

Research Update for 13 July 2015 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 has been published on CAA's website as CAA Paper 2011/01. A summary of the HSRMC-funded S61 and S.Puma MRGB seeded defect testing should ideally be produced and published but this is unlikely to happen in the near future due to pressures on resources at CAA.

Overall the project has been very successful and Oil & Gas UK are progressing implementation. AgustaWestland have licensed the GE system for the AW139 which was presented 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 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.

It is understood that the AW139 system is performing well, the Sikorsky S92 system less so. The CSI for the Airbus Helicopter EC225 is under way. Progress on implementation appears slower than desirable and a renewal of industry resolve is required.

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 EASA review of the regulations and advisory material on ditching and water impact (Rule-making task ref. RMT.0120 (27&29.008)) was launched in January 2013 and has met a further seven times. The last meeting was held at EASA in Cologne from 12 through 14 May 2015. The overall concept has been finalised and EASA is putting the finishing touches to the NPA prior to publication. A final draft (v10) of the NPA is expected to be circulated shortly and a one-day meeting has been arranged for 14 July 2015 to discuss a few remaining issues. The NPA is to be published late July/early August 2015 and the final decision is due in June 2016. The NPA will only cover rule changes for new helicopter designs; the working group is seeking EASA management permission to continue and produce a second NPA to cover retrospective action. Presentations on the RMT were given at the 03 December 2013 ASTG and the 04 June 2014 OGUUK Aviation Seminar.

The initial scoping study commissioned by C-NLOPB at Oceanic Consulting Corporation in Newfoundland has been completed and reported. The S92 wave tank trials have been 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. For reasons that are not understood, progress on this work has been slow. UK CAA will be assisting with the monitoring of this project.

EBS Specification: The development of the example draft technical standard for EBS contained in CAA Paper 2003/13 into a full specification has been completed and the overall project report, including the technical standard, was published in CAP 1034 in May 2013. The standard has been/is being used by CAA to approve Category A EBS for compliance with CAA Safety Directive SD-2015/001 following publication of CAP 1145. In addition, following presentation of the work to the EASA Rule Making Task, a formal standard (ETSO) is to be produced by ASD-STAN NWP for Emergency Breathing Systems (EBS) (8.7009). It has been agreed that EASA will be represented by D Howson (UK CAA) and the author of the specification in CAP 1034, Dr Coleshaw, will be included as a subject matter expert (SME).

Presentations on the work have been given at the 11 May 2010 HSRMC meeting, the 08 June 2011 Oil & Gas Aviation Symposium, the 05/06 December 2011 EASA ditching workshop and the 23-27 September EASA RMT.0120 meeting.

Related AAIB Safety Recommendations:

- Aircraft Accident Report 2/93, G-TIGH near the Cormorant 'A' platform, East Shetland Basin, Safety Recommendations 93-26, 30 and 31.
- Aircraft Accident Report 7/2008, G-BLUN at the North Morecambe gas platform, Safety Recommendation 2008-036.
- Aircraft Accident Report 1/2011, G-REDU at the ETAP Central Production Facility Platform, Safety Recommendation 2011-065.

(3). Operations to Moving Decks

The initial sea trials on the Maersk GP III in 2012 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.

The current plan is to launch an initial system in CAP 437, hopefully late 2015/ early 2016. The scope of this system was discussed and agreed with the industry and includes the following elements:

- New heave rate measure (SHR) – the modified version of this (hysteresis added) has been tested off-line on data from the Foinaven FPSO and the Alliance DSV; it should ideally be trialled in-service before being widely introduced.
- Helideck traffic lights – this addresses misreporting of deck motion which accounts for about a third of the related MORs.
- Relative wind monitoring - this addresses the West Navion accident scenario (G-BKZE, November 2001, which involved loss of vessel heading control), and the passage of line squalls while on-deck (NB: Also applicable to fixed helidecks.)
- Initial MSI/WSI advisory only limits – initial advisory limits will be produced for the S.Puma; it is intended that limits for the AW139 and S92 will follow.
- New HMS display – human factors design principles have been employed to develop an improved 'standard' display and to incorporate the additional information required for the new scheme.

Following a competitive tender, Fugro GEOS have been contracted to produce a prototype system for trials on Chevron's 'Captain' FPSO with Bristow Helicopters. Production, testing, installation and commissioning have been completed and the trial commenced on 27 April 2015. Thus far, there have been some minor anomalies with the functioning of the equipment but the trial is otherwise progressing smoothly. The main issue requiring attention is the conspicuity of the helideck-mounted repeater lights. It is now considered that dual intensity lights will be required in order to cover both daylight and night time operations; discussions with Orga, the lighting provider, are ongoing. Due to the later than hoped start of the trial, it is now expected that the trial will extend into the winter 2015/16 period in order to more fully 'exercise' the system.

Further development of the MSI/WSI and, in particular, the production of validated helicopter type-specific limits will be considered once work on the initial system has been completed and it has been incorporated in CAP 437.

The HELIOS Joint Industry Project (JIP) on operations to moving decks run by MARIN in The Netherlands is reported to have been completed and the final deliverables were circulated at end October 2014. Follow-on work comprising offshore tests of the Deckfinder system, simulator tests with helmet mounted displays and the implementation of the deck-lock-grid system grid was planned but insufficient financial backing was forthcoming and the JIP is now being wrapped up.

Presentations on this project have been given by Atkins at the Oil & Gas Aviation Seminar in September 2010, by 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

All work on the development and validation of the specification has been completed and reported in CAP 1077. The specification was added to CAP 437 in the 7th Edition issued in February 2013. Letters to industry advising CAA's position on helideck lighting and the timescales for the introduction of the new lighting have been issued. An update to the specification in CAP 437 (Appendix C) has been produced, consulted on and will be incorporated in the next update (8th Edition) later in 2015. The main reason for the update was to add tolerances on the circle and H dimensions and locations to assist addressing the practical issues that have arisen with early installations.

A working group has been established by Oil & Gas UK to pool experience and expertise to address installation issues; the working group last met on 29 January 2014. Ownership of the working group has been transferred to Step Change in Safety but nothing has happened yet.

CAA has been approached by some of the lighting manufacturers to approve their products. This is being addressed via CAA International on a commercial basis as this work is outwith CAA's remit (offshore helidecks are unlicensed).

Presentations on this project have been given by 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, analysis performed by GE Aviation has demonstrated significant potential of the concept. The final report on the GE work has been completed and accepted.

EASA have tendered a research project to develop a low airspeed sensor for helicopters which, if successful, could negate the need for this work. Unfortunately no bids for the project were received.

On a more positive note, a meeting to discuss the establishment of a helicopter operator FDM user group was held on 02 December 2013. The second meeting took place on 29th April. A good spirit of cooperation was evident and the 3 main operators have provided information on their FDM programmes to CAA, including recent FDM 'event' statistics. This information was reviewed at a further meeting held on 17 June 2014, and it was agreed that an exercise on the EC225 (since all three operators use this aircraft) be performed with the aim of consolidating and standardising (where appropriate) the event sets to facilitate the interpretation of the event statistics.

(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,
- addition of RNAV guidance to assist shuttling.

The AIS work package (1st bullet above) and the demonstration of the integration of SOAP with the enhanced helideck lighting (2nd bullet above) have both been contracted. The first set of flight trials were performed in January 2011 and CAA were briefed on the results in 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 in 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. The night trials to explore the integration of SOAP with the new helideck lighting remain to be undertaken.

Some work on the safety assessment of the visual segment (3rd bullet above) was performed by a PhD student at Imperial College; a presentation on Felipe Nascimento's work was given at the 11 May 2010 HSRMC meeting. In addition, Helios Technology have been awarded a further EU Framework project called HEDGE NEXT. This has involved simulator trials to further develop the approach procedure focussing, in particular, on the visual segment and interfacing the procedure to low level RNAV routes (4th bullet above). A workshop was held at Helios on 03 December 2012 to discuss this work and some operational concepts in need of investigation were identified for further consideration.

Meanwhile, initial discussions with the Joint Operator's Review (JOR) on the subject of offshore approaches were held on 13 August 2014 with a view to identifying a way forward. Sikorsky have developed a system similar to SOAP for the S-92 which has been certificated by the FAA and which was announced at the 04 June 2013 Oil & Gas UK Aviation Seminar. Although not fully in line with the SOAP it may be possible to use this and/or any equivalents available from the other OEMs as a vehicle for in-service trials. In addition, consideration can be given to performing the SOAP night trials now that the new helideck lighting has been installed on the BP Miller (see item 4 above).

Following transfer of the JOR functions to HeliOffshore, further discussions on the best way to take this project forwards with the industry are now needed.

Presentations on this project have been given by Helios at the 10 June 2008 Oil & Gas UK ASTG Seminar and at the 11/12 June 2008 RAeS Maritime Operations of Rotorcraft

conference, and by CAA at the 02-03 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 at NLR in The Netherlands has been completed which comprised the following main elements:

- a review of the current helideck friction measuring techniques;
- full scale testing of profiled aluminium helidecks;
- investigation of the effectiveness of low profile helideck nets.

The results from all of this work have been used to develop a new approach to helideck friction measurement and monitoring. An outline proposal was presented to the HCA Helideck Steering Committee on 10 July 2014 which was broadly agreed. CAA will develop it for further discussion at the next meeting scheduled for 29 July 2015.

Related AAIB Safety Recommendations:

- Although there are no AAIB Safety Recommendations that correspond directly, this work is closely related to the work on operations to moving decks.

(8). Helideck Environmental Research

All research has been completed and reported and, where applicable, incorporated in CAP 437. Use of helicopter FDM to map and monitor the environments around offshore platforms unfortunately remains an aspiration. This will be progressed via the Helicopter FDM User Group established in December 2013 (see Item 5) and/or HeliOffshore.

The importance of the hazard presented by turbine exhaust plumes was highlighted by the issue of Sikorsky Safety Advisory SSA-S92-10-002 in April 2010. The turbine exhaust stacks on the Ninian platforms have/are being re-routed as a result. CFD studies have been performed in Norway to identify the location of turbine plumes as a function of wind speed/direction and turbine load which has been extended to cover all Norwegian installations. This work has been discussed at the HCA Helideck Steering Committee and a response submitted regarding concerns over the treatment of rate of change of temperature in exhaust plumes.

As regards the issue of cold flaring, the NTSB issued five Safety Recommendations concerning loss of engine power on helicopters operating to and from offshore oil platforms on 02 September 2014. The NTSB recommends that the addressees "...identify and develop comprehensive systems and procedures to mitigate the risk of ingestion of raw gas discharges, such as methane, by helicopters operating in the vicinity of offshore oil platforms. After appropriate mitigations are developed as recommended in Safety Recommendation A-14-69, require fixed [and mobile] offshore oil platform operators to implement these systems and procedures." CAP 437 is referenced.

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 07 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 has been published as CAA Paper 2012/01.

As regards main rotor health monitoring and further work on tail rotors, following extensive negotiations CAA and AgustaWestland (AW) agreed a Non-Disclosure Agreement (NDA) which has enabled CAA to participate in the AW Rotorcraft Technology Validation Programme (RTVP). This major programme includes significant work on rotor HUMS. The initial meeting between CAA and AgustaWestland was held on 01 February 2012 at which GE Aviation presented the work on the application of AAD to tail rotor VHM data. The last progress meeting with AW was held on 03 April 2014; further meetings will be scheduled at appropriate points in the programme.

AW are attending HSRMC meetings and providing regular updates; AW provided a brief at the 11 December 2012 ASTG meeting. 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 02-03 December 2009 EASA Rotorcraft Symposium.

(12). HTAWS 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 and Sikorsky S76 flight data from Bristow Helicopters' Flight Data Monitoring (FDM) programme has been used to establish the limits of normal operations for

the spectrum of helicopter technological standards and a broad range of types of operation. 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 this work was produced and circulated to relevant industry contacts on 22 October 2012.

Further to completion of this work, the proposed new warning envelopes have been evaluated against a further six occurrences for which data has since become available. Of particular note was the 23 August accident to S.Puma G-WNSB and, in this case, none of the warning envelopes currently proposed would have generated a timely warning. A new mode based on airspeed and total torque has, however, been developed and tested and shows good promise; analysis indicates a useful warning time of 13 seconds for the G-WNSB accident.

A meeting was held with Honeywell, the leading HTAWS manufacturer, on 17 June 2015 to review the work to date. Honeywell have agreed to produce a prototype ('red label') HTAWS computer for use in Bristow's flight simulators to enable the modifications to be evaluated by pilots in terms of effectiveness. It is hoped that the hardware will be available in time for the trials to be performed during Q1 of 2016.

In the meantime, the agreed preliminary warning envelope definitions are to be supplied to the helicopter operators for implementation in their FDM analysis programmes. This will enable the envelopes to be assessed, primarily for nuisance alert rate, across a wider range of helicopter types.

In addition, the contract for the work on warning form/format has been let to Cranfield University working with Royal Holloway University of London. The formal project launch meeting will take place on 30 July but Cranfield have been authorised to start work on the literature review and also attended the 17 June meeting with Honeywell. This work is due to be completed by June 2016. A second set of flight simulator trials is envisaged once this work has been completed and the results implemented in the prototype HTAWS computer.

This project was proposed by Bristow Helicopters and Shell Aircraft and is being jointly funded by Bristow Helicopters, OGP, Shell Aircraft, Oil & Gas UK, HeliOffshore and BP.

Presentations on the work to date were given to the 28/29 September 2011 OGP Aviation Safety Committee, the 08 November 2011 HSRMC meeting and the 07/08 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 Met Office helicopter triggered lightning product was evaluated through in-service trials on the OHWeb weather information service during the winter 2012/13, 2013/14 and 2014/15 'lightning seasons' by all three Aberdeen-based helicopter operators. The performance of the system was most recently discussed during an OHWeb User Forum on 20 January 2015, and subsequently during an end of season project review meeting on 30 April 2015. Overall the system is considered to be working well, although the volatility of the risk remains a challenge for operators on days where the risk is related to scattered showers rather than frontal activity. Developments to address the impact on operations include:

- Provision of advance warning (3 days) of high risk days;
- A facility to allow over flight of high risk areas;
- Review of thresholds of risk area boundaries;
- Alignment of lightning and wave height forecasts.

In addition, operating areas lacking precipitation radar coverage such as Scatsta and the Norwegian coast are likely to suffer from reduced performance. By including precipitation radar data from non-UK sources (under the EUMETNET OPERA project), the accuracy of the forecasts will be improved. The Met Office has produced a costed proposal for Norway to consider. The Met Office is also investigating the costs and feasibility of installing a precipitation radar on Scatsta.

Presentations on this work have been given at the 08 June 2011 and 13 June 2012 Oil & Gas UK Aviation Seminars.

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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03 July 2015

Nomenclature

AAD	Advanced Anomaly Detection
AAIB	Air Accidents Investigation Branch (of the UK DfT)
AIS	Automatic Identification System
CAA	Civil Aviation Authority (UK)
CAP	Civil Aviation Publication (UK CAA)
CFD	Computational Fluid Dynamics
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
ETSO	European Technical Standards Order
EU	European Union
FDM	Flight Data Monitoring
FDR	Flight Data Recorder
FPSO	Floating Production Storage & Offloading
GE	General Electric
GIANT	GNSS in Aviation
GPS	Global Positioning System

GPWS	Ground Proximity Warning System
HADS	Helicopter Air Data System
HCA	Helideck Certification Agency
HEDGE	Helicopters Deploy GNSS in Europe
HLL	Helideck Limitations List
HMS	Helideck Monitoring System
HOMP	Helicopter Operations Monitoring Programme
HSE	Health & Safety Executive (UK)
HSRMC	Helicopter Safety Research Management Committee
H-TAWS	Helicopter TAWS
HUMS	Heath & Usage Monitoring System
ICAO	International Civil Aviation Organisation
JIP	Joint Industry Project
MOR	Mandatory Occurrence Report
MRGB	Main Rotor Gear Box
MSI	Motion Severity Index
NDA	Non-Disclosure Agreement
NPA	Notice of Proposed Amendment
NTSB	National Transportation Safety Board (USA)
OEM	Original Equipment Manufacturer
OGP	International Oil & Gas Producers Association
OGUK	Oil & Gas UK
OHWeb	Offshore Helicopter Website (weather information)
OPERA	Operational Programme for the Exchange of Weather Radar Information
PCF	Potentially Catastrophic Failure
RAeS	Royal Aeronautical Society (UK)
RNAV	Area Navigation
RTVP	Rotorcraft Technology Validation Programme
SBAS	Space-Based Augmentation System
SHR	Significant Heave Rate
SME	Subject Matter Expert
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
03 JUNE 2015.**

Item	CAA Project Code	Title	Funding Status
1. ONGOING WORK			
1	5.1	HUMS - advanced analysis of HUMS data.	Study completed. Final report 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.	Study completed. Final report published in CAP 1034.
		EASA Rule Making Task RMT.0120 (27&29.008).	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).	All work completed. Final report published in CAP 1077. Implementation in progress.
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) – <ul style="list-style-type: none"> 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.
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.	Study completed. Final report to be published as a CAA paper.
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.

Item	CAA Project Code	Title	Funding Status
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 published in CAA Paper 2012/01.
		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	-	HTAWS Warning Envelopes.	Initial funding for next phase of work on warning form and format received allowing tendering to proceed.
13	-	Triggered Lightning Strike Forecasting.	Sufficient funding committed to complete all work currently identified.