



Expeditionary Logistics Component

Littoral Combat and Power Projection FNC

Wrap up and Q&A

HiCASS Industry Day

23 October 2003

**Mr. Ed Crawford
ExLog FNC HiCASS
Product Line Manager
(703)588-0061**



JJMA Modeling Effort



- **Moored and fendered multibody ship simulations**
 - Absolute and relative ship motions in a seaway
 - Fendering and mooring line force histories
 - Crane dynamics / load pendulation
 - Control system simulations
- **Sensitivity analysis**
 - Ship sizes / freeboards / mooring configuration
 - Fender stiffness and damping
 - Mooring winch locked vs. constant tension
 - Mooring winch / fender tuning
 - Modal period and heading sensitivities
- **Initial results**
 - Fender stiffness & damping relatively ineffective in crane motion mitigation



Modeling and Simulation Project Objectives:

- **Conduct coupled dynamic simulations of baseline and proposed UNREP systems operating between moving vessels in seaways**
 - Characterize and evaluate dynamic performance
- **Develop UNREP system performance specs to satisfy target ops requirements.**

No existing simulator can model the entire system!



NRL/NSWCCD Summary



- Static analysis identified an approximate 4X increase in highline tension when going from standard UNREP to heavy UNREP at 300'.
- 2D Heavy UNREP dynamic analysis shows that vertical kingpost control can significantly improve load stability, **especially at 300 ft. separation and sea state 5.**
 - Sensing might be a real-time, accurate Inertia Navigation System, plus cable angle sensing.
- 2D HiCASS Dynamic analysis shows pendulum oscillations can be **significantly reduced** and load can track the motion of receiving ship using a transfer crane with active control.
 - Sensing done with INS, cable angle and length, crane angle.
- A predictive capability of ship motions may not be required for active control. However, further research is necessary.



Questions