which may need to be scaled to be representative.

Current practice in the event of a helideck not meeting the minimum CAP 437 mu value of 0.65 is to fit a helideck net. However, the effectiveness of helideck nets has never been confirmed experimentally and has been further called into question following the move from the 'standard' 20 mm sisal rope nets to the low profile FricTape nets following the introduction of the 25 mm obstacle height limit by ICAO. The contract with NLR was extended to investigate the feasibility of conducting full scale tests on helideck nets. The feasibility study has been completed and reported and a costed proposal for a limited test programme has been received. The contract with NLR has been extended to add this work following confirmation of funding from HSE.

8 Helideck Environmental Research

All research has been completed and reported and, where applicable, incorporated in CAP 437. Attention is presently being focussed on the use of helicopter FDM to map and monitor the environments around offshore platforms.

Turbulence:

The final report on the validation of the turbulence criterion (CAA Paper 2008/02) recommends that helicopter FDM data be routinely collected and analysed to monitor the turbulence environments around offshore platforms, providing quantitative feedback for improvement and refinement of the HLL and, possibly, further tuning of the criterion. A presentation to HCA and the helicopter operators to promote this use of HOMP data was given in Aberdeen on 7 November 2006 and was well received. All information necessary to implement the algorithm in HOMP has been provided to the helicopter operators and their HOMP system suppliers. A further presentation was given at the 16 April 2008 HMLC meeting, and this was repeated at an ad-hoc CAA/CHC meeting held on 7 November 2008.

Disappointingly, virtually no progress in implementing this scheme has been made by the helicopter operators, despite its value and importance being emphasised by the findings of an audit of HCA by the CAA. It appears that few flow studies are being commissioned by the industry and no flow study results are being received by HCA, and this situation is being exacerbated by poor reporting by flight crews; very few turbulence report forms are ever received.

Turbine Exhaust Plumes:

The final report on the visualisation of offshore gas turbine exhaust plumes (CAA Paper 2007/02) recommends that helicopter FDM data be routinely collected and analysed to identify 'problem' platforms for consideration for installation of a plume visualisation system. The importance of this hazard was highlighted by the issue of Sikorsky Safety Advisory SSA-S92-10-002 in April 2010 concerning flight through high temperature exhaust plumes.

More recently, some issues regarding the modelling of turbine exhaust plumes have been raised by Peutz in the Netherlands. In essence, the suitability of CFD for these exercises has been called into question.

Related AAIB Safety Recommendations:

- AAIB Bulletin 3/96, G-AYOM at the Claymore Accommodation Platform, Safety Recommendation 96-1.

9 Extension of HUMS to Rotors

The initial study on extending HUMS to rotors comprised a review of all relevant work (including the earlier HSRMC-funded studies) in order to form a consolidated view of the state of the art of the application of VHM techniques to the detection of rotor system Potentially Catastrophic Failures (PCFs). The study has been completed and was published in CAA Paper 2008/05.

Further work entailing the application of the Advanced Anomaly Detection (AAD) techniques developed on the transmission HUMS research (see item 1 above) to in-service tail rotor HUMS data was contracted to GE Aviation and has been completed. The slightly mixed results of this work were presented at the 7 December 2009 HSRMC meeting. Whereas it seems possible to detect faults prior to the start of the last flight (provided that both axial and radial vibration data are available), on-board analysis would be required to provide timely warnings. The main problems are the 'noisy' nature of the data and, in the case of the S.Puma study, the lack of axial vibration data. The final report on this work has been completed and accepted, and will be published as a CAA Paper in 2012.

As regards main rotor health monitoring and further work on tail rotors, following extensive negotiations the CAA and AgustaWestlands (AW) have agreed a Non-Disclosure Agreement (NDA) which will enable the CAA to participate in the AW Rotorcraft Technology Validation Programme (RTVP). This major programme includes significant work on rotor HUMS. The initial meeting between the CAA and AgustaWestlands was held on 1 February 2012 at which GE Aviation presented the work on the application on AAD to tail rotor VHM data. AW provided the CAA with a presentation to brief the 16 May 2012 HSRMC meeting. A progress meeting with AW was held on 20 June 2012 and further meetings will be scheduled at appropriate points in the programme. It is hoped that EASA will be able to participate but that seems unlikely at present due to lack of resources.

Related AAIB Safety Recommendations:

- Aircraft Accident Report 1/2005, G-BJVX near the Leman F platform in the North Sea, Safety Recommendation 2004-040.
- Aircraft Accident Report 7/2010, G-PUMI at Aberdeen Airport, Safety Recommendation 2010-027.

10 Tail Rotor Strike Warning

A feasibility study on the provision of a tail rotor strike warning system is included in the joint industry HSRMC work programme, but insufficient funding is available to proceed at present.

11 TCAS

All work including dedicated and in-service trials have been completed outside of the HSRMC research programme by Bristow Helicopters. Bristow has EASA TCAS II STCs for the AS332L, S92 and S76 and has applied for a FAA STC for the S92 with the FAA doing a demo flight probably in December 2012. All UK Bristow S92s have TCAS II and the S76C++ fleet is being equipped. Eurocopter has a TCAS II system certified for the EC 225 which will be an option on the EC175. AgustaWestland is to offer TCAS II on the AW189. Sikorsky has no TCAS II systems yet but has plans. Bristows are retrofitting their fleet; the other operators have been slower on the uptake.

A presentation of the work at Bristows was given to the 54th HSRMC meeting on 30 January 2008, at the 16-19 September 2008 European Rotorcraft Forum in Liverpool, and at the 2-3 December 2009 EASA Rotorcraft Symposium.

12 EGPWS Warning Envelopes

This project comprises the development of improved 'Classic Mode' EGPWS warning envelopes for offshore helicopter operations, and effectively addresses a number of AAIB Safety Recommendations made in the report on the accident to G-REDU in February 2009 near the ETAP platform.

Eurocopter EC225 flight data from Bristow Helicopters' Flight Data Monitoring (FDM) programme has been used to establish the limits of normal operations. This has enabled the Classic Mode warning envelopes and their associated input parameters to be refined, and has also allowed new warning envelopes to be developed. The revised and new warning envelopes have been tested using the available data from four accidents and have demonstrated a worthwhile improvement in performance in terms of warning time with a 'nuisance' alert rate of better than 1:100 flights. An interim report covering that work was produced and circulated to relevant industry contacts on 20 February 2012.

The contract was amended to extend the work to cover a second, dissimilar helicopter type (Sikorsky S76A+) to test the new warning envelopes on aircraft which are expected to exhibit greater variability than the EC225 in terms of their flight paths. This work has been completed and reported and, although 'normality' for the S76A+ was broader than for the EC225 as expected, it was not as much as had been expected. Consequently, it appears that it has been possible to produce a single set of HTAWS 'classic mode' warning envelopes covering both helicopter types while maintaining a 'nuisance' alert rate of no worse than 1 in 100 flights and still provide significantly enhanced warning times. This is especially welcome as it is believed that, as well as covering the spectrum of helicopter technological standards, a broad range of types of operation has also been addressed. The Bristow S76A+ fleet used for this study are operated in the southern North Sea which involves a lot of manual flying and low level shuttling, which is quite distinct from the EC225 style of operation in the northern North Sea.

The next step in the project will be to examine the form and format of the associated warnings. Simulator trials are then envisaged both for flight crew evaluation of the complete system and also to generate further 'accident' examples for testing the envelopes. Progress on these areas will be subject to availability of resource/funding. This project was proposed by Bristow Helicopters and Shell Aircraft and is being jointly funded by Bristow Helicopters, OGP, Shell Aircraft and BP.

Presentations on the work to date were given to the 28/29 September 2011 OGP Aviation Safety Committee, the 8 November 2011 HSRMC meeting and the 7/8 December 2011 EASA Rotorcraft Symposium.

Related AAIB Safety Recommendations:

- Aircraft Accident Report 1/2011, G-REDU at the ETAP Central Production Facility platform, Safety Recommendations 2011-060, 061, 062 and 063.

13 Triggered Lightning Strike Forecasting

A programme of work to investigate and demonstrate the feasibility of forecasting/predicting triggered lightning strikes to helicopters has been undertaken in response to requests from industry. The work is being performed by the UK Met

Office and is funded by Oil & Gas UK, CAA Norway, CHC and seven individual oil/gas companies.

The programme of work initially contracted was completed in June 2011 and the contract extended to conduct an in-service evaluation of the system on OHWeb during the 2011/12 lightning season. The trial commenced on 1 October 2011 but was suspended at the beginning of January 2012 due to usability issues. Good feedback was received from the helicopter operators and fixes have been worked up by the Met Office.

The modified system was reviewed by the CAA, CHC and Bristows on 11 September 2012 and it was agreed to proceed with the second trial during winter 2012/13 starting on 1 October 2012. Harmonised operational procedures for the three risk levels that will now be displayed are to be agreed by the helicopter operators to ensure consistency. The trial commenced on 1 October as planned. A minor 'bug' was discovered on 26 October and a 'work-around' adopted pending the permanent fix which was installed on 8 November. The trial continues. Note that if the trials system performs satisfactorily, it will be left running on OHWeb going forwards.

Presentations on this work have been given at the 8 June 2011 and 13 June 2012 Oil & Gas UK Aviation Symposiums.

Related AAIB Safety Recommendations:

- Aircraft Accident Report 2/97, G-TIGK North Sea 6 NM south-west of the Brae A oil platform, Safety Recommendation 95-45.

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Nomenclature

AAD	Advanced Anomaly Detection
CAA	Civil Aviation Authority (UK)
C-NLOPB	Canadian Newfoundland and Labrador Offshore Petroleum Board
DGPS	Differential GPS
EASA	European Aviation Safety Agency
EBS	Emergency Breathing System
EGPWS	Enhanced Ground Proximity Warning System
EHEST	European Helicopter Safety Team
FDM	Flight Data Monitoring
FPSO	Floating Production Storage & Offloading
GE	General Electric
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
HADS	Helicopter Air Data System
HCA	Helideck Certification Agency
HLL	Helideck Limitations List
HMS	Helideck Motion System
HOMP	Helicopter Operations Monitoring Programme
HSRMC	Helicopter Safety Research Management Committee
H-TAWS	Helicopter Terrain Awareness Warning System
HUMS	Health & Usage Monitoring System
JIP	Joint Industry Project
MOR	Mandatory Occurrence Report
MRGB	Main Rotor Gear Box
MSI	Motion Severity Index
OGP	International Oil & Gas Producers Association
OGUK	Oil & Gas UK
PCF	Potentially Catastrophic Failure
RNAV	Area Navigation
RTVP	Rotorcraft Technology Validation Programme
SBAS	Space-Based Augmentation System
SHR	Significant Heave Rate
SOAP	SBAS Offshore Approach Procedure
TAWS	Terrain Awareness Warning System
TCAS	Traffic Alert & Collision Avoidance System
VHM	Vibration Health Monitoring
WSI	Wind Severity Index
WXR	Weather Radar

Proposed HSRMC Research Programme – Funding Status as at 20 November 2012

Item	CAA Project Code	Title	Funding Status
1. ONGOING WORK			
1	5.1	HUMS - advanced analysis of HUMS data.	Study completed. Final report being published in CAA Paper 2011/01.
2	5.3	Ditching/Water Impact - side floating helicopter design study.	Study completed by Eurocopter/Aer Azur under contract to EASA. Final report published on EASA's website.
		Ditching/Water Impact - EBS specification.	Sufficient funding available to complete all work currently identified.
3	5.10	Operations to Moving Helidecks – generation of MSI / WSI operating limits and in-service trials.	Sufficient funding available to complete all work currently identified.
4	8.2	Helideck Lighting - in-service trials of new scheme (circle & 'H' lighting).	Sufficient funding available to complete all work currently identified.
5	14.3	HOMP - extension to low airspeed regime.	Project on hold.
2. EXTENSIONS TO EXISTING PROGRAMMES			
6	5.7	Offshore Approaches (GIANT) – development and simulator evaluation of 'full' GPS approach + EGNOS reception study.	Study completed. Final report published in CAA Paper 2010/01.
		Offshore Approaches (HEDGE) – demonstration of the integration of the SOAP procedure with the enhanced helideck lighting, safety assessment of the visual segment, integration of AIS into the navigation display, addition of RNAV guidance to assist shuttling.	Sufficient funding available for AIS receiver integration and flight demonstration of integration with helideck lighting only.

Item	CAA Project Code	Title	Funding Status
7	8.1	Helideck Friction - review of measuring techniques.	Study completed. Final report to be published as a CAA paper.
		Helideck Friction – testing of aluminium decks and development of pass/fail criterion.	Study completed. Final report to be published as a CAA paper.
		Helideck Friction – effect on resistance to sliding of landing nets.	Sufficient funding available to complete all work currently identified.
8	8.5	Helideck Environment - review of CAP 437 vertical wind component criterion.	Study completed. Final reports published in CAA Papers 2008/02 and 2008/03.
3. NEW PROJECTS			
9	-	HUMS – preliminary study on extension to rotor systems.	Study completed. Final report published in CAA Paper 2008/05.
		HUMS - application of advanced data analysis techniques to HUMS tail rotor data.	Study completed. Final report to be published in a CAA paper in 2012.
		HUMS – AgustaWestlands Rotorcraft Technology Validation Programme (RTVP).	No funding required at this time.
10	5.16	Tail Rotor Strike Warning.	Insufficient funding to proceed at present.
11	-	TCAS - in-service trials.	Trials completed and implementation in progress.
12	-	EGPWS Warning Envelopes.	Sufficient funding available to complete all work currently identified.
13	-	Triggered Lightning Strike Forecasting.	Sufficient funding committed to complete all work currently identified.