

validation of EGNOS helicopter approach

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Overview of presentation

- North Sea environment
- Current instrument approach procedures
- SBAS Offshore Approach Procedure development
- Testing and validation of the SOAP
- Conclusions



North Sea oil and gas exploration and production is underpinned by efficient helicopter transport...

- Oil production commenced in 1960's
- Underpinned by regular helicopter transport for staff and equipment
- More than 300 helidecks in UK sector
- Rigs often very remote
- 7 fatal accidents since 1976 with loss of 94 lives, 34 non-fatal accidents





The offshore environment can be an inhospitable place for helicopters...



- Fierce winds with strong gusts
- No protection from the terrain
- Winter lightning strike season due to passing cloud base
- Operating flight levels can be subject to icing
- Helidecks commonly high enough to be located in low cloud



Even in good conditions there are a number of challenges unique to offshore operations...

- Not all rigs are fixed in one location
- Moving cranes, gantries and chimneys
- 'Flaring' of natural gas
- Turbulence/wind shear caused by wind over superstructure
- Mobile obstacles close in to the helipad





Current instrument approaches are a pragmatic response to the need to operate in IMC, but remain sub-optimal...







Ideally an offshore instrument approach would have a number of characteristics...

- Capable of AFCS coupling for lateral and vertical guidance
- Straight in approach to abeam the rig
- Straight ahead climbing missed approach
- Crew selectable approach heading
- Supports mobile rigs
- Able to be retrofitted to existing fleet







EGNOS together with an advanced RNAV capability could present a feasible solution to the requirements...

- Navigation system specifically designed for approach operations
- North Sea coverage
- High accuracy and integrity
- Requires no infrastructure on the rigs themselves
- Supports autopilot coupling
- Standalone avionics possible thereby minimising retrofit costs



The SBAS Offshore Approach Procedure (SOAP) has been developed and simulated to examine its feasibility...



Vertical and lateral guidance is mostly angular and ILS like with a few subtle exceptions...



The flight simulations of the SOAP were considered very successful...

- Line service pilots and training pilots
- 80 approaches flown over 4 days
- Autopilot and raw-SBAS approaches
- Varying speed on approach (60-80kts)
- Cross winds simulated
- Preference for 0.75NM MDR, although 0.50NM acceptable at lower speed
- Preference for 4 degree approach slope at 80kts
- Maximum rig offset angle of 30 degrees
- Level segment length of 0.75NM fully acceptable



A set of flight trials were carried out to test EGNOS signal availability...

- Conducted at Aberdeen airport to be at a representative latitude for North Sea operations
- Aircraft's own antenna was used, located on the tail boom, connected to a specially installed SBAS-capable receiver
- Trial included a set of grounded engine runups, a series of orbits at constant bank angles, and a number of representative SOAP-like approaches on different headings



During orbits, engine masking caused significant loss of signal lock which would have exceeded APV alarm limits
Approaches were less affected due to constant heading, but there were high visibility constraints in certain directions
For SOAP approaches in the North Sea, the antenna would ideally be relocated



Before SOAP becomes a genuine option for offshore approaches significant further work is needed ...

- SOAP not supported by current SBAS avionics
- Need for proto-type avionics
 - Trial on-the-fly procedure design functionality
 - Investigate Man-Machine Interface (MMI) for approach track selection

• Development of receiver standards (national or international)

...but there is potentially a window of opportunity in which to do it



Conclusions

- North Sea operations require a better form of instrument approach
- EGNOS offers many features of interest
- The SOAP has the potential to benefit operational safety levels
- The requirements of SOAP are beyond current equipment capability





- Work must be undertaken before it is possible to use SOAP for North Sea operations
- If successful there will be a need to move forward in the development of avionic solutions



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GSA GIANT Project

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