

Flight Crew Operating Manuals (FCOM) Briefing Sheet



HeliOffshore
Safety Through Collaboration

HeliOffshore's Operational Effectiveness workstream is working with OEMs to develop helicopter Flight Crew Operating Manuals (FCOM).

As the FCOM concept is new to the rotary sector, the objective is initially limited to offshore oil and gas operations. The helicopter FCOM only relates to offshore operations whenever automation is used within the normal flight envelope.

As helicopter operators function globally and can differ in a number of their procedures, particularly in terms of the use of Altimeter and RadAlt bug setting, these issues will not be directly addressed in the FCOM, but placeholders for operational variation will be inserted.

This Briefing Sheet lays out the desired scope for an OEM generated FCOM for offshore helicopter operations. Whilst it is intended to be definitive in nature, the extent of the FCOM project is likely to develop and may mature which will, in turn and with the agreement of all stakeholders, influence the contents of this document.

The Briefing Sheet is in two parts:

- **Part 1** covers automation which is the priority for offshore operators due to a lack of information and guidance in current RFMs and associated documentation from OEMs;
- **Part 2** covers the overall format of the FCOM which can follow the production of the automation information. Complying with Part 2 gives flight crews a holistic document covering all aspects of operating the aircraft safely in an offshore oil and gas role.

Operators currently use the core RFM and then consult the Supplements to piece together the Normal Operating Procedures (NOPs), Emergency Operating Procedures (EOPs) and Limitations for their aircraft modified by the various equipment installed above the basic fit. It is envisaged that the aeroplane concept of the FCOM being a non-approved document, in a similar manner to Part 2 of the RFM, is adopted by the OEM. Part 1 of the RFM will still remain the document required by Part 29.1581 and there is no intention for the OEM to modify that.

It might be appropriate for the OEM to agree an equipment standard with the operators for the aircraft covered by the FCOM: as a minimum the FCOM should cover an aircraft fitted with radar, TAWS, TCAS I/II, floatation gear, life rafts, emergency cabin lighting and emergency exit lighting. For some types additional equipment such as full icing equipment will be applicable.

As most operators are moving towards the use of Electronic Flight Bags, then the FCOM should be available in an open source, searchable electronic format. Use of hyperlinks should be considered which will link the user from the text being viewed to additional information; for example, an EOP linking the user to a detailed description of the system.

For further information, please email info@heli offshore.org

PART 1: Automation

As discussed above, this section should be given the highest priority as misuse and misunderstanding of automation has the potential to lead to accidents and serious incidents in both offshore and onshore operations.

The automation section should be laid out in 3 sections as described below:

- Section 1 - Describing the general philosophy of automation use on the type in question
- Section 2 – Detailing how the automation should be used, including (a) NOPs and (b) EOPs.
- Section 3 – Containing more detailed technical information.

Section 1 - The general philosophy of Automation on this type

Points expanded in this section would include:

- How is the system designed?
- Why was it designed that way?
- How is the system interfaced by the pilot?
- How does the autopilot interface with other aircraft systems?
- How is it envisaged that the crew use the automation, in general terms, including recommendations for the 'best practice' use of automation such as:
 - vertical speed modes
 - altitude capture modes
 - Go-Around mode
 - any deceleration modes
 - any hover or low speed modes
- Issues associated with flying in 'mixed modes' including 3 axis/2Q or 'flying through' whilst upper modes are engaged.
- Any protection modes, warnings or safety systems built into the automation.

Section 2(a) - Normal Operating Procedures Relating to Automation

The content in this section should recognise that several levels of automation are available and details on 'best practice use' of these modes should be expanded for the following phases of flight:

- On ground, including any pre-flight tests required.
- Take-off – onshore (PC1 and 2) and offshore (PC2)
- Go-around – including how acceleration and climb are scheduled if GA is selected below V_y
- Cruise
- Descent
- Approach including:
 - ILS see example below
 - Onshore non-precision approach, including LOC, VOR, NDB and GPS/GNSS
 - The anticipated behaviour of deceleration and automatic level-off modes
 - Offshore OSAP/ARA using a combination of basic and upper modes
 - Any proprietary approaches for the aircraft type

Example for Cat 1 ILS Approach guidance:

Autopilot Vertical Modes: During the initial approach the crew should use the altitude acquire mode to change levels during a descent in order to minimise the chance of a level bust.

Autopilot Lateral Modes: the arrival, holding and navigation to the Initial Approach Fix should be flown coupled to the FMS. When radar vectors are provided then the Heading mode should be coupled (bug vs FMS).

Airspeed hold: the airspeed mode should be coupled from 'top of descent'. The ideal target speed envelopes for optimal AP performance throughout the Approach phase is xxx-xxx kts.

RadAlt bugs should be set in accordance with the Company Operations Manual.

The MFDs should be configured to show the following information to ensure optimal operation by the PF and monitoring by the PM:.....

On a closing heading to the localiser the ILS should be 'armed'. The glideslope function should only be 'armed' once the aircraft is established on the localiser and cleared for the approach.

At Decision Altitude for landing, the coupled Approach modes should remain engaged/be disengaged at point 'x':

Use of the Deceleration mode will result in the aircraft automatically levelling off at xx ft. Indicated speed be reduced/left at the approach speed until the level off commences, etc.

Go-around: The GA function should be selected in combination with the following modes.....

This part of Section 2 could also contain any inappropriate level & combinations of automation – this is linked to the previous point on issues associated with flying in a ‘mixed mode’ (i.e. AP controlling some or all control channels and pilot controlling the rest manually). A matrix might be an appropriate way to show the recommended mode combination for each phase of flight and may address which modes should be used for Performance Class 1 and Class 2 operations, if the same combination is not valid for both?

If the AP system has Power Limiting, then:

- how is this information displayed to the pilots in terms of visual and aural warnings;
- what are the limiting parameters, (for example, the AP targets altitude at the expense of airspeed until V_y below which it reduces altitude to maintain airspeed);
- how does any emergency or ‘blowaway’ mode function?

Section 2(b) - Emergency or Autopilot Degraded Procedures Relating to Automation

Given that several levels of automation are available, this section should describe how the AP should be used when related aircraft systems or individual components degrade or fail, for example, a cyclic pitch trim failure, or a yaw lane failure or a RadAlt failure during:

- Take-off
- Go-around
- Cruise
- Descent
- Approach:
 - Onshore Non precision approach, including LOC, VOR, NDB and GPS/GNSS
 - Offshore OSAP/ARA
 - Any proprietary approaches for the aircraft type

This section should clearly address which protection modes are lost or degraded following a partial degradation or complete failure of the AP and related systems and offer advice on ‘best practice’ when flying in ‘mixed mode’ configurations (i.e. 3 axis/2Q). As before, a ‘best practice’ mode combination matrix in degraded AP configurations may be an appropriate solution here.

Detailed explanation on the implications that a partially degraded system may have on other aircraft system(s) should be given. For example, a RadAlt fault/failure might have implications for some autopilot upper modes, but it may also have implications for TAWS and TCAS.

For aircraft equipped with an OEI Training Mode, what is the information ‘sensed’ by FADEC and how does it differ from what the Avionics and Pilots ‘see’. If a Power Limiting case is reached during training, does the system revert to AEO, and if so, what are the protections built in, how is recovery to AEO achieved and what can the pilot anticipate in terms of information displayed in the cockpit?

Section 3 – Expanded and detailed technical information

This section would aim to provide much more detailed information on how systems work (expanding on the information provided in RFM Part 2 Section 1. It would primarily be aimed at trainers and technical pilots whose roles require this additional level of knowledge, but may also be of general interest to Line pilots.

Of particular interest will be more detail on:

- Limitations on performance of the system, for example with Go-around coupled the system is limited to trimming at x degrees/second.
- Protection modes – how do they work
- What are the triggers resulting in one mode changing to another – for example, ‘Decel’ mode to RA hold on an ILS, or the ‘level off’ function following an altitude change
- Interface with other aircraft systems.

A lot of this information may already exist in training material and maintenance manuals. The aim is to bring it into one place where pilots can access it from a single source. If an electronic form of the FCOM is eventually provided, then this detailed information could be accessed by hyperlink from the relevant section.

PART 2: OVERALL LAYOUT OF THE FCOM

The overall layout of the FCOM could follow the general layout of the RFM. Although a lot of the text will be repeated in the FCOM, it does give the user a single source reference for their configured aircraft. In many cases it will be acceptable for the OEM to “cut and paste” text from the current RFM Part 1 and 2 and so the overall task is not as onerous as may be envisaged.

Section 1 – Limitations.

This section should cover the aircraft limitations with the offshore equipment fitted, not the baseline aircraft. All Limitations, Cautions and Warnings from the relevant RFM Supplements should be displayed in this section.

Section 2 – Normal Procedures

When the overall FCOM is produced, the NOP elements of automation should be included in this section.

Section 3 – Emergency Procedures

When the overall FCOM is produced, the EOP elements of automation should be included in this section.

Section 4 - Performance

Where the aircraft has electronic performance data available, for example via an APP, then this section is not required.

Section 5 – Aircraft Systems

This should contain detailed technical information on the aircraft systems. It is envisaged that the electronic form of the FCOM will make use of hyperlinks to allow the user to link from the overall description into deeper technical explanations, or link to NOPs and EOPs.

The FCOM need not contain mass and balance data, or a copy of the MMEL; these items will remain operator specific and should be covered in the operators' Operations Manuals.

In summary, the FCOM will never fully replace either RFM or Operations Manuals, but will ultimately be presented as a document that can be referenced from either of RFM or Operations Manuals and holds the potential to be used directly in operations, where appropriate.

For further information, please email info@helioffshore.org