

IT TECHNOLOGIES IN SHIPBUILDING

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ABSTRACT

Shipbuilding and industrial marine industry has a long and proud history that encompasses everything from the world's finest 19th-century sailing schooners to modern world class icebreakers. In between are a diverse group of vessels that have been designed and built in this country to serve our unique, expansive coastline and its network of coastal marine communities.

Keywords: *Design Aids, 3D Modeling, Interference Checking, CAPAC® Systems, Chloropac® Systems.*

1. INTRODUCTION

The 16th International Conference on Computer Applications in Shipbuilding (ICCAS) will review operational experience from existing computer applications in the design and building of ships and offshore structures and will cover a full range of topics including; CAD, CAM, integrated systems, knowledge management, simulation and virtual reality applications.

It will also examine the advances in Information Technology which have contributed to increased productivity in both shipbuilding and maritime operations; including increasing co-operative working between shipyards, marine equipment and system manufacturers, engineering partners and shipping companies.

These conferences attract a large international audience and provide an excellent forum for both those developing and using computer applications in shipbuilding.

The global maritime industry faces many challenges as it seeks to recover from the financial crisis which has affected all sectors of the industry, whilst at the same time, responding to the continuing demands of operators, regulators and society for greater efficiency, safety and the protection of the environment. This response will require innovative thinking from all sectors of the maritime industry, and particularly those involved in ship design and construction.

2. SHIPBUILDING TECHNOLOGY

In today's shipbuilding industry, the need for technology that supports concurrent engineering, design, and life cycle management is critical. From the initial design stage of the project through the ship construction stage, IT provides shipbuilding technology designed to reduce costs and increase shipyard productivity. Facets of our shipbuilding technology solutions to assist with shipbuilding plans include:

1. Ship Design and Assembly
2. Materials Planning and Procurement
3. Information Management

The ship design and construction process benefits from Intergraph shipbuilding technology. Through automating routine tasks and allowing pre-configuration

of equipment characteristics, shipbuilding companies benefit from reduced labor costs and quicker time-to-design schedules. Shipbuilding plans can leverage automated drawing generation functionality, providing shipbuilding companies with accurate and up-to-date documentation while also reducing the cost of design.

To maximize efficiency throughout the procurement process, a comprehensive materials management solution is required. By providing workflow management functionality to support a shipyard of any size, IT shipbuilding technology supports all stages of the shipbuilding process, from concept to procurement.

In today's shipbuilding industry, shipbuilding companies need a fresh approach to information management in order to efficiently execute their shipbuilding plans. By facilitating optimization throughout the design, production and life cycle management stages, IT shipbuilding technology provides the information management tools needed to make the shipyard more competitive.

IT delivers innovative shipbuilding technology designed to support shipbuilding companies in the ways they need it most. For shipbuilding companies whose shipbuilding plans are specific to military vessels, or those who design for cruise or cargo ships, ship design and construction are transformed with Intergraph's solutions.

3. MULTI-DISCIPLINE 3D MARINE, OFFSHORE & SHIPBUILDING MODELING & DESIGN

Smart Marine 3D, IT's latest 3D marine, offshore, and shipbuilding design solution, dramatically increases design, modeling, and deliverable production productivity across all key disciplines involved in the design of today's complex structures while increasing overall design quality, data integrity, and productivity. Using industry-standard database technologies, Smart Marine 3D is a true, data-centric offshore modeling environment. Smart Marine 3D also includes fabrication requirements for pipes and plate and profile nesting applications. Smart Marine 3D includes a series of integrated tasks addressing key design activities, including:

Project Setup and Reference Data Tasks – Definition and management of multi-disciplinary component catalogs and specifications;

Design Aids – Intelligent grids combined with 3D space management tools;

3D Modeling – Plates, profiles, piping, equipment, outfitting structure, civil/ foundation, electrical cable tray, HVAC ducting, multi-disciplinary hangers and supports, disciplines such as hole management, and planning for managing data in blocks or modules;

Interference Checking – Constant, interactive interference checking and project-level interference checking integral for improvements in quality and productivity;

Smart Marine 3D enables designs to be checked for clashes and corrected prior to fabrication and assembly. Cost, time, and schedules can be reduced and quality increased. This instills a high degree of confidence that "as-designed" equals "as-built."

When seawater or freshwater are used as part of an engineering process - in petrochemical works, electric power generating or desalination plants, offshore oil & gas production and in ships or other applications using water - biological fouling can be an issue. Siemens Water Technologies can help prevent biofouling and marine corrosion in these applications by providing cost-effective, energy efficient and flexible treatment systems that require virtually no operator attention.

4. CAPAC® SYSTEMS

For over 50 years the CAPAC® system has been installed to provide automatic, permanent protection that prevents electrolysis and galvanic corrosion from attacking the submerged surfaces of a broad range of sea-going vessels and fixed or mobile offshore structures. Capac® systems combine our in-house, state-of-the-art anode and electrode technologies with excellent engineering, design, manufacturing and quality control to produce superior, reliable solutions.

There are more than 3,000 Capac® systems installed around the world.

5. SEACURE™ BALLAST WATER TREATMENT

To help meet new ballast water treatment standards, Siemens Water Technologies has developed the SeaCURE™ ballast water treatment system. The system uses a combination of physical separation and a proprietary, on-demand treatment with biocides, produced in-situ from seawater, without the addition of chemicals. The system is based on a proven 30+ year record and over 2,500 shipboard installations of Siemens' well-known Chloropac® biofouling control system.

Loose components in customized SeaCURE™ ballast water treatment system shown in actual engine room.

6. CONCLUSIONS

Intergraph provides solutions for every size of shipyard and any type of shipbuilding plans. From

vessels requiring specialized ship structural design, to shipbuilding plans that require additional offshore engineering services, Intergraph has the shipbuilding technology, the experience, and the track record to help shipbuilding companies gain and maintain a leading edge.

Ship piping design, and particularly floating production, storage, and offloading vessel piping, requires rugged installations that can withstand the hull/platform movement associated with wave loads. These analyses involve the consideration of volumes of data that may be overwhelming due to ever-changing boundary conditions. Intergraph analysis solutions provide integrated tools that provide opportunities to improve change management and the iterative information flow that takes place in analyzing and designing these maritime vessels.

One of the core components of a sound marine, offshore, and shipbuilding design and operating environment is knowledge and information. A significant challenge is how to capture this specific information, build on it through the design, procurement, and construction phases, and hand this over to owners and operators. Once the essential data is put into the owner's or operator's hands, how should this data best be used? This data is the backbone for marine, offshore, and shipbuilding facility decisions in all phases. As the project develops, the data required grows, changes, and transforms into a valuable asset that can be put to use.

Marine, offshore, and shipbuilding designers, owners, and operators need engineering data management software with enhanced decision support capabilities to facilitate global design, production, and life cycle optimization of the offshore facility. From concept and design through maintenance, operations, and decommissioning, Intergraph enables electronic management of all of the marine, offshore, and shipbuilding facilities' engineering information. By integrating information on the physical asset, processes, and regulatory and safety imperatives, Intergraph's engineering data management tools can set the basis for the pursuit of operational excellence performance.

7. REFERENCES

- [1] BERTRAM, V. (1994) „Investitionsbeurteilung von Software“ 28. Fortbildungskurs, IfS, Hamburg van der Bles, G.; Dirkse, C. (2000) *Integrated Shipbuilding by Concurrent Engineering 1st International Euro Conference on Computer and Information Technology in the Marine Industries (COMPIT)*, Potsdam.
- [2] BUHR, W., KEIL, H., KRUGER, S., *Rechnereinsatz im Projekt* Proc. STG, Springer, 1998, 353-363.
- [3] HAMMER, M., CHAMPY, J. (1996) „Die tragende Rolle der Informationstechnik“, in *Business Reengineering - Die Radikalkur für das Unternehmen*, CAMPUS, 112-133.
- [4] <http://www.intergraph.com>
- [5] <http://www.ic.gc.ca>
- [6] <http://www.rina.org.uk>
- [7] <http://www.wikipedia.org>.