IBMSDS

Industrial Bulk Marine Shipping Development system (formerly, Bulk Shipping Development System) is a comprehensive model for design and development of dry, liquid or gas bulk marine shipping projects.

Over 130 input variables enable modeling of ship construction in any shipyard anywhere, financed under any capital structure / terms, operated under any flag, depreciated under any tax regime, or none.

Output of IBMSDS includes optimized ship (or fleet) principal dimensions, form coefficients, weight group totals, light ship estimate, powering options, delivered cost, project financial projections, loan amortization, depreciation schedule and DACPUT (Discounted Average Cost per Unit Throughput) to support the project.

Innovations

A complete management empowerment tool

BSDS measures the trade-off

INSPIRATION for TransTech Marine's Bulk Shipping Development System (BSDS) came from two sources, claims Geoffrey Uttmark, president of the company.

First was the intuitive appreciation that technical design and project financial/economic analyses are, as far as the shipper is concerned, simply two sides of one coin. Ideally, the ship (or fleet of ships) should be sized to cargo characteristics and throughput requirements, and around any physical constraints imposed by such details as draught limitations, berth size, storage capacity and canals. This means standardised 'off-the-shelf' designs might not be ideal and, if not, the difficulty comes in trying to balance the technical and economical trade-offs.

The second source of inspiration is TransTech's contention that shipping is not always a derivative business as commonly thought. Many examples exist of trades that did not exist until the technology to exploit them was developed, so shipping technology and economics can lead to the development of a market.

Uttmark claims that many industrial shipowners simply select the lowest freight rate from a variety of stock designs, because the industry lacks the tools the provide a better approach. BSDS has been designed to give the ship owners a tool with which "to negotiate more effectively with the builder, as well as enabling the shipyard to respond more rapidly and completely to owners' specific design requirements." The BSDS can be therefore viewed as a "complete management empowerment tool" integrating a technical design module with a complete project financial presentation, comprising loan amortisation, schedule of operating costs and cash flow projections.

To date BSDS has been used in a consultative role on projects for shipping coal, iron ore and raw sugar. Uttmark believes "there are mining, agricultural, oil and gas, and other shipping group interests who would benefit from DBSDS (Dry Bulk Shipping Development System), LBSDS (Liquid Bulk Shipping Development System), or LGSDS (Liquid Gas Shipping Development System) to help validate or develop projects where efficient seaborne transport is critical."

An example of where the system would be beneficial is for exporters of lower value commodities, which are vulnerable to being closed out of overseas markets by transportation costs. TransTech claims BSDS can assist policy makers determine if limited resources would be better invested in the national fleet or in harbour improvements, enabling deeper draught ships to load more cargo, have a faster turnaround time, hence lowering freight rates through improved efficiency.

How it works

In a case study using DBSDS, a coal carrying cargo vessel operating on the Great Lakes shuttle service had some of the vessel's measurements already set by a desire not to exceed the constraints of the Saint Lawrence Seaway. The overall length was reduced from the maximum, as this is the most costly dimension. Design depth ratios and beam ratios were set within certain limits as was the block coefficient. Further measurements were also input to define hull constraints.

A preferred main propulsion system, with power output and propeller selection, propulsive coefficient, appendage resistance, an initial nominal fuel rate and required service margin were added into the machinery section, along with options for no bulbous bow and bunker costs and loading requirements.

A cargo unloading system involving the use of high derricks was selected in preference to conveyors to increase cargo capacity and allow the carriage of deck cargo.

Full vessel financing details including construction subsidy, vessel depreciation and owner tacing information is also input, along with construction and operation details.

In the case study the program explored 53 separate designs within the power range selected. Output of essentially redundant designs is kept to a minimum "by the judicious selection of the increments of the input variables within the allowed ranges," said Uttmark.

Lowest cost solution

Each successive design iteration seeks a lower DACPUT (Discounted Annual Cost Per Unit Throughput) figure than previous designs, a process that continues until the absolute minimum solution is found or the specified design space is fully exhausted. The least cost transport solution within the defined design space is produced because the DACPUT measure captures all ship construction, finance and operating costs on a discounted life-cycle cost basis. To ensure that a true minimum has been achieved, the increments or bounds of the design variables can be reduced or expanded in subsequent program executions. Uttmark claims this degree of control is essential, "since in some applications (such as supplying a steel mill with limited scrap storage capacity) sub-optimisation of shipping costs might be less critical than optimising the process as a whole."

Uttmark believes perceptive use of DBSDS can point to intelligent questions, leading to improved design and project structuring. "Final absolute decisions always remain the domain of the designer, shipowner, operator or builder." He goes on to say, "this is bulk shipping project development as it should be, using DBSDS to evaluate alternatives completely and economically, so that managers charged with design, finance and operations can take their decision insightfully and authoritatively."

Fairplay Solutions

IBMSDS has been used to develop optimized designs ranging from a short sea "pocket" LH_2 tanker to prototyping the lead "Chinamax" 400,000 DWT bulk carriers. The model provides strategic advantages to:

- **Shipyards offering negotiated contract with potential customers on optimized new design,**
- **Industrial, agricultural, energy, minerals shippers seeking advantage from lower transport cost,**
- **Ocean carriers pursuing value creation from balanced spot and industrial shipping market exposure.**

IBMSDS empowers senior managers in shipyards, shippers groups and commodity trading companies, and proactive ship owners / operators take on the role of active market maker, instead of passive responder.

Success can be by design or by luck. IBMSDS is for management teams who plan to win.