



# Lean Aftermarket Reverse Logistics: How to Reduce Balance Sheet Investment



**Ron Giuntini, CPIM**  
Executive Director and Founder  
OEM Product-Services Institute (OPI)





# Presentation Outline

- Definitions
- Case Study 1:  
When a Lean Initiative Goes Right
- Case Study 2  
When a Lean Initiative Goes Wrong
- Conclusions

# Polling Question #1

## What is your enterprise affiliation?

- OEM
- OEM new product authorized distributor
- Independent maintenance service provider
- Independent aftermarket parts manufacturer
- Product operator, private
- Product operator, government, defense
- Product operator, government, non-defense
- Third party logistics provider
- Software vendor
- Management consultant
- Financial auditor
- Financial services
- Independent wholesaler/retailer
- Used product distributor
- Trade group
- Publisher
- Other



## What is aftermarket?

**“Services that supply solutions to operators for managing the productivity of a product”**

Other terms used are

- Product support
- Lifecycle management
- Customer support
- Product-services

...but Jack Welch believes that using the term aftermarket” causes an enterprise to focus upon it as an “afterthought” ...but that’s another story!





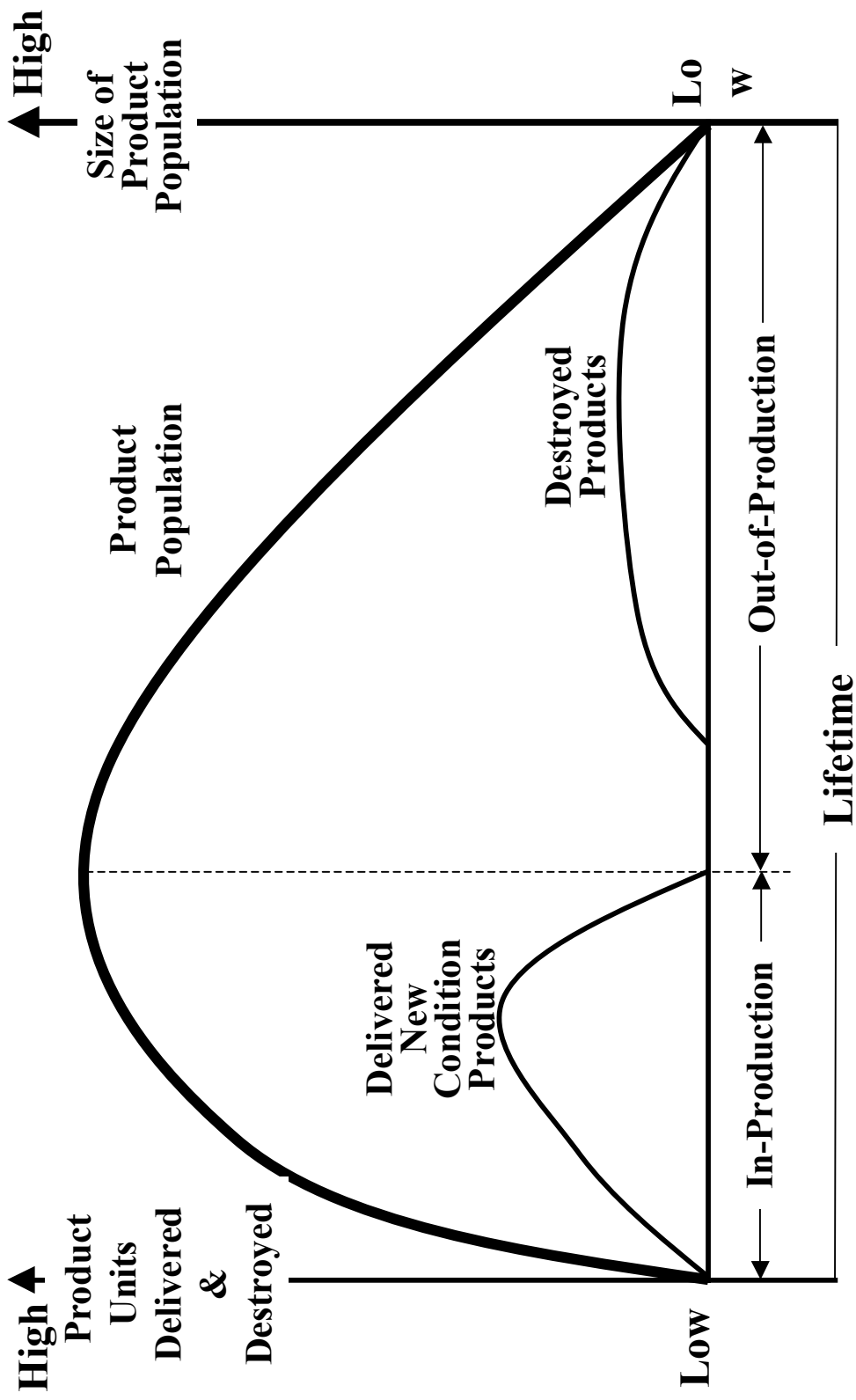
# Who are the operators of products that demand aftermarket services?

Product	Operator	Product	Operator
Bulldozer	Construction contractor	Bar code readers	Public warehouse
Router	Data network provider	Aircraft	Cargo airline
Slot machine	Casino	Truck cab	Trucker
Combine	Farmer	Locomotive	Railroad
MRI	Hospital	Compressor	Gas extractor
Laser metal cutter	Manufacturer	Instrument	Laboratory
Refrigerator	Food wholeseller	Drill	Oil platform operator
Printer	IT department	Turbine	Electric utility
ATM	Bank	Computer	Design engineer
Projector	Movie theatre	Others	Others

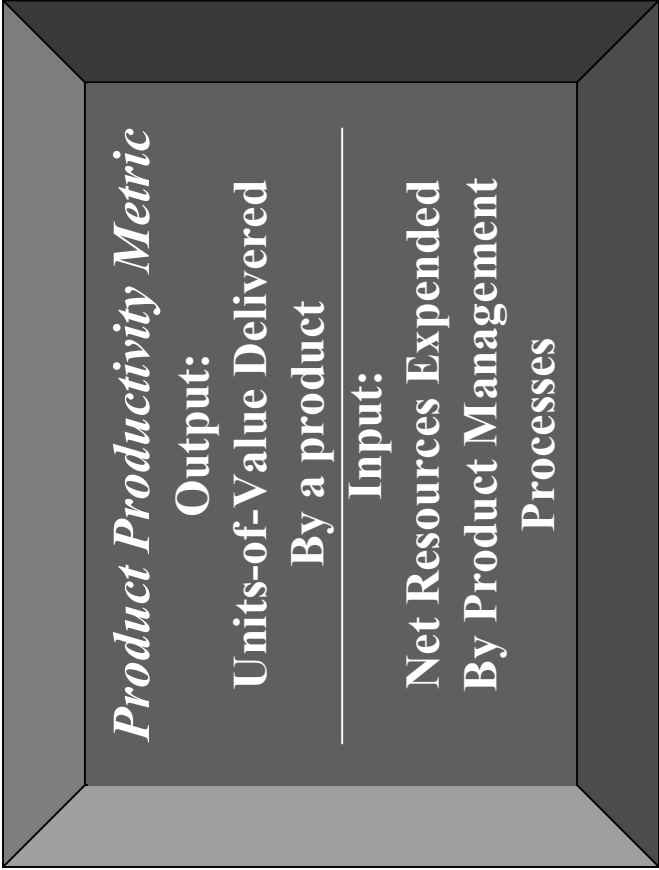
... with auto/light truck and military equipment operators creating the largest demand



# Aftermarket Supplies Solutions Throughout the Lifetime of a Product



# What is product productivity?



Legend			
↑↑	↑	↔	↓
hi increase	increase	no change	decrease
			↓
			hi decrease

Output:	Input:	Productivity
↑↑	↑	↑
↑	↓	
↑	↔	
↔	↓	
↓	⇓	
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↑	↑	↔
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↓	↑	↓
⇓	↓	
↔	↑	
↑	⇓	
↓	↔	

# What is unit-of-value delivered?

<b>Product</b>	<b>Unit-of-Value Delivered</b>
Bulldozer	# of tons excavated per shift
Router	# of messages transmitted per minute
Slot machine	# of plays per hour
Combine	# of acres harvested per hour
MRI	# of scans performed per hour
Laser metal cutter	# of pieces produced per shift
Refrigeration	# of tons of frozen food stored weekly
Printer	# of color pages printed at desired quality
Bar code readers	# of error-free scans per shift
Aircraft	# of express packages moved per trip
Truck cab	# of ton miles per trip
Others	Others



# Examples of Aftermarket Services

Service Delivered	Product Management Processes							
	Acquire	Control	Remove	Prepare	Run	Monitor	Maintain	Modify
Not-new product sale	✓						✓	
Product like-kind exchange	✓		✓					
Product short-term rental	✓		✓				✓	✓
Product operating lease, long-term	✓		✓				✓	✓
Product multioperator pooling	✓	✓	✓				✓	✓
Product capital lease	✓							
Product disaster recovery program	✓	✓	✓	✓	✓	✓	✓	✓
Product installation/acceptance				✓				
Product asset tracking software		✓						
Product deinstallation			✓					
Product sale/lease-back	✓		✓					
Product buyback/trade-in			✓					
Consumable sale				✓			✓	✓
Technician training				✓	✓	✓	✓	✓



# Examples of Aftermarket Services

Service Delivered	Product Management Processes							
	Acquire	Control	Remove	Prepare	Run	Monitor	Maintain	Modify
Product configuration records mgt.							✓	✓
Maintainer scheduling software							✓	
Life-extension exchange program								✓
Off-site remanufacturing/rebuild/overhaul							✓	✓
On-site maintenance labor							✓	
Reliability records management						✓		
Like-kind component exchange program							✓	✓
Service parts planning software							✓	✓
Remote reliability monitoring						✓		
Pay-per-units-of value delivered	✓	✓	✓	✓	✓	✓	✓	✓
	✓		✓					
	✓	✓						
Others	✓	✓	✓	✓	✓	✓	✓	✓

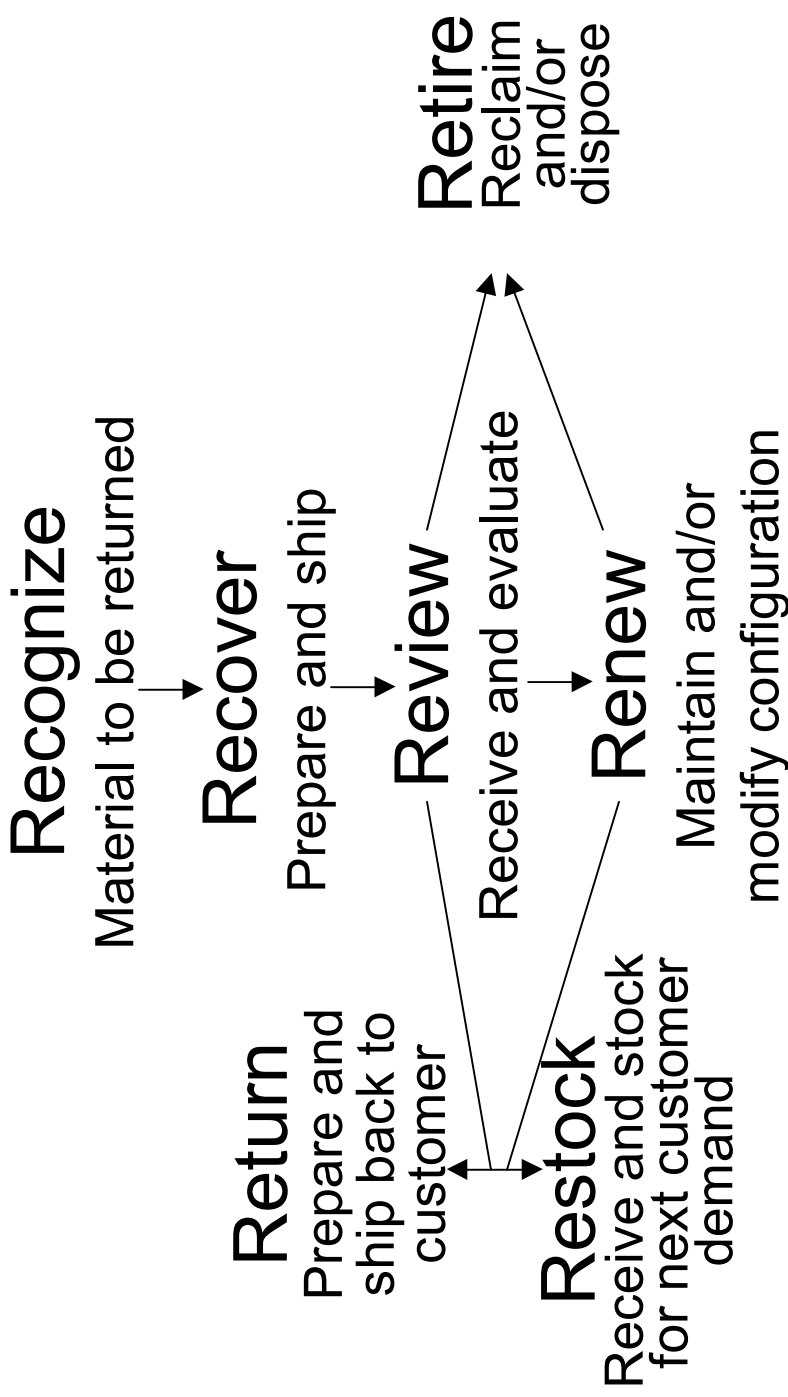


# Examples of Aftermarket Services

Service Delivered	Product Management Processes							
	Acquire	Control	Remove	Prepare	Run	Monitor	Maintain	Modify
Technical documentation distribution			✓	✓	✓	✓	✓	✓
On-site calibration & testing				✓		✓	✓	✓
Regulatory compliance reporting				✓	✓	✓	✓	✓
Tooling/instrument sale				✓			✓	✓
Operator labor					✓			
Operator scheduling software				✓	✓			
Energy consumption monitoring								
Remote quality of output monitoring						✓		
Hazardous waste disposal			✓		✓		✓	✓
Vendor-managed consumables				✓			✓	✓
New service parts sale								
Technical consulting			✓	✓	✓	✓	✓	✓
Regulatory requirement change kit sale								✓

# What is reverse logistics?

A process that enables a supplier of goods to manage the flow of impaired materials from its customers:



**Impaired Material:** in its current condition and/or configuration, it can not fulfill a supplier's next demand



# What material types flow through the reverse logistics process?

- Products (i.e., equipment, machines, vehicles)
- Service parts
- Tooling
- Testing instruments
- Consumables
- Accessories
- Modification kits
- Others

An estimated \$150B in materials flow through the U.S., non-auto/DOD aftermarket reverse logistic process  
...mostly products



# Examples of Aftermarket Events Driving Reverse Logistics

Supplier or customer forward like-kind exchange	Recall/destroy; regulatory agency mandated
Supplier-site product configuration modification or maintenance (upgrade/repair)	Short or long-term operating lease expiry
Sale, defective good return	Sale, shipping container return
Pooling expiry	Sale, wrong item shipped
Buyback from customer	Sale/Leaseback
Trade-in	Others

Some are planned and some are unplanned transactions; with unplanned being an expenditure to avoid and planned being an expenditure that must be incurred.



# How does reverse logistics activity affect the supplier's balance sheet?

- Mobile Fixed Assets
  - Asset: location, condition, and configuration
  - Renewal expenditure accruals (i.e., repair on rental return)
- Inventory Current Assets
  - Asset: location, condition, and configuration
  - Expense accruals (i.e., warranty)
- Accounts Receivables (i.e., penalty for non-return)
- Others

Revenue recognition of long-term aftermarket services contracts can be challenging...profit margin analysis can fluctuate significantly if balance sheet accruals are not properly crafted and maintained...often killing such programs...but that's another story!



# What is lean?

“Doing more and more with less and less,  
while coming closer and closer to  
providing customers with exactly what  
they want.”

## *Lean Thinking*

by Womack and Jones

...just another term to describe *productivity*!!



# So how are we going to learn to make the aftermarket reverse logistics balance sheet more lean?

## Learning Objectives, Delivered Through Two Case Studies

- How to organize for lean
- How to provide incentives or penalties to product possessors to return products quickly
- How to reflect impaired products on the balance sheet for enterprise visibility and accountability
- How to apply the KISS principle to achieve lean with a few simple performance metrics
- How to identify industry metrics for impaired balance sheet investment



# Case Study

## Aerospace OEM Service Parts When a Lean Initiative Goes Right

### Situation:

- Rapid expansion of installed base due to new aircraft models introduction
- Coupled with an expansion of service parts: rental/loaner programs, pay-upon-use programs, and exchange programs
- Compounded by a global customer base
- Made even worse by new product reliability problems driving high levels of warranty activity
- Resulted in an out-of-control reverse logistics environment
  - a bloated balance sheet of impaired materials
  - forcing the service parts organization to frantically purchase new condition parts to fulfill customer demands
  - Often competing with new product manufacturing for acquiring a limited supply of new-condition proprietary items





# What to do?

- **Identify the location and value of all impaired materials.** (create virtual locations on fixed/current asset control systems)
  - Recognized as due-in from customer, but yet to be received
  - Received but review process is not complete
  - Inducted in renewal process but not complete
  - Each location should have its own GL # so that there is total financial transparency for management
  - At standard/average/historical/replacement cost
  - As a percent of total balance sheet investment
  - Some parts are driven by warranty, not repairable transactions, and have no financial value but are required to be returned for technical evaluation. These should have a pro forma value for control purposes.
  - How should these items be treated for material planning purposes? You can have the same part number in several different conditions and different balance sheet categories and used in different types of transactions and ownership categories.
- **...The Aftermarket material control and planning environment is five times more complex than that of new product manufacturing.**

# What to do?

- **Identify age of flow**
  - (Current date) minus (date of shipment to customer for materials that have yet to be received)
  - (Current date) minus (date of receipt for materials in which the review process is not complete)
  - (Current date) minus (date of review process completed for materials inducted into renewal process but not completed) Identify value of materials at each location
    - At standard/average/historical/replacement cost
    - As a percent of total balance sheet investment
- **Identify number of pieces at each location**

**Note:** For enterprises that use A/R to track impaired materials return, the work is many times more difficult, especially if the A/R is credited at the end of the review process. This is a highly undesirable approach.

**Note:** Materials that are customer-owned should not be reflected on the supplier's balance sheet, but their value should be identified for liability insurance purposes... This requires creation of a pro forma balance sheet for liability purposes



# What was done?

- Aging of each step (there are many variables that are inputs; customer locations, supplier/customer forward exchange, scheduled/unscheduled maintenance, operator downtime, etc.)
  - From 75 days to 10/25 days from recognition to receipt for domestic/international customers
  - From 20 days to 5 days for review
  - From 55 days to 15 days for renewal
- Limit dollar value of shipments to customers that were in new condition, where not-new condition could have satisfied demand to a maximum of 5 percent (new condition material shipped)/(service transactions not requiring new condition materials)

**This performance plan was focused on reducing impaired material investment by 75 percent.**





# Getting the Organization Focused

- Assign accountability of impaired materials metric performance to planners/buyers
  - Coordinate with customer relations group
  - Assign renewal process coordination
  - Reassign warranty administration
  - Physically segment warehouse returns area to each planner
  - Provide resources to expedite
  - Source not-new materials
  - Assign balance sheet ledger accounts for each process and segment for each planner/buyer
- Raise compensation for planners/buyers ...from 8-15 percent...but you have to deal with the gatekeepers of compensation, HR
- Fifty percent of planners did not make the cut...technical knowledge of product became important...this is not a clerk's job.



# Getting the Customers Focused

- Make it easier to return goods by providing adequate return packaging and simplifying administrative burdens, pictorial documentation and return transportation
- Create an aggressive notification process if a customer has breached a return deadline
- Visit larger customers to educate them on importance of timely returns
- Emphasize that you want the material back and don't want to invoice the customer for non returned materials

....you must demonstrate to the customer that you are focused on getting the material back  
...and you dog them until it is returned

...Sal's Story





# How long did it take to reach the performance goal?

- 3-6 months to convince customers that they were serious
  - 6-12 months to make organization changes
  - 6-12 months to make process changes
  - 24 months after above efforts were begun, goals were met
- ...after reaching goal, but without continued management focus, you can let 12-30 months of efforts go down the drain within 3-6 months.

**This is hand-to-hand combat,  
with little glory.**

# Case Study

## Construction OEM Product Rental When a Lean Initiative Goes Bad

### Situation:

- OEM developed a program for its distributors where it rented product to the distributor, and the distributor in turn rented the product to operators.
- Program was established where units would be returned to the OEM for remanufacturing on a calendar-time driven schedule. The distributor would process a like-kind exchange transaction with the OEM for a replacement. This effort optimized balance sheet investment.
- Demand for the sale of new product was greater than the ability of the OEM to supply.
- In order to meet new product demand, the sales force was “stealing” low time rental units, causing major disruption in rental program material planning.
- New product sales generated 85 percent of corporate revenue.



## What to do?

- Only one choice was available that could materially affect the shortfall; squeeze the reverse logistics pipeline even further, and that was limited to the following processes:
    - Reduction in receipt/review/induction process cycle times
    - Reduction in remanufacturing process cycle times
- The above had to be reduced by 25 percent to meet customer requirements for rental units.



# What was done?

- Upgrade of planning system
- More planning and control resources
- Increase parts investment
- Increase remanufacturing capacity

Above accomplished in six months to meet  
25 percent reduction goal.





## What went wrong?

- A financial accountant was assigned to the remanufacturing operation who did not understand the complexities of remanufacturing managerial cost accounting; it requires many accrual accounts, especially when major components are being swapped from one work order to another.
- Also there are many expenditures that are out-of-period with rental income.
- As a result of the accountant's ignorance, profit margins began to swing wildly from month-to-month: 10-50 percent.
- The rental operations and marketing executives were customer-focused but were ignorant of managerial accounting.



# What was the outcome?

- The CEO was extremely frustrated with the profit volatility of the remanufacturing operation, and he could not be given a proper explanation.
- Though customers were being satisfied with a materially leaner balance sheet, the CEO shut down the operation because he believed, “If you can’t explain it, then you can’t manage it.”

Note: The management team left the OEM and joined a competitor, forcing the OEM to reinitialized remanufacturing operation two years later because of market forces.



# Conclusions

- Getting to lean is much grunt, with little kudos.
- Understanding financial reporting is critical for lean initiatives.
- The aftermarket, non consumer environment is very complex, requiring a systemic approach at managing many interdependent processes.
- As aftermarket service contracts become more prevalent, lean reverse logistics will become an important part of the business model.

Note: The DOD's Performance Based Logistics initiative is highly dependent upon lean aftermarket reverse logistics.



# Questions and Answers



Ron Giuntini, CPIM

Executive Director and Founder  
OEM Product-Services Institute (OPI)  
(570) 523-0992 [oeservices@aol.com](mailto:oeservices@aol.com)





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