

Returnable Container Control and Management Problems and Solutions

Control and management of returnable containers and other '*cyclic assets*' is a complicated process. Cyclic assets (containers, items, vehicles) regularly move between facilities controlled by the owner of the asset and facilities controlled by non-owners of the asset, or, from areas of high control (the organization or department) to areas of lesser control (the department or individual). The term '*cyclic asset*' resulted from puzzling over why the issues of returnable container management generally remained unsolved. When we started in 1998 there was, and still is, a large variety of asset management software. Some of it was very sophisticated but consistently failed or provided only a partial solution for '*cyclic asset*' tracking. An automotive industry AIAG committee estimated in 2005 that the problem cost \$750 million dollars annually and this likely underestimated total costs. Individual customers identified losses of millions of dollars for specialty containers.

Many tried to use intuition and existing tools to solve the problem. These attempts generally failed because there was a misunderstanding of the fundamental problem. Those responsible for solving the problem were plenty smart and they applied resources to the problem but their efforts usually produced partial success at best. Container management is fundamentally a control problem. Why is managing returnable containers not like managing capital equipment, tooling, documents, raw materials or a host of other corporate assets? Why is it when returnable containers are used within an organization their losses are only 5 – 10 % of a comparably sized system that moves the containers between organizations? When we began to understand the difference we defined the term '*cyclic asset*'. In returnable container systems the varying levels of control and different methods of control from organization to organization is the problem.

Inside organization 'A' it is easy to initiate action; control is direct and simple. The appropriate manager tells an 'A' employee to load containers on a truck and it happens. If the containers are frequently unavailable the manager determines the reason for their unavailability. If the lack of containers is an 'A' internal problem they address allocation and use issues and solve the problem. If, however, the manager determines the lack of containers is caused by partner 'B' (more likely several partners), they contact partner 'B' and ask for assistance (expedite). They cannot directly control partner 'B'; their success depends on the partner's willingness and ability to meet the 'A' manager's request. If containers are lost or misallocated within partner 'B's' facility, even the most cooperative partner lacks the ability to return containers that cannot be found. You will usually hear partner 'B' say, "I sent back all that I have."

Simply put, within an organization control can be simple and direct. Between organizations control depends on enforceable agreements. Your partners must agree to a specific plan for the containers. There must be an incentive for appropriate performance (quality rating, delivery rating) or a penalty for poor performance (rental) preferably both.

Intuitively, we want to track containers at every location. When we attempt to do this the information flow has the same problem as the container control. You can easily track shipments of containers to partner 'B', but you cannot track containers within partner 'B' unless partner 'B' provides internal movement information. The information problem is the same as the container management problem. There is no direct way to ensure partner 'B' will provide accurate, timely information on their internal movements of your assets.

Returnable Container Control and Management Problems and Solutions

Formal Control

In English control is a common word. We try to control our expenses, our pets, our children and our temper. We all have a strong informal idea of what we think we mean when we say ‘control’. When we attempt to control our returnable containers we are actually describing a formal technique that is used in a variety of quality situations. Formal control requires three steps, they are:

1. **We must have a plan.** When we send a container to partner ‘B’, we must have an agreement that identifies what we expect will happen when the container is in partner ‘B’s facility. For example, You put a blue box on the truck and it arrives at ‘B’ the same day. When a blue box arrives ‘B’ will fill it with parts the first or second day it is in their facility. ‘B’ will ship your parts so they arrive at our facility on the forth day. Another way to state this is in the form of a ‘cycle plan’. A ‘cycle plan’ describes the location where the container should visit and the time in days it can remain at the location. The ‘cycle plan’ for the above situation is, “The blue box can be on the truck to ‘B’ for one day, in the ‘B’ facility for two days; and on the truck back to you one day.”
2. **We must have a way to determine how well we are doing on the plan.** This is why you want to know how many containers are at each location. We do need this information, but it is not sufficient without knowing how many should be at the location at any particular time based on the plan. If you shipped the exact same quantity, 100 items for example, seven days a week. You would expect to receive 100 items every day starting on the forth day. However, if you ship varying quantities, 5 days a week, each day a different quantity would be returned. The chart below illustrates the concept of a rolling average and shows performance that meets the plan based on both partners shipping and receiving 5 days a week.

	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.	Mon.
Truck Out	80	100	70	90	75	0	0	100
At ‘B’	0	80	180	170	160	235	235	0
Truck Back	0	0	0	80	100	0	0	235
Back from ‘B’	0	0	0	80	100	0	0	235

Notice that virtually every day a different amount of blue boxes should be at facility ‘B’. Knowing how many blue boxes are at ‘B’ is useless unless you know how many should be there. This is further complicated by the fact that your partner usually sends you most of the items back per plan. You send them 100, they return 98. Looking at the raw data is not useful when they perform well. What you really want to know is how far behind plan they are. In the example in the chart the answer would be 0. They are performing perfectly according to your agreement; you don’t need to do anything. Also notice that knowing that there are 80 containers at ‘B’ on Tuesday doesn’t provide any useful information without reference to the plan.

Additionally, control is enhanced by reducing the time between measuring performance and taking corrective action. Maximum control is achieved when we have access to performance information immediately.

Returnable Container Control and Management Problems and Solutions

3. *We must have the will and ability to correct the difference between the measured performance and the planned performance.* This is the step that is often overlooked. When you realize that your returnable containers situation would benefit from increased control you initiate steps to allocate, use and track the items within your facility. Depending on the complexity of your operations you may be able to achieve 100% accountability within the direct control of your facilities and 3rd party service providers. You may determine that some or all of your partners are not performing per plan. At this point you loose control because you lack the ability to directly control your partner's performance. The following example represents a common situation.

You may be certain that last month you sent partner 'B' 4000 containers and they returned 3845. That may seem pretty good; it is a 3.875% static 'loss'. We really don't think of it as a loss because we expect they are acting in good faith, they will find and return the missing items next month and it will all work out in the long run. Experientially we know that it doesn't work out in the long run. Each year (quarter, or month) we are buying extra boxes. If that represents an average month, it would equate to a 46.5% annual static loss. That seems ridiculously high, but repurchase patterns indicate that 15-20% annual loss is common in cyclic situations.

When we call 'B' and tell them that we sent them 4000 and they returned 3845 they will typically reply, "That can't be right (they doubt your numbers). We send back everything that we have." If you have no reason to doubt their sincerity you have identified that their facility is out of control. That is either, 1) they are unaware of the plan or not committed to it; 2) they have no way of evaluating how they are performing on the plan (no tracking); or 3) they lack the will or ability to change their actions so they can perform according to plan.

Management Vs. Control

Our basic desire is to control our cyclic assets to ensure timely movement and reduce losses. Unfortunately we can't. As explained above, control is always a local issue. The definition of cyclic means we have reduced or no direct control. Managing your cyclic asset fleet requires that you understand and address this fundamental truth. Management of cyclic assets requires two fundamental agreements. The first is the definition of appropriate performance. The second is the agreement of your partner that they will perform according to plan or compensate you for their poor performance.

Coming to agreement on appropriate performance requires fundamental honesty. One partner owns the asset. They provide it for use to their partner for a specific reason. This reason is usually for their efficiency or as a requirement of contract. The buyer in the contract and the owner of the asset can usually dictate appropriate use. Since this is by agreement, both parties have explicitly or implicitly agreed to appropriate use. The container is to be used for delivery only, delivery and dispensing, delivery and WIP, etc. They are to be used only by the partner or the partner may use them for their vendors or clients. The partner is to keep a reserve inventory beyond normal use or not. Often inappropriate use is an advantage to one partner. When this is the case you have systemic poor performance. The asset is regularly used in a manner that is not seen as appropriate use by the owner.

Returnable Container Control and Management Problems and Solutions

Notice that appropriate use must be defined for each container, at each appropriate location. It may also be different for different parts and for different directions of movement. Each plan for appropriate use requires a 'cycle plan'. A 'cycle plan' is a list of appropriate locations and the time in days at each location. After appropriate use is defined in the form of a 'cycle plan' you need to track performance to the plan.

The second agreement required is more difficult. Essentially we are going to require that our partners fulfill the agreement we have or pay us rent for our containers when they do not perform as agreed. When we established the agreement we may have only identified a basic plan. The basic plan may be something like the following.

“Company ‘A’ will purchase the returnable containers and use them to ship part number 123 to company ‘B’. They will use 9”x12”x8” plastic tote with an open top that is stackable. Each tote will hold 32 123 parts. Company ‘B’ will return the totes to company ‘A’ in a clean and serviceable condition.

The basic plan might not even have that much detail. It lacks any statement about appropriate use. The plan does not have enough detail to allow you to manage the cyclic asset. Adding detail to the basic plan to define performance is part of the first agreement.

The second agreement requires the partner that doesn't own the asset compensate the owner of the asset for poor performance. This agreement is more difficult because your partner eventually will have to pay, in real dollars, for their poor performance. Your customers may correctly point out that they did not agree to this at the time of contract. You may have to wait for the next contract before you can get an agreement on compensation. The cost of poor performance is real and comes directly off your bottom line. Even if you cannot get compensation for poor performance calculating the cost of the poor performance is essential for managing the cyclic assets.

Rental of Cyclic Assets

The first thing that occurs to an organization when you discuss cyclic asset rental is that they are not in the rental business. It seems a difficult effort for a small return. If this is the case, your management only needs to decide that the cost of poor performance is negligible and can be written off as the cost of doing business. This is often the case when the assets are being used within an organization. The cost of tracking and managing the assets exceeds the amount that can be saved by increased control. However, awareness of your cyclic asset management needs often comes from becoming aware of the cost of managing your current assets. Expediting costs, replacement costs, special shipping costs, capital costs and warehouse costs become significant. You are not going to use asset rental as a profit center, you are going to use it as a method of gaining the ability to ensure your partners are performing to plan or compensating you for your poor performance. This is essential to establish cost control over the parts of the network of partners.

There are three basic approaches to rental, Product Delivery Rental, Item Rental, Performance Based Rental.

Returnable Container Control and Management Problems and Solutions

Item Rental / Lease

This approach charges rent for an item for a specific period of time. This approach is common for tool / equipment rental and for service companies that rent or lease an item to other organizations for their use. This includes pallets, containers, chemical and gas tanks, rail-cars, intermodal containers and others. In this case rental is a primary service of the company that owns the asset.

Product Delivery Rental

When a customer's product requires a specialty container the rental or the agreement to rent is included in the product purchase. This type of rental is common for propane, specialty gasses, liquid chemicals and in situations where the container is expensive (a stainless IBC for example). Rental may be calculated with or without consideration for appropriate use. For example, \$2.00 per day from the date of delivery until the IBC is returned. In these systems the customer is responsible for tracking the container and are charged rental until the container is returned. The customer is required to return or purchase the container to end the rental charge.

This approach requires serialization of the containers; each has to have a unique identification number. That number has to be tracked for calculation of rental. This approach has the advantage of being very easy to understand with simple mathematics. It has the disadvantage of requiring serialization. Serializing assets is necessary if the asset has testing requirements (chemical tanks used for transportation of certain chemicals, propane tanks, lifting slings). If serialization of the asset is not necessary, tracking by serial numbers significantly increases tracking effort and costs.

Performance Rental

Performance rental charges rent for an item when it does not meet specified performance criteria. This approach is the most useful for cyclic asset networks where the asset regularly is in the direct control of non-owners. If the non-owner meets the agreed upon performance, there are no rental charges. If their performance does not meet the agreement, the non-owner is charged rent for the time they delay return or for their losses. Performance rental can be applied to serialized or non-serialized items.

Tracking performance by quantity is conceptually complicated and the mathematics requires rolling averages of quantities. The rolling averages require a defined cycle plan as a basis to calculate performance. Although more difficult to conceptualize than serialized item tracking, this approach reflects the fact that the individual containers are interchangeable.

Remember our goal in performance-based rental is to not to collect rent but to improve your partners' performance. You will want to emphasize to your partners that the best outcome is performance that meets the plan (the plan to which they agreed). I have heard a colleague describe the requirements for container management as accountability, tracking and a stick. Performance based rental is the stick you use to cause your partners (the ones you can't directly control) to perform to the agreement based plan.

Returnable Container Control and Management Problems and Solutions

Management Through Compensation

Our definition of 'cyclic asset' identifies that we will lose or reduce our ability to directly control the reusable container. Since we can't control the asset we need to manage our containers in a way that reduces our costs or at least identifies the costs accurately. Remember our desire to control our cyclic assets usually is derived from identifying significant replacement, expediting or repackaging costs. In other words we have a reusable container cost control problem. Like all formal control problems it can be reduced to three steps shown below.

1. Plan – Reduce container management costs to an acceptable level.
2. How are we doing on the plan? – Our costs are currently too high.
3. Take corrective action to eliminate the difference between the plan and current performance. – Create, implement and monitor a plan to reduce container management costs.

When we create our cost reduction plan we will need to identify container management costs. Generally speaking, systems that loose containers have high asset replacement costs. Systems that perform poorly without large losses have an inventory that is too large. When you have inefficient control of returnables, if you have enough, you have too many. The following lists identify the most common returnable container costs. The related costs are both direct and indirect. All do not apply (hopefully) to any specific returnable container management system.

Asset Related Costs

- capital cost of the asset
- the cost of capital including opportunity costs
- acquisition costs, time spent purchasing new/replacements
- inventory costs

Delivery Assurance Costs

- expediting labor costs
- expediting shipping costs
- cost of alternate packaging
- disposal cost of alternate packaging

Production Inefficiency Costs

- repacking costs
- container related downtime
- container related charge-backs

Some of these costs are one-time, some performance specific and some continuous. We want to take any of the costs from the above list that apply to our situation and combine them in an appropriate rental charge. That rental charge should be expressed in cost per day. This cost should be significantly higher than the replacement cost amortized over its useful life. It should represent a penalty for poor performance. Remember in a perfectly performing system you will collect no rent. By identifying the cost as a cost per item, per day we can calculate static and dynamic costs.

Returnable Container Control and Management Problems and Solutions

Static Vs. Dynamic Costs

Static costs reflect losses or inappropriate use that is systemic. Dynamic costs more closely reflect the entire cost to the organization. The following example illustrates the difference. Let's imagine a partner that uses our asset on a four-day cycle. You send them 100 containers per day 22 days a month; 2200 containers. If you judge their performance statically on a monthly basis they only need to return 2200 containers by the last day of the month. If they actually did that you would need an inventory that was 550% larger than necessary to meet the agreed dynamic plan (four day cycle). Admittedly, this is a worst-case example. It is more likely that it will only be 250%. Of course your goal is that the inventory be 100% of the necessary items. Dynamic cost calculation accurately reflects bad practice on your partner's part.

For example, it may be convenient for your partner to temporarily retain a number of containers in several locations in their facility. These mini inventories allow them to schedule production and line changes more efficiently, but they represent an inappropriate use of your asset. If you imagine the mini inventory is 100 boxes kept an additional four days in three different areas the cost of not conforming to the plan is 1200 (100 items x 4 days x 3 locations) times the daily rental for the item. Dynamic performance calculated daily will reflect this inappropriate use; static performance calculated monthly will likely miss most of the misuse and perhaps all of it. In a previous case study we determined that an appropriate daily rental for an item that cost \$125 would be in \$0.20 - \$0.25. If we consider our imaginary boxes to be \$12.50 totes a likely rental price would be \$0.02 - \$0.03 per day. At \$0.03 per day rental the dynamic calculation of the performance cost is \$36. By itself this does not seem very significant. Maybe not, but remember that represents on tote for one partner for one month with no losses.

In a normal system you may have sixty partners that average two different containers. If you did and this modest misuse was considered average you would have an annual poor performance loss of (36 x 60 x 2 x 12) of \$51,840 if you never lost a container. In a system where those numbers are representative you could also expect a total inventory of \$600,000 with losses of \$60,000-\$90,000 per year; that means an annual cost of \$111,840 - \$141,840. The costs escalate if expensive items like fold-down boxes or heavy-duty metal boxes are used. One of the biggest problems of managing returnable containers is that it is easy to underestimate the total costs of your returnable containers.

Practical Application

In a complex problem like container management for a significant fleet of containers it is often difficult or impossible to ensure that everything works as it should. This is particularly true if your partners are a mix of vendors and customers and you have to get the agreement of these partners. Essentially, your partners must control and track your container to the agreed upon plan in their facilities. Even if they understand they are not performing to a mutually acceptable plan, they will doubt your numbers and significantly underestimate the cost to you of their poor performance. They may be completely unwilling to enter into any manner of compensation agreement. Even if this is the case, tracking the dynamic performance of your assets will allow you to accurately estimate the cost of current system performance. This information will allow you to accept these costs as normal or seek to offset them in future contracts with vendors and clients. For more information about general returnable packaging issues visit our web page

<http://www.container-tracker.com/features&concepts.php> .