Washington State Apples

A packaging and distribution system case scenario

The case scenario that follows was developed around a Full Disclosure® model. The information used to create the model was provided directly by the grower/shipper. To maintain confidentiality, only the name of the grower was changed.

The Washington State Apples model is a fair and accurate representation of a real-world packaging and distribution system. It compares the economics of shipping in Corrugated Common Footprint (CCF) containers vs. returnable plastic containers (RPCs).

The Commodity

Washington state's apple legacy began in the early 1800's when settlers realized the soil and climate east of the Cascade mountains were ideal for growing fruit. Orchards flourished in valleys and plateaus, and the land was abundant with hundreds of varieties of apples.

Nearly two centuries later, Washington state produces more than half the apples grown in the U.S. for fresh eating. Each year, 10 to 12 billion apples are picked by hand, carefully packaged, and then shipped to every state in the U.S. and scores of foreign countries.

Apples represent Washington's largest agricultural product. In 2002, apples destined for the fresh fruit market were estimated at 3.6 billion pounds. Considering an average container weighs 42 pounds, this equates to over 85.7 million containers annually.

Wenatchee Valley orchard

This case scenario focuses on a large grower and shipper of apples situated in Washington's Wenatchee Valley. For the purposes of the discussion, we'll call the grower/shipper **Northwest Orchards**.

What is a case scenario?

What's the difference between a case *study* and a case *scenario*?

A *case study* typically concentrates on a real-world situation or commodity, which is then brought to light through a thorough interpretation of actual data.

A *case scenario*, on the other hand, still uses real-world situations and data. But it "recasts" this information in a way that maintains the subject's anonymity and protects confidential information. This case scenario contains accurate information, however it has been "generalized" to protect sensitive information.

Company Perspective

Northwest Orchards is one of the largest shippers of apples, cherries and pears on the west coast of the United States. They began operation in the early 1960s with a single grove of cherries on a fertile hillside in central Washington state.

As the years went by, this family-owned and operated business has grown to over 10,000 acres. Apple orchards feature old-time favorites like Red and Golden Delicious varieties. Popular new varieties include Fuji, Braeburn, Jonagold and Pink Lady®.

Northwest Orchards is a progressive and environmentally conscious company. In 1989, they developed a "Responsible Choice" program that starts in the orchard and continues through to storage and packaging.

As part of the program they monitor soil moisture and irrigate only when necessary. They also use chemicals for pest control that are safer for humans and beneficial insects. The investment in research and development has made Northwest Orchards a leader in environmentally sound tree salvaging, pest management and fertilization methods.

In addition to traditional orchards, Northwest has an extensive organic growing operation. Eight apple varieties are grown without the use of any synthetic chemicals.

The company uses state-of-the-art controlled atmosphere (CA) storage for its fruit. Apples are placed in large, airtight, refrigerated storage facilities where temperature, oxygen, carbon dioxide and humidity are carefully controlled. This process slows respiration of the fruit, which in turn slows ripening. This allows Northwest Orchards to store and ship apples year 'round.

The Case

The packaging and distribution system for Northwest Orchards typifies that of a large produce grower/shipper.

Each fall, apples are picked at nearby orchards and then transported to a Northwest Orchards facility where they are cleaned and sorted. Apples destined for immediate shipment to domestic markets are packed into containers (either corrugated or plastic), loaded onto pallets, and then placed in 48-foot refrigerated trailers.

Packing Yellow Delicious Apples

Semi-trailer trucks transport the apples to distribution centers (DCs). At the DC, pallets of apples are "broken down" (reconfigured for retail), loaded onto delivery trucks and distributed to retail outlets.

Apples headed to foreign markets (Northwest Orchards ships apples to over 30 foreign countries) are placed into containers, loaded onto pallets, and then loaded into refrigerated railcars or ships for final distribution.

Some apples go into storage after harvest. Northwest Orchards' extensive controlled atmosphere (CA) facilities allow apples to be stored for several months, while maintaining quality and freshness.

This case focuses on a typical domestic packaging and distribution scenario for Northwest Orchards. Apples are transported from the grower/shipper to a distribution center and then to retail outlets.

At retail outlets, corrugated containers are broken down, placed into balers and recycled for the positive economic value of old corrugated containers (OCC).

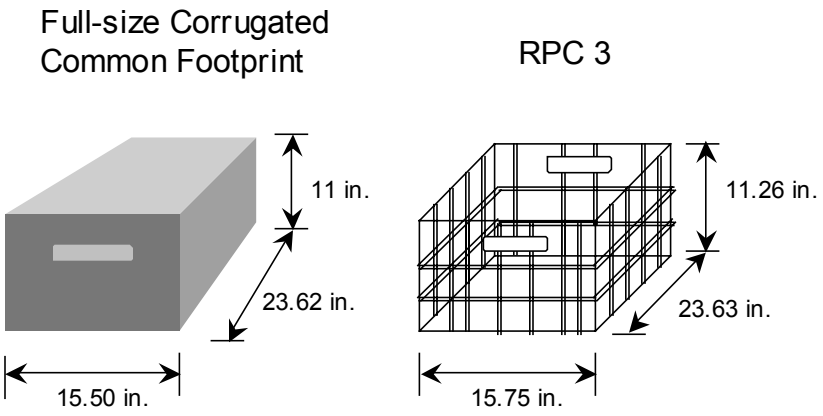
RPCs, on the other hand, must complete the return trip, which requires sorting, washing, sanitizing, warehousing and redistributing to Northwest Orchards.

For more details on Northwest Orchards' distribution system and the RPC backhaul leg, go to the section "Distribution Profile."

Container Profile

Because of the many types of fruits shipped and different market requirements, Northwest Orchards uses a wide variety of containers and packaging materials (for example, liners and trays). In fact, over 3,000 different packaging configurations are currently employed.

This case scenario assumes that apples are packed into either 40-pound capacity corrugated containers (full-size Corrugated Common Footprint) or 40-pound capacity returnable plastic containers (RPC 3).



Container	Dimensions L x W x H (inches)	Weight (lbs)	External Cube (inches ^{3})
Corrugated Common Footprint	23.62 x 15.50 x 11.00	2.00	4027
RPC 3	23.63 x 15.75 x 11.26	5.60	4190

Packing Materials

The 40# Corrugated Common Footprint containers and 40# returnable plastic containers can accommodate three layers of apples. Molded fiber trays and liners are used to protect the apples during shipping. There is a $0.30 per container fixed cost for packing materials, plus $0.10 per layer for additional liners. Therefore, the cost per container for packing materials is $0.60.

What is a "Eurobox"?

"Eurobox" is a common term, and refers to a container that conforms to the Corrugated Common Footprint (CCF) specifications. The term is a bit of a misnomer, even though it is common in the industry. It was derived because European countries were early adopters of the CCF containers.

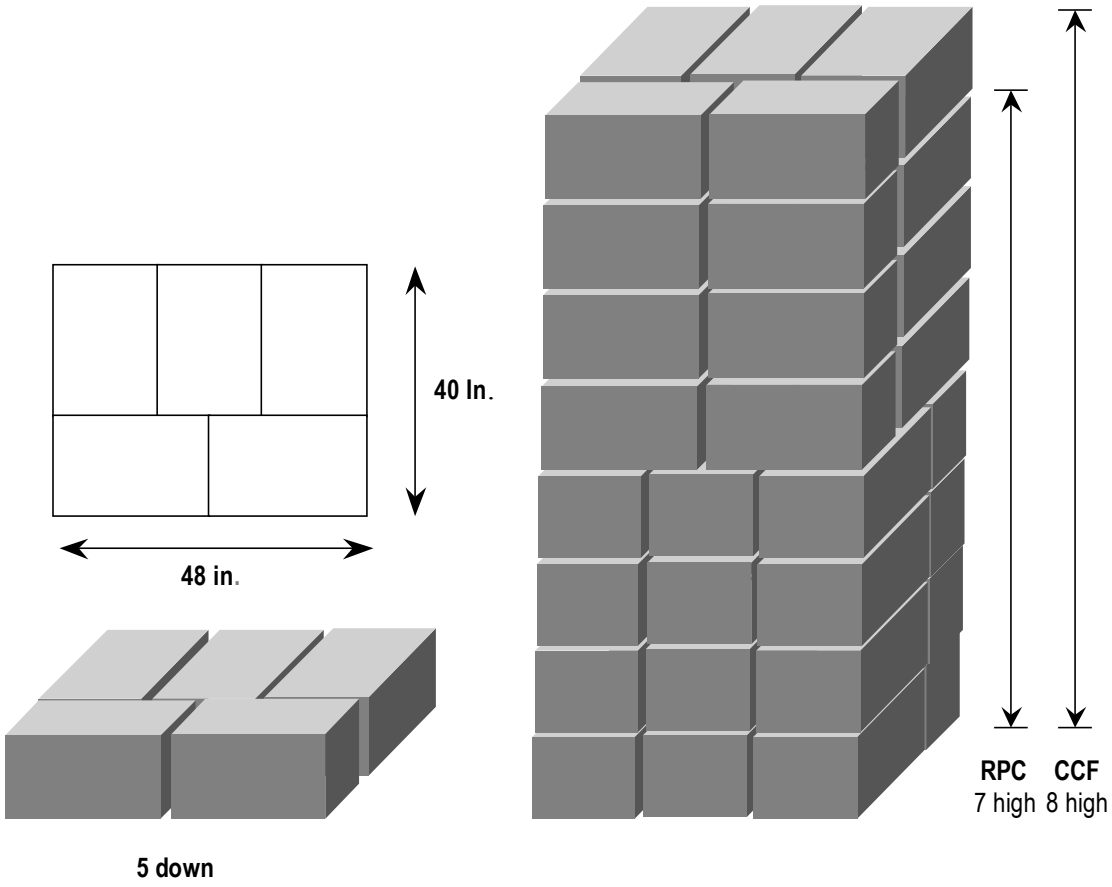
More information on the Corrugated Common Footprint.

Pallet Configuration

Pallets are loaded by forklift onto trailers as single-level loads (as opposed to double-level loads where two layers of pallets are stacked). Standard 40" x 48" GMA pallets are used.

Pallets are configured in one of two ways:

- Corrugated containers are configured five down (five boxes per tier), eight layers high (or 40 containers per pallet).
- RPCs are configured five down, seven layers high (or 35 containers per pallet).



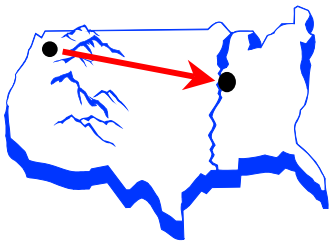
Container	Stacking Pattern (containers/layer x number of layers)	Container Gross Weight (lbs)	Containers per Pallet	Full Pallet Weight (lbs)	Pallet Height (inches)	Pallets per Trailer
Corrugated Common Footprint	5 per layer, 8 high	42.0	40	1680	88	25*
RPC 3	5 per layer, 7 high	45.6	35	1596	79	26 **

* Trucks carrying corrugated containers "weigh out" (are weight-constrained) at 25 pallets (42,000 pounds total payload weight).

** Trucks carrying RPCs "cube out" (are volume-constrained) at 26 pallets.

Distribution Profile

This case scenario assumes that apples are shipped 2,000 miles. For the sake of illustration, that's the approximate distance from Yakima, Washington to Chicago, Illinois.



Note: Trucks leaving Northwest Orchards ship FOB (free on board) from their packing facility. That is, the retailer purchasing the apples pays for the freight costs. This is important to keep in mind, as costs are being allocated later on in the modeling process.

The distribution profile for Northwest Orchards involves several steps. Apples are trucked to distribution centers, where they are unloaded by forklift and broken down (re-palletized) for distribution to retail outlets.

At the DC, the process of breaking down the unitized loads from the grower/shipper, placing them into storage, then subsequently "picking" orders to ship to the retail store can involve many steps. For this case scenario, the analysts assumed that the containers are stored in the DC using the original shipper's unit load (pallet). Containers are then re-stacked for shipment to stores on mixed pallets containing similar commodities, such as similar produce items requiring refrigeration

The mixed pallets leaving the DC are loaded onto delivery trucks for transportation to retail outlets. Once at the retail stores, pallets are unloaded from the trailers and prepared for retail presentation.

Empty corrugated containers are broken down and recycled for their old corrugated container (OCC) value. At this point, the corrugated container's function in the distribution of Northwest Orchard's apples is complete.

In 2002, more than 74% of all corrugated containers in the US were recycled. It is estimated that this recycling rate grows to over 90% at the retail level. [1]

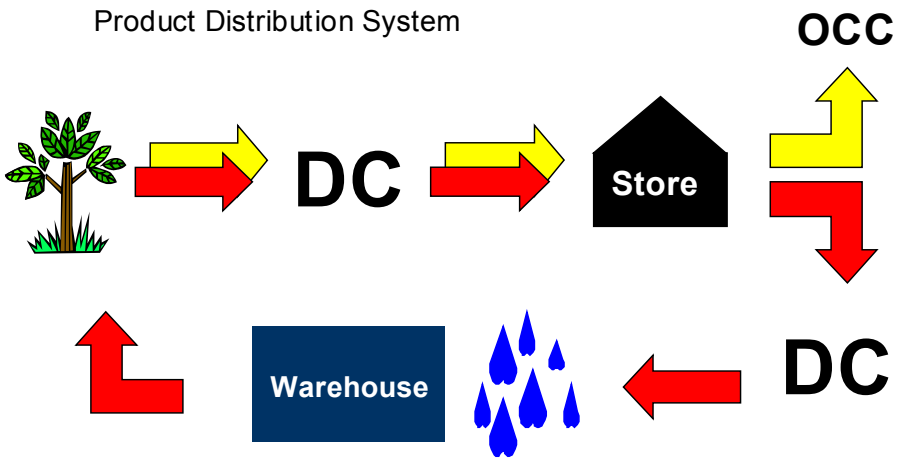
RPC Backhaul Leg

Unlike corrugated containers (which have been recycled for their OCC value), RPCs now begin the long trip back to the grower/shipper.

First they are transported to a sorting area in the DC where they are sorted according to size and condition. From the DC, RPCs are transported to a

[1] American Forest & Paper Association, 2003.

washing depot where they are washed, sanitized and repaired as necessary. From the washing depot, RPCs are transported to a warehouse for holding. When needed, they are shipped back to Northwest Orchards.



RPC Return Trip (Backhaul Leg)

Northwest Orchards believes it takes approximately 120 days (or about four months) for an RPC to make this round trip. Therefore, each RPC makes about three complete cycles (or "turns") per year. This relatively long cycle time is somewhat impacted by the fact that apples often spend time in cold storage during their distribution cycle.

The RPC backhaul leg is an expensive and often time-consuming operation, and is thoroughly examined in the **Comparison** portion of the case scenario.

The Comparison

The Northwest Orchards case is a real-world situation that objectively compares supply chain costs of using corrugated (CCF) vs. RPCs. Using the information provided by Northwest Orchards, the model development team started analyzing the case.

The model for Northwest Orchards was created using the Full Disclosure® modeling tool. Full Disclosure allows the user to accurately compare the distribution system economics of corrugated containers to RPCs (in this case, a Corrugated Common Footprint container to an RPC 3).

The model developers carefully placed container and distribution system data provided by the grower/shippers into a Full Disclosure model of their situation. In addition to data provided by the grower/shippers, the model developers also used key data points, which are industry-accepted or commonly agreed-upon values. Northwest Orchards also accepted these data points.

Note: The information in the following table came from industry sources, and represents commonly agreed-upon values. For more information on these data points and how they were determined, see the Full Disclosure Tables of Common Values.[2]

Data Point	Defined As…	Value Used in Model
Full Running Rate per Mile	Operating cost per mile when truck is fully loaded	$1.55/mile
Loading and Unloading Productivity at DC	Rate at which a truck can be loaded/unloaded	30 pallets/hour
Labor Rate at DC	Hourly rate for one worker at the DC	$15/hour
Labor Rate at Grower, Retail Store, Washing Station	Hourly rate for one worker at the grower, retail store, or washing station	$10/hour
Recycling Value per Unit	Value per container from recycling old OCC (assumes OCC is $65/ton)	$0.065/container
RPC Useful Life	Number of years an RPC lasts before it breaks or wears out (assumes 24 lifetime trips at 3 trips per year)	8 years
RPC Washing Costs	Cost to wash and sanitize one RPC	$0.35/container

[2] You must be a member of the AF&PA, FBA or CPA and have a member login to access this information.

RPC Loss and Theft Rate	Percentage of RPCs that must be replaced annually due to lost (misplaced) containers or theft	3%

Annual Containers & Cost per Container

This case scenario assumes that Northwest Orchards ships 700,000 containers of apples annually.

Northwest Orchards currently pays $1.00 for each 40# Corrugated Common Footprint container. This cost does not reflect the added costs incurred for packing materials.

Northwest Orchards currently rents its RPCs from a third-party pool provider. They pay $1.00 per container, per trip to rent from the pool provider. Northwest Orchards also pays $6.00 per container to replace lost or stolen RPCs.

Why rent containers?

Some grower/shippers are required by the retailer to ship in RPCs. For that reason, many growers like Northwest Orchards have turned to renting RPCs, rather than purchasing a pool of containers.

Although renting containers may seem like a prudent economic decision, there are still start-up costs involved in deploying RPCs. For Northwest Orchards, the requirement to ship in RPCs necessitated a $3 million capital investment in specialized palletizing and handling equipment.

Plus, all parties involved in the distribution system may want to consider whether rental costs are sustainable by the pool operator over time. To assist in understanding the implications of renting and who bears the cost, the AF&PA commissioned the development of a Rental Analysis Excel® spreadsheet. This spreadsheet imports the results of a Full Disclosure model, and allows the user to assign owners and allocate rental costs to those owners.

Model Building with Full Disclosure

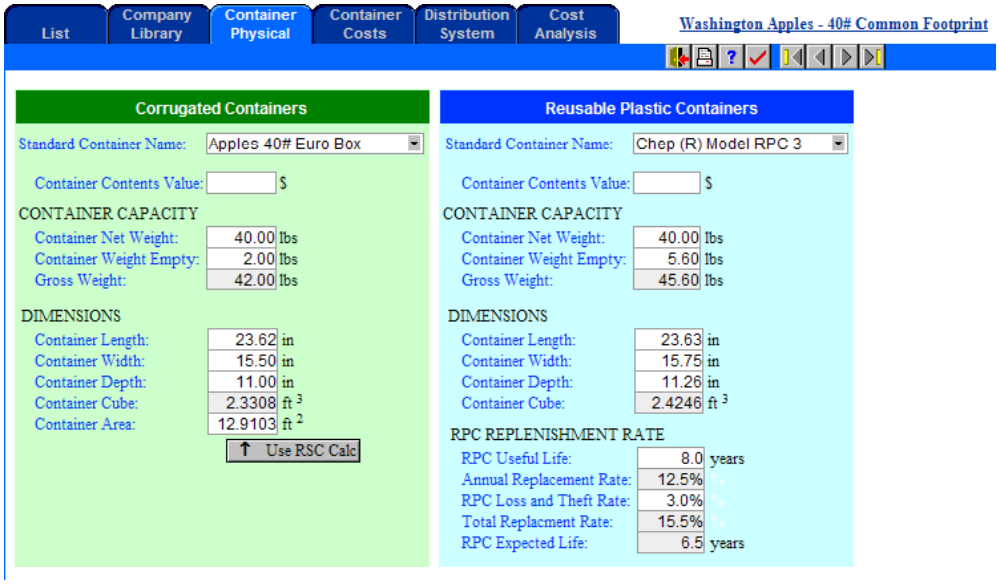
The model-building process using Full Disclosure involves taking all the information and data points supplied to this point and systematically applying them to the various screens in the application. Although the application is flexible enough to support many modeling approaches, the following descriptions follow the approach used to develop the Washington Apples Full Disclosure model.

Because Northwest Orchards rents containers, the model developers chose to build two models, one which depicts a scenario where RPCs are purchased by the grower/shipper (Steps 1-4), and one which analyzes the economics and cost owners in a rental scenario (Step 5).

Step 1. Define each container (size, weight, useful life).

The graphic shows the Full Disclosure **Container Physical** screen, where the modelers described the two containers - CC and RPC. Notice that this screen

displays all the critical dimensions, weight and RPC replenishment requirements. Replenishment requirements include useful life (expressed in years of service) and loss and theft rate.

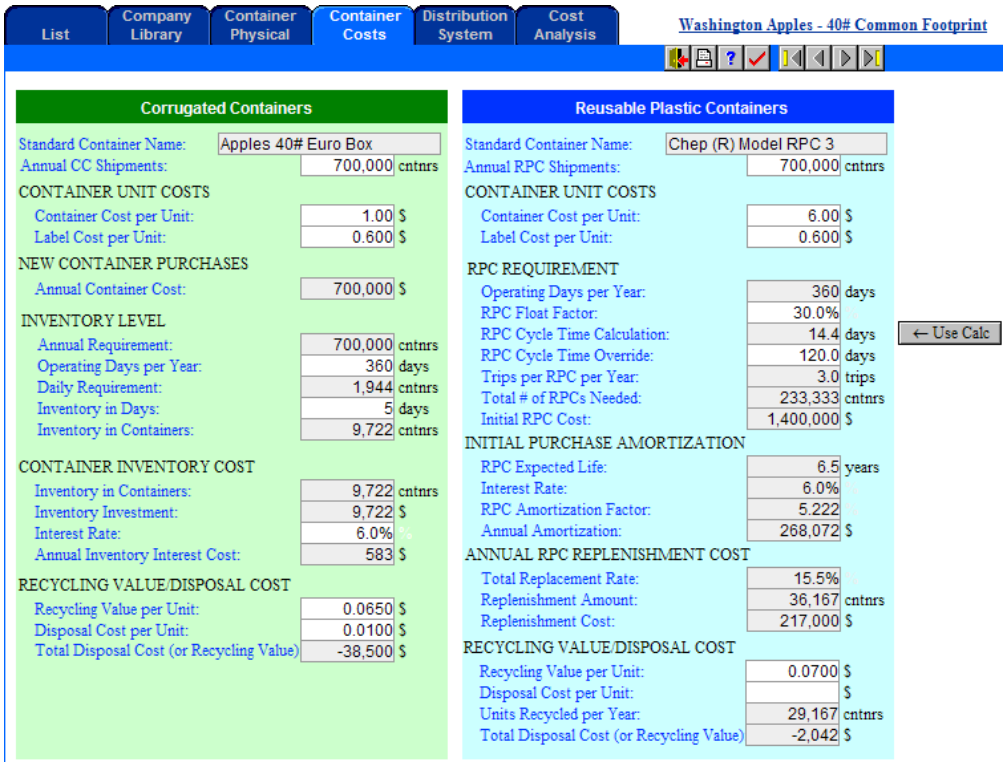


Container Physical screen

Step 2. Define container costs.

The Full Disclosure **Container Costs** screen displays the costs associated with the 40# Corrugated Common Footprint container and the 40# RPC. In addition to costing information, this screen is where the modelers defined the inventory levels, recycling values and RPC cycle time.

Note that the values entered in Full Disclosure directly correspond to information provided by Northwest Orchards.

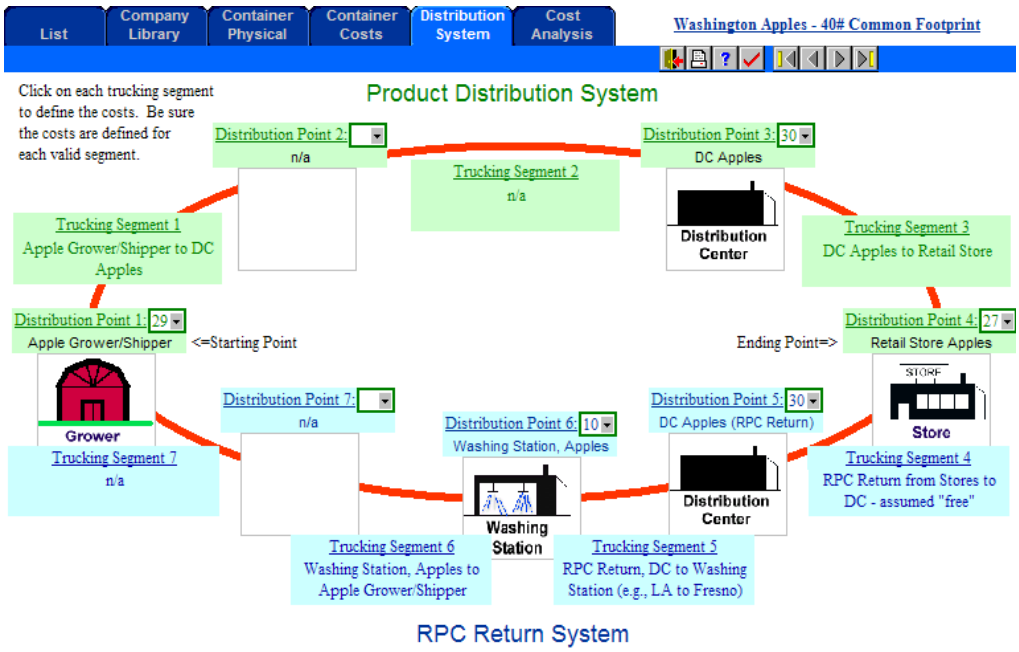


Container Costs screen

Step 3. Define the points and segments in the distribution system.

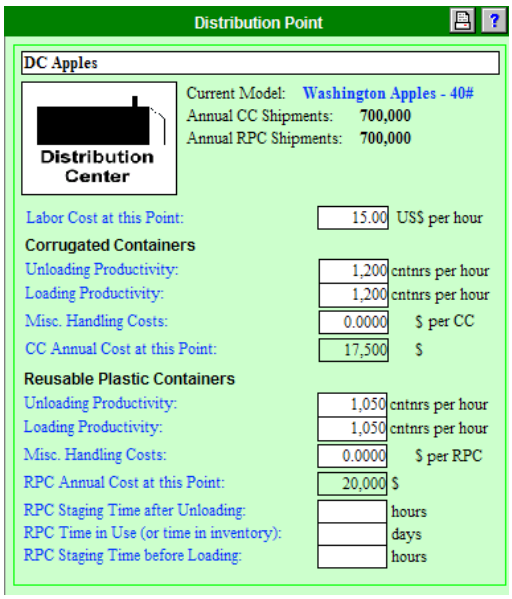
Full Disclosure's **Distribution System** map allows the user to define all the distribution points and trucking segments in the trip. Each distribution point (for example, grower, DC, retail store, washing depot) in the system is first defined. Then costs associated with the point are determined. Finally, by drilling down on each segment (leg) of the trip, the user can define the specific details of that leg (such as distance traveled, payload, etc.).

Note that the Full Disclosure distribution map closely resembles the Product Distribution System flowchart.



Distribution System map

By drilling down on a Distribution Point in the map, the user can define the labor rates and loading and unloading productivity rates at that point. The graphic below shows how the modelers specified these values for both containers at the apples DC.

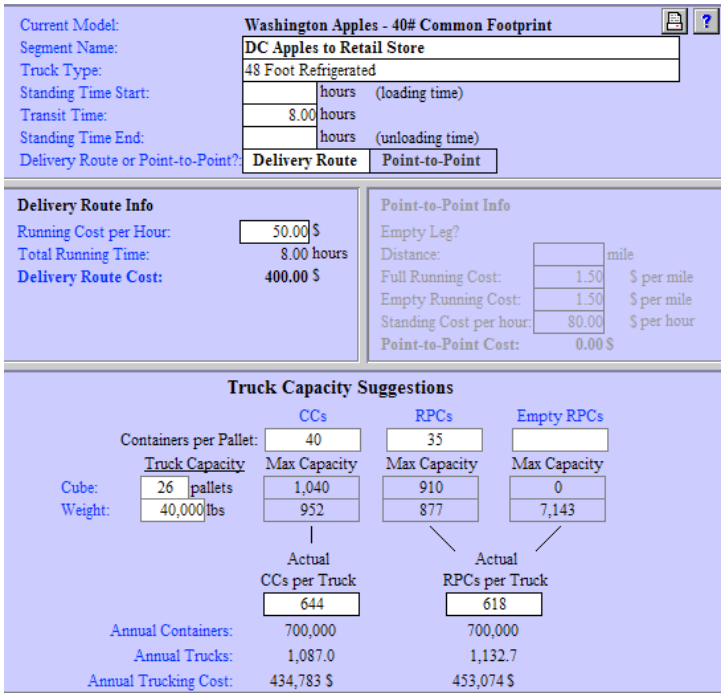


Drill down on map defines distribution point data

Appropriate distribution points were defined and representative data entered for every point in the system (including all points in the RPC return trip).

Defining distribution segments (legs) of the trip allows the user to specify the number of miles traveled, running cost per mile, the type of truck used. It's also where the user specifies the number of containers that can be loaded

into a trailer before weighing out or cubing out. The graphic shows how one segment on the distribution map (the DC to retail store leg) was defined.



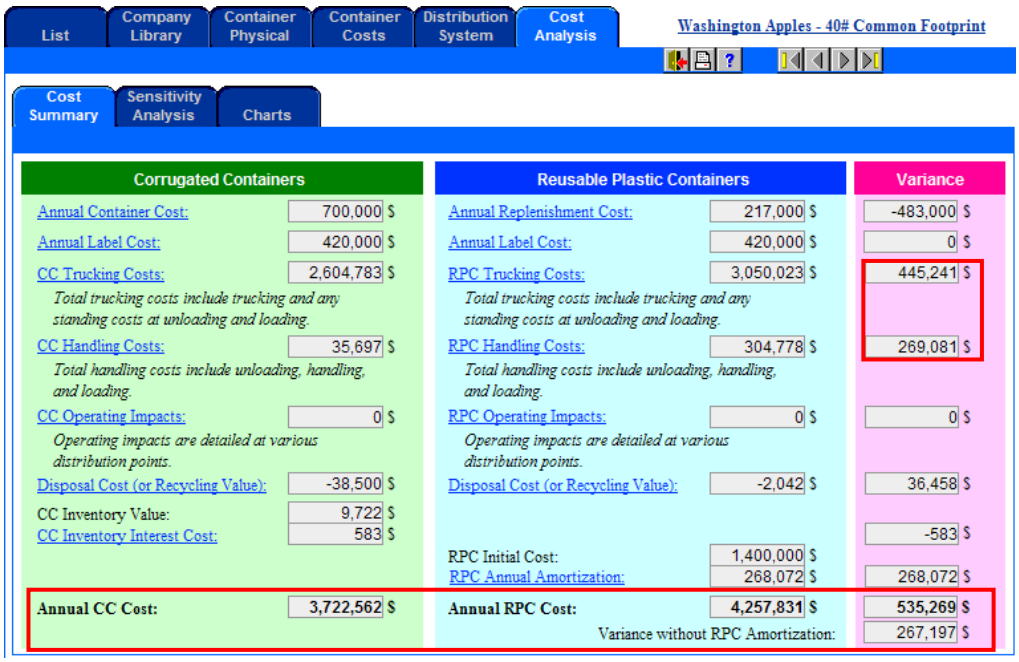
Drill down on map defines segment data

At this point, it is appropriate to view (and review) the results of the model building process.

Step 4. Analyze the results.

The Full Disclosure **Cost Analysis** screen allows the user to see a summary of the model results.

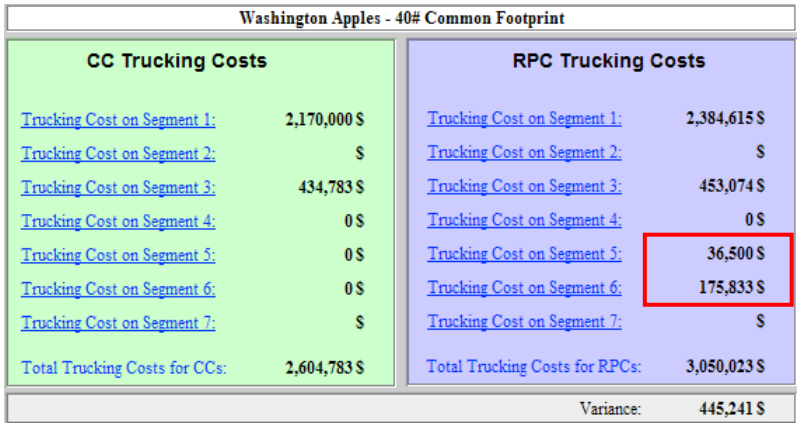
Here the user sees a summary of all the data entered into the model. Container costs are highlighted, as are annual label costs (which includes the cost of the packing material), trucking costs, handling costs, operating impacts, and disposal costs. Results are displayed by comparing a Corrugated column to an RPC column, and calculating the variance for each cost category. The accounting charge to amortize the initial container investment may be included or excluded.



Cost Summary screen

Note that RPCs incur higher costs associated with trucking and handling. Cumulatively, the costs are over $714,000 annually. This is the result of the RPC backhaul trip requirements, handling costs at the DCs, and washing and warehousing costs.

Full Disclosure effectively shows where in the distribution system (which segment) costs are incurred. The graphic below is a drill-down on Trucking Costs and is derived from information in the **Distribution System** map. Segment 5 (the DC-to-washing depot leg) and Segment 6 (the washing depot-to-apple grower leg) accurately represent costs associated with the RPC return trip.



Drill down on Trucking Costs

Another area of interest is Handling Costs. Here again the additional handling costs incurred at every stop in the RPC return trip dramatically increase the overall annual cost to ship RPCs.

The impact of RPC washing costs is shown at Point 6. Note how Full Disclosure depicts the cost to wash a container (which was defined as $0.35/container x 700000 annual containers) at this distribution point.

Washington Apples - 40# Common Footprint			
CC Handling Costs		**RPC Handling Costs**	
Handling Cost at Point 1:	6,530 $	Handling Cost at Point 1:	7,778 $
Handling Cost at Point 2:	$	Handling Cost at Point 2:	$
Handling Cost at Point 3:	17,500 $	Handling Cost at Point 3:	20,000 $
Handling Cost at Point 4:	11,667 $	Handling Cost at Point 4:	17,778 $
Handling Cost at Point 5:	0 $	Handling Cost at Point 5:	12,000 $
Handling Cost at Point 6:	0 $	Handling Cost at Point 6:	247,222 $
Handling Cost at Point 7:	$	Handling Cost at Point 7:	$
Total Handling Costs for CCs:	35,697 $	Total Handling Costs for RPCs:	304,778 $
		Variance:	269,081 $

Drill down on Handling Costs

Bottom Line: The Washington State Apples case is clearly favorable to corrugated containers. As shown in the cost summary, corrugated containers show an annual cost advantage of $267,197 (without RPC amortization). If you factor in RPC amortization, the advantage to corrugated is even more pronounced. Here you see an annual cost advantage of $535,267 for corrugated containers.

Another way of thinking about this is to realize that if RPCs are used in this supply chain, overall costs will go up by over $260K per year. The impact is even higher (over $535K per year) if you include the annual amortization expense of paying for the original supply of RPCs.

There is more to be learned from this scenario, however. The next step uses the Excel-based Rental Analysis spreadsheet to uncover more details on the economics of pool operations.

Who really pays the cost of renting an RPC?

Step 5. Analyze the economics and "owners" in a rental situation.

RPC system operators often make the following offer to a grower/shipper:

"If you pay a rental fee each time you ship a product in an RPC, we (the pool operator) will set the price per trip rental price at about what you are currently paying for a corrugated container."

In return for paying this rental fee, the RPC system operator agrees to furnish the containers; gather, transport, sort, inspect and clean the containers; and return them to the grower/shipper for the next shipping cycle. They also agree to make the investment to purchase the initial pool of containers and to replace containers that are lost or stolen outside of the grower/shipper's control.

This offer may seem appealing. However, the Full Disclosure analysts have found that a scrupulous investigation of "who really bears the cost" in a rental situation can provide great insight. To that end, the Rental Analysis

Spreadsheet was used to determine exactly who is responsible for the various costs involved in shipping apples in rented RPCs.

Rental Analysis Details

The analysis of Northwest Orchards' rental arrangement with the RPC pool operator began by identifying which "player" (or participant) in the distribution system "owned" (was responsible for) the cost of each portion of the trip. This allowed the modelers to accurately determine who bears the cost of each activity, and where in the distribution system these costs arise.

The modelers imported the data from the Washington Apples model into the Rental Analysis spreadsheet. (This is an easy process, and is automated in Full Disclosure.)

The team used the same three cost owners as in the Full Disclosure model: Northwest Orchards, a major retailer and the pool operator.

Once owners were defined, an owner was assigned to each of the following costs in the model:

- Container costs (including packing materials)
- Trucking costs
- Handling costs
- RPC rental costs (including loss and theft)

Here's what the modelers saw when they imported data from Full Disclosure and assigned owners to all the container costs. Note that the values displayed in this screen are exactly the same as those in the Full Disclosure **Cost Summary** screen for the Washington Apples model. Also note that "owners" for each of these areas have been assigned in the right hand column of the spreadsheet.

Import Data | Define Owners | Cost Summary | Trucking | Handling | Operating Impacts | Rental Costs | Rental Summary

Cost Summary

	CCs	RPCs	Variance	Owner	
Annual Container Cost	700,000	217,000	(483,000)	Northwest Orchards	CC
				|Pool Operator	RPC
Annual Label Cost	420,000	420,000	0	Northwest Orchards	CC
				Northwest Orchards	RPC
Trucking Costs	2,604,783	3,050,023	445,241	***Distributed by segment***	
Handling Costs	35,697	304,778	269,081	***Distributed by point***	
Operating Impacts	0	0	0	***Distributed by point***	
Disposal Cost/Recycling Value	-38,500	-2,042	36,458	Major Retailer	CC
				|Pool Operator	RPC
CC Inventory Interest Cost	583		(583)	Northwest Orchards	CC
RPC Amortization Cost		268,072	268,072	|Pool Operator	RPC
ANNUAL CC COST	**3,722,562**	**4,257,831**	**535,269**		
	Variance without RPC Amortization		267,197		

Cost Summary data imported directly from Full Disclosure model

As another example, the graphic below shows how rental costs are apportioned for the various owners in the Washington Apples model.

Rental Costs

Distribution Point #	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Total for All Points
Point On/Off	*On*	*Off*	*On*	*On*	*On*	*On*	*Off*	*for comparison*
Distribution Point Name	Apple Grower/Shipper		DC-Apples	Retail Store	DC (Return)	RPC Washing		
Owner	Northwest Orchards		Major Retailer	Major Retailer	Major Retailer	|Pool Operator		
Rental Fees								
Rental Fee per Container	1.00							
Total Rental Fees at this Point	700,000	0	0	0	0	0	0	**700,000**
Non-Refundable Deposit Costs								
Deposit per Container	6.000		6.000	6.000				
Refund per Container	6.000		6.000	6.000				
Annual Cost of Non-Refundable Deposits	0	0	0	0	0	0	0	**0**
Lost and Stolen Container Costs								
RPC Time in Use (days)	80.0		10.0	10.0		20.0		**120.0**
Average Number of RPCs Required (at this point)	155,556	0	19,444	19,444	0	38,889	0	233,333
Safety Stock (*based on* RPC Float Factor)	46,667	0	5,833	5,833	0	11,667	0	70,000
Average Number of RPCs on Hand	202,222	0	25,278	25,278	0	50,556	0	**303,333**
Loss and Theft Rate (at this point only, % per year)	1.00%		1.00%	1.00%				**3.0%**
Annual Cost of Lost & Stolen RPCs	12,133	0	1,517	1,517	0	0	0	**15,167**
Capital Costs								
Total Deposits Paid during the Year	4,200,000	0	4,200,000	4,200,000	0	0	0	
RPC Time in Use (days)	80.0	0.0	10.0	10.0	0.0	20.0	0.0	
Deposit is debited X days in advance (days)	0.0		0.0	0.0				
Refund is credited Y days after return (days)	0.0		0.0	0.0				
Average Time a Deposit Remains Outstanding (days)	80.0	0.0	10.0	10.0	0.0	20.0	0.0	
Interest Rate on Capital	6.00%		6.00%	6.00%				
Annual Capital Cost of Deposits	56,000	0	7,000	7,000	0	0	0	**70,000**
Other Costs								
Other Expenses per Container Trip	0.0200		0.0100	0.0100		0.0800		
Annual Other Costs	14,000	0	7,000	7,000	0	56,000	0	**84,000**
Total Rental Costs at this Point	**782,133**	**0**	**15,517**	**15,517**	**0**	**56,000**	**0**	**869,167**

Rental costs apportioned between Northwest Orchards, the retailer and the pool operator

Rental fees ($1 per container) are paid by Northwest Orchards. Deposit costs ($6 per container) are shared between Northwest Orchards and the retailer.

Loss and theft of containers (3% per year) is apportioned equally among the three owners.

Administrative costs incurred for the RPC pool administration are assumed at $0.02 per container at the grower/shipper, $0.01 per container at both the DC and the retail store, and $0.08 per container at the washing depot.

Rental Analysis Results

A careful examination of the rental analysis summary shows higher overall supply chain costs and the pool operator bearing substantial additional costs.

Overall Summary of RPC Rental Costs vs. Corrugated

Washington Apples - 40# Eurobox

Cost Owner	Full Disclosure Model			Rental Costs		Total RPC	RPC Rental
	Corrugated	RPC	Variance	Fees	Other	Rental Cost	vs. Corrugated
	(1)	*(2)*	*(3)=(2)-(1)*	*(4)*	*(5)*	*(6)=(2)+(4)+(5)*	*(7)=(6)-(1)*
|Pool Operator	0	942,586	942,586	(785,167)	56,000	213,419	213,419
Major Retailer	2,595,449	2,887,468	292,018	17,033	14,000	2,918,501	323,052
Northwest Orchards	1,127,113	427,778	(699,335)	768,133	14,000	1,209,911	82,798
Unassigned	0	0	0	0	0	0	0
Grand Total	**3,722,562**	**4,257,831**	**535,269**	**0**	**84,000**	**4,341,831**	**619,269**

Rental analysis summary

The costs shown in the **Full Disclosure Model** columns of the spreadsheet are as expected. We see the pool operator pay the cost to purchase, transport, clean and warehouse the containers. We see the retailer bearing all the trucking costs. And we see Northwest Orchards paying to purchase the corrugated containers and the packing materials for both corrugated containers and RPCs.

The **Rental Costs** columns show how these costs were allocated across the three owners. Notice that the pool operator earns the rental fees being paid by Northwest Orchards as revenue or negative costs. (And, conversely, we see Northwest Orchards paying those rental fees.) However, the pool operator also bears more costs associated with administering the RPCs than do the other owners in the system (in this case, $56,000 annually).

The **Total RPC Rental Cost** reflects RPC rental fees, RPC replacement costs, any forfeited deposits, associated packing material costs, and RPC administration expense required to track these expensive assets.

According to the analysis, the RPC pool operator is spending $213,000 more than it takes in rental fees each year to operate the Northwest Orchards float of containers?

Why would an RPC system provider, choose to operate at a financial loss? How long can that rental rate be sustained?

Furthermore, the **RPC Rental vs. Corrugated** column shows that the retailer is spending an additional $323,000 each year to ship in RPCs. Some retailers who promote or require RPCs believe there are financial gains to be made in handling RPCs at the DCs, and that these gains outweigh the added cost to

ship in returnable plastic containers. However, very little evidence exists to substantiate these claims.

And, finally, we turn to the costs incurred by Northwest Orchards. Owing to the fact that Northwest Orchards does not pay for shipping to the DC (this cost is incurred by the retailer) and that their rental rate is currently at parity with the price of a corrugated container, the results of the analysis from their perspective is only slightly negative.

The cost differential Northwest Orchards sees in shipping RPCs vs. corrugated is about $83,000 a year. (However, one should keep in mind that Northwest Orchards invested $3,000,000 in capital equipment in order to efficiently ship RPCs.) This is most likely an acceptable expense for Northwest Orchards (even though it has no cost savings return on its investment), because of the volume of business the retailer brings to their operations.

The Conclusion

The Northwest Orchards case scenario compared Corrugated Common Footprint containers to RPCs in both a purchase situation and a rental situation.

The results demonstrate that the corrugated container was more economical in both situations (buy and maintain a float of RPCs or rent RPCs). In addition, the rental analysis showed the true owners of the cost of each segment of the distribution system.

The perspective of this scenario was purposefully broad. The analysis was performed with an objective eye toward the overall supply chain economics of each container type. The modelers did not take the perspective of the grower, nor the retailer, nor the pool operator.

But now may be a good time to assume the perspective that a grower/shipper might have. For example, as it pertains to this case scenario:

- From the grower/shipper's perspective, one might ask, "When seeing the results of the costs that are currently being borne by the pool operator, how long can that pool operator continue to 'operate in the red' as far as the rental rate on their containers?"
- As a follow-on question, again from the grower/shipper perspective, "Will these relatively low and 'subsidized' rental rates gradually begin to 'creep up' as time draws on, and pool operators feel more comfortable with their market influence?"

Other broad conclusions can be drawn from this analysis…

- Northwest Orchards is committed to maintaining the best of the old and new in their operations. They still pick and pack apples by hand. Corrugated containers have been the container of choice for Northwest Orchards for over 40 years. They've recently chosen to integrate RPCs into their distribution system because a major retailer requires it.

- The inclusion of RPCs into Northwest Orchards' business strategy has necessitated start-up costs for case erection and other handling equipment ($3 million capital investment).
- As a general rule, the distance traveled (in this scenario, 2000 miles) affects the economics of the case. RPCs are generally more expensive than corrugated containers when shipped at distances greater than 250 miles[3].
- The impact of washing and sanitation costs should not be underestimated. Apples (like most produce) must be transported in clean containers. The value assumed in the model ($0.35 per container) may be too low for some situations.
- When analyzing a packaging decision, do not underestimate or preclude the impact of labor and handling costs at the distribution center and washing depot.

This case scenario clearly shows the economic advantages of Corrugated Common Footprint containers when objectively compared to RPCs. If you'd like more information about this case, or information on developing a customized scenario for your needs, contact the Corrugated Packaging Alliance.

The Model

The Full Disclosure Washington Apples model is available for download. However, you must have Full Disclosure 1.3 installed to import and display the model.

Download Washington Apples model

More information on getting Full Disclosure

[3] Sensitivity Analysis White Paper, 2003, American Forest & Paper Association.