

# The cost of knowledge

When an experienced shipowner embarks on a new-build project, is there a need for a more considered analysis during the design process?

There are many factors that necessitate the need for more research, including operating parameters, operating regions, competition and cost, but what positive effect can an aggressive approach to analysis and strong preliminary design and planning have?

To answer these questions, one has first to consider the design process directly related to the cost of the build. For instance, the level of knowledge at the early stages of the design process is limited, so the freedom to change the design is high and the cost of change is low. An increase of knowledge in the early design stages will definitely require less costly design changes in later stages and should reduce the risk of modifications during or after the building process. The cost of these modifications can sometimes affect the profitability of the ship/asset acquisition. Another benefit of a higher level of knowledge in the early design stage is the increased likelihood of the project being completed on time and within budget.

The benefits of a higher level of knowledge in the early design stages, therefore, are mainly in risk reduction and the avoidance of future unexpected costs which, in worst-case scenarios, could make the ship acquisition unprofitable and increase its build cost.

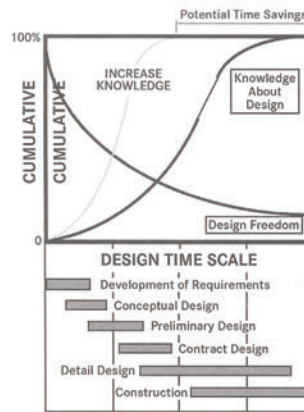
This benefit comes with a cost, but this cost is probably small compared with the risk. The cost of the design up to the preliminary phase varies between 0.2% and 0.1% of the cost of the project. Therefore, even if it is doubled it is still remarkably low, compared to the potential loss which is more likely to occur if the preliminary design is kept too basic.

The ability to achieve new-build (asset) profitability through a strong advance design process starts with the ability to achieve the strategic fit between the market and its development (possible scenarios) and the current technologies, regulations and their possible development.

This strategic fit should be reflected by the performance specification for the new ship, which is also the fundamental input for the further design phases and it should be consistently used in the capital budgeting projection.

Traditionally, only one concept design, normally based on existing vessels, is generated to fit the specified performances. It is quite intuitive that there could be and there normally is more than one design to fit the required performances. This is true even if these performances are stated as a range of acceptable

A level of knowledge at the early design stage can reduce risk and avoid future costs, writes Burness Corlett Three Quays' Dean Smith and Stefano Scarpa



■ Knowledge/freedom diagram in ship design

values, rather than a single acceptable requirement.

It could be very beneficial for the decision maker to be able to decide among a few option designs that fulfil the specified performances rather than take the only one available. The problem is that by using the traditional spiral design process the generation of more than one concept design can be very time consuming and expensive.

New concept design processes developed in the last few years make this option generation fast and reliable. These processes (most of them based on multi-criteria decision making methods) use extensive computer calculation power and simple decision analysis techniques. The increased level of complexity in this phase of the decision process has the benefit of better informed decisions and fit between the capital budgeting decision, the final product and the company's general strategy.

In the initial phase of the design process it would also be very important to analyse and understand what the impact on the business model is and what impact the failure to achieve perform-

ances might have. This is because the contractual documents (building contract and technical specification) should include liquidated damages, penalties and cancellation clauses that reduce at minimum the financial risk and the economic loss in case of failed performances.

In Burness Corlett Three Quays' (BCTQ) experience, especially with medium to large shipowners, the shipowner's representative can have difficulties in enforcing liquidated damages and penalties of the contract and specification. The decision process is quite difficult and time consuming and there is often a lack of clear understanding of the consequences of enforcing these particular contract clauses.

This is why in, BCTQ's opinion, it would be beneficial to future decisions on enforcing liquidated damages and penalties to develop in the early project stage some additional decision tools, such as consequence and decision trees.

The self-implementation of most of these tools is sometimes difficult in medium/large organisations, because of organisation rigidity and inertia. It is often easier to implement them with the assistance of an external facilitator.

The importance of design up to the preliminary stage should not be underestimated. And risk, therefore, could be greatly reduced with a relatively small initial investment and the use of more modern design processes, which have the benefit of taking the new design closer to the decision maker's targets and objectives. □

