

Flightpath Management (FPM)

Recommended Practice for Oil and Gas
Passenger Transport Operations



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Safety Through Collaboration

Safety Through Collaboration

Collaboration empowers safety and is at the very heart of HeliOffshore. This Flightpath Management (FPM) Recommended Practice is a great example of how our industry – from designers and maintainers, to pilots and passengers – works together and learns from each other to ensure no lives are lost in offshore flight.

I would like to thank the HeliOffshore FPM Working Group, industry stakeholders and every HeliOffshore member who came together to deliver this guidance. Thank you for your commitment and contribution. Together, we will implement and sustain ever-higher levels of performance so those we are responsible for travel home safely every day.

*Tim Rolfe
CEO, HeliOffshore*

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Authors:

Sam Ratterree (WG lead)

PHI

Dave Denman

Bristow

Shawn Vaughn

Bristow

Tim Rolfe

Bristow

Jon Hopkinson

CHC

JJ Gerber

Cougar

Dave Welch

Flight Safety International

François Lassale

HeliOffshore

Matt Greaves

HeliOffshore

Mulham Terkaoui

HeliOffshore

Mark Prior

M Prior Consulting

Herman Stroub

Omni

Gregory Le-Bellec

TOTAL

Haris Labib

Weststar

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1 Introduction	4	2 Guidance	8	3 Summary of recommendations	17
1.1 Introduction	5	2.1 Guidance introduction	9	Annex A – Example briefings and callouts	19
1.2 Background	5	2.2 Energy state	9	Annex B – Recommended guidance points on stabilized approaches	23
1.2.1 Fixed-wing approach criteria	5	2.2.1 Standardised approach profiles	10	Annex C – Automation guidance principles	26
1.2.2 Helicopter approach criteria	6	2.2.2 Energy state monitoring	11	Annex D – Abbreviations and definitions	28
1.3 Helicopter energy state	7	2.2.3 Energy state call outs	11		
		2.3 Approach briefing	11		
		2.4 Go Around management	12		
		2.5 Monitoring procedures	13		
		2.5.1 Standard calls	14		
		2.5.2 Deviation calls	14		
		2.6 Automation	14		
		2.6.1 General	14		
		2.6.2 Automation principles	14		
		2.6.3 Offshore approach at night or in DVE	15		
		2.6.4 Onshore approach	15		
		2.6.5 Manual flight	13		
		2.6.6 Automation fly through	15		
		2.6.7 Automation serviceability	15		

Section 1 Introduction



Section 1

Introduction

1.1 Introduction

The Flight Safety Foundation (FSF) Approach and Landing Accident Reduction Task Force (ALAR) determined that non-stabilized approaches for fixed-wing aircraft were causal factors in 66 percent of 76 approach-related accidents that occurred between 1984 and 1997 (Flight Safety Digest, 1998). These accidents could be represented by two groups: the low and slow approach that resulted in a reduced ground clearance CFIT event and the fast and high approach that concluded with loss of control or runway excursions.

In a similar context, the 2019 HeliOffshore Safety Performance Report determined that offshore helicopter accidents involving controlled flight into or toward terrain (CFIT) and loss of control inflight (LOC-I) events resulted in 48 percent of all industry fatal accidents between 2013 and 2018. While flight path management encompasses all aspects of aircraft movement, approach path mismanagement issues have shown to be a significant contributor to CFIT and LOC-I. As such the trend has been to adopt stabilized approach principles in an attempt to eliminate offshore approach incidents.

The adoption and adaptation of fixed-wing principles has in no small way contributed to

a safety enhancement of offshore helicopter approaches. However, in implementing approach criteria based simply upon airspeed (IAS), rate of descent (ROD) and bank angles, the opportunity to directly consider the energy state of the aircraft on approach to a landing site has not been addressed.

The recommended practices in this document seek to expand the considerations appropriate to offshore helicopter operations by reviewing five key elements that are fundamental to the conduct of a safe, stabilized approach and go-around in the offshore environment.

These five key elements are:

- Energy state
- Approach briefing
- Go-around management
- Monitoring procedures
- Use of automation

This guidance is intended to be read in conjunction with the HeliOffshore paper on Automation Guidance; it expands on the principles explained in the HeliOffshore automation videos.

Included in this guidance are references to IOGP Report 690 *Offshore Helicopter*

Recommended Practices. The text included in the blue boxes reproduces some of the relevant guidance from that report for ease of reference.

1.2 Background

It is helpful to highlight the basic principles of the stabilized approach concept, which was first developed in the fixed-wing community. It serves to provide context and background to the specific helicopter differences that will be discussed later in the chapter.

1.2.1 Fixed-wing approach criteria

Although some variation exists amongst commercial fixed-wing operators, the fundamental principle of a stabilized approach focuses on 'approach gates' or a point in the approach by which certain criteria should be achieved. There are many similarities when comparing stabilized criteria between fixed-wing aircraft and helicopters. The purpose of the criteria are similar regardless of aircraft type, but to further illustrate the fixed-wing background, example criteria are listed below:

The principles stipulated by Airbus in their FOBN are indicative of the widely accepted criteria to be achieved by certain heights on approach.

1. Aircraft on the correct lateral and vertical flight path
2. Small changes in heading and pitch to maintain flight path
3. Landing configuration
4. Thrust above idle and stable to maintain required speeds
5. Landing checklist complete
6. Flight parameters within limits

The flight parameter limitations are further expanded as follows:

1. Airspeed v_{app} +10/-5 kt
2. Vertical speed less than 1000 fpm unless briefed
3. Pitch attitude +/- specified degrees (aircraft-dependent)
4. Approach aid deviation (G/S, LOC) within specified limits
5. Unique procedures or abnormal conditions require specific briefings.

Deviation from these parameters outside of the specified gates requires an immediate go-around.

For instrument procedures the basic parameters for stabilisation remain the same, but specific boundaries for instrument approach navigation should be introduced for each instrument approach type:

- a. CAT I ILS: within 1-dot deviation of glide path and localiser
- b. RNAV: within $\frac{1}{2}$ -scale deflection of vertical and lateral scales and within RNP requirements
- c. LOC/VOR: within 1-dot lateral deviation; and
- d. Visual (to a runway): lined up with the runway centreline no later than 300 ft.

The fixed-wing principles further recommend that stabilized approach gates should be observed, and active communication calls made during each approach. The normal bracketing corrections used to maintain stabilized conditions may occasionally involve momentary overshoots made necessary by atmospheric conditions; such overshoots are acceptable. Frequent or sustained overshoots are not.

Legacy guidance for the 1,000 ft gate required that a go-around must be conducted if the flight was not fully stable in IMC. The new functional significance of the 1,000 ft mark is that it is the last suitable point along the approach to ensure that final landing configuration is selected and verified by the flight crew. The gear transition, deceleration to final approach speed, and power stabilisation should occur before the aircraft reaches the next gate at 500 ft AGL. It should be emphasised that initial configuration should occur before reaching the 1,000 ft gate; this gate is the last point at which final landing configuration should be selected and confirmed.

Previous guidance for the 500 ft gate required that a go-around must be conducted if the flight was not fully stable

Introduction

in VMC. The revised guidance retains the recommendation that the approach should be fully stable at this gate; however, the mandate to go around has been removed. Although a go-around may be considered at this gate, not *mandating* a go-around reduces the overall number of potential go-arounds by allowing low-risk unstable approaches to continue while at a safe altitude. The 500 ft gate is a suitable point in the approach for flight crew to verify all stable approach criteria. It is a familiar demarcation for flight crews. Being stable at this point in the approach allows for subsequent developing instabilities to be compared against a state of constant energy reduction. Improved situational awareness at this gate is also achieved through procedural active communication between flight crew.

The 300 ft gate establishes the boundary between higher altitudes where a stable approach is strongly recommended and the point where continuing an unstable descent reduces the margin of safety. It differentiates between approach stability and a go-around decision. It should be understood that the 300 ft AGL value is not intended to be absolute; it can be approximated to take advantage of aircraft automatic callout systems. For example, it could be synchronised with the 100 ft to go call many operators use when approaching DA/MDA. Descending in an unstable state below the 300 ft gate should be a warning to flight crews that the level of risk is increasing and action is required, whether the aircraft is unstable at this gate or becomes unstable below 300 ft.

The awareness of the increased need for action can be improved by heightening the definition of the aircraft's condition, from being in an unstable condition to being in a condition to go around. This can prompt the flight crew to make the correct decision – to go around. To further emphasise the point, the 1,000 ft to 300 ft window can be viewed as the stable approach zone, with the focus on ensuring that the aircraft is fully stabilized in comparison with these analyses, a gate of 300 ft AGL to execute a go-around provides adequate altitude margin for even the most extreme low-energy unstable approach.

Gate	PM call	PF response
1,000 ft AGL	"1,000, configured/not configured" or "Gear"	"Roger"
500 ft AGL	"500 stabilized/not stabilized" or "Speed [parameter]"	"Roger" or "Correcting"
300 ft AGL	"300 stabilized or go around"	"Roger" or "Going around"
100 ft to DA/MDA	"100 to go stabilized" or "100 go around"	"Roger" or "Going around"

1.2.2 Helicopter approach criteria

Operators should establish flight path management guidance in their Operations Manuals, Training Manuals, and Checklists for critical phases of flight operations (including taxi, take-off, cruise, approach, and landing). As part of this flight path management guidance, operators should develop procedures for the use of stabilized approach procedures.

These procedures should be similarly based on stabilized approach gates which define when an approach is considered stabilized, and actions to be taken if the stabilized parameters are not met.

Approaches should ideally be stabilized by 1000 ft above approach minima, but no later than 500 ft above approach minima in IMC; and by 500 ft above landing elevation in VMC, with the following two exceptions:

- Operations where the transit height is less than 500 ft above landing site elevation: The aircraft should be stabilized prior to descent below 300 ft above landing site elevation and before deceleration below 60 kt ground speed
- Operations where the aircraft is consistently operating at a low height above the terrain such as seismic work involving external load operations into remote landing sites, requiring a site reconnaissance before landing: The stabilized approach criteria may require modification by the operator. Any changes to the standard criteria should be clearly documented in the relevant Operations Manuals.

A flight is stabilized when:

- a. The aircraft is on the correct flight path and the correct navigational data has been confirmed as entered into the navigation system for final approach to the desired airport, heliport, helideck, or other landing site.
- b. Only small changes in heading, track, and power are required to maintain the correct flight path, unless environmental conditions require larger power changes than normal.
- c. All briefings and checklists have been completed, except for the final landing check.
- d. The aircraft is in the correct landing configuration. In addition to previously mentioned landing gear, approach speed, and power criteria, an additional consideration of rotor speed selection might be an example of additional helicopter specific configuration differences at this gate. Depending on airframe model, there may be other unique configuration requirements that should be addressed.
- e. The sustained rate of descent is no greater than 700 fpm upon arrival at the stabilized approach gate, or as recommended by the instrument procedure. If an approach requires a rate of descent greater than 700 fpm, this should be clearly briefed, with a focus on procedures that should be used to account for the higher-than-normal rate of descent.
- f. Once the approach minimums (altitude, time, etc.) are achieved the correct airport, heliport, helideck, or landing site is confirmed.

Introduction

IOGP Report 690 specifies that:

"The aircraft operator has established a procedure for flight crew to confirm the location of offshore destinations.

There is a process to identify the relative risk (high, medium, or low) of a wrong deck landing at a particular destination or vessel during flight planning. This process considers factors such as the location of mobile installations and vessels, proximity of adjacent decks, physical similarity of adjacent installations or vessels, similarity in naming conventions, etc.

Procedures are in place to review this risk during all pre-flight briefings and discuss in pre-landing briefings (unless the risk in that area is continuously low).

There are procedures in the operations manual/normal checklists for verification of the destination position and facility name when approaching all vessels and installations."

Anytime an approach becomes 'unstabilized' (out of compliance with the above guidelines) a go-around / missed approach should be executed immediately, unless the operator has established a limited number of deviation protocols that can be safely used to return to the stabilized profile.

Further expansion and summary of stabilized criteria can be found in *Annex B - Recommended guidance points on stabilized approaches.*

1.3 Helicopter energy state

The energy management concept requirements for fixed-wing and helicopters are based on somewhat different end-state goals. Aeroplanes need to be stabilized on approach to ensure that they will be able to land and stop within the runway space available. Helicopters need to be stabilized on approach to ensure they will be able to stop at the correct place and then land, which means to arrive at the Landing Decision Point (LDP) within the correct parameters. Management of speed, pitch attitude, and flight path vector is therefore important for aeroplanes for different reasons than for helicopters. Control of speed in relation to power, collective pitch, and nose pitch attitude (which affects both speed and perspective) are both fundamental factors for helicopters.

A report resulting from research conducted by the UK CAA and *FlightDataPeople* (Clapp and Howson, 2015) into the viability of modifications to HTAWS warning envelopes, concluded that increased warning periods can be expected from flight envelope changes made specifically to the commonly used Honeywell Mark XXII HTAWS system. Notably the report also concluded that an additional envelope based upon total torque and airspeed, i.e. energy state, would enhance the warning criteria available during the approach phase of flight.

Establishment of energy state criteria as part of an Approach Management policy, is considered an essential element and should be incorporated in Operations Manual guidance.

It should be noted that direction provided to aircrew in terms of energy state management will vary according to type (Clapp and Howson, 2015), making it essential to develop procedures applicable to each aircraft model. The energy state boundary referred to above is a 'hard' warning envelope; specific criteria in terms of airspeed, power and rate of descent should be defined for each type to provide 'soft' boundaries within which the aircraft can be considered to be on an acceptable flight path.

Section 2 Guidance



Section 2

Guidance

2.1 Guidance introduction

In reviewing the stabilized approach criteria in use by helicopter operators and the potential enhancements likely to become available through modifications to warning systems, the following guidance is provided under the heading of Approach Management. This is considered to be more encompassing than simple approach gates and the compliance with a fixed-wing style stabilized approach. The principle of Approach Path Management requires the consideration of a range of elements, each providing a specific barrier to a risk experienced during the approach phase by any helicopter.

IOGP Report 690 specifies that:

"The aircraft operator has established stabilised approach procedures.

Stabilised approach procedures are documented that define when to conduct a missed approach or abort a landing if deviation criteria for a stabilised approach are not met.

The procedures are written with reference to the HeliOffshore Flightpath Management Recommended Practices (HO-FPM-RP-v2.0).

Stabilised approach procedures are specific to the aircraft type or use a TC Holder issued Flight Crew Operating Manual (FCOM).

Procedures are characterised by defined speeds, climb/descent rate, vertical flight-path and configuration, through a series of defined 'gates' as necessary.

Stabilised approach criteria confirm that: The aircraft is on the correct flight path and only requires small changes in heading, attitude and power to remain on the correct flight path;

The aircraft is in the correct landing configuration and all briefings and checklists have been conducted;

The power setting is appropriate for the aircraft configuration, not below the manufacturer's minimum if specified in the Aircraft Flight Manual or Flight Crew Operating Manual (FCOM), and

Flight crew procedures include monitoring of the flight path and the requirement to announce deviations and subsequent actions using specified criteria.

Unique approach procedures or abnormal conditions that require a deviation from stabilised approach criteria require a special briefing.

Procedures are in place for no-fault, mandatory go-arounds should any approach not be stabilised and pilots practice all-engine operating (AEO) go-arounds as part of their proficiency training.

The aircraft operator uses HFDM analysis, within its SMS to assist with the identification of specific risks in the conduct of flight procedures."

2.2 Energy state

Although previously derived stabilized approach criteria often consider minimum airspeed and maximum rates of descent (ROD), the concept of combining airspeed, rate of descent, aircraft pitch attitude, and collective position (torque applied) to determine an energy state has rarely been addressed in operations manual guidance. As previously discussed, current research is working towards a HTAWS mode expansion, that will warn flight crew of an impending low energy state. However, these systems only provide warnings where a situation has already started to develop, making it necessary to establish flight practices and company guidance to prevent the development of low energy state conditions.

2.2.1 Standardised approach profiles

IOGP Report 690 specifies that:

'All CAT operations to offshore destinations are carried out in PC1, PC2e, PC2DLE, or PC2.'

Onshore take-offs, departures, approaches, and landings for the purpose of carrying passengers are conducted in accordance with PC1 criteria, unless specific circumstances dictate the use of PC2 criteria and then only when a safe forced landing can be assured in the event of a critical power unit loss.

When performance planning for offshore take-offs, departures, approaches and landings there is no exposure to deck edge strike or to a forced landing in the event of a critical power unit loss.

The RFM PC1/PC2/PC2DLE/PC2e flight profiles are used, both onshore and offshore as appropriate. (It is acceptable to vary from flight profiles if published in the Operations Manual provided that the aircraft mass is in accordance with the approved performance data.)"

The use of standard repeatable approach profiles, tailored for specific types where required, enhances the ability of crews to monitor and detect deviations.

HeliOffshore members provided three alternative examples of standardised offshore approaches. The first, developed for the AW139, makes use of a 5 degree profile

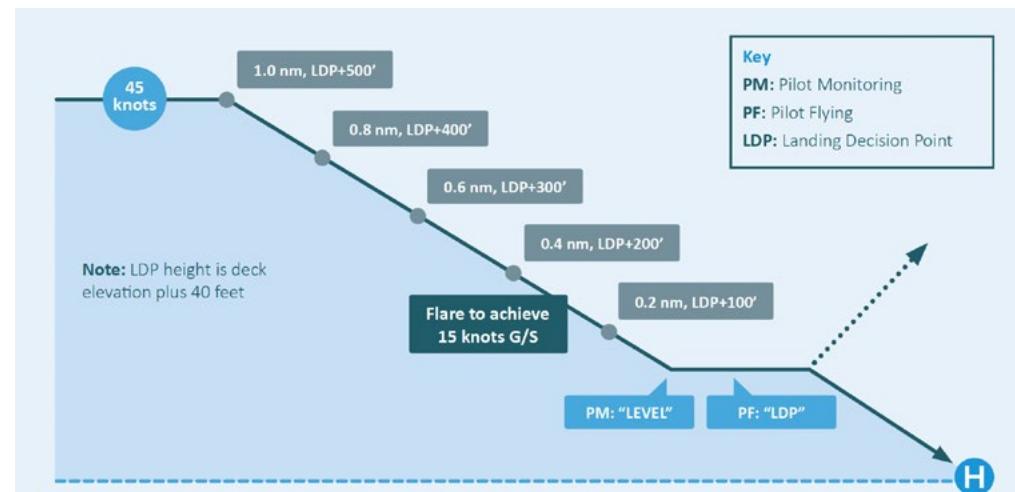
that can easily be monitored by the PM, through the use of the FMS and a pseudo-glide slope indicator. It is not intended to be flown as an instrument style approach but rather provides enhanced monitoring tools to ensure a standardised approach is flown both day and night in VMC.

The second example is more generic, providing guidance that could be applicable to multiple aircraft types.

Both styles of guidance are valid but both require that approaches are flown in the same manner, to the same gates and airspeeds regardless of the landing site and regardless of day or night operations. Repeatability is the key to ensuring the aircraft achieves safe, predictable parameters at the LDP every time.

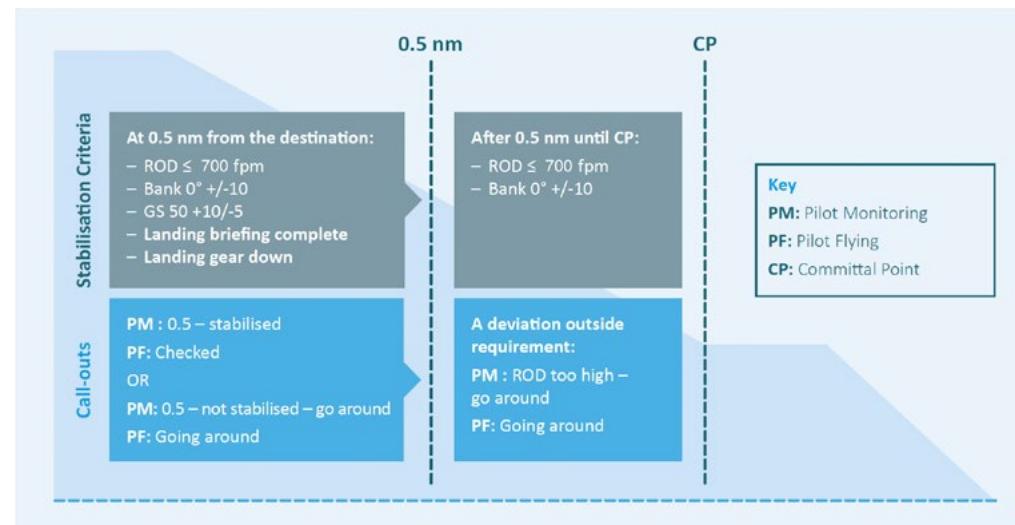
The third example highlights that there can be significant difference between day VMC, and night and Degraded Visual Environment (DVE) conditions. Approaches in day VMC can largely be based on a standard 'sight picture', whereas night and DVE approaches may require a more formalised structure of gates and checkable parameters. These should be minimised for simplicity and repeatability, to reduce pilot workload. However there is no reason why all approaches, even in day VMC and in short-sector 'shuttle' operations, cannot comply with a set starting gate position (for example, half a mile established on the final approach track) where the established parameters for the specific approach must be achieved.

2.2.1.1 Example 1: Defined 5° Profile

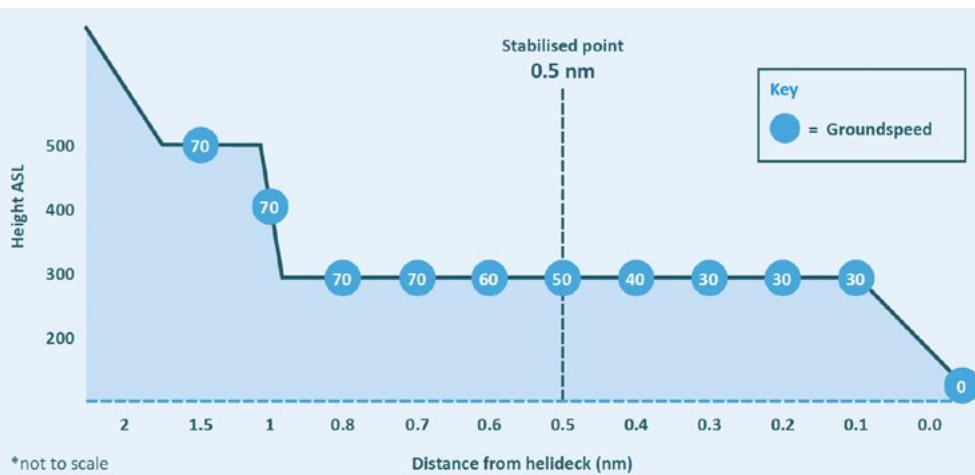


Height Profile: The required profile heights are referenced to LDP (i.e. Deck Height plus 40'). The circuit height is 500' above LDP. The profile is based upon a 1 in 2 calculation such that dividing the distance by 2 results in a simple calculation of height above target height, i.e. 0.8 NM is 400' above LDP.

2.2.1.2 Example 2: Standardised Approach criteria



2.2.1.3 Example 3: Day DVE or night offshore approach*



*not to scale

The stabilised point is at 0.5nm with the aircraft fully configured for landing. Descent to 300 feet (or deck height plus 50 feet if higher) is carried out fully coupled. Use of the coupler is maintained as long as possible; if necessary, the cyclic channels (speed, heading) may be decoupled if the aircraft configuration requires, but RADALT/ALT hold should be retained as long as possible. Speed reduction should be carried out by selecting a suitable nose up attitude. The benefit of approaching at a constant height is that one less parameter has to be considered; in addition, any required go-around manoeuvre will be less dynamic. A missed approach should be carried out if any parameter (for example rate of descent or groundspeed) exceeds defined criteria after the stabilisation gate, see the discussion in **2.2.2 Energy State Monitoring** below.

2.2.2 Energy state monitoring

The energy state call out is considered critical in preventing CFIT or loss of control events in offshore helicopters. Again, it may not be possible to define these points generically as each aircraft's stability and power characteristics differ, but continuous monitoring gates can be established. The need for a standard '500 to go' call (for an onshore approach) or a '0.5 NM' call for an offshore approach, defining the stabilized 'gate', warrants examination. Many of the events related to energy state have occurred below this 500 ft level or inside 0.5 NM, suggesting that a continuous monitoring of energy state is more valid than achieving a singular point in space where the aircraft is considered stable. The later in the approach

that instability occurs, the more difficult it is to remedy. Operators should ensure their procedures reflect this requirement of continuous monitoring.

For offshore approaches, in particular in degraded visual environment (DVE) or at night, it is important to define criteria that require a go-around to be flown should the approach become unstable between the 0.5 NM gate and the committal point. These should normally include minimum power setting, minimum airspeed and maximum rate of descent. Any landing site that is similarly limited in physical dimension, such as a confined area, should be treated in the same way.

2.2.3 Energy state call outs

Three examples of approach minima for speed and power standards are:

1. During approach to a clear area (runway/flyway), the requirement to maintain a minimum of V_y until deceleration is necessary to comply with the landing procedure dictated by operator guidance, regulatory requirements or manufacturer guidance.
2. During approach to a landing site of limited physical dimension (helideck/confined area), the requirement to maintain a minimum of V_{toss} until the transition point for speed reduction is reached offshore.
3. Specify a minimum power below a certain speed, where a prescribed call initiates a go-around (note this type of call may be aircraft-specific). It is a technique for some flight crews to compare power setting and pitch attitude to known hover values towards the end of the landing approach to verify energy state is acceptable for a safe landing. Operators should consider standardizing energy state parameters as part of stabilized approach criteria. The UK CAA have published guidance on power and airspeed combinations in CAP 1519 in support of HTAWS design for offshore helicopters. While the guidance is for HTAWS design, it could assist in establishing simplified energy state parameters to be used by flight crews as part of the stabilized criteria monitoring.

two parts; the details of the approach being flown be it visual or procedural, and the manner in which the aircraft is to be flown.

Common problems with briefings have been highlighted in accident investigations where errors of omission and inappropriate actions resulting from lack of information have been identified as causes. The traditional briefing list, as detailed in many operations manuals, has encouraged a non-interactive procedure followed by "Questions?", where the ability to share a common vision of the planned approach is often hindered. Equally the repetition of standard information, appropriate to all approaches, often inhibits the understanding of information specific to the approach being briefed.

The following is recommended for approach briefings:

- a. An approach briefing should be given for each landing. The briefing should be completed before the top of descent for an instrument approach and no later than the Before Landing checks for a visual approach. Where available, the coupler should be used during the approach briefing to reduce workload. The briefing should be conducted by the appropriate crewmember dictated in operational guidance for a given situation. Briefings should also be fully interactive with each item briefed and confirmed during the briefing to ensure mutual understanding between pilots and to verify accurate settings. If either pilot has any misunderstanding, both pilots should resolve the issue during the briefing, to mitigate any

2.3 Approach briefing

Approach Briefings can be considered in

misunderstandings during the actual approach.

b. It is recommended that operational guidance describes how the crew will prepare the cockpit in advance of the briefing (setting up of required approach aids, frequencies and so on). This minimises the chances of interruptions while further adjustments are made to system settings, reducing the possibility of essential steps being missed. During the briefing, the briefer points out the settings to verify the setup matches what is required in the procedure and is duplicated on both sides of the cockpit as applicable. This provides redundancy (dual confirmation), reducing the time required for the briefing.

c. Separate the section of the briefing that refers to aircraft management and ensure that both pilots understand the IAS, ROD, and anticipated power settings for the approach. Highlight the areas for the specific approach where particular focus may be required, such as higher rates of descent when a downwind component is present. It is accepted that heading changes may be required during the final stages of an offshore approach. Especially if the approach track is not aligned with the wind due to obstacles in the approach path, requiring alignment into wind at a late stage. However, flight path (track) changes should always be minimised when possible.

d. Brief a go-around procedure including the aircraft management parameters such as speed, rate of climb, power, heading, and automation usage. All of this should be standard operating procedure requiring minimum briefing,

Guidance

but any non-standard items should be briefed in detail. Discuss the various possibilities that may lead to a go-around late in the approach. Some examples include, loss of visual references due to heavy rain showers, patchy fog, or last-minute problems at the landing site. This section of the briefing should also be interactive, and each pilot should articulate what is expected of their position during the go-around.

NOTE: In the context of approaches and automation, any variation to standard automation operating procedures should be briefed separately with particular attention drawn to the potential consequences and the required additional monitoring. See also the HeliOffshore videos on automation guidance.

2.4 Go-around management

While operations manuals should include a focus on the need to address go-around procedures in every approach briefing (see *Section 2.3d*) such that crews are prepared whatever the eventuality, attention should also be drawn to the Human Factors barriers that may affect the decisions made in regards to a go-around. A go-around is a flight procedure that is often neglected in both preparation and training. Statistics, kindly provided by the LOSA Collaborative, identify a strong tendency for fixed-wing crews to continue approaches despite deviations outside of company published stabilized approach criteria, suggesting a reluctance to execute a go-around. That reluctance tends to stem from a powerful

desire to complete the landing. Historic culture supports the landing at planned destination as the only possible positive outcome. That desire can be coupled with other human factor pressures. Factors that lead to a breakdown in procedural discipline include: fatigue, company pressures, customer pressure, fuel state, deteriorating weather, and the powerful desire to land at the destination. That powerful desire to land can also intervene during a go-around. Once the go around is initiated, the crew must maintain commitment to a stabilized go around, even if the landing area suddenly becomes visible after the go around is stabilized. Procedural discipline is supported by strong policy and safety culture. Operators should develop a clear no-fault policy of supporting a crew's decision to perform a go-around regardless of the circumstances. A stabilized, successful go-around will always yield better results than an unstabilized approach.

Data gathered from 53 fixed-wing LOSA programs conducted over the last five years indicate that 411 Unstable approaches, as defined by the specific companies and witnessed by observers, were continued to a landing. Of these approaches 55 percent were flown by the Captain of the aircraft. Only 12 unstable approaches resulted in missed approaches being flown.

Observations have also suggested that missed approaches are often poorly managed when they are conducted, prompting a revision to the observation criteria and the acquisition of additional data. As more LOSA observations are gathered by the offshore helicopter industry

it should become more apparent as to whether similar areas of concern exist. It cannot be over emphasised however, that a revision of procedures and dedicated training scenarios should be considered as part of the overall approach management system within all companies.

The considerations during the go-around of a large jet are complex because of aircraft configuration changes such as flaps and the associated speed restrictions. Likewise, for a helicopter at low speed with a high pitch-up attitude, at night, at 90 degrees offset to a drilling rig helideck, a go-around can be just as complex: the helicopter requires a substantial change in pitch attitude to accelerate back to V_{toss} , while minimising height loss; the PF needs to transfer their scan rapidly from outside to inside; and the PM needs to monitor the attitude, power, and flight path very closely. Regardless of aircraft type and the technical requirements of a go-around, the overriding human factor issue is that crews are landing 'focused' and often mentally unprepared when a missed approach is required. Furthermore, helicopter training has often focused on the need to train the go-around from instrument approaches with one engine inoperative (OEI) and rarely reflects an all engines operative (AEO) go-around from an unstabilized approach. Operators should consider devoting some training time to AEO go-arounds as a result of an unstabilized approach, loss of visual cues, or last-minute problems on the landing site.

Operations manuals should contain not only the instructions and appropriate calls to direct a go-around but also clear simple

guidance on how to conduct the go-around. That guidance should include stabilized go-around criteria for the PF to execute and the PM to monitor, in line with the same philosophy as the approach criteria. This should include direction regarding flight path parameters and the correct use of automation modes including any combination of modes to be avoided. The guidance should address how the energy state and required reactions during a go-around will differ according to situation. The go-around conducted late in the approach at a low altitude with low airspeed is different to a procedural go-around conducted as part of a missed approach procedure. In the case of an instrument missed approach procedure, the aircraft energy state should already be stabilized at an airspeed and track that support an immediate transition to a climb with only a change to climb power. In this condition, stabilized go-around criteria should be set similar to the example shown.

Example 4: Stabilized Missed Approach Criteria

A stabilized missed approach means the aircraft maintains a stabilized airspeed and climb rate, desired flight path and configuration during the initial stages of an IFR Missed Approach to 500 ft above landing surface. The following parameters constitute an unstabilized missed approach:

- Excessive pitch, roll or yaw corrections.
- Failure to maintain appropriate airspeed (V_y).

Guidance

- Failure to maintain a positive rate of climb of at least 500 fpm not to exceed RFM limitations.
- Heading deviations greater than 10 degrees without appropriate correction unless in response to charted procedure.

Upon recognition of being outside the parameters of a stabilized Missed Approach, the PM shall make deviation calls (see Section 2.5.2)

In the cases where the go around is initiated late in the landing approach, flight path parameters should be reestablished that support a favorable energy state. Guidance and training should support the application of takeoff power, a pitch attitude that provides acceleration to V_{toss} and subsequently V_y , and a go-around track that avoids known obstacles. Once a positive rate of climb is obtained, along with an appropriate stable climb airspeed, the transition to the previously mentioned stabilized missed approach criteria should be utilized.

Example 5: Go-around from low energy state

IMC flight can be much more difficult at low airspeeds. Training should be conducted to prepare crews for the challenging task of maintaining flight path management under those conditions. Many older automated systems are not active or are unreliable at low airspeeds, therefore manual recovery skills (see Section 2.6.5) should be part of training programs. For the newer

automated systems that can be used at low airspeeds, the crew training should encompass understanding and practice of the automation in slow flight regimes.

2.5 Monitoring procedures

The ability to follow stabilized criteria and procedures requires both pilots to work in unison and share the same situational awareness. This requires the use of detailed briefings and also a prescribed set of standard callouts that ensure both pilots are sharing the same mental picture at all times during the approach.

IOGP Report 690 specifies:

"The aircraft operator has procedures outlining the duties and responsibilities of all flight crew members, specifically 'Pilot Flying' and 'Pilot Monitoring' roles and tasks are defined."

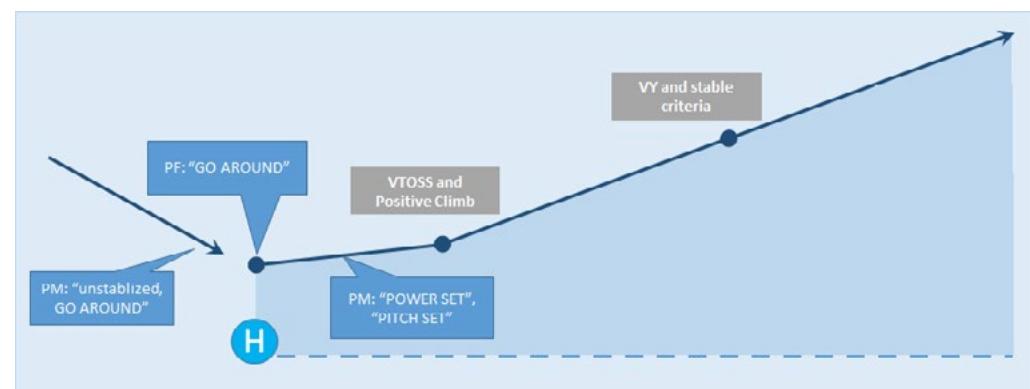
Given that considerable variation exists between the aircraft types operated offshore and between operator philosophies, it is not possible to detail every specific call, although

a large number are generic and could be applied. This guidance therefore provides the basic principles that should be applied to Operations Manual procedures and examples of some current practices.

Some examples are provided in Annex A – *Example briefings and callouts* – at the end of this document.

IOGP Report 690 specifies:

"Flight procedures (SOP or Operations Manual) are used by the aircrew in the performance of their duties, referencing the FCOM if available. These procedures include cockpit procedures, use of checklists, automation policy, and crew monitoring procedures including confirmation of actions, mode settings, aircraft responses and deviation calls. The procedures are described concisely so that aircrew will recognise and act on deviations from standards in a timely manner."



2.5.1 Standard calls

'Standard calls' are those calls that are required throughout the normal flight regime to ensure an equivalent situational understanding between the two pilots. 'Deviation calls' are addressed in the following section.

All operators are encouraged to include standard calls as part of a continuous improvement process, using tools such as LOSA to ensure the continued validity of all cockpit procedures. Historically cockpit callouts have increased as the result of events and reports but are rarely reduced as a result of automation usage. To maintain the credibility of such calls, and in turn ensure their correct and continued usage, it is considered essential to keep calls to a minimum and only use calls where a missed call or event would have a safety consequence.

IOGP Report 690 specifies:

"There is a sterile cockpit policy covering as a minimum, restrictions on unnecessary conversation, use of EFBs or PEDs, and paperwork, during flight below key altitudes, and during certain phases of flight or ground operations."

2.5.2 Deviation calls

It should be noted that the examples provided in the Annexes are not exhaustive and refer predominantly to the approach phase. It is essential to ensure brevity where aircrew can concentrate on the task in hand and not focus on the calls as a script to be followed. Calls should serve a safety purpose

Guidance

at all times.

Deviation calls should therefore be based upon the following criteria:

1. Pilots should make deviation calls as soon as a deviation is observed outside of defined limits to ensure the maximum time for correction before an unacceptable flight condition occurs.
2. The thresholds should be set at the point where a deviation to this level is rare but equally at the point where a recovery is still possible with minimum intervention. These settings should also ensure that PM is not required to make constant calls for minor deviations such that PF becomes immune to PM's input and therefore fails to take action when it really becomes necessary.
3. Pilots should acknowledge ALL calls to ensure situational awareness and also to function as early detection of incapacitation.
4. Any call made for deviation from stabilized criteria should be acted upon immediately, not simply acknowledged.
5. If the stabilized criteria are not re-established before the required point on the approach, the PM shall command a go-around and PF shall comply immediately. If stabilized criteria are not maintained during a go-around the PM may need to assume control.
6. Operators should develop a non-punitive go-around policy that views all go-arounds as a safe choice, regardless of reason. Examples could include: ATC requirements; deteriorating meteorological conditions; or misjudgment of visual approach.

2.6 Automation

2.6.1 General

Automation and its safe usage have been the subject of much debate, with focus areas of mode confusion, training and the development of procedures to ensure equivalent situational awareness between pilots.

HeliOffshore has, in particular, dedicated significant resources to both research and training videos to ensure the necessary understanding of both concept and operation of automation systems.

This section concentrates on the safe usage of automation during the approach and go-around phases of flight through the use of standardised operating principles.

IOGP Report 690 specifies:

"The aircraft operator has defined automation procedures.

The automation procedures contain requirements for the appropriate use of automation to reduce cockpit workload and increase standardization.

The automation procedures are defined for all phases of flight.

Type-specific procedures for the use of automation are based on those published in the Flight Crew Operating Manual (FCOM).

The policy includes procedures for manual flight control to maintain flight proficiency including those conditions under which automation systems may be deselected and manual flight undertaken.

The Minimum Equipment List (MEL) has clear requirements for the AFCS to be serviceable for night or IFR flights."

2.6.2 Automation principles

HeliOffshore's Automation Guidance to support this information can be found in Annex C – Automation Guiding Principles. These guiding principles are offered to ensure effective use of automation. Standard Operating Procedures based on these principles should help to mitigate the risks of interacting with cockpit automation and improve safety performance in usage and monitoring.

1. The coupler / flight director should only be engaged once the aircraft is in a trimmed stable configuration after takeoff, possibly defined by a minimum speed (for example, V_{mini}, V_{toss}, or

V_y) and a minimum height. Similarly, guidance should describe when the coupler/flight director should be disengaged during an approach. During DVE that may be as late as possible in the approach. Transition procedures should be clearly detailed in the Operations Manual.

2. All climbs should be performed in 4-axes (3-cue Sikorsky).
3. All descents should be performed in 4-axes (3-cue Sikorsky).
4. Cruise should be flown in 3-axes/2-cue as a minimum standard utilising lateral modes for navigation and an altitude hold function. Operational guidance should describe the varying situations that support 3-axes versus 4-axes cruise coupling and any associated risks.

NOTE: Specific consideration should be given to automation training requirements to ensure comprehensive understanding of all protection modes and the consequences an OEI condition may have on degraded coupled modes.

2.6.3 Offshore approach at night or in DVE

Whenever possible, a straight-in landing is preferred. If a circling approach is unavoidable it shall be flown coupled in 4-axes/3-cue, with PF adjusting ALT, HDG and IAS through beep trims while maintaining visual cues until the Committal Point.

The use of automation for offshore approaches should be integrated into the specified approach profiles as described under energy state earlier in this guidance document.

NOTE: Certain aircraft types require the final stages of offshore approach profiles to be flown at speeds below the minimum coupled speed. This type of restriction requires manual flight on final approach and reinforces the need for standardised approach profiles.

NOTE: In some cases it may be easier to manually fly the lateral profile rather than coupled to HDG; this is acceptable provided the vertical (altitude hold, radar altitude hold, or vertical speed) and IAS modes remain engaged.

2.6.4 Onshore approach

The variety of available onshore approaches and the range of automation available to conduct these various approach types makes the application of standardised criteria across multiple types difficult.

However, the application of the standard automation principles in 2.6.2 *Automation principles* and the energy state monitoring criteria in 2.2.2 *Energy state monitoring* should aid the safe conduct of all types of onshore approaches.

2.6.5 Manual flight

The transition from coupled to manual flight, a daily and normal occurrence for helicopter operations, requires defined criteria to ensure a safe and standardised procedure.

The ability for pilots of modern aircraft to maintain manual flying currency has also been a recent topic of debate and as such warrants inclusion in this guidance material. As a result the criteria under which manual

currency practice can take place should be clearly defined in the appropriate section of each company's operations manuals. Example guidance is given below.

Criteria for manual flight

To address the potential loss of manual flying skills due to use of automation, crews are encouraged to fly manually in VMC and IMC. No limits are placed on the frequency of manual flying, but it should only be conducted in the following circumstances:

- a. In VMC:
 - i. By day onshore and offshore at any time, including takeoff, en route, approach and landing.
 - ii. By night onshore at any time, including takeoff, en route, approach and landing
- b. In IMC:
 - i. By day or night while en route at any time above MSA.
 - ii. By day for onshore and offshore departures, en route below MSA, and for onshore instrument approaches, provided conditions are at or better than 4,000 m visibility and cloud base not below 600 ft or not below 200 ft above DH/MDH, whichever is the higher.
 - iii. By night for onshore departures, en route below MSA, and for onshore instrument approaches, provided conditions are at or better than 5,000m visibility and cloud base not below 1,000 ft or not below 200 ft above DH/MDH, whichever is the higher.
- c. Night offshore let-downs, approaches,

and circuits/patterns shall not be flown manually.

- d. Night offshore departures shall not be flown manually unless operating under the MEL.

In addition, cockpit workload should not be excessive, and the crew briefing shall be explicit in stating where the manual handling segment starts and ends.

2.6.6 Automation fly through

As a general principle, once the automation is engaged, it should be left to do its job. Any attempt to 'help it along' may just 'confuse it' and can often result in an unexpected aircraft state once the pilot releases the controls. If the rate of change of parameter is too slow using the normal control beep switches, it may be possible to press the appropriate trim release, fly to and set the new required datum (for example airspeed) then release the trim button again. Be wary of disengaging a single axis to make a change in the datum; far better to anticipate changes in sufficient time for the automation to make them on your behalf.

2.6.7 Automation serviceability

Automation serviceability and how it should be restricted to avoid potential approach profile mismanagement is complex as aircraft differ in design and concept of operation. It is therefore impossible to provide accurate guidance for each aircraft type but rather a set of guidance principles that should form the basis of changes to an Operator's Minimum Equipment List (MEL) not necessarily provided as part of a master MEL (MMEL). In essence, additional restrictions

should be considered over and above those recommended by the manufacturer's MMEL where enhanced safety is required during the approach phase of flight.

Automation serviceability recommendations

1. Any item that restricts the functionality of the autopilot should restrict operations to day VMC only.
2. Inoperative collective axis trim will require the aircraft to be flown in 3-axes/2-cue and will require enhanced monitoring and crew discussion. For climbs and descents, unless it conflicts with the design of the automation, it is strongly recommended that airspeed should always be coupled to the cyclic pitch axis and the vertical profile controlled manually on the collective. This is particularly important in the event a go-around is required. Both pilots need to confirm that the correct go-around power is set and the additional monitoring required by this non-standard configuration shall be covered in the approach briefing.
3. The MEL may make provision for system unserviceability to permit ferry flights or single flights back from offshore in other than day VMC conditions, to allow recovery of the aircraft to a maintenance base, provided such unserviceabilities are permitted by the MMEL.

CAUTION: Operations manuals should clearly detail modes and combinations of modes that present additional hazards due to mode confusion. Examples of these potentially dangerous practices include:

- Reducing collective pitch to reduce airspeed when the cyclic pitch axis is coupled to the vertical profile and not IAS
- The reduction of airspeed when coupled to a vertical mode without IAS engaged.

Section 3 Summary of recommendations



Section 3

Summary of recommendations

Operators should establish flight path guidance in their Operations Manuals, Training Manuals, and Checklists for critical phases of flight operations (inclusive of taxi, take-off, cruise, approach, and landing). As part of this flight path guidance, operators will develop procedures for the use of stabilized approach procedures for all flights (*Section 1.2.2*).

The provision of guidance encouraging operators to consider energy state criteria as part of a stabilized approach, is considered an essential element and as such should be incorporated accordingly in Operations Manual guidance (*Section 1.3*).

Continuous monitoring of stabilized criteria over multiple 'gates' is more valid or relevant than achieving a singular point in space where the aircraft is considered stable. Operators should ensure their procedures reflect this requirement (*Section 1.2.2*).

An approach briefing should be given for each landing. The briefing should be completed before the top of descent for an instrument approach and no later than the Before Landing checks for a visual approach. Where available, the coupler should be used during the approach briefing to reduce workload. Briefings should be interactive to support engagement and focus of all crewmembers. Details of the approach briefing should include specific threats to that approach, how those threats will be managed, reference to any additional go-around triggers, non-standard parameters, or unique landing site requirements (*Section 2.3*).

Operators should consider devoting training time to AEO go-arounds as a result of an unstabilized approach, loss of visual cues, or last-minute problems at the landing site. The go-around training should also be initiated from varying levels of energy state, to include the more challenging low speed regimes (*Section 2.4*).

All operators are encouraged to include standard calls for normal operations and for deviations from normal flight profiles. Calls should be kept to a minimum, be logical and only used where a missed call or event would have a safety consequence (*Section 2.5*).

Operators should ensure that their operations manuals clearly detail procedures for the use of automation and, if OEM guidance (for example, FCOM) is unavailable, explain automation modes and combinations of modes that may present additional dangers due to mode confusion. Specific consideration should be given to automation training requirements to ensure all protection modes are fully understood (*Section 2.6*).

Annex A Example briefings and callouts



Annex A

Example briefings and callouts

Example full instrument approach briefing:

Contents:

- a. Plate number, name, and date
- b. Follow the briefing strip order, i-viii if applicable but in any case, the following items are to be included:
 - i. Approach type
 - ii. Navigation aids (Radio and/or GPS setup and requirements)
 - iii. If raw data or coupler/flight director will be used
 - iv. Speeds
 - v. Arrival: STAR arrival route
 - vi. Procedural sector
 - vii. FAT crossing altitudes and timing
 - viii. Minima and weather
 - ix. Runway elevation
 - x. Actions at minima
 - xi. Missed approach procedure including planned alternate and fuel requirements
 - xii. Any airfield or heliport special briefings

Abbreviated IFR approach briefing:

- a. ILS (or other approach) to runway XX at.....
- b. FAT is.....°, DA/MDA is.....ft, minimum RVR ... metres
- c. Runway elevation is
- d. Commencement and continuation of approach
- e. I will fly 4-axes coupled / 3-axes coupled/ raw data approach
- f. My landing/your landing (subject to weather)
- g. Go-around procedure will be.....

Example abbreviated offshore landing briefing:

1. Standard offshore landing, heading XX
2. Go-around to the right/direction XX
3. Review any turbulent arcs, obstructions or restricted landing arcs if applicable

Briefing

Pilot flying	Pilot monitoring
Plate 11-1, ILS Y dated 2 October 2019	I have the same
ILS to runway 03, ILS frequency 109.75, tuned and identified CVF my side	109.75 tuned and identified I-ABC my side
Final approach course 034 set my side	034 set my side
I will fly 4-axes coupled at 100 kt. No STAR, it will be radar vectors. Crossing altitude 1,340 ft at 4DME.	1,340 ft at 4DME
Weather is above minima, there is no approach ban. Elevation is 210 ft, bug set at 410 ft.	Bug set 410 ft
Assuming you are visual at minima I will continue to fly the approach fully coupled until I am happy with the visual references, then decouple and land	Understood
If we have to go around, standard missed approach procedure is straight ahead to 2,000 ft then start a left turn back to the NDB to hold at 3,000 ft	I will set ALTP to 3,000 ft once we start the descent. NDB is tuned and identified 397 DEF and set on the RMI.
We have enough fuel for two approaches before we need to divert to XXX	I agree

Example calls, onshore instrument approach:

Flight event	Pilot monitoring		Pilot flying	
It is recommended that the PF maintain reference to the instruments while PM looks for visual references and monitors the approach.				
	ACTIONS	CALL OUT	ACTIONS	CALL OUT
At first inward movement of localiser bar		“Localiser alive”		“Checked”
At first downward movement of glideslope pointer/bar		“Glideslope alive”		“Checked”
If flown coupled, at localiser/gideslope capture		“Localiser/gideslope captured”		“Checked”
FAP inbound	(note a)	“FAP”		“Descending”
500 ft above DA, stabilized approach		“500 ft to go, stabilized”		“500 to go, stabilized”
or		or		or
500 ft above DA, not stabilized		“500 ft to go, not stabilized, go around”		“Going around”

100 ft above DA		“100 ft to go”		“100 to go”
At or just before DA	If PM has required visual references	“Visual” or “Visual, Runway, 11 o’clock” or “Visual, lights straight ahead”	If PF has required visual references	“Visual, Landing”
	If not visual (note b.)	“DA, Go around”		“Going around”

Note:

- Normal SOP calls and checks regarding FD selections, DAs, and bug settings are applicable during the approach
- The “DA, Go around” call should be made in time to allow the go-around decision to be made at the minima

Example procedures for automation management and standard calls

Autopilot – Coupler/flight director modes

When available, it is recommended to operate the aircraft coupled, encouraging better overall management of aircraft systems, navigation, and passenger comfort. It is important to involve both pilots in the process at all times to maintain a closed loop. All mode selections and de-selections shall be announced, and confirmed by the other pilot. PF may make mode selections himself or may request the PM to make selections, in particular at times of high workload. All mode selections below 500 ft at night or in IMC should be made by the PM, on the PF's request, with the exception of modes that may be selected directly by buttons on the flight controls and full disengagement of the coupler/FD. While PM may adjust mode values at PF's request, PF may only adjust coupled mode values, provided it can be done using buttons on the flight controls; PF shall call the adjustments being made (for example, to IAS, HDG or ALT), so that PM is aware and can monitor.

Coupler/FD management

There are three steps. PF can start at step one or two depending on who is pressing the button on the coupler panel. PM will respond with the next step in line, and so forth. If the modes couple automatically, PF calls **"Captured"**.

When altitude change mode is used (ALTA/ALTP), both pilots shall confirm that the desired altitude is set with reference to the correct altimeter sub-scale setting. The pilot not selecting the altitude change mode shall

then confirm that the correct vertical mode engages. Do not select the next desired altitude until clearance to climb or descend has been received, to avoid inadvertent altitude changes.

Deselection of a mode shall also be requested or announced. All decouple alerts shall be acknowledged, either with the procedure below, or if an unexpected alert is heard, with a clear statement of what has changed.

The three steps are command, action, and confirmation:

- Command (request a mode, if required)
- Action (mode selected or armed): Visually locate the mode select button in question, select the mode, and look for the expected mode annunciation and aircraft reaction
- Confirmation (correct indication displayed on the Flight Mode Annunciator): Visually verify the correct mode annunciation and that the aircraft reacts accordingly

PF asks PM to couple a mode	
PF	PM
"Select altitude"	
	"Altitude selected"
"Altitude captured"	
PF couples a mode themselves	
PF	PM
"Altitude selected"	
	"Altitude captured"

The helicopter is coupled in VS and reaches the acquired altitude

PF	PM
"Altitude captured"	
	"Checked"

PF asks PM to arm localiser

PF	PM
"Arm localiser"	
	"Localiser armed"
Pause	
"Localiser captured"	
	"Checked"

PF arms the localiser

PF	PM
"Localiser armed"	
	"Checked"
Pause	
"Localiser captured"	
	"Checked"

Note: If there is a pause between a mode being armed and the mode capturing, the other pilot responds with "Checked". When manually flying the aircraft by command bars only, the same terminology is used, however, the PF should add the words **"Display Only"** after the word **"Captured"**. For example **"Localiser captured - display only"**.

Annex B Recommended guidance points on stabilized approaches



Annex B

Recommended guidance points on stabilized approaches

1. Stabilized approach:

The purpose of a stabilized approach is to ensure the helicopter is in the correct configuration, on the correct flight path, and within the correct parameters for the intended landing type (class 1 or 2, hover or running). The aim is to provide safe, repeatable, and consistent parameters at the LDP to minimise pilot workload and to provide a favorable energy state in support of safe approaches down to the termination point. The diversity of operations, environments, and OEM guidance makes a fully encompassing list of stabilized criteria difficult to produce. However, recommended guidance points in this Annex can be applied to the majority of operations.

An approach is stabilized when the following criteria are met:

1. The helicopter is in the correct landing configuration, with the exception of speed limited selections for example, NR
2. The helicopter is on the correct (briefed and agreed) flight path within permitted tolerances and this can be maintained using angles of bank and rates of descent within stabilized limits. Normal limits should be defined by the Operator and may be, for example (these examples are not definitive):

- Speed fixed for an instrument approach (within ± 10 kt of briefed speed), or appropriate to the distance to go for visual approaches.
- Rate of descent no greater than 700 fpm. If an approach requires a rate of descent greater than 700 fpm, this should be clearly briefed, with a focus on procedures that should be used to account for the higher-than-normal rate of descent.
- Steady power setting (except that when coupled in 4-axes / 3-cue, variations of power demanded by the AFCS to maintain the approach parameters, especially in turbulence, but are acceptable within the context of a stabilized approach). Additionally, some automation systems have an automatic approach deceleration mode, which would also be an acceptable AFCS commanded power change.
- Bank angle variations less than 20 degrees.
- Within half-scale localiser or glideslope deviation or 5 degrees of RMI bearing.

Approaches should be stabilized from defined gates (for example as described below):

1. Onshore instrument approaches should ideally be stabilized by 1,000 ft above approach minima, but no later than 500 ft above approach minima.
2. Onshore visual approach, from 500 ft above landing site elevation.
3. Onshore circling segment of any approach shall have wings level at 200 ft above airport elevation
4. Offshore approaches, from 0.5 NM from the installation if distance is used, or 300 ft above landing site elevation if based on altitude.
5. For low-level SAR and EMS operation, the helicopter shall be stabilized from the point of starting the final descent for landing and in any case before LDP +50 ft, as appropriate.

Just before reaching the gate, PM shall check that the required criteria are met; if they are, the PM shall call "Stabilized". If any of the criteria are not met at the gate, PM will call "Not stabilized, go around".

The stabilized approach is terminated for onshore instrument approaches at the MAP, when either a missed approach is initiated or the aircraft is manoeuvred to land, and

terminated for visual approaches at LDP or the equivalent point for Class 2 landings. For ARAs, the visual segment after the MAP is flown as a stabilized visual approach up to the helideck descent point. All parameters should remain within the deviation limits.

2. Unstabilized approach:

An approach is unstabilized if any of the following criteria are met by the defined gate, or after passage of the final gate (these examples are not definitive):

- Rate of descent above 700 fpm and not correcting.
- Speed significantly above or below the requirement (for example deviation greater than ± 10 kt on an instrument approach and not correcting).
- Deviation of half scale or greater on localiser or glideslope or 5 degrees or greater on RMI bearing.
- Height below final approach height offshore before helideck descent point.
- Any TAWS/EGPWS alert.

3. Key considerations and threats for the go-around:

- Why was the go-around required? Aircraft problem, airfield/helideck problem or weather problem (for example loss of visual references, windshear)
- Was the go-around due to an unstable approach?
- What parameter was unstable?
- How will this affect the go-around? For example was the airspeed low or the rate of descent high? Both of these will cause piloting difficulties in converting to the required go-around profile.
- Was the aircraft coupled, and in what configuration (4-axes/3-cue or 3-axes/2-cue), or was it being flown manually?
- If the transition to the go-around involves a change of automation configuration, what needs to be managed closely? Does selection of “Go Around” mean that the roll mode drops out? Does the aircraft need to be re-trimmed to ensure that no unexpected attitude changes are introduced when the new mode(s) are selected?

Annex C Automation guidance principles



Annex C

Automation guidance principles

HeliOffshore Automation Guidance - V1.0 December 2016

These guiding principles are offered to ensure effective use of automation. Standard Operating Procedures based on these principles will help to mitigate the risks of interacting with cockpit automation and improve safety performance in usage and monitoring.

Know how and when to use your automation

- Understand when and how your AP is designed to protect the flight envelope.
- Understand the functional capabilities and authority of your AP.
- Clarify use of automated modes during in-flight crew briefings.

Follow your SOPs for autopilot mode selection and deselection

- Ensure the aircraft is properly trimmed and power applied with an appropriate attitude.
- Consider and manage AP usage in 3 stages: (1) pilot intention (2) mode selection, (3) aircraft reaction.
- Use clear and consistent language to announce, confirm and acknowledge AP mode changes and FMS programming

updates.

- Communicate misunderstandings or knowledge gaps around mode display symbology.

Use the appropriate level of automation for the situation and be prepared to change as necessary

- Use the AP as an aid to flight; step up and down between levels of automation, as required.
- Be prepared to fly manually if it reduces workload.
- Avoid manual control inputs when AP is engaged.
- Use 4-axes coupling where possible for all climbs, descents and approaches.
- Select a target altitude when making significant level changes.

Be aware of autopilot functional limitations during mixed-mode and degraded operations

- Be clear which channels are controlled through the AP or manually by the PF
- Speed will always be a function of the helicopter's attitude in pitch; be aware of undesired speed changes when IAS mode is not coupled or is degraded.

Take appropriate and timely action when deviations from the desired aircraft state are observed

- Integrate the AP mode indications into your routine scan as PF and PM.
- Clearly announce observed deviations from the intended flightpath and intervene as required

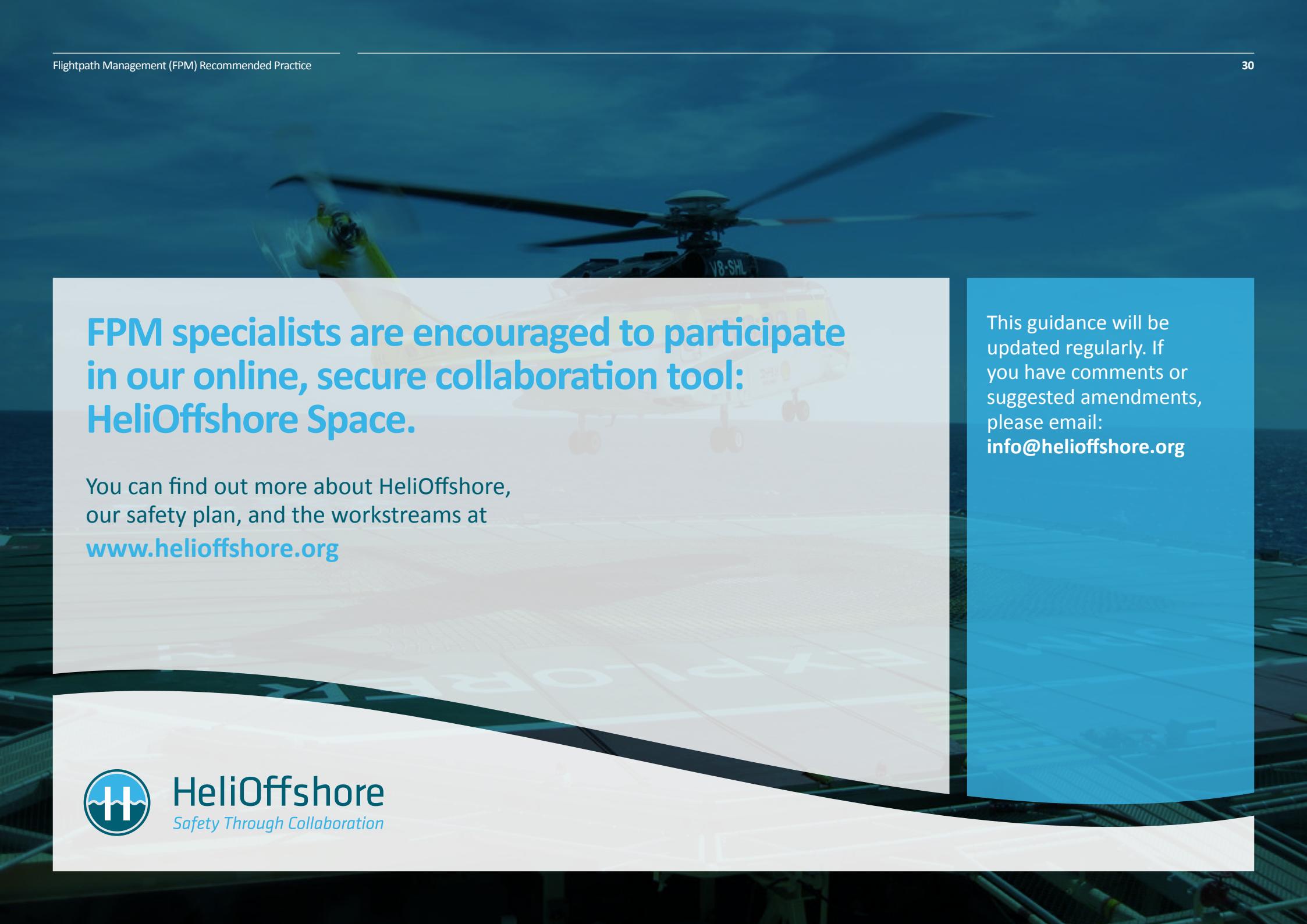
Annex D Abbreviations and definitions



Annex D

Abbreviations and definitions

AEO	All Engines Operative	LOC-I	Loss of Control - Inflight
ALT	Altitude hold mode (of an autopilot coupler)	LOSA	Line Oriented Safety Audit
ALTP / ALTA	Altitude Preset/Altitude Acquire mode (of an autopilot coupler)	MDA	Minimum Descent Altitude (on a non-precision or APV approach)
AMG	IOGP Aircraft Management Guidelines	MDH	Minimum Descent Height (on a non-precision or APV approach)
APV	Approach Procedure with Vertical guidance	MEL	Minimum Equipment List (produced by an operator and based on, but not less restrictive than, the MMEL, and approved by the operator's national regulatory authority)
CFIT	Controlled Flight Into or Towards Terrain	MMEL	Master Minimum Equipment List (a list of equipment permitted to be inoperative, produced by the manufacturer and approved by the certifying regulatory authority (for example EASA or FAA))
DA	Decision Altitude (on a precision approach or an approach procedure with vertical guidance)	MSA	Minimum Safe Altitude
DME	Distance Measuring Equipment (a ground-based navigation aid that permits an aircraft to determine range from it)	NDB	Non Directional Beacon
DVE	Degraded Visual Environment (conditions with visibility less than 4,000 m and/or when there is no distinct natural horizon). DVE includes offshore night (see further discussion in 2.1 Standardised Approach Profiles).	OEI	One Engine Inoperative
FAF / FAP	Final Approach Fix/Point (the final defined fix or point on an instrument approach)	PF	Pilot Flying
FAT	Final Approach Track	PM	Pilot Monitoring
FCOM	Flight Crew Operating Manual (published by aircraft manufacturers)	ROC	Rate of Climb
FD	Flight Director	ROD	Rate of Descent
FSF	Flight Safety Foundation	RVR	Runway Visual Range
FOBN	Flight Operations Briefing Note (published by Airbus)	SOP	Standard Operating Procedures
fpm	feet per minute	Shuttling	VMC operations between offshore installations or vessels separated by short distances (typically less than 10 NM), normally supported by specific weather and operating criteria. Some operators make use of abbreviated checklists when shuttling to exclude aircraft configuration changes which are unneeded on shorter sectors.
ft	feet		Standard instrument arrival
G/S	Glideslope (of ILS)		Takeoff Safety Speed (the lowest speed ensuring continued climb performance of at least 100 ft per minute (fpm) with one engine inoperative and landing gear down, at 200 ft above the takeoff surface; speed for best angle of climb)
HDG	Heading hold mode (of an autopilot coupler)	STAR	Best rate of climb speed (speed ensuring continued climb performance of at least 150 fpm with one engine inoperative and landing gear up, at 1,000 ft above the takeoff surface)
(H)TAWS	(Helicopter) Terrain Awareness System	Vtoss	Visual Meteorological Conditions (flight in VMC may be performed using visual references)
IAS	Indicated Air Speed hold mode (of an autopilot coupler)		
ILS	Instrument Landing System		
IMC	Instrument Meteorological Conditions (flight in IMC must be performed by reference to instruments)		
IOGP	International Oil and Gas Producers' Association	Vy	
kt	knots		
LDP	Landing Decision Point (the latest point on the final approach where the decision to land or to go around may be made)		
LOC	Localiser (of ILS)	VMC	



FPM specialists are encouraged to participate in our online, secure collaboration tool: HeliOffshore Space.

You can find out more about HeliOffshore, our safety plan, and the workstreams at www.helioffshore.org

This guidance will be updated regularly. If you have comments or suggested amendments, please email: info@helioffshore.org



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