4) H4= 49.4380 INCHES
5) D2-D1= 120 INCHES
6) ANGLE= 2.98 DEGREES
SERIAL NUMBERS:
1) F100: L039
2) F500: L085
3) F600: L039
B. TYPE ?F? WIND SYSTEM HAS BEEN VERIFIED AS SATISFACTORY IAW NAVAIR INSRTUCTIONS FOR CATEGORY ?B? OPERATION.
4. THIS UPGRADED AVIATION FACILITY CERTIFICATION EXPIRES 31 MAY 2018 UNLESS DIRECTED OTHERWISE BY THE TYCOM OR COGNIZANT AUTHORITY.
5. NAVAIR ASIR (b3)(10USC§130)(b6) AND (b3)(10USC§130)(b6) SEND.// BT
#0004
NNNN

(b3)(10USC§130)(b6) (LPD 20)

From: AFLOATRAGRUWESTPAC(b3)(10USC§130)(b6)
Sent: Tuesday, October 06, 2015 3:07 PM
Cc: COMMAND E-MAIL
Subject: R 060607Z OCT 15 AFLOATRAGRUWESTPAC YOKOSUKA JA USS GREEN BAY SAR MISSION AREA CERTIFICATION RECOMMENDATION//
Signed By: postmaster@oix.navy.mil

Importance: Low

RTTUZYUW RHOIAAA0001 2790604-UUUU--RUOIBBB.
ZNR UUUUU
R 060607Z OCT 15
FM AFLOATRAGRUWESTPAC YOKOSUKA JA
TO COMNAVSURFPAC SAN DIEGO CA
INFO COMSEVENTHFLT
COMEXSTRIKGRU SEVEN
COMPHIBRON ELEVEN
COMAFLOATRAGRUPAC SAN DIEGO CA
AFLOATRAGRU SAN DIEGO CA
AFLOATRAGRUMIDPAC PEARL HARBOR HI
AFLOATRAGRUPACNORWEST EVERETT WA
AFLOATRAGRUWESTPAC YOKOSUKA JA
USS GREEN BAY
BT
UNCLAS
MSGID/GENADMIN/ATGWP/-/OCT//
SUBJ/USS GREEN BAY SAR MISSION AREA CERTIFICATION RECOMMENDATION//
REF/A/DOC/CNSP-CNSL/09MAR2012//
REF/B/DOC/CNSP-CNSL/30AUG2012//
REF/C/DOC/ATGPAC/15MAR2013//
REF/D/DOC/ATGPAC/08JUN2012//
NARR/REF A IS CNSP-LINST 3502.3, SURFACE FORCE READINESS MANUAL. REF B IS CNSP-LINST 3500.11, SURFACE FORCE EXERCISE MANUAL. REF C IS ATGPACINST 3502.2, ATGPAC STANDARD OPERATING PROCEDURES. REF D IS ATGPACINST 3502.1, ATGPAC USERS GUIDE.//
POC/(b3)(10USC§130)(b6) /LOC:SASEBO, JA/DSN:(b3)(10USC§130)(b6)/
EMAIL:(b3)(10USC§130)(b6)
RMKS/1. IAW REFS A THROUGH D, USS GREEN BAY SUCCESSFULLY COMPLETED ALL REQUIRED REF B CERTIFICATION EXERCISES (CE) AND THE 1.4 CERTIFICATION EVENT FOR THE SAR MISSION AREA. ATGWP FULLY MANNED THE EVENT IAW REF C.

MISSION AREA	DATE
SAR	02 OCTOBER 2015

2. ATGWP RECOMMENDS USS GREEN BAY FOR CERTIFICATION IN SAR TO EXPIRE 31 OCTOBER 2017.
3. USS GREEN BAY WILL CONTINUE REPETITIVE EXERCISES (RE) FOR SAR IAW REF B.//
BT
#0001
NNNN

Aircraft message 2016

[redacted] (LPD 20)

From: USS GREEN BAY [redacted]
Sent: Tuesday, May 24, 2016 4:00 PM
Cc: COMSEVENTHFLT; USS BLUE RIDGE; USS BLUE RIDGE; COMMAND E-MAIL
Subject: R 240800Z MAY 16 USS GREEN BAY AVIATION FACILITY CERTIFICATION INSPECTION ABOARD USS GREEN BAY

Importance: Low

RAAUZYUW RUOIAAA0003 1450800-UUUU--RUJDAAA RUCIBBB.
ZNR UUUUU
R 240800Z MAY 16
FM USS GREEN BAY
TO NAVAIRWARCENACDIV LAKEHURST NJ
INFO PEOTACAIR PATUXENT RIVER MD
CUSFFC N6 NORFOLK VA
COMPACFLT PEARL HARBOR HI
COMSEVENTHFLT
COMNAVSEASYSCOM WASHINGTON DC
COMNAVAIRSYSCOM PATUXENT RIVER MD
COMNAVSURFPAC SAN DIEGO CA
COMEXSTRIKGRU SEVEN
COMLOG WESTPAC
COMPHIBRON ELEVEN
NAVSHIPREPFAC AND JAPAN RMC YOKOSUKA JA
NAVSHIPREPFAC AND JAPAN RMC DET SASEBO JA
THREE ONE MEU
HELSEACOMBATRON TWO FIVE
NAVAIRWARCENACDIV LAKEHURST NJ
AIG 6862
USS GREEN BAY
BT
UNCLAS
MSGID/GENADMIN/GREEN BAY/MAY//
SUBJ/AVIATION FACILITY CERTIFICATION INSPECTION ABOARD USS GREEN BAY (LPD20)//
REF/A/DOC/OPNAVINST 3120.35K/22JUN2012//
REF/B/DOC/SI-ACS-AFB-1M/01SEP2011//
REF/C/DESC:DOC/NAVAIR 00-80T-122/01NOV2012//
REF/D/DESC:DOC/NAEC-91-8050/09APR1985//
REF/E/DESC:DOC/NAWCADPAX TR-2006-32/09NOV2006//
REF/F/DESC:MSG/NAVAIRLKE 4.8.2.5/151936ZJAN2010//
REF/G/DESC:LTR/SER 65/11-73/NSWCCD/16MAR2011//
REF/H/DESC:MSG/COMNAVSEASYSCOM WASHINGTON DC/301731ZJUN2014//
REF/I/DOC/NAEC-ENG-7576 REV BK/01JAN2016//
REF/J/DESC:DOC/NAVAIR 17-1-537/01APR2015//
NARR/REF A IDENTIFIES REQUIREMENTS FOR AIR CAPABLE AND AMPHIBIOUS ASSAULT SHIPS TO OPERATE AIRCRAFT. REF B IS AIR CAPABLE SHIP AVIATION FACILITIES BULLETIN. REF C IS HELICOPTER OPERATING PROCEDURES FOR AIR CAPABLE SHIPS NATOPS MANUAL. REF D IS NAEC-91-8050, CERTIFICATION TEST PROCEDURE FOR SHIPBOARD WIND MEASURING SYSTEM. REF E IS NAWCADPAX/TR-2006/32, WIND SPEED AND DIRECTION AT USS SAN ANTONIO (LPD 17) ANEMOMETERS (WIND TUNNEL TEST REPORT). REF F PROVIDES MV22 AIRCRAFT THERMAL HEATING FLIGHT DECK RESTRICTIONS FOR SHIPS IN LPD 17 CLASS. REF G IS NAVAL SURFACE WARFARE CENTER, CARDEROCK DIVISION LETTER SPECIFYING THAT USMC MV22 AIRCRAFT ARE EQUIVALENT TO USAF CV22 AIRCRAFT IN REGARDS TO DECK STRENGTH AND FLIGHT DECK THERMAL RESTRICTIONS. REF H IS A NAVSEA 21AM FLEET ADVISORY 01-2014, INTERIM GUIDANCE FOR V-22 MAINTENANCE GROUND TURNS. REF I IS SHIPBOARD AVIATION FACILITIES RESUME. REF J IS NAVAIR AIRCRAFT SECURING AND HANDLING MANUAL DETAILING PROPER TIEDOWN PROCEDURES.
POC/L. [redacted]/UNIT: 4.8.7.2/NAVAIR YOKOSUKA JAPAN/TEL:

DSN [redacted]
POC/[redacted] UNIT: USS GREEN BAY/
[redacted]
RMKS/
1. USS GREEN BAY (LPD-20) HAS BEEN INSPECTED IAW REFS A AND B. CERTIFICATION IS GRANTED FOR THE FOLLOWING LEVELS, CLASSES, TYPES OF AVIATION FACILITIES AND SPECIFIED AIRCRAFT:
(READ IN FOUR COLUMNS)

LEVEL	CLASS	SERVICE	AIRCRAFT
ALL SPOTS			
II	1	USN/USMC	H1,H46,H53D,H53E,V22
II	2	USN/USMC	H3
II	2	USN	H60
II	2	USCG	H60,H65
II	2	USMC	H60
II	2	USA	H60,H60M
II	2	USAF	H60
II	2A	USA	H1,H6,H58,H64
II	2A	USAF	H1,H53,V22
SPOTS 1 AND 2			
III	3	USMC	AV8B
SPOT 2 ONLY			
II	2A	USA	H47
TEE LINE			
II	4, TYPE 2	USN/USMC	H1,H3,H46,H53D,H53E,H60,V22
II	4, TYPE 2	USCG	H60,H65
II	4, TYPE 2	USA	H1,H47,H60,H60M
II	4, TYPE 2	USAF	H1,H53,H60,V22

2. RESTRICTIONS:
A. FULL CERTIFICATION FOR ALL LEVELS, CLASSES, AND TYPES AS REQUIRED BY REF A IS PRECLUDED DUE TO THE FOLLOWING DEVIATION FROM REF B:
1) DOCUMENTATION OF SUCCESSFUL TACAN CERTIFICATION BY FAA OR SESEF RANGE HAS NOT BEEN PROVIDED.
B. CERTIFICATION IS CONTINGENT UPON INCORPORATION AND CONFORMANCE WITH THE FOLLOWING STATEMENTS IN THE USS GREEN BAY AIRCRAFT OPERATIONS BILL:
1) MULTIPLE SPOT AIRCRAFT OPERATIONS SHALL BE IAW LPD 17 CLASS SPOTTING MATRIX SPECIFIED IN REF C.
2) THE LPD 17 WIND SENSOR LOCATIONS DO NOT MEET THE REQUIREMENTS OF REF D. THE USE OF THE UPWIND SENSOR IS REQUIRED FOR ALL FLIGHT OPERATIONS. IAW REF E, THE PORT WIND SENSOR DATA IS VALID FROM 180 DEGREES TO 035 DEGREES AND STARBOARD WIND SENSOR DATA IS VALID FROM 335 DEGREES TO 180 DEGREES.
3) USMC MV22 AND USAF CV22 AIRCRAFT THERMAL HEATING FLIGHT DECK RESTRICTIONS FOR SHIPS IN LPD 17 CLASS APPLY IAW REFS F AND G.
4) V-22 MAINTENANCE TURNS SHALL BE CONDUCTED IAW THE DECK HEATING MITIGATION PROCEDURES PROVIDED IN REF H.
5) WHEN H60 T/M/S (TYPE/MODEL/SERIES) AIRCRAFT ARE POWERED FROM THE SHIPS AESS, ENERGIZING THE H60 T/M/S BACKUP HYDRAULIC PUMP IS NOT AUTHORIZED.
6) ENSURE GUNS IN PORT/STARBOARD CATWALKS AND ASTERN OF THE FLIGHT DECK AND ANTENNAS IN THE PORT/STARBOARD CATWALKS ARE LOWERED AND STOWED BELOW FLIGHT DECK LEVEL OR REMOVED PRIOR TO FLIGHT QUARTERS.
7) USN/USMC H53D AND USAF H53 HELICOPTERS OPERATING AT SPOT 1 ARE RESTRICTED TO LANDING WITH THE FORWARD NOSE GEAR IN THE FORWARD HALF OF THE TOUCHDOWN CIRCLE.
8) USN/USMC H53E HELICOPTERS OPERATING AT SPOT 1 ARE RESTRICTED TO LANDING WITH THE FORWARD NOSE GEAR ON THE 4 FT. DIAMETER LANDING SPOT LOCATED WITHIN THE TOUCHDOWN CIRCLE.
9) USA H47 AIRCRAFT IS RESTRICTED TO OPERATING ON SPOT 2 ONLY.
10) ALL AIRCRAFT WEIGHT RESTRICTIONS LOCATED IN APPENDIX D OF REF I SHALL BE STRICTLY ADHERED TO. A COPY OF REF H CAN BE DOWNLOADED FROM THE AIRWORTHINESS WEBSITE AT:
HTTPS://AIRWORTHINESS.NAVAIR.NAVY.MIL.
11) SHIP PERSONNEL SHALL ENSURE PROPER TIEDOWN PROCEDURES DESCRIBED

IN REF J ARE ADHERED TO.
3. COMMENTS:
A. THE FOLLOWING SGSI DATA APPLIES:
POLE CHECK DATA:
1) H1= 29.5625 INCHES
2) H2= 30.2500 INCHES
3) H3= 42.5000 INCHES
4) H4= 49.4380 INCHES
5) D2-D1= 120 INCHES
6) ANGLE= 2.98 DEGREES
SERIAL NUMBERS:
1) F100: L039
2) F500: L085
3) F600: L039
B. TYPE ?F? WIND SYSTEM HAS BEEN VERIFIED AS SATISFACTORY IAW REF D FOR CATEGORY ?B? OPERATION.
C. THE JP-5 FUEL SYSTEM HAS BEEN SATISFACTORILY VERIFIED IAW NAWCADLKE-MISC-48J400-C017.
4. CERTIFICATION WILL BE UPGRADED ACCORDINGLY UPON NOTIFICATION THAT DISCREPANCY LISTED IN PARAGRAPH 2 HAS BEEN PROVIDED TO NAVAIR REPRESENTATIVE.
5. THIS AVIATION FACILITY CERTIFICATION EXPIRES 31 MAY 2018 UNLESS DIRECTED OTHERWISE BY THE TYCOM OR COGNIZANT AUTHORITY.
6. CO COMMENTS: TACAN CERTIFICATION IS CURRENTLY SCHEDULED IN MID-JUNE. GBY EXPECTS TO UPDATE CERTIFICATION MESSAGE TO INCLUDE LEVEL 1 CAPABILITIES PRIOR TO MOB-A CERTIFICATION EVENTS.
7. NAVAIR ASIR [redacted] AND [redacted] SEND.//
BT
#0003
NNNN

UNITED STATES MARINE CORPS
MAR NE AVIATION TRAINING SYSTEM SITE FUTENMA
1st MARINE AIRCRAFT W NG AVIATION TRAINING SYSTEM
MCAS FUTENMA, OK NAWA, JAPAN
UNIT 37301
FPO AP 96386-7301

IN REPLY REFER TO:
5800.7
MATSS
10 OCT 17

From: [redacted], Assistant Command Investigator ICO 05 Aug 17 MV-22B Mishap
To: (b3)(10USC§130)(b6) [redacted], MV-22B Class Desk, PMA-275

Subj: REQUEST FOR PMA-275 AND NAVAIR ASSISTANCE

Ref: (a) JAGINST 5800.7f (JAGMAN)
(b) 16 DEC 16 MV-22B Mishap Command Investigation Appointment Letter

1. As the appointed Command Investigator into the facts and circumstances surrounding the MV-22B mishap on 05 Aug 17 in vicinity of Okinawa, Japan, I request the assistance of the MV-22B Class Desk, PMA-275 in coordinating and collecting evidence and information essential to this matter.

2. Flight recorder data, and pertinent information already collected in the conduct of this investigation will be shared with the MV-22B Class Desk, PMA-275, NAVAIR and industry specialists.

3. All shared information is to be considered to be For Official Use Only (FOUO).

4. The point of contact in this matter is (b3)(10USC§130)(b6) [redacted], and can be reached at (b3)(10USC§130)(b6) [redacted] or DSN: [redacted].

(b3)(10USC§130)(b6)
[redacted]

September 3, 2017
From: Mishap Investigation Support Team (MIST)
To: VMM-265 Aviation Mishap Board (AMB)

Title: Report containing findings from the in-field investigation concerning VMM-265's class A mishap involving Aircraft BUNO # 168634 which occurred on 05 August 2017.

For the infield analysis, the following items were the points of interest: the Aviation Life Support Systems (ALSS) for 4 of the 5 aircrew and 1 passenger, the general condition of the cockpit and cabin, the pilot/co-pilot seats, and the troop seats.

There were a total of 26 personnel on the aircraft: the aircraft commander, the co-pilot, 3 crew chiefs, and 21 passengers. The co-pilot was seated in the left cockpit seat, and the aircraft commander was seated in the right cockpit seat. The crew chiefs will be referred to as crew chief 1, crew chief 2, and crew chief 3. The crew chief located in the forward starboard side of the cabin is crew chief 1. Crew chief 2 is the aft crew chief secured to the starboard side cargo ring tie down while crew chief 3 is the aft crew chief secured to the port side cargo ring tie down in the aircraft. The only passenger referenced in this report is the deceased passenger. When referencing directions, the aircraft reference standard is used. For this report and all Engineering Investigations (EIs) that may be completed, the above identification scheme will be used.

ALSS

For the infield investigation, 4 of the 5 survival vests worn by the aircrew and the survival gear worn by the deceased passenger were evaluated. The survival vests consisted of 3 CMU-37's, and 1 CMU-38. The deceased passenger was wearing a LPU with HABD bottle. The CMU-37 for crew chief 1, and the gear worn by the deceased passenger were transported with the remains for the medical examination and were not physically evaluated infield. However it was possible to examine the photographs taken during the recovery process. The analysis of those photographs is included in this report. The CMU-38 worn by the co-pilot was transported with the remains after recovery of the aircraft and there were no photographs reviewed. As a result, there was no analysis done on the co-pilots ALSS for the infield report. The analysis of the ALSS will be broken down below based on crew position.

Aircraft Commander: The aircraft commander was wearing a CMU-38 Aircrew Endurance Vest, SN: CS4094, and an HGU-84 helmet. There was no damage to note on either the CMU-38 or the HGU-84. The LPU on the survival vest had both beaded handles pulled and both CO_2 canisters discharged. The HABD bottle level was observed at about 1.2k PSI. The flight suit for the TAC was not evaluated in field as it was transported with the aircrewman during the CASEVAC and was not recovered.

Co-Pilot: Based on maintenance records, the Co-pilot was wearing a CMU-38 Aircrew Endurance Vest, SN: BC8729. The ALSS of the co-pilot was transferred with the remains after recovery of the aircraft. There was no data evaluated on co-pilots survival gear infield.

Crew Chief 1: Crew Chief 1 was wearing a CMU-37 Aircrew Endurance Vest, SN: NO4453, and an HGU-84. The ALSS for crew chief 1 was transported for the medical examination process. The only analysis of the ALSS was done through the photographs taken during the recovery process. Based on the photographs, both beaded handles of the LPU were still secured to the LPU. Neither CO_2 canisters were discharged. Both of the Emergency Release Assembly (ERA) handles were secured to the shoulders of the CMU-37. Neither ERA latch was opened. The cross connector strap and short tether were still attached to the CMU-37. The pressure in the HABD bottle was roughly 2.1k PSI and the valve for the bottle was open. The HGU-84 was difficult to analyze using the supplied photographs. There were no observations made about the condition of the helmet. Photographs of the ERA handle, ERA latches, and LPU handles can be seen in the figures below.

(b) (7)(C)

[redacted]

Crew Chief 2: Crew Chief 2 was wearing a CMU-37 Aircrew Endurance Vest, SN: DB6914 and an HGU-84. Both beaded handles of the LPU were pulled and both CO_2 canisters discharged. The HABD bottle was observed at about 2.1k PSI. There was nothing to note about the flight suit of crew chief 2. Both ERA handles were found unsnapped from the shoulders of the survival vest, but neither ERA latch was disconnected. The cross connector strap was still secured to both ERA latches and the short tether was secured to the cross connector strap. There was some damage to the tape and stickers on the back of the HGU-84. Some of the damage to the tape appears to go down to the shell of the helmet. That damage can be seen in figure 4 below. There was also abrasion damage to the ERA latches on the back of the vest. The damage was found on the top of the latches and was

consisently on the same side. The adjustable tether portion of the CMU-37 restraint was found still secured to the aft most, starboard side cargo ring tie down in the aircraft. The ERA handle and the damage to the latches as found on the vest can be seen below.

Figure 4: CC2 HGU-84.

Figure 5: ERA Handle

Figure 6: ERA Latches and Cross Connector Strap

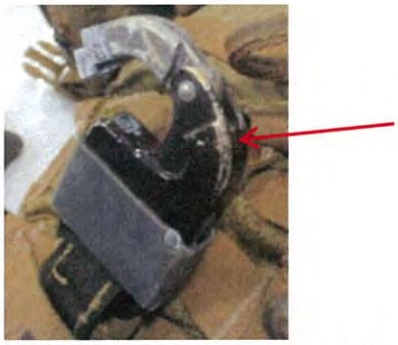


Figure 7: Abrasion Damage to ERA Latch

Crew Chief 3: Crew Chief 3 was wearing a CMU-37 Aircrew Endurance Vest, SN: MH2191 and an HGU-84. Both beaded handles of the LPU were pulled and both CO_2 canisters discharged. There was nothing to note on either the flight suit or the HGU-84. The HABD bottle was observed to be empty with no pressure in the bottle. Both ERA handles were found unsnapped from the shoulders of the survival vest, but only the left ERA latch was disconnected. The cross connector strap was still secured to the right ERA latch and the short tether was not found with the vest. The adjustable length tether for the crewchiefs restraint was not found secured to the aircraft, it was recovered free floating in the aircraft. The ERA latches as found on the vest can be seen below.

Figure 8: ERA Latches and Cross Connector Strap

Passenger: The deceased passenger was wearing a passenger LPU with HABD bottle SN: 022795, a kevlar helmet, and a plate carrier with SAPI plates installed. The gear for the passenger was transported with the remains and was not physically evaluated onsite. The only analysis of the gear was through the photographs taken during the recovery process. Based on the photographs, both beaded handles were still secured to the LPU. Neither CO_2 canisters were discharged. The pressure in the HABD bottle was observed at about 2.1k PSI and the valve was open. The beaded handles of the LPU can be seen in the figure below.

(b) (7)(C), (b) (6)

[redacted]

General Aircraft Condition

Initial recovery of the aircraft on the MMA Pinnacle had the aircraft inverted and resting on the cockpit. Once the recovery crane lowered and released the aircraft on the deck of the salvage ship, the cockpit or any other part of the aircraft was not entered due to safety reasons. Prior to being released by the crane, there was some time spent in both the cabin and cockpit of the aircraft. Once on land, the aircraft was also rested on the cockpit and there was some damage done to the cockpit during the righting of the aircraft. Figure 10 shows the orientation of the aircraft as it was placed on the salvage vessel and figure 11 shows the aircraft condition after being flipped over on land.

Figure 10: Aircraft Orientation on Deck of MMA Pinnacle

Figure 11: Aircraft Condition on Land

Aircraft Cockpit

Given the limited evaluation that was done prior to the crane releasing the aircraft on the MMA Pinnacle, it was noted that there was significant intrusion into the survivable space of the cockpit. The left side of the cockpit experienced the most amount of damage and intrusion. There was significant deformation to the bulkhead just aft of the co-pilot seat. The rails for the co-pilot seat were deformed and the co-pilot seat experienced significant damage to the seat bucket. This damage was noted before the aircraft came to rest on the cockpit on the deck of the ship or being flipped on land. Figure 14 shows the cockpit after the aircraft was righted. Specific damage to the co-pilot seat can be found below in the section discussing the cockpit seats. The condition of the cockpit on the can be seen in the figures below.

(b) (7)(C), (b) (6)

[redacted]

Aircraft Cabin

The cabin of the aircraft remained intact and there did not appear to be any intrusion damage. Survivable space was maintained in the cabin. The two aft most emergency egress hatches on the port and starboard side of the cabin were used during the mishap. Both hatches had their respective emergency release handle pulled and the window successfully fell from the aircraft. The emergency egress hatches in the forward port side, and ceiling of the cabin were not activated. Neither hatch had their emergency release handle pulled.

At the emergency egress locations in the V-22, the troop seats partially block the egress hatches. To allow unimpeded egress from the aircraft, the troop seats are supposed to drop from the aircraft structure when the hatch release handle is activated. A Cartridge Actuated Device (CAD) fires and is supposed to pull the pins securing the troop seat to the aircraft and gravity is free to let the seats fall from the aircraft. The seats can either move down or up depending on the aircraft orientation. In the case of the two egress hatches that were activated, both troop seats fell from the aircraft structure on the port side of the aircraft, but neither troop seat fell from the aircraft structure on the starboard side of the aircraft. The emergency egress hatches can be seen below. A photograph of the CAD that releases the seats can be seen in figure 19.

Figure 15: Starboard Side Aft Emergency Egress Hatch

Figure 16: Starboard Side Aft Emergency Egress Hatch

Figure 17: Port Side Emergency Egress Hatch

Figure 18: Port Side Emergency Egress Hatch

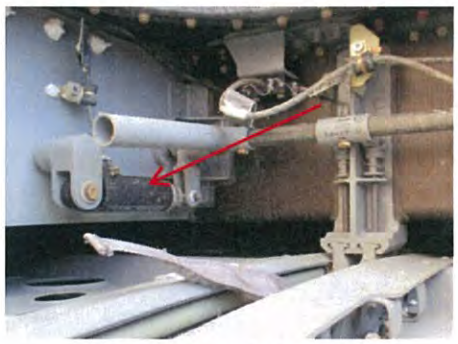


Figure 19: Seat Release CAD

Pilot/Co-Pilot Seats

Right Seat, Aircraft Commander Seat: The right seat in the cockpit had the Variable Load Energy Absorber dial adjusted to roughly 170 lbs. The pilots weight was not confirmed infield, but given roughly 40 pounds of gear being worn, this would equate to a pilot weight of 130 lbs if the seat was adjusted correctly for the pilots equipped weight. The seat did not show any signs of stroke. The restraint system for the right seat was still intact and present. There was not any significant damage to note on the right seat in the aircraft.

Left Seat, Co-Pilot Seat: The left seat in the cockpit had the Variable Load Energy Absorber dial adjusted to roughly 190 lbs. The co-pilots weight was not confirmed infield, but given roughly 40 pounds of gear being worn, this would equate to a pilot weight of 150 lbs if the seat was adjusted properly for the co-pilots equipped weight. The seat did not show any signs of stroke. The restraint system for the left seat was cut in multiple locations to facilitate the recovery of the co-pilot. The seat bucket of the left seat experienced significant damaged as seen in the figure below. The track that the seat translates on as it strokes was bent forward and there was a lot of damage to the bulkhead just behind the co-pilot seat.

(b) (7)(C), (b) (6)

[redacted]

Troop/Jump Seats

The MV-22B has a total of 25 troop seats installed in the cabin of the aircraft and 1 troop seat mounted to the door in the tunnel. The door in the tunnel known as the Jump Seat and the forward most seat on the starboard side of the aircraft is the crew chief seat. The mishap aircraft had a total of 24 occupants in the cabin. A total of 3 occupants were crew chiefs and were not seated at the time of the mishap. There were a total of 4 seats unoccupied during the mishap. All 25 troop seats were accounted for and 23 of the 25 seats were still secured to the aircraft. The 2 seats that were not secured to the aircraft were the two troop seats located at the port side, aft emergency egress hatch. They detached from the aircraft during the emergency hatch activation.

Troop Seats: In the evaluation of the troop seats, none of the seats stroked. All but 1 seat had the restraint system unlatched and some seats experienced varying amounts of damage. The damage seen was isolated to the seat backs of the troop seat and the seats on the starboard side of the cabin. Examples to the troop seat damage can be seen in the figures below.

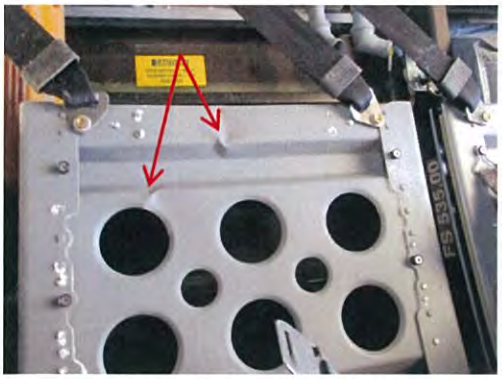


Figure 22: Troop Seat Damage

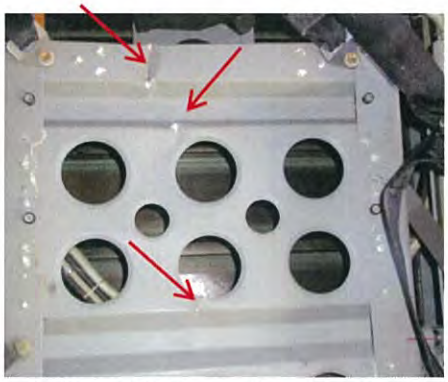


Figure 23: Troop Seat Damage

It was noted that on 2 of the troop seats, the restraint system was manufactured incorrectly. On the first and last seat on the starboard side of the cabin, varying components of the buckle assembly were defective. On the forward most seat, the buckle tang was manufactured incorrectly and on the aft most seat, the buckle latch was manufactured incorrectly. Both the buckle tang and latch were sewn into the restraint backwards. As a result of the incorrect manufacturing, the webbing must be twisted for the occupant to secure the restraint system properly. This webbing twist could possibly cause injury to the occupant or possible failure of the restraint in a high energy impact. Figures 24 and 25 show the defective restraints, while Figure 26 shows the engineering drawing for the restraint.

Figure 24: Incorrect Buckle Tang

Figure 25: Incorrect Buckle Latch

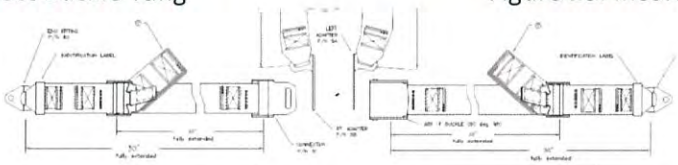


Figure 26: Drawing of V-22 Troop Seat Restraint System

Conclusions/Recommendations

(b) (5)

[redacted]

(b) (5)

[redacted]

Respectfully,

[redacted]

NAVAIR, MIST Rotary Wing/Tilt Rotor Infield Team Lead
tel. [redacted]
[redacted]

FOUO – For Official Use Only

AEROMECHANICS AMPHIBIOUS OPERATIONS SUMMIT PACKAGE

Agenda

- Introductions of the presenting team
- USS New Orleans mishap recap
- USS Green Bay mishap recap
- Aerodynamic interaction and impact on power
- Control Law design and impact on power
- Fleet wide operations to ships
- Flight testing
- Whats Next

Presenters

- (b3)(10USC§130)(b6) – HX-21 V-22 Department Head
- (b3)(10USC§130)(b6) – NAVAIR Flight Dynamics
- (b3)(10USC§130)(b6) – NAVAIR Applied Aerodynamics
- (b3)(10USC§130)(b6) – NAVAIR Performance
- (b3)(10USC§130)(b6) – NAVAIR Modeling and Simulation
- (b3)(10USC§130)(b6) – NAVAIR V-22 Flight Test

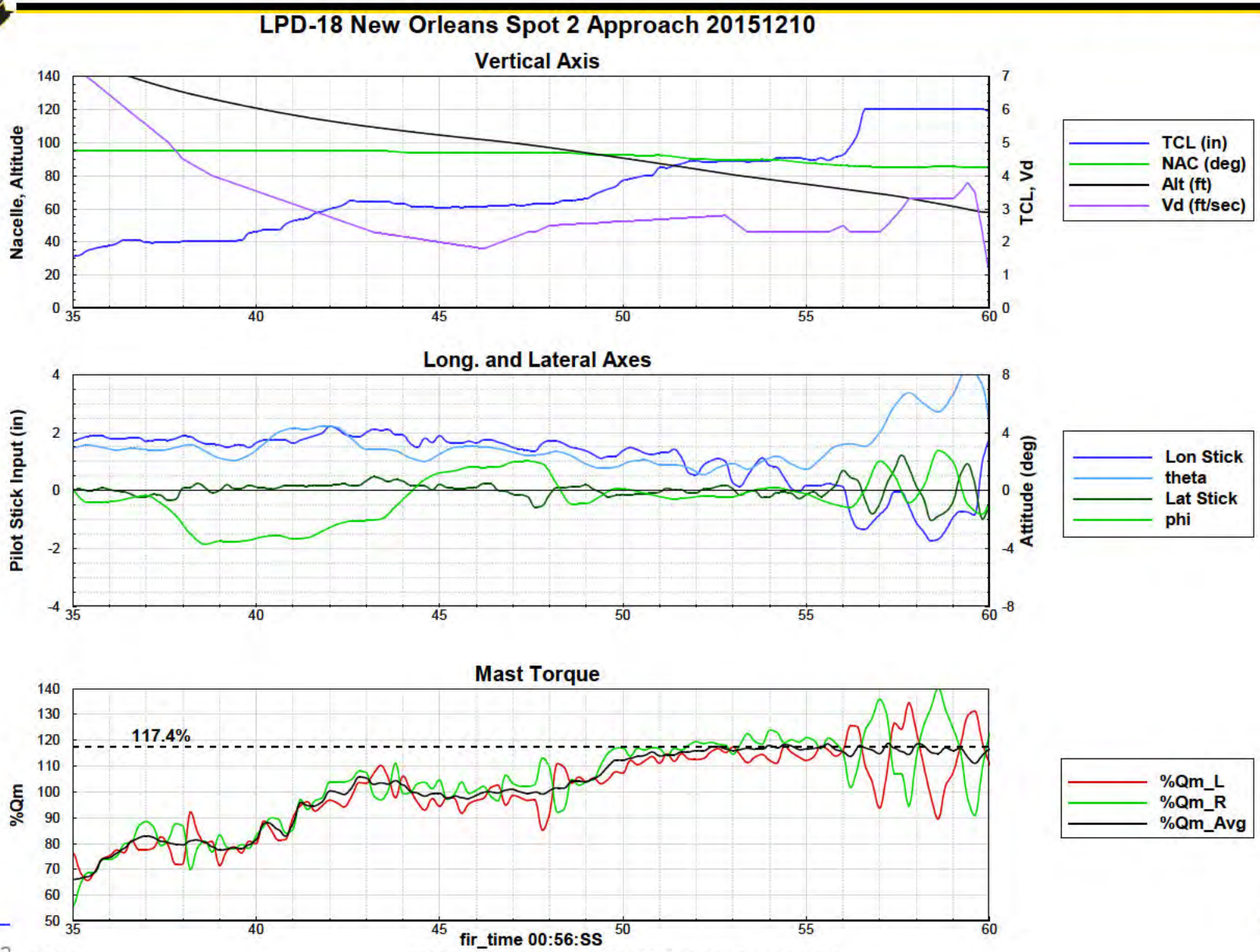
USS New Orleans Recap

- 9 December 2015
- Starboard to Port approach to Spot 2
- Low wind over deck (5 KT or less)
- Decelerating with aft nacelle
- Aircrew unable to arrest rate of descent leading to impact with ship
- No Steady-state hover
- Aircraft settled onto corner of flight deck

New Orleans Event Recreation Video

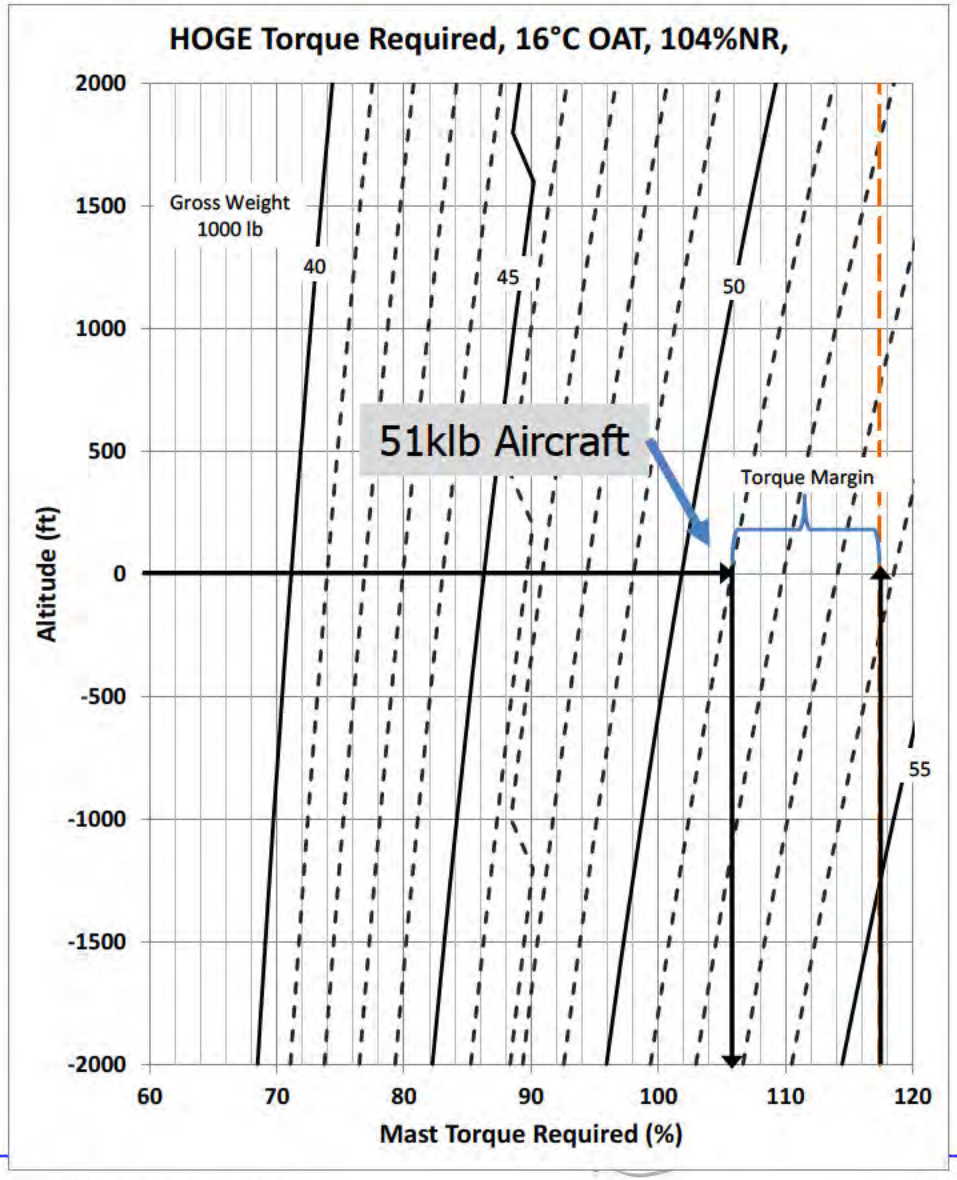
BUNO 168026
VMM-166
Class A
9 Dec 2015

New Orleans Event Time Histories



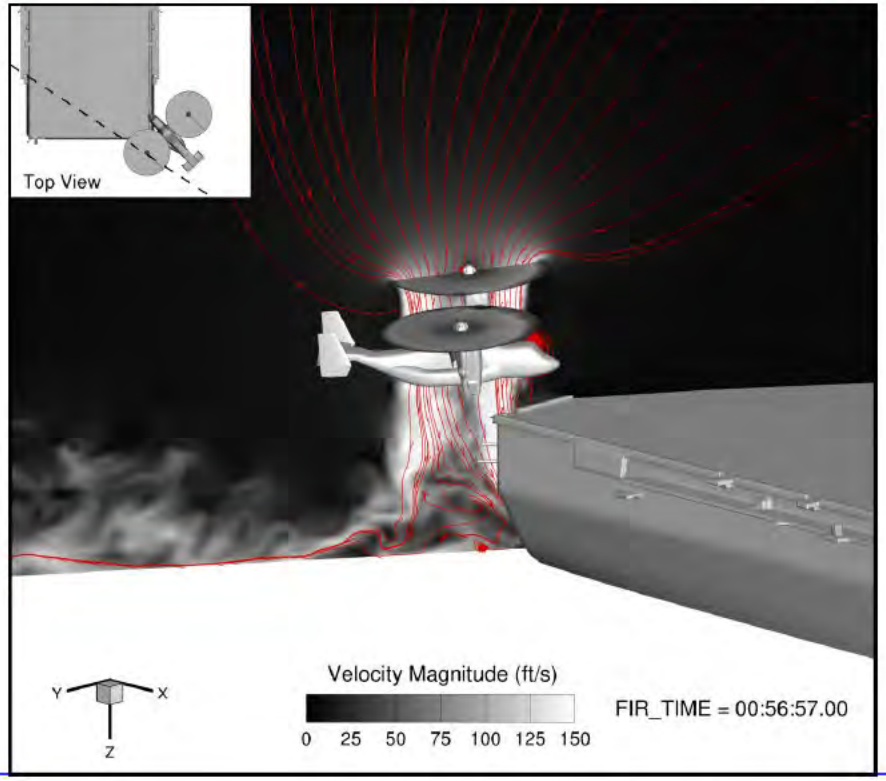
New Orleans Performance Summary

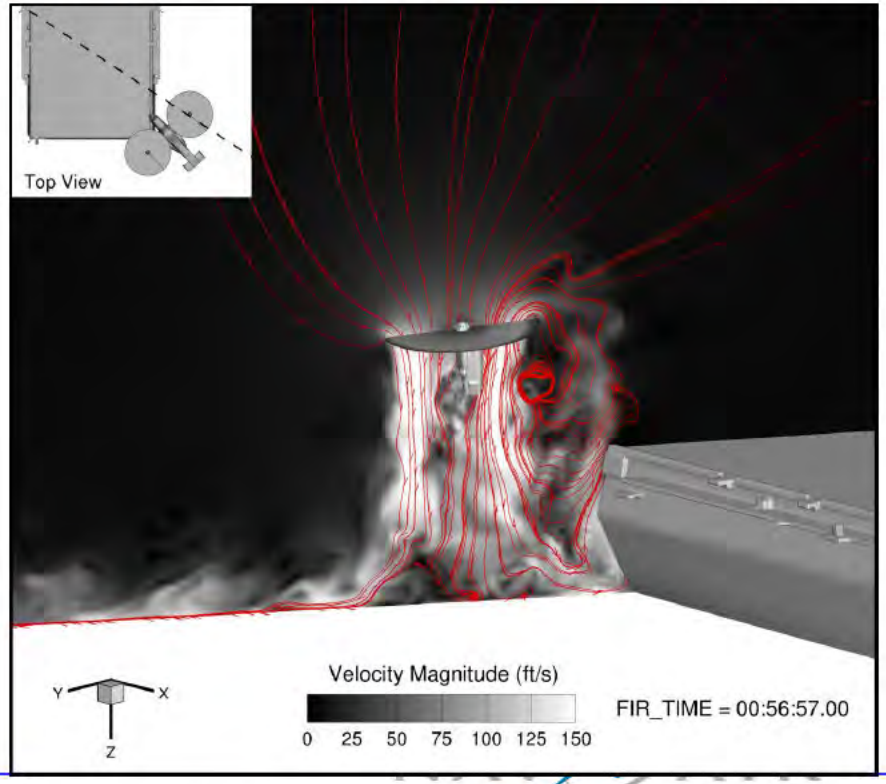
- **OAT: 16°C**
- **GW: 51,023 lb.**
- **HOGE Zero Wind Qm: 105.9%**
  - 6.1% Qm margin to Chapter 4 Shipboard limit of 112%
  - 11.5% Qm margin to 117.4% transmission limit
  - 53,760 lb Max Hover GW



New Orleans Event Flowfield Snapshot

- **Increase in vertical descent rate at 00:56:57 coincident with onset of wake recirculation**
- **Spot 2 line of approach results in greater amount of left rotor outwash passing around stern of ship, diminishing strength of recirculation seen by right rotor**
- **CFD contour plots of velocity magnitude overlaid by streamlines**





LPD-17 Spot 2 L&R Envelope

- **No low wind torque transient note**
- **Flight testing did not indicate torque transients exceeding standard 10% recommendation (MV NATOPS Chapter 8)**

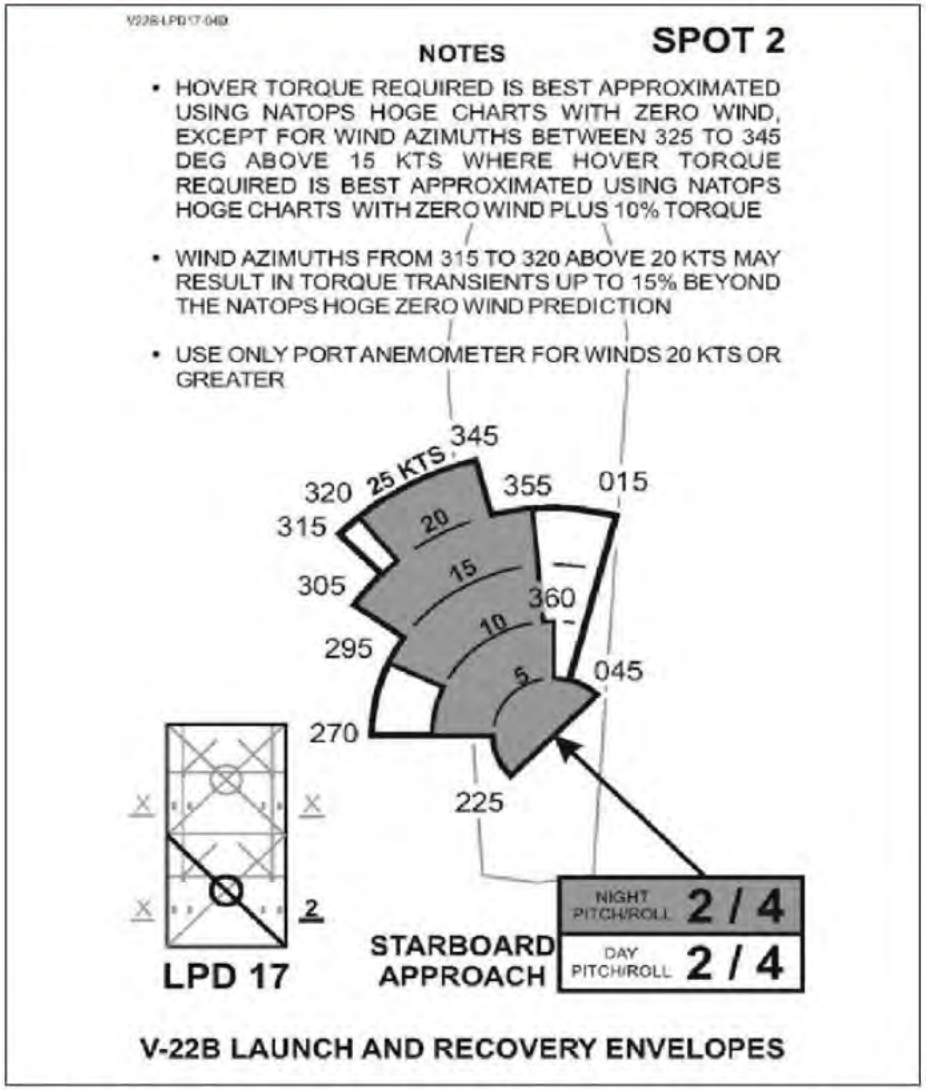


Figure R-7. V-22B Launch and Recovery Envelope for LPD 17 Class Ships, Spot 2 Starboard Approach (Sheet 4)

USS Green Bay Event Recap

- August 5, 2017
- Starboard to Port approach to Spot 5
- Low wind over deck (approx 5 KT)
- Nominal approach, aircrew is unable to arrest rate of descent just prior to crossing deck edge
- Left nacelle strikes deck near spot 5
- Aircraft fuselage impacted starboard deck edge and rolled over impacting the water inverted.

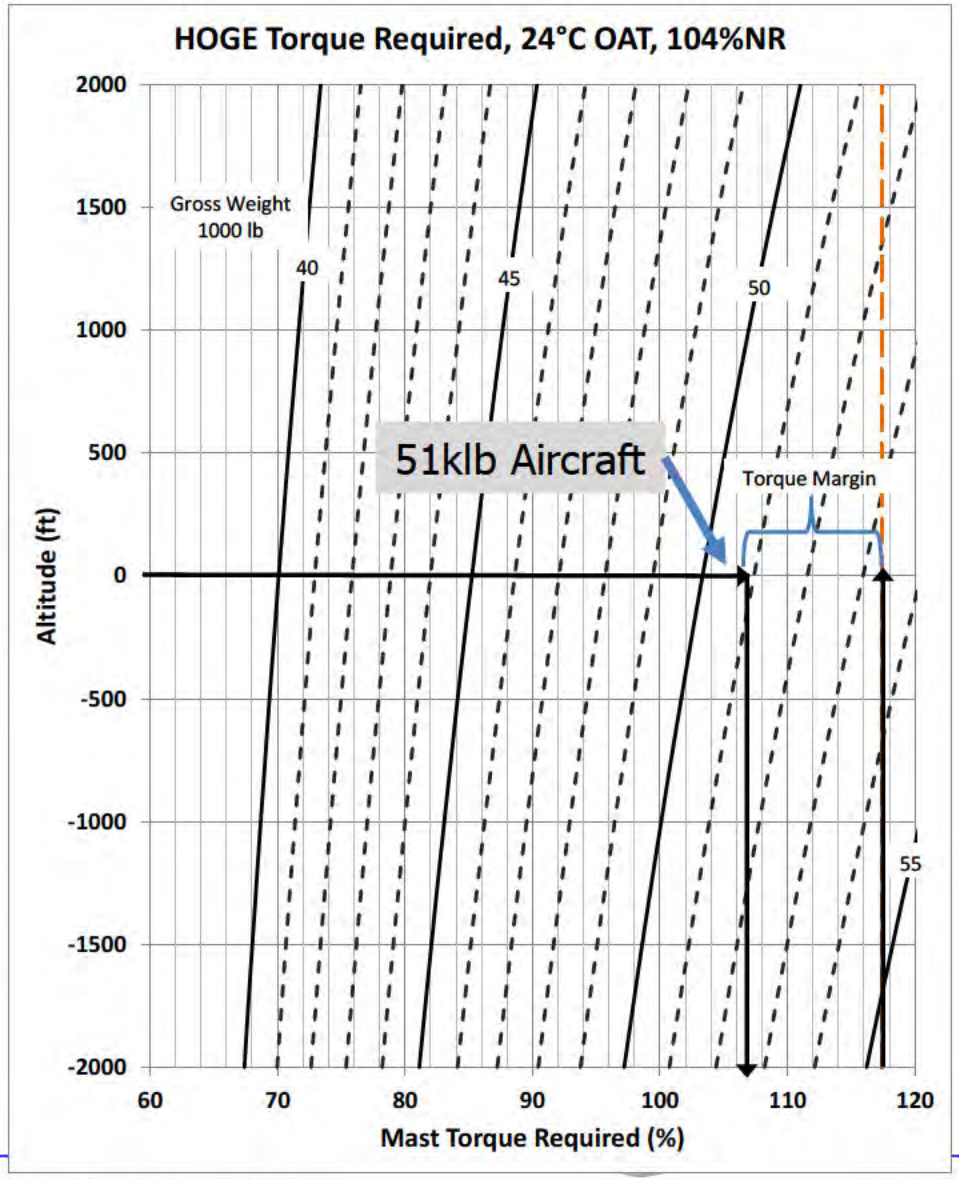
ONGOING MISHAP INVESTIGATION; CAN ONLY DISCUSS FACTUAL INFORMATION – NO CAUSAL FACTORS

Green Bay Event Recreation video

Green Bay Event Time Histories

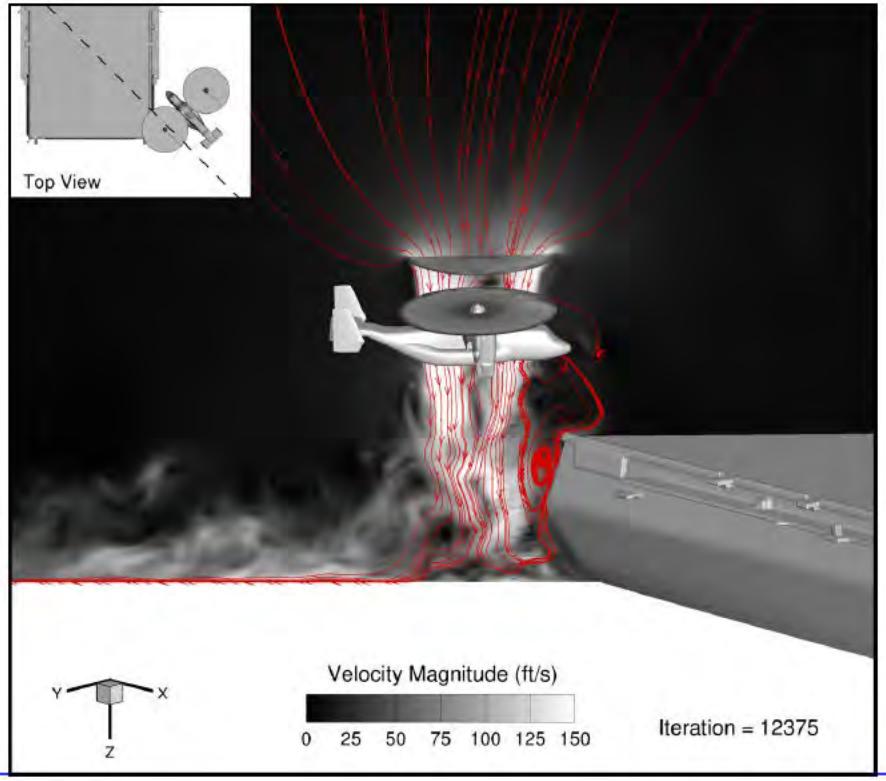
Green Bay Performance Summary

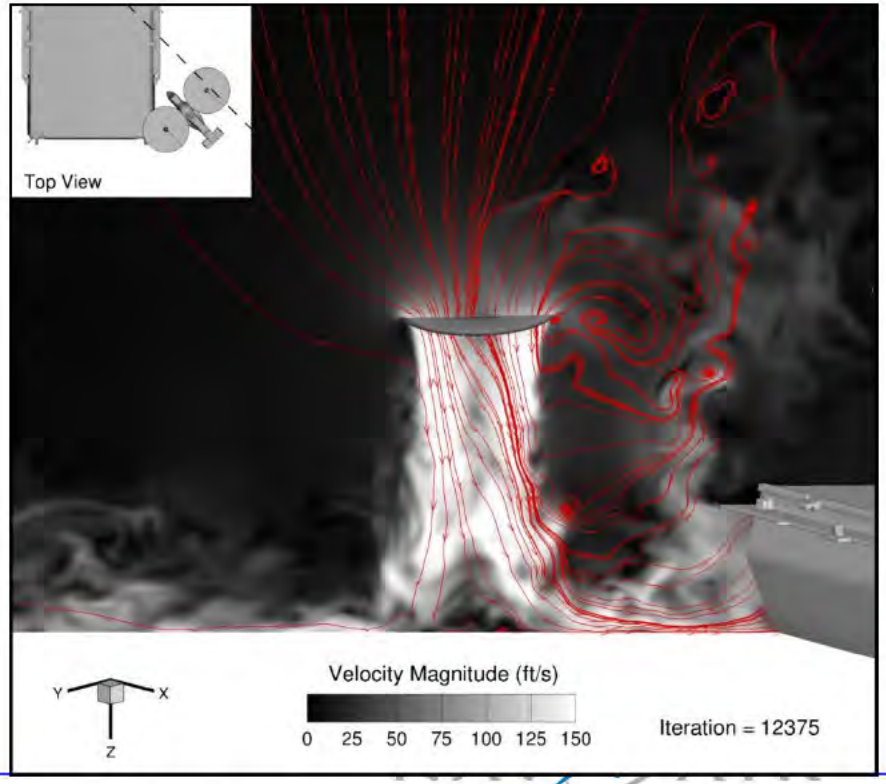
- **OAT: 24°C**
- **GW: 50,800 lb.**
- **HOGE Zero Wind Qm: 106.7%**
  - 5.3% Qm margin to Chapter 4 Shipboard limit of 112%
  - 10.7% margin to 117.4% transmission limit
    - only 115% - 116% sustained average mast torque
  - 53,300 lb Max Hover GW
  - LPD-17 Spot 5 less than 5 kts WOD notes up to 15% transient torque requirement



Green Bay Event Flowfield Snapshot

- **Increase in vertical descent rate at 06:03:42 coincident with onset of wake recirculation**
- **Greater amount of recirculation through right rotor than left due to position and orientation of aircraft with respect to ship**
- **CFD Contour plots of velocity magnitude overlaid by streamlines**





LPD-17 Spot 5 L&R Envelope

- **Envelope includes note for 15% torque transient for winds less than 5 KT.**
- **Based on analysis of flight test data for this approach and landing.**

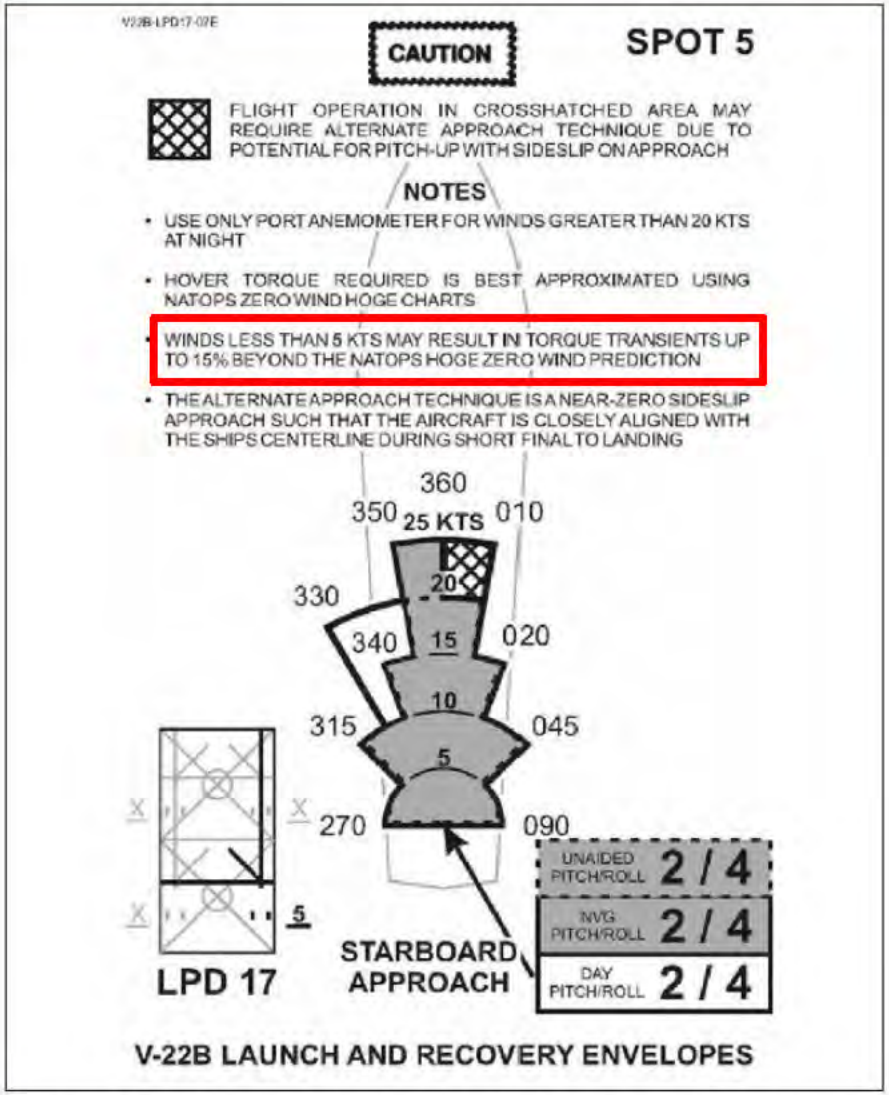


Figure R-7. V-22B Launch and Recovery Envelope for LPD 17 Class Ships, Spot 5 Starboard Approach (Sheet 7)

Comparison Video 1

Comparison Video 2

Comparison of

Buno 168026 (Dec 2015 mishap)

and

Buno 168634 (Aug 2017 mishap)

Produced by (b3)(10USC§130)(b6)
NAVAIR ASIST

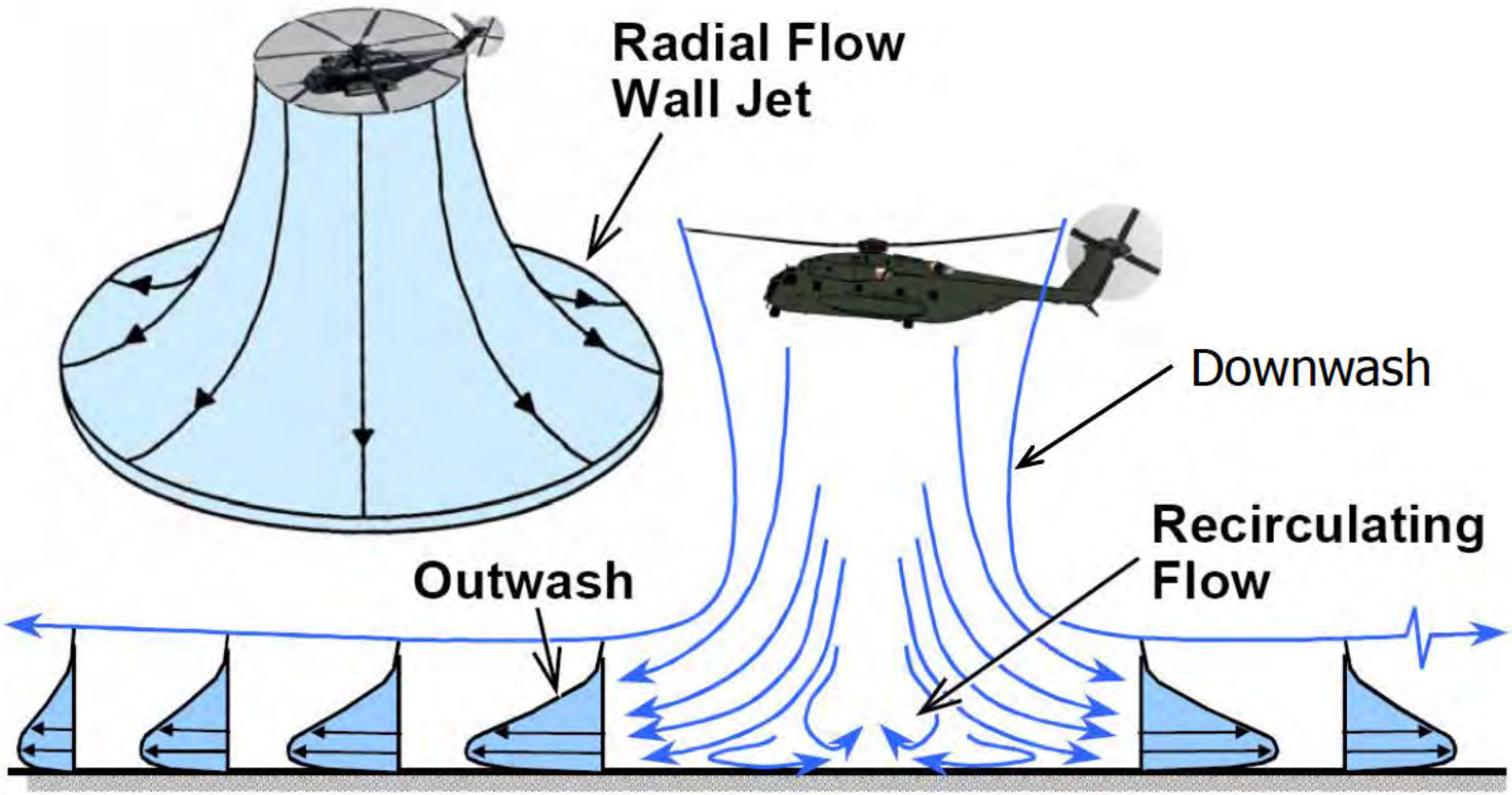
Comparison

- Both were heavy gross weight (approx 51,000 lbs)
- Both ~10% Qm margin to 117% transmission limit
- Wind over Deck low for both events
- Ship motion not a factor (calm seas)
- Same Ship Class
- Starboard to port approach
- Different approach technique
- Green Bay approach slower – more steady-state
- Wake environment less impactful in New Orleans

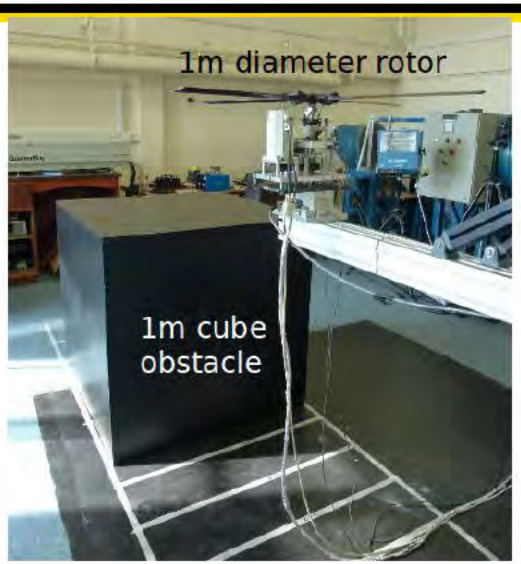
Engineering analysis shows both aircraft were performance limited, which resulted in inability to arrest a rate of descent.

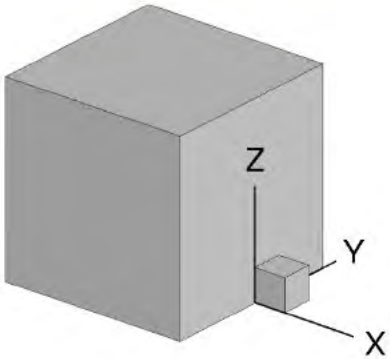
ROTOR WAKE INTERACTION AND IMPACT ON POWER REQD

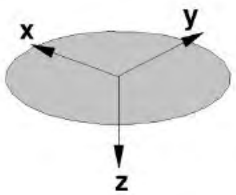
Helicopter Outwash Flowfield

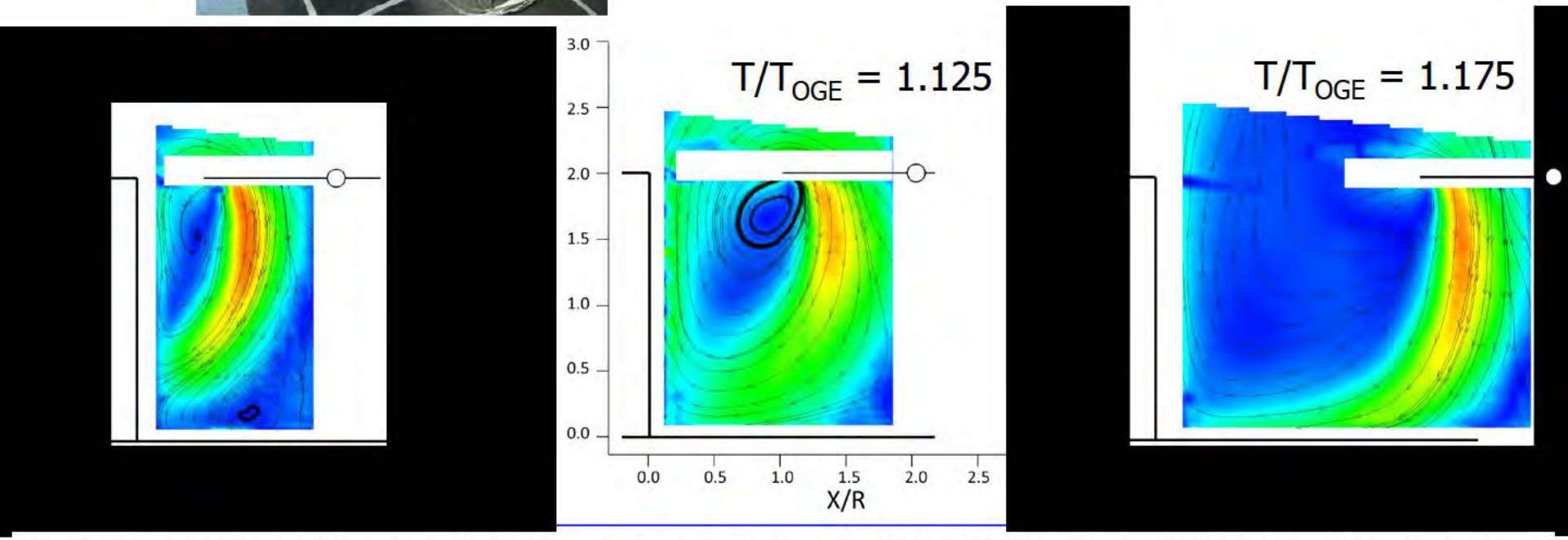


Rotor/Obstacle Aero Interactions





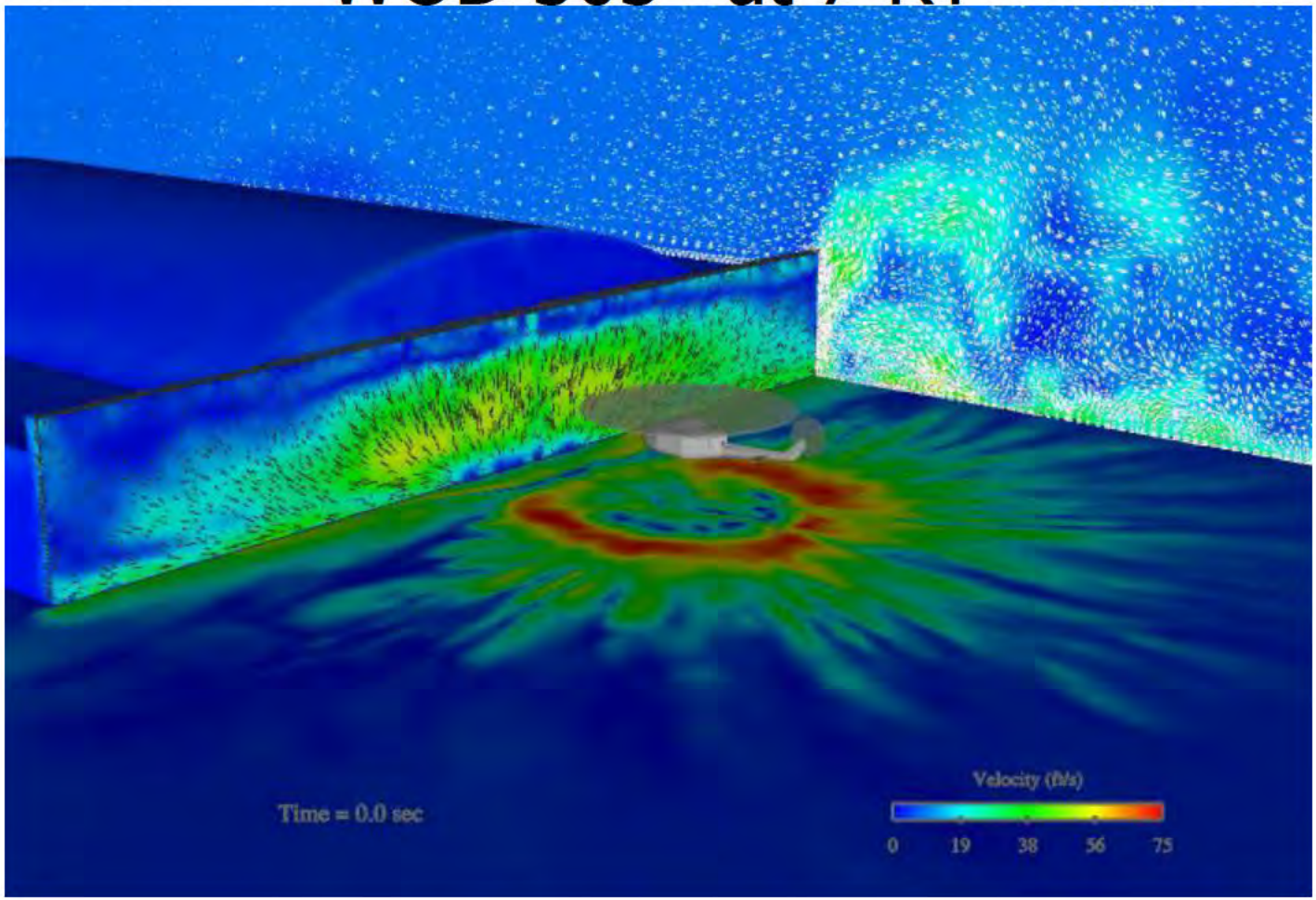




Zagalia, Giuni, and Green, "Rotor-Obstacle Aerodynamic Interaction in Hovering Flight", AHS 72nd Forum, West Palm Beach, FL, May 2016

Bell 412 Hovering in the Lee of a Hangar

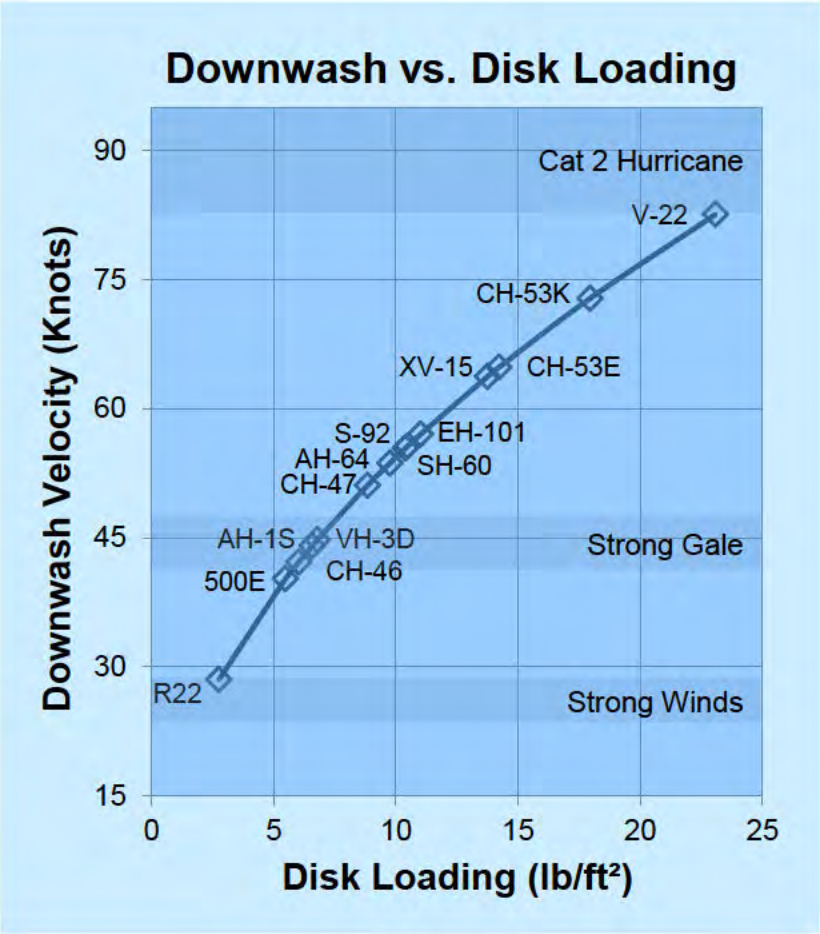
WOD 303° at 7 KT



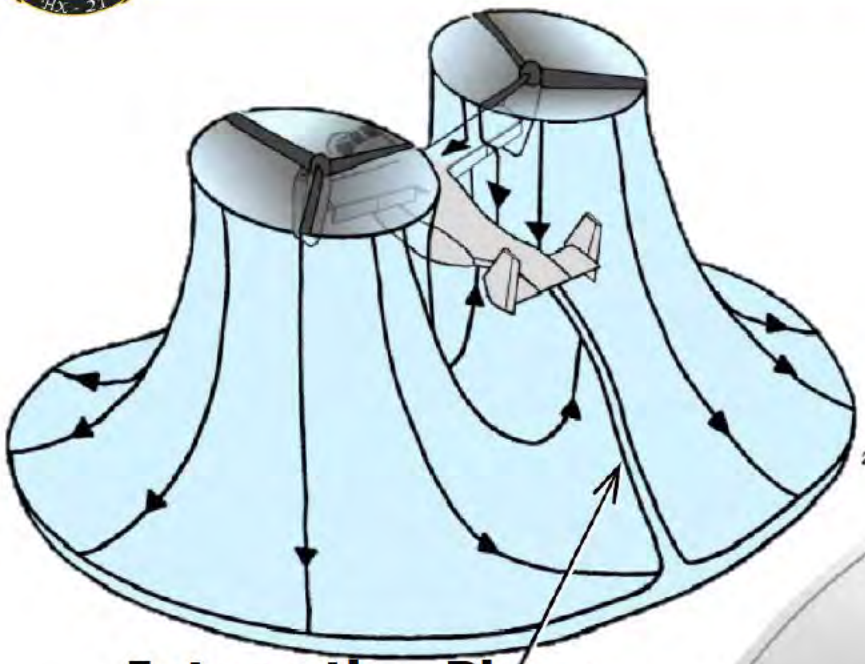
What about High Disk-Loading Tiltrotors?

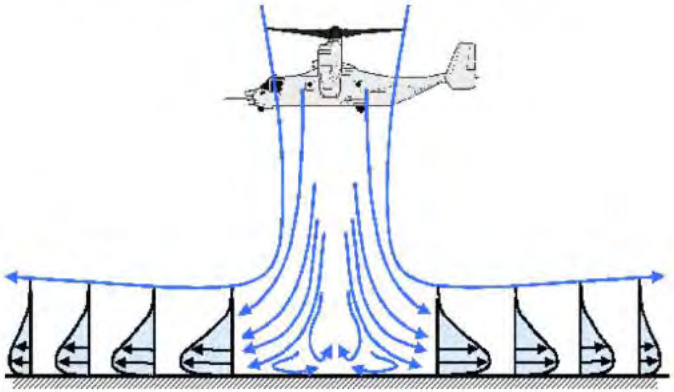
Disk Loading and Downwash

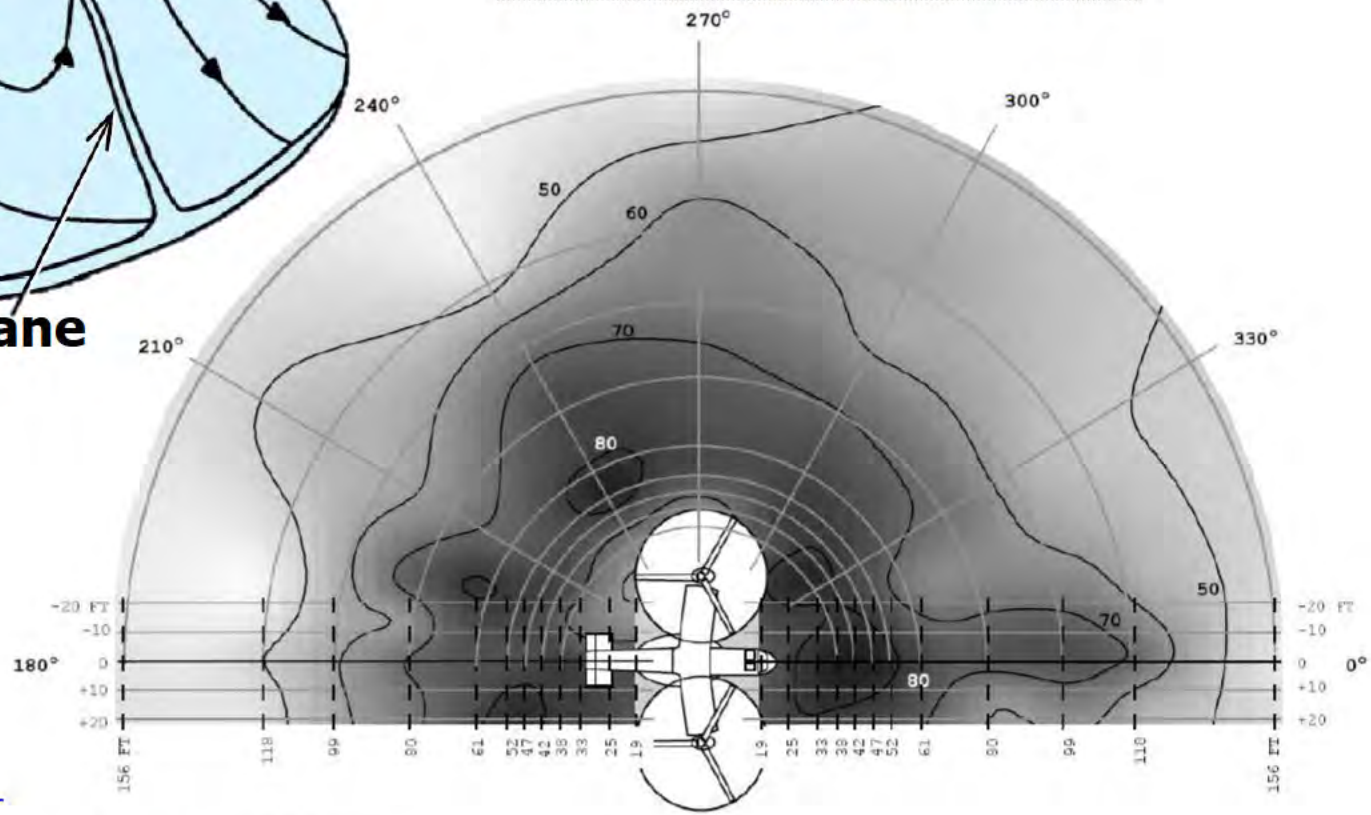
Downwash Velocity ∝ Disk Loading



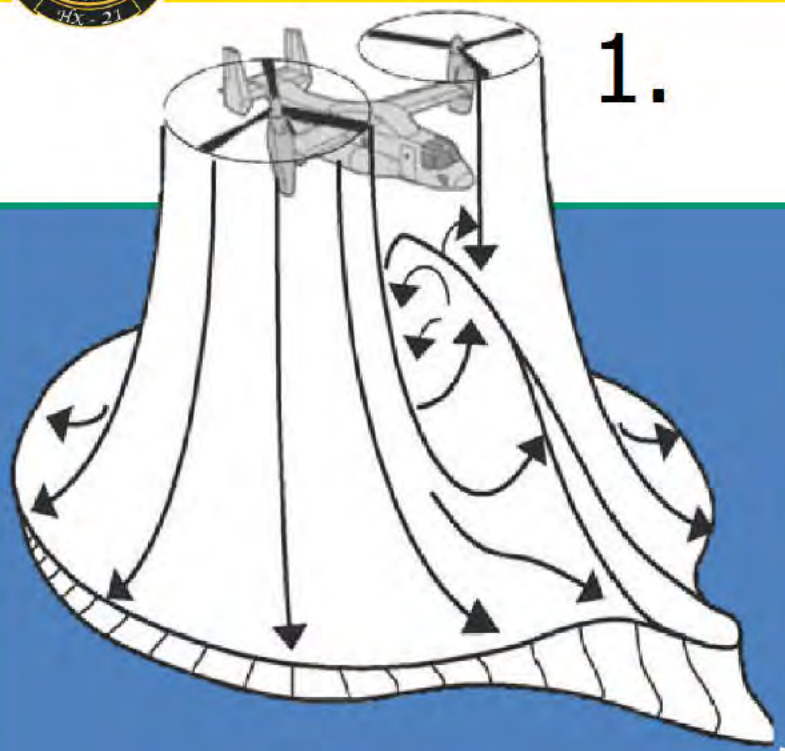
Tiltrotor Outwash Flowfield

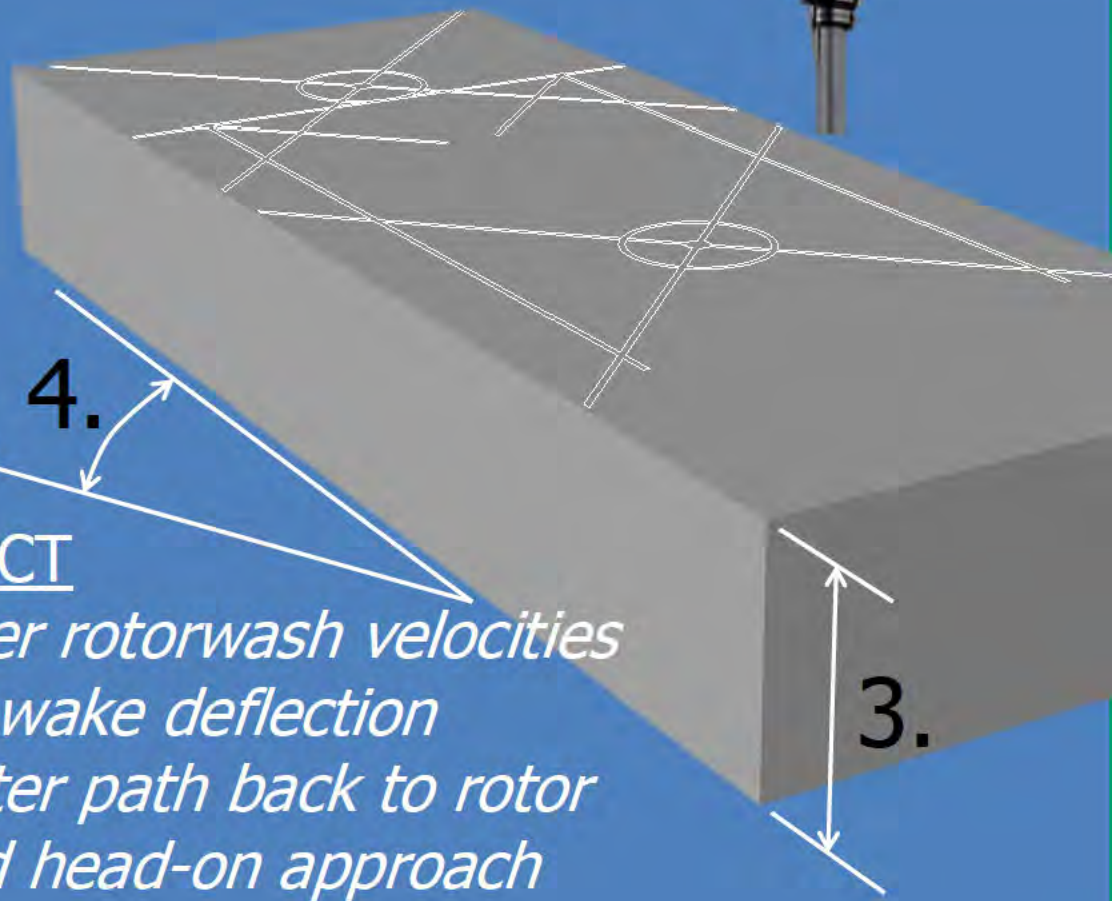






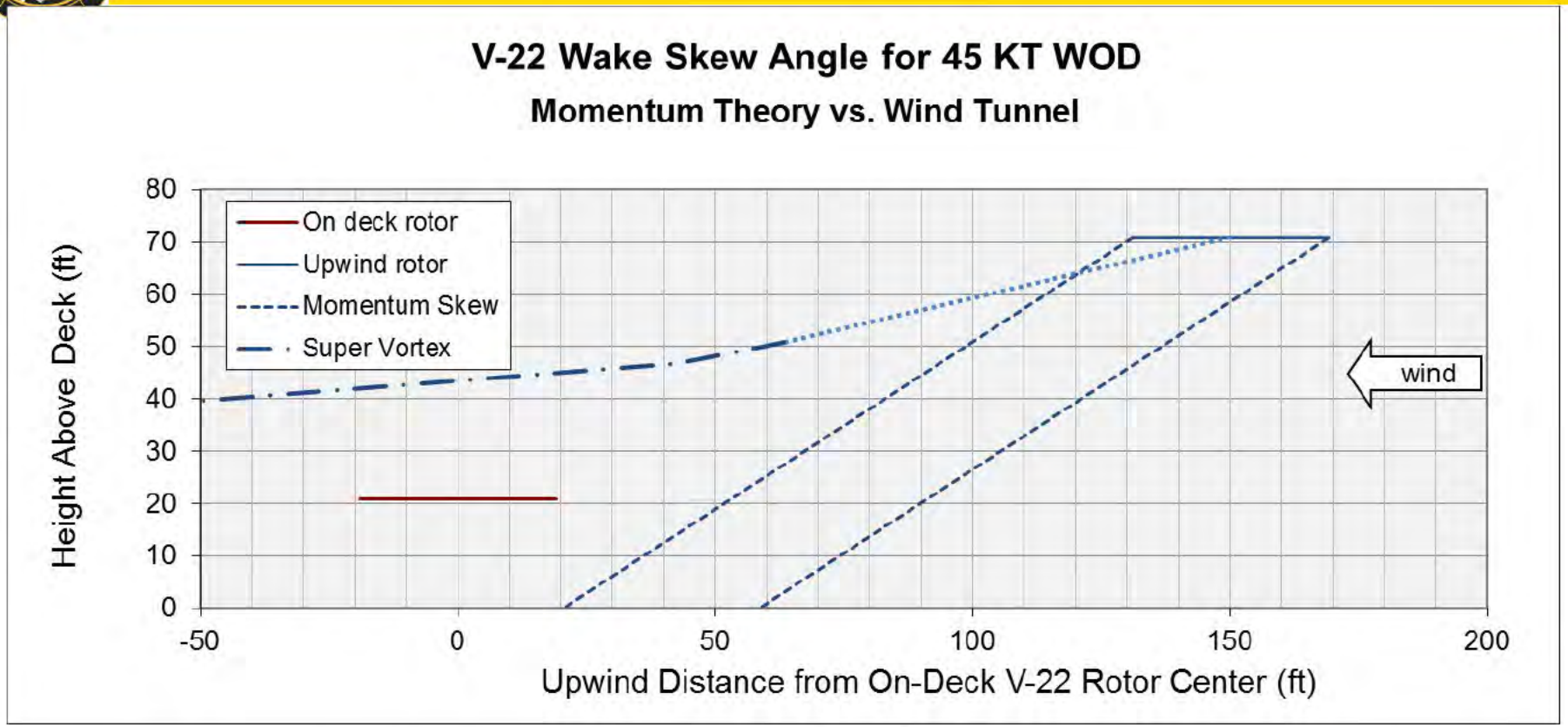
Factors Impacting Recirculation





FACTOR	IMPACT
1. Heavy GW	*Higher rotorwash velocities*
2. Low winds	*Less wake deflection*
3. Low deck height	*Shorter path back to rotor*
4. Approach heading	*Avoid head-on approach*

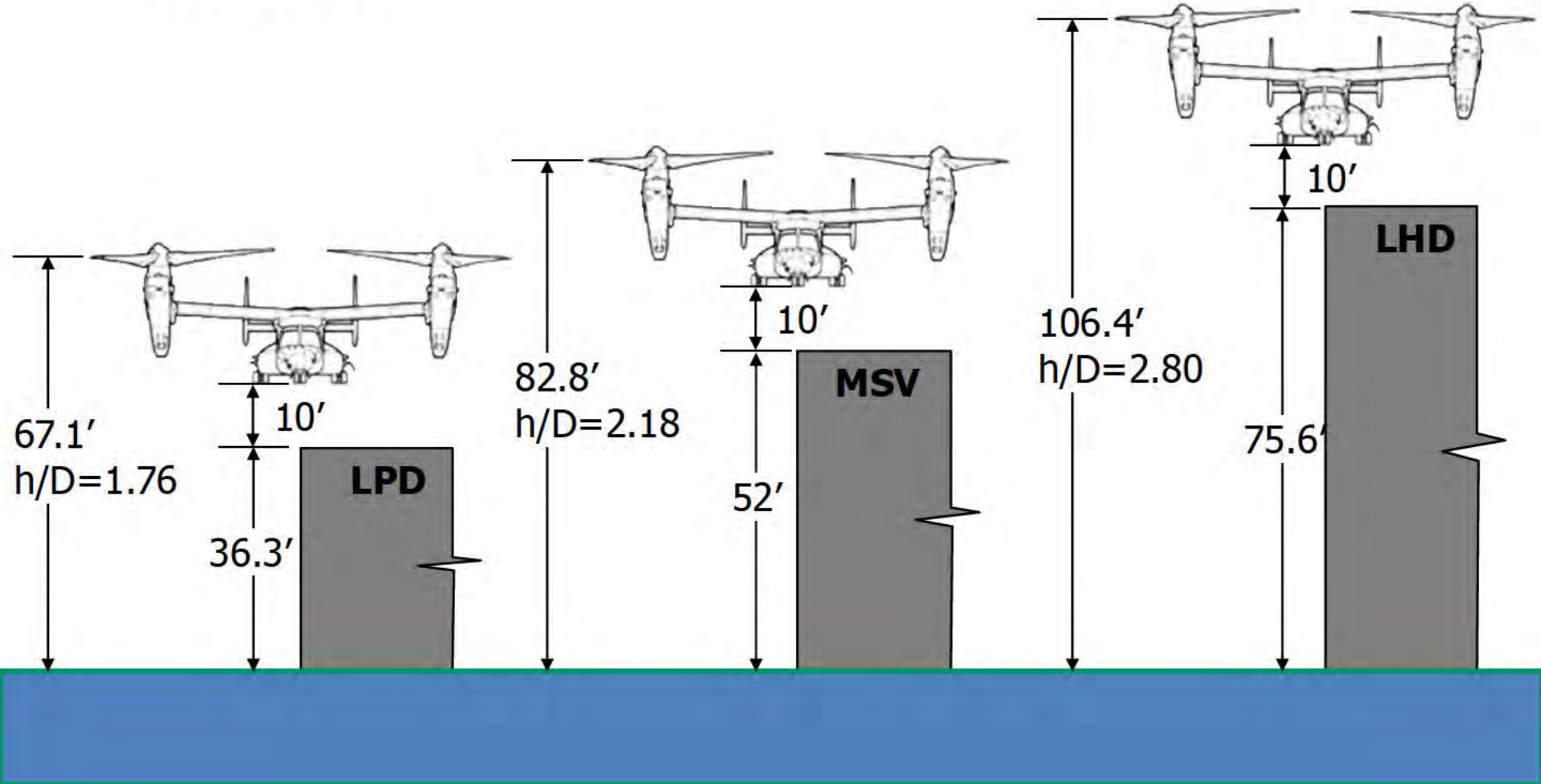
Wind Over Deck



- Increased relative wind speed reduces power required (via translational lift)
- Increased rel. wind speed convects wake downstream, reducing potential for recirculation

Deck Height

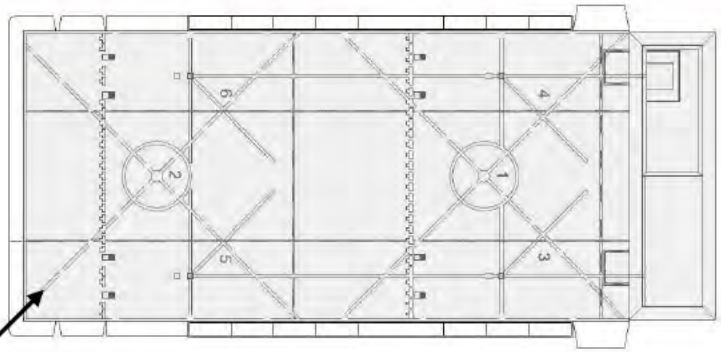
- Lower deck height = shorter path back to rotors for recirculation

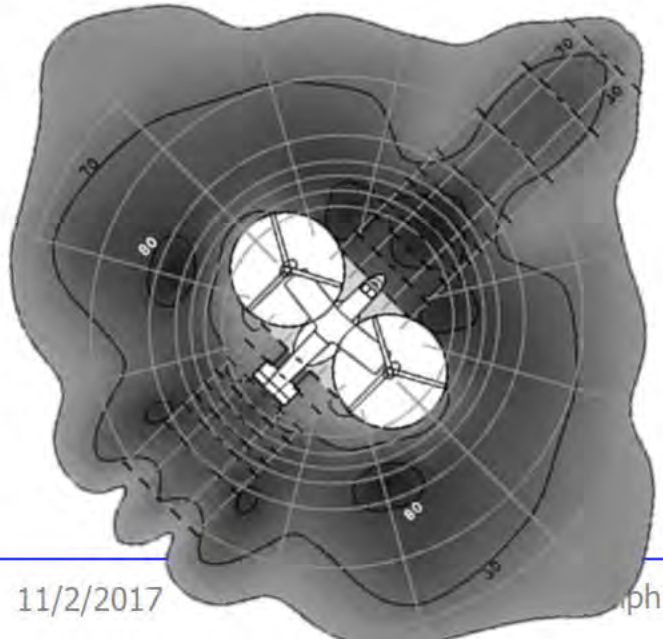


Approach Line & Heading

Low wind + low closure rate approach conditions can be assumed quasi-static

- Outwash flowfield travels with aircraft intact until obstacle encountered

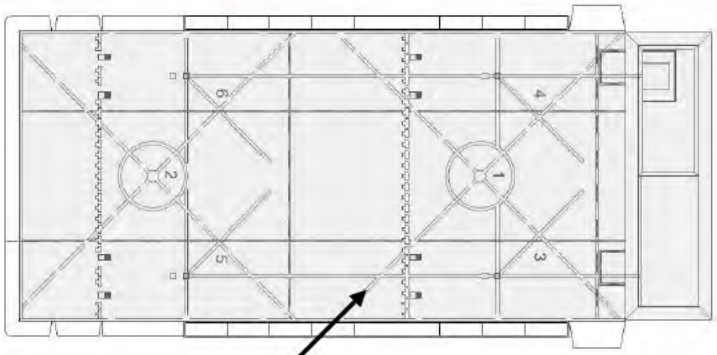




Spot 2 Standard Approach

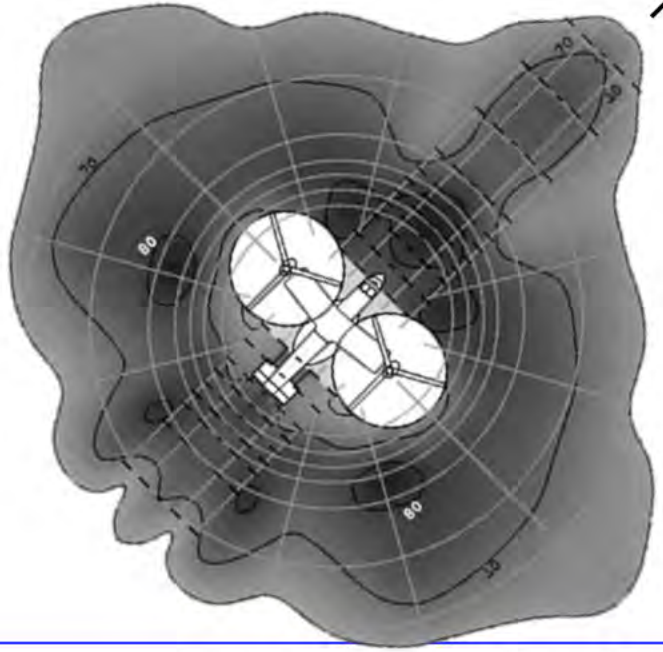
- Outwash diverted around stern and starboard hull

Approach Line & Heading

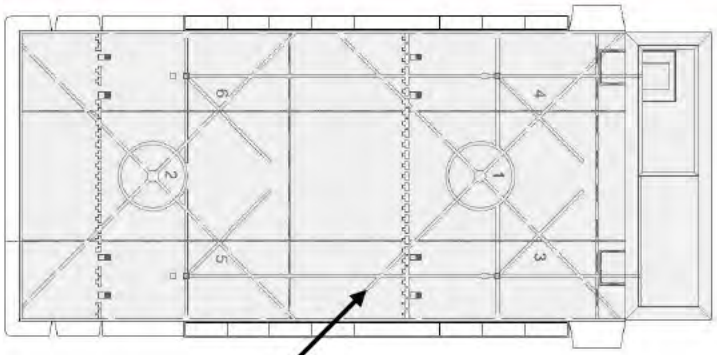


Spot 1 Standard Approach

- Outwash opposed by starboard hull in oblique approach to mid-deck

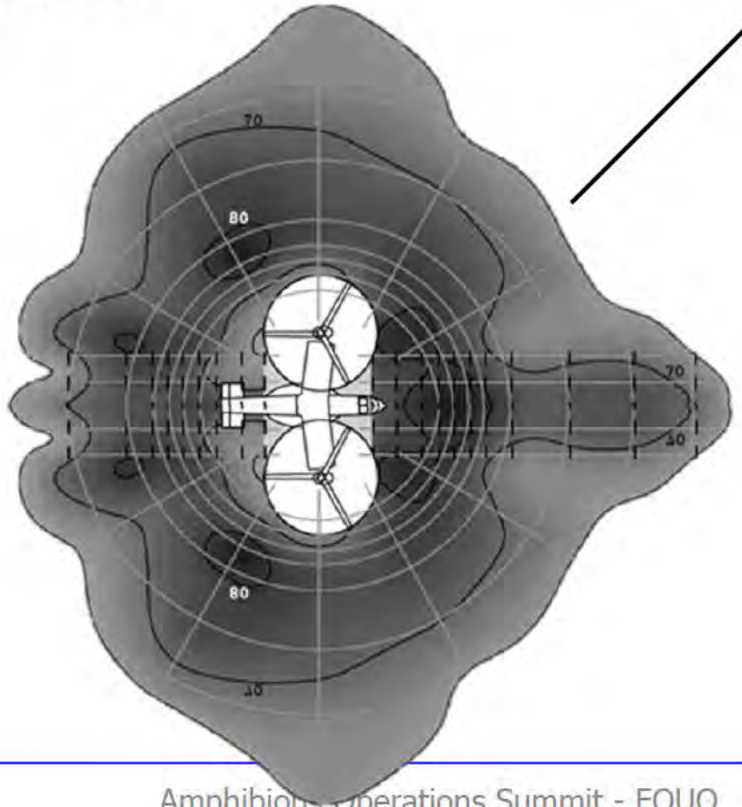


Approach Line & Heading

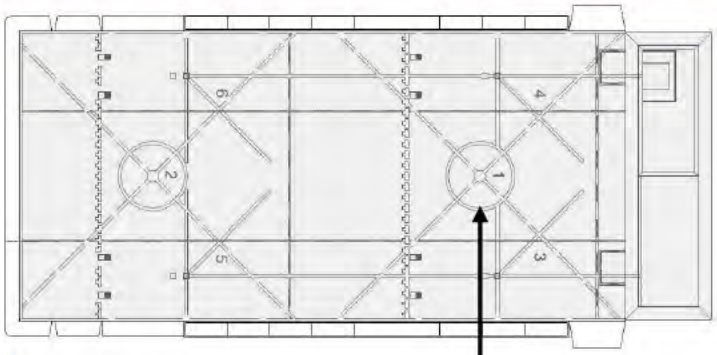


Spot 1 Alternate Approach

- Could potentially delay recirculation onset
- Impact TBD

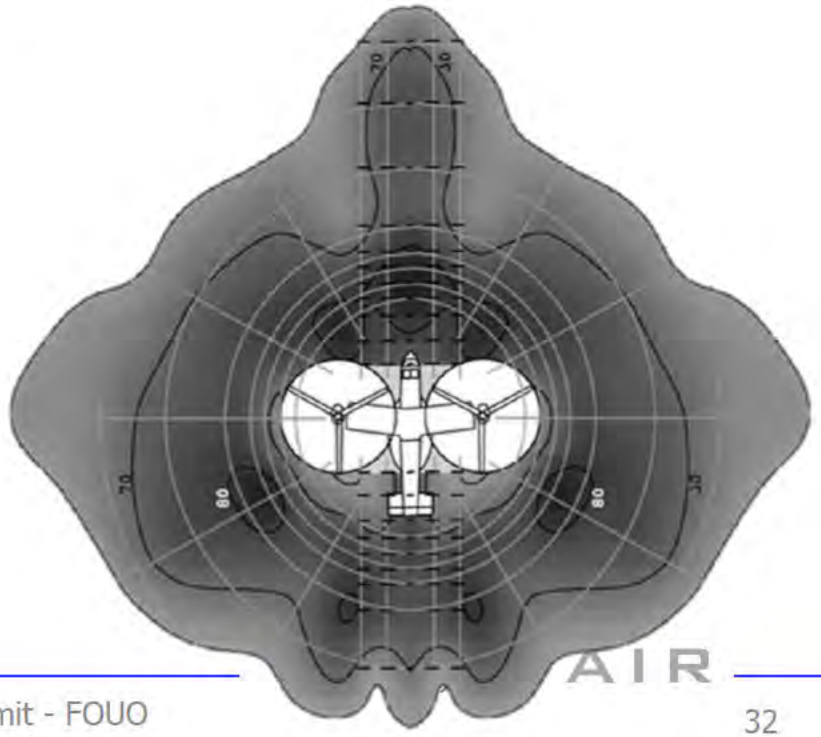


Approach Line & Heading



Athwartship or Stern Approach

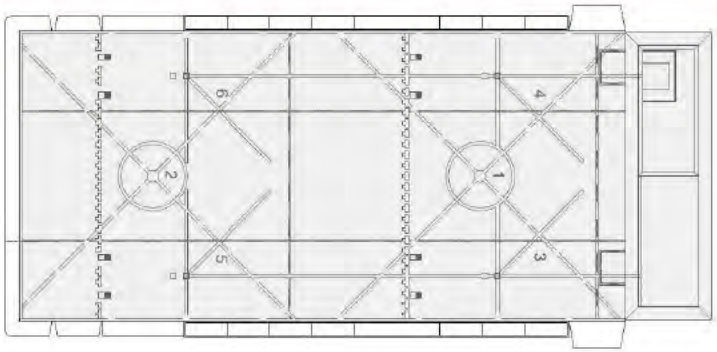
- Ship hull in broadside opposition to outwash
- Expect greater recirculation but less lateral asymmetry

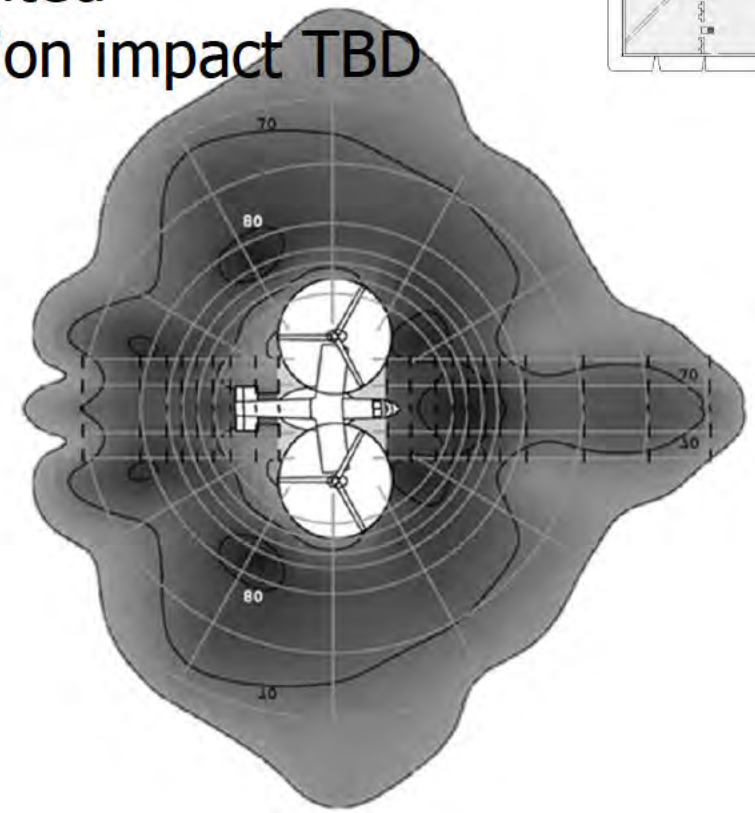


Approach Line & Heading

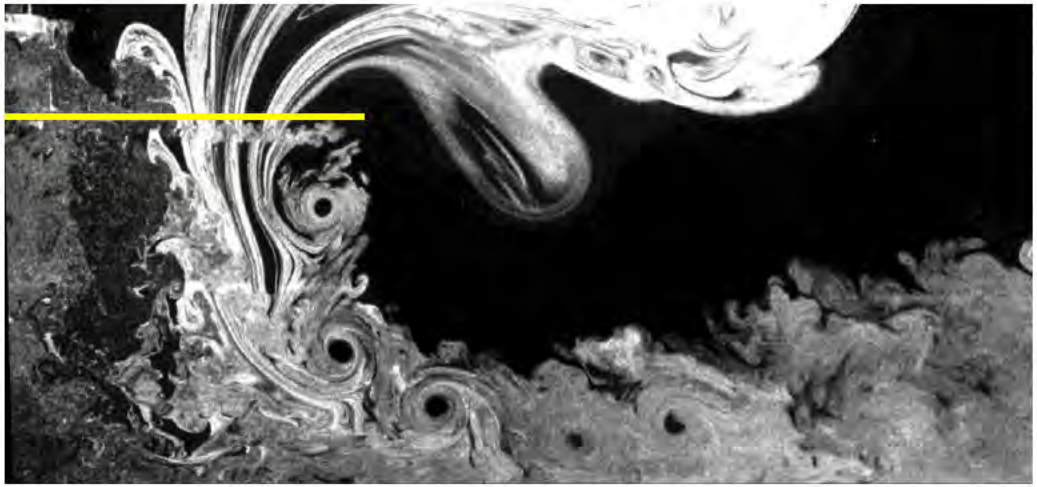
Alternate Parallel Approach

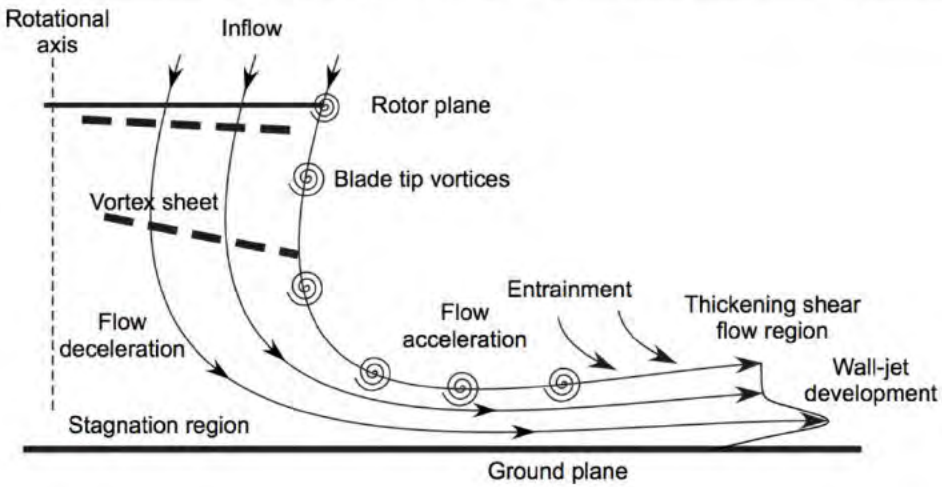
- Provides escape route if torque limited
- Recirculation impact TBD





Complexity of Rotor IGE Flowfield





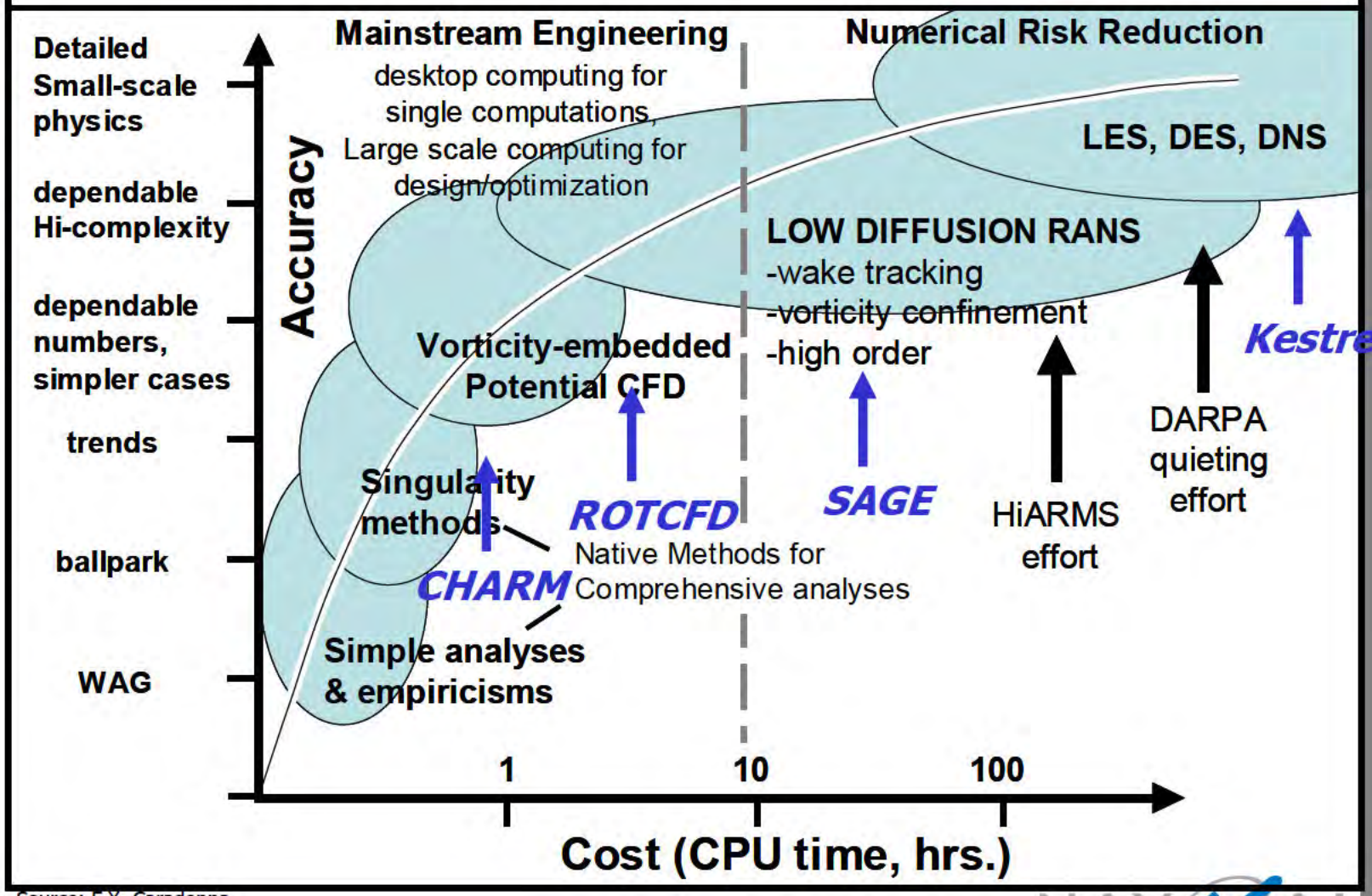
Source: Leishman, J. G., "Challenges in Understanding the Fluid Dynamics of Brownout," AHS Adv. Rotorcraft Technology and Safety Operations, Omiya, Japan, Nov, 2010

- Rotor proximity to impervious boundaries constrain rotor flow development
- Vortex filament stretching and vorticity intensification
- Wall jet-like flow embedded with discrete, persistent vortices is highly unsteady
- Aperiodic flow, with locally high velocities near the surface
- Regions of localized flow separation

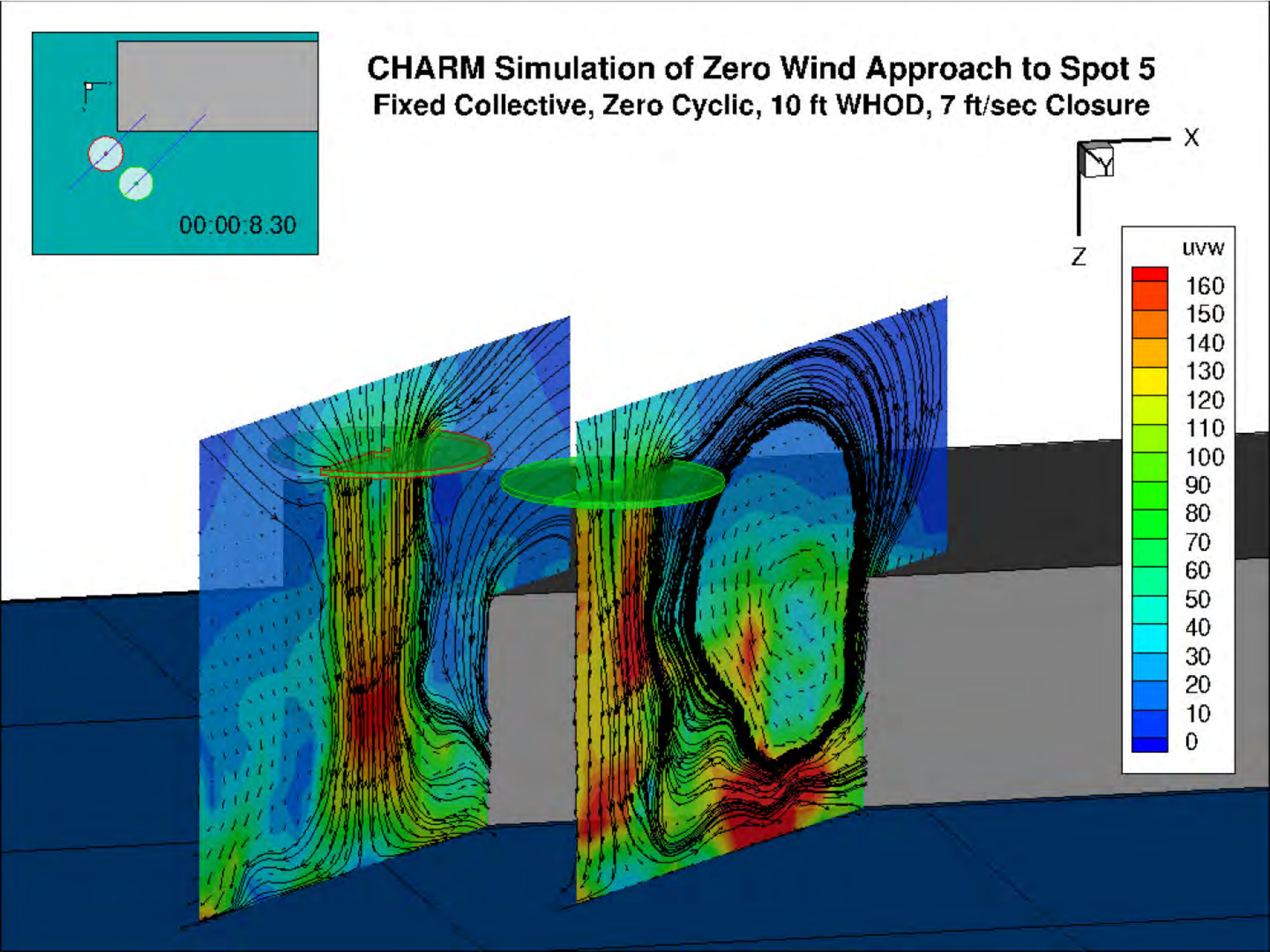
Add to this:

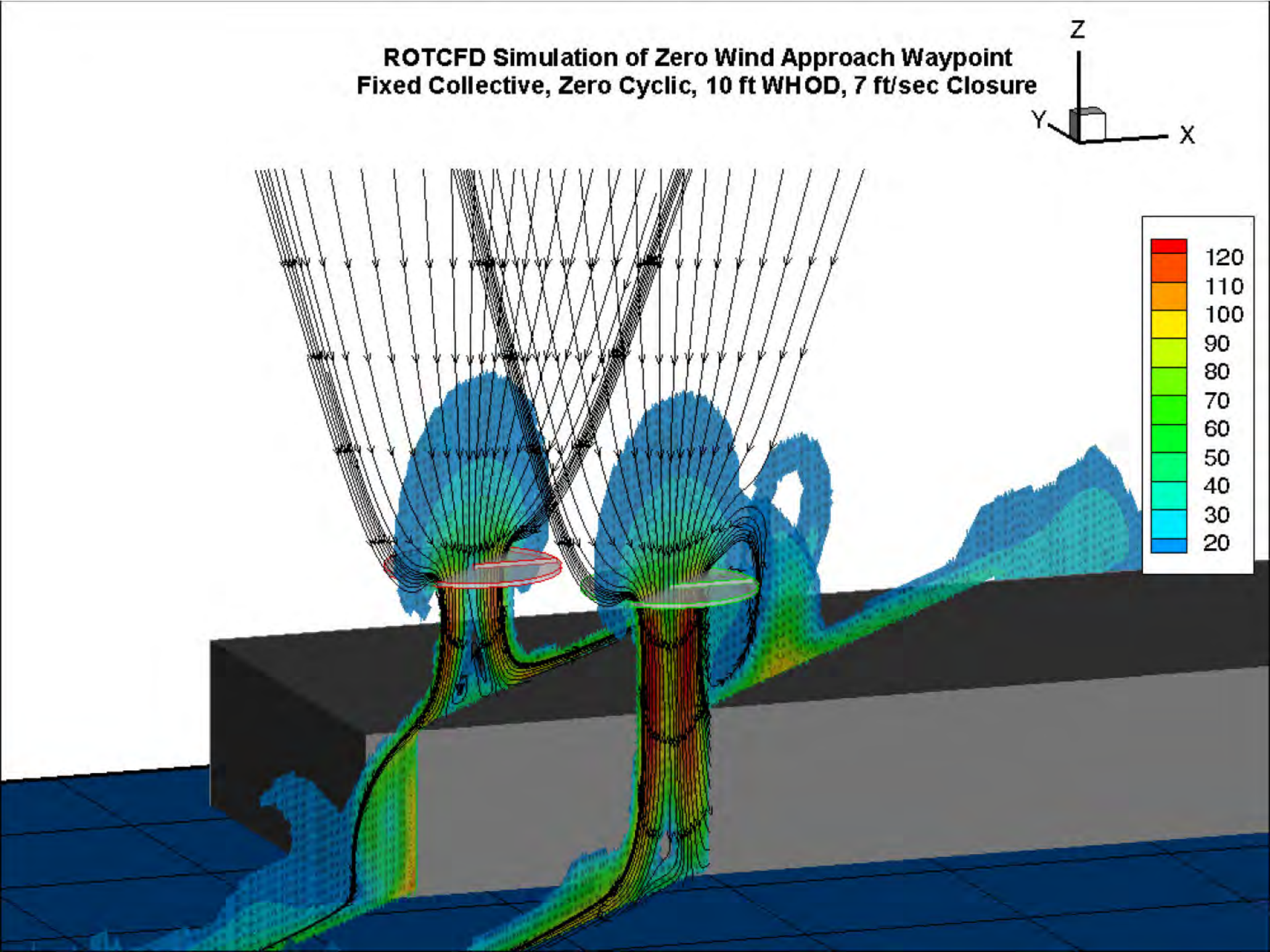
- Near-field interaction with airframe
- Far-field interaction with ship hull
- Impact of recirculation on rotor performance
- Transient vs. steady state

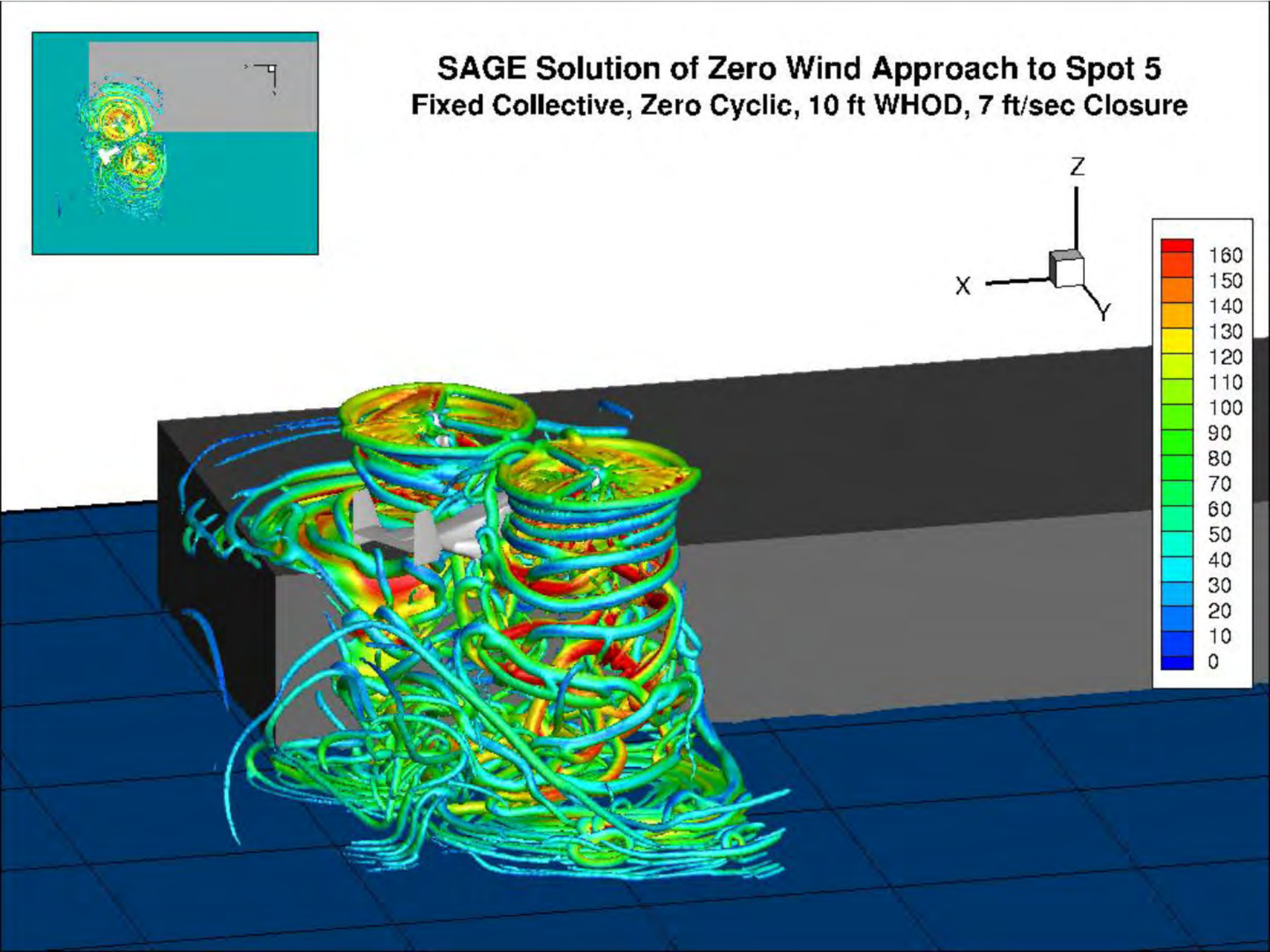
Spectrum of Rotor/Wake Analyses



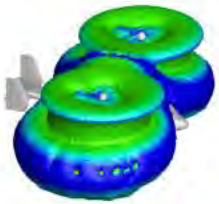
Source: F.X. Caradonna

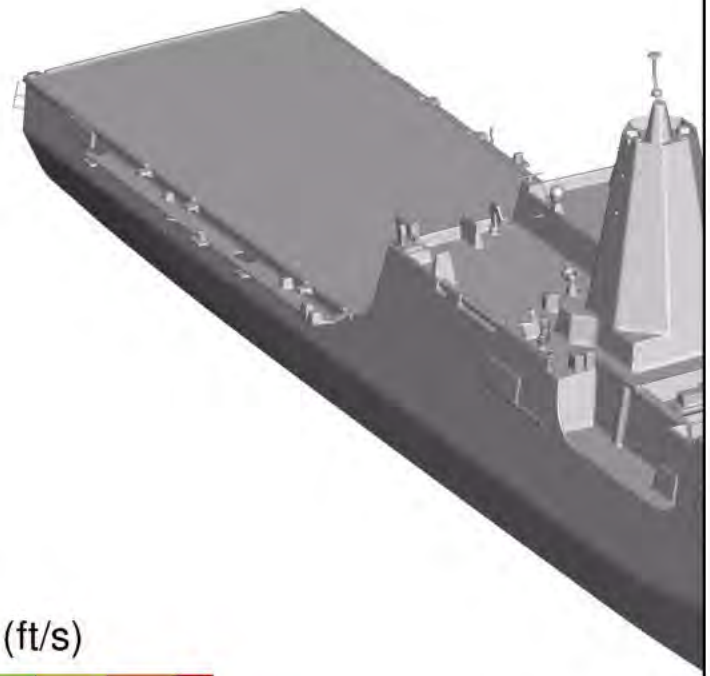

CHARM Simulation of Zero Wind Approach to Spot 5
Fixed Collective, Zero Cyclic, 10 ft WHOD, 7 ft/sec Closure
00:00:8.30
X
Y
Z
uvw
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0


ROTCFD Simulation of Zero Wind Approach Waypoint
Fixed Collective, Zero Cyclic, 10 ft WHOD, 7 ft/sec Closure
Z
Y
X
120
110
100
90
80
70
60
50
40
30
20

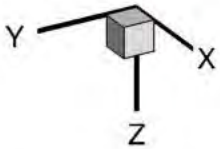

SAGE Solution of Zero Wind Approach to Spot 5
Fixed Collective, Zero Cyclic, 10 ft WHOD, 7 ft/sec Closure
Z
X
Y
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

V-22 Starboard Approach to LPD-17 Spot 5
Winds: 000 @ 0kts
Fixed Rotor Controls
Kestrel CFD Simulation

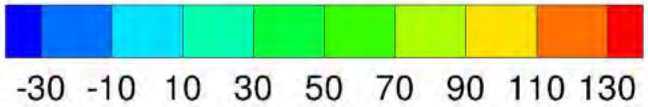




* At 55Klb, the induced velocity at the rotor disk is approximately 70 ft/s



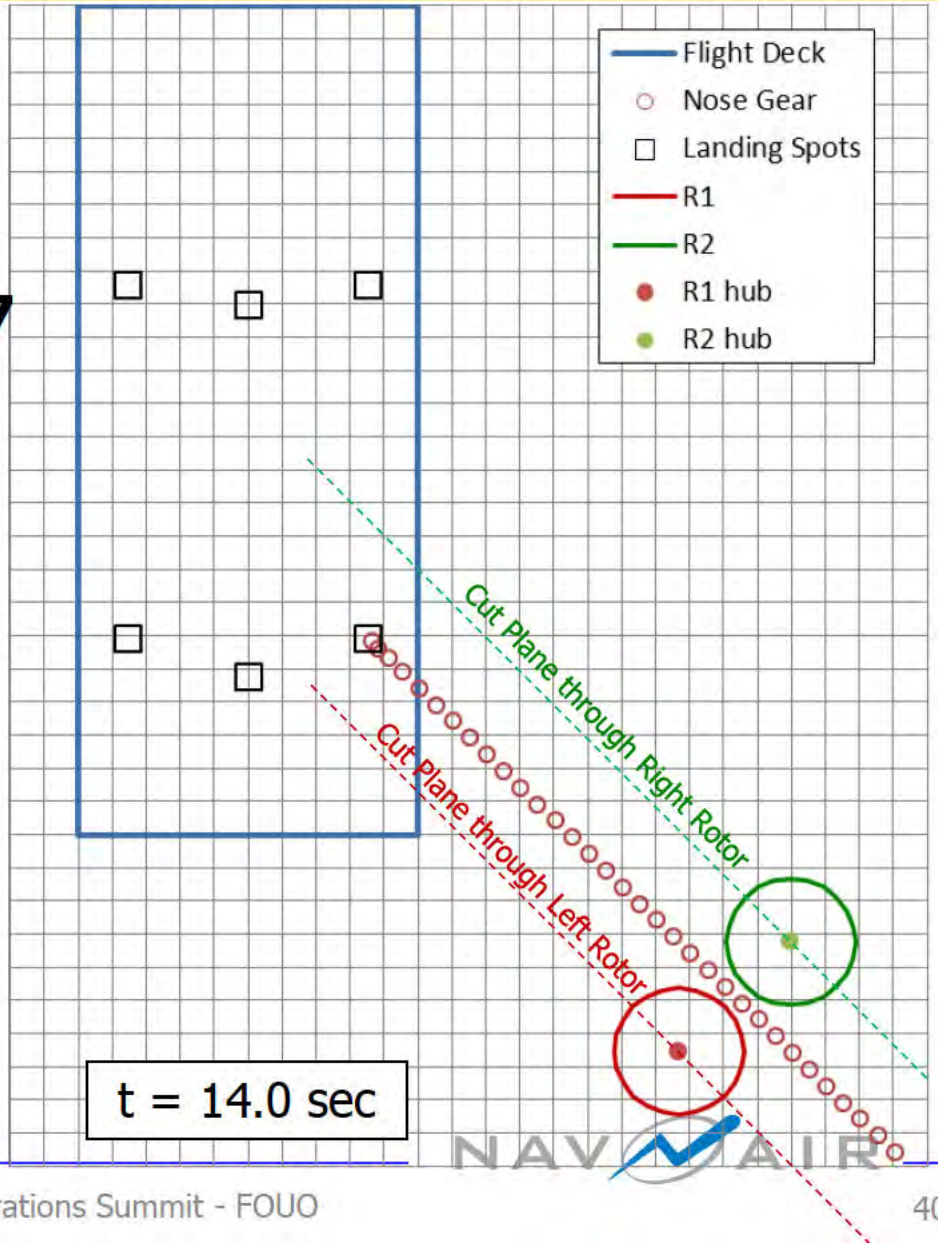
Vertical Velocity (ft/s)

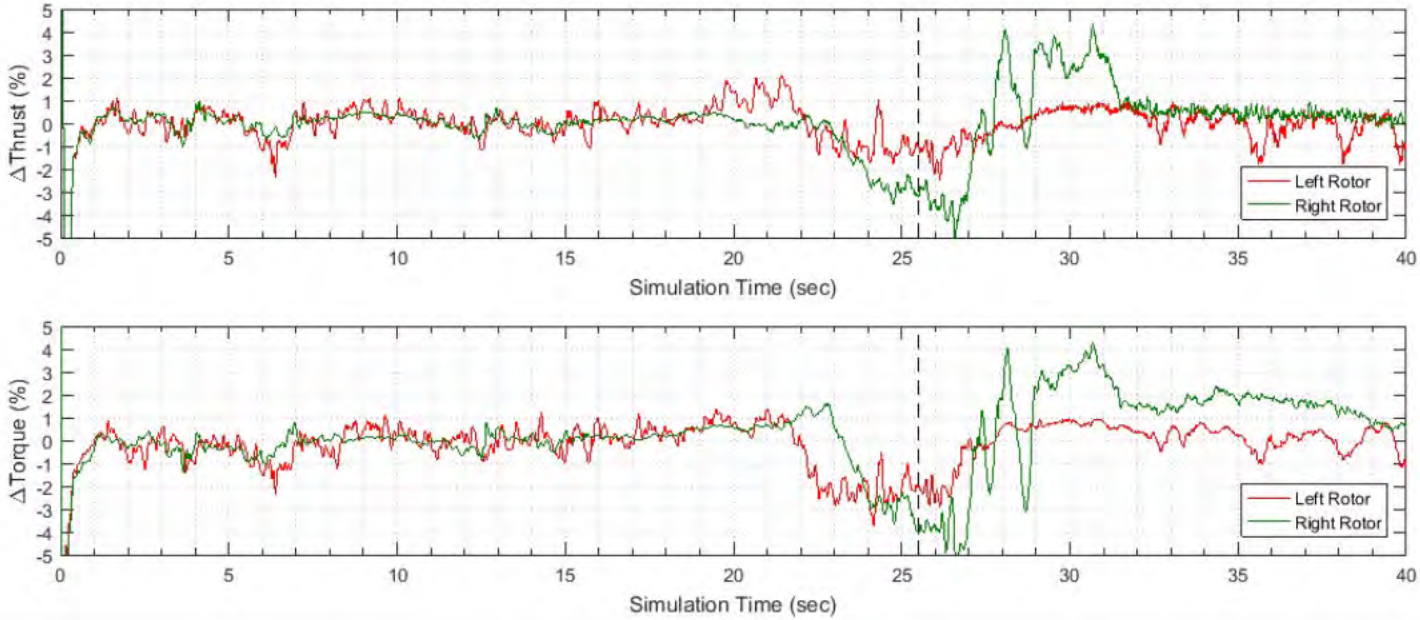


Iteration = 250

Generic Approach Setup

- **Aircraft translating along an ideal 45° starboard approach at constant 7.07 ft/s closure rate then decelerating upon crossing deck edge**
- **Constant wheel height above deck of 10 ft**
  - Rotor height above deck = 30.8 ft
  - Rotor height above sea surface = 67.2 ft




ΔThrust (%)
Simulation Time (sec)
Left Rotor
Right Rotor
ΔTorque (%)
Simulation Time (sec)
Left Rotor
Right Rotor

V-22 Starboard Approach to LPD-17 Spot 5
Winds: 000 @ 0kts
Fixed Rotor Controls
Kestrel CFD Simulation
Velocity Magnitude (ft/s)
0 25 50 75 100 125 150
Iteration = 12750

V-22 Starboard Approach to LPD-17 Spot 5
Winds: 000 @ 0kts
Fixed Rotor Controls
Kestrel CFD Simulation
Velocity Magnitude (ft/s)
0 25 50 75 100 125 150
Iteration = 12750

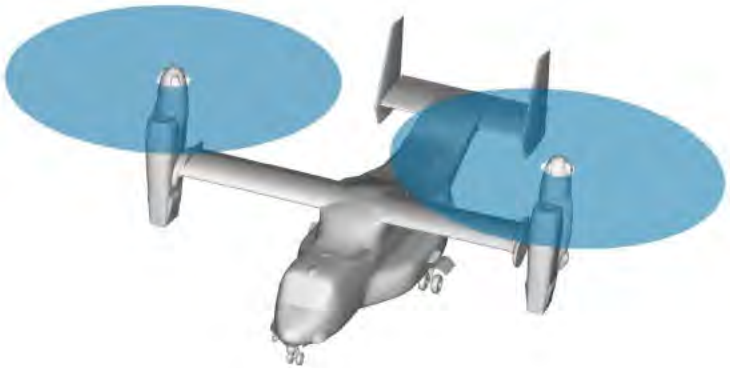
CFD Methodology for Mishap Events

- **CREATE-AV Kestrel CFD Solver**
- **V-22 zero wind recovery to designated spot on LPD**
- **Ship relative trajectory and aircraft attitude time history**
  - Derived from CASVIEW reconstruction
- **Ship model**
  - LPD-17 class ship model w/flight deck 36.3 ft above waterline
- **V-22 Model**
  - Gear-up VTOL mode w/90° nacelles, fully extended flaperons, and undeflected tail surfacesActuator disk rotor model (SMEMRD)
    - Rotors represented by actuator disks which impart momentum into flowfield
    - Trade-off between computational efficiency and solution accuracy relative to discrete blade analysis
  - Fixed Rotor Controls
    - Collective pitch trimmed to 55 Klb total thrust (50 Klb GW + 10% download) for zero-wind HOGE in the absence of the ship, then held constant throughout approach
    - Any thrust augmentation, degradation, or asymmetry between rotors that then develops can be attributed to changes in the rotor flowfield

CFD Model Geometry

Rotor Modeling Fidelity

Actuator Disk

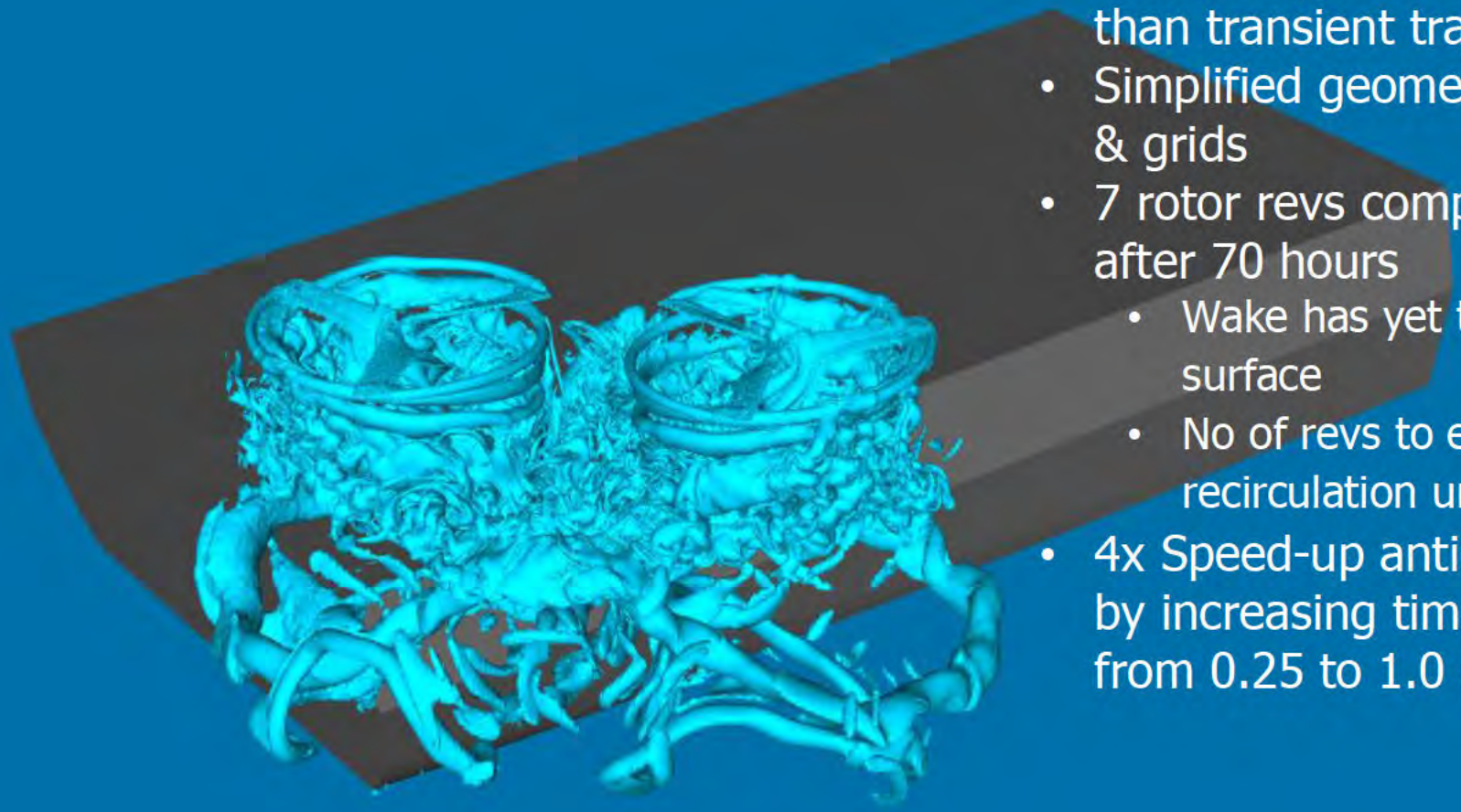


- 44 minutes per revolution (100 hrs for 20 sec evolution)
- Captures mean flowfield velocities and loading
- Less accurate performance

Discrete Blades

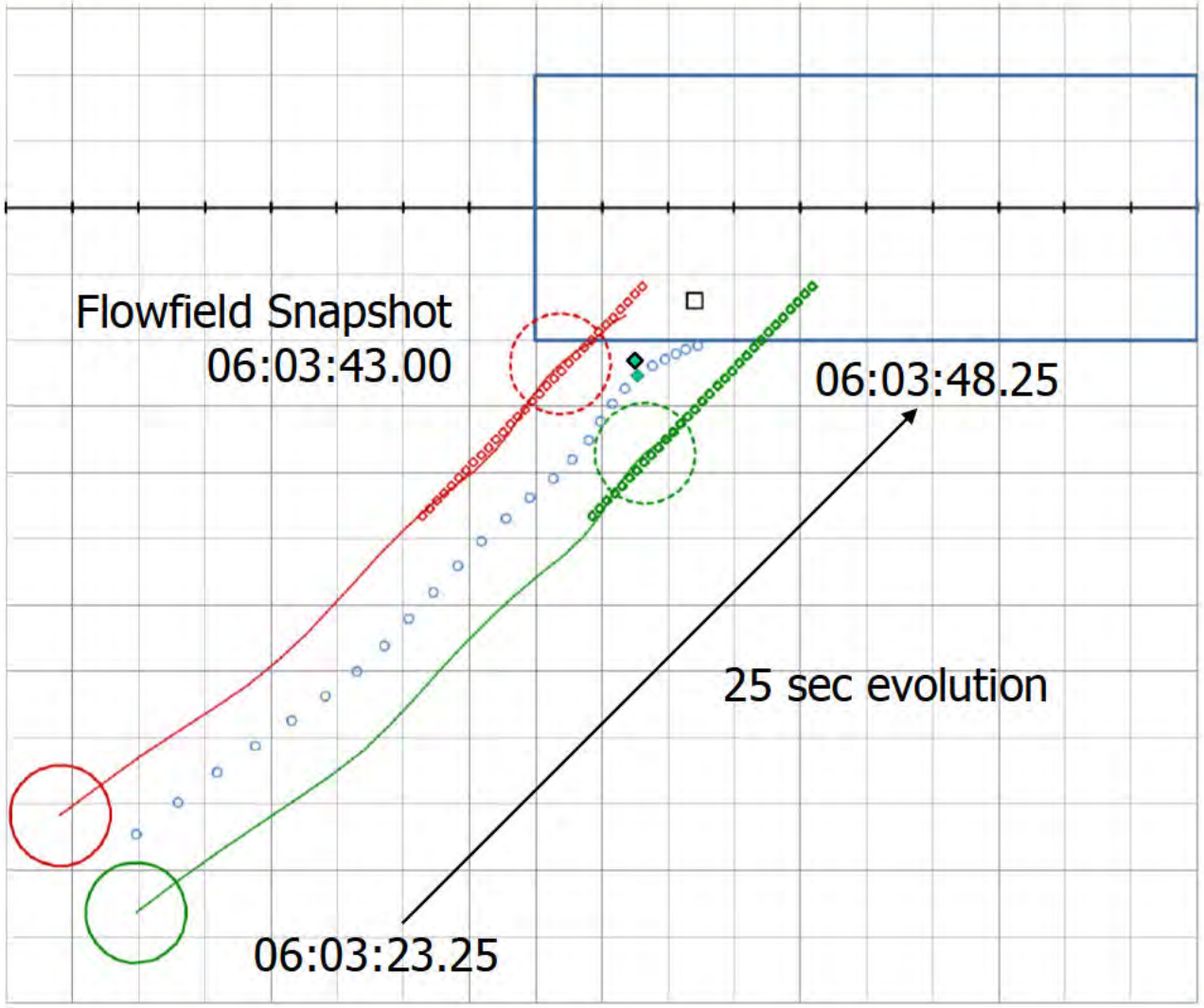
- 10 hours per revolution (57 days for 20 sec evolution)
- Captures unsteady induced velocities and loading
- More accurate performance

HELIOS Discrete Blade Computation



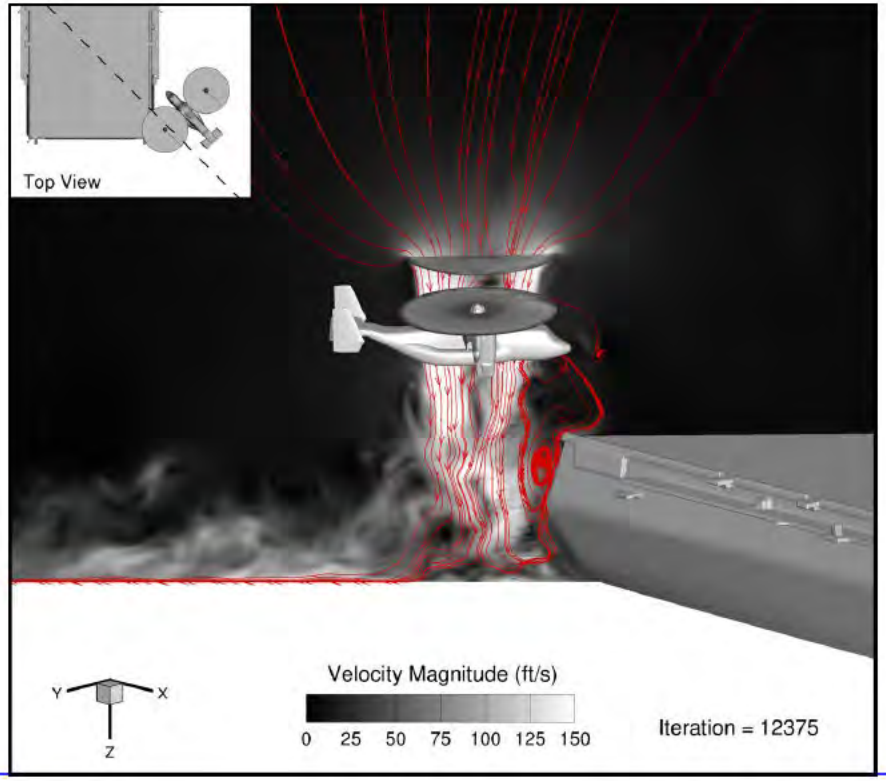
- Static waypoint rather than transient trajectory
- Simplified geometry & grids
- 7 rotor revs complete after 70 hours
  - Wake has yet to hit sea surface
  - No of revs to establish recirculation unknown
- 4x Speed-up anticipated by increasing time step from 0.25 to 1.0 deg

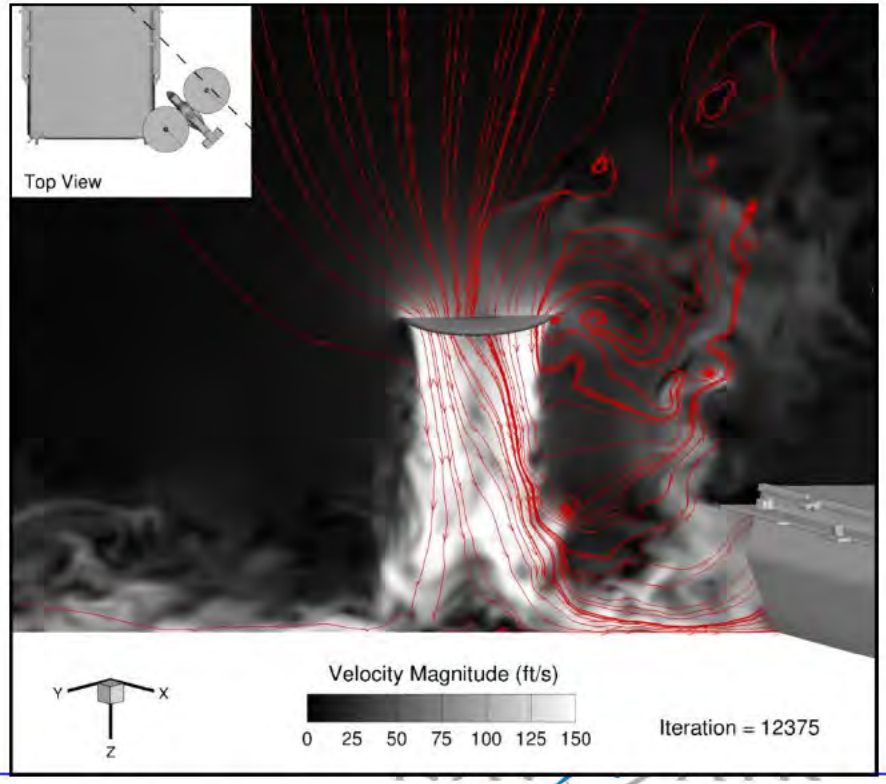
USS Green Bay Event CFD Analysis

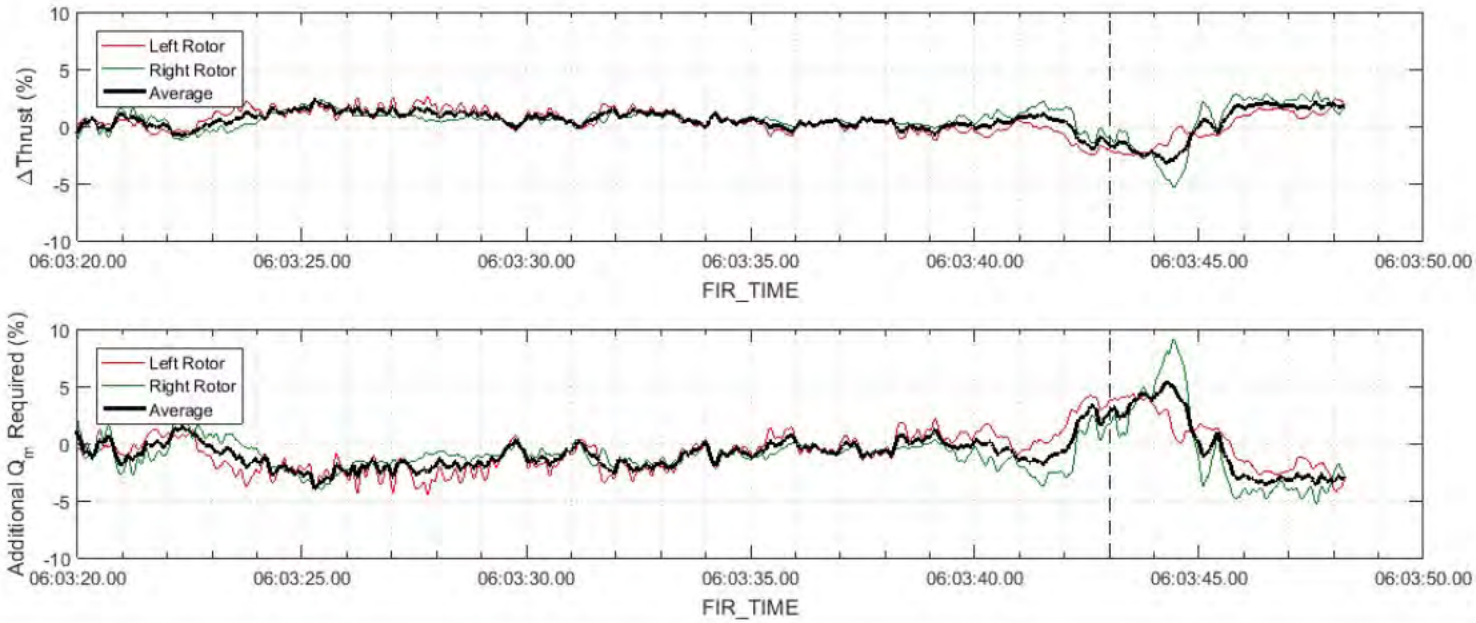


Green Bay Event Flowfield Snapshot

- **Increase in vertical descent rate at 06:03:42 coincident with onset of wake recirculation**
- **Greater amount of recirculation through right rotor than left due to position and orientation of aircraft with respect to ship**
- **CFD Contour plots of velocity magnitude overlaid by streamlines**



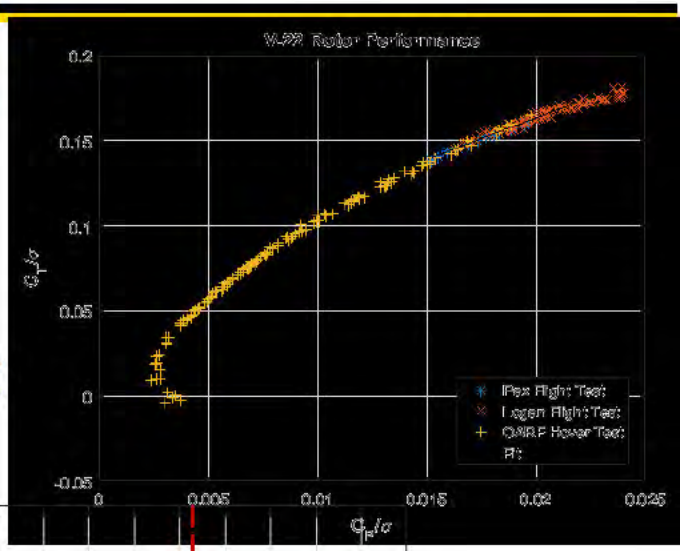


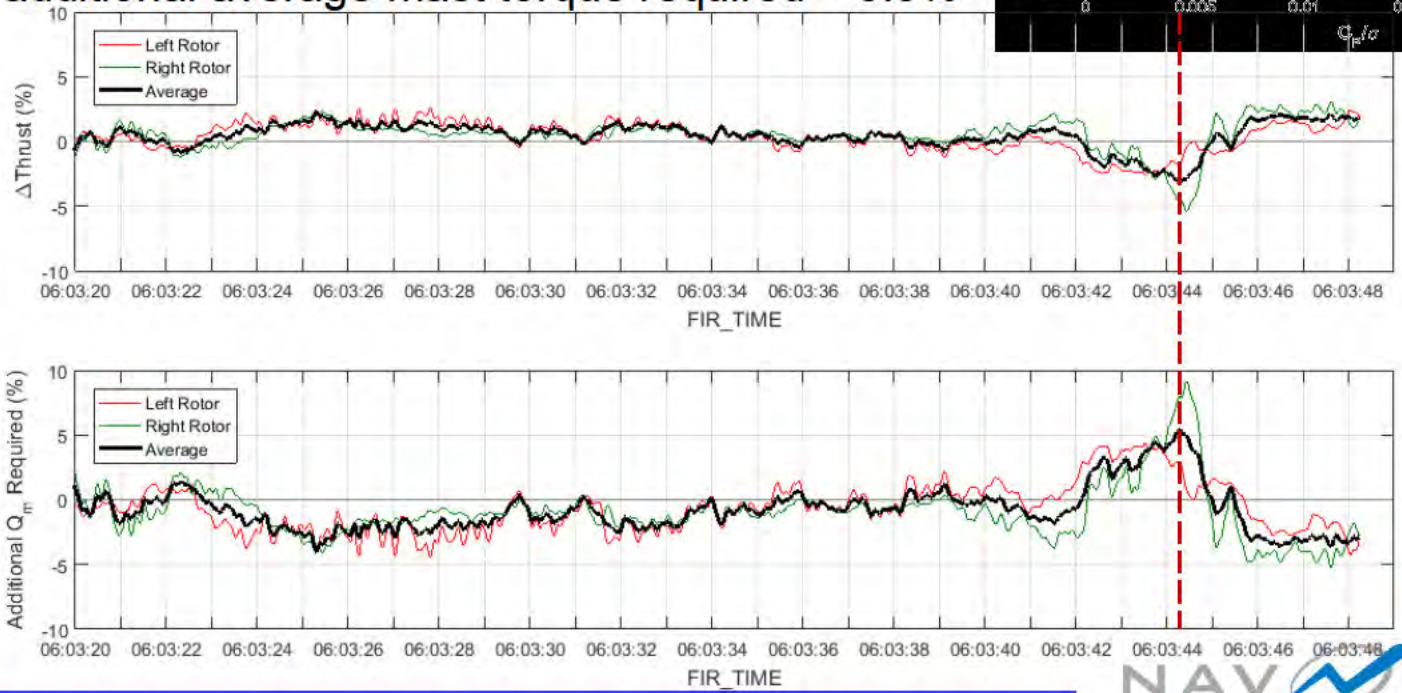

Left Rotor
Right Rotor
Average
ΔThrust (%)
10
5
0
-5
-10
06:03:20.00
06:03:25.00
06:03:30.00
06:03:35.00
06:03:40.00
06:03:45.00
06:03:50.00
FIR_TIME
Left Rotor
Right Rotor
Average
Additional Q_m Required (%)
10
5
0
-5
-10
06:03:20.00
06:03:25.00
06:03:30.00
06:03:35.00
06:03:40.00
06:03:45.00
06:03:50.00
FIR_TIME

MV-22 / LPD-20 BuNo: 168634
Winds: 000 @ 0kts
Fixed Rotor Controls
Kestrel CFD Simulation
Top View
Velocity Magnitude (ft/s)
0 25 50 75 100 125 150
Iteration = 12375
Y
X
Z
MV-22 / LPD-20 BuNo: 168634
Winds: 000 @ 0kts
Fixed Rotor Controls
Kestrel CFD Simulation
Top View
Velocity Magnitude (ft/s)
0 25 50 75 100 125 150
Iteration = 12375
Y
X
Z

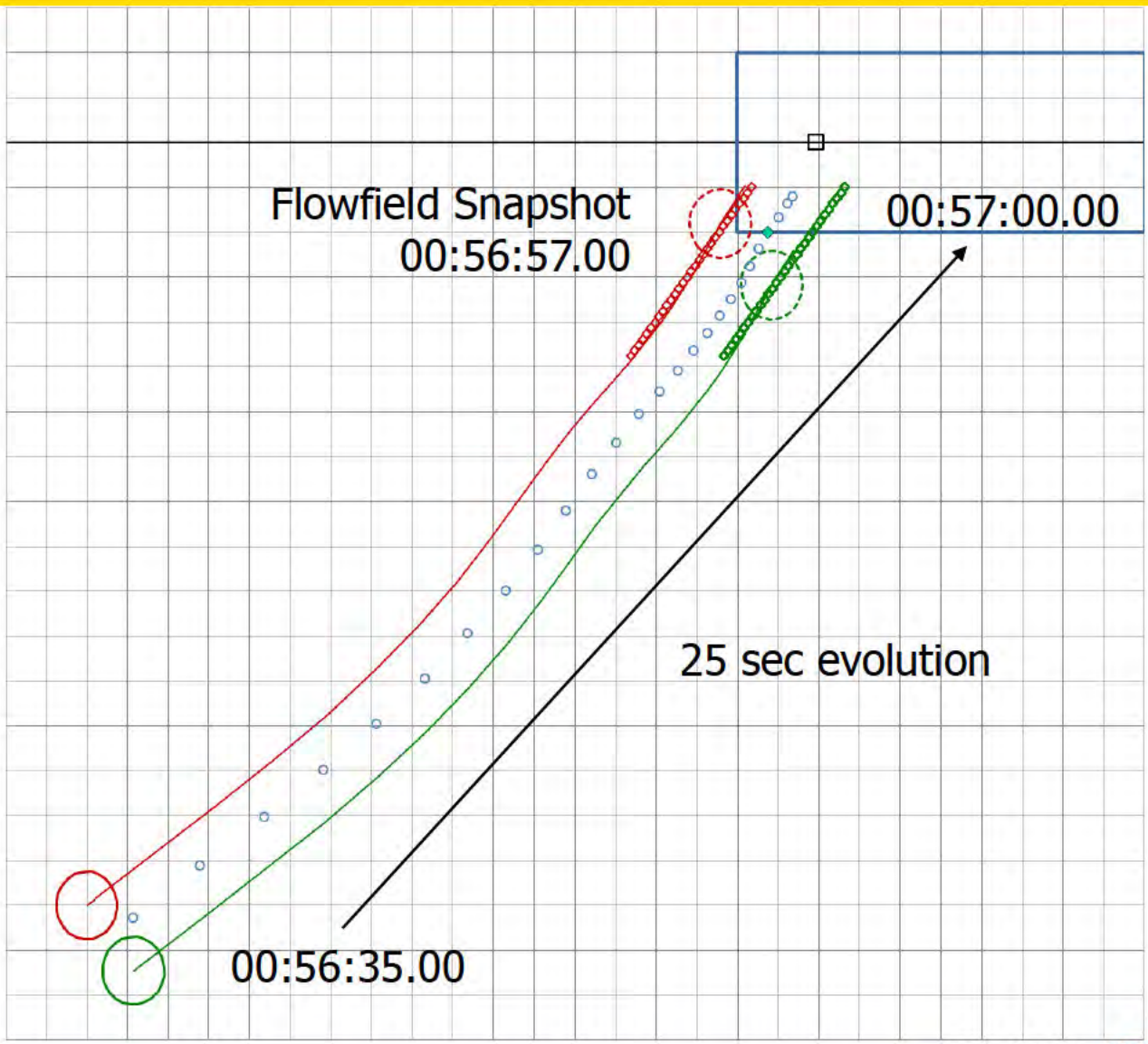
Green Bay Rotor Performance Impact

- **Thrust normalized by 27.5Klb required for 1g flight**
  - Thrust deficit begins at 06:03:42.00
  - Max. average thrust deficit of 3.2% (~880 lb/rotor) occurs at 06:03:44.28
- **Additional mast torque required to restore each rotor to 1g thrust calculated using HOGE performance predictions**
  - Max. additional average mast torque required ≈ 5.5%



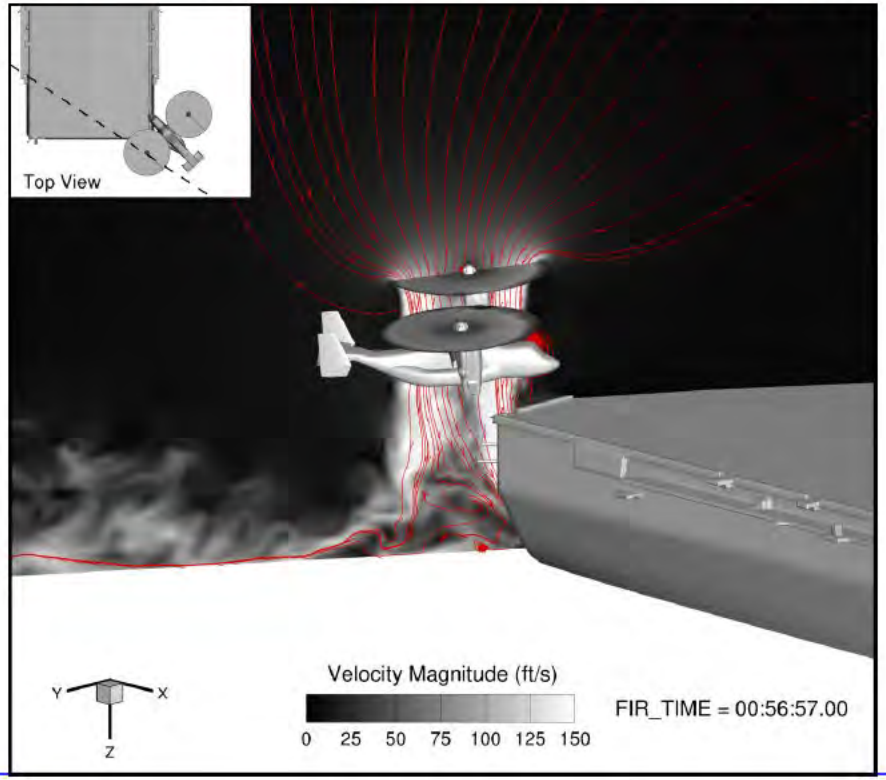


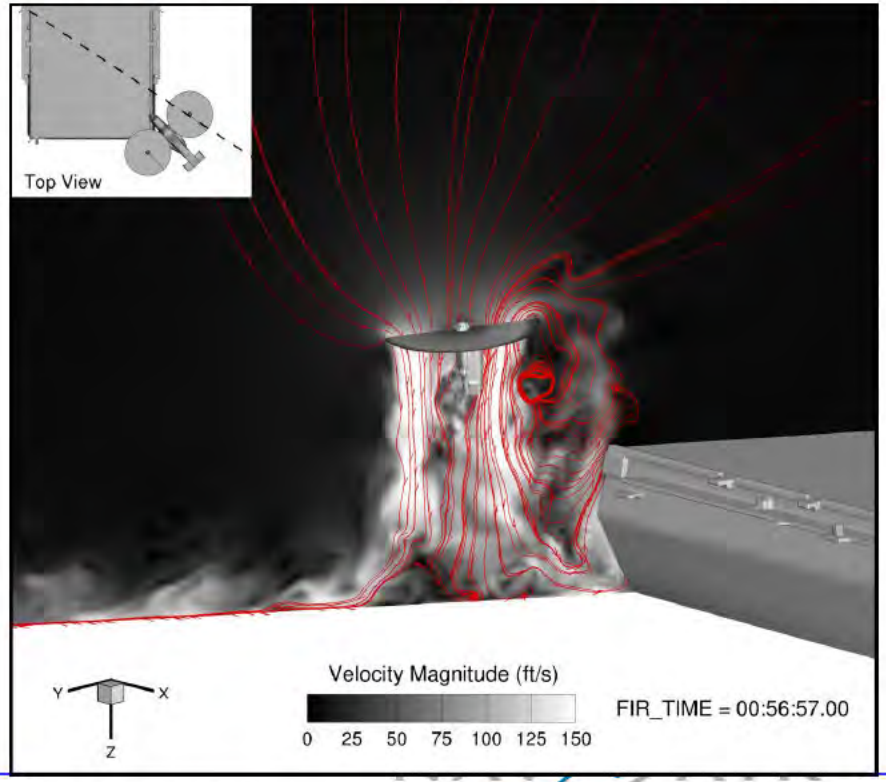
USS New Orleans Event CFD Analysis

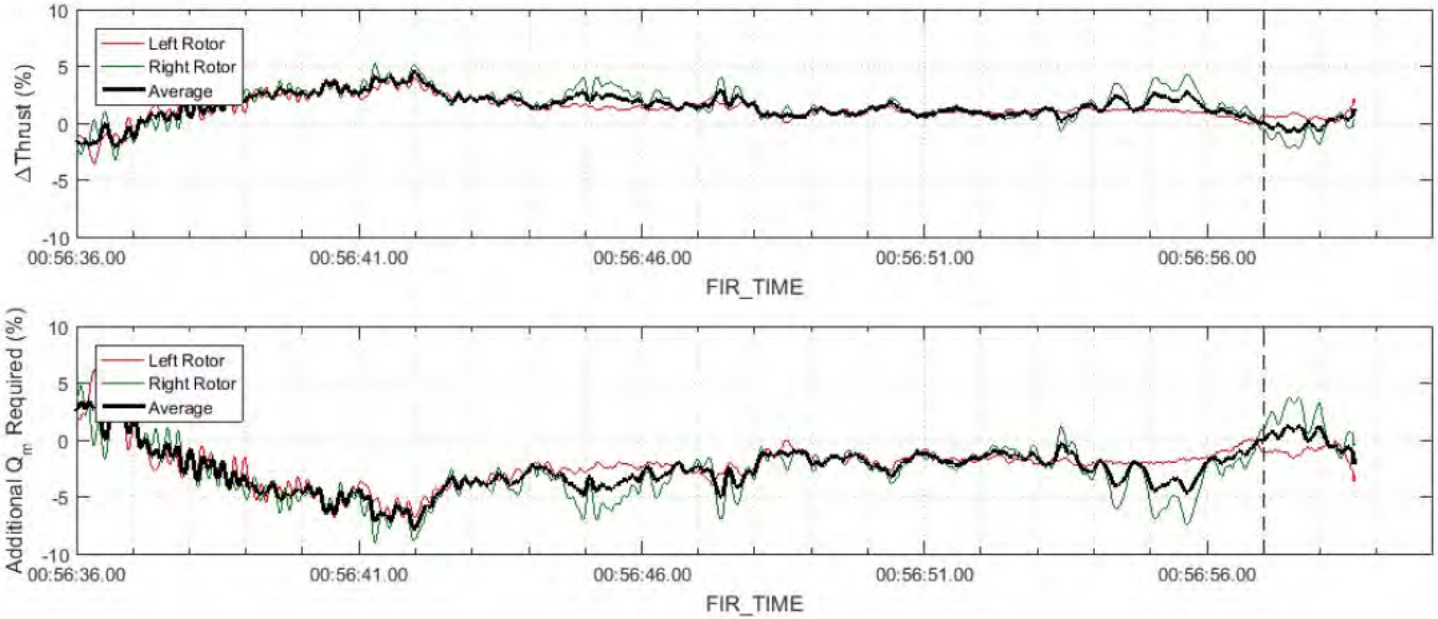


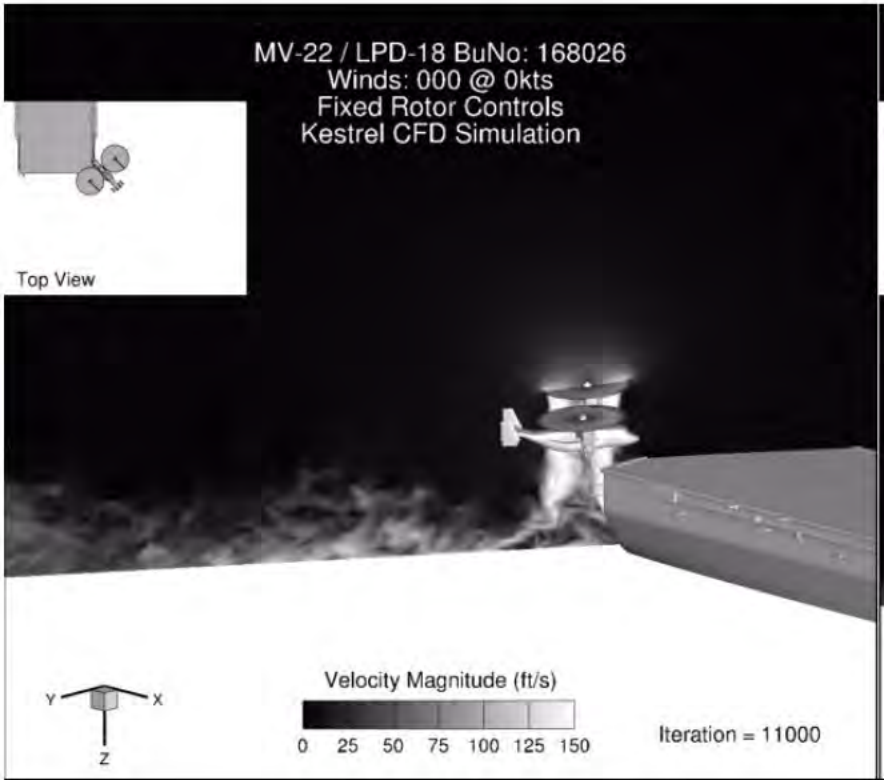
New Orleans Event Flowfield Snapshot

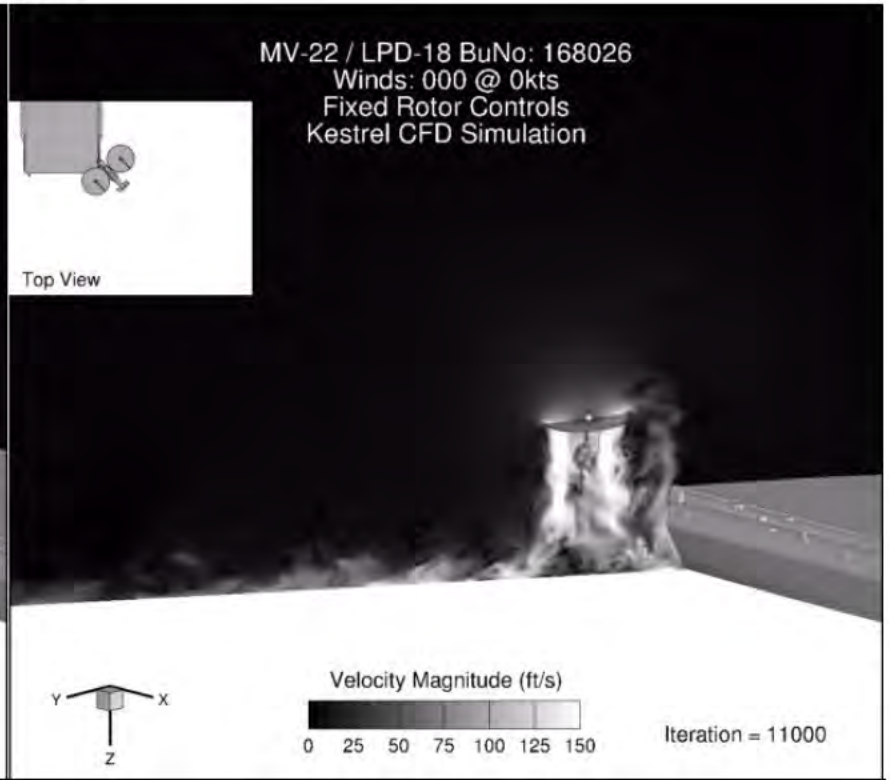
- **Increase in vertical descent rate at 00:56:57 coincident with onset of wake recirculation**
- **Spot 2 line of approach results in greater amount of left rotor outwash passing around stern of ship, diminishing strength of recirculation seen by right rotor**
- **CFD contour plots of velocity magnitude overlaid by streamlines**





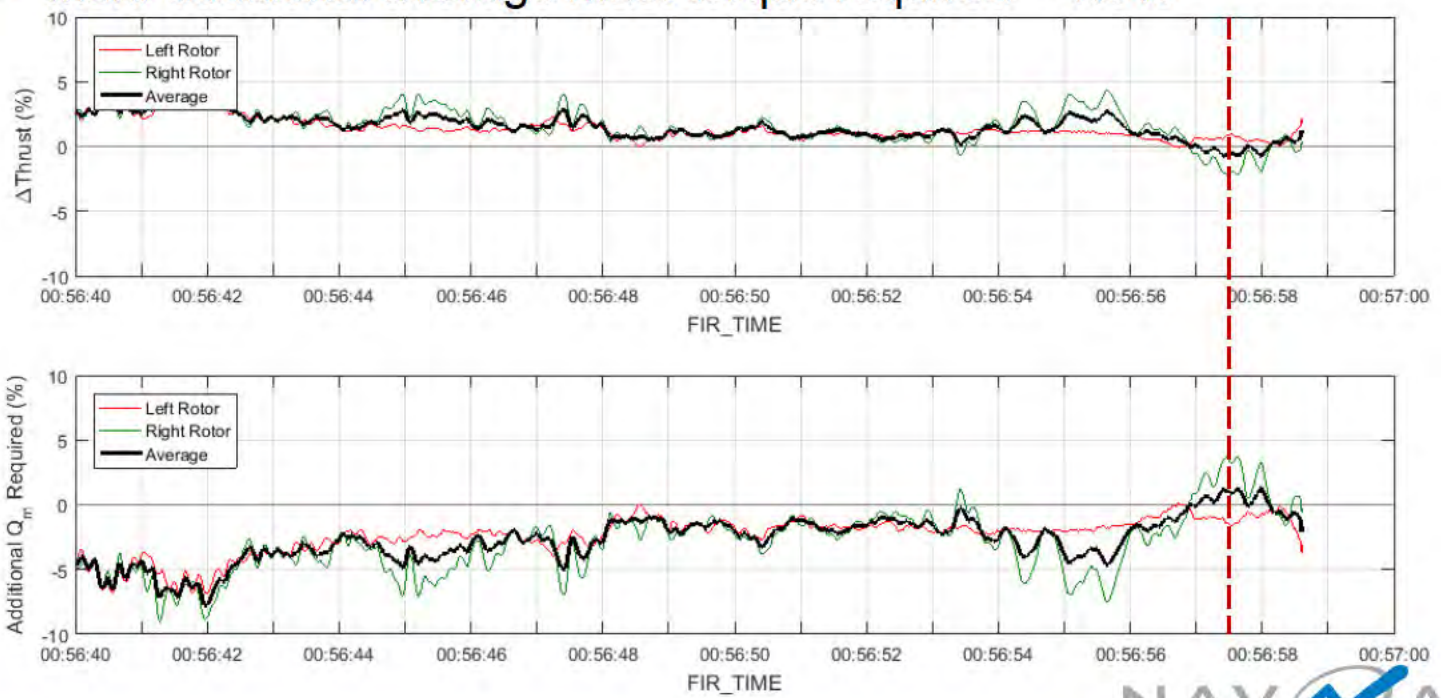

Left Rotor
Right Rotor
Average
ΔThrust (%)
10
5
0
-5
-10
00:56:36.00
00:56:41.00
00:56:46.00
00:56:51.00
00:56:56.00
FIR_TIME
Left Rotor
Right Rotor
Average
Additional Q_m Required (%)
10
5
0
-5
-10
00:56:36.00
00:56:41.00
00:56:46.00
00:56:51.00
00:56:56.00
FIR_TIME


MV-22 / LPD-18 BuNo: 168026
Winds: 000 @ 0kts
Fixed Rotor Controls
Kestrel CFD Simulation
Top View
Velocity Magnitude (ft/s)
0 25 50 75 100 125 150
Iteration = 11000
Y
X
Z


MV-22 / LPD-18 BuNo: 168026
Winds: 000 @ 0kts
Fixed Rotor Controls
Kestrel CFD Simulation
Top View
Velocity Magnitude (ft/s)
0 25 50 75 100 125 150
Iteration = 11000
Y
X
Z

New Orleans Rotor Performance Impact

- **Thrust normalized by 27.5Klb required for 1g flight**
  - Thrust deficit begins at 00:56:57
  - Max. average thrust deficit of 0.8% (~220 lb/rotor) occurs at 00:56:57.50
- **Additional mast torque required to restore rotors to 1g thrust**
  - Max. additional average mast torque required ≈ 1.3%



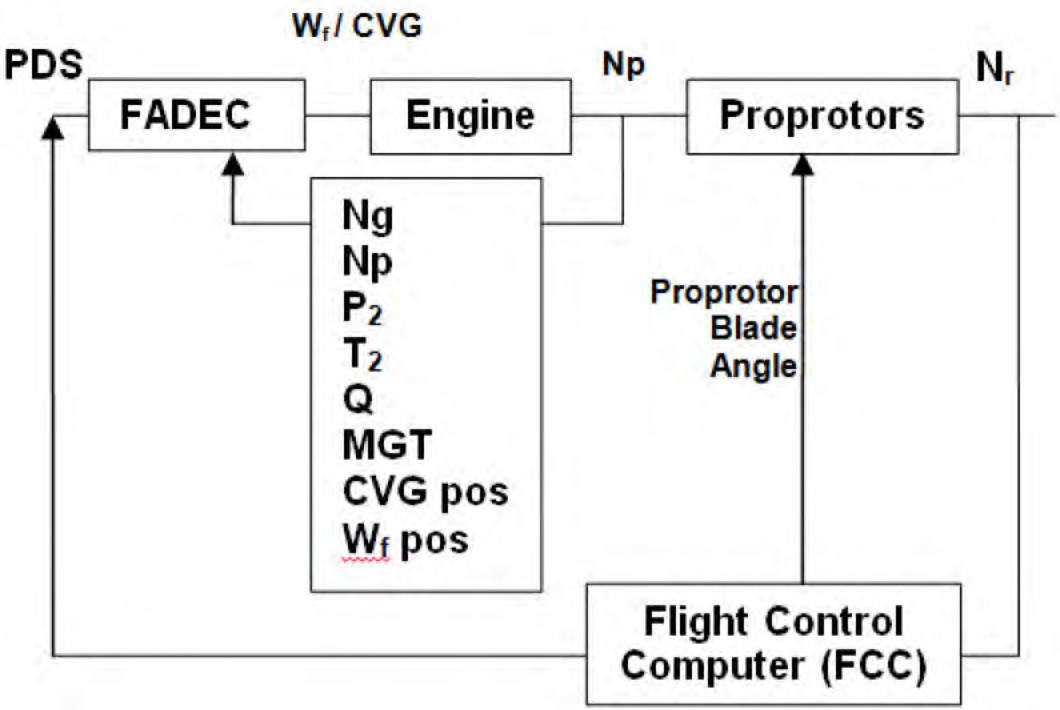
CFD Analysis Findings

- **Recirculation evident in both Green Bay and New Orleans Mishaps**
  - More so on Green Bay due to approach line (more hull area in opposition to outwash)
- **Influence of phenomena limited to 1.5 rotor diameters from deck edge**
  - Thrust augmentation, followed by degradation, then recovery as rotor enters ground effect
- **Analysis likely to under predict performance impacts**
  - Actuator disk model more likely to predict mean impacts than peak impacts
  - Fixed rotor controls trimmed to 98% thrust target
  - Impact on download neglected

CONTROL LAW DESIGN AND IMPACT ON POWER

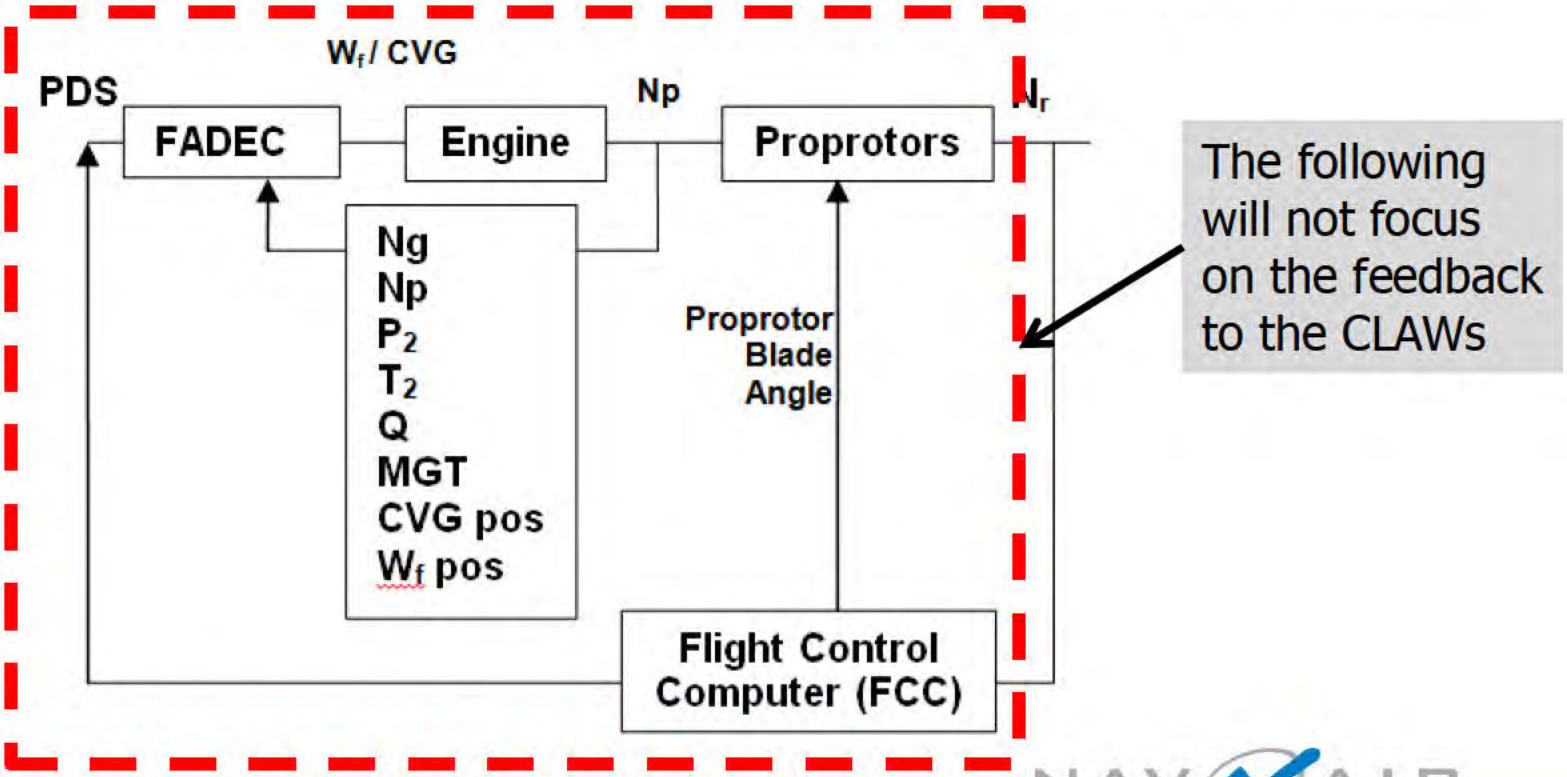
CLAW Thrust Production Refresh

- **Increase Vertical Speed**
  - Increase Thrust
    - Increase Collective → Torque Required
    - Increase Power Demand Signal → Increase Torque Available

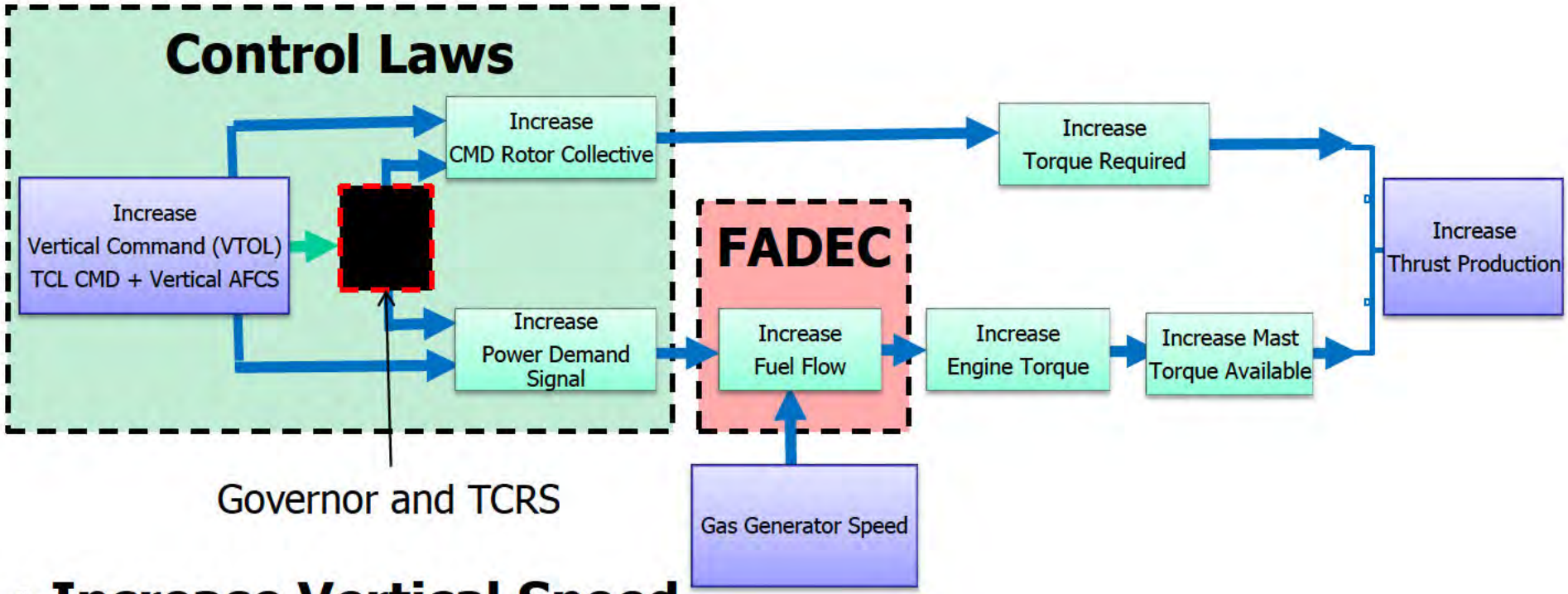


CLAW Thrust Production Refresh

- **Increase Vertical Speed**
  - Increase Thrust
    - Increase Collective → Torque Required
    - Increase Power Demand Signal → Increase Torque Available

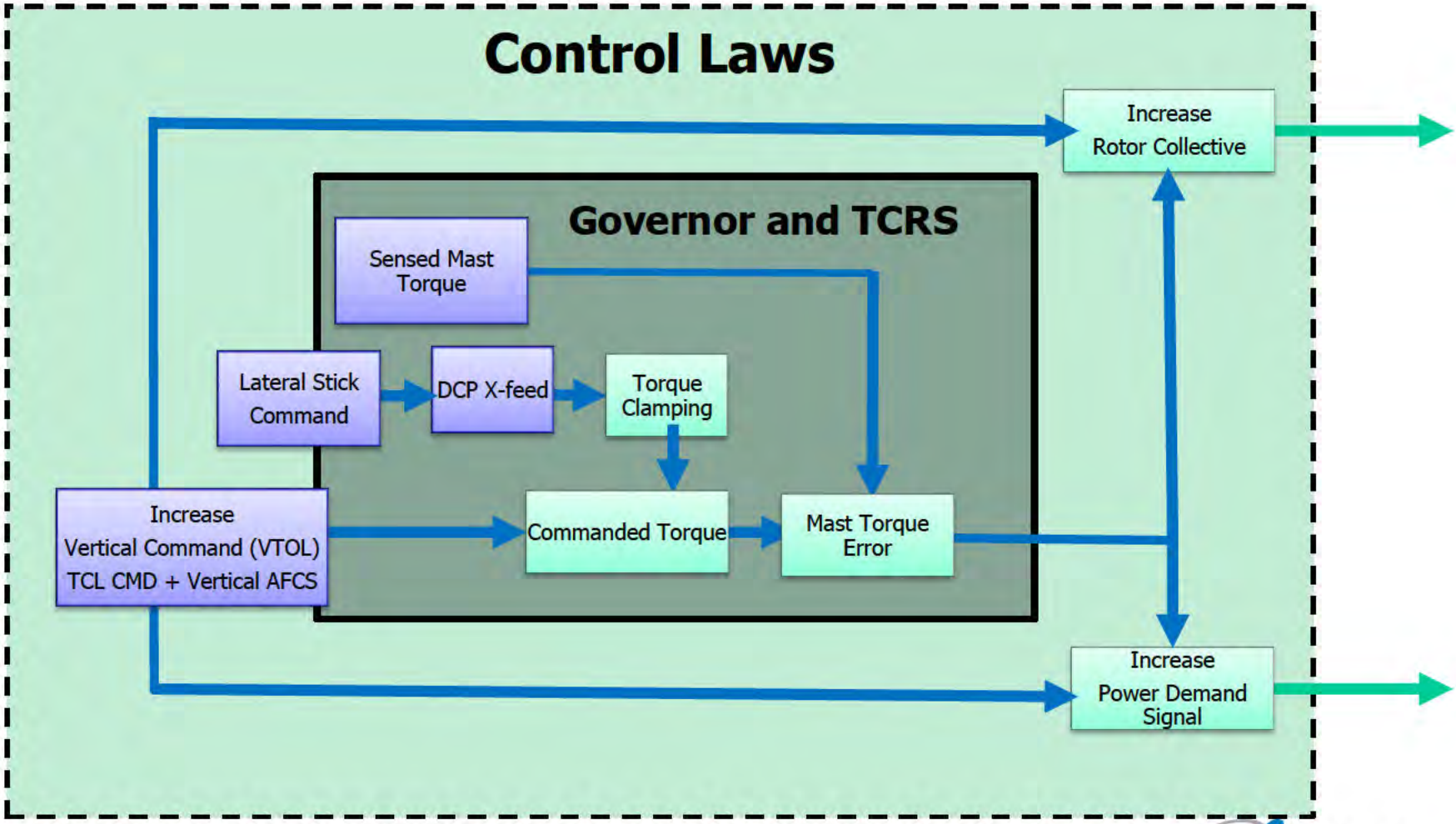


CLAW Thrust Production Refresh



- **Increase Vertical Speed**
  - Increase Thrust
    - Increase Collective
    - Increase Torque Available

CLAW Thrust Production Refresh



Increased Lateral Control Power (ILCP)

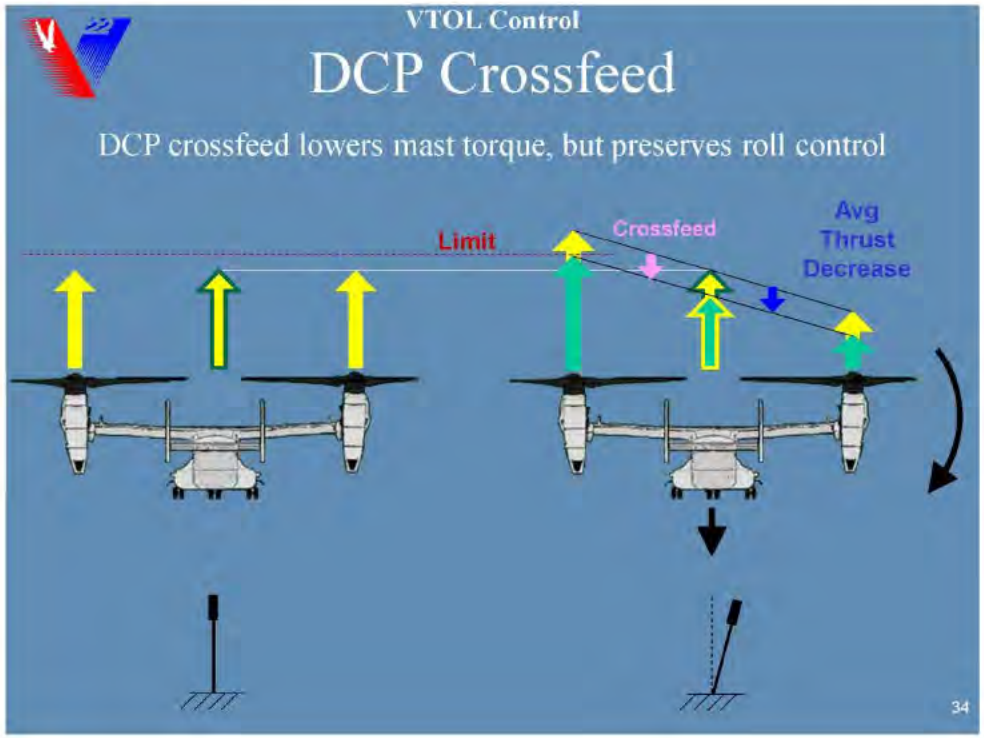
- **In response to two formation flight near misses, control law changes were design to improve roll control power**
- **4 major design features:**
  - Decreasing the airspeed at which lateral cyclic stick begins to command flaperon inputs
  - Increasing the airspeed at which lateral cyclic gearing is active
  - Increasing the net Differential Collective Pitch (DCP) limit and symmetric DCP limit
  - Increasing the lateral stick to DCP gain.

ILCP continued

- **The ILCP design can remove some of the total aircraft torque available under certain circumstances where, in order to prevent Proprotor Gearbox (PRGB) over torques while still maintaining roll control effectiveness, aircrew lateral control is prioritized over the vertical control.**
- **Done through 2 features:**
  - DCP Crossfeed
  - Torque Clamping

DCP Crossfeed

- **Normally, the upgoing and downgoing rotor produce equal but opposite torque changes, thus the symmetric collective is unchanged.**
- **In high power settings, the upgoing rotor's collective is limited so as to not overtorque the PRGB**
- **The amount that is limited is transferred to the downgoing rotor so that the net DCP command is preserved.**



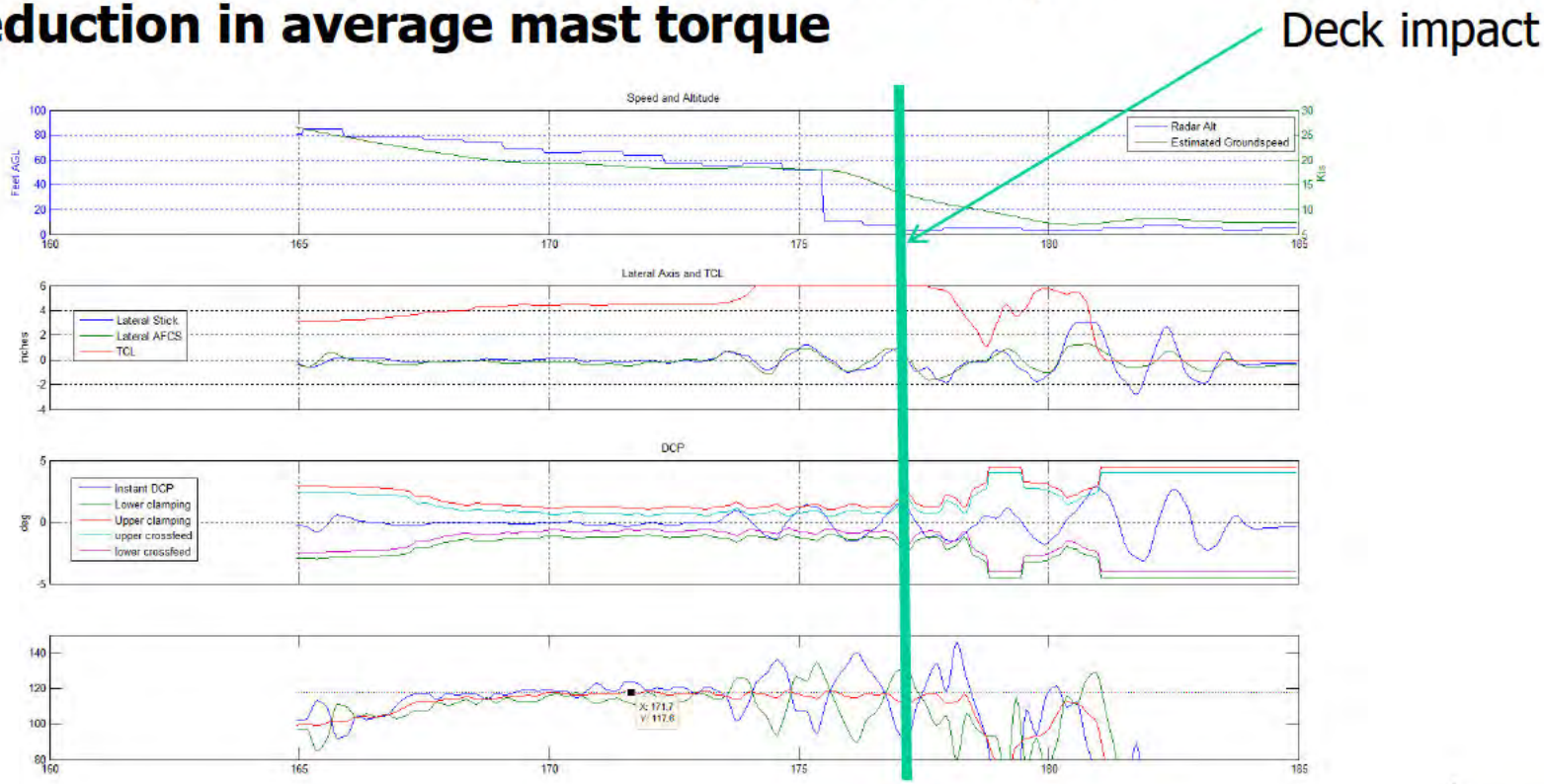
Almost exclusively high power situations

Torque Clamping

- If a large lateral input is commanded, the torque command is momentarily reduced (clamped) to accommodate the large DCP command.
- Only during DCP crossfeed as well
- The torque clamp is only active for brief periods of time that coincide with peaks in DCP command
- A maximum of 16.5% can be subtracted from the torque command due to this effect. (117.4 – 16.5 = 100.9)
- The torque command will be limited for as long as the large DCP crossfeed command persists
- Analysis and testing of V-22 data showed potential to get clamping to 112% during some shipboard operations
- Shore based testing demonstrates ILCP not a factor inside of NATOPS operating envelope.

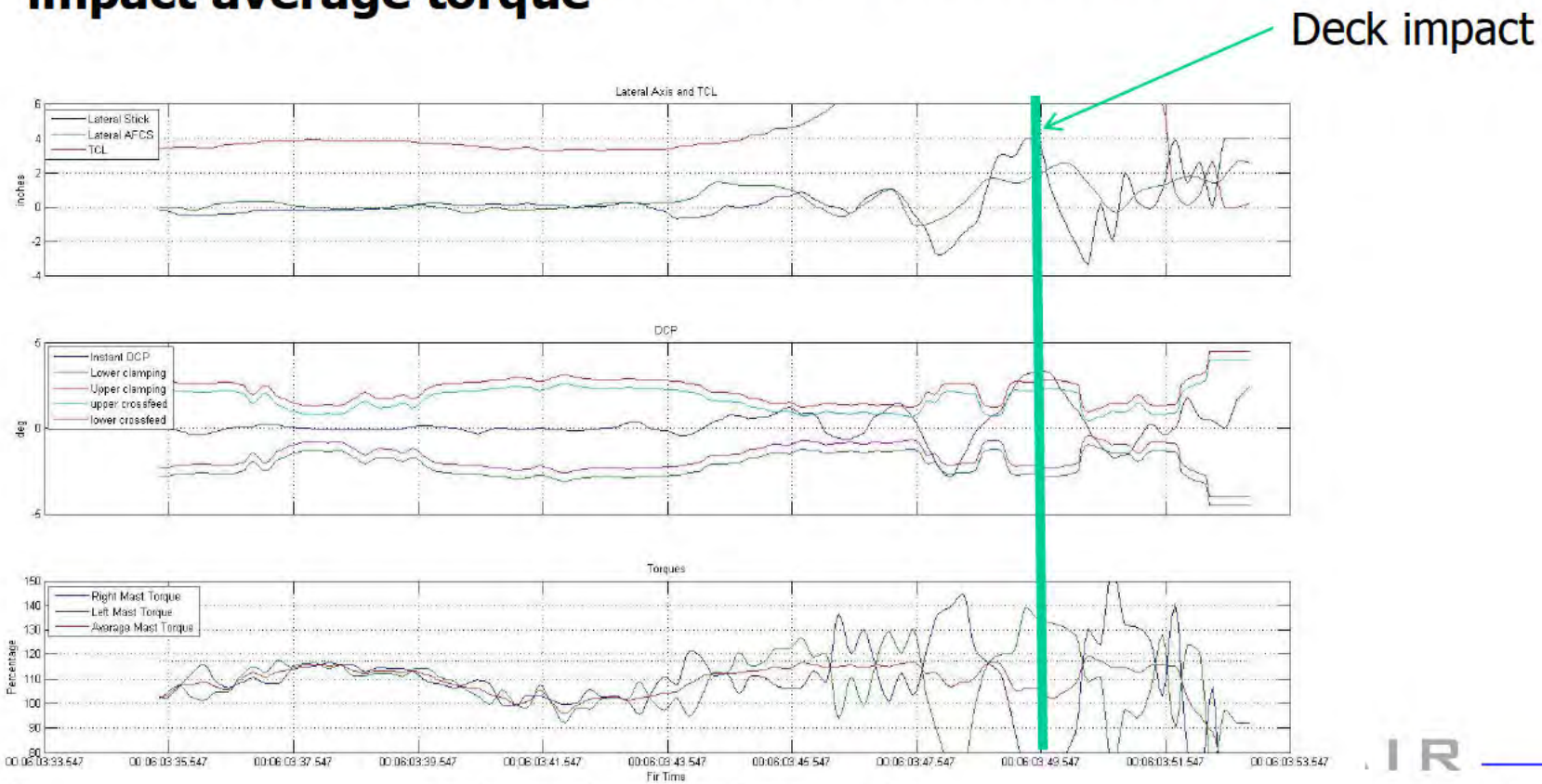
New Orleans Torque Clamping

- **No evidence of torque clamping causing reduction in torque on approach.**
- **End game shows lateral cyclic driving up DCP momentarily – may be driving momentary reduction in average mast torque**

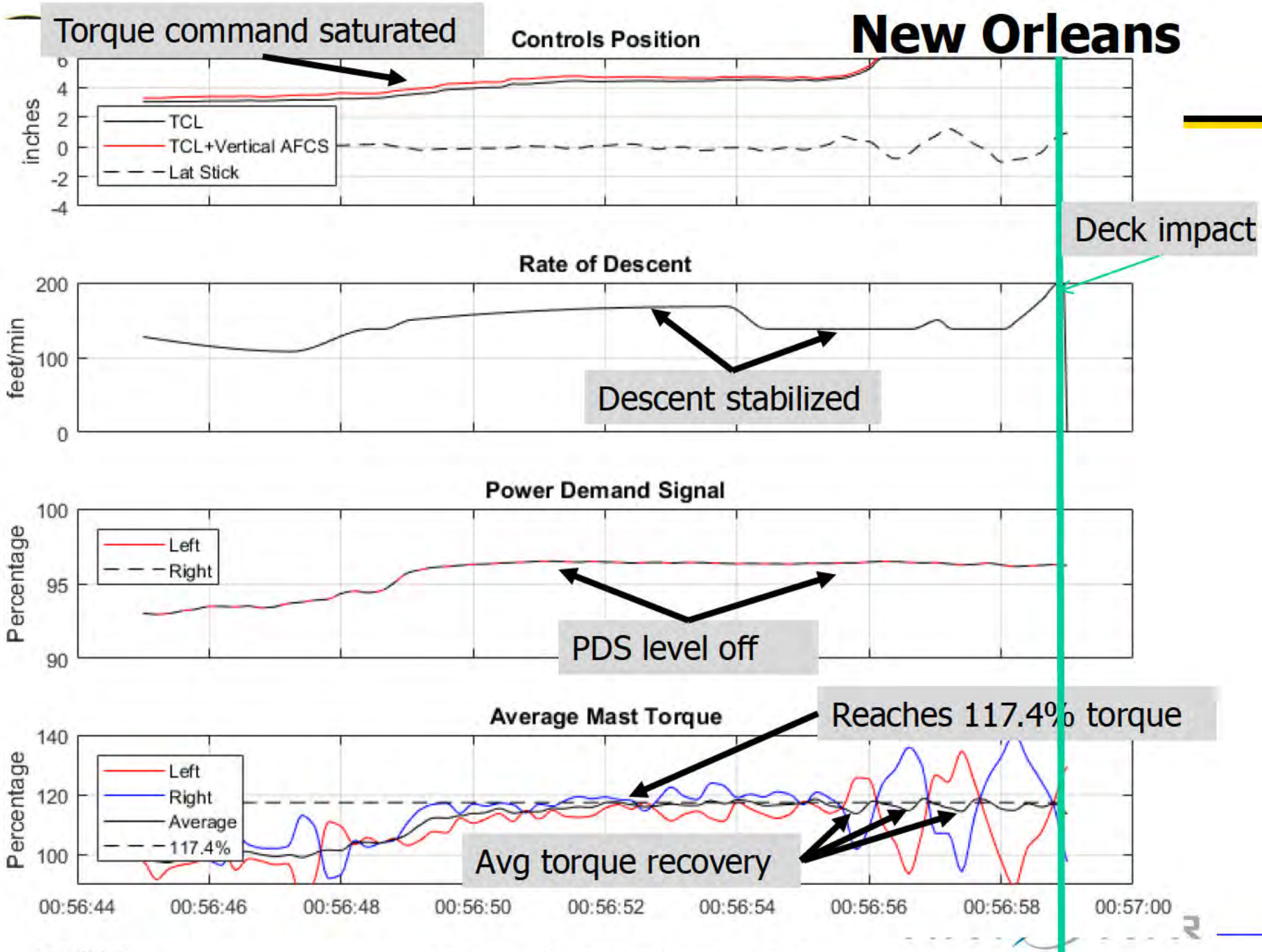


Green Bay Torque Clamping

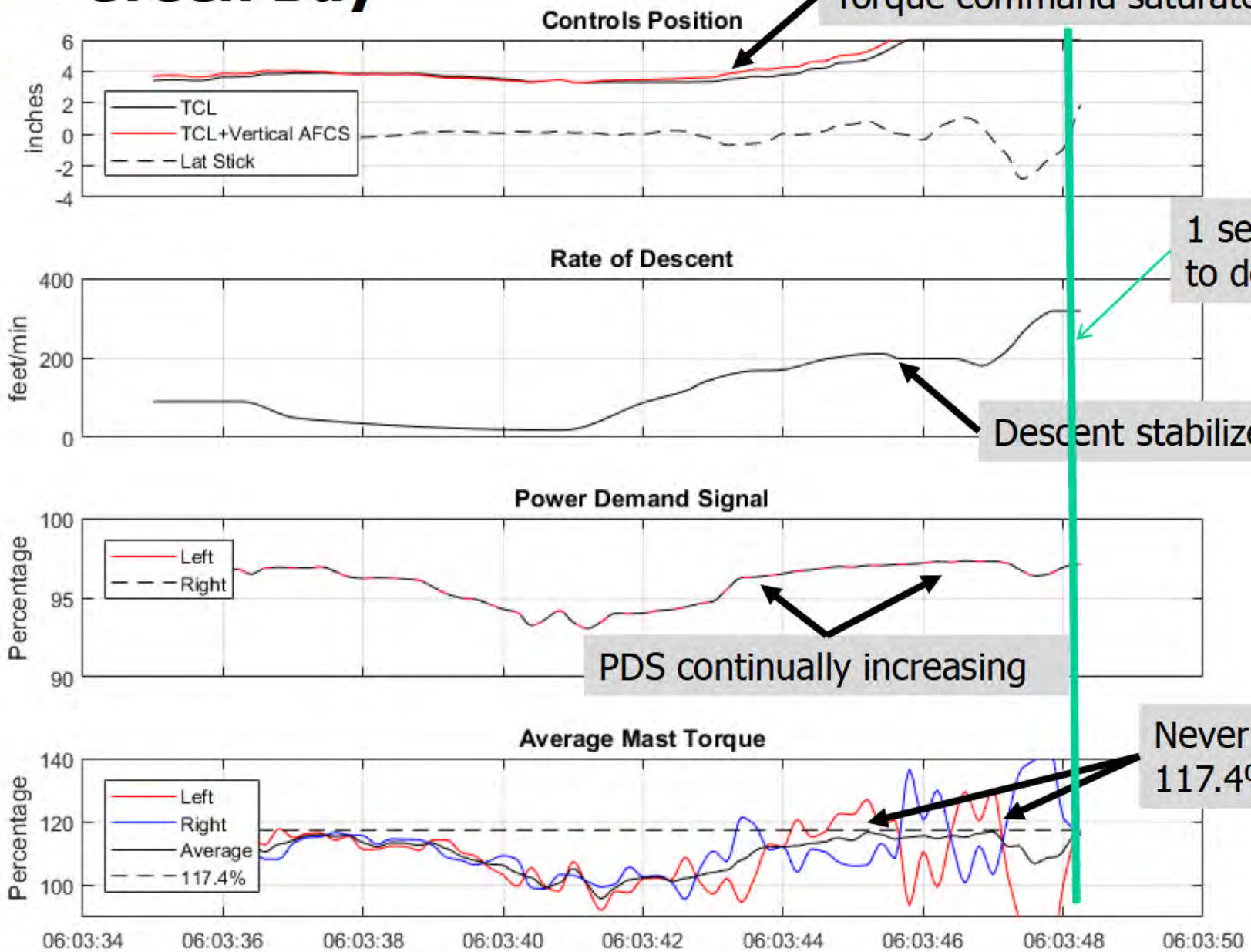
- **No evidence of torque clamping causing reduction in torque on approach.**
- **End game shows lateral cyclic driving up DCP momentarily – short enough time to not directly impact average torque**



New Orleans


Torque command saturated
Controls Position
inches
TCL
TCL+Vertical AFCS
Lat Stick
Deck impact
Rate of Descent
feet/min
Descent stabilized
Power Demand Signal
Percentage
Left
Right
PDS level off
Average Mast Torque
Reaches 117.4% torque
Left
Right
Average
117.4%
Avg torque recovery
00:56:44
00:56:46
00:56:48
00:56:50
00:56:52
00:56:54
00:56:56
00:56:58
00:57:00

Green Bay

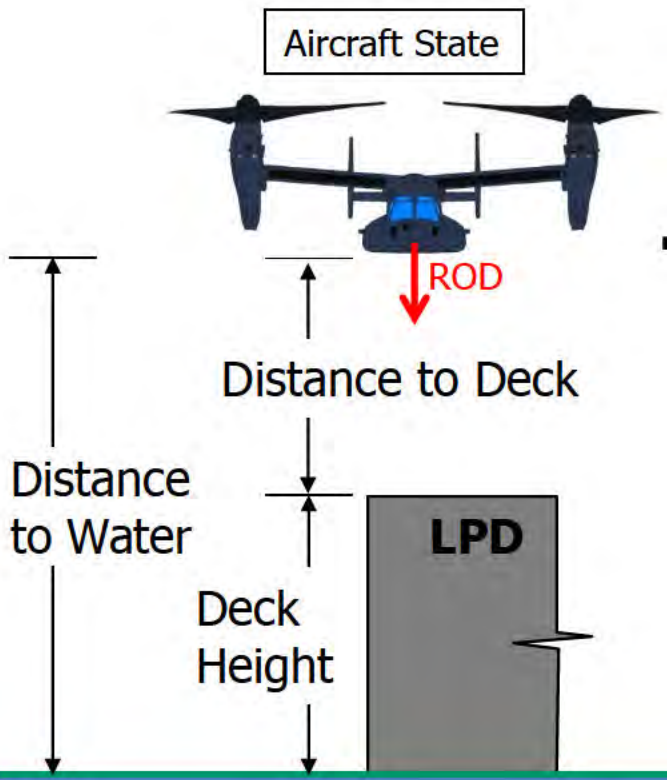

Torque command saturated
Controls Position
inches
TCL
TCL+Vertical AFCS
Lat Stick
1 second prior to deck impact
Rate of Descent
feet/min
Descent stabilized
Power Demand Signal
Percentage
Left
Right
PDS continually increasing
Average Mast Torque
Percentage
Left
Right
Average
117.4%
Never reach 117.4% torque
06:03:34
06:03:36
06:03:38
06:03:40
06:03:42
06:03:44
06:03:46
06:03:48
06:03:50

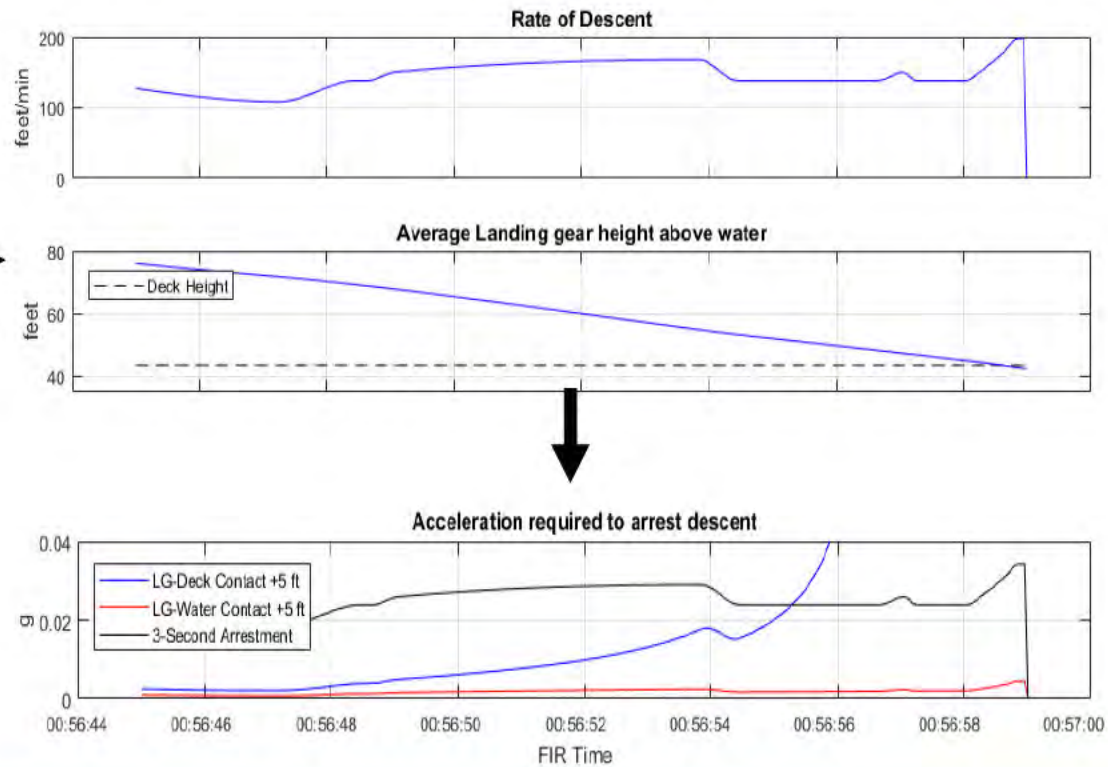
ADDITIONAL THRUST AND TORQUE REQUIRED TO ARREST DESCENT

Blade Element Model – Energy Analysis

Blade Element Model - Energy Analysis

- Given the ROD and landing gear height above deck/water
  - Reconstruct acceleration required for each slice of time



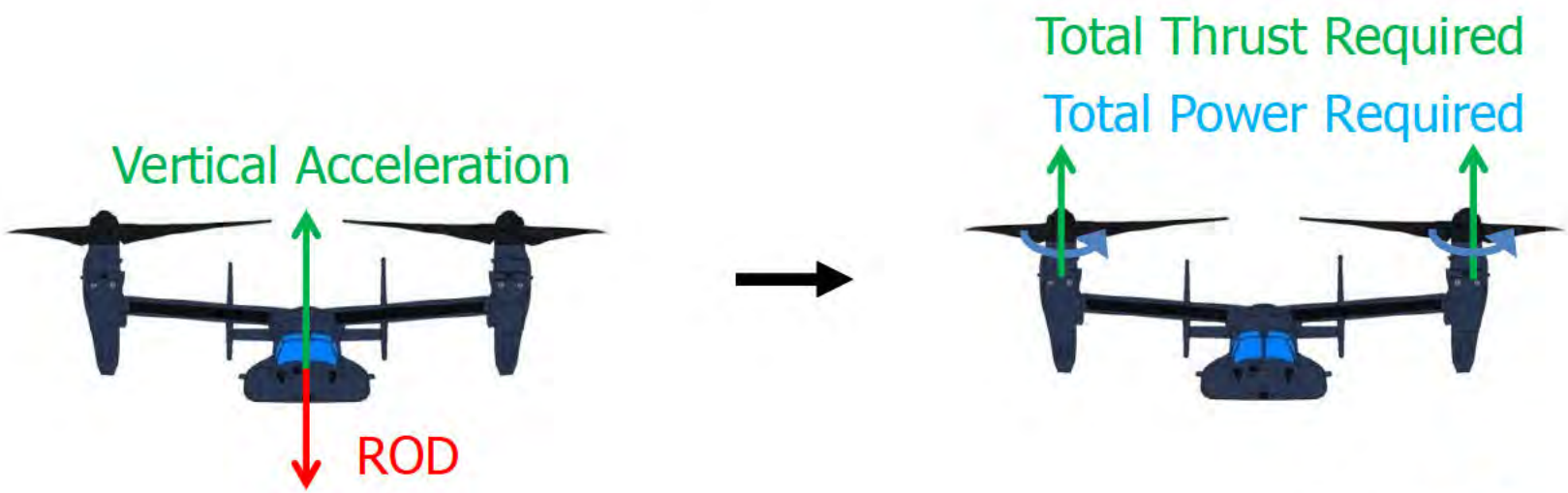


Blade Element Model - Energy Analysis

- Separately parametrically sweep blade element model for ROD and vertical acceleration
  - To determine Thrust and Torque required at each ROD and vertical acceleration

Blade Element Model Sweep

Sweep Output

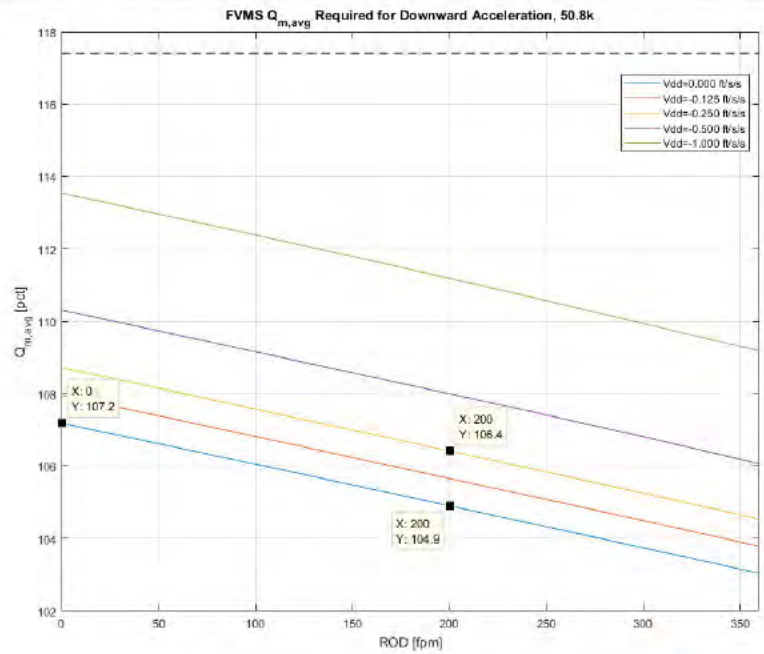


Blade Element Model - Energy Analysis

- From the parametric sweep thrust and torque outputs a lookup table can be assembled

BEM Sweep Outputs

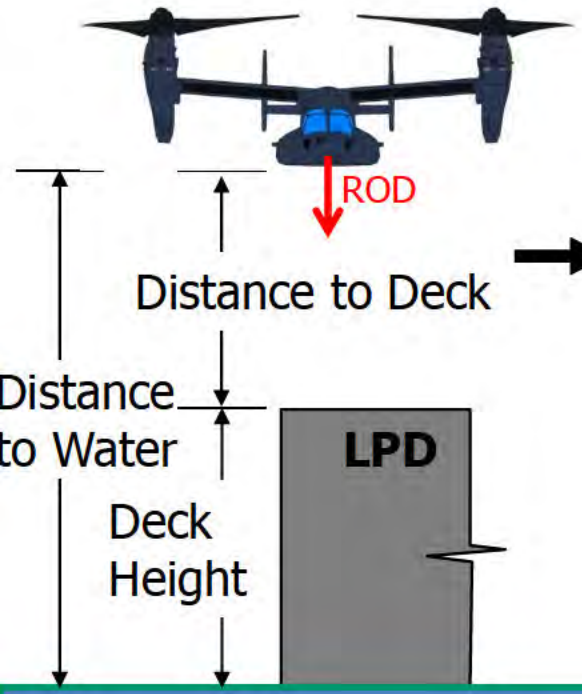
Torque, Thrust lookup table for aircraft acceleration and ROD



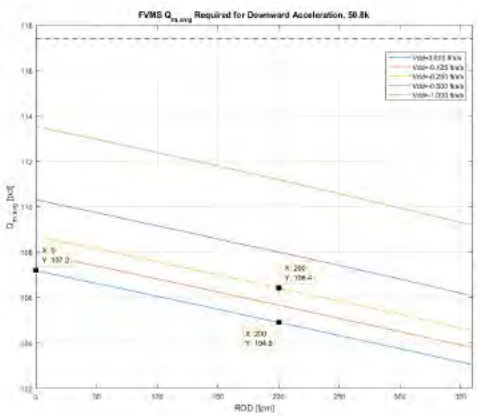
Blade Element Model - Energy Analysis

- With the lookup table the time history of thrust and torque required can be constructed.

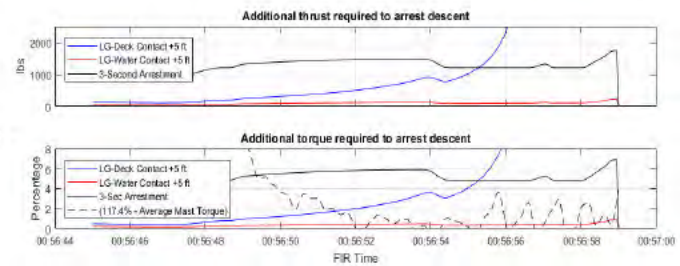
Aircraft State



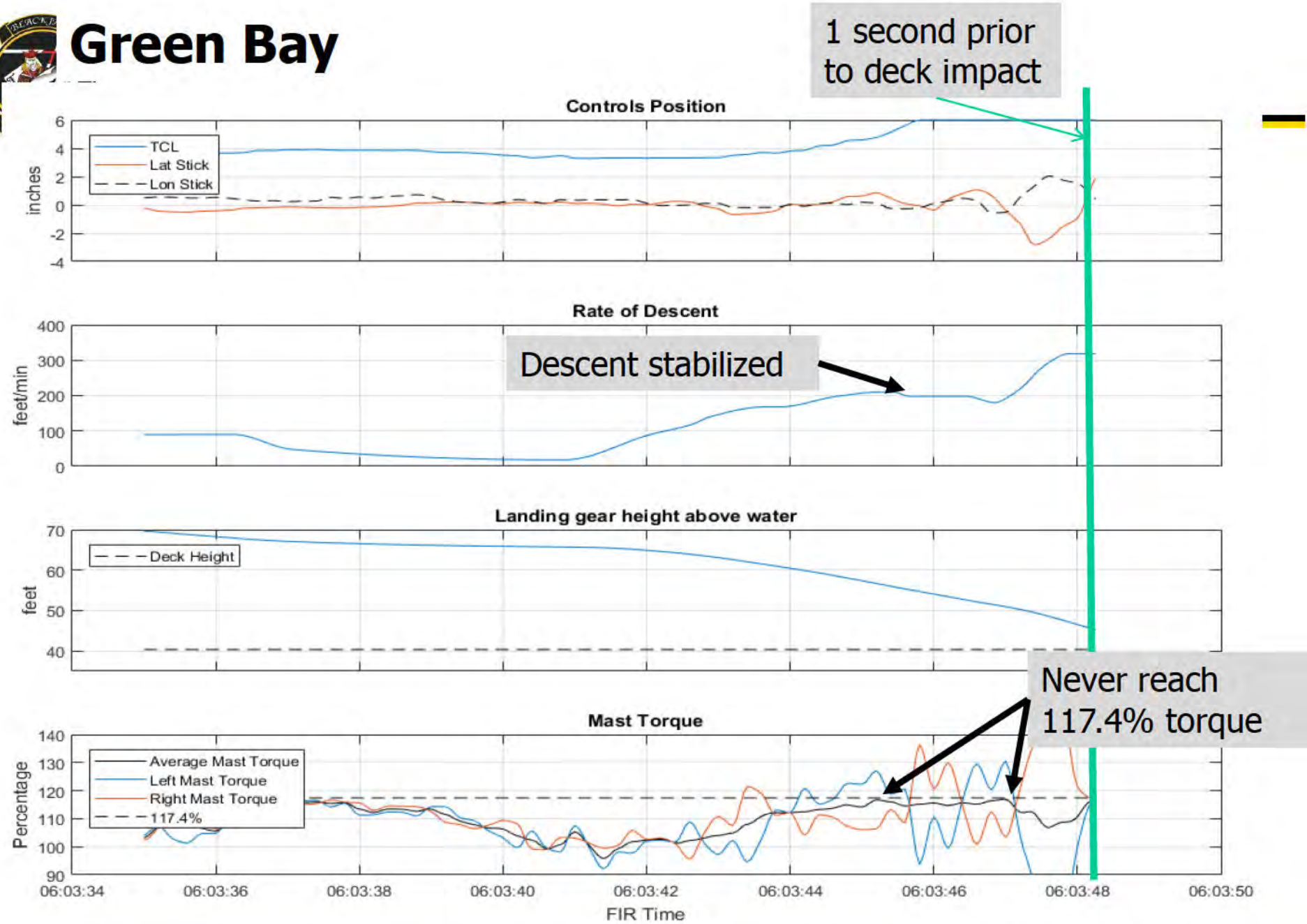
Torque, Thrust lookup table for aircraft acceleration and ROD



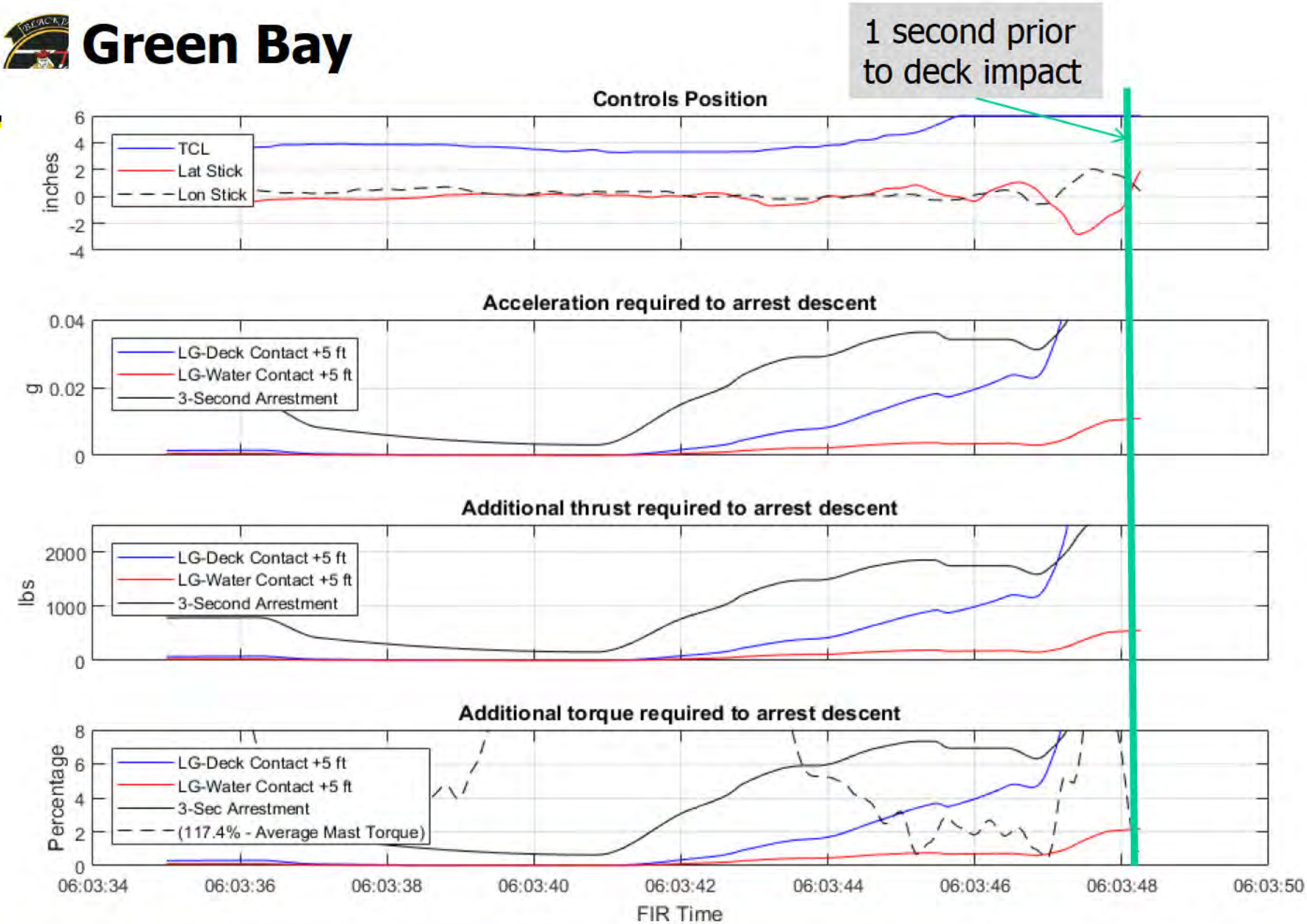
Thrust and torque required to arrest descent



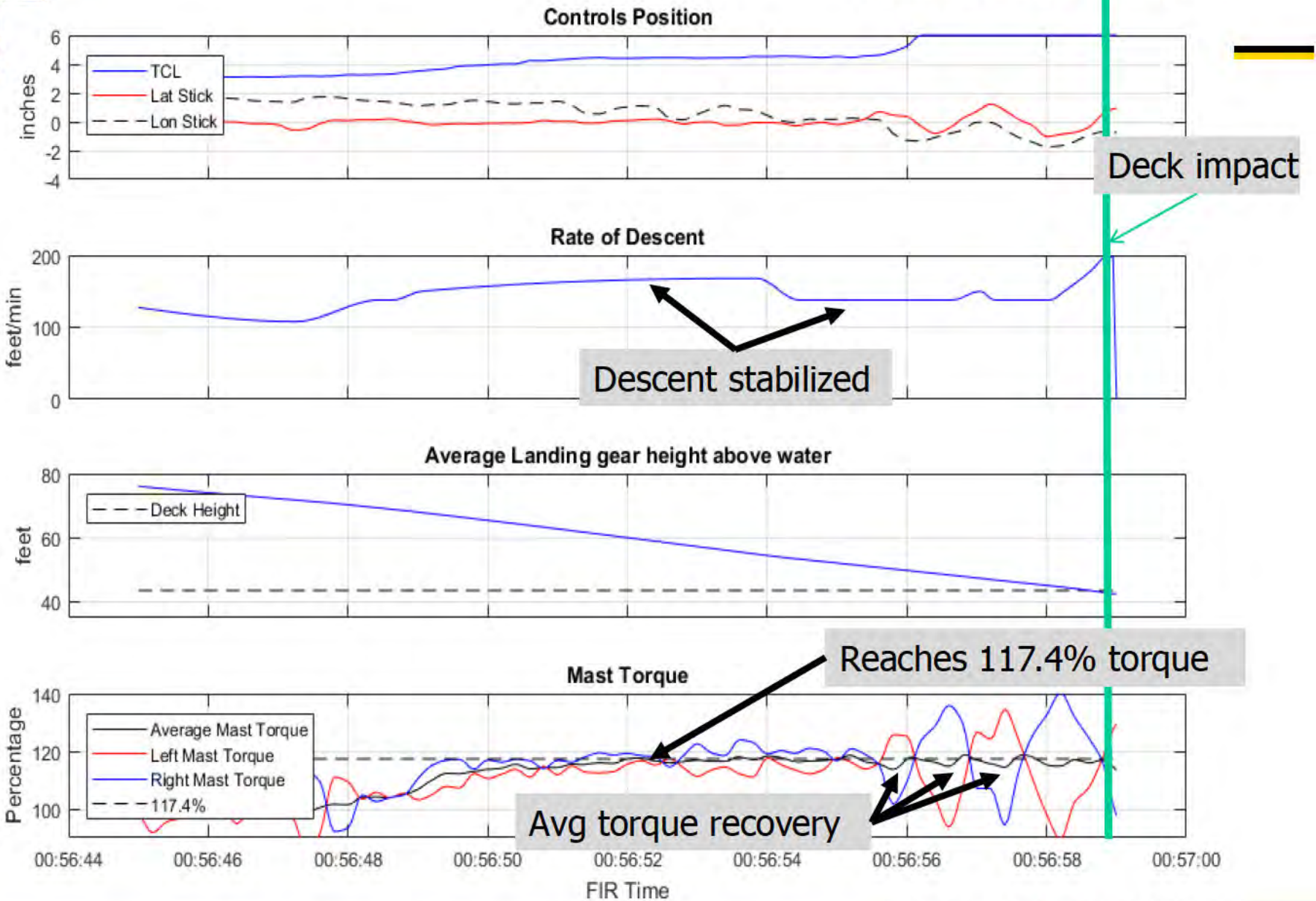
Green Bay


1 second prior to deck impact
Controls Position
TCL
Lat Stick
Lon Stick
inches
Rate of Descent
feet/min
Descent stabilized
Landing gear height above water
Deck Height
feet
Never reach 117.4% torque
Mast Torque
Average Mast Torque
Left Mast Torque
Right Mast Torque
117.4%
Percentage
06:03:34
06:03:36
06:03:38
06:03:40
06:03:42
06:03:44
06:03:46
06:03:48
06:03:50
FIR Time

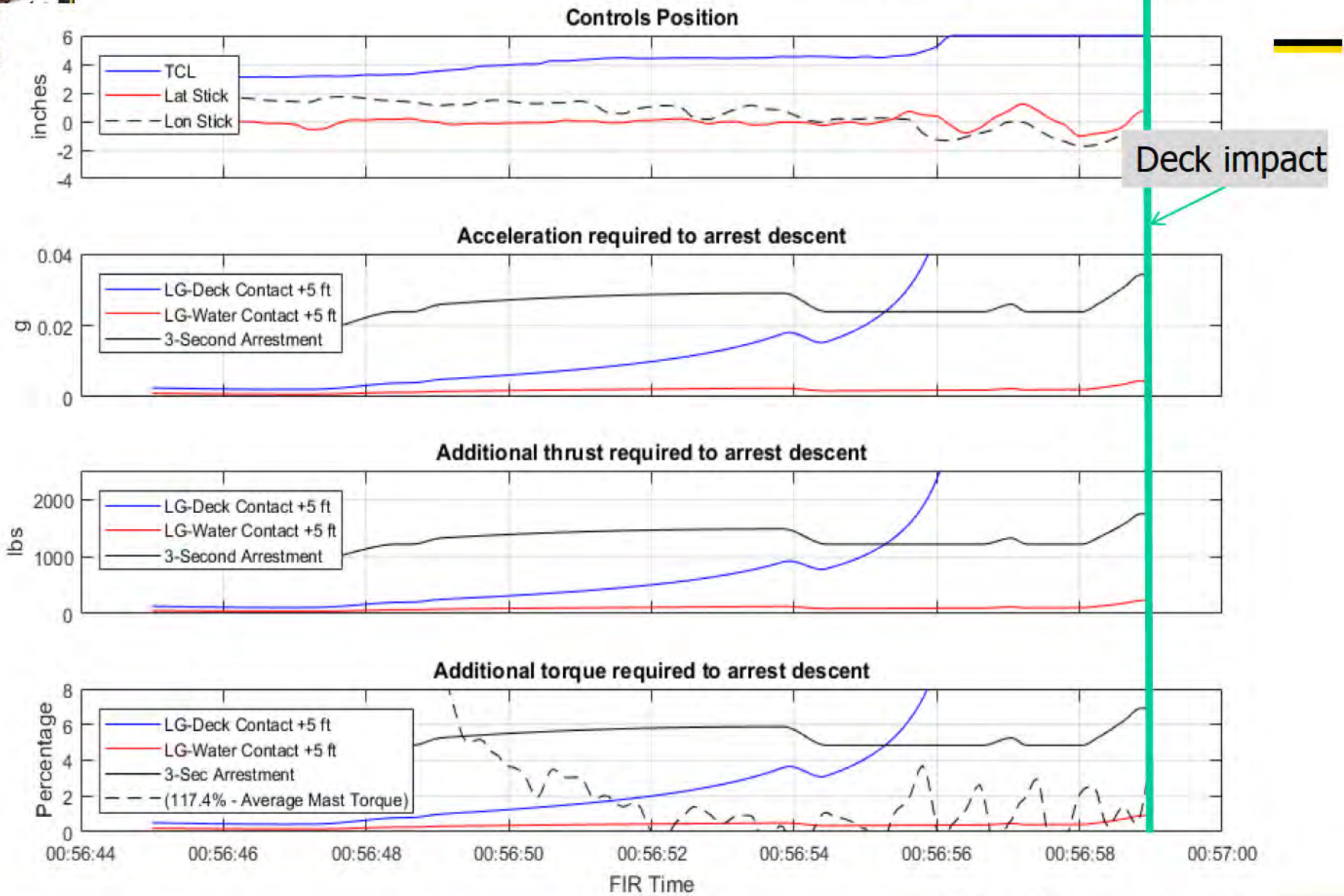
Green Bay


1 second prior to deck impact
Controls Position
inches
TCL
Lat Stick
Lon Stick
Acceleration required to arrest descent
g
LG-Deck Contact +5 ft
LG-Water Contact +5 ft
3-Second Arrestment
Additional thrust required to arrest descent
lbs
LG-Deck Contact +5 ft
LG-Water Contact +5 ft
3-Second Arrestment
Additional torque required to arrest descent
Percentage
LG-Deck Contact +5 ft
LG-Water Contact +5 ft
3-Sec Arrestment
(117.4% - Average Mast Torque)
06:03:34
06:03:36
06:03:38
06:03:40
06:03:42
06:03:44
06:03:46
06:03:48
06:03:50
FIR Time

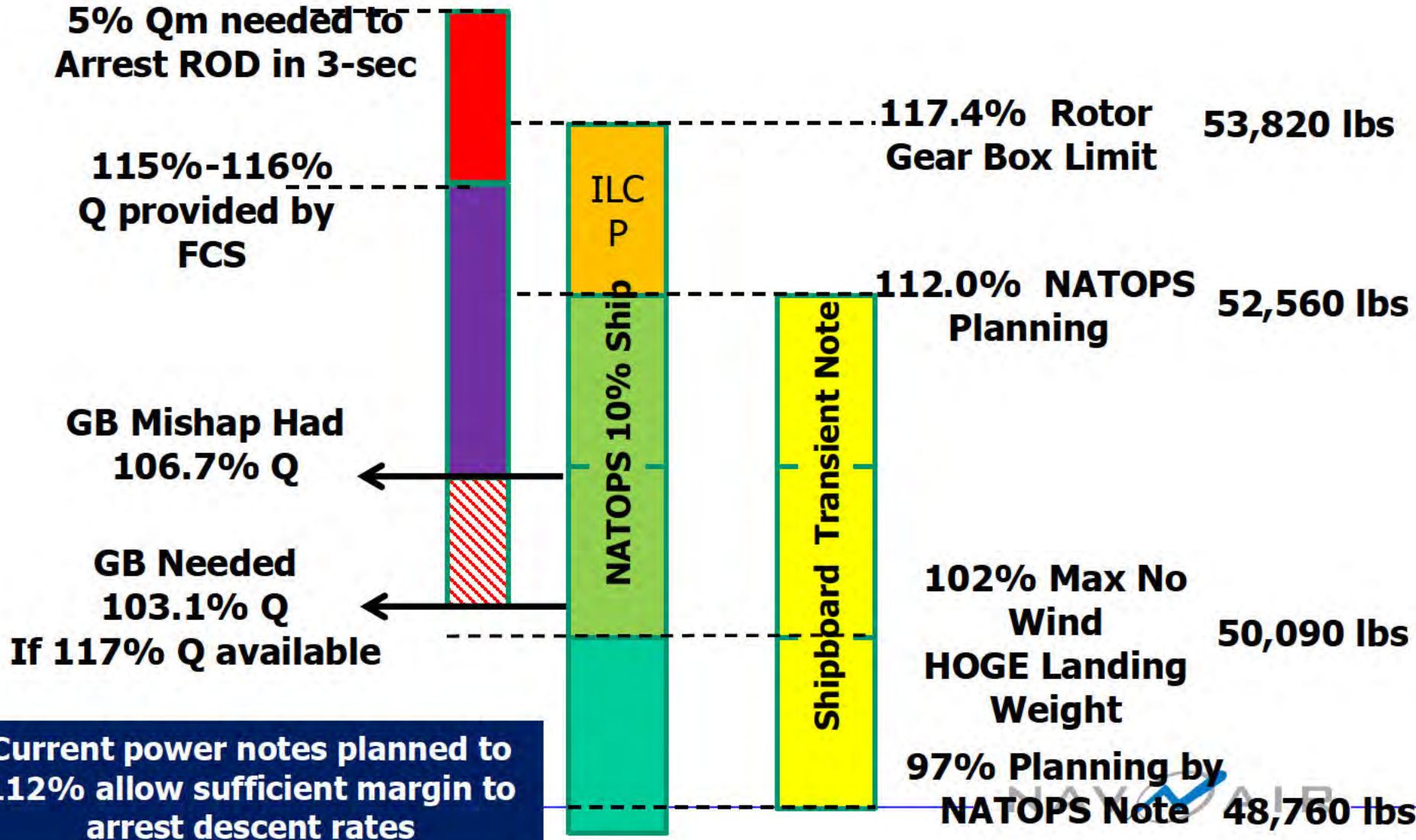
New Orleans


Controls Position
inches
TCL
Lat Stick
Lon Stick
Deck impact
Rate of Descent
feet/min
Descent stabilized
Average Landing gear height above water
feet
Deck Height
Reaches 117.4% torque
Mast Torque
Percentage
Average Mast Torque
Left Mast Torque
Right Mast Torque
117.4%
Avg torque recovery
00:56:44
00:56:46
00:56:48
00:56:50
00:56:52
00:56:54
00:56:56
00:56:58
00:57:00
FIR Time

New Orleans


Controls Position
inches
TCL
Lat Stick
Lon Stick
Deck impact
Acceleration required to arrest descent
g
LG-Deck Contact +5 ft
LG-Water Contact +5 ft
3-Second Arrestment
Additional thrust required to arrest descent
lbs
LG-Deck Contact +5 ft
LG-Water Contact +5 ft
3-Second Arrestment
Additional torque required to arrest descent
Percentage
LG-Deck Contact +5 ft
LG-Water Contact +5 ft
3-Sec Arrestment
(117.4% - Average Mast Torque)
00:56:44
00:56:46
00:56:48
00:56:50
00:56:52
00:56:54
00:56:56
00:56:58
00:57:00
FIR Time

Performance Margin Determination



Current power notes planned to 112% allow sufficient margin to arrest descent rates

FLEET WIDE OPERATIONS TO SHIPS

Launch and Recovery Envelopes

Note

- Considerable difference may exist between the flight deck winds and those measured by mast-mounted anemometers. For most ships, aircraft zero wind hover torque is often the best approximation to shipboard hover torque requirements for all wind conditions; however, additional power margin (5 to 10 percent torque) may be required to approach, overcome turbulence, decelerate, or depart the flight deck vicinity. Shipboard power available is based upon the contingency power rating. Envelope regions exhibiting hover torque requirements in excess of flight manual zero wind hover torque are designated by an appropriate note.

- **This note exists in all shipboard NATOPS for all platforms**
  - Acts as guidance, not limitation, which is consistent for how torque planning is discussed

Other rotorcraft operations to ships

- Torque transient notes are common on other rotorcraft platforms.
- Torque notes range anywhere from 5% to 25%
- Notes are based on flight test recommendations
- Torque transient notes are worded inconsistently between rotorcraft
- All torque guidance in the form of notes on L&R charts

Examples from other rotorcraft

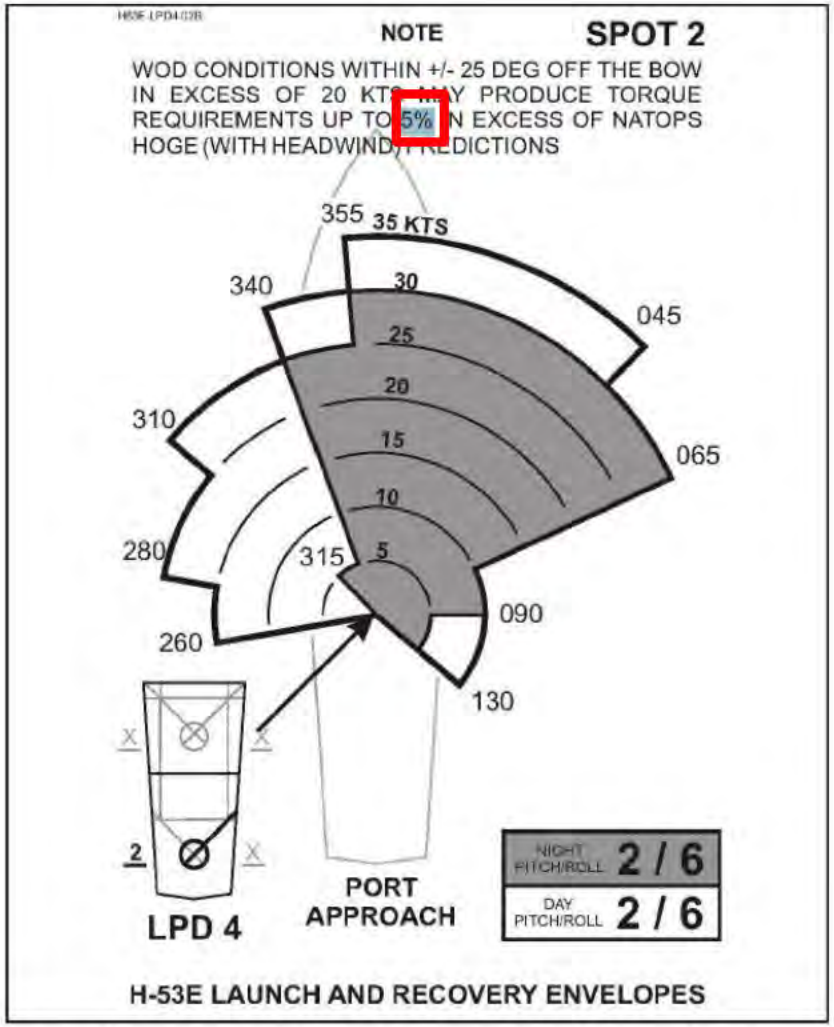


Figure J-16. H-53E Launch and Recovery Envelopes for LPD 4 Class Ships Spot 2, Port Approach (Sheet 2)

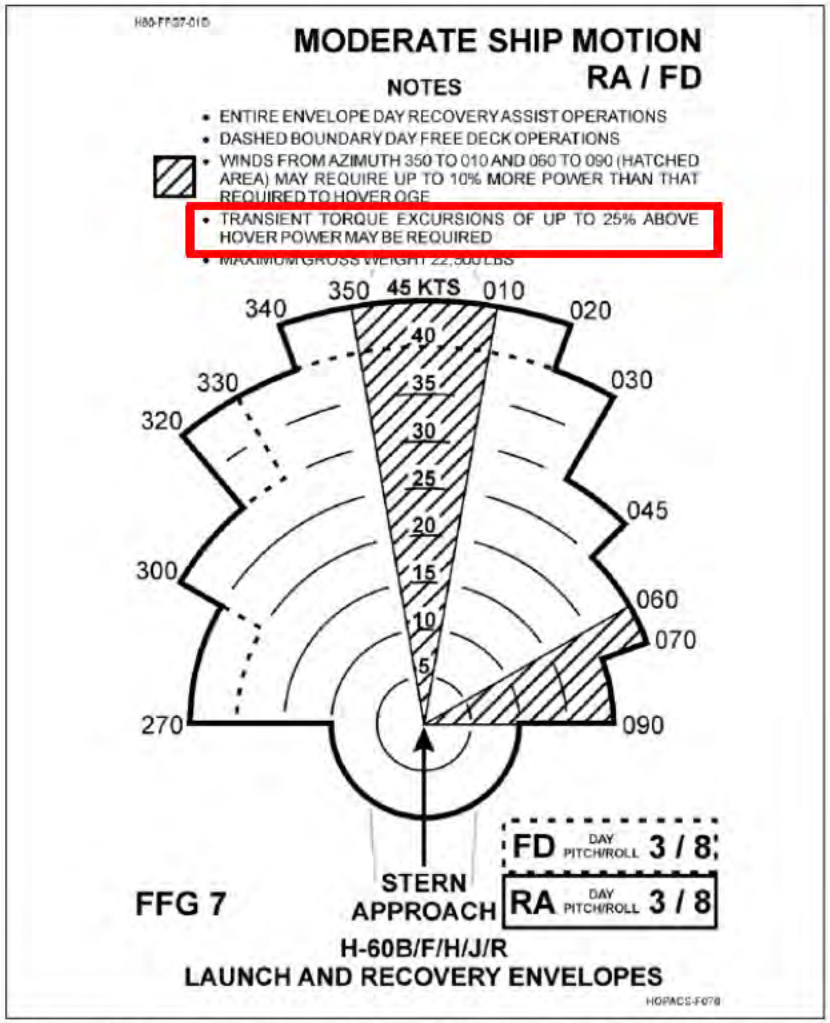


Figure M-23. H-60 Launch and Recovery Envelopes for FFG 7 Class Ships: H-60B/F/H/J/R, Recovery Assist and Free Deck Envelope (Moderate Pitch and Roll) (Sheet 1 of 7)

How does V-22 stack up

- **V-22 consistently has more torque guidance notes than other platforms (almost every L&R envelope**
- **Why?**
  - Higher Disk Loading
  - Rotor Configuration
    - Asymmetric ground effect
  - Rotor – Airframe interactions
    - Download
    - Pitch up with Sideslip

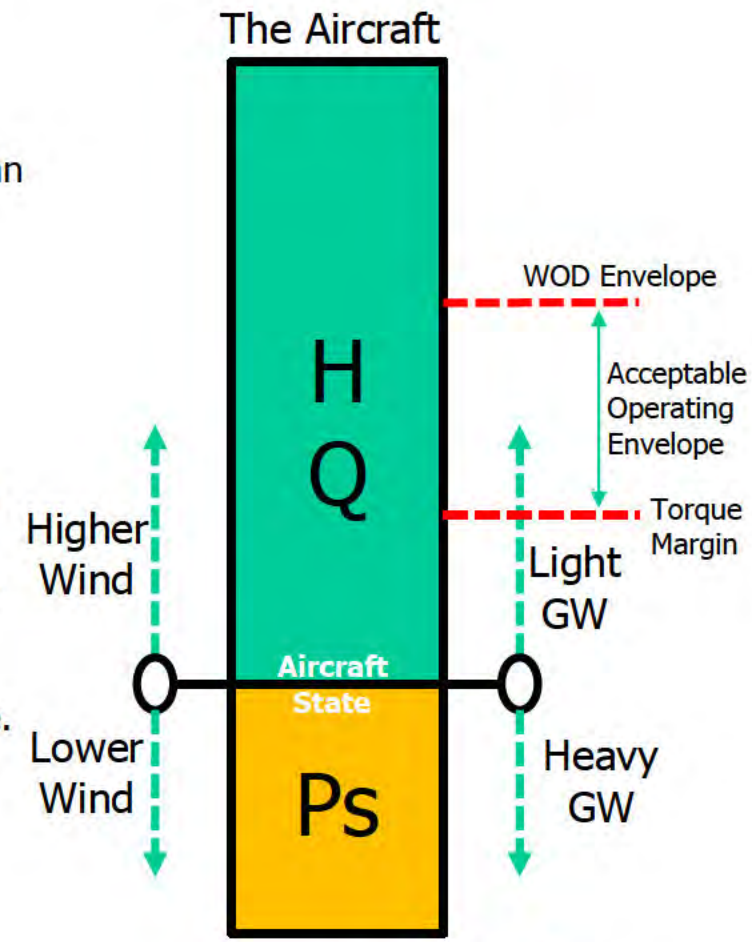
FLIGHT TEST

Overview

- **Why Flight Test?**
- **History of LPD Dynamic Interface (DI)**
- **Genesis of Shipboard L/R Envelopes**
  - Flight Test Data
  - Engineering Analysis
  - Publication
- **Torque Transient Examples**
  - Low WOD Variability
  - ROD Arrestment
  - Low vs. High WOD
- **LHD / LSD Test Data Examples**
- **V-22 Characteristics**
  - Low WOD Limits
  - Performance Variables
  - Shipboard Waveoff Example
- **Steady-Heading Technique**
- **Flight Test Way Forward**

Why Flight Test?

- **VTOL handling qualities (HQ) & excess power (Ps) inversely proportional.**
- The aircraft has a finite amount of HQ inherent in the system. By extension there is only so much power that it can produce.
- **Testing has shown:**
  - HQ tend to degrade with higher wind and lighter GW.
  - Naturally, Ps degrades with heavier GW and lower winds.
- **The <u>Shipboard WOD Envelope</u>** preserves acceptable HQ while the **<u>Torque Margin</u>** drives an acceptable amount of excess power for the shipboard power requirement stackup.
- **Heavy GW** operations need **higher winds** to bring the aircraft state line up into the Acceptable Operating Envelope.
- **Light GW** operations need **lower winds** to bring the aircraft state line down into the Acceptable Operating Envelope.



History of LPD 17 Class DI

2006

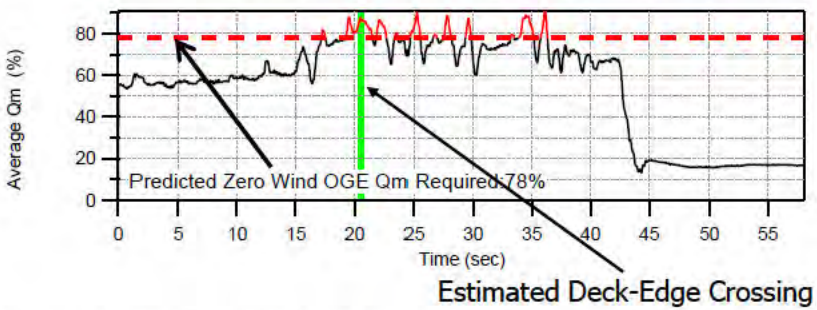
- LPD 17
- First-of-class DI
  - Multiple T/M/S
- V-22 envelope validation (priority) and expansion
- All spots, port/stbd approaches
- Light GW (prioritize HQ)
- Headwind prioritized over azimuth
  - Headwind = ship speed flexibility
  - Azimuth = ship heading flexibility
- Main spots (1&2) prioritized over expanded spots (3-6)
- Granted expanded envelopes for all spots

2012

- LPD 19
- Priority ILCP/VMS software regression (torque clamping)
  - Heavier GW / high lateral trim conditions (all spots)
  - High WOD off-azimuth targeted
- Also included envelope expansion
  - 1,2,5,6 (no 3 or 4)
- ILCP found to be an improvement (112% Avail)
- Granted further expansion and L/R notes

Flight Test Data

Example Time History of Torque During Shipboard Recovery
(LPD 17-Class, Spot 5, Calm Winds)

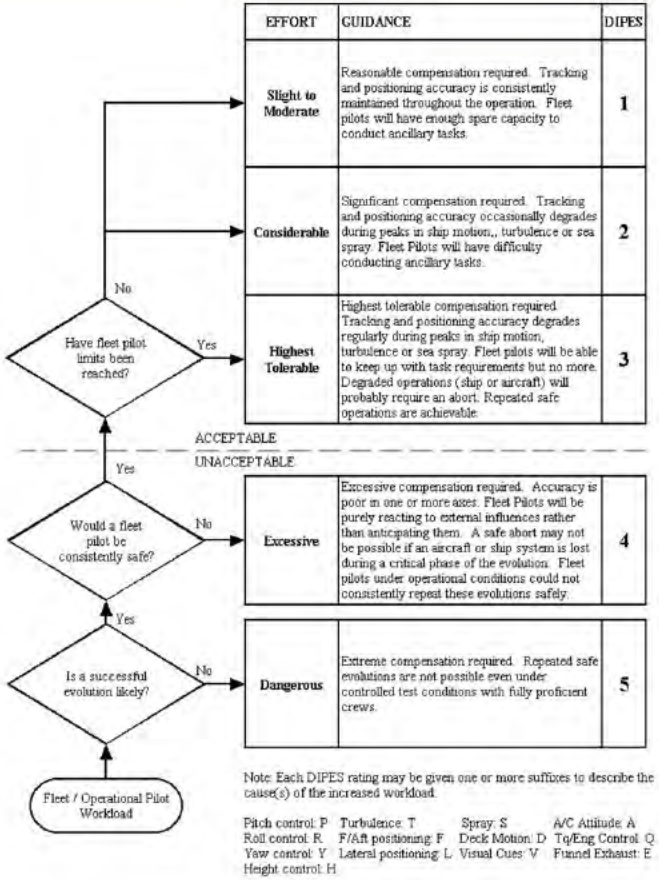


Critical Case for Handling Qualities:

- Light Gross Weight (< 45,000 lb)
- Aft CG

Recovery Test Technique:

- "Fleet-representative" approach
- Prolonged hover over landing spot for torque analysis
- DIPES rating assigned by PF



EFFORT	GUIDANCE	DIPES
Slight to Moderate	Reasonable compensation required. Tracking and positioning accuracy is consistently maintained throughout the operation. Fleet pilots will have enough spare capacity to conduct ancillary tasks.	1
Considerable	Significant compensation required. Tracking and positioning accuracy occasionally degrades during peaks in ship motion,, turbulence or sea spray. Fleet Pilots will have difficulty conducting ancillary tasks.	2
Highest Tolerable	Highest tolerable compensation required. Tracking and positioning accuracy degrades regularly during peaks in ship motion, turbulence or sea spray. Fleet pilots will be able to keep up with task requirements but no more. Degraded operations (ship or aircraft) will probably require an abort. Repeated safe operations are achievable.	3
Excessive	Excessive compensation required. Accuracy is poor in one or more axes. Fleet Pilots will be purely reacting to external influences rather than anticipating them. A safe abort may not be possible if an aircraft or ship system is lost during a critical phase of the evolution. Fleet pilots under operational conditions could not consistently repeat these evolutions safely.	4
Dangerous	Extreme compensation required. Repeated safe evolutions are not possible even under controlled test conditions with fully proficient crews.	5

Standardized NAVAIR method for Dynamic Interface testing

Engineering Analysis (HQ)

HQ Analysis Examines:

- DIPES Ratings (controllability)
  - 3 or better = acceptable / keeper
  - 4 or worse = unacceptable after repeat to verify
- Control margins
  - PU/SS
  - Alternate approach implications
- AFCS limits
- Additional pilot comments

Handling Qualities

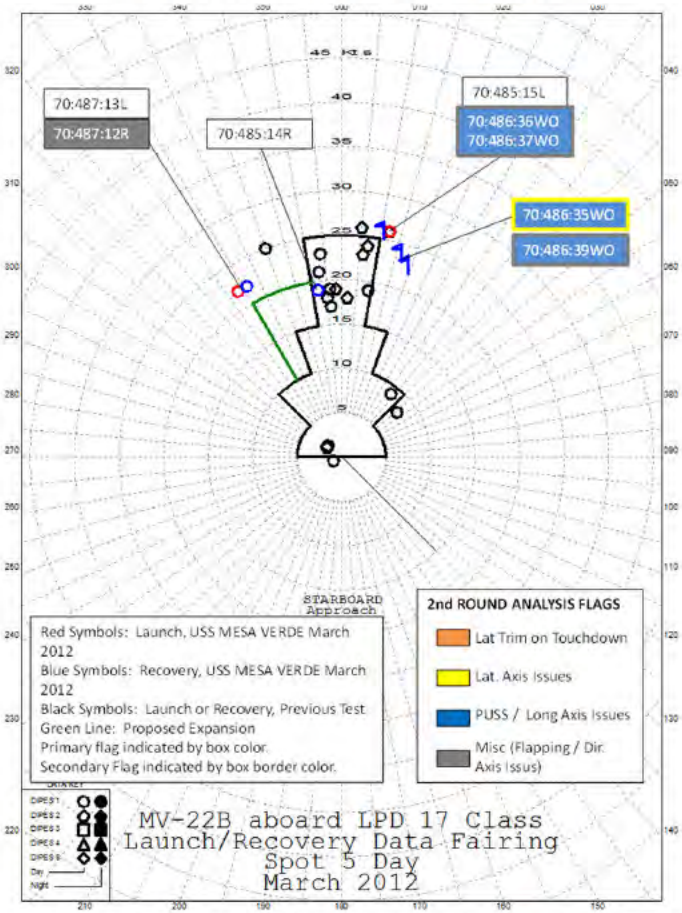


Figure B-21: Spot 5 Analysis Summary for Day Envelope Expansion Tests

HQ sets lateral limits on L/R envelope

Engineering Analysis (Ps)

Peak Recovery Torque

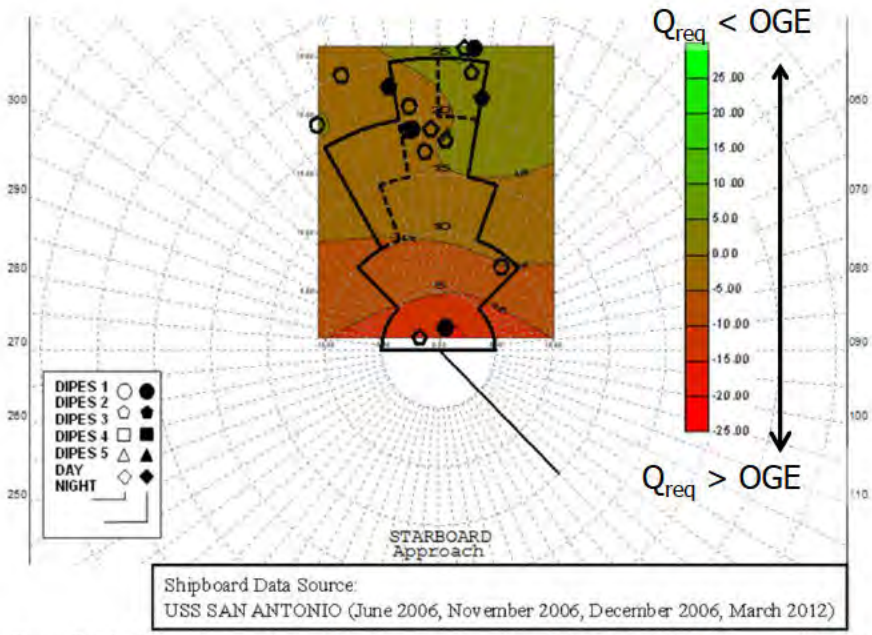


Figure B-32: Comparison of Actual Maximum and Predicted NATOPS HOGE Torque with Zero Wind for LPD 17 Class Ships, Spot 5

- Maximum torque used during recovery operation
- Compared to NATOPS OGE predicted hover torque
- Delta torque color-coded into graphic across multiple WOD conditions

Average Hover Torque

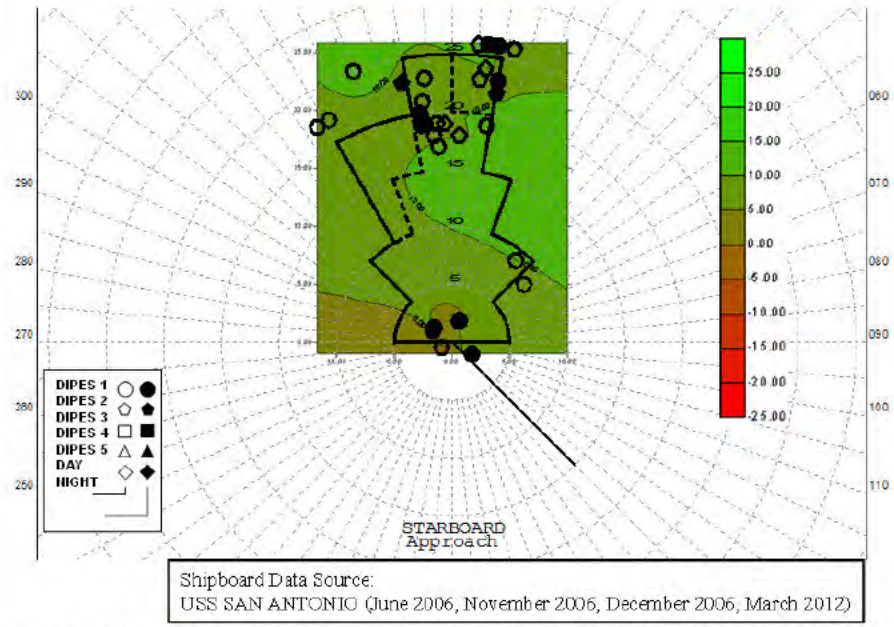


Figure B-31: Comparison of Actual Average and Predicted NATOPS HOGE Torque with Zero Wind for LPD 17 Class Ships, Spot 5

- Average torque used for a stable hover over the spot
- Compared to NATOPS OGE predicted hover torque
- Delta torque color-coded into graphic across multiple WOD conditions

Ps analysis drives NATOPS L/R Envelope torque NOTEs

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Ps Assumption

If:

Measured

89% QM_{REQ} for Ship Recovery

− 74% QM_{REQ} for HOGE

15% torque margin

NATOPS

Then:

97% QM_{REQ} for HOGE

+ 15% torque margin

112% QM_{REQ} for Ship Recovery

Predicted

A 15% torque margin at light GW is assumed to have the same benefits at heavy GW.

Current NATOPS Product

MV-22B NATOPS

Note

For most ships, aircraft NATOPS zero wind HOGE torque is often the best approximation to shipboard hover torque requirements for all wind conditions.

For VTOL shipboard operations, an additional power margin of 10% torque above observed hover torque may be required to approach, overcome turbulence, decelerate, or depart the flight deck vicinity.

****Transients ≤ 10% not indicated on L/R Envelopes****

Air-Capable Ship NATOPS

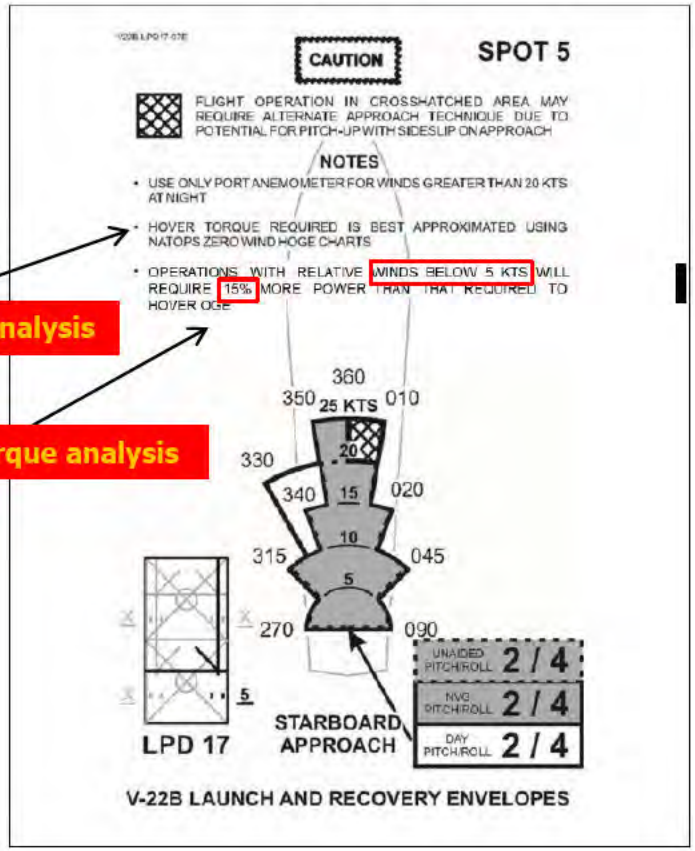
(Multiple T/M/S Appendices)

Note

Considerable difference may exist between the flight deck winds and those measured by mast-mounted anemometers. For most ships, aircraft zero wind hover torque is often the best approximation to shipboard hover torque requirements for all wind conditions; however, additional power margin (5 to 10 percent torque) may be required to approach, overcome turbulence, decelerate, or depart the flight deck vicinity. Shipboard power available is based upon the contingency power rating. Envelope regions exhibiting hover torque requirements in excess of flight manual zero wind hover torque are designated by an appropriate note.

Air-Capable Ship NATOPS

(V-22 Appendix)



Average torque analysis

Peak torque analysis

NATOPS/IFC include all spot-specific information for aircrew

Recent NATOPS Changes

MV-22B NATOPS Chapter 4, IC 84 (13 Sep 2017)

Mission Planning Mast Torque Available.

1. Shipboard Operations.
   a. VTOL: The lesser of maximum calculated power available or 112%.

WARNING

Failure to account for shipboard launch and recovery envelope torque planning guidance may result in power required exceeding power available, resulting in unrecoverable descent rates and possible loss of aircraft. For specific wind conditions, additional power margin may be required to overcome external air wake disturbances in the vicinity of the flight deck edge. This wake disturbance may be amplified if the approach stagnates near the deck edge.

MV-22B NATOPS Chapter 4, IC 85 (16 Oct 2017)

4.29 HQMC MV-22B LPD WIND RESTRICTION

1. When steady state winds are 10kts or less, MV-22B recovery aboard LPD 4 and LPD 17 Class Ships shall be conducted with gross weights less than 45,000 lbs.

ACS NATOPS, V-22 App, IC 19 (19 Oct 2017)

WARNING

Failure to account for shipboard launch and recovery envelope torque planning guidance may result in power required exceeding power available, resulting in unrecoverable descent rates and possible loss of aircraft.

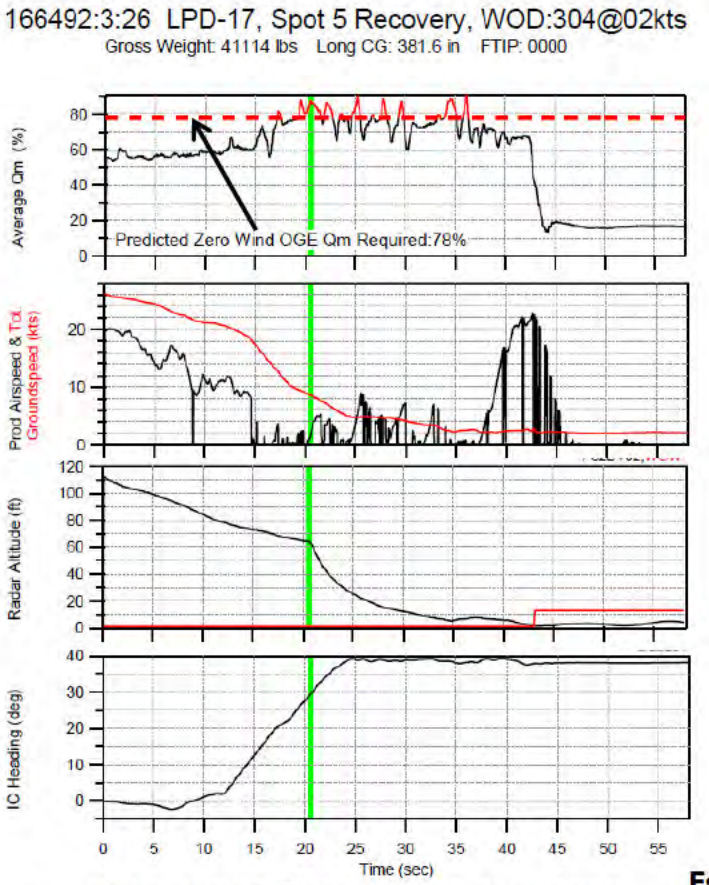
Note

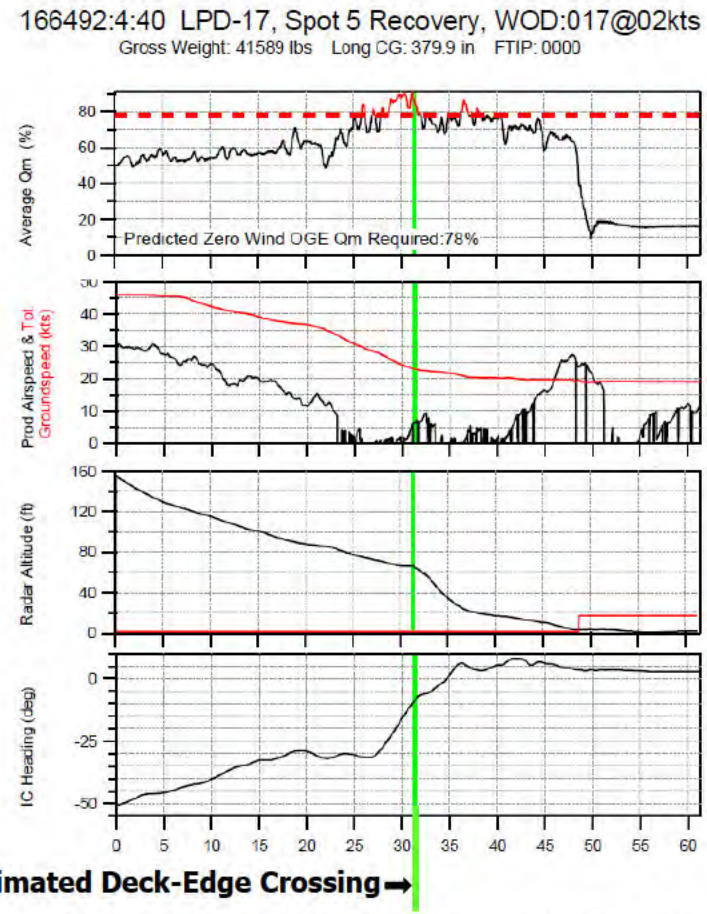
For specific wind conditions, additional power margin may be required to overcome external air wake disturbances in the vicinity of the flight deck edge. This wake disturbance may be amplified if the approach stagnates near the deck edge.

L/R Envelopes:

- HOVER TORQUE REQUIRED IS BEST APPROXIMATED USING NATOPS ZERO WIND HOGE CHARTS
- OPERATIONS WITH RELATIVE WINDS BELOW 5 KTS WILL REQUIRE 15% MORE POWER THAN THAT REQUIRED TO HOVER OGE

Spot 5 Low WOD Comparison

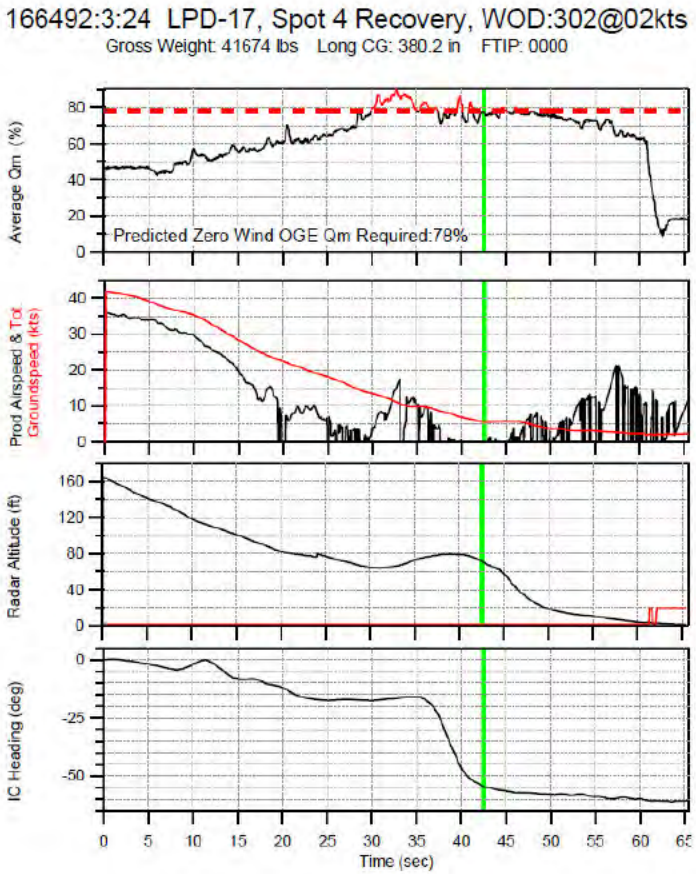




- 15 kt closure 5 sec prior to deck edge
- 25 deg heading change in 15 sec
- 13% Q_M transient, mostly over deck

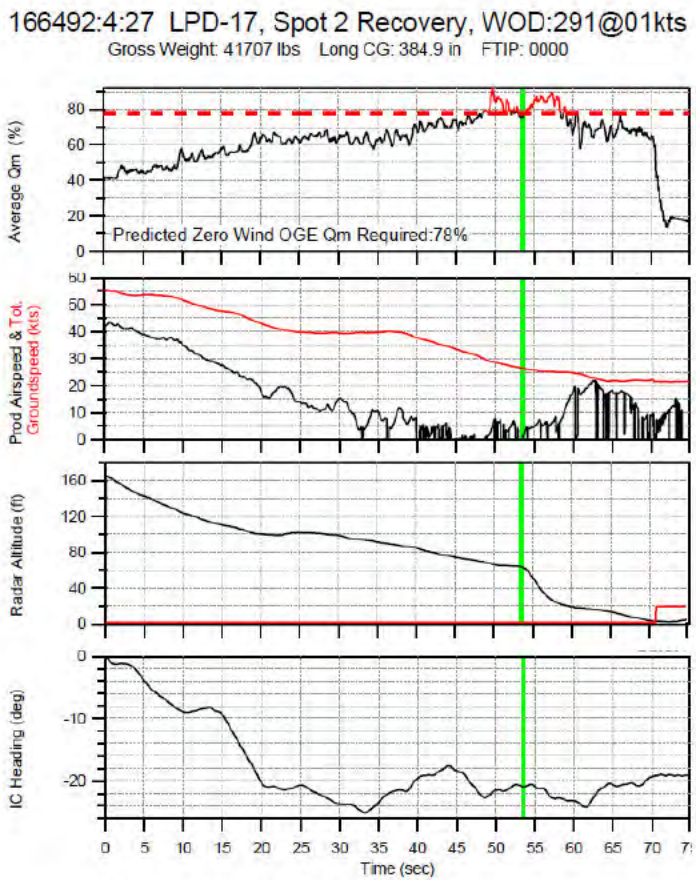
- <10 kt closure 5 sec prior to deck edge
- 30 deg heading change in 10 sec
- 13% Q_M transient, mostly prior to deck

More Low WOD Variables

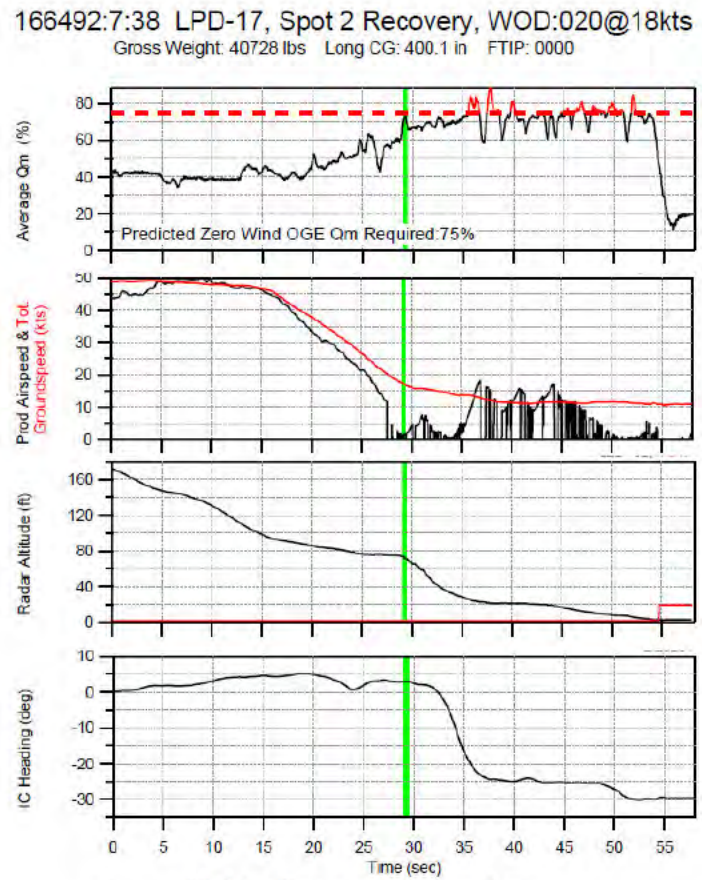


- **<10 kt closure 5 sec prior**
- **Initiated a small climb prior to deck edge**
  - **TCL over-correction?**
- **40 deg heading change in 5 sec**
- **13% transient, all prior to deck edge**

Low WOD vs. High WOD Transients



- <10 kt closure 5 sec prior
- Steady glideslope
- No significant heading change
- 13% transient, transiting over deck edge



- >15 kt closure 5 sec prior
- Shallow glideslope
- Alt approach heading change
- 15% transient with quartering HW

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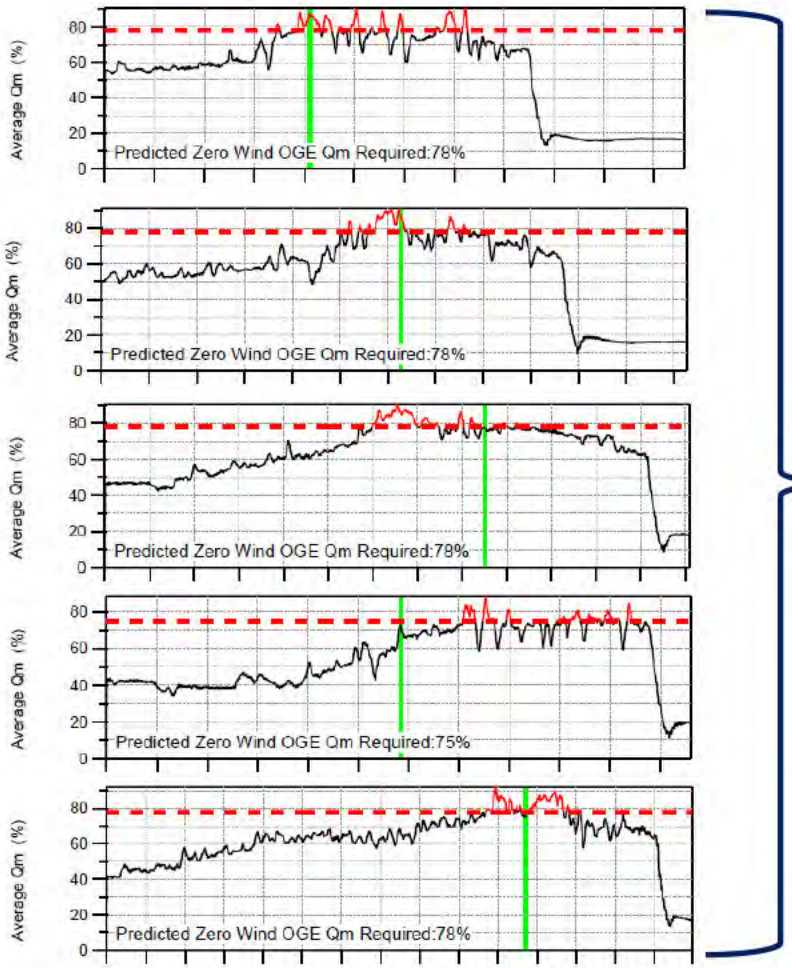
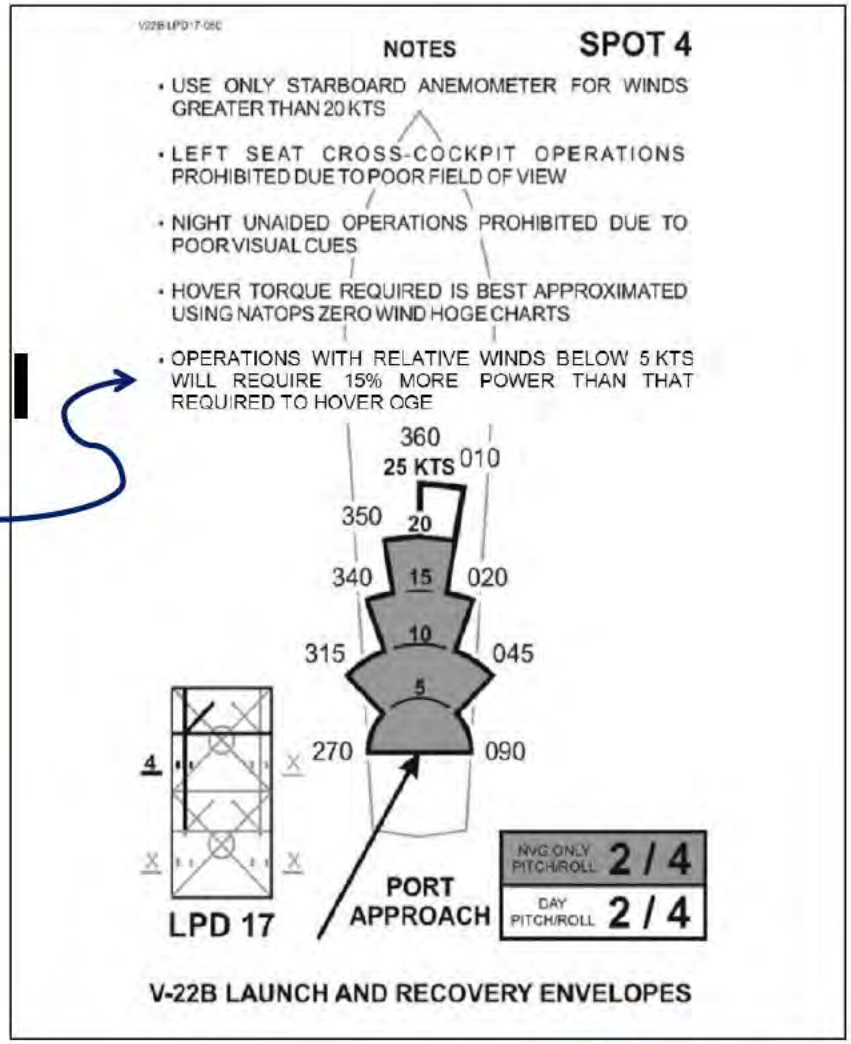
Transient Descriptions





NAVAIR only considers transient magnitude

Applicable to Other Ships

LSD 41 Class

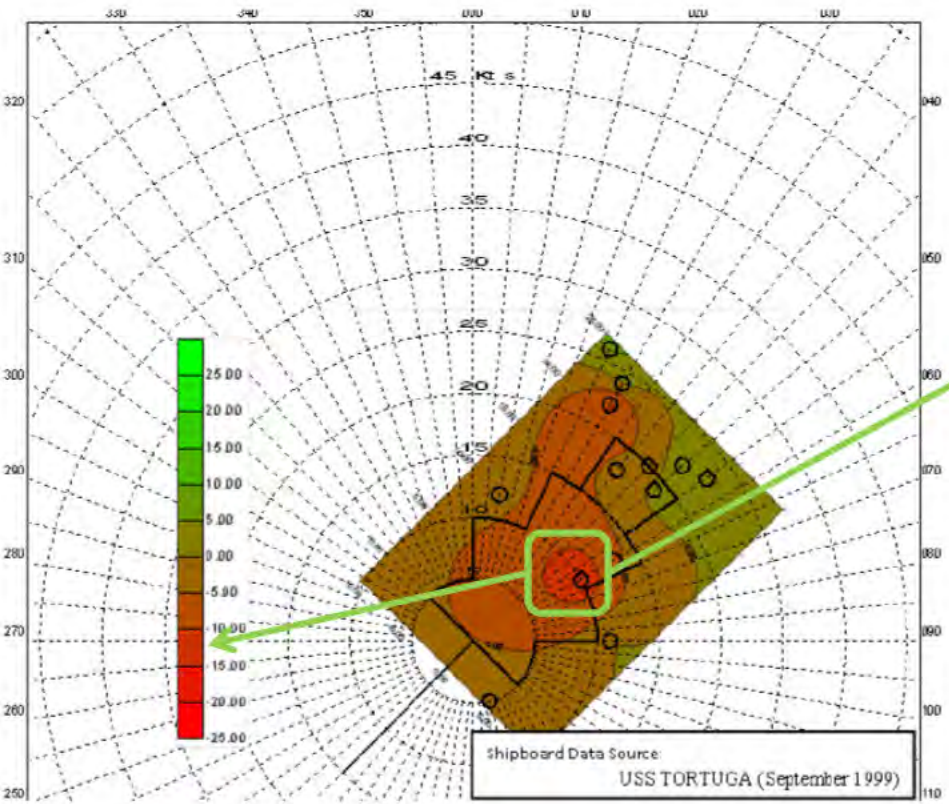
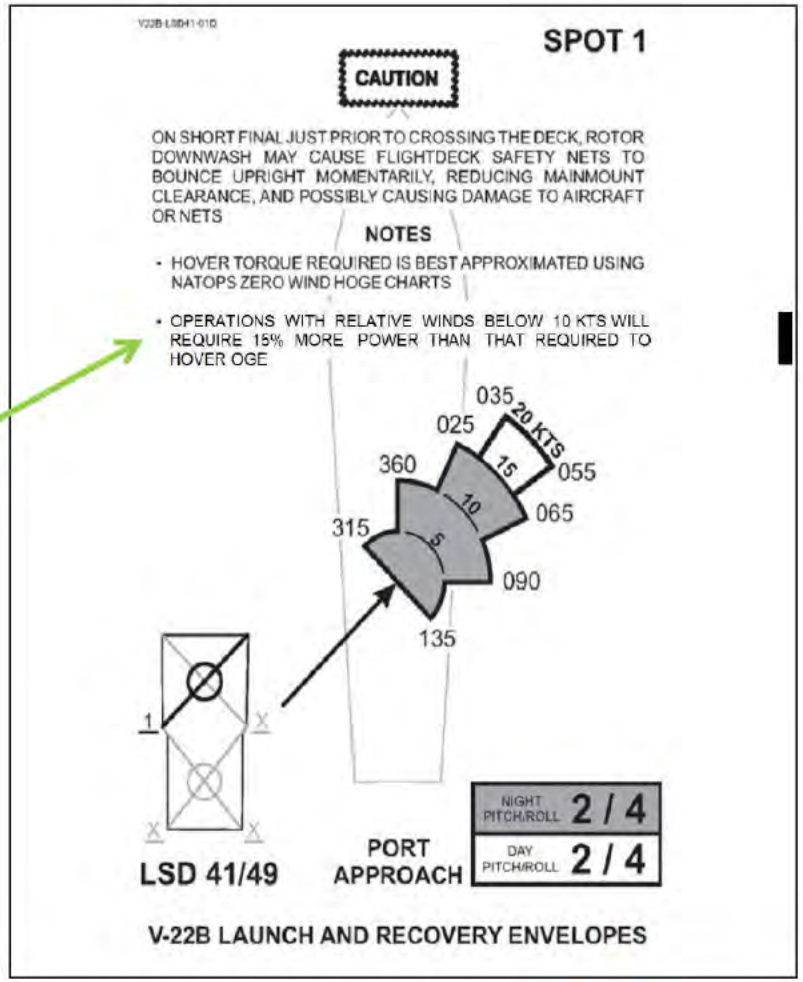
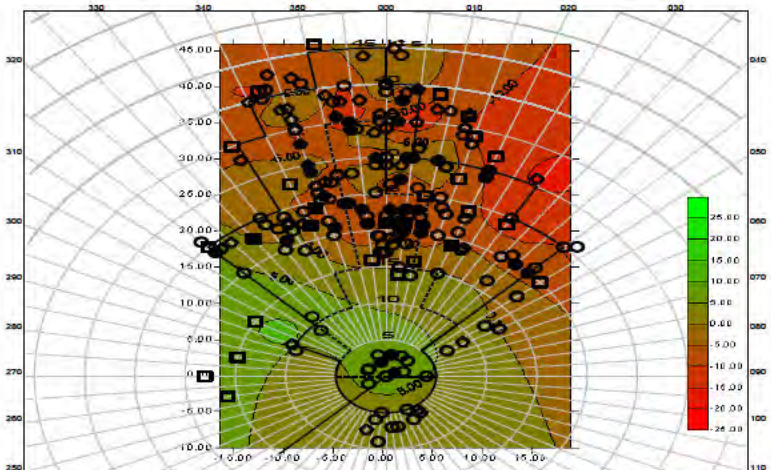


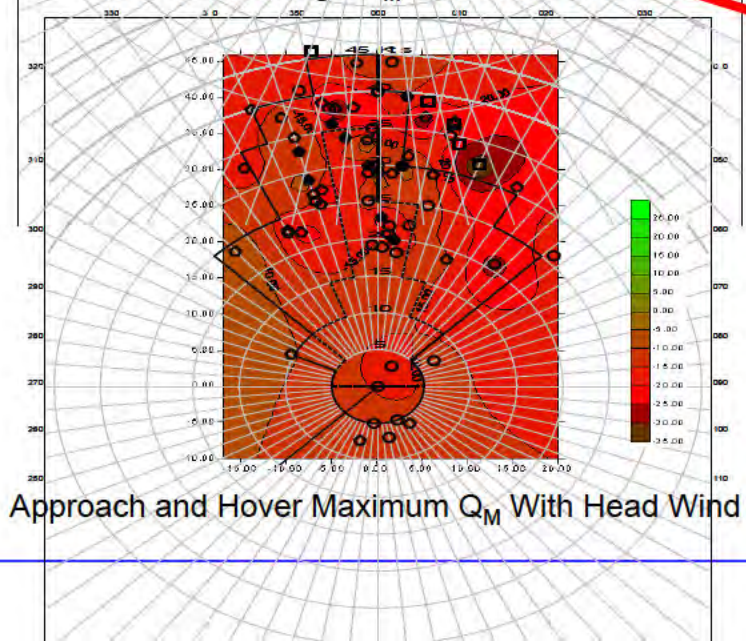
Figure C-168: Comparison of Actual Maximum and Predicted NATOPS HOGE Torque with Zero Wind for LSD 41/49 Class ships, Spot 1 Port Approach, with *Hover 3.0*



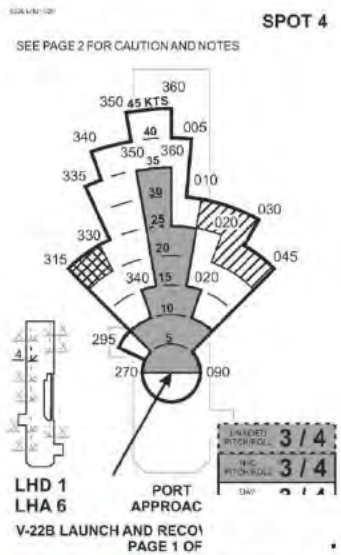
LHD Class



In Hover Average Q_M With Head Wind



Approach and Hover Maximum Q_M With Head Wind



- **Large open deck fwd LHD Spot 4 allows for headwind credit**
- **Higher winds over the bow introduce turbulence (transients)**

NOTES

- AIRCRAFT SHALL BE CONFIGURED WITH SOFTWARE SUITE A6.01(MV) / B4.01(MV) / C1.01(MV) / 10.3.01(CV) OR SUBSEQUENT.
- HOVER TORQUE REQUIRED IS BEST APPROXIMATED BY USING NATOPS HOGE CHARTS WITH FORECAST HEADWIND COMPONENT, EXCEPT FOR WIND SPEEDS GREATER THAN 15 KTS WHERE HOVER TORQUE REQUIRED IS BEST APPROXIMATED BY USING NATOPS HOGE CHARTS WITH FORECAST HEADWIND COMPONENT +15% TORQUE.
- WINDS LESS THAN 15 KTS MAY RESULT IN TORQUE TRANSIENTS UP TO 20%, AND WINDS GREATER THAN 15 KTS MAY RESULT IN TORQUE TRANSIENTS UP TO 15%.

LHD 1
LHA 6

V-22B LAUNCH AND RECOVERY ENVELOPES
PAGE 2 OF 2

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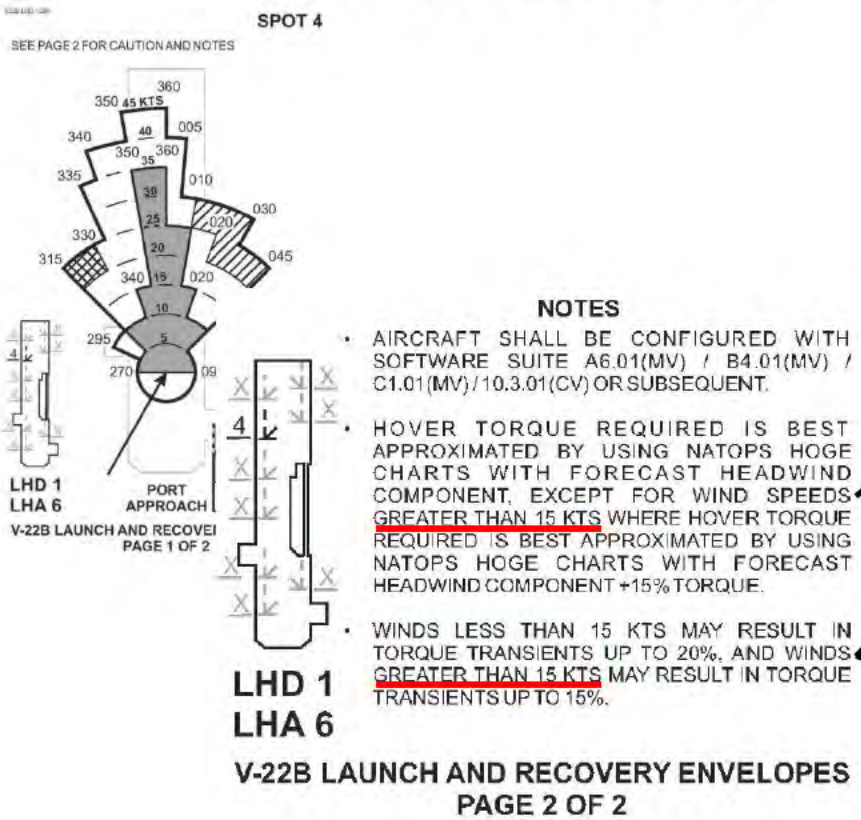
Example Planning Problem

Assume:

- LHD Spot 4
- WOD 30 to Port @ 18 kts
- 46.0 GW / PA 1000 / OAT 25



Headwind Component

-200, Fig 23-94:

Wind speed = 18 kt

Wind azimuth = 30°

Runway (headwind) component = **15 kt**

Hover Torque Required

-200, Fig 23-38:

Zero-wind = 91% Q_M

w/ headwind = 90 % Q_M

+ 15% = **105% QM**

L/R Torque Required

90 % Q_M + 15% Transient = **105% QM**

Max GW for L/R:

-200, Fig 23-38:

112% - 15% = 97% Q_M Required:

97% → 15kt HW → **48.0 Max GW**

Performance Variables

Effects

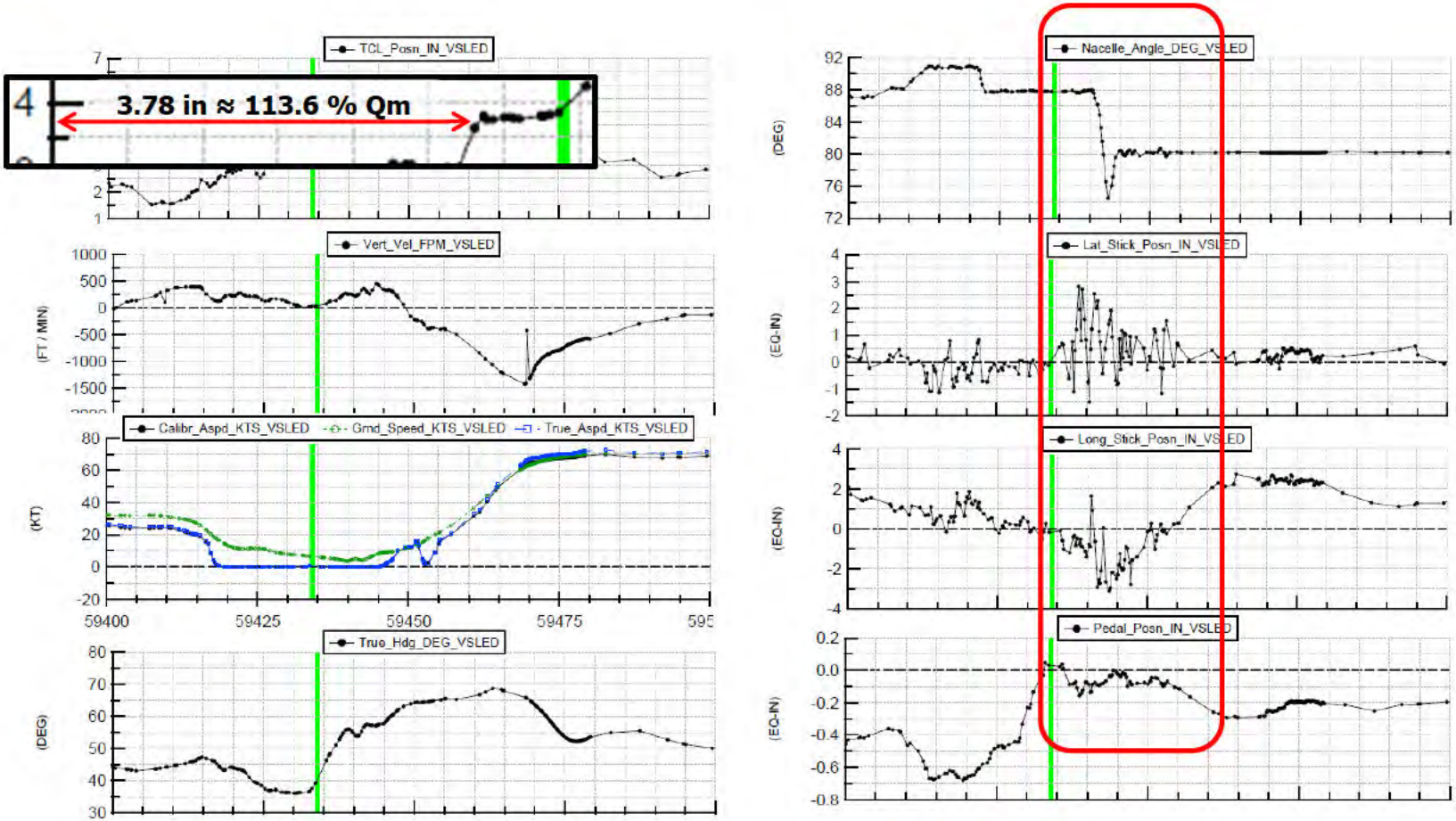
- Maneuvering
  - Lateral – Rotor tilt
  - Directional – Rotor tilt and head wind
- Loss of wing-borne lift as airspeed slows
- Wing download increase as airspeed slows
- Rotor wake re-ingestion at ship deck edge
- Rotor to rotor interaction in sideward flight
- Flat plate area increase in sideward flight
- Torque Clamping (ILCP)
- Opposed Lateral Cyclic (OLC)
- Interim Power
  - Artifact of large lateral inputs
- PU/SS
- Vertical momentum
- Nacelle movement
- Asymmetric wind flow from superstructure
  - Lateral trim increase
  - Loss of wind effect

Factors that Influence Magnitude and Duration

- Type of approach flown
- Winds over deck and heading relationship
- Location of the spot relative to deck edge
- Glideslope flown
- Airspeed management on the approach
- Time spent just prior deck edge
- Amount of gross lateral maneuvering
- Amount of nacelle movement
- TCL input management
- Pedal turning out of favorable winds
- Wind flow characteristics of the spot
- Time spent lingering over the spot

All effects cumulatively peak at the deck edge – and all or just a few may be present in any given approach.

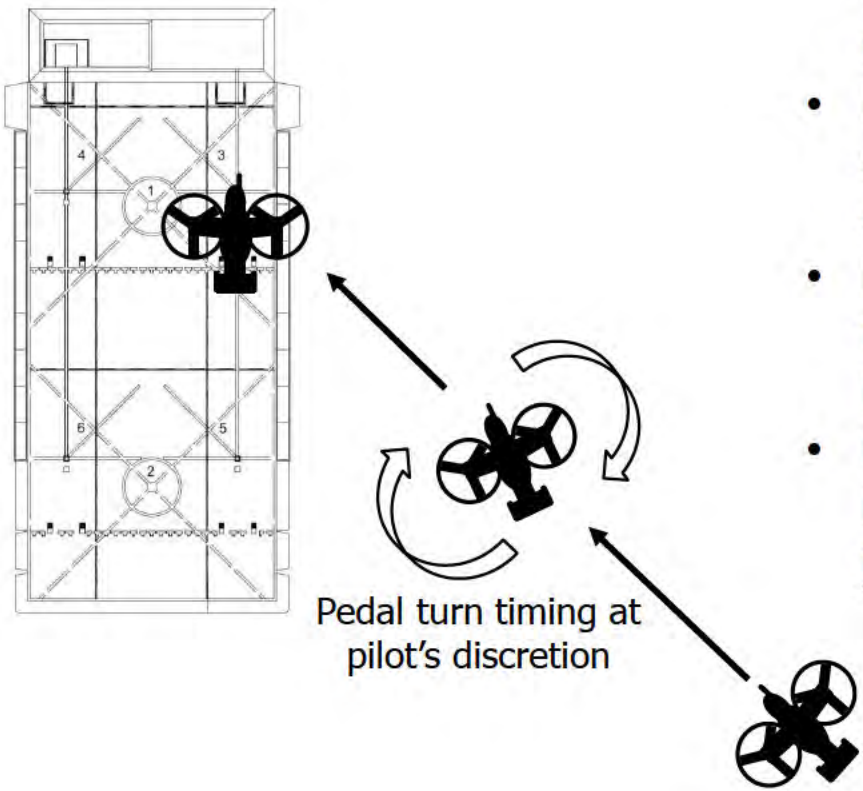
Shipboard Waveoff Example



Potentially mis-rigged TCL followed by highly proficient pilot being able to accomplish wave-off by 13 ft

NAVAIR

Approach Technique



- **Most V-22 pilots initiate pedal turns in proximity to crossing deck edge**
- **Pedal turns may be made anywhere on final or over the spot**
- **NATOPS Alternate Approach technique gives guidance for PU/SS mitigation**
- **Patterns are standardized by NATOPS/NTTP, <u>approach techniques are not</u>**

Flight test does not account for approach technique variability

WHAT NEXT?

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

QUESTIONS?

Backup Slides

Batch Simulation - Hover

1.5”, 1.0Hz

(b)(4); (b)(3)

[redacted]

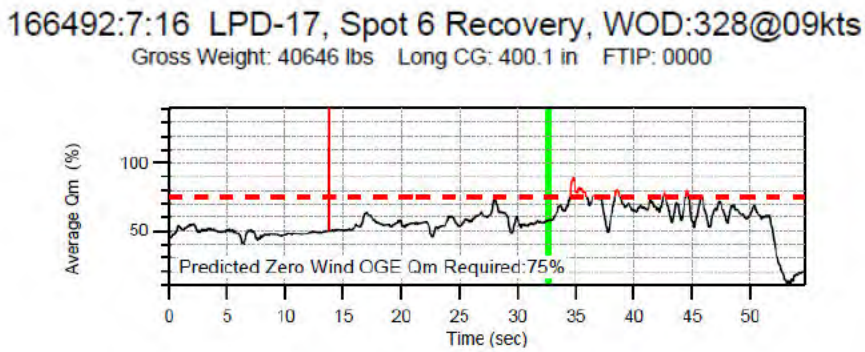
Batch Simulation – Sideward Flight 1.0”, 1.0Hz (Critical Case)

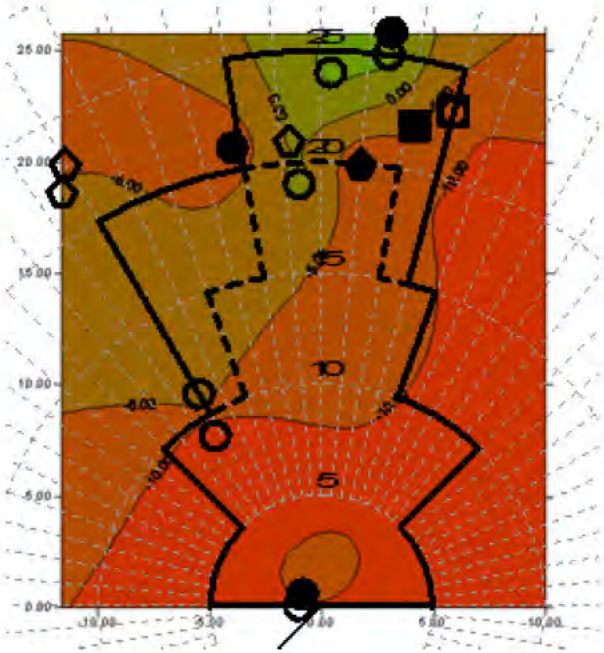
(b)(4); (b)(3)

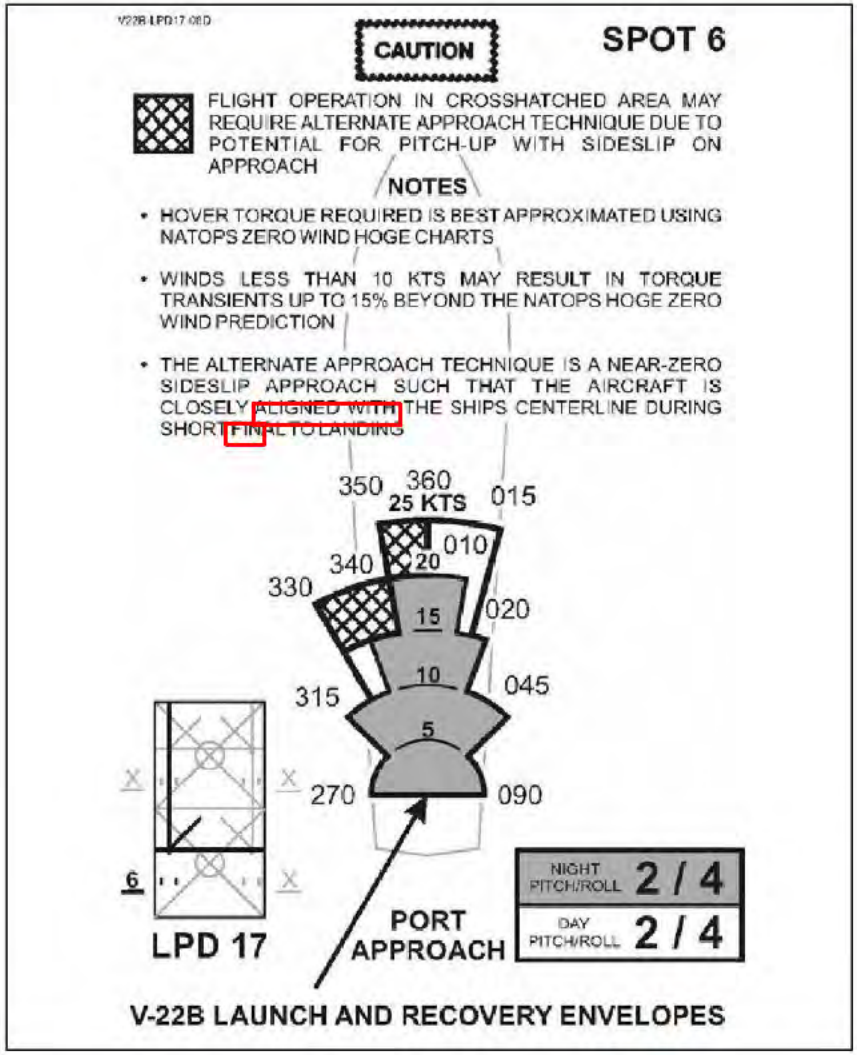
[redacted]

HQMC LPD 10-kt Restriction

LPD 17 Spot 6







Mast Torque Error

(b)(4); (b)(3)

[redacted]

Mast Torque Error

(b)(4); (b)(3)

[redacted]

Power Demand Signal

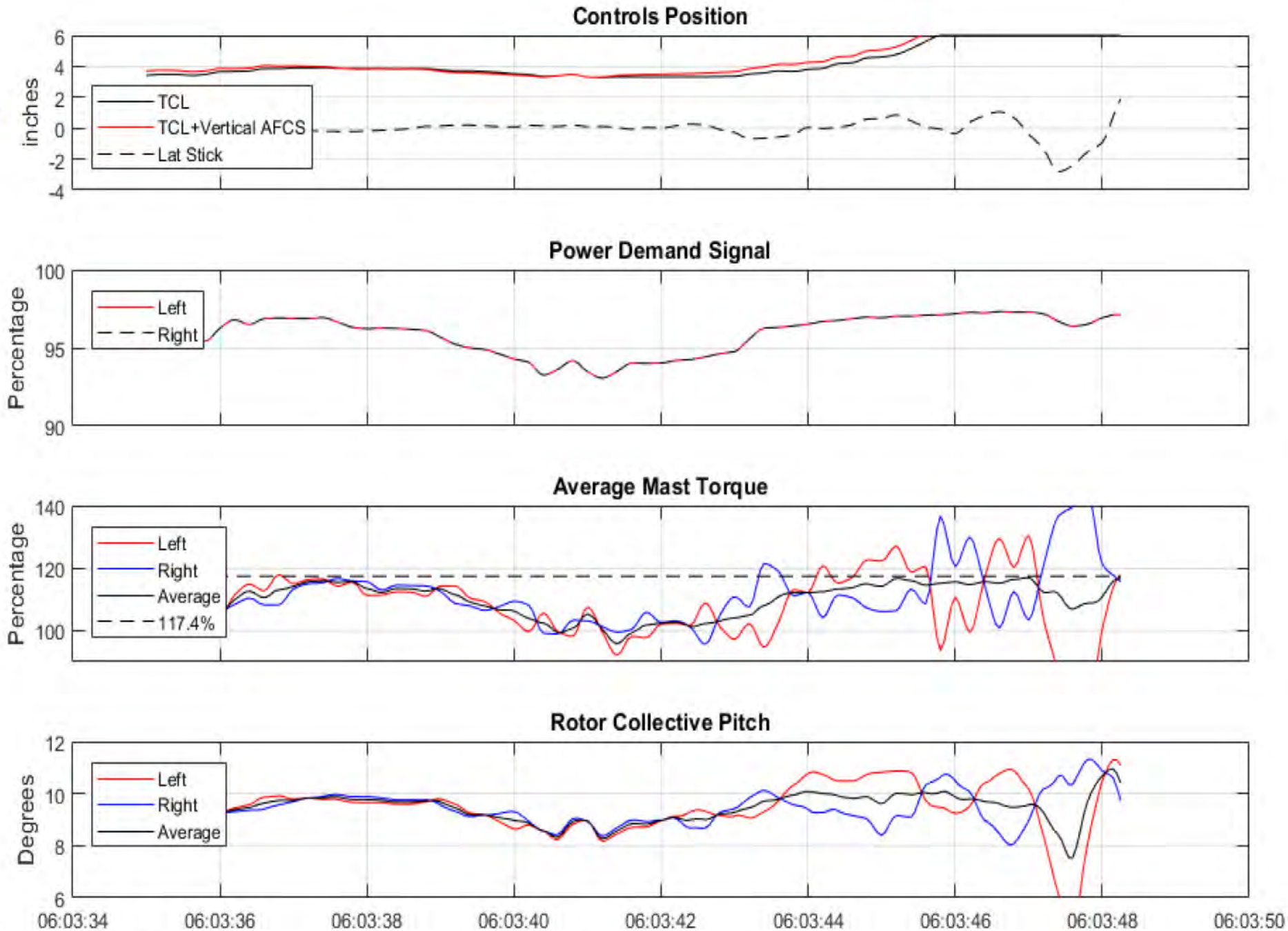
(b)(4); (b)(3)

[redacted]

Power Demand Signal

(b)(4); (b)(3)

[redacted]


Controls Position
inches
TCL
TCL+Vertical AFCS
Lat Stick
Power Demand Signal
Percentage
Left
Right
Average Mast Torque
Percentage
Left
Right
Average
117.4%
Rotor Collective Pitch
Degrees
Left
Right
Average
06:03:34
06:03:36
06:03:38
06:03:40
06:03:42
06:03:44
06:03:46
06:03:48
06:03:50
FIR Time

So what?

- How much additional power is required to arrest rate of descent 5 feet above deck height?
- New Orleans - % more power
- Green Bay - % more power
- New Orleans – X Lbs to get X% power
- Green Bay – X Lbs to get X% power

Current power notes planned to 112% allow sufficient margin to arrest descent rates

Enclosure 40

NAVMC 3100.11C MV-22B Training and Readiness (T&R) Manual

495 pages

Publicly available here:
http://www.marines.mil/Portals/59/Publications/NAVMC%203500.11D.pdf?ver=2018-01-31-081915-793

Enclosure 41

Joint Flight Operations Standard Operating Procedures

76 pages

Exempt from release pursuant to (b)(7)(F).

MV-22B Pilots

August 3, 17 09:10

Highlight		> 15	> 15					> 30	> 60	> 120	> 180						> 30		> 30	
Expired		> 30	> 30					> 180	> 100	> 200	> 300						> 365		> 365	
Name	CURRENT MONTH	LAST FLIGHT	LAST NVG FLIGHT	TNVG LAST 30 DAYS	TOTAL NVG	TOTAL LLL	LAST RVL	LAST LAT	LAST 30 DAYS	LAST 60 DAYS	LAST 90 DAYS	TOTAL MV-22 TIME	TOTAL TAC HOURS	TOTAL HRS	FY HOURS	LAST NITE	DAY CQ	Day Ship Landings	NIGHT CQ	Night Ship Landings
Assigned to permanent unit																24				
(b3)(10USC§130)(b6)	3.5	08/03/17 - 0	07/25/17 - 8	3.6	801.4	404.7	07/08/17 - 25	03/17/17 - 139	25.2	45.4	46.9	2007.6	1401.4	3243.6	152.5	07/25/17 - 8	08/03/17 - 0	9	07/25/17 - 8	5
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	6.0	527.8	322.2	08/03/17 - 0	03/30/17 - 125	20.8	35.5	35.5	1425.2	905.7	1675.9	137.5	08/03/17 - 0	08/03/17 - 0	16	08/03/17 - 0	8
(b3)(10USC§130)(b6)	0.0	08/03/17 - 0	07/09/17 - 24	4.6	671.3	332.0	06/01/17 - 62	05/23/17 - 71	7.1	40.3	62.5	1687.4	1130.8	1946.5	211.4	07/09/17 - 24	07/09/17 - 24	5	07/09/17 - 24	5
(b3)(10USC§130)(b6)	0.0	07/05/17 - 28	06/17/16 - 411	0.0	316.9	159.4	06/01/17 - 62	05/10/17 - 84	4.7	25.1	34.2	477.3	185.3	1405.9	39.2	06/29/17 - 35	07/05/17 - 28	1	11/27/12 - 1709	0
(b3)(10USC§130)(b6)	0.0	07/20/17 - 13	07/17/17 - 16	5.9	128.2	68.1	07/19/17 - 14	07/16/17 - 17	10.2	27.9	48.5	607.1	199.7	823.7	229.3	07/17/17 - 16	06/04/17 - 59	-	02/25/16 - 524	-
(b3)(10USC§130)(b6)	0.0	07/26/17 - 7	07/26/17 - 7	1.9	82.0	40.8	07/23/17 - 11	05/10/17 - 84	31.2	44.8	67.5	405.7	86.4	621.1	200.6	07/26/17 - 7	07/26/17 - 7	12	07/26/17 - 7	3
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	1.6	38.8	15.1	08/03/17 - 0	02/14/17 - 169	26.2	41.7	46.5	264.4	0.0	473.6	167.8	08/03/17 - 0	08/03/17 - 0	4	08/03/17 - 0	3
(b3)(10USC§130)(b6)	0.0	07/20/17 - 13	07/17/17 - 16	8.2	125.5	82.9	07/20/17 - 13	07/16/17 - 17	15.3	33.0	49.3	496.1	111.0	697.5	154.3	07/17/17 - 16	06/04/17 - 59	-	08/06/15 - 727	-
(b3)(10USC§130)(b6)	0.0	08/03/17 - 0	07/17/17 - 16	9.7	149.9	67.8	07/19/17 - 14	07/14/17 - 19	14.5	33.4	45.9	614.1	218.6	830.6	194.5	07/17/17 - 16	06/04/17 - 59	-	02/26/16 - 523	-
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	4.7	34.3	17.7	08/03/17 - 0	04/28/17 - 96	18.4	34.1	42.5	234.5	0.0	436.5	140.4	08/03/17 - 0	08/03/17 - 0	8	08/03/17 - 0	14
(b3)(10USC§130)(b6)	3.4	08/03/17 - 0	07/26/17 - 7	5.0	132.4	72.8	12/19/16 - 226	05/10/17 - 84	20.4	44.1	57.5	716.5	271.5	944.5	109.2	07/26/17 - 7	08/03/17 - 0	5	07/26/17 - 7	7
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	6.2	208.6	129.2	08/03/17 - 0	03/02/17 - 153	43.5	71.0	71.0	901.0	363.7	1110.7	159.3	08/03/17 - 0	08/03/17 - 0	20	08/03/17 - 0	6
(b3)(10USC§130)(b6)	0.0	07/26/17 - 7	07/26/17 - 7	9.8	249.5	133.8	07/23/17 - 11	03/17/17 - 139	25.6	26.6	32.5	961.7	457.8	1174.9	182.4	07/26/17 - 7	07/26/17 - 7	12	07/26/17 - 7	6
(b3)(10USC§130)(b6)	2.3	08/03/17 - 0	08/03/17 - 0	10.2	232.5	125.9	08/03/17 - 0	05/23/17 - 71	34.0	57.2	71.7	812.7	328.5	1024.6	207.9	08/03/17 - 0	08/03/17 - 0	7	08/03/17 - 0	6
(b3)(10USC§130)(b6)	4.0	08/03/17 - 0	07/19/17 - 14	3.6	64.1	30.2	03/20/17 - 135	04/28/17 - 96	20.3	46.8	55.3	404.8	73.8	618.4	190.4	07/19/17 - 14	08/03/17 - 0	9	07/19/17 - 14	3
(b3)(10USC§130)(b6)	0.0	07/27/17 - 6	07/26/17 - 7	1.6	71.2	30.8	04/14/17 - 110	05/04/17 - 90	20.2	36.6	52.0	385.0	13.7	619.4	123.1	07/26/17 - 7	07/27/17 - 6	12	07/26/17 - 7	3
(b3)(10USC§130)(b6)	3.4	08/03/17 - 0	07/26/17 - 7	3.8	44.2	15.0	07/18/17 - 16	04/05/17 - 119	30.1	41.7	49.9	311.2	0.0	532.4	161.9	07/26/17 - 7	08/03/17 - 0	13	07/26/17 - 7	7
(b3)(10USC§130)(b6)	0.0	07/24/17 - 10	07/18/17 - 15	5.5	39.9	11.4	07/19/17 - 15	02/28/17 - 155	35.4	46.4	48.4	193.7	0.0	406.2	126.7	07/18/17 - 15	07/24/17 - 10	11	07/12/17 - 21	5
(b3)(10USC§130)(b6)	0.0	07/26/17 - 7	07/26/17 - 7	2.5	95.5	49.4	07/19/17 - 15	01/25/17 - 189	25.7	45.8	50.2	577.7	169.7	789.2	168.8	07/26/17 - 7	07/26/17 - 7	7	07/26/17 - 7	7
(b3)(10USC§130)(b6)	3.5	08/03/17 - 0	06/21/17 - 42	0.0	15.2	4.5	04/07/17 - 117	05/04/17 - 90	12.2	22.7	32.5	82.5	0.0	277.2	86.0	06/21/17 - 42	08/03/17 - 0	2	06/21/17 - 42	0
(b3)(10USC§130)(b6)	4.0	08/03/17 - 0	06/21/17 - 42	0.0	16.4	3.8	07/23/17 - 11	05/04/17 - 90	20.9	32.0	45.3	93.1	0.0	296.8	97.1	06/21/17 - 42	08/03/17 - 0	12	06/21/17 - 42	0
(b) (6), (b)	0.0	07/19/17 - 15	07/12/17 - 21	3.9	56.1	24.9	07/19/17 - 15	02/15/17 - 168	19.2	32.0	37.5	145.9	0.0	339.7	117.3	07/12/17 - 21	07/19/17 - 15	4	07/12/17 - 21	6
(b3)(10USC§130)(b6)	2.3	08/03/17 - 0	08/03/17 - 0	3.2	21.9	6.1	05/25/17 - 69	04/05/17 - 119	17.8	30.2	47.6	111.3	0.0	300.5	84.9	08/03/17 - 0	08/03/17 - 0	3	08/03/17 - 0	14
(b3)(10USC§130)(b6)	0.0	07/18/17 - 15	07/18/17 - 15	6.7	35.0	14.1	07/18/17 - 15	04/05/17 - 119	25.2	34.9	43.0	153.8	0.0	345.3	137.2	07/18/17 - 15	07/15/17 - 19	5	07/12/17 - 21	7
	1.6	-	-	4.5	173.3	90.1	-	-	21.8	38.7	48.9	586.3	246.6	872.3	149.2	-	-		-	

MV-22B Aircrew

August 4, 17 09:28

Name	CURRENT MONTH	LAST FLIGHT	LAST NVG FLIGHT	TNVG LAST 30 DAYS	TOTAL NVG	TOTAL LLL	LAST RVL	LAST LAT	LAST 30 DAYS	LAST 60 DAYS	LAST 90 DAYS	TOTAL MV-22 TIME	TOTAL TAC HOURS	TOTAL HRS	FY HOURS	LAST NITE	DAY CQ	Day Ship Landings	NIGHT CQ	Night Ship Landings
Highlight		> 15	> 15					> 30	> 60	> 120	> 180						> 30		> 30	
Expired		> 30	> 30					> 180	> 100	> 200	> 300						> 365		> 365	
MV-22B Aerial Observer/Gunner																2				
(b3)(10USC§130)(b6)	0.0	07/15/17 - 20	-	0.0	0.0	0.0	-	-	0.0	0.0	4.0	0.0	0.0	0.0	30.1	02/12/17 - 172	-	-	-	-
(b3)(10USC§130)(b6)	2.3	08/03/17 - 0	08/03/17 - 0	9.6	77.8	37.7	11/04/16 - 272	04/05/17 - 120	28.1	44.8	51.8	0.0	0.0	0.0	125.6	08/03/17 - 0	08/03/17 - 0	-	08/03/17 - 0	-
	1.2	-	-	4.8	38.9	18.9	-	-	14.1	22.4	27.9	0.0	0.0	0.0	77.9	-	-		-	
MV-22B Crew Chief																20				
(b3)(10USC§130)(b6)	0.0	02/23/17 - 161	02/09/17 - 175	0.0	522.3	278.2	01/09/17 - 206	02/09/17 - 175	0.0	0.0	0.0	0.0	0.0	0.0	15.9	02/09/17 - 175	03/17/16 - 504	-	01/12/12 - 2030	-
(b3)(10USC§130)(b6)	0.0	05/23/17 - 72	05/23/17 - 72	0.0	751.5	270.4	02/28/17 - 156	05/04/17 - 91	0.0	0.0	3.5	0.0	0.0	0.0	27.3	05/23/17 - 72	-	-	-	-
(b3)(10USC§130)(b6)	2.2	08/04/17 - 0	08/04/17 - 0	18.1	164.9	83.8	07/16/17 - 18	07/16/17 - 18	18.1	30.5	52.9	0.0	0.0	0.0	203.6	08/04/17 - 0	08/04/17 - 0	-	08/04/17 - 0	-
(b3)(10USC§130)(b6)	0.0	07/19/17 - 16	03/19/14 - 1233	0.0	209.6	119.4	07/19/17 - 16	12/19/13 - 1323	23.0	29.0	29.0	0.0	0.0	0.0	29.0	03/19/14 - 1233	06/09/17 - 55	-	06/09/17 - 55	-
(b3)(10USC§130)(b6)	2.2	08/04/17 - 0	08/04/17 - 0	5.3	82.2	36.0	05/23/17 - 72	05/23/17 - 72	17.1	43.8	65.3	0.0	0.0	0.0	119.1	08/04/17 - 0	08/04/17 - 0	-	08/04/17 - 0	-
(b3)(10USC§130)(b6)	2.3	08/03/17 - 0	08/03/17 - 0	8.9	310.8	176.9	07/18/17 - 16	07/18/17 - 16	36.7	73.5	104.7	0.0	0.0	0.0	282.9	08/03/17 - 0	08/03/17 - 0	-	08/03/17 - 0	-
(b3)(10USC§130)(b6)	5.0	08/04/17 - 0	08/04/17 - 0	11.2	412.1	201.4	07/08/17 - 26	07/08/17 - 26	15.1	39.7	69.9	0.0	0.0	0.0	280.7	08/04/17 - 0	08/04/17 - 0	-	08/04/17 - 0	-
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	8.6	643.4	356.8	07/08/17 - 26	07/12/17 - 22	42.4	81.7	113.4	0.0	0.0	0.0	268.1	08/03/17 - 0	08/03/17 - 0	-	08/03/17 - 0	-
(b3)(10USC§130)(b6)	0.0	07/20/17 - 14	07/09/17 - 25	3.0	82.8	45.0	07/08/17 - 26	10/17/16 - 290	17.3	34.3	42.8	0.0	0.0	0.0	103.3	07/09/17 - 25	07/20/17 - 14	-	07/09/17 - 25	-
(b3)(10USC§130)(b6)	4.0	08/03/17 - 0	07/15/17 - 19	1.8	287.2	151.1	07/19/17 - 16	04/29/17 - 96	42.9	65.1	84.3	0.0	0.0	0.0	258.3	07/15/17 - 19	08/03/17 - 0	-	07/07/17 - 27	-
(b3)(10USC§130)(b6)	3.4	08/03/17 - 0	07/12/17 - 22	2.3	90.1	47.8	07/23/17 - 12	07/19/17 - 16	62.6	101.7	110.5	0.0	0.0	0.0	305.5	07/12/17 - 22	08/03/17 - 0	-	07/12/17 - 22	-
(b3)(10USC§130)(b6)	3.5	08/03/17 - 0	07/26/17 - 8	8.2	142.4	62.2	07/23/17 - 12	07/18/17 - 16	57.3	89.3	114.6	0.0	0.0	0.0	298.7	07/26/17 - 8	08/03/17 - 0	-	07/26/17 - 8	-
(b3)(10USC§130)(b6)	0.0	08/03/17 - 0	07/15/17 - 19	0.3	63.2	29.1	04/29/17 - 96	05/10/17 - 85	16.2	45.9	63.9	0.0	0.0	0.0	216.5	07/15/17 - 19	07/27/17 - 7	-	06/09/17 - 55	-
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	14.6	97.5	49.6	07/19/17 - 16	05/23/17 - 72	31.6	45.1	74.2	0.0	0.0	0.0	229.8	08/03/17 - 0	08/03/17 - 0	-	08/03/17 - 0	-
(b3)(10USC§130)(b6)	5.0	08/04/17 - 0	08/04/17 - 0	14.9	101.8	49.3	03/20/17 - 136	04/04/17 - 121	18.0	29.0	46.1	0.0	0.0	0.0	242.1	08/04/17 - 0	08/04/17 - 0	-	08/04/17 - 0	-
(b3)(10USC§130)(b6)	0.0	07/20/17 - 14	07/09/17 - 25	4.5	64.3	26.3	03/20/17 - 136	03/20/17 - 136	13.5	27.8	27.8	0.0	0.0	0.0	165.1	07/09/17 - 25	07/20/17 - 14	-	07/09/17 - 25	-
(b3)(10USC§130)(b6)	3.4	08/03/17 - 0	07/25/17 - 9	4.7	39.0	20.7	07/23/17 - 12	07/18/17 - 16	68.6	91.0	113.1	0.0	0.0	0.0	216.0	07/25/17 - 9	08/03/17 - 0	-	07/25/17 - 9	-
(b3)(10USC§130)(b6)	3.5	08/03/17 - 0	07/12/17 - 22	3.7	32.7	15.0	07/23/17 - 12	07/18/17 - 16	52.9	75.8	92.8	0.0	0.0	0.0	180.3	07/12/17 - 22	08/03/17 - 0	-	07/12/17 - 22	-
(b3)(10USC§130)(b6)	0.0	07/24/17 - 10	04/01/17 - 124	0.0	8.0	0.0	07/19/17 - 16	-	22.0	25.0	25.0	0.0	0.0	0.0	83.8	04/01/17 - 124	06/09/17 - 55	-	06/09/17 - 55	-
(b3)(10USC§130)(b6)	0.0	07/05/17 - 29	02/06/17 - 178	0.0	4.7	0.0	-	05/10/17 - 85	3.7	24.6	44.7	0.0	0.0	0.0	99.4	02/06/17 - 178	07/05/17 - 29	-	06/09/17 - 55	-
	2.0	-	-	5.5	205.5	101.0	-	-	28.0	47.6	63.9	0.0	0.0	0.0	181.3	-	-		-	

MV-22B Pilots

August 4, 17 09:36

Highlight		> 15	> 15					> 30	> 60	> 120	> 180						> 30		> 30	
Expired		> 30	> 30					> 180	> 100	> 200	> 300						> 365		> 365	
Name	CURRENT MONTH	LAST FLIGHT	LAST NVG FLIGHT	TNVG LAST 30 DAYS	TOTAL NVG	TOTAL LLL	LAST RVL	LAST LAT	LAST 30 DAYS	LAST 60 DAYS	LAST 90 DAYS	TOTAL MV-22 TIME	TOTAL TAC HOURS	TOTAL HRS	FY HOURS	LAST NITE	DAY CQ	Day Ship Landings	NIGHT CQ	Night Ship Landings
Assigned to permanent unit																24				
(b3)(10USC§130)(b6)	3.5	08/03/17 - 0	07/25/17 - 9	3.6	801.4	404.7	07/08/17 - 26	03/17/17 - 140	28.7	48.9	50.4	2011.1	1404.9	3247.1	152.5	07/25/17 - 9	08/03/17 - 0	11	07/25/17 - 9	5
(b3)(10USC§130)(b6)	5.0	08/04/17 - 0	08/04/17 - 0	8.8	530.6	322.2	08/03/17 - 0	03/30/17 - 126	23.6	38.3	38.3	1428.0	908.5	1678.7	139.7	08/04/17 - 0	08/04/17 - 0	16	08/04/17 - 0	10
(b3)(10USC§130)(b6)	1.2	08/04/17 - 0	08/04/17 - 0	4.6	671.3	332.0	06/01/17 - 64	05/23/17 - 72	7.1	36.3	62.5	1687.4	1130.8	1946.5	212.6	08/04/17 - 0	08/04/17 - 0	5	08/04/17 - 0	5
(b3)(10USC§130)(b6)	0.0	07/05/17 - 29	06/17/16 - 412	0.0	316.9	159.4	06/01/17 - 64	05/10/17 - 85	4.7	21.1	34.2	477.3	185.3	1405.9	39.2	06/29/17 - 36	07/05/17 - 29	1	11/27/12 - 1710	0
(b3)(10USC§130)(b6)	0.0	07/20/17 - 14	07/17/17 - 17	5.9	128.2	68.1	07/19/17 - 15	07/16/17 - 18	10.2	26.4	48.5	607.1	199.7	823.7	229.3	07/17/17 - 17	06/04/17 - 60	-	02/25/16 - 525	-
(b3)(10USC§130)(b6)	1.2	08/04/17 - 0	08/04/17 - 0	1.9	82.0	40.8	07/23/17 - 12	05/10/17 - 85	31.2	44.8	67.0	405.7	86.4	621.1	201.8	08/04/17 - 0	08/04/17 - 0	12	08/04/17 - 0	3
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	4.4	41.6	15.1	08/03/17 - 0	02/14/17 - 170	29.0	43.3	49.3	267.2	0.0	476.4	167.8	08/03/17 - 0	08/03/17 - 0	4	08/03/17 - 0	4
(b3)(10USC§130)(b6)	1.0	08/04/17 - 0	08/04/17 - 0	8.2	125.5	82.9	07/20/17 - 14	07/16/17 - 18	15.3	32.0	49.3	496.1	111.0	697.5	155.3	08/04/17 - 0	08/04/17 - 0	-	08/04/17 - 0	-
(b3)(10USC§130)(b6)	1.0	08/04/17 - 0	08/04/17 - 0	9.7	149.9	67.8	07/19/17 - 15	07/14/17 - 20	14.5	30.4	45.9	614.1	218.6	830.6	195.5	08/04/17 - 0	08/04/17 - 0	-	08/04/17 - 0	-
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	7.5	37.1	17.7	08/03/17 - 0	04/28/17 - 97	21.2	33.9	44.3	237.3	0.0	439.3	140.4	08/03/17 - 0	08/03/17 - 0	8	08/03/17 - 0	14
(b3)(10USC§130)(b6)	3.4	08/03/17 - 0	07/26/17 - 8	5.0	132.4	72.8	12/19/16 - 228	05/10/17 - 85	23.8	47.5	60.9	719.9	274.9	947.9	109.2	07/26/17 - 8	08/03/17 - 0	6	07/26/17 - 8	7
(b3)(10USC§130)(b6)	5.0	08/04/17 - 0	08/04/17 - 0	9.0	211.4	129.2	08/03/17 - 0	03/02/17 - 155	46.3	73.8	73.8	903.8	366.5	1113.5	161.5	08/04/17 - 0	08/04/17 - 0	20	08/04/17 - 0	6
(b3)(10USC§130)(b6)	0.0	07/26/17 - 8	07/26/17 - 8	9.8	249.5	133.8	07/23/17 - 12	03/17/17 - 140	25.6	25.6	32.5	961.7	457.8	1174.9	182.4	07/26/17 - 8	07/26/17 - 8	12	07/26/17 - 8	6
(b3)(10USC§130)(b6)	2.3	08/03/17 - 0	08/03/17 - 0	12.5	234.8	125.9	08/03/17 - 0	05/23/17 - 72	36.3	55.5	74.0	815.0	330.8	1026.9	207.9	08/03/17 - 0	08/03/17 - 0	7	08/03/17 - 0	7
(b3)(10USC§130)(b6)	4.0	08/03/17 - 0	07/19/17 - 15	3.6	64.1	30.2	03/20/17 - 136	04/28/17 - 97	24.3	49.3	59.3	408.8	77.8	622.4	190.4	07/19/17 - 15	08/03/17 - 0	10	07/19/17 - 15	3
(b3)(10USC§130)(b6)	0.0	07/27/17 - 7	07/26/17 - 8	1.6	71.2	30.8	04/14/17 - 111	05/04/17 - 91	20.2	35.6	52.0	385.0	13.7	619.4	123.1	07/26/17 - 8	07/27/17 - 7	12	07/26/17 - 8	3
(b3)(10USC§130)(b6)	3.4	08/03/17 - 0	07/26/17 - 8	3.8	44.2	15.0	07/18/17 - 17	04/05/17 - 120	33.5	45.1	52.8	314.6	0.0	535.8	161.9	07/26/17 - 8	08/03/17 - 0	15	07/26/17 - 8	7
(b3)(10USC§130)(b6)	0.0	07/24/17 - 11	07/18/17 - 16	5.5	39.9	11.4	07/19/17 - 16	02/28/17 - 156	35.4	46.4	48.4	193.7	0.0	406.2	126.7	07/18/17 - 16	07/24/17 - 11	11	07/12/17 - 22	5
(b3)(10USC§130)(b6)	0.0	07/26/17 - 8	07/26/17 - 8	2.5	95.5	49.4	07/19/17 - 16	01/25/17 - 190	25.7	44.6	50.2	577.7	169.7	789.2	168.8	07/26/17 - 8	07/26/17 - 8	7	07/26/17 - 8	7
(b3)(10USC§130)(b6)	3.5	08/03/17 - 0	06/21/17 - 43	0.0	15.2	4.5	04/07/17 - 119	05/04/17 - 91	15.7	26.2	36.0	86.0	0.0	280.7	86.0	06/21/17 - 43	08/03/17 - 0	3	06/21/17 - 43	0
(b3)(10USC§130)(b6)	4.0	08/03/17 - 0	06/21/17 - 43	0.0	16.4	3.8	07/23/17 - 12	05/04/17 - 91	24.9	36.0	49.3	97.1	0.0	300.8	97.1	06/21/17 - 43	08/03/17 - 0	12	06/21/17 - 43	0
(b) (6), (b)	0.0	07/19/17 - 16	07/12/17 - 22	3.9	56.1	24.9	07/19/17 - 16	02/15/17 - 169	19.2	32.0	37.5	145.9	0.0	339.7	117.3	07/12/17 - 22	07/19/17 - 16	4	07/12/17 - 22	6
(b3)(10USC§130)(b6)	2.3	08/03/17 - 0	08/03/17 - 0	5.5	24.2	6.1	05/25/17 - 71	04/05/17 - 120	20.1	32.0	49.9	113.6	0.0	302.8	84.9	08/03/17 - 0	08/03/17 - 0	3	08/03/17 - 0	15
(b3)(10USC§130)(b6)	0.0	07/18/17 - 16	07/18/17 - 16	6.7	35.0	14.1	07/18/17 - 16	04/05/17 - 120	25.2	30.9	43.0	153.8	0.0	345.3	137.2	07/18/17 - 16	07/15/17 - 20	5	07/12/17 - 22	7
	1.9	-	-	5.2	173.9	90.1	-	-	23.4	39.0	50.4	587.8	247.4	873.8	149.5	-	-		-	

MV-22B Aircrew

August 6, 17 08:38

Name	CURRENT MONTH	LAST FLIGHT	LAST NVG FLIGHT	TNVG LAST 30 DAYS	TOTAL NVG	TOTAL LLL	LAST RVL	LAST LAT	LAST 30 DAYS	LAST 60 DAYS	LAST 90 DAYS	TOTAL MV-22 TIME	TOTAL TAC HOURS	TOTAL HRS	FY HOURS	LAST NITE	DAY CQ	Day Ship Landings	NIGHT CQ	Night Ship Landings
Highlight		> 15	> 15					> 30	> 60	> 120	> 180						> 30		> 30	
Expired		> 30	> 30					> 180	> 100	> 200	> 300						> 365		> 365	
MV-22B Aerial Observer/Gunner																2				
(b3)(10USC§130)(b6)	0.0	07/15/17 - 22	-	0.0	0.0	0.0	-	-	0.0	0.0	4.0	0.0	0.0	0.0	30.1	02/12/17 - 174	-	-	-	-
(b3)(10USC§130)(b6)	2.3	08/03/17 - 2	08/03/17 - 2	9.6	77.8	37.7	11/04/16 - 274	04/05/17 - 122	28.1	44.8	47.3	0.0	0.0	0.0	125.6	08/03/17 - 2	08/03/17 - 2	-	08/03/17 - 2	-
	1.2	-	-	4.8	38.9	18.9	-	-	14.1	22.4	25.7	0.0	0.0	0.0	77.9	-	-		-	
MV-22B Crew Chief																20				
(b3)(10USC§130)(b6)	0.0	02/23/17 - 163	02/09/17 - 177	0.0	522.3	278.2	01/09/17 - 208	02/09/17 - 177	0.0	0.0	0.0	0.0	0.0	0.0	15.9	02/09/17 - 177	03/17/16 - 506	-	01/12/12 - 2032	-
(b3)(10USC§130)(b6)	0.0	05/23/17 - 74	05/23/17 - 74	0.0	751.5	270.4	02/28/17 - 158	05/04/17 - 93	0.0	0.0	3.5	0.0	0.0	0.0	27.3	05/23/17 - 74	-	-	-	-
(b3)(10USC§130)(b6)	2.2	08/04/17 - 1	08/04/17 - 1	17.3	167.1	83.8	07/16/17 - 20	07/16/17 - 20	17.3	32.7	55.1	0.0	0.0	0.0	203.6	08/04/17 - 1	08/04/17 - 1	-	08/04/17 - 1	-
(b3)(10USC§130)(b6)	0.0	07/19/17 - 17	03/19/14 - 1235	0.0	209.6	119.4	07/19/17 - 17	12/19/13 - 1325	23.0	29.0	29.0	0.0	0.0	0.0	29.0	03/19/14 - 1235	06/09/17 - 57	-	06/09/17 - 57	-
(b3)(10USC§130)(b6)	2.2	08/04/17 - 1	08/04/17 - 1	7.5	84.4	36.0	05/23/17 - 74	05/23/17 - 74	19.3	46.0	67.5	0.0	0.0	0.0	119.1	08/04/17 - 1	08/04/17 - 1	-	08/04/17 - 1	-
(b3)(10USC§130)(b6)	7.8	08/05/17 - 0	08/03/17 - 2	7.2	310.8	176.9	08/05/17 - 0	08/05/17 - 0	38.7	79.0	110.2	0.0	0.0	0.0	288.4	08/03/17 - 2	08/05/17 - 0	-	08/03/17 - 2	-
(b3)(10USC§130)(b6)	5.0	08/04/17 - 1	08/04/17 - 1	13.4	414.3	201.4	07/08/17 - 28	07/08/17 - 28	17.3	41.9	69.6	0.0	0.0	0.0	280.7	08/04/17 - 1	08/04/17 - 1	-	08/04/17 - 1	-
(b3)(10USC§130)(b6)	7.8	08/05/17 - 0	08/03/17 - 2	8.6	643.4	356.8	08/05/17 - 0	08/05/17 - 0	47.4	86.7	118.4	0.0	0.0	0.0	273.1	08/03/17 - 2	08/05/17 - 0	-	08/03/17 - 2	-
(b3)(10USC§130)(b6)	5.5	08/05/17 - 0	07/09/17 - 27	3.0	82.8	45.0	08/05/17 - 0	10/17/16 - 292	22.8	39.8	48.3	0.0	0.0	0.0	108.8	07/09/17 - 27	08/05/17 - 0	-	07/09/17 - 27	-
(b3)(10USC§130)(b6)	4.0	08/03/17 - 2	07/15/17 - 21	1.8	287.2	151.1	07/19/17 - 17	04/29/17 - 98	42.7	65.1	84.3	0.0	0.0	0.0	258.3	07/15/17 - 21	08/03/17 - 2	-	07/07/17 - 29	-
(b3)(10USC§130)(b6)	3.4	08/03/17 - 2	07/12/17 - 24	2.3	90.1	47.8	07/23/17 - 13	07/19/17 - 17	58.9	101.7	110.5	0.0	0.0	0.0	305.5	07/12/17 - 24	08/03/17 - 2	-	07/12/17 - 24	-
(b3)(10USC§130)(b6)	3.5	08/03/17 - 2	07/26/17 - 10	8.2	142.4	62.2	07/23/17 - 13	07/18/17 - 18	53.6	89.3	114.6	0.0	0.0	0.0	298.7	07/26/17 - 10	08/03/17 - 2	-	07/26/17 - 10	-
(b3)(10USC§130)(b6)	0.0	08/03/17 - 2	07/15/17 - 21	0.3	63.2	29.1	04/29/17 - 98	05/10/17 - 87	16.2	44.7	63.9	0.0	0.0	0.0	216.5	07/15/17 - 21	07/27/17 - 9	-	06/09/17 - 57	-
(b3)(10USC§130)(b6)	2.8	08/03/17 - 2	08/03/17 - 2	14.6	97.5	49.6	07/19/17 - 17	05/23/17 - 74	31.6	45.1	71.7	0.0	0.0	0.0	229.8	08/03/17 - 2	08/03/17 - 2	-	08/03/17 - 2	-
(b3)(10USC§130)(b6)	5.0	08/04/17 - 1	08/04/17 - 1	17.1	104.0	49.3	03/20/17 - 138	04/04/17 - 123	20.2	31.2	48.3	0.0	0.0	0.0	242.1	08/04/17 - 1	08/04/17 - 1	-	08/04/17 - 1	-
(b3)(10USC§130)(b6)	0.0	07/20/17 - 16	07/09/17 - 27	4.5	64.3	26.3	03/20/17 - 138	03/20/17 - 138	13.5	27.8	27.8	0.0	0.0	0.0	165.1	07/09/17 - 27	07/20/17 - 16	-	07/09/17 - 27	-
(b3)(10USC§130)(b6)	8.4	08/05/17 - 0	07/25/17 - 11	4.7	39.0	20.7	08/05/17 - 0	08/05/17 - 0	69.9	96.0	118.1	0.0	0.0	0.0	221.0	07/25/17 - 11	08/05/17 - 0	-	07/25/17 - 11	-
(b3)(10USC§130)(b6)	8.5	08/05/17 - 0	07/12/17 - 24	2.0	32.7	15.0	08/05/17 - 0	08/05/17 - 0	54.4	80.8	97.8	0.0	0.0	0.0	185.3	07/12/17 - 24	08/05/17 - 0	-	07/12/17 - 24	-
(b3)(10USC§130)(b6)	0.0	07/24/17 - 12	04/01/17 - 126	0.0	8.0	0.0	07/19/17 - 17	-	22.0	25.0	25.0	0.0	0.0	0.0	83.8	04/01/17 - 126	06/09/17 - 57	-	06/09/17 - 57	-
(b3)(10USC§130)(b6)	0.0	07/05/17 - 31	02/06/17 - 180	0.0	4.7	0.0	-	05/10/17 - 87	0.0	24.6	44.7	0.0	0.0	0.0	99.4	02/06/17 - 180	07/05/17 - 31	-	06/09/17 - 57	-
	3.3	-	-	5.6	206.0	101.0	-	-	28.4	49.3	65.4	0.0	0.0	0.0	182.6	-	-		-	

MV-22B Pilots

August 6, 17 08:51

Highlight		> 15	> 15					> 30	> 60	> 120	> 180						> 30		> 30	
Expired		> 30	> 30					> 180	> 100	> 200	> 300						> 365		> 365	
Name	CURRENT MONTH	LAST FLIGHT	LAST NVG FLIGHT	TNVG LAST 30 DAYS	TOTAL NVG	TOTAL LLL	LAST RVL	LAST LAT	LAST 30 DAYS	LAST 60 DAYS	LAST 90 DAYS	TOTAL MV-22 TIME	TOTAL TAC HOURS	TOTAL HRS	FY HOURS	LAST NITE	DAY CQ	Day Ship Landings	NIGHT CQ	Night Ship Landings
Assigned to permanent unit																24				
(b3)(10USC§130)(b6)	3.5	08/03/17 - 2	07/25/17 - 11	3.6	801.4	404.7	07/08/17 - 28	03/17/17 - 142	28.7	48.9	50.4	2011.1	1404.9	3247.1	152.5	07/25/17 - 11	08/03/17 - 2	11	07/25/17 - 11	5
(b3)(10USC§130)(b6)	5.0	08/04/17 - 1	08/04/17 - 1	9.3	532.8	322.2	08/03/17 - 2	03/30/17 - 128	22.3	40.5	40.5	1430.2	910.7	1680.9	139.7	08/04/17 - 1	08/04/17 - 1	12	08/04/17 - 1	13
(b3)(10USC§130)(b6)	1.2	08/04/17 - 1	08/04/17 - 1	5.8	672.5	332.0	06/01/17 - 65	05/23/17 - 74	7.3	37.5	63.7	1688.6	1130.8	1947.7	212.6	08/04/17 - 1	08/04/17 - 1	4	08/04/17 - 1	7
(b3)(10USC§130)(b6)	0.0	07/05/17 - 31	06/17/16 - 414	0.0	316.9	159.4	06/01/17 - 65	05/10/17 - 87	0.0	21.1	34.2	477.3	185.3	1405.9	39.2	06/29/17 - 38	07/05/17 - 31	-	11/27/12 - 1712	-
(b3)(10USC§130)(b6)	5.5	08/05/17 - 0	07/17/17 - 19	5.9	128.2	68.1	08/05/17 - 0	07/16/17 - 20	15.7	31.9	54.0	612.6	205.2	829.2	234.8	07/17/17 - 19	08/05/17 - 0	3	02/25/16 - 527	0
(b3)(10USC§130)(b6)	1.2	08/04/17 - 1	08/04/17 - 1	3.1	83.2	40.8	07/23/17 - 13	05/10/17 - 87	28.7	46.0	63.7	406.9	86.4	622.3	201.8	08/04/17 - 1	08/04/17 - 1	11	08/04/17 - 1	4
(b3)(10USC§130)(b6)	2.8	08/03/17 - 2	08/03/17 - 2	4.4	41.6	15.1	08/03/17 - 2	02/14/17 - 172	29.0	43.3	49.3	267.2	0.0	476.4	167.8	08/03/17 - 2	08/03/17 - 2	4	08/03/17 - 2	4
(b3)(10USC§130)(b6)	1.0	08/04/17 - 1	08/04/17 - 1	7.7	126.5	82.9	07/20/17 - 16	07/16/17 - 20	14.8	33.0	50.3	497.1	111.0	698.5	155.3	08/04/17 - 1	08/04/17 - 1	0	08/04/17 - 1	6
(b3)(10USC§130)(b6)	1.0	08/04/17 - 1	08/04/17 - 1	7.7	150.9	67.8	07/19/17 - 17	07/14/17 - 22	12.5	31.4	46.9	615.1	218.6	831.6	195.5	08/04/17 - 1	08/04/17 - 1	0	08/04/17 - 1	6
(b3)(10USC§130)(b6)	2.8	08/03/17 - 2	08/03/17 - 2	7.5	37.1	17.7	08/03/17 - 2	04/28/17 - 99	21.2	33.9	44.3	237.3	0.0	439.3	140.4	08/03/17 - 2	08/03/17 - 2	8	08/03/17 - 2	14
(b3)(10USC§130)(b6)	3.4	08/03/17 - 2	07/26/17 - 10	5.0	132.4	72.8	12/19/16 - 229	05/10/17 - 87	23.8	47.5	60.9	719.9	274.9	947.9	109.2	07/26/17 - 10	08/03/17 - 2	6	07/26/17 - 10	7
(b3)(10USC§130)(b6)	5.0	08/04/17 - 1	08/04/17 - 1	11.2	213.6	129.2	08/03/17 - 2	03/02/17 - 156	48.5	76.0	76.0	906.0	368.7	1115.7	161.5	08/04/17 - 1	08/04/17 - 1	20	08/04/17 - 1	9
(b3)(10USC§130)(b6)	0.0	07/26/17 - 10	07/26/17 - 10	8.1	249.5	133.8	07/23/17 - 13	03/17/17 - 142	22.1	25.6	32.5	961.7	457.8	1174.9	182.4	07/26/17 - 10	07/26/17 - 10	5	07/26/17 - 10	6
(b3)(10USC§130)(b6)	2.3	08/03/17 - 2	08/03/17 - 2	12.5	234.8	125.9	08/03/17 - 2	05/23/17 - 74	36.3	55.5	74.0	815.0	330.8	1026.9	207.9	08/03/17 - 2	08/03/17 - 2	7	08/03/17 - 2	7
(b3)(10USC§130)(b6)	4.0	08/03/17 - 2	07/19/17 - 17	3.6	64.1	30.2	03/20/17 - 138	04/28/17 - 99	24.3	49.3	59.3	408.8	77.8	622.4	190.4	07/19/17 - 17	08/03/17 - 2	10	07/19/17 - 17	3
(b3)(10USC§130)(b6)	5.0	08/05/17 - 0	07/26/17 - 10	1.6	71.2	30.8	08/05/17 - 0	05/04/17 - 93	25.2	40.6	57.0	390.0	13.7	624.4	128.1	07/26/17 - 10	08/05/17 - 0	14	07/26/17 - 10	3
(b3)(10USC§130)(b6)	3.4	08/03/17 - 2	07/26/17 - 10	3.8	44.2	15.0	07/18/17 - 18	04/05/17 - 122	30.8	45.1	48.3	314.6	0.0	535.8	161.9	07/26/17 - 10	08/03/17 - 2	15	07/26/17 - 10	7
(b3)(10USC§130)(b6)	0.0	07/24/17 - 12	07/18/17 - 18	5.5	39.9	11.4	07/19/17 - 18	02/28/17 - 158	35.4	46.4	48.4	193.7	0.0	406.2	126.7	07/18/17 - 18	07/24/17 - 12	11	07/12/17 - 24	5
(b3)(10USC§130)(b6)	5.0	08/05/17 - 0	07/26/17 - 10	2.5	95.5	49.4	08/05/17 - 0	01/25/17 - 192	28.0	49.6	55.2	582.7	174.7	794.2	173.8	07/26/17 - 10	08/05/17 - 0	9	07/26/17 - 10	7
(b3)(10USC§130)(b6)	3.5	08/03/17 - 2	06/21/17 - 45	0.0	15.2	4.5	04/07/17 - 120	05/04/17 - 93	15.7	26.2	36.0	86.0	0.0	280.7	86.0	06/21/17 - 45	08/03/17 - 2	3	06/21/17 - 45	0
(b3)(10USC§130)(b6)	4.0	08/03/17 - 2	06/21/17 - 45	0.0	16.4	3.8	07/23/17 - 13	05/04/17 - 93	24.7	35.6	49.3	97.1	0.0	300.8	97.1	06/21/17 - 45	08/03/17 - 2	11	06/21/17 - 45	0
(b3)(10USC§130)(b6)	0.0	07/19/17 - 18	07/12/17 - 24	3.9	56.1	24.9	07/19/17 - 18	02/15/17 - 171	19.2	32.0	37.5	145.9	0.0	339.7	117.3	07/12/17 - 24	07/19/17 - 18	4	07/12/17 - 24	6
(b3)(10USC§130)(b6)	7.8	08/05/17 - 0	08/03/17 - 2	5.5	24.2	6.1	08/05/17 - 0	04/05/17 - 122	25.6	36.7	52.9	119.1	0.0	308.3	90.4	08/03/17 - 2	08/05/17 - 0	3	08/03/17 - 2	15
(b3)(10USC§130)(b6)	0.0	07/18/17 - 18	07/18/17 - 18	6.7	35.0	14.1	07/18/17 - 18	04/05/17 - 122	25.2	30.9	43.0	153.8	0.0	345.3	137.2	07/18/17 - 18	07/15/17 - 22	5	07/12/17 - 24	7
	2.8	-	-	5.2	174.3	90.1	-	-	23.5	40.2	51.2	589.1	248.0	875.1	150.4	-	-		-	

MV-22B Aircrew

August 3, 17 09:10

Highlight		> 15	> 15					> 30	> 60	> 120	> 180						> 30		> 30	
Expired		> 30	> 30					> 180	> 100	> 200	> 300						> 365		> 365	
Name	CURRENT MONTH	LAST FLIGHT	LAST NVG FLIGHT	TNVG LAST 30 DAYS	TOTAL NVG	TOTAL LLL	LAST RVL	LAST LAT	LAST 30 DAYS	LAST 60 DAYS	LAST 90 DAYS	TOTAL MV-22 TIME	TOTAL TAC HOURS	TOTAL HRS	FY HOURS	LAST NITE	DAY CQ	Day Ship Landings	NIGHT CQ	Night Ship Landings
MV-22B Aerial Observer/Gunner																2				
(b3)(10USC§130)(b6)	0.0	07/15/17 - 19	-	0.0	0.0	0.0	-	-	0.0	0.0	4.0	0.0	0.0	0.0	30.1	02/12/17 - 171	-	-	-	-
(b3)(10USC§130)(b6)	2.3	08/03/17 - 0	08/03/17 - 0	7.3	75.5	37.7	11/04/16 - 271	04/05/17 - 119	25.8	42.5	50.0	0.0	0.0	0.0	125.6	08/03/17 - 0	08/03/17 - 0	-	08/03/17 - 0	-
	1.2	-	-	3.7	37.8	18.9	-	-	12.9	21.3	27.0	0.0	0.0	0.0	77.9	-	-		-	
MV-22B Crew Chief																20				
(b3)(10USC§130)(b6)	0.0	02/23/17 - 160	02/09/17 - 174	0.0	522.3	278.2	01/09/17 - 205	02/09/17 - 174	0.0	0.0	0.0	0.0	0.0	0.0	15.9	02/09/17 - 174	03/17/16 - 503	-	01/12/12 - 2029	-
(b3)(10USC§130)(b6)	0.0	05/23/17 - 71	05/23/17 - 71	0.0	751.5	270.4	02/28/17 - 155	05/04/17 - 90	0.0	0.0	3.5	0.0	0.0	0.0	27.3	05/23/17 - 71	-	-	-	-
(b3)(10USC§130)(b6)	0.0	07/17/17 - 16	07/17/17 - 16	18.1	164.9	83.8	07/16/17 - 17	07/16/17 - 17	18.1	31.5	52.9	0.0	0.0	0.0	201.4	07/17/17 - 16	06/04/17 - 59	-	02/24/16 - 525	-
(b3)(10USC§130)(b6)	0.0	07/19/17 - 15	03/19/14 - 1232	0.0	209.6	119.4	07/19/17 - 15	12/19/13 - 1322	23.0	29.0	29.0	0.0	0.0	0.0	29.0	03/19/14 - 1232	06/09/17 - 54	-	06/09/17 - 54	-
(b3)(10USC§130)(b6)	0.0	07/25/17 - 8	07/12/17 - 21	5.3	82.2	36.0	05/23/17 - 71	05/23/17 - 71	17.1	46.8	65.3	0.0	0.0	0.0	116.9	07/12/17 - 21	07/25/17 - 8	-	07/12/17 - 21	-
(b3)(10USC§130)(b6)	2.3	08/03/17 - 0	08/03/17 - 0	6.6	308.5	176.9	07/18/17 - 15	07/18/17 - 15	34.4	75.2	102.4	0.0	0.0	0.0	282.9	08/03/17 - 0	08/03/17 - 0	-	08/03/17 - 0	-
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	8.4	409.3	201.4	07/08/17 - 25	07/08/17 - 25	12.3	40.9	68.1	0.0	0.0	0.0	278.5	08/03/17 - 0	08/03/17 - 0	-	08/03/17 - 0	-
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	5.8	640.6	356.8	07/08/17 - 25	07/12/17 - 21	39.6	80.1	110.6	0.0	0.0	0.0	268.1	08/03/17 - 0	08/03/17 - 0	-	08/03/17 - 0	-
(b3)(10USC§130)(b6)	0.0	07/20/17 - 13	07/09/17 - 24	3.0	82.8	45.0	07/08/17 - 25	10/17/16 - 289	17.3	38.3	42.8	0.0	0.0	0.0	103.3	07/09/17 - 24	07/20/17 - 13	-	07/09/17 - 24	-
(b3)(10USC§130)(b6)	4.0	08/03/17 - 0	07/15/17 - 18	1.8	287.2	151.1	07/19/17 - 15	04/29/17 - 95	38.9	61.1	80.3	0.0	0.0	0.0	258.3	07/15/17 - 18	08/03/17 - 0	-	07/07/17 - 26	-
(b3)(10USC§130)(b6)	3.4	08/03/17 - 0	07/12/17 - 21	2.3	90.1	47.8	07/23/17 - 11	07/19/17 - 15	59.2	99.3	107.1	0.0	0.0	0.0	305.5	07/12/17 - 21	08/03/17 - 0	-	07/12/17 - 21	-
(b3)(10USC§130)(b6)	3.5	08/03/17 - 0	07/26/17 - 7	8.2	142.4	62.2	07/23/17 - 11	07/18/17 - 15	53.8	87.3	111.1	0.0	0.0	0.0	298.7	07/26/17 - 7	08/03/17 - 0	-	07/26/17 - 7	-
(b3)(10USC§130)(b6)	0.0	08/03/17 - 0	07/15/17 - 18	0.3	63.2	29.1	04/29/17 - 95	05/10/17 - 84	16.2	46.4	63.9	0.0	0.0	0.0	216.5	07/15/17 - 18	07/27/17 - 6	-	06/09/17 - 54	-
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	11.8	94.7	49.6	07/19/17 - 15	05/23/17 - 71	28.8	43.3	72.4	0.0	0.0	0.0	229.8	08/03/17 - 0	08/03/17 - 0	-	08/03/17 - 0	-
(b3)(10USC§130)(b6)	2.8	08/03/17 - 0	08/03/17 - 0	12.1	99.0	49.3	03/20/17 - 135	04/04/17 - 120	15.2	29.2	43.3	0.0	0.0	0.0	239.9	08/03/17 - 0	08/03/17 - 0	-	08/03/17 - 0	-
(b3)(10USC§130)(b6)	0.0	07/20/17 - 13	07/09/17 - 24	4.5	64.3	26.3	03/20/17 - 135	03/20/17 - 135	13.5	27.8	27.8	0.0	0.0	0.0	165.1	07/09/17 - 24	07/20/17 - 13	-	07/09/17 - 24	-
(b3)(10USC§130)(b6)	3.4	08/03/17 - 0	07/25/17 - 8	4.7	39.0	20.7	07/23/17 - 11	07/18/17 - 15	65.2	89.1	109.7	0.0	0.0	0.0	216.0	07/25/17 - 8	08/03/17 - 0	-	07/25/17 - 8	-
(b3)(10USC§130)(b6)	3.5	08/03/17 - 0	07/12/17 - 21	3.7	32.7	15.0	07/23/17 - 11	07/18/17 - 15	49.4	73.3	89.3	0.0	0.0	0.0	180.3	07/12/17 - 21	08/03/17 - 0	-	07/12/17 - 21	-
(b3)(10USC§130)(b6)	0.0	07/24/17 - 9	04/01/17 - 123	0.0	8.0	0.0	07/19/17 - 15	-	22.0	25.0	25.0	0.0	0.0	0.0	83.8	04/01/17 - 123	06/09/17 - 54	-	06/09/17 - 54	-
(b3)(10USC§130)(b6)	0.0	07/05/17 - 28	02/06/17 - 177	0.0	4.7	0.0	-	05/10/17 - 84	3.7	28.6	44.7	0.0	0.0	0.0	99.4	02/06/17 - 177	07/05/17 - 28	-	06/09/17 - 54	-
	1.6	-	-	4.8	204.9	101.0	-	-	26.4	47.6	62.5	0.0	0.0	0.0	180.8	-	-		-	

VMM-265
MAINTENANCE CONTROL
168634

A/C 13
AIRCRAFT DISCREPANCY BOOK

NALCOMIS OMA

File Window Help

Automated Aircraft Discrepancy Book

ORG: GH5 BUNO: 168634 TMS: MV-22B Next Phase: 76.800 Hours Up/Down/Partial: U

MODEX: 13 Assy Cd: AYNE Basic Wgt: 34806 Acft Hours: 203.200 Last Flown: 23 JUL 2017 0900

Engine/APU/Prop Data | Open Work Orders | Awaiting Maintenance Control Approval | Closed Work Orders Last 10 Flights

Acceptance For Flight | Consumption | Inspections Near Due | Removals Near Due | Summary

Refresh

Oxy Qty: 1,800.00

Fuel Grade: JP5

Fuel Qty: 9,400.00

Hot Seat Ind: NO

Oil Grade	Oz. Of Oil Added	Multiplier	Description
23699	0.0	1.0	ENGINE, AIRCRAFT TURBINE - CAE130781 (1)
23699	0.0	1.0	ENGINE, AIRCRAFT TURBINE - CAE130782 (2)

Ordnance: AC INSTALLED WITH COMBO MOUNT SN 22MV-1070, M240D CONFIGURED, SB. QASO [redacted] b3)(10USC§130 (b6)

Special Equipment:

Limitations: THE FOLLOWING EOC APPLIES: NONE

Pilot Signature: 05 AUG 2017 0

I have personally inspected this aircraft IAW the applicable MRCs/checklists. Any discrepancies noted have been entered on a work order.

Certification of safe for flight condition by MMCO, MO or MCO. If authorized, other persons may sign.

I've reviewed discrepancy reports flights, insured wgt. and balance accept this aircraft for flight.

Signatures: Plane Captain: [redacted] (b3 (10USC§130)(b6)

Safe for Flight: [redacted] (b3 (10USC§130)(b6)

Pilot [redacted] (b) 10USC 130 (6)

A-Sheet | Daily Maint. Record | Turnaround Maint. Record | Aircraft Limitations | Daily/Turnaround - Local Card Reference | Last 10 A-Sheets

NALCOMIS OMA

File Window Help

Automated Aircraft Discrepancy Book

ORG: GH5 BUNO: 168634 TMS: MV-22B Next Phase: 76.800 Hours Up/Down/Partial: U

MODEX: 13 Assy Cd: AYNE Basic Wgt: 34806 Acft Hours: 203.200 Last Flown: 23 JUL 2017 0900

Engine/APU/Prop Data | Open Work Orders | Awaiting Maintenance Control Approval | Closed Work Orders Last 10 Flights

Acceptance For Flight | Consumption | Inspections Near Due | Removals Near Due | Summary

Refresh

Oxy Qty: 1,800.00

Fuel Grade: JP5

Fuel Qty: 9,400.00

Hot Seat Ind: NO

Oil Grade	Oz. Of Oil Added	Multiplier	Description
23699	0.0	1.0	ENGINE, AIRCRAFT TURBINE - CAE130781 (1)
23699	0.0	1.0	ENGINE, AIRCRAFT TURBINE - CAE130782 (2)

Ordnance: AC INSTALLED WITH COMBO MOUNT SN 22MV-1070, M240D CONFIGURED, SB. QASO [redacted].

Special Equipment:

Limitations: THE FOLLOWING EOC APPLIES: NONE

Pilot Signature: 00 0000 00

I have personally inspected this aircraft IAW the applicable MRCs/checklists. Any discrepancies noted have been entered on a work order.

Certification of safe for flight condition by MMCO, MO or MCO. If authorized, other persons may sign.

I've reviewed discrepancy reports flights, insured wgt. and balance accept this aircraft for flight.

Signatures: Plane Captain: [redacted]

Safe for Flight:

Pilot:

A-Sheet | Daily Maint. Record | Turnaround Maint. Record | Aircraft Limitations | Daily/Turnaround - Local Card Reference | Last 10 A-Sheets

NALCOMIS OMA

UNCLASSIFIED - NIPRNET - MNC

File Window Help

Automated Aircraft Discrepancy Book

ORG: GH5 BUNO: 168634 TMS: MV-22B Next Phase: 76.800 Hours Up/Down/Partial: D

MODEX: 13 Assy Cd: AYNE Basic Wgt: 34806 Acft Hours: 203.200 Last Flown: 23 JUL 2017 0900

Engine/APU/Prop Data | Open Work Orders | Awaiting Maintenance Control Approval | Closed Work Orders Last 10 Flights

Acceptance For Flight | Consumption | Inspections Near Due | Removals Near Due | Summary

Refresh

Oxy Qty: 1,800.00

Fuel Grade: JP5

Fuel Qty: 8,500.00

Hot Seat Ind: NO

Oil Grade	Oz. Of Oil Added	Multiplier	Description
			ENGINE, AIRCRAFT TURBINE - CAE130781 (1)
			ENGINE, AIRCRAFT TURBINE - CAE130782 (2)

Ordnance: AC INSTALLED WITH COMBO MOUNT SN 22MV-1070, M240D CONFIGURED, SB. QASO [redacted] b3 (10USC§130 (b6)

Special Equipment:

Limitations: THE FOLLOWING EOC APPLIES: NONE

Pilot Signature: 00 0000 00

I have personally inspected this aircraft IAW the applicable MRCs/checklists. Any discrepancies noted have been entered on a work order.

Certification of safe for flight condition by MMCO, MO or MCO. If authorized, other persons may sign.

I've reviewed discrepancy reports flights, insured wgt. and balance accept this aircraft for flight.

Signatures: Plane Captain: Safe for Flight: [redacted] (b3)(10USC§130) b6) Pilot [redacted] (b3)(10USC§130 (b6)

A-Sheet | Daily Maint. Record | Turnaround Maint. Record | Aircraft Limitations | Daily/Turnaround - Local Card Reference | Last 10 A-Sheets

Ready

Turnaround Maint. Records for MODEX 13 /BUNO 168634

Received Date: 04 AUG 2017 0255 Completion Date: 05 AUG 2017 0756 Maint Cntl Sig [redacted] b3 (1 U C§13) b6)

Card No	Wc Cd	Tool Box #	Discrepancy	Corrected	Worker Signature
01	310	6-3	NONE	☐	[redacted] b3 (10USC§130) b6)
02	310	6-3		☐	
03	310	6-3		☐	
04	310	6-3		☐	
05	310	6-3		☐	
06	310	6-3		☐	
07	310	6-3		☐	
08	310	6-3		☐	
09	310	6-3		☐	
10	310	6-3		☐	
11	310	6-3		☐	
12	310	6-3		☐	
13	310	6-3		☐	
14	310	6-3		☐	
15	310	6-3		☐	
16	310	6-3		☐	
	310	6-3		☐	
18	310	6-3		☐	

Maint. Records for MODEX /BUNO

Received Date: 04 AUG 2017 0255 Completion Date: 05 AUG 2017 0756 Maint Cntl Sig: b3 (1 USC§13) b6) [redacted]

Card No	Wc Cd	Tool Box #	Discrepancy	Corrected	Worker Signature
19	310	6-3		☐	b3 (0USC 13) b6) [redacted]
20	310	6-3		☐	
21	310	6-3		☐	
22	310	6-3		☐	
23	310	6-3		☐	
24	310	6-3	NONE	☐	

Daily Maint. Records for MODEX 13 /BUNO 168634

Received Date: 04 AUG 2017 0252 Completion Date: 05 AUG 2017 0756 Maint Cntl Sig: b3 (1 USC§13) b6) [redacted]

Card No	Wc Cd	Tool Box #	Discrepancy	Corrected	Worker Signature
01	310	6-3	NONE	☐	(b3) 10USC§130)(b6) [redacted]
02	310	6-3		☐	
02.1	310	6-3		☐	
03	310	6-3		☐	
04	310	6-3		☐	
04.1	310	6-3		☐	
05	310	6-3		☐	
05.1	310	6-3		☐	
06	310	6-3		☐	
06.1	310	6-3		☐	
06.2	310	6-3		☐	
07	310	6-3		☐	
08	310	6-3		☐	
08.1	310	6-3		☐	
08.2	310	6-3		☐	
08.3	310	6-3		☐	
	310	6-3		☐	
09.1	310	6-3		☐	

Maint. Records for MODEX /BUNO

Received Date: 04 AUG 2017 0252 Completion Date: 05 AUG 2017 0756 Maint Cntl Sig: [redacted] b) 10U C§1 0) b)

Card No	Wc Cd	Tool Box #	Discrepancy	Corrected	Worker Signature
09.2	310	6-3		☐	[redacted] b3 (10USC§130)(b6)
10	310	6-3		☐	
11	310	6-3	NONE	☐	
12	310	6-7	NONE	☐	
12.1	310	6-7		☐	
12.2	310	6-7		☐	
12.3	310	6-7		☐	
12.4	310	6-7		☐	
12.5	310	6-7		☐	
12.6	310	6-7		☐	
12.7	310	6-7	NONE	☐	
13	310	6-3	NONE	☐	
13.1	310	6-3		☐	
13.2	310	6-3		☐	
13.3	310	6-3		☐	
13.4	310	6-3		☐	
	310	6-3		☐	
13.6	310	6-3		☐	b3) 10U C 130)(b6) [redacted]

Maint. Records for MODEX /BUNO

Received Date: 04 AUG 2017 0252 Completion Date: 05 AUG 2017 0756 Maint Cntl Sig [redacted] (3) 10USC 13) b6)

Card No	Wc Cd	Tool Box #	Discrepancy	Corrected	Worker Signature
13.7	310	6-3	NONE	☐	[redacted] (3) 10USC 130 (b)
14	310	6-7	NONE	☐	

ORG : [illegible]
ORG Name : [illegible]
Aircraft Data: MODEX

NALCOMIS [illegible]A
SCHEDULED INSPEC[illegible]NS REPORT
05 AUG 2017 - 05 AUG 2018

DATE: 05 AUG 2017
TIME: 0609
REQ BY: (b)(10USC§130) b6)
PAGE: 1 of 2

Verified by b3 (10USC§130)(b6) on 8/5/17@ 0620

MODEX	BUNO/Serno	Assy Cd	Position Code	Task Name	Location	Interval	When Due Date	Units	Current	Remaining
13	168634	AYNE		7 DAY INSPECTION (AFLOAT)	PRIMARY	7 Day	10 AUG 2017			5
	22MV-1070	BY07		28 DAY SPECIAL INSPECTION-DEPLOY	PRIMARY	28 Day	14 AUG 2017			9
	168634	AYNE		56 DAY INSPECTION	PRIMARY	56 Day	12 SEP 2017			38
		AYNE		91 DAY INSPECTION	PRIMARY	91 Day	19 SEP 2017			45
	EN0017323	AYNE		CABIN EMERGENCY EQUIPMENT INSPI	PRIMARY	182 Day	12 DEC 2017			129
	EN0017788	AYNE		CABIN EMERGENCY EQUIPMENT INSPI	PRIMARY	182 Day	12 DEC 2017			129
	BH425097	CV2R		360 DAY INSPECTION	PRIMARY	360 Day	04 JUL 2018			333
	BH425096	CV2L		360 DAY INSPECTION	PRIMARY	360 Day	04 JUL 2018			333
	FAK168634	AYNE		CABIN EMERGENCY EQUIPMENT INSPI	PRIMARY	364 Day	12 JUN 2018			311
	XXX	AYNE		CRASH POSITION INDICATOR TEST (AN	PRIMARY	364 Day	29 AUG 2017			24
	CAE130781	T1B	1	35 HOUR ENGINE INSP (AUSTERE ONL	PRIMARY	35 Hour		205.900	203.200	2.700
	CAE130782	T1B	1	35 HOUR ENGINE INSP (AUSTERE ONL	PRIMARY	35 Hour		205.900	203.200	2.700
	168634	AYNE		35 FLIGHT HOUR INSPECTION	PRIMARY	35 Hour		205.900	203.200	2.700
	BH410593	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	BH415047	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	BH394732	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	BH423375	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	BH415046	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	BH425361	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	CAE130782	T1B	1	70 FLIGHT HOUR INSPECTION	PRIMARY	70 Hour		210.000	203.200	6.800
	CAE130781	T1B	1	70 FLIGHT HOUR INSPECTION	PRIMARY	70 Hour		210.000	203.200	6.800
	168634	AYNE		70 FLIGHT HOUR INSPECTION	PRIMARY	70 Hour		210.000	203.200	6.800
	BH410593	AYNE		70 HOUR BLADE ROOT FOR CRACKS IN	PRIMARY	70 Hour		210.000	203.200	6.800
	BH394732	AYNE		70 HOUR BLADE ROOT FOR CRACKS IN	PRIMARY	70 Hour		210.000	203.200	6.800
	BH423375	AYNE		70 HOUR BLADE ROOT FOR CRACKS IN	PRIMARY	70 Hour		210.000	203.200	6.800
	BH415047	AYNE		70 HOUR BLADE ROOT FOR CRACKS IN	PRIMARY	70 Hour		210.000	203.200	6.800
	BH425361	AYNE		70 HOUR BLADE ROOT FOR CRACKS IN	PRIMARY	70 Hour		210.000	203.200	6.800
	BH415046	AYNE		70 HOUR BLADE ROOT FOR CRACKS IN	PRIMARY	70 Hour		210.000	203.200	6.800
	CAE130782	T1B	1	70 HOUR POWER ASSURANCE	PRIMARY	70 Hour		210.000	203.200	6.800
	CAE130781	T1B	1	70 HOUR POWER ASSURANCE	PRIMARY	70 Hour		210.000	203.200	6.800

ORG : G[illegible]
ORG Name : [illegible]
Aircraft Data: MODEX

NALCOMIS [illegible]A
SCHEDULED INSPEC[illegible]NS REPORT
05 AUG 2017 - 05 AUG 2018

DATE: 05 AUG 2017
TIME: 0609
REQ BY: [redacted] b3)(10USC§130) b6)
PAGE: 1 of 2

Verified by [redacted] (b3 (10USC§130)(b6) on 8/5/17@ 0620

MODEX	BUNO/Serno	Assy Cd	Position Code	Task Name	Location	Interval	When Due Date	Units	Current	Remaining
13	168634	AYNE		7 DAY INSPECTION (AFLOAT)	PRIMARY	7 Day	10 AUG 2017			5
	22MV-1070	BY07		28 DAY SPECIAL INSPECTION-DEPLOY	PRIMARY	28 Day	14 AUG 2017			9
	168634	AYNE		56 DAY INSPECTION	PRIMARY	56 Day	12 SEP 2017			38
		AYNE		91 DAY INSPECTION	PRIMARY	91 Day	19 SEP 2017			45
	EN0017323	AYNE		CABIN EMERGENCY EQUIPMENT INSPI	PRIMARY	182 Day	12 DEC 2017			129
	EN0017788	AYNE		CABIN EMERGENCY EQUIPMENT INSPI	PRIMARY	182 Day	12 DEC 2017			129
	BH425097	CV2R		360 DAY INSPECTION	PRIMARY	360 Day	04 JUL 2018			333
	BH425096	CV2L		360 DAY INSPECTION	PRIMARY	360 Day	04 JUL 2018			333
	FAK168634	AYNE		CABIN EMERGENCY EQUIPMENT INSPI	PRIMARY	364 Day	12 JUN 2018			311
	XXX	AYNE		CRASH POSITION INDICATOR TEST (AI	PRIMARY	364 Day	29 AUG 2017			24
	CAE130781	T1B	1	35 HOUR ENGINE INSP (AUSTERE ONI	PRIMARY	35 Hour		205.900	203.200	2.700
	CAE130782	T1B	1	35 HOUR ENGINE INSP (AUSTERE ONI	PRIMARY	35 Hour		205.900	203.200	2.700
	168634	AYNE		35 FLIGHT HOUR INSPECTION	PRIMARY	35 Hour		205.900	203.200	2.700
	BH410593	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	BH415047	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	BH394732	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	BH423375	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	BH415046	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	BH425361	AYNE		35 HOUR INSPECTION.	PRIMARY	35 Hour		205.900	203.200	2.700
	CAE130782	T1B	1	70 FLIGHT HOUR INSPECTION	PRIMARY	70 Hour		210.000	203.200	6.800
	CAE130781	T1B	1	70 FLIGHT HOUR INSPECTION	PRIMARY	70 Hour		210.000	203.200	6.800
	168634	AYNE		70 FLIGHT HOUR INSPECTION	PRIMARY	70 Hour		210.000	203.200	6.800
	BH410593	AYNE		70 HOUR BLADE ROOT FOR CRACKS II	PRIMARY	70 Hour		210.000	203.200	6.800
	BH394732	AYNE		70 HOUR BLADE ROOT FOR CRACKS II	PRIMARY	70 Hour		210.000	203.200	6.800
	BH423375	AYNE		70 HOUR BLADE ROOT FOR CRACKS II	PRIMARY	70 Hour		210.000	203.200	6.800
	BH415047	AYNE		70 HOUR BLADE ROOT FOR CRACKS II	PRIMARY	70 Hour		210.000	203.200	6.800
	BH425361	AYNE		70 HOUR BLADE ROOT FOR CRACKS II	PRIMARY	70 Hour		210.000	203.200	6.800
	BH415046	AYNE		70 HOUR BLADE ROOT FOR CRACKS II	PRIMARY	70 Hour		210.000	203.200	6.800
	CAE130782	T1B	1	70 HOUR POWER ASSURANCE	PRIMARY	70 Hour		210.000	203.200	6.800
	CAE130781	T1B	1	70 HOUR POWER ASSURANCE	PRIMARY	70 Hour		210.000	203.200	6.800

				TIME	0825			

SFF CHECKLIST

MODEX: 13 BUNO: 168634 DATE: 8/5/17 ETD/ETR: 0800/1630 TMS: MV-22B EVENT: 6502 HRS: 5.5

- ☑ Print the following reports:
  1. Scheduled Inspection Report.
  2. High Time Report (ensure capture of Pitch Link data).
  3. TD Outstanding Report.
  4. A/C Equipment Work Load.
  5. Last 10 Part 'A' Report.
  6. Installed Explosives Report.
- ☑ Verify Daily and Turnaround are completed.
- ☑ Compare Sched Insp Report to Rough Log & completed scheduled inspections.
- ☑ Screen Sched Insp Report for delinquent inspections and minimum required days/times for the event.
- ☑ Screen High Time Report for minimum required days/times for the event.
- ☑ Verify date last flown; if over 30 days FCF "C" profile is required.
- ☑ Ensure APU starts/hours and oil consumption is logged.
- ☑ Ensure Engine Oil Consumption logs are filled out and oil consumption is logged in OOMA.
- ☑ Ensure Fuel Sample Log is filled out (samples pulled w/in 24 hours of first flight of the day).
- ☑ Ensure Tire Pressure Log is filled out (tire pressures logged for the current day).
- ☑ Screen TD Outstanding report:
  1. Ensure no TD's are overdue; review TD's nearing due date.
  2. Ensure Level 1 TD's have active WO; WO's shall have NLT date in the system reason & discrepancy.
- ☑ Screen A/C Work Load; physically check all open WO's against the A/C Work Load by placing a check mark on the report and perform the following:
  1. Evaluate WO to determine if it is necessary to complete prior to flight.
  2. Verify EOC; ensure there are no "D" discrepancies; update EOC as appropriate (refer to MESM).
  3. Verify Job Status; ensure no WO's are "IW", "CT", or "JC"; update job status on MAF in ADB.
  4. Verify that any "WP" status has an open doc and that there are no AKO docs.
  5. Ensure open WO's are correctly placed in ADB (in order according to workload).
  6. Ensure corrosion WO's are correctly documented (type/severity of corrosion in discrepancy), and have a due date listed in system reason. All corrosion WO's must be corrected w/in 28 days.
  7. Verify that IP's in ADB match IP's in OOMA; check IP's for currency; ensure WO's have IP's as required.
- ☑ Verify completed Part "A's" in the ADB against the Last 10 Report, ensure all Part "A's" are complete and correct.
- ☑ Review last 10 flights:
  1. Completed WO's shall be placed on the left side in the "LAST 10" section.
  2. Verify WO's requiring NPPC or FCF are stamped appropriately; FCF/NPPC WO's not signed shall be placed on the right side in the "LAST 10" section.
  3. Purge completed WO's and Part "A's" older than 10 flights.
- ☑ View the following OMA screens:
  1. Maintenance Control JCN assignment; Check for WO's awaiting JCN's.
  2. Multiple Active Work Order Window; Check for IW job status.
  3. Project/Priority que; Check for parts awaiting assignments.
  4. Maintenance Control WO sign off window; Check for WO's awaiting to be processed.
  5. Run 'Tool Box not CDI' ADHOC; ensure all sign off of tool boxes.
  6. Screen Inspections & Removal Near Due tabs in the electronic ADB.
- ☑ Screen flight schedule for aircrew and ensure flight gear inspections are current.
- ☑ Verify CAD/PAD installations for expiration dates on installed explosive report.
- ☑ Screen weight and balance Form "F" for validation; check that basic weight matches Part "A".
- ☑ Update Ordnance block (if ordnance installed must be done by QASO); Update Special Equipment block.
- ☑ Update Aircraft Limitations block with appropriate EOC WO's.
- ☑ Initial the Daily Screening Log Sheet.
- ☑ Sign Part "A" form block 10 and/or digitally sign in OOMA.
- ☑ Mass Job Status change all M3's to M7's once aircraft is certified SFF.
- ☑ Insert Part "A", current D&T, this checklist and printed reports in the ADB; printed reports will be stapled, signed and dated when complete.

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