

AVT Engineering Capabilities

ID	Description
1	Mathematical Modelling
2	Helicopter Simulation (Helicopter-Ship Interface)
3	Aircraft Simulation
4	Ship Hydrodynamic Simulation
5	Dynamics
6	FEM / Structural Analysis
7	Simulation Graphics
8	Aerodynamics
9	Operational Research
10	Systems Modelling
11	Optimisation
12	Data Analysis
13	Data Acquisition
14	CAD

AVT Helicopter - Ship Analysis Capabilities

ID	Description
1	OnDeck Helicopter Model Development
2	Ship Motion Model Development
3	Ship Motion Model Embarked Validation
4	OnDeck Toppling Sliding Limit SHOL Analysis
5	OnDeck Lashed Limit Analysis (Chains, Nylons, Other)
6	Sea State Capability Analysis / Procurement Advice
7	Sea State Risk Assessment (Limit Events per hr)
8	OnDeck SHOL Embarked Validation (Maritime Helicopter Aid)
9	OnDeck Helicopter Model Embarked Tuning (Maritime Helicopter Aid)
10	Maritime Helicopter Aid System (Real-Time SHOL Proximity Guidance)
11	RAST Restraint System Limit Analysis
12	DeckLock Restraint System Limit Analysis
13	MacTaggart Scott TRIGON Analysis
14	ASIST Restraint System Analysis
15	Alternate Deck Restraint System Model Development
16	Douglas MANTIS/MAMAS Ground Handler Limit Analysis (Potential)
17	Alternate Ground Handler Model Development
18	Airframe Clearance Analysis (Hangar Doors, Radome-Deck, ..)
19	Flight Deck Landing Loads Analysis
20	Undercarriage Landing Loads Analysis
21	Obstructed Landing Load and Response Analysis (e.g. RSD Box, ASIST)
22	Lashing Layout Optimisation (Flight Deck, Bespoke Hangar)
23	Lashing Layout Sensitivity Analysis
24	Simulated On-Deck Fatigue Analysis
25	Helicopter Transport Limit Analysis (e.g. MRH90 – C17)

AVT Ship Analysis Capabilities

ID	Description
1	Ship Motion Model Development
2	Ship Motion Model Embarked Validation
3	Anti-roll Tank Modelling
4	Active Control System Modelling

AVT Handling Qualities Analysis Capabilities

ID	Description
1	Flight Data Analysis
2	ADS-33 E PRF Analysis (Bandwidth, Aditude Quickness, Max Rate, ...)

ADF Tasking

AVT has been engaged by the Australian Defence Science and Technology Organisation since 1998 to provide expertise in the analysis of helicopter-ship operating limits and other interface issues.

The work conducted for the ADF includes:

ID	Date	Description
1	1998 -	Ongoing OnDeck code development, documentation and maintenance
2	1998	Development of Black Hawk OnDeck simulation model
3	1999	Development of new OnDeck batch procedures for rapid operating limit assessment.
4	1999	Dynamic unrestrained and restrained limit analysis of Black Hawk on RAN LPA.
5	2000	Refinement of AS350BA Squirrel OnDeck model for FOCFT risk mitigation
6	2000	ADAMS dynamic software trial.
7	2000	Development of Java GUI interface.
8	2000	Development of C++ OpenGL Replay graphics code for simulation visualisation and limit assessment.
9	2000	Development of high fidelity friction algorithm to model adhesion and sliding and braking effects.
10	2000	Fatigue analysis of Black Hawk helicopter on LPA class ships based on operation usage.
11	2001	Development of a high fidelity Seasprite OnDeck model .
12	2001	Development of Indal RAST helicopter restraint model for limit analysis with functional RSD traverse capability.
13	2001	Development of high fidelity Black Hawk undercarriage model with multi-stage non-linear oleo spring and damping characteristics as well as drag link dynamics.
14	2001	Development of standalone Matlab undercarriage simulation model for high fidelity undercarriage oleo and tyre stiffness and damping optimisation.

15	2002	Deck strength analysis using Black Hawk OnDeck model. Black Hawk undercarriage model optimised using drop test data for high decent rate load correlation. Deck foot print loads estimated to assess allowable decent rates.
16	2003	OnDeck lashing and undercarriage load spectrum analysis of Black Hawk Helicopters based on RAN operational usage.
17	2005	Development of an improved methodology for determining helicopter-ship on-deck limits. Refined methodology for operational analysis using 6 degree of freedom ship motion based on Shipmo input. Since been refined in 2008.
18	2005	Black Hawk Pilot in the loop simulation fidelity analysis using ADS-33E PRF. Hover Bandwidth, moderate amplitude and large amplitude quantative measures determined and compared against flight test data. Simulations were conducted using FlightLab and GenHel.
19	2003	Black Hawk lashing scheme optimisation and sensitivity analysis. Optimisation used to perturb and tune lashing scheme arrangement for minimal loading for a wide range of operating conditions. Optimisation wrapper integrated into OnDeck code.
20	2005	Refinement of Seahawk OnDeck model to include high fidelity undercarriage model.
21	2005	Refinement of Sea King OnDeck model to include high fidelity undercarriage model.
22	2006	Development of high fidelity Chinook OnDeck simulation model for FOCFT risk mitigation. Polytropic compression routine integrated into OnDeck for improved high loads estimation as well as hysteresis modelling.

23	2006	Dynamic landing, sliding and toppling limit analysis of Seasprite on Kaman modified RSD with skirt panels. OnDeck code significantly modified to handle multi-surface tyre interactions. Landing analysis performed for a range of decent rates, lateral drift rates, ship angles and tyre-RSD skirt panel interactions. Toppling and sliding operating limit analysis performed with RSD panel interaction. Complex friction modelling implemented as well as tyre contact patch algorithm fidelity refinements. FEM unit loads matrix included for loads estimation of redundant parts of undercarriage structure.
24	2007	Development of high fidelity Tiger OnDeck simulation model for FOCFT risk mitigation.
25	2007	Dynamic Limit Analysis of Seahawk on Sirius using ShipmoPC regular ship motion input. Unrestrained and lashed analysis.
26	2007	Development of high fidelity MRH90 OnDeck simulation model for FOCFT risk mitigation
27	2008	Development of Maritime Helicopter Aid (MHA) based on real time simulation using OnDeck code. Commonwealth funded Capability Technology Demonstrator (CTD) Program managed by DSTO.

AVT International Work

Since 2005 AVT has conducted simulation analysis for foreign navies. The tasking includes:

ID	Date	Organisation	Description
1	2005	Danish Navy	Development of Lynx OnDeck simulation model.
2	2005	Danish Navy	OnDeck limit analysis of Lynx on Flexible Support Ship based on FREDYN ship motion data input. Deck lock modelling included.
3	2005	New Zealand Navy	Comprehensive Limit Sensitivity analysis and development of more comprehensive Decklock model. Comprehensive sinusoidal shipmotion limit analysis including ship manoeuvring effects.
4	2006	Swedish Navy	OnDeck limit analysis and lashing scheme sensitivity analysis of Lynx on Visby Corvette.
5	2008	New Zealand Navy	Ship Motion Analysis of NZ Multi-Role Vessel (MRV) using ShipmoPC including anti-roll tank modelling and time domain integration into OnDeck software with anti-roll tank saturation and active mode corrections..
6	2008-	New Zealand Navy	OnDeck limit analysis of Seasprite on MRV using ShipmoPC irregular motion input. Limits resolved into roll and pitch as well as sea state capability. Deck lock modelling included.
7	2008	New Zealand Navy	Ship Motion Analysis of NZ Off Shore Patrol Vessel (OPV) using ShipmoPC.
8	2008-	New Zealand Navy	OnDeck limit analysis of Seasprite on OPV.
9	2008-	MacTaggart Scott	TRIGON system OnDeck Integration and analysis