Körber Supply Chain

How to save millions on your demurrage bill

KÖRBER

Introduction

In supply chains that involve the chartering of vessels, demurrage is seen by many organizations as an inevitability of moving cargos. Billions of dollars of demurrage charges are levied each year across the bulk shipping sector. In today's world however, with the advent of new technologies and vessel planning techniques, this no longer needs to be the accepted norm. This paper demonstrates a new approach to vessel scheduling that can drive demurrage savings.

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Understand the supply chain challenge

In order to understand the factors that contribute to demurrage, it is important to first understand the nature of the supply chain in which most multinational shipping companies are operating. For the purpose of illustration we shall look at the oil and gas supply chain, parallels can be drawn with other bulk sectors.

Production planning

Let us start by looking at the demand side and understanding the refinery planning process.

Many factors will be considered when producing the refinery plan; product demand, the cost of raw products, the operating costs, and the value of the refined products. Using this information, a production plan will be created defining the refined products and the tonnes or barrels per month to be produced.

The planner will determine the types of crudes – the raw materials – needed to support the plan, and share these requirements with the traders. In this way, the refinery planner creates a 2 to 3 month refinery plan, biased towards maximizing refinery profits and fulfilling the forecasted demand. Little, if any, consideration will have been given to the resulting demurrage.

Traders

The trader's remit is to acquire crude and other raw materials at the best price and to sell these and refined product at a profit. The consequences being that not all buying decisions are directly made to favor the terminal or the refinery plan. The trader is unlikely to have assessed the impact of new charters, or vessel congestion.

Scheduling

As time progresses the plan is converted into a schedule of movements, normally with a two-week horizon, to satisfy specific orders. The scheduler must ensure they have the right components to make and blend the finished products. This, however, is not a straightforward task. Crudes originally planned for production may have been re-sold by the trader, refined product prices may result in production changes, and vessel delays may result in critical raw material shortages impacting the refinery plan. On top of these potential difficulties, continual vessel estimated time of arrival (ETA) changes place a huge burden on this scheduling activity. Our research has shown that a typical scheduler can expect to manage 19 ETA changes per day. When you consider that each ETA change results in a schedule amendment, you can start to appreciate the scheduler's challenge of maintaining a reliable and feasible schedule for the refinery and terminal.

Vessel Fleet

Most oil majors have a fleet with capacity to cover a level of product movements. However, peaks in product demand will affect vessel availability and require short-term vessel charters to be made throughout the supply chain cycle.

The challenge is to balance the anticipated movements with the supply of vessels, at the same time minimizing the number of spot charters.

Difficulty measuring the cost of decisions

In the above example, we can see how the decision making cycle of the plan, procurement and sourcing of goods can easily become unbalanced. This makes it necessary to rely on spot charters, and demurrage inevitably comes into play. Naturally, the overriding priority is to produce product and make profits: demurrage reduction might not be part of the decision-making.

Applied Modelling Algorithms are intelligent applications designed to find the best scheduling options.

A New Approach with AMA

Applied Modelling Algorithms, AMA, are intelligent applications designed to find the best scheduling options. They can be configured to consider demurrage when evaluating the best possible schedule, at the same time ensuring higher business priorities are maintained.

They utilize computer optimization and simulation techniques to enable users to make better-informed decisions. This is achieved by creating a computer model of the terminal that accurately defines the operating capability and the limitations of that particular terminal. This will include the number of available berths, the availability of facilities at each berth to process certain cargo types, the movement of resources – such as availability of tugs and pilots – the availability of landside resource – such as mooring gangs – transfer lines, storage tanks etc. In tidal waters, tides, draft and other channel constraints can also be modelled. The result is a scheduling tool that is capable of identifying the best schedule from evaluating a huge number of potential permutations of vessel/cargo movements.

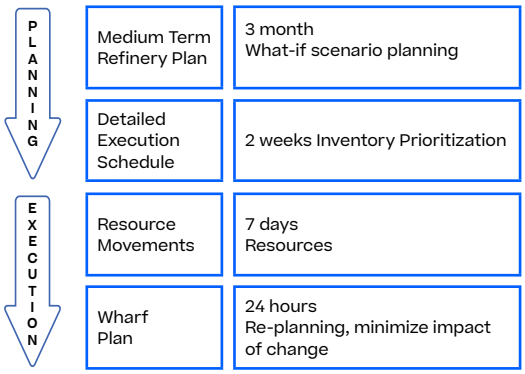
How can AMA contribute to the planning of vessel calls through the supply chain cycle?

In our example supply chain we can see that there are many issues which need to be overcome in order to limit demurrage.

The diagram depicts the movement from a plan built with “forecast” average demands moving into a near term “actual” demand and supply schedule.

AMA Production Planning
In the medium term, with the aid of AMA, the scheduler can translate the refinery production plan into a projected vessel and movement’s schedule. This provides the scheduler with the ability to test scenarios thereby highlighting any shortcomings in the terminal’s ability to accommodate the vessel/crude movements needed to support the plan. In turn, this creates the “ideal” vessel plan with minimized demurrage.

This is also useful in planning berth or facility outages, refinery turn-around and any activities that have a potential to disrupt the plan. These necessary activities can be built into the scenarios and vessel disruption minimized or flagged as a potential problem.



AMA Trading

Trading decisions and contango plays can be supported by evaluating the impact of storing products at favorable prices, whilst considering the impact of such plays on inventory capacity or vessel availability.

Providing this information is shared with the scheduler, the schedule can be updated with these changes. This has the effect of adding new constraints, which need to be managed.

AMA Scheduling

As focus moves from planning to scheduling, the AMA scheduling tool can look to anticipate the impact on the schedule of any forecast changes, outages, resource limitation or berth availability. Tanks can be monitored to ensure that they have suitable ullage and pipelines can be planned to make sure that they are available for cargo transfer. It is the ability to minimize disruption and to truly evaluate the best possible schedule very quickly that makes the biggest savings. Schedulers typically have to manage a high number of potential permutations planning each move, much like a good chess player, in order to decide which vessel should be moved first.

Anyone who has played chess can appreciate the difficulty in thinking ahead of the game, and even given access to a spreadsheet or a whiteboard on which to plan their moves, this would not help them a great deal. In the same way the scheduler is having to make moves not knowing which ETA change they will receive next that will require a change to their strategy.

The AMA schedule will not replace the scheduler, the scheduler always remains in control but the calculations, taking into consideration the terminal constraints, can be made for them. In this way, demurrage can become a decision factor while maintaining other higher priority decision drivers.

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Top 10 tips to reduce your demurrage bill with AMA

- Create a feasible plan; ensure your long-term plan has been tested against the constraints of the terminal
- Include all your operating constraints; ensure that any factors that affect demurrage are included in your planning decision
- Evaluate ETA change impacts; determine the implications of any ETA changes and update the schedule based on least disruption and demurrage
- Share the plan; ensure stakeholders are using the same live plan in real time: avoid using different systems, avoid working from out of date information and avoid having different views of the latest position
- Small changes make a big impact; make small changes to the plan. Moving a vessel slightly earlier or swapping for an equal vessel with slightly more demurrage potential have been proven to add up to considerable cost savings
- Reduce times between vessel calls; manual planning requires larger contingency between vessel calls. Once your decisions are supported by AMA, these windows can be reduced
- Understand your terminal constraints; by evaluating why demurrage is being incurred, you identify potential infrastructure or process changes that will alleviate bottlenecks
- Benchmark; select a tool with an automatic planning feature that will let you find the best possible schedule against which you can measure your own performance
- Dashboard; ensure you are measuring the right KPIs and allow users to customize their views to only see the information that relates to their goals and objectives
- Increase plan reliability; the consequence of creating reliable plans has a huge knock on effect on all the decisions made in your terminal

A final thought

Demurrage reduction may not be the top priority of a supply chain director. However, that does not mean it is not a significant cost that can be minimized. In our research, we have seen terminals benefit from between 19 and 23 percent annual savings on their demurrage bill.

When you consider those terminals had multi-million dollar annual demurrage bills you can appreciate these savings more than warrant the investments needed in an intelligent AMA scheduling system.

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