CDI SM Business Solutions

THE QUARTERLY DIGEST

of CDI Marine Systems Development Division (SDD)
(formerly Band, Lavis & Associates)
900 Ritchie Highway, Severna Park, MD 21146

Volume 26 March 2004

FROM DAVE'S DESK

CDI Marine Systems Development Division (CDIM-SDD), formerly Band, Lavis and Associates, is Maryland's largest firm of Naval Architects. We are located on Ritchie Highway in Severna Park, MD and have a 27-year history in developing innovative ships, craft and systems. CDI Marine is part of CDI Government Services which, in turn, is part of CDI Business Solutions, a division of CDI Corp., with annual sales exceeding $1B and headquartered in Philadelphia, PA. CDI Business Solutions employs over 3300 engineers and technicians serving the marine, aerospace, pharmaceutical and petrochemical industries. CDI Marine is the largest marine design company in the U.S., providing to industry and government sectors a very wide range of marine engineering and naval architectural services. CDI Marine provides extensive design and CAD drafting support to Gulf Coast, Mid-Atlantic and Northwest shipyards. CDI Marine also specializes in advanced computational hydrodynamics, prototyping, RDT&E, and combat-systems engineering services. CDIM-SDD, in Maryland, is a world leader in advanced marine technology and high-performance ships, including Air Cushion Vehicles (ACVs).

CDIM-SDD is also known for its advanced ship design software, COMPASS™, and for developing advanced marine waterjet propulsion systems like those developed with Honeywell for the USMC EFV (formerly AAAV) high-speed tracked amphibian troop carrier (Figure 1). CDIM-SDD also operates a dedicated facility in Arnold, MD for manufacturing and testing small models and prototypes.

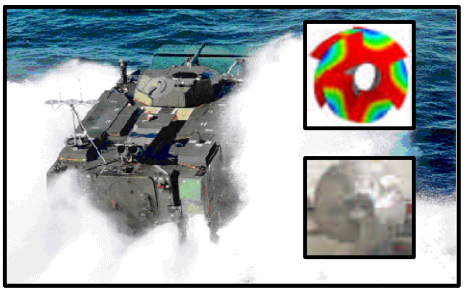

Figure 1. EFV with Waterjets Designed by CDIM-SDD

CDIM-SDD continues to expand support to numerous high-profile U.S. Government programs including those involved with: Homeland Security, the USCG DeepWater Program, the Aegis Cruiser Missile Conversion Program, the AOE(X), the MPF-Future Ship Program, the LHD-8, the DD(X), the Littoral Combatant Ship (LCS) and the LCAC, as well as a continued involvement in vessel acquisition management and port engineering services to commercial ship operators. This year, we expect to complete our support to Aker Finnyards for the design and testing of their 70-knot stealth ACV (Figure 2). Also this year, we will complete a number of other ACV design programs for U.S. and other overseas clients.

Figure 2. 70-knot ACV Designed by CDIM-SDD

For Homeland Security and Force Protection, CDIM-SDD has been extensively involved in systems development for nuclear, chemical, and biological detection and countermeasures. More than 30 unique hardware systems have been prototyped by CDIM-SDD over the past three years, and we have implemented numerous and continuing upgrades to these and other legacy systems. Approximately ten unique systems have been transitioned to quantity production, and more than 2500 systems of various types are in use worldwide. For other Homeland Security efforts, CDIM-SDD is providing acquisition-phase engineering and program logistics support to the Office of Boat Forces at USCG HQ and to the USCG

In This Issue . . .

Response Boat Project Office. One recent major accomplishment has been the development of vessel specifications and the development and operation of a web-based equipment casualty reporting system that provides data to ensure that the USCG vessels remain reliable and are cost-effectively supported throughout their life.

CDI Marine Systems Development Division (CDIM-SDD) has brought very significant business to other Maryland companies over the last 27 years, including Maryland's academia and Government agencies. This has ranged from having multi-million dollar prototypes built at the BMI shipyard in Baltimore to testing at various facilities such as the USNA in Annapolis. Oceaneering Technologies, Inc., in Upper Marlboro, manufactures both prototype and production systems that we design. These range from precision machined components to large assemblies. Just last year, we tested our advanced marine waterjets and an ACV model for a foreign client at the Navy's NSWC labs at Carderock, and, in January 04, we tested an advanced propulsion system at the University of Maryland. By finding and cooperating with the very best capabilities in the area, we have been successful in expanding our base of business and the quality and size of our scientific staff.

COMPOSITE HIGH SPEED VESSEL (CHSV) PROGRAM
By Jeff Benson, Programs Manager

CDI Marine Systems Development Division (CDIM-SDD) is providing support to ONR and NSWCCD in systems acquisition planning and programming for the CHSV Program. ONR 334 is currently investigating HM&E technologies to support the development of high-speed littoral vessels. One part of this overall effort is the Composite High Speed Vessel (CHSV) Program, a shipyard-oriented initiative to explore, develop and document the technology for lightweight, high-speed vessels capable of operating in the littoral environment. The primary objectives of the CHSV Program are: to mitigate the overall risks for future all-composite vessels; to investigate novel hydrodynamic and powering configurations for the CHSV hullform (including the application of lifting body technology to this mission); and to assess and facilitate the construction of such a vessel in a shipyard environment. Northrop Grumman Ship Systems is the prime contractor for this effort.

Concept Design of a nominal 2000-ton CHSV has been completed (see Figure 1). It forms the basis for ongoing feasibility studies and associated risk identification and mitigation efforts. Technical challenges associated with the design have been identified, and an extensive risk mitigation program is underway.

The composites risk mitigation effort focuses on materials characteristics, hull structure (and associated joint design), outfitting, manufacturing and acceptance/certification. More than thirty composite material systems have been identified and are being screened; nominally, five will be fully characterized. Hull structural concepts satisfying CHSV Concept Design requirements have been posed, and global and local analyses are being conducted. Representative composite structural joints are being developed and will be fabricated and tested. In addition to addressing the unique composites/structural design aspects of CHSV, the risk mitigation effort includes fabrication of a large Manufacturing Demonstration article to prove basic feasibility and fabricability, and to explore unique manufacturing approaches and artifacts.

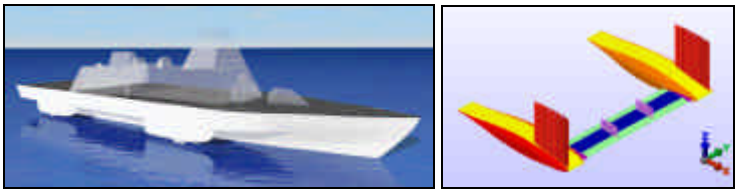

Figure 1. CHSV Concept Design

The CHSV lifting body concept was developed by NGSS' subcontractor, Navatek. Providing 40-50% of the ship's lift, it represents a giant leap beyond that which currently exists. Hydrodynamic risk mitigation efforts include extensive design and model testing to evaluate CHSV's performance, both bare-hull and with lifting bodies.

The results of hydrodynamic model tests, together with the results of the various composites risk mitigation efforts, will be integrated with the ongoing feasibility studies to produce a final deliverable, the CHSV Feasibility-Level Design Study Report.

LIFT FANS FOR SKJOLD
By Mark McCain, Mechanical Engineer

Last year, CDIM-SDD completed the design and model-scale testing of new lift fans that will be used to provide the air flow to the cushion of the *SKJOLD*-Class Fast Patrol Boats, six of which are being built by UMOE Mandal for the Royal Norwegian Navy. Construction in Norway of the *SKJOLD* craft (Figure 1), which are fast, but stealthy, Surface Effect Ships (SES), is to begin this year and be completed by the end of 2007.

Picture Courtesy of UMOE Mandal

Figure 1. Norwegian Skjold Fast Combatant SES

IMPROVED CONCEPT ILLUSTRATION THROUGH ADVANCED ANIMATION
By John Schech, Senior Software Engineer

The Rapidly Deployable Intermodal Facility (RDIF) is an advanced naval vessel that is being considered for development initially as a sea-basing platform. The RDIF's design presents a number of engineering challenges. The vessel must be capable of re-configuring for a specific mission at a typical naval facility, transit from CONUS to the Theatre of Operations at high speeds, and then, upon arriving in theatre, transform from a vessel having catamaran-type hulls to a spar-hull-supported open-ocean platform. CDI Marine Systems Development Division (CDIM-SDD) recently used an array of advanced animation tools to highlight some of the significant RDIF challenges.

One of the visualization tools that CDIM-SDD uses is 3D Studio Max, a sophisticated animation and modeling software package that is used heavily in the movie industry. The building of the virtual environment is akin to building sets for a movie. Each scene to be "filmed" needs lighting, cameras, background and special effects. At CDIM-SDD, we use 3D Studio often to demonstrate engineering concepts through animation and still renderings.

The animation that CDIM-SDD developed for the RDIF project was comprised of three scenes: port operations and transit, the catamaran-to-spar hull transformation, and the platform-to-platform connection with VTOL operations. Each of these scenes was "filmed" in a virtual environment built with a combination of AutoCAD and 3D Studio Max models.

The first scene features the RDIF leaving port, having been configured for its mission. The port was drawn in AutoCAD and then imported into 3D Studio along with the RDIF and the LHA Tarawa models. The Tarawa was added to show the RDIF's relative size as compared to other naval vessels (Figure 1). The second scene was a bit trickier. The RDIF had to be shown from two different angles. The first angle was from above the vessel (not shown) to feature it during its ballasting operations. The second angle was from below the vessel to show the transformation from the catamaran configuration to the spar-hull configuration (Figure 2). To do this, the virtual camera was "dollied" from above the water to underneath the vessel as the vessel morphed from its high-speed configuration to its sea-basing configuration.

Figure 1. RDIF Leaving Port

Figure 2. Spar Hull Configuration (underwater view)

The final scene (Figure 3) showcases the RDIF's ability to connect to other RDIF vessels and to conduct VTOL operations. In this scene, all of the same models were used along with the addition of a helicopter model.

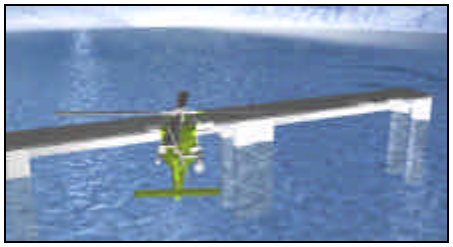

Figure 3. VTOL Operations on Joined RDIFs

Developing 3D models and animating them is a valuable engineering tool. Animations can bring ideas from the drawing board to reality, albeit a virtual one. AutoCAD and 3D Studio Max affords CDIM-SDD the ability to view a working design before any metal is cut.

MANISH GUPTA RECEIVES "QUALITY MANAGER OF THE YEAR" AWARD
By Diane King, Editor

On March 12, 2004, Manish Gupta, SDD's Engineering Manager, was presented with the "Quality Manager of the Year" award. Manish was chosen from among the 800 employees of CDI Government Services to receive this award. Manish has demonstrated exceptional engineering management skills and business development initiatives over the last several years. This has lead to significant business from NGSS, including structural analysis and design work in support of the LHD-8 and Cruiser Conversion Programs and, more recently, Systems Engineering work in support of the DD(X) Program. As a result, he has brought into the company close to $1M of revenue and has tripled the size of the group for which he has supervisory responsibility.

Manish also presented numerous technical papers at conferences last year that promoted CDIM, and he studied for and acquired his MBA at GW, which he adds to his MS in Ocean Engineering and BS in Naval Architecture. He has versatile engineering skill sets with strong technical abilities in ship structures and is highly regarded by our clients. For several years, he has been our senior structures engineer with overall responsibility on all ship structures work performed in our office. Congratulations Manish!

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ADDRESS CORRECTION REQUESTED

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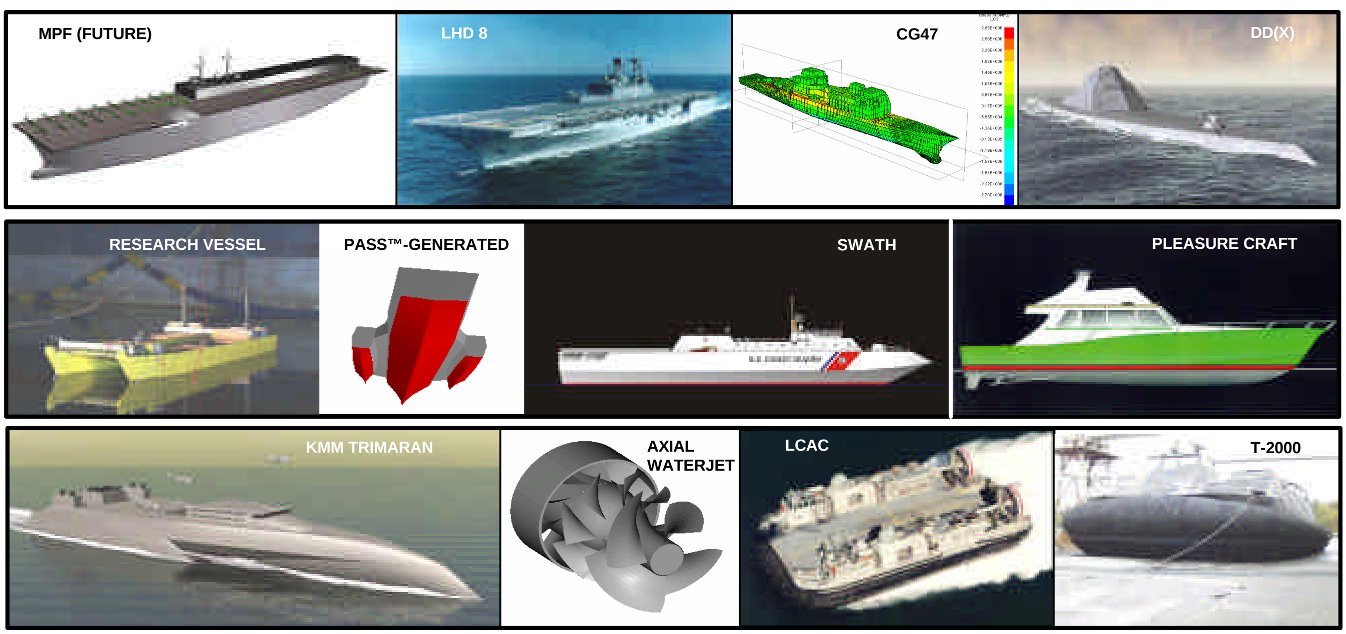

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