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The Art and Science of Part Segmentation in Inventory Planning

Service parts organizations are faced with the challenge of managing hundreds of thousands of SKUs. Segmentation, or grouping and treating SKUs similarly based on different part attributes, is one of the most useful tools for managing portfolio breadth. Countless examples of segmentation-based approaches exist across service parts organizations. In warehousing, segmenting parts by part dimension and velocity and slotting them by zone is commonly used to optimize picking times. In pricing, part segmentation is a foundational first step for applying a value-based strategy to market-indexed price points.

Segmentation also has its uses in inventory planning. For example, segmenting and tracking parts in varying lifecycle stages is required for implementing lifecycle-based forecasting. Segmenting parts based on age and movement speed can be useful for inventory financing activities including setting a service life and reserve policy. Regular reviews of on-hand inventory in these segments is also helpful in gauging its effectiveness.

Perhaps the most foundational segmentation technique used in inventory planning is to set target service levels used to calculate safety stock. As a reminder, most service parts organizations are using this (or some version of the) **industry standard safety stock calculation:**

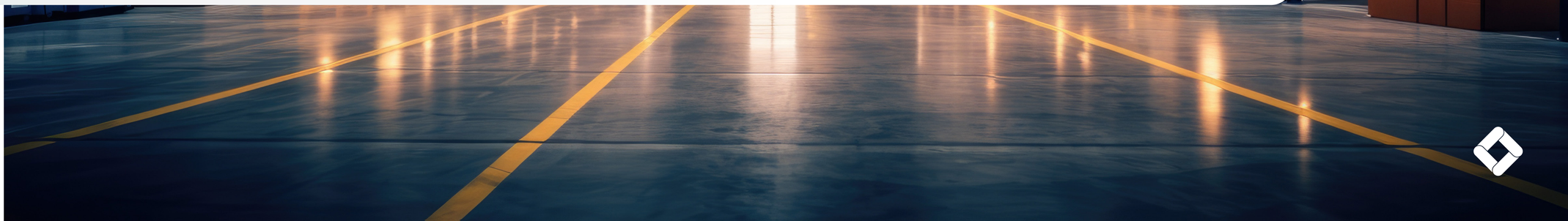
$$\text{Safety Stock} = \text{Target Service Level} \times \sqrt{\text{Lead Time} \times \text{Stdev. of Demand}^2 + \text{Average Demand}^2 \times \text{Stdev. of Lead Time}^2}$$

The purpose of segmentation in this context has traditionally been to group parts so that TSLs can be set and manually optimized in buckets, as doing this at a part number level was computationally prohibitive. Using attribute data like velocity and cost is most common. Once initially set, planners would engage in "parameter tuning" exercises, searching for better versions of the TSL grouping to achieve maximum fill for minimum safety stock.

Advancements in planning software computational ability, including PTC Servigistic's Multi-Echelon Optimization (MEO), have made it possible to optimize part deployment and safety stock calculations on the part number / location level with the mathematically best answer.

The benefit in terms of inventory reduction in using this method over traditional ones is staggering, generating, 20-30+% reduction in inventory investment.

Fundamentally, this takes a lot of the guesswork out of planning and allows the planners to use segmentation tools for more strategic purposes. Segmenting based on factors like brand can give multi-brand OEMs the ability to give their premium brand customers a premium experience. Segmenting and increasing service on uptime-critical parts can be used to ensure availability and reduce machine downtime. Segmentation can also be used in a commercial context to control availability separately on competitive and captive parts.



Planners segmenting in an MEO environment must remember like any mathematical equation, a segment acts as an additional constraint, yielding a mathematically suboptimal answer; or in this case meaning you need to buy more inventory to achieve the same fill. Before introducing segments, planners should ask themselves “what is the business outcome that this segment should achieve?” Planners should evaluate the service improvement and associated inventory investment as part of their overall optimization strategy.

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