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PTC 128 - Featured Solution: PTC Service Parts Management

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PTC Service Parts Management Solution

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Before

Inefficient service parts planning causing high inventory investment, low customer service levels, high excess and obsolescence and expedite costs

After

Service parts network optimized, low inventory investment, high customer service levels, low excess, obsolescence and expedite costs

An enterprise solution to…

- **Forecast demand** for spare parts
- **Optimize inventory** globally across stocking locations
- Strategic and Tactical planning to **mitigate excess** and shortage conditions
- Simulation/KPI **analysis to measure** and tune the model

…increase service level and decrease cost

- Increase part availability up to 30%
- Reduce inventory up to 50%
- Increase service level agreement compliance
- Reduce repair, ordering, and expediting costs

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SPM Roadmap

PTC Roadmaps and Disclaimer

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SPM 2012 Release Summary

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Release 10.1
(Jan 2012)

User Interface
- Rich Internet UI, modernized style and components (JQueryUI, Ajax)

Forecasting
- Life Cycle Rates in Causal Forecasting

Inventory Optimization
- Asset Sustainability Optimization (ASO)*
- ASL Calculation in Inventory Optimization
- Inventory Churn Control

Order Planning/ Planner Workflow
- New Planner Worksheet – global visibility, drill-ins
- Interactive Planning (iPWS)

Release 10.2
(June 2012)

Forecasting
- Cluster-based last time buy forecasting*

Inventory Optimization
- K-Curve Cycle Stock Optimization*
- Respect production
- Variance to mean ratio cap

Order Planning / iPWS
- Sticky menus
- Plan on load option
- Auto complete for part and location lookups
- Color coding of order types
- Configurable order / sku parameters tab
- Lead time bar graphs
- Date range filter in the order tab

Release 10.3
(Dec 2012)

Forecasting
- Blended shipment based and cluster-based LTB forecasting

Inventory Optimization
- Scenarios and Optimization Target Sets
- SKU / Location comparison views
- Copy Scenario
- Custom attributes
- External Scenarios
- Quick links to iPWs
- SKU constraints by days
- Stock Max constraints

Order Planning / iPWS
- Break orders into economic order quantities
- Packaging size info
- Direct navigation from forecast grid to demand details page
- Filtering journal entries
- Alerts visible on review tab

2012

*Optionally Licensed Module

SPM 2013 Release Summary

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Release 10.4
(Apr 2013)

Forecasting
- Composite Forecasting across multiple streams

Order Planning / iPWS
- Expand All on Part Chain Details view
- Inline editing of orders
- Status badges for repair, procurement, replenishment related data
- Balancing based on safety level and reorder point
- Link to iPWS from review board

Release 10.5
(June 2013)

Inventory Optimization
- Planner security by segments for view, override, approve
- Pre and post optimization overrides
- Pooling forecast and inventory
- Scenario part supply chain view

Order Planning / iPWS
- Order splitting across multiple supplier
- Shared minimum order quantities for groups of parts by vendor

Release 10.6
(Dec 2013)

Forecasting
- Trend dampening Phi
- Intermittence smoothing statistical method
- Auto approve of last time buy forecasts

Inventory Optimization
- Stocking Policy Page with exchange curve and what-if
- Visual results analytics and heatmaps
- Coefficient of Variance Cap
- Batch processing capability
- Multi-period optimization calc
- Additional fields on scenario, location and sku summary pages

Order Planning / iPWS
- Separate user right for save
- iPWS audit tracking
- Coordinate planning of independent regional networks

2013

SPM 2014 Release Summary

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Release 10.7
(June 2014)

Forecasting
- Demand roll up
- Enhanced causal forecasting: simplified data model, ease of use, multi causal, usage rate calc, contract support

Inventory Optimization
- Unified module (SIO, MIO, MEO)
- Hierarchical network views of performance metrics
- Simplification of target fill rate types
- Service targets for total forecast (internal and external)
- Enhanced Stocking Policy View: Visibility of SKU constraints, improved layout

Order Planning / iPWS
- Inventory balances display
- Plan sales orders in trigger mode

Release 11.0
(Dec 2014)

Forecasting
- Variable number of history slices by method
- Causal Forecast Detail View enhancements
- Product rollout / causal values views
- Multi-thread causal forecasting process
- Causal forecast for multiple streams

Inventory Optimization
- Hierarchical network views for setting targets
- Multi-period budget reporting
- Combined fill rate and asset availability optimization
- Part level pool bank size constraint

Order Planning / iPWS
- Replacement part effective dates
- Inventory burnout period for excess
- iPWS usability enhancements to parameter and deployment tabs

SPM Roadmap

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Release 11.1
(Aug 2015)

Forecasting
- Causal Forecast failure rate and BOM views
- Composite forecast GUI
- Outlier Analysis for Intermittent parts
- New Graphing package

Inventory Optimization
- Rotable pool fill rate enhancements
- Part criticality multiplier in bang for buck calculation
- Overrides to Production Workflow
- Customer Wait time SKU constraints
- Mulit-Indenture asset availability based optimization and fill rate optimization in a single scenario

Order Planning / iPWS
- Workqueue item status enhancements
- iPWS deployment tab and usability improvements

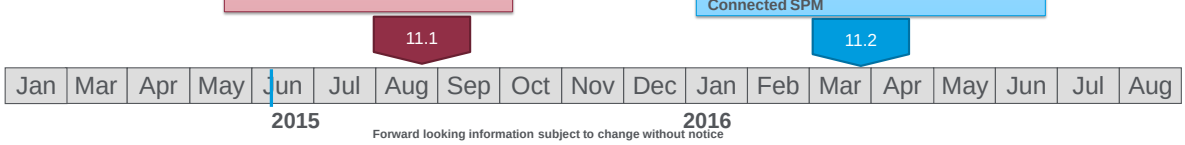
Release 11.2
(March 2016)

Forecasting
- Causal Forecasting Scenarios
- Enhanced accuracy tracking and reporting
- Connect Network Optimization and Causal Forecasting
- LTB enhancements
- Dependent part forecasting

Inventory Optimization
- Emergency backup parent locations
- Forecast stream based service targets
- Budget Targets with availability optimization in MIME
- PBL enhanced modeling

Order Planning / iPWS
- Daily walkthrough report
- Improved kit visibility and navigation in iPWS
- Excess pullback improvements
- Schedule Change Suppression enhancements

Connected SPM



Forward looking information subject to change without notice

SPM Roadmap Improvement Themes

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- **Connected SPM**
  - Causal Forecasting and Product Uptime Optimization using Configuration and Condition
  - Connected product's BOM, location and sensor data is used in causal forecasting and in Product uptime based parts optimization
- **Next Generation Causal Forecasting**
  - Continued evolution and improvements to the next generation Causal Forecasting model which was first introduced in v10.7 (June 2014)
- **Inventory Optimization**
  - Multi-indenture asset availability and fill rate optimization in a single scenario
  - Easier configuration for optimizing rotable pool size
  - Emergency backup locations modeling, reducing inventory investment required to meet performance targets.
- **Order Plan / Planner Worksheet**
  - Additional information on the deployment tab, part kits view and several usability improvements
  - Daily walk through report for easier understanding of order plan recommendations
- **Network Optimization and Causal Forecasting**
  - Linked to intelligently map install base to stocking locations, leveraging geo location and install base assignment capabilities for improved forecast automation and accuracy.
- **LTB Enhancements**
  - cluster-based LTB enhancements including easier management of regional LTBs and better handling of alternate part chains

PTC Service Parts Management

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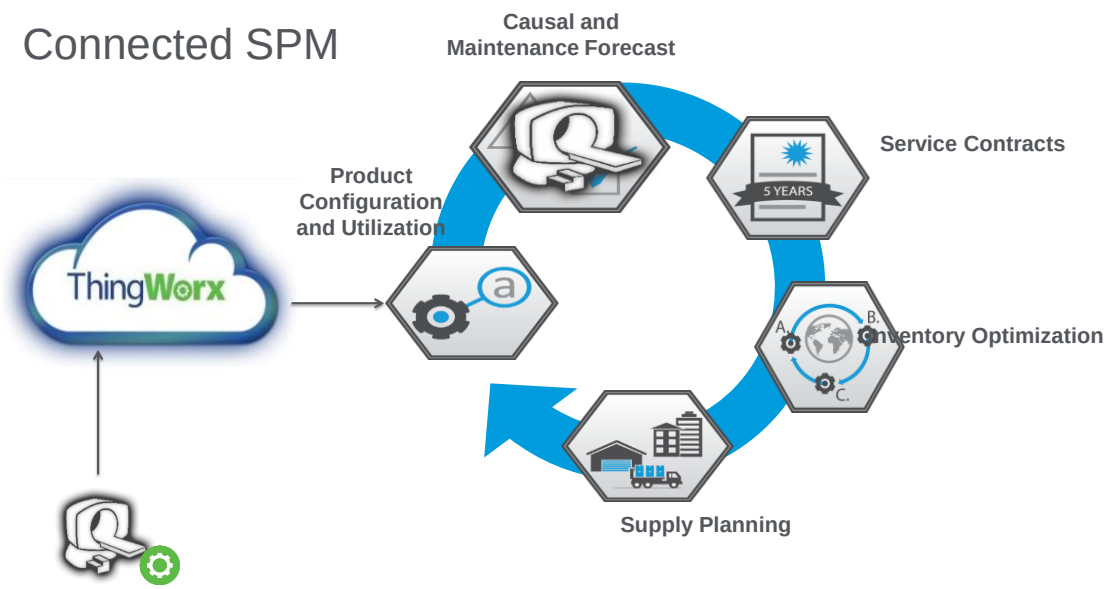

Connected Service Parts Management – Key Features

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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**
  - Condition based scheduled maintenance event and required parts forecasting
- **Early Failure Notification**
  - Early notification of a part failure to preposition inventory, reducing lead-time and inventory

ThingWorx
A PTC Business

Connected SPM Apps

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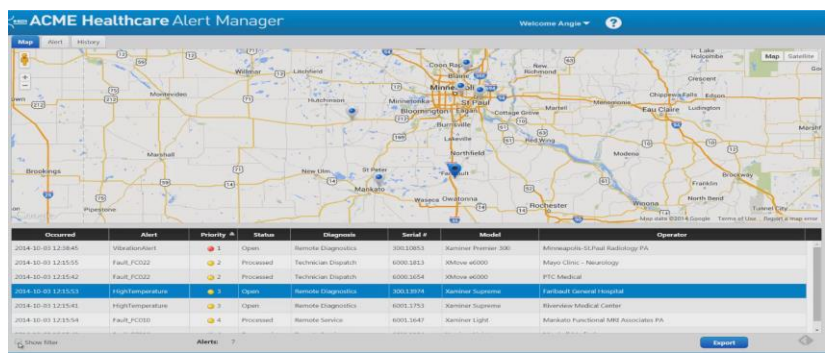
- **Early Warning Parts Demand app**
  - UI command center providing alert visibility into upcoming failures and removals due to life limited parts, scheduled maintenance
  - UI alerting part shortages and sourcing required part in service supply chain (Parts Locator)
- **Install Base Stocking Policy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

Service Parts Inventory Optimization - Goal

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- Get the highest service return from every dollar invested in inventory
  - Determine optimal service part stocking levels
  - Create stocking plan to support service contracts
  - Honor business rules and practical constraints
  - Create a stable plan
  - Build a realistic model of the connected to reduce plan vs. actual mismatch

Service Parts Inventory Optimization - Challenges

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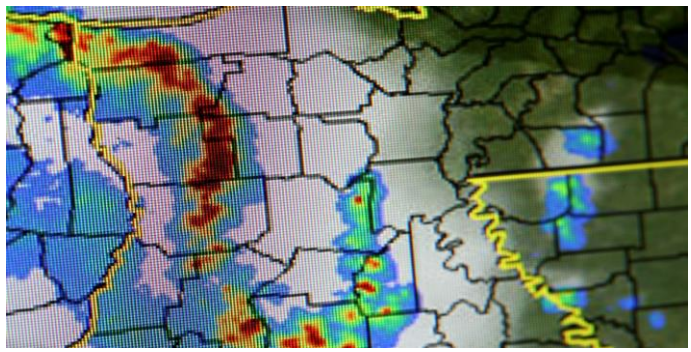
- Why is Service Parts Inventory Optimization Challenging?
  - Uncertainty
  - Risky asset decision
  - Complex supply chain flows
  - Short product life cycles, longer service cycles



Business challenges of meeting Service Level goals

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Business challenges of meeting Service Level goals

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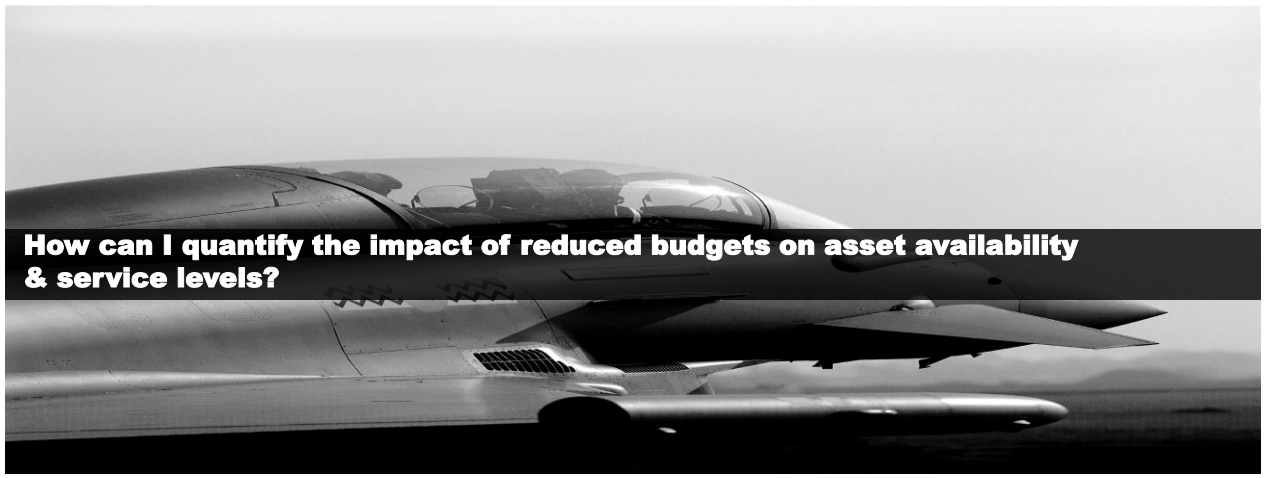

Business challenges of meeting Service Level targets

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Business challenges of meeting Service Level Goals

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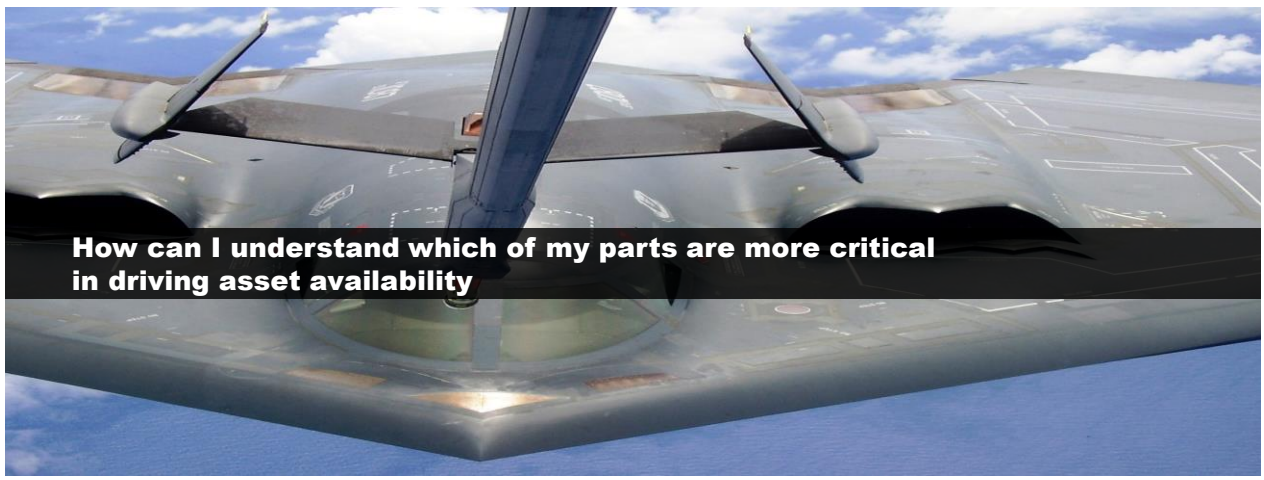

Common Objectives of Service Organizations

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- Improve Customer Satisfaction
- Reduce Costs
- Increase Revenue

- How to quantify?
  - Fillrate
  - # EBO's (expected back orders)
  - Duration of EBO's
  - Response time (RTAT)
  - Equipment Uptime
  - Inventory carrying cost
  - Excess & Obsolescence cost
  - Expediting Costs
  - Sell more parts
  - Sell SLA contracts
  - Sell Rotable pool subscriptions

(Using the same or marginally more inventory)

Meeting challenges with PTC Service Parts Management

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- **PTC Service Parts Management is a solution that is specifically designed for spares forecasting & inventory optimization in support of "performance based" contracting that emphasizes "outcomes" over parts**
- **PTC Service Parts Management has accurate mathematical models for**
  - **Forecasting that considers future "intelligence" about deployed equipment & operational plans**
  - **Correlating which parts are "critical" to driving equipment uptime through MIME (multi-indenture, multi-echelon) optimization**
  - **Taking into consideration inherent variability in supply lead-times for procurement & repair**

SPM : Proven COTS solution for Service Parts planning

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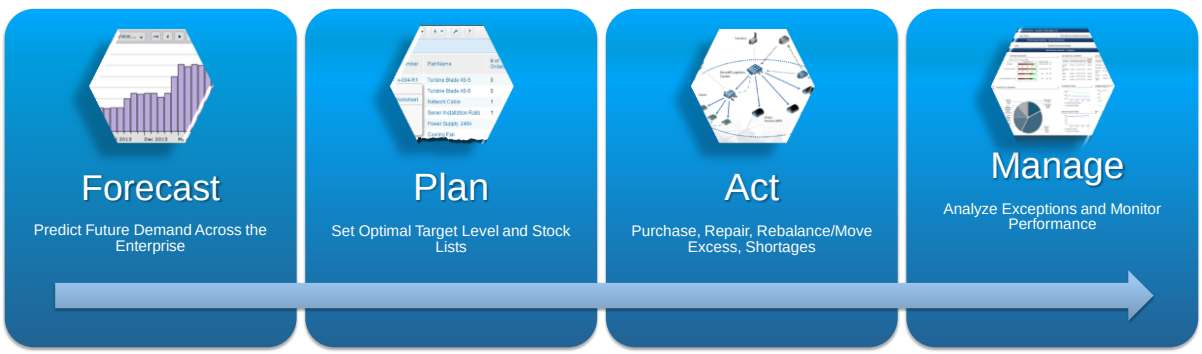

- Import usage history
- Perform provisioning based on mission and time phased deployment
- Forecast unplanned & planned material usage

- Safety stock, EOQ, ROP, Min/Max
- Weapon system/fleet availability targets
- Multi-echelon, Multi-indenture
- Rotable pool planning

- Configurable review "thresholds"
- Multi-level repair and rebalance
- Automatically monitor material orders

- Visibility across depots, warehouses, FOBs
- Target vs. actual performance
- Shortage & excess analysis
- What-if modeling

Service Parts Inventory Optimization

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Takes Advantage of Multiple Dimensions

- Parts
  - Costs, usage rate, criticality, procurement & repair lead times
- Locations
  - Multi-echelon coordination, transit times
- Customers
  - Differentiated Service contracts
- Time
  - Intelligently blend proactive and reactive planning
- Traditional inventory planning methodologies do not take advantage of these dimensions
  - service parts optimization can reduce inventory investment by over 30% over traditional methods

Evolution of Spare Parts Inventory Optimization

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SIO = Single Item Optimization

MIO = Multi Item Optimization

MEO = Multi Echelon Optimization

MIME = Multi Indenture, Multi Echelon

Illustration of spare parts optimization (SIO)

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SIO = Single part @ single location

	FCST	LT	Cost	For 80% overall fill rate
P1	5	6 mo	$500	45 (fill rate = 80%)
P2	20	1 mo	$100	30 (fill rate = 80%)
P3	50	15 day	$20	38 (fill rate = 80%)

Cost = $26,260

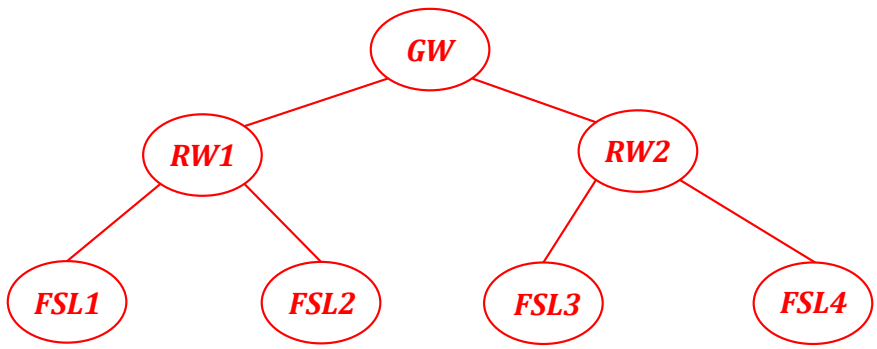

Illustration of spare parts optimization (MIO)

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MIO = Many parts @ single location

	FCST	LT	Cost	For 80% overall fill rate
P1	5	6 mo	$500	35 (fill rate = 60%)
P2	20	1 mo	$100	33 (fill rate = 90%)
P3	50	15 day	$20	60 (fill rate = 98%)

Cost = $22,000

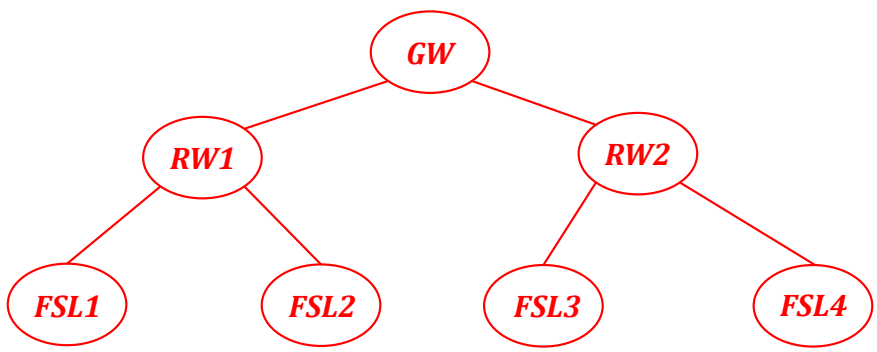

Illustration of spare parts optimization

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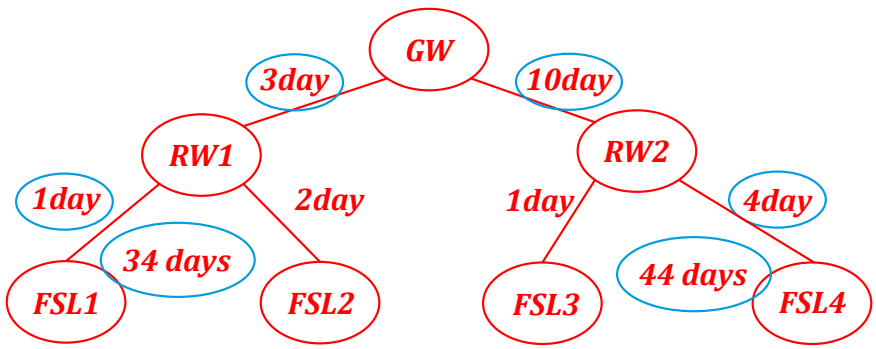
MEO = Many parts @ multiple locations

	FCST	LT	Cost
P1	5	6 mo	$500
P2	20	1 mo	$100
P3	50	15 day	$20



Summary of Optimization Methods

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SIO = Single Part @ single location, with NO trade-offs

MIO = Many parts with trade-offs @ single location

MEO = Trade-offs between many parts @ multiple locations

MIME = additional complexity of trade-offs between repairable subassemblies & components

> Availability Optimization & system uptime

PTC's Service Parts Management Solution Benefits…

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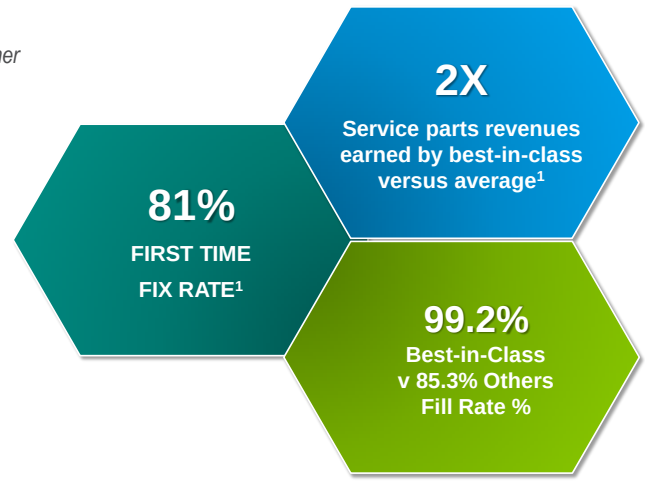
…to **ENTERPRISE**
- *Increase company & service profit, revenue and customer value*
- *Achieve sustainable competitive advantage*

…to **SERVICE ORGANIZATION**
- *Increase efficiency*
- *Increase supplier recovery*
- *Reduce IT spend*

…to **CUSTOMER**
- *Better product and service outcomes*
- *Better coverage*



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