Inventory Optimisation: Systematically Aligning Stock Levels with Cost-Effectiveness and Product Availability

Inventory optimisation refers to the systematic control of stock levels with the aim of ensuring product availability while minimising tied-up capital, inventory costs and obsolescence risks. It combines demand planning, procurement logistics and supplier management into one end-to-end process. In practice, it often achieves the greatest impact when procurement, sales and production work together on uniform planning parameters.

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Key facts at a glance

01 Inventory optimisation aims at the optimal trade-off between product availability, tied-up capital and inventory costs.

02 Core methods are ABC/XYZ analysis, safety stock calculation, reorder point and demand-driven procedures.

03 Typical levers are fine-tuned service levels, lot size optimisation and supplier terms.

04 Inventory turnover in manufacturing frequently ranges from 4 to 12 per year, strongly dependent on industry and material class.

05 Digital planning systems and call-off procedures significantly increase planning certainty.

06 Optimisation is a continuous process, not a one-off project.

Definition: inventory optimisation

Inventory optimisation is the systematic design and continuous adjustment of raw material, semi-finished and finished goods stock. It determines which item is stocked in which quantity, at which location and at which point in time. The goal is an economically sound balance between availability and

tied-up capital.

Distinction from mere stock reduction

Inventory optimisation does not mean across-the-board reductions in stock levels. Blanket reduction jeopardises product availability and triggers expensive emergency purchases. Optimisation rather means controlling stock differentially: maintaining high availability for critical A items, while C items of low value are geared towards convenient but cost-saving supply. The benchmark is always the total cost view comprising tied-up capital, inventory costs, procurement costs and shortage costs.

Position within procurement logistics

Inventory optimisation sits at the interface of demand planning, procurement and logistics. It relies on parameters such as planning procedures, safety stock, reorder point and lot size, and is influenced by supply-side factors: lead times, delivery reliability and the flexibility granted in a call-off contract. Instruments such as the delivery schedule with tolerance bands also act directly on the required coverage period and thus on stock levels.

Objectives and benefits of inventory optimisation

Optimisation addresses several target variables simultaneously and establishes a documented compromise between tied-up capital and product availability.

Financial objectives

Capital tied up in stock is frequently one of the largest working capital blocks in manufacturing companies. Every reduction in stock releases liquidity and reduces inventory, insurance and write-down costs. Typically, annual inventory carrying costs of 15 to 25 per cent of stock value are assumed, including capital interest, space and shrinkage costs. This rate serves as the justification benchmark for optimisation projects.

Supply security and customer service

At the same time, optimisation secures availability: production stoppages due to missing parts are usually more expensive than the capital costs of a safety stock. This conflict of objectives is resolved through differentiated service levels per material class. High service levels for production-critical items, moderate ones for standard parts. A structured capacity reconciliation with suppliers additionally supports supply security because bottlenecks are identified earlier.

Supplier and process effects

Inventory optimisation makes weaknesses in the supply chain visible: erratic lead times, high variability or incorrect planning parameters. It forces clear agreements, for example via call-off orders, and regular deadline monitoring. This also improves data quality for procurement and strengthens the negotiating position.

Methods and approach in inventory optimisation

An effective approach usually follows a fixed cycle: analyse, set parameters, implement, monitor. The following building blocks have proven themselves in practice.

ABC and XYZ analysis as a foundation

ABC analysis classifies items by value or consumption relevance, XYZ analysis by consumption regularity. Combining the two creates action classes: AX items (high value, constant) are suitable for Just-in-Time or call-off arrangements, CZ items (low value, sporadic) rather for minimum quantities or make-to-order planning. In practice, this segmentation alone frequently releases 10 to 20 per cent of stock value.

Safety stock, reorder point and lot size

Safety stock should be derived statistically from lead time average and variability as well as demand variability, not from rule-of-thumb formulas such as 'three weeks of coverage'. Reorder point procedures suit continuous demand, periodic demand forecasting suits discontinuous demand. Lot sizes are optimised against set-up costs and inventory costs; volume discounts and minimum order quantities are included as constraints. For series components, a higher degree of standardisation reduces the number of items and thus total stock.

Procurement-side levers

Lead times are the strongest stock driver: every reduction or stabilisation lowers safety stock and reorder point. Levers are consolidation of the supplier base, dual sourcing for risk mitigation, framework and call-off agreements, and defined firm and flexible periods in the delivery schedule. For standardised, catalogue-based parts, efficient catalogue management can additionally reduce order frequency and stock because small-volume demand is processed quickly and bundled.

Overview of the procedure

A typical approach is structured in four steps, ideally repeated quarterly.

- Cleanse stock and consumption data and form ABC/XYZ classes
- Define planning parameters (service level, safety stock, lot size) by material class
- Derive and implement levers with suppliers, contracts and processes
- Monitor effectiveness via KPIs and regularly fine-tune parameters

Key KPIs of inventory optimisation

Without reliable metrics, inventory optimisation remains mood management. What matters is a small, consistently measured set of KPIs that captures tied-up capital and product availability together.

Core KPIs

Inventory turnover (revenue or material consumption divided by average stock) shows the speed of

circulation. Days of inventory on hand translate stock into days and are more tangible for management dialogue. The service level measures how often demand could be met without a shortage.

Control and quality metrics

In addition, supplier on-time delivery (OTIF), the share of aged or obsolete stock and forecast accuracy prove valuable. High stock combined with poor forecast accuracy indicates planning problems rather than genuine demand. Write-downs on long-standing stock reveal obsolescence risks, for example relating to components affected by RoHS compliance or upstream products no longer technically required.

Risks and controls in inventory optimisation

Stock reduction carries supply risks; stock build-up ties up capital and can create shrinkage and value loss. Controls must safeguard both directions.

Supply and market risks

Aggressive stock reduction with unreliable suppliers or long replenishment lead times quickly leads to shortages. A risk heat map across critical materials and suppliers helps to set safety stocks on a risk-based rather than blanket basis. Where dependencies on single sources exist, dual sourcing or a verified level of in-house production depth should be priced in as an alternative.

Data and organisational risks

Incorrect bills of materials, duplicate item master records or outdated lead times distort any optimisation. Master data cleansing is therefore a prerequisite. Organisationally, a clear allocation of roles helps: planning sets the parameters, procurement negotiates terms, controlling evaluates. Critical stock decisions go through a defined purchase approval process, and commercial readjustments are documented in contract management, for example via a price adjustment clause, so that price increases do not unnoticedly feed into stock build-ups.

Contractual safeguards

Stock commitment and flexibility must be balanced contractually. Firm and flexible quantities, notice periods and price guarantees belong in framework agreements; for long lead times, a call-off contract supports plannability. Changes to call-offs must be formally mapped via the 'amend delivery schedules' process so that stock corrections do not lead to inconsistent commitments.

Current developments in inventory optimisation

Technology and supply chain pressure are changing the methodology: decisions are becoming more data-driven, faster and more network-oriented.

Automation and AI-supported forecasting

Modern planning systems deploy methods that incorporate seasonality, promotional and trend signals and continuously readjust forecasts. Machine learning approaches significantly improve forecast accuracy, especially for long item portfolios, compared with classical methods, but do not replace professional plausibility checks. Automatic replenishment proposals with purchase approval workflows shorten response times and relieve the planning function.

Resilience and network thinking

Since the supply chain disruptions of recent years, the focus has broadened: stock is once again regarded as a strategic buffer, not merely a cost block. The goal is a deliberate, evaluated buffering strategy rather than blanket stock minimisation. On the supplier side, a supplier segmentation matrix with a scoring model supports concentrating safety stocks where the risk of failure and its impact are greatest.

Collaboration in the supply chain

Vendor-managed inventory, shared demand data and joint capacity planning shift stock to where it can be held most economically. Prerequisites are trusting data relationships and contractually clear provisions on ownership, liability and write-downs. Optimised network stock in this way reduces total costs across several tiers of the supply chain, not only those of one's own warehouse.

Typical metrics

Metric	Typical value
Inventory turnover	4–12 per year *industry-dependent; trend over the time series is decisive*
Days of inventory on hand	30–120 days *average stock divided by daily consumption*
Service level	> 95% *class-specific; critical A-items frequently > 98%*
On-time delivery (OTIF)	> 95% *reliable on-time delivery is an excellent basis for low safety stocks*
Obsolescence rate	< 2% *share of write-down stock in total stock value*

Practical example

A medium-sized mechanical engineering company with around 18,000 active part numbers suffered from growing stock levels and simultaneous shortages of critical parts. An analysis showed: safety

stocks had been set across the board at three weeks, lead times in the item master were outdated, and around one third of stock value was accounted for by sporadically consumed C items.

- ABC/XYZ segmentation of all items and class-specific service levels instead of blanket stockkeeping
- Cleansing of lead times in the item master and statistical recalculation of safety stocks
- Conversion of series components to call-off contracts with defined firm and flexible periods
- Dual sourcing for four single-sourced components, accompanied by quarterly deadline monitoring of critical suppliers

Conclusion

Inventory optimisation is not a one-off project but a permanent control process between tied-up capital and product availability. It succeeds when it segments on the basis of data, sets parameters by material class and consistently considers the levers with suppliers and contracts. Controls such as a risk heat map, service level measurement and regular parameter reviews secure the sustainability of the results. Companies that establish this cycle typically achieve noticeable stock reductions while simultaneously improving product availability. What is decisive is shared responsibility of procurement, planning and sales for uniform planning data.

Frequently asked questions

? What does inventory optimisation mean?

Inventory optimisation refers to the systematic control of stock levels in order to balance product availability and cost-effectiveness. It involves setting inventory planning parameters such as safety stock, reorder point and lot size. The goal is to minimise tied-up capital and inventory costs while ensuring sufficient supply security.

? How can stock levels be reduced without jeopardising availability?

What matters is differentiated segmentation using ABC/XYZ analysis rather than across-the-board reduction. Critical items retain high service levels, while standard items are geared towards cost-efficient supply. In addition, shorter and more stable lead times, call-off contracts with flexibility and a higher degree of standardisation act as levers for reducing stock without supply risk.

? Which KPIs are relevant for inventory optimisation?

Core KPIs are inventory turnover, days of inventory on hand, service level and supplier on-time delivery. Supplemented by forecast accuracy and the share of obsolete stock. Consistent measurement across equal periods and definitions is important so that trends can be reliably identified.

? What is a good inventory turnover ratio?

There is no universally valid target value; it depends heavily on industry and material class. In

manufacturing, values typically range between 4 and 12 turns per year. What is meaningful is comparison over time series and against industry-comparable benchmarks, not a single absolute value.

? What role does procurement play in inventory optimisation?

Procurement directly influences required stock levels through lead times, minimum order quantities, discount tiers and contract flexibility. Framework agreements, call-off contracts and dual sourcing are key levers. In addition, procurement provides supplier information needed for risk-appropriate safety stocks and capacity reconciliation.

? Is Just-in-Time worthwhile for inventory optimisation?

Just-in-Time significantly reduces stock levels but increases dependency on delivery reliability and logistics stability. It is best suited to constantly consumed, locally available A- and B-class items with reliable suppliers. Where distances are long, sources are single-sourced or demand is highly variable, buffer stocks or contractual flexibility are usually the better choice.

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