

## PTC Service Parts Optimization

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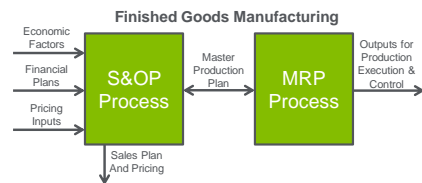
June 2015



### In most organizations there is a big gap...

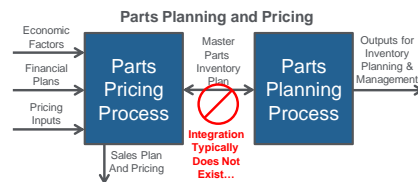
...between service parts management and pricing

- The process in service is often very different from manufacturing
- Most leading edge manufacturers utilize a Sales and Operations Planning (S&OP) process
- S&OP drives the Material Requirements Planning (MRP) process as an input indicating forecasted demand
- S&OP also provides a balance to help manage supply and demand
  - A key lever to manage supply and demand is *price-setting*
  - Pricing is typically based on several factors including:
    - Similarity or alignment with similar products or services
    - Competitive pressures on pricing similar products
    - Demand-driven price elasticity



Most Service Organizations manage their service parts inventory management and pricing separately

- An integrated solution of processes and support systems typically does not exist
- Management and optimization of service parts inventories is typically contained within a supply chain organization
  - Solutions such as PTC's Service Parts Management help drive the optimization of inventory levels, ordering, and distribution of service parts throughout the organization
- The pricing of service parts is often contained within a marketing or product management function
  - Solutions such as PTC's Service Parts Pricing are often isolated from the inventory aspect of the business meaning that a pricing or stocking decision is often done in isolation



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## Why the Disconnect?

- “What We’ve Got Here is... failure to Communicate”
  - Cool Hand Luke, 1967
- Lack of integration is likely due to multiple factors:
  - Process evolution out of separate disciplines with no comprehensive strategy
  - Resources in disparate organizations with often conflicting objectives
  - Poor technical infrastructure to provide means to manage across the processes



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Integrating the processes and systems can unlock a new level of optimization

- **A new integrated SPO solution provides many benefits**
  - Utilization of information across entire solution area
  - Optimization of many cross-functional use cases
  - Lower Total Cost of Ownership (TCO) in implementation and ongoing support
- **Contract-Based Parts Optimization**
  - Align stocking strategies to contracts
  - Wide mix of install base, products and service levels
  - Develop a comprehensive strategy
- **Connected Product Management (CPM) capabilities further enhance the promise of SPO**
  - Availability of product-level information can drive dynamic integrated pricing and inventory decisions
  - Predictive analytics regarding product/part performance will enable better warranty-based pricing decisions
  - Integrated CPM with SPO will further drive accuracy of inventory plans and allocations

- **Improved cash management and profit through better integration between planning and pricing**
  - Prioritize high-margin parts when planning inventory
  - Price parts based on availability, set higher prices for critical shortage parts
  - Burn off excess inventory through promotions
- **Improved profit through recognized differences in profit velocity in both inelastic and elastic products**
  - Dynamically segment based on variations in demand, automatically generating price recommendations
  - Prioritize high-profit velocity parts when planning inventory
- **Improved profit through improved execution of product life cycle strategies**
  - Dynamically set part prices based on part lifecycle
- **Improved execution of the financial plan**
  - Project revenue and profit more accurately through forecast integration

Pricing managers are not aware that a spare part price cut requires a 20% increase in inventory to meet gross profit target. **Stock-out occurs, gross profit goal missed**

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SOLUTION

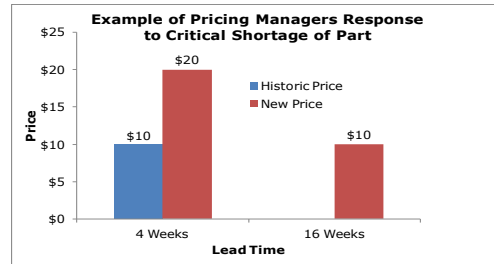
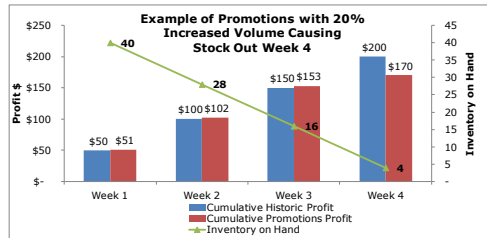
Pricing managers are automatically prevented from making spare part price cuts that require more than 15% increase in inventory to meet gross profit target. **Gross profit goal ACHIEVED**

Pricing manager is unaware that there is severe lead time pressure put on item due to critical shortages in supplier availability

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Pricing manager increases less than lead time product price significantly in response to critical shortage. **Increased profit and decreased late shipments result**



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Regional price differences (e.g., United States Northeast vs. Southwest) often need to occur due to variations in economic conditions, etc. A single price level in a complex market would limit ability to maximize profit while variations that are too wide might encourage parts purchasing arbitrage.

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Regional price differentiation is carefully managed by developing financial impact analyses before setting prices – then the likely impact to regional price setting is communicated back to Parts Planning to ensure appropriate inventory levels by region. **Long-term profit goals are enhanced by proactively managing inventory levels and allowing regional price variations.**



Example: Company has 2 distribution centers providing product to one single customer location in Pennsylvania. Margin expectations become very different dependent on source location once visible to pricing manager.

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# Leveraging Differences in Elasticity and Profit Velocity

Price Elasticity does not apply in many situations with service parts due to dealer networks and the behavior of parts purchasing. However, in situations in which analysis suggest that a part is exhibiting price elasticity, it may be difficult to verify the exact elasticity and therefore the "optimal" price.

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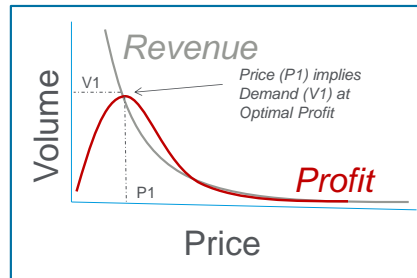
By utilizing selected "price testing" in a test market using location-based price levels, the impact on demand can be measured. Based on the price tests, a new price level can be derived and the resulting impact to the demand communicated to Planning to adjust expected demand to **correctly set inventory levels**.

Constrained to an inventory budget, the optimal investment of stock between two like margin products with very different turns and profit velocity is seldom considered

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Inventory turns are considered as part of the margin optimization equation. Investment favors product with high velocity and **profit is increased significantly**.



Monthly Trend	Item 1	Item 2
Avg Cost	\$ 10	\$ 10
Avg Monthly Stock	3	3
Historic Investment	3	3
Sale Price	\$ 25	\$ 25
Monthly Sell Through Rate	80%	100%
Estimated Potential Margin	\$36	\$54
New Investment	2	4

\*Assumes an incremental 25% opportunity given sell through of 100% by month end. May consider increasing price on item 1 when decreasing inventory.

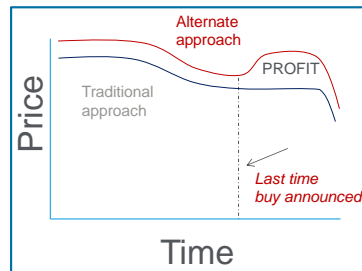
# Managing Parts Life Cycles is also Critical

In Parts Planning, when a part is nearing "End of Life", a "Last Time Buy" event typically occurs – signaling that the last purchase of a part is required. The planning model forecasts the inventory levels required to maintain that part for the required future time. Subsequently, sales of the part are higher than expected and concern exists that the part will go out of stock too early.

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This scenario creates an opportunity to harvest higher profit levels and stretch out the inventory stock for a longer period of time. The pricing solution rules are established for "End-of-Life" products to increase prices by 3% when inventory levels are dropping faster than projected. **Inventory levels are correctly adjusted and gross profit goal ACHIEVED.**

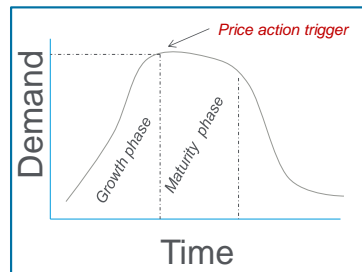


Parts that are in a "growth" stage of the life cycle can be particularly susceptible to after market suppliers entering the market and stealing market share. Parts planning forecasting models can track and suggest life cycle phases for each part and where vulnerabilities exist for after market competition.

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Pricing rules are established for "growth" stage parts with conservative margin targets. This helps stave off after market competition by reducing opportunities to enter the market. This enables much more aggressive pricing as parts enter subsequent life cycles as "captive parts." **Long-term profit goals are enhanced by actively managing against competitive actions.**

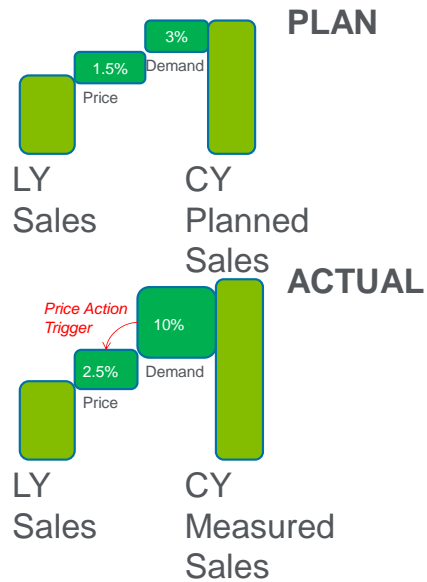


Inventory levels are established through demand forecasting models. However, actual demand significantly exceeds forecasted demand due to external factors including economic conditions, unexpected sales volumes of assembled product requiring more service parts.

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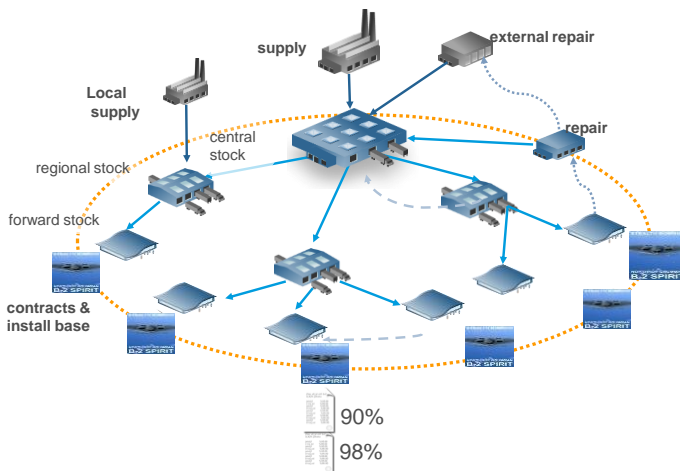
Pricing rules in place recognize inventory stocking levels and suggest an additional price change of 1%. Demand is delayed temporarily yet additional revenue overall is improved while inventory levels are adjusted. **Inventory levels are correctly adjusted and gross profit goal ACHIEVED**



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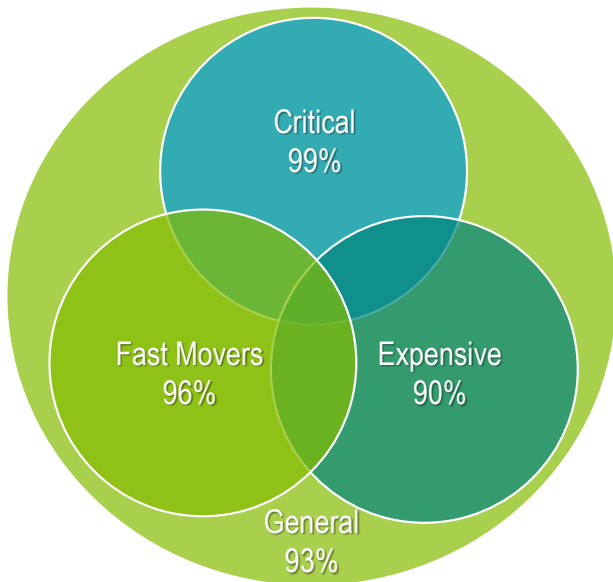
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## Wide Mix of Service Commitments



- Broad range of products and end customers with varying service commitments

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- Over Serve Standard Contracts
- Under Serve Premium Contracts
- Lagging Stocking Strategies
- Service Contract Exposure
- Missed Revenue Opportunities



- Meet SLAs
- Lower Inventory Investment
- Proactive Stocking Strategies
- Service Contract Alignment
- Capture Revenue Opportunities



### Contract Install Base Causal Forecasting

Contract Name	Product Name	Warehouse	Forecast Start	Forecast End	Forecast Stream Name
Contract_3001	PROD_BOMXABC	Warehouse1	30	Jul 1, 2013	Oct 1, 2013
Contract_3001	PROD_BOMXABC	Warehouse1	20	Jul 1, 2013	Jul 1, 2013
Contract_3001	PROD_BOMXABC	Warehouse1	10	Jan 1, 2013	Apr 1, 2013
Contract_3001	PROD_BOMXA	Warehouse1	40	Oct 1, 2013	
Contract_3001	PROD_BOMXA	Warehouse1	30	Jul 1, 2013	Oct 1, 2013
Contract_3001	PROD_BOMXA	Warehouse1	20	Apr 1, 2013	Jul 1, 2013
Contract_3001	PROD_BOMXA	Warehouse1	10	Jan 1, 2013	Apr 1, 2013

### Causal Forecast Detail

Contract Name	Product Name	Install Site Name	Row Type	Feb 2013	Mar 2013	Apr 2013	May 2013	Jun 2013	Jul 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013
Causal Value	BJ-44	Cote Digital	Forecast	0.386	0.386	0.386	0.386	0.386	0.386	0.386	0.386	0.386	0.386	0.386
			Product Quantity	2	2	2	2	2	2	2	2	2	2	2
			Part Population	4	4	4	4	4	4	4	4	4	4	4
			Failure Rate	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Platinum Service	BJ-44	Dade tech	Forecast	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125
			Product Quantity	1	1	1	1	1	1	1	1	1	1	1
			Part Population	1	1	1	1	1	1	1	1	1	1	1
			Failure Rate	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Platinum Service	BJ-44	Florida Digital	Forecast	0.393	0.393	0.393	0.393	0.393	0.393	0.721	0.721	0.721	0.721	0.721
			Product Quantity	2	2	2	2	2	2	4	4	4	4	
			Part Population	4	4	4	4	4	4	7	7	7	7	
			Failure Rate	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Platinum Service	BJ-44	Mayaca Systems	Forecast				0.379	0.379	0.379	0.379	0.379	0.379	0.379	0.379



PTC® Servigistics® Service Group Parameters

Model Fill Rate and Availability Contract Service Scenarios

Name	Comments	Customer Demand Fill Rate	Customer Location Fill Rate	Total Location Fill Rate
90 Customer and 93 total fill	90 customer and 93 total fill	90.0%	93.0%	
90 Customer fill at locations	90% customer fill rate target at all locations	90.0%		
90 SKU constraint				
A Parts			95.0%	
Accessories				
All Parts		92.0%	80.0%	
All Products-Avail				
Americas Region	America Region and America Field Locations		92.0%	
B Parts		93.0%		
Central Parts				80.0%
Gold Availability				
Gold Service		95.0%	93.0%	
Location and Overall Availability				90.0%
Location total target				90.0%

Location Hierarchy: Location and Overall Availab

Service Metric: Availability and Fill Rate

Location Hierarchy: Default Hierarchy

Location	Contract	Availability	Wait Time(Days)	Customer Fill Rate	Total Fill Rate
Los Angeles					
San Francisco					
San Jose					
US S East Regional(ATL)					
Atlanta					
Gold Service		99.0			
Platinum Service		99.0			
Silver Service		99.0			
Charlotte					
New Orleans					

SERVIGISTICS Location Visual Analytics

Scenario: Scenario-1802 Period: 20130601 Location: 1014100A Analytic Type: Type 1 Fill Rate: Part Cost by Customer Daily Forecast for Location

Optimal Service Level Distributions Multi-Echelon Optimization

Location	Min	Max	0-5	0.5-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50	50-100	100-150	150-200	200-300	300-500	500-1000	1000-1500	1500-2000	2000-4000	4000-6000	6000-10000
1014100A	200	200	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	100	200	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	80	100	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	50	80	100%	99%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	50	50	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	40	50	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	30	40	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	20	30	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	15	20	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	10	15	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	8	10	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	7	8	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	6	7	100%	99%	99%	99%	99%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	5	6	100%	99%	99%	99%	99%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	4	5	100%	100%	99%	99%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	3	4	100%	100%	98%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	1	3	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	0.8	1	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	0.5	0.8	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	0.2	0.5	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	0.1	0.2	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	0.05	0.1	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	0.01	0.05	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	0.005	0.01	100%	97%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
1014100A	0	0.005	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%

High 100.0% 92.5% 85.0% 77.5% 70.0% Low

# Contract-Based Parts Optimization

PTC Servistics - Service Group Results

Scenario: Availability and Fill Rate Optimization | Period: 20130201 | Location: All | Service Group: All | Display: Hierarchy | Go... | Additional Data... | ?

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Service Group and Location	Results				Targets				New Targets				
	Customer Network Fill Rate	Network Availability	Customer Location Fill Rate	Total Location Fill Rate	Customer Network Fill Rate	Network Availability	Customer Location Fill Rate	Total Location Fill Rate	Customer Network Fill Rate	Network Availability	Customer Location Fill Rate	Total Location Fill Rate	
<b>Optimized Supply Chain</b>													
99 customer and 93 total fill	92.74%				\$24,959	\$5,245,300	\$7,124,943	\$4,671,435			90.0	93.0	92.74%
Location and Overall Availability	97.16%	99.67%			\$29,552	\$50,222	\$59,099	\$169,034			95.0	90.0	92.0
Atlanta		97.16%	97.16%	99.67%									97.16%
Platinum Service	97.21%				\$19,142	\$35,142	\$35,338	\$127,795	99.0%		99.0		97.21%
Atlanta		97.21%	97.21%		\$19,142	\$35,142	\$35,338	\$127,795	99.0%				97.21%

Filter By: Contract | Filter

Contract	Average Period Forecast	Average Period Forecast Value	Average Population	Weighted Backorders	Stock Maximum Value	Availability	Equipment Wait Time	Target Availability	Target Availability Parameter
Gold Service	5.70	\$4,446.16	19.8	0.16	\$6,240.00	99.20%	0.78	99.0%	99.0
Platinum Service	1,023.65	\$107,051.51	2,260.3	8.60	\$20,977.85	99.62%	0.24	99.0%	99.0
Silver Service	22.43	\$10,043.01	50.8	0.51	\$16,510.00	99.00%	0.63	99.0%	99.0

# Contract-Based Parts Optimization

PTC Servistics - Scenario Budget Summary

Scenario: Availability and Fill Rate Optimization | ?

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	Total	2013	Jan-2013	Feb-2013	Mar-2013	Apr-2013	May-2013	Jun-2013	Jul-2013	Aug-2013	Sep-2013	Oct-2013	Nov-2013	Dec-2013	2014
<b>Multi-Period Optimization and Cash Flow Projections</b>															
Total Forecast	Units	2,076,826	220,151	19,257	47,156	17,176	16,919	19,884	16,311	21,810	22,875	22,570	22,074	21,996	224,129
Cost		\$1,079,290	\$117,821	\$10,257	\$25,257	\$9,059	\$8,924	\$10,354	\$8,924	\$11,447	\$12,044	\$11,977	\$11,477	\$11,477	\$1,179,469
Confirmation Forecast	Units	2,076,826	220,151	19,257	47,156	17,176	16,919	19,884	16,311	21,810	22,875	22,570	22,074	21,996	224,129
Cost		\$42,581,019	\$39,879,597	\$3,385,036	\$3,371,363	\$3,377,285	\$3,450,379	\$3,510,764	\$3,504,324	\$3,631,535	\$3,859,894	\$3,864,593	\$3,854,923	\$3,661,502	\$3,719,180
Customer Fill Rate		93.27%	93.23%	92.74%	92.64%	92.69%	92.95%	93.01%	93.11%	93.75%	93.57%	93.81%	93.65%	93.51%	93.8
Overall Metrics	Total Fill Rate	93.81%	93.76%	93.55%	93.55%	93.53%	93.76%	93.76%	93.69%	94.11%	94.01%	93.77%	93.96%	93.80%	94.0
Availability		99.82%	99.81%	99.67%	99.73%	99.73%	99.75%	99.74%	99.75%	99.84%	99.91%	99.90%	99.91%	99.90%	99.9
Stock Maximum	Units	53,897	53,633	50,512	46,799	48,069	50,221	51,947	51,194	55,811	58,714	57,400	58,084	56,598	561
Cost		\$6,790,961	\$6,783,764	\$7,124,943	\$6,461,425	\$6,639,896	\$6,522,148	\$6,779,961	\$6,596,460	\$6,718,685	\$7,040,417	\$6,821,910	\$6,996,429	\$6,821,019	\$6,862,141
Safety Stock	Units	10,639	10,588	9,964	9,263	9,545	9,817	10,168	9,916	11,039	11,691	11,375	11,537	11,213	111
Cost		\$888,107	\$887,293	\$934,956	\$882,075	\$900,046	\$850,926	\$876,140	\$849,751	\$835,106	\$922,923	\$895,971	\$911,161	\$900,282	\$896,141
Repair Forecast	Units	13,484	12,371	1,146	1,157	1,117	1,125	1,125	1,120	1,138	1,131	1,093	1,092	1,123	11
Cost		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Beginning Inventory Position	Units	51,988	51,448	16,129	52,945	40,823	50,557	52,261	53,394	51,824	56,164	58,985	57,631	58,633	571
Cost		\$7,438,882	\$7,498,535	\$8,198,242	\$9,492,801	\$8,449,092	\$7,998,062	\$7,316,545	\$6,979,436	\$6,742,101	\$6,839,108	\$7,143,865	\$6,919,101	\$7,108,740	\$6,942,141
New Buy	Units	269,930	248,891	52,937	12,677	16,993	19,498	19,170	16,621	25,019	24,266	20,123	21,984	19,599	211
Cost		\$41,386,278	\$37,616,250	\$4,679,595	\$2,327,654	\$2,926,255	\$2,768,893	\$3,173,654	\$3,266,988	\$3,728,542	\$3,964,650	\$3,439,820	\$3,844,562	\$3,495,665	\$3,770,141
Ordering		\$146,404	\$133,839	\$11,270	\$11,719	\$11,555	\$12,087	\$11,968	\$12,282	\$12,722	\$12,495	\$12,749	\$12,423	\$12,569	\$121
Repair Ordering		\$397,485	\$361,699	\$30,462	\$30,946	\$31,430	\$31,914	\$32,398	\$32,882	\$33,366	\$33,850	\$34,334	\$34,818	\$35,302	\$351
Total Cash Outflow		\$41,930,167	\$38,111,788	\$4,721,326	\$2,370,319	\$2,969,240	\$2,812,863	\$3,218,020	\$3,312,152	\$3,774,630	\$4,010,996	\$3,486,903	\$3,891,803	\$3,543,536	\$3,818,141

# Contract-Based Parts Optimization

PTC® Live Global

## Install Base Contract Stocking Coverages



## Contract Install Base Causal Forecasting

Filter Records By

Provision
Provision 1
Provision 2

Product Rollout

Provision Name	Install Site Name	Product
Provision 1	Region 1	Jet 1
Provision 2	Region 1	Jet 1

## Model Fill Rate and Availability Contract Service Scenarios

Part	Contract	Scenario	Fill Rate	Availability
1010000	100	200	100%	100%
1010000	40	50	100%	100%
1010000	10	20	100%	100%
1010000	20	30	100%	100%
1010000	10	10	100%	100%
1010000	2	3	100%	100%
1010000	1	2	100%	100%
1010000	1	1	100%	100%
1010000	0.4	1	100%	100%
1010000	0.2	0.5	100%	100%
1010000	0.1	0.2	100%	100%
1010000	0.05	0.1	100%	100%
1010000	0.02	0.05	100%	100%
1010000	0.01	0.02	100%	100%
1010000	0.005	0.01	100%	100%
1010000	0.002	0.005	100%	100%
1010000	0.001	0.002	100%	100%

## Optimal Service Level Distributions Multi-Echelon Optimization

Part	Contract	Scenario	Fill Rate	Availability
1010000	100	200	100%	100%
1010000	40	50	100%	100%
1010000	10	20	100%	100%
1010000	20	30	100%	100%
1010000	10	10	100%	100%
1010000	2	3	100%	100%
1010000	1	2	100%	100%
1010000	1	1	100%	100%
1010000	0.4	1	100%	100%
1010000	0.2	0.5	100%	100%
1010000	0.1	0.2	100%	100%
1010000	0.05	0.1	100%	100%
1010000	0.02	0.05	100%	100%
1010000	0.01	0.02	100%	100%
1010000	0.005	0.01	100%	100%
1010000	0.002	0.005	100%	100%
1010000	0.001	0.002	100%	100%

## Optimized Supply Chain

## Multi-Period Optimization and Cash Flow Projections

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Revenue	240,000	250,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000
Total Cost	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Net Profit	60,000	70,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000

# Contract-Based Parts Optimization

PTC® Live Global

## Install Base Contract Stocking Coverages



## Contract Install Base Causal Forecasting

Filter Records By

Provision
Provision 1
Provision 2

Product Rollout

Provision Name	Install Site Name	Product
Provision 1	Region 1	Jet 1
Provision 2	Region 1	Jet 1

## Model Fill Rate and Availability Contract Service Scenarios

Part	Contract	Scenario	Fill Rate	Availability
1010000	100	200	100%	100%
1010000	40	50	100%	100%
1010000	10	20	100%	100%
1010000	20	30	100%	100%
1010000	10	10	100%	100%
1010000	2	3	100%	100%
1010000	1	2	100%	100%
1010000	1	1	100%	100%
1010000	0.4	1	100%	100%
1010000	0.2	0.5	100%	100%
1010000	0.1	0.2	100%	100%
1010000	0.05	0.1	100%	100%
1010000	0.02	0.05	100%	100%
1010000	0.01	0.02	100%	100%
1010000	0.005	0.01	100%	100%
1010000	0.002	0.005	100%	100%
1010000	0.001	0.002	100%	100%

## Optimal Service Level Distributions Multi-Echelon Optimization

Part	Contract	Scenario	Fill Rate	Availability
1010000	100	200	100%	100%
1010000	40	50	100%	100%
1010000	10	20	100%	100%
1010000	20	30	100%	100%
1010000	10	10	100%	100%
1010000	2	3	100%	100%
1010000	1	2	100%	100%
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1010000	0.01	0.02	100%	100%
1010000	0.005	0.01	100%	100%
1010000	0.002	0.005	100%	100%
1010000	0.001	0.002	100%	100%

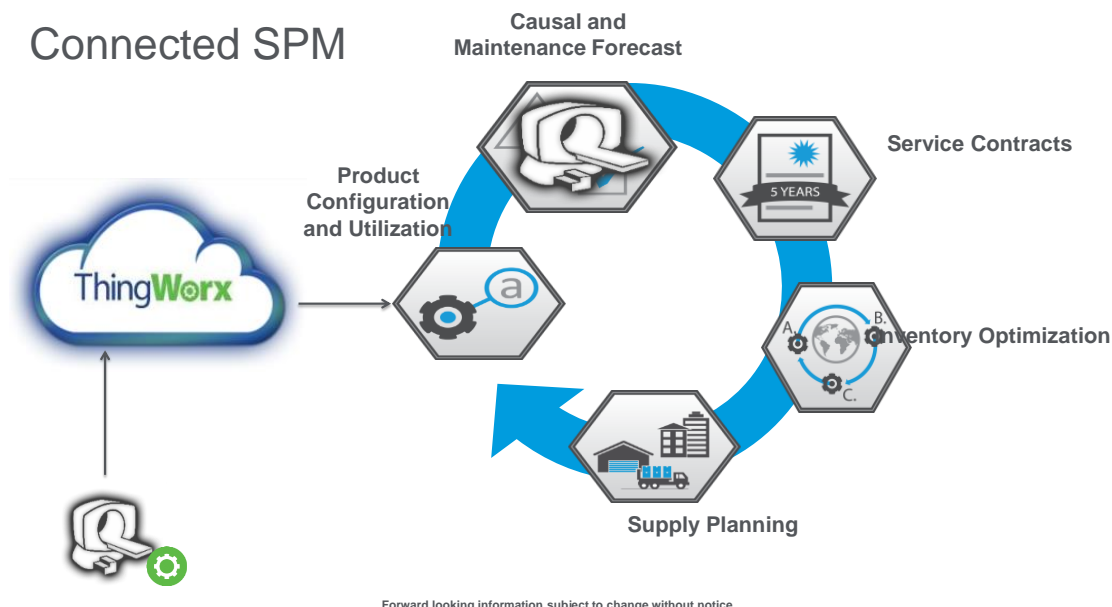
## Optimized Supply Chain

## Multi-Period Optimization and Cash Flow Projections

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Revenue	240,000	250,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000
Total Cost	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Net Profit	60,000	70,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000



## Connected SPM



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## Connected Service Parts Management – Key Features

Increase forecast accuracy, reduce inventory investment, improve service levels

- **Causal Forecasting and Product Uptime Optimization using Configuration & Usage**
  - Connected product’s as maintained BOM, location and actual usage is used in causal forecasting and product uptime based parts optimization
- **Life Limited Part replacement forecasting**
  - Condition by serial number, actual usage and life limits used in LLP forecasting
- **Maintenance Forecasting using Configuration and Condition**
  - Maintenance information will drive revised warranty forecasts which can then lead to adjustments in service parts pricing to optimize margins
- **Early Failure Notification**
  - Early notification of a part failure to preposition inventory, reducing lead-time and inventory



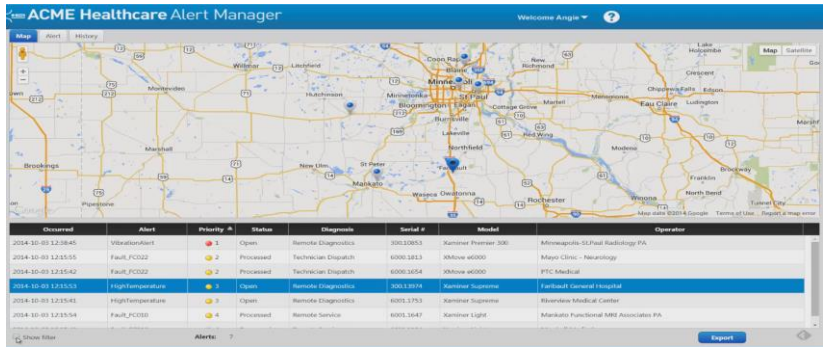
**ThingWorx**  
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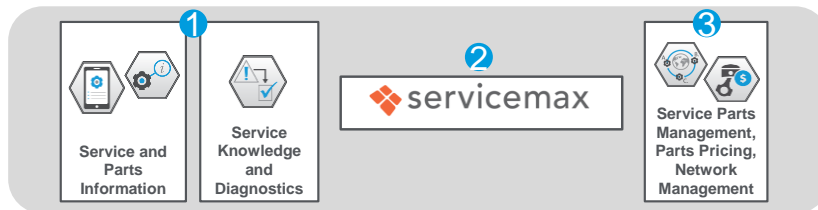
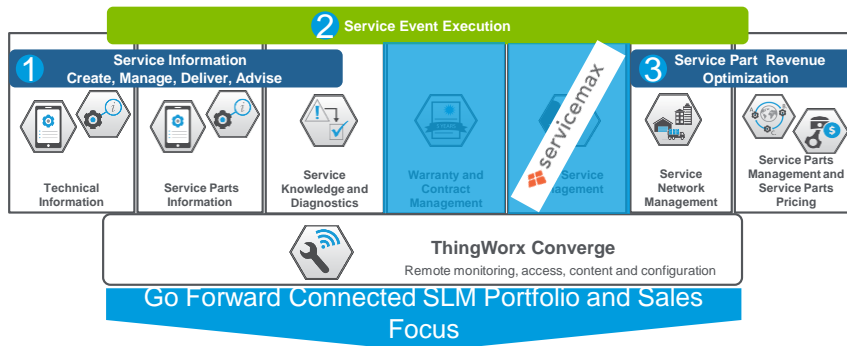
- **Early Warning Parts Demand app**
  - UI command center providing alert visibility into upcoming failures and removals due to life limited parts, scheduled maintenance
  - UI alerting part shortages and sourcing required part in service supply chain (Parts Locator)

- **Install Base Stocking Policy Planning**
  - Provide ThingWorx mashup UI cockpit to visualize and establish install base stocking strategy, sensing and responding to connected products in the field



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