OPTIMIZING RAILCAR MANAGEMENT
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Time to Take a Second Look at Railcar Planning

The cost required to distribute bulk products such as petroleum, chemicals, and gases is a substantial part of the total cost of manufacturing and distributing these products to customers. Our experience is that in most supply chains, optimizing the transport and delivery alone can reduce the total distribution costs by as much as 10%. However, by far the greatest savings can be realized only by coordinating the distribution of these products with manufacturing.

With distribution costs rising and approaching 15% of total manufacturing costs (excluding ingredient costs), many companies believe that it is time to look at this area again. An added incentive is that rail transport has a significantly lower carbon footprint than trucks. Utilizing rail at the expense of trucks is one way that companies can meet some of the forthcoming emission standards.

As transport costs continue to increase, companies are exploring different distribution methods. For example, tests of biodiesel blends continue to be run in various pipelines, but it is still far from being a mainstream method of transporting methyl esters. Until pipeline transportation is an option, the biodiesel industry will continue to rely on the rail and barge system to transport its product long distances. Rail transport continues to be a dominant mode because of its relative flexibility versus barge transport, and its lower cost versus trucks.

Rail car management in most manufacturing companies is a disconnected function that operates relatively independently. There are many reasons for this. Traditionally, rail car management has been viewed as a service for the rest of the supply chain. Its function is to ensure that the transport resources are available when they are needed. Cost was only nominally considered. As transport costs creep up to between 10 and 15% of the total delivered cost, more attention is being paid to this function. However, the typical analysis goes something like this: “You can move a railcar 2 ½ times the distance that you can move a truck for the same per gallon price. The cost to move a truck 300 miles is the same cost per gallon as to move a railcar 2 ½ to three times as far. For that same cost per gallon, you can move a barge from the Midwest to the Gulf.”

Nothing in this analysis takes into account the higher delivery time variability of rail car transport versus trucks, the increased inventory required to support longer transport times with rail and barge, the effort required to coordinate rail cars versus trucks, or the need to ship larger quantities with one mode versus another.

Opportunities and Impediments

Because rail car distribution is incorrectly viewed at most companies as a separate and distinct activity from the rest of supply chain planning, efforts to reduce costs focus almost entirely on the transport aspects. These efforts strive to increase the utilization of the fleet and terminals by either outsourcing the rail car management or by actively expediting the cars. Companies that run large fleets of rail cars (like some of the Russian crude producers) have also made efforts to rationalize the delivery network, especially the routes that run through other countries.
When companies outsource the actual rail car management, it does reduce the actual transport costs. However, in order to contract out the function, companies have to establish metrics like availability, turnaround times, and on-time delivery with the service provider. At the same time, they need to agree to terms that specify how the rail cars will be used. These may be perfectly logical from the transport point of view, but they often end up imposing constraints on other parts of the supply chain, like manufacturing. The additional costs of higher inventory and lower manufacturing flexibility are almost never considered.

For example, most manufacturers of bulk chemicals use rail cars both for transport and for temporary storage. Bulk chemical facilities are notoriously inflexible. In certain situations, a great deal of additional storage capacity is needed in the short term. Rather than building spare silo capacity, companies lease additional rail cars for a short time to store excess product.

Secondly, the movement of rail cars is not within the control of the manufacturer. The third party that actually moves the rail cars has little incentive to reduce lead times or reduce delivery variability. The providers are mainly concerned with aggregating cars into trains so that they can transport the cargo efficiently. This means that a railcar may wait for some period of time before there are enough cars to make up a logical train to a destination. Unit trains, which consist of approximately 100 cars shipped from a one point to another, are much more reliable and tend to have less variability in the shipment times. However, to utilize unit trains, manufacturers have to move large quantities of product routinely.

Railroads have been routinely tracking rail cars and using that data to keep shippers informed about their freight for many years. Most manufacturers who use a significant number of railcars utilize a commercial service that consolidates the raw input provided by the railroads. What this means is that manufacturers can track the location of their cargo and its status on a daily basis. However, this data is not normally used in developing plans for the supply chain, nor is it proactively used to maximize the utilization of owned and leased cars. Railcars are leased for a period of time, (say a year) and not usually by trip. This means that the higher the utilization, the lower the unit costs.

One useful exercise is to use the available data to count the number of owned and leased cars that are loaded in transit, empty in transit, loaded at the destination, empty at the destination, loaded at the origin, and empty at the origin. In our experience (both in Europe and the US), up to 25 percent of all the cars in the leased fleet are empty and not moving on any given day. There are some legitimate reasons like maintenance, cleaning etc., but reducing this number is equivalent to money in the bank. Often, the reasons are controllable. Customers may keep empty cars on a sidetrack until they are requested, cars may be queued up waiting for the cleaning station to be free, or cars may simply be “lost” for a time.

Increasing the utilization of owned and leased cars means not just keeping cars loaded and moving, but also balancing out the requirements for cars over time so that the total fleet size is kept to a minimum. Another tactic is to balance the owned and leased cars versus third party shippers. For example, one petroleum company (not in the US) was able to identify routes that traditionally had a high degree of transport time variability. By assigning these routes to third party shippers, it was able to reduce the overall variability in transit times for its own (leased and owned) cars. As a result, it managed to reduce the total number of leased cars that it needed.
By far the biggest opportunity fleet usage is to plan the movement of material simultaneously with production. Coordination between the functions is essential to meeting demand in the most efficient way. Very few companies currently attempt to do this. But doing this well can increase the utilization of the fleet and terminals, lower the inventory by reducing the buffer between manufacturing and distribution, and reduce manufacturing and distribution costs simultaneously.

A Framework for Optimizing Railcar Planning
A logical framework to improve rail car planning consists of three layers:

1. A data analysis layer that can quickly query the current status and location of rail cars. This is needed to analyze current fleet status and support expediting decisions.

2. A tactical planning layer to determine if the fleet will support the manufacturing and distribution requirements in the short term. This can help determine if there are going to be enough empty cars at the plants to keep the facilities running.

3. A strategic planning layer to facilitate decisions on required fleet size and leasing decisions

The first layer consists of the tools that a dispatcher needs to manage the day to day movement of rail cars. It is intended to provide a single window for the dispatcher so that they can monitor rail car movement, identify immediate issues, and proactively expedite and dispatch. By comparing to historical data, the tools should allow the dispatcher to quickly identify exceptions. The dispatcher should be able quickly ascertain:

1. If the cars in transit to a destination are taking much longer than normal, or if the cars are being held longer than normal.

2. The location and status of all cars.

3. The projected arrival of empty cars at the manufacturing facilities, and whether or not they should be expedited.

4. Maintenance and cleaning requirements so that resources for these can be prepositioned.

At a more granular level, the data can be used for load consolidation, dispatching of individual transport assets, and the routing/scheduling of deliveries.
The tactical planning layer looks at the projected movement of cars over 30 to 90 days to determine if the current fleet can support the manufacturing requirements. It looks at the production coming off the plants, determines which cars will be loaded, estimates the travel time to the customer and the residence, and time spent with the customer to determine when each car can be expected back at the plant. The goal is to determine if there is a feasible and cost effective way to meet the anticipated demand with the supply. This is particularly important when there is more than one manufacturing facility served by the same fleet. Rail car utilization can be often increased by the moving the cars between facilities and reducing cleaning requirements. At the very minimum, the tactical planning layer needs to consider:

// The manufacturing schedule at each plant/facility
// The projected demand and timing
// Different transport alternatives
// Variability service level targets by demand location
// Multiple vehicle types
// Weight and capacity restrictions
// Vehicle type/commodity compatibility
// Compartments
// Loading restrictions/equipment (by location and type)

The strategic planning layer addresses questions like size of the transport fleet, the location of distribution centers or bulk terminals, as well as the inventory targets at each storage point. It also needs to calculate the optimal target inventories at each distribution center by considering transport time, transport time variability,
and demand variability. The strategic planning layer supports the planner in looking at the entire distribution network simultaneously to come up with optimal balance of assets for the twelve to eighteen month time frame.

**Getting Started**

It is always easier to define what to do versus how to do it. The steps required to begin improving rail car planning are actually no different from those used to improve other supply chain planning functions.

The first is to consolidate the data needed for the planners and the dispatchers. This includes the data that shows the current status of cars, the demand for cars, and the historical data so that tracking metrics can be put in place. This step is necessary to determine the reliability of data and the variability in the available data.

Next, the planning processes needs to be integrated with the rest of the supply chain. This is best done at the tactical or monthly level first. Normally, a company has some form of tactical planning or S&OP process that can be extended to include railcar planning. These building blocks are essential before other improvements can be addressed.
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