

# Safety Time Buffer: Systematically Planning Time Reserves in Procurement and Production

The safety time buffer is a planned time reserve that buyers and supply chain managers build in between the delivery date and the actual requirement date. It absorbs unforeseen delays at suppliers, in transport or in production without production lines coming to a standstill. In this glossary article you will learn how to dimension buffers, which KPIs demonstrate effectiveness and what risks arise from excessive or missing reserves.

## Key facts

- The safety time buffer is the difference between the earliest possible requirement date and the planned goods receipt or availability date.
- Typical buffer times in practice range from a few days to several weeks, depending on the criticality of the material.
- Dimensioning is frequently based on historical delivery times, delivery reliability (carrier performance) and replenishment lead times.
- Buffers that are too large tie up capital and increase inventory, while buffers that are too small jeopardise schedule adherence.
- The buffer is a central element of Material Requirements Planning (MRP), where it is often maintained as a lead time or safety time key.
- Critical materials with a high risk of supply failure generally receive significantly longer buffers than standard commodities.

## Definition: Safety Time Buffer

The safety time buffer describes a deliberately planned time reserve between the expected availability date of a material and the date on which it is needed in production or dispatch. It is one of the classic instruments of supply and schedule security alongside safety stock and alternative sources of supply.

## Distinction from Safety Stock

While safety stock is a quantity reserve against short-term demand spikes and quantity deviations, the safety time buffer offsets timing deviations. The two instruments complement each other: a buffer helps when goods arrive late, safety stock when more demand arises than planned. In practice, both are often managed in combination, with the approach weighted differently in the ERP system depending on the material class.

## Integration into Planning

In Material Requirements Planning (MRP), the safety time buffer is typically stored as a lead time offset or as safety time in days at material master level. Planning then triggers orders earlier than the pure

requirement date would require. It is crucial that the buffer is defined on a material-specific basis rather than across the board, as replenishment lead times and failure risks vary greatly by commodity.

## Methods and Approach for Dimensioning the Safety Time Buffer

The size of the buffer should not be determined by gut feeling but on a data basis. A multi-stage process of data analysis, classification and regular review has proven effective.

### Analysis of Historical Delivery Times

The starting point is the actual replenishment lead times of past periods, ideally broken down into order processing time, supplier manufacturing time, transport and goods receipt time. From the variance of throughput times, it can be derived which buffer is required to achieve a defined service level. Statistical approaches are frequently used for this, such as a multiple of the standard deviation of lead time.

### Classification by Criticality

Not every part deserves the same buffer. An ABC-XYZ analysis combined with a criticality assessment has proven effective: items with a high share of revenue, tight tolerances or single-sourcing risk receive longer reserves than readily available C-parts. The procurement strategy also plays a role: those with an active commodity strategy and established second sources can usually reduce buffer times.

### Linkage with Delivery Agreements

The buffer should always be considered in conjunction with contractual arrangements. Contract negotiations allow binding delivery times, notification deadlines in the event of delays and escalation levels to be agreed, which reduce risk and thereby lower the required buffer size. Framework agreements with fixed replenishment lead times or supplier-run stock programmes are proven instruments for this.

## Key KPIs for Managing the Safety Time Buffer

Whether buffer size and effect are right can only be assessed with KPI-supported monitoring. The following metrics have established themselves in practice.

### Delivery Reliability and Schedule Adherence

Delivery reliability measures the proportion of deliveries that arrive complete, correct and on time. It is the most important feedback metric for buffer dimensioning: high and stable delivery reliability allows shorter buffers, while volatile values require larger reserves. In addition, schedule adherence at goods receipt shows whether the planned buffer was actually maintained or is frequently consumed.

### Buffer Consumption and Shortage Rate

Buffer consumption indicates how often and by how much the planned time reserve was actually used. If the buffer is regularly fully utilised, it is dimensioned too tightly; if it remains untouched over the long term, it ties up capital unnecessarily. The shortage rate complements this view by showing how many production runs had to be interrupted despite the buffer, for schedule or material-related reasons.

### Inventory and Capital Metrics

Since longer buffer times lead to higher inventories, inventory turnover and tied-up working capital must remain in focus. In practice, the buffer is often optimised together with safety stock in order to minimise

total capital tie-up. A proven principle is: better short buffers with active supplier management than large hidden reserves in the warehouse.

## **Risks and Controls in Dealing with Time Buffers**

Incorrectly dimensioned buffers cause considerable costs or forfeit the desired protection. Clear governance with regular review is therefore essential.

### **Risk of Oversized Buffers**

Overly generous time reserves lead to premature ordering, high inventories and increased obsolescence risk, especially with fast-moving technology or customised components. Excessive buffers also mask genuine supplier problems: poor carrier performance is compensated by hidden reserves instead of being addressed at its root. This delays necessary supplier development measures or changes of supplier.

### **Risk of Missing Buffers for Critical Materials**

Conversely, reserves that are too tight jeopardise supply, for example with long lead times, single sourcing or volatile markets. For such items, a contingency plan and defined escalation routes should additionally exist. For bespoke items and small-batch production, early demand registration and safeguarding via tooling and long-term call-offs are recommended, rather than relying solely on time buffers.

### **Controls and Governance**

A semi-annual to annual review of all buffer keys, supported by current delivery reliability and inventory metrics, has proven effective. Changes should be documented and released for approval so that planning remains traceable. Alignment with budgeting is also important: buffer times influence inventory planning and capital requirements and should therefore be explicitly considered in the budgeting process.

## **Current Developments: Buffers in Volatile Supply Chains**

The experiences of recent years have changed views on time buffers. Blanket just-in-time approaches are being replaced in many places by risk-adapted reserves.

### **From Lean to Risk-Oriented Buffer Management**

Many companies have learned that extreme leanness without resilience can be costly. The trend is towards differentiated buffer concepts: standard parts run largely buffer-free via kanban or consumption-based control, while critical A-items and long-lead items deliberately receive larger reserves. Ramp-up management for new projects is viewed particularly critically, as delivery times are known to be more volatile in this phase.

### **Digitalisation and Transparency**

Digital supply chain platforms and standardised interfaces such as cXML improve real-time transparency of order and transport status. The better the visibility, the more precisely the buffer can be dimensioned, because disruptions are detected earlier and reaction times can be calculated more realistically. This data also helps in obsolescence management and forward-looking buffering: discontinued components must be procured earlier and more reliably.

# Safety Time Buffer in Contracts, Transport and Settlement

The buffer only unfolds its effect in interplay with contractual, logistical and commercial processes. Three interfaces deserve particular attention.

## Incoterms and Transport Lead Times

The chosen Incoterms delivery condition, such as DAP or DPU, determines which contracting party bears the transport risk and customs clearance and how long the realistic lead time is. For international procurement, for example with a carnet (ATA) for demonstration goods, bureaucratic and transport times are extended; the buffer must reflect this. In practice, unclear delivery terms frequently cause exactly the delays that the buffer is supposed to protect against.

## Goods Receipt, Inspection and Downstream Calculation

Even after goods receipt, time losses can occur, for example through invoice verification, incoming inspection or the returns process in the event of complaints. The buffer should therefore not end at the delivery note but cover the time until production availability. In addition, cost breakdown and preference calculation help assess whether longer but cheaper sourcing routes with larger buffers are economically worthwhile.

## Typical metrics

### **Delivery reliability (OTIF): > 95%**

typical target value; high stability allows shorter buffers

### **Buffer consumption rate: < 20%**

proportion of cases in which the reserve is actually used

### **Shortage rate: < 1%**

proportion of production runs interrupted due to material issues

### **Inventory coverage: material-dependent**

must be weighed against capital tie-up and budgeting

## Practical Example

A medium-sized mechanical engineering company with small-batch production repeatedly experienced line stoppages because electro-technical components with long replenishment lead times arrived too late. The company analysed two years of delivery history, classified all materials by criticality and lead time and introduced graduated buffer keys in its ERP system.

- Critical long-lead parts were given buffer times of typically three to six weeks, while standard parts remained almost buffer-free.
- For single-sourcing items, a contingency plan was drawn up including second-source development and an escalation matrix.
- Binding delivery times and weekly status reports were agreed in contract negotiations.
- Quarterly monitoring of delivery reliability and buffer consumption enabled a gradual reduction in inventory levels.

## Conclusion

The safety time buffer is a deceptively simple but strategically important control instrument between supply capability and capital tie-up. What matters is data-based, material-specific dimensioning rather than blanket surcharges. Combined with clear delivery agreements, a contingency plan for critical items and regular KPI reviews, the buffer absorbs delays without allowing inventories to grow unchecked. Companies that manage buffers in a risk-oriented and differentiated manner achieve both high schedule adherence and acceptable inventory costs. In interplay with safety stock, supplier management and digital transparency, the time buffer thus remains a core building block of resilient procurement processes.

## Frequently asked questions

### What is a safety time buffer in procurement?

A safety time buffer is a planned time reserve between the expected delivery or availability date of a material and the date on which it is actually needed. It offsets unforeseen delays at suppliers, in transport or during incoming inspection. The aim is to avoid production interruptions without permanently holding excessive stock.

### How large should a safety time buffer be?

There is no universal benchmark; the size depends on replenishment lead time, delivery reliability, criticality and sourcing route. In practice, a few days are often allowed for standard parts and several weeks for critical or long-lead items. A data-based derivation from the variance of historical delivery times and regular reviews have proven effective.

### What is the difference between a safety time buffer and safety stock?

The safety time buffer offsets timing deviations by triggering orders earlier; it primarily ties up time, not necessarily stock quantity. Safety stock is a quantity reserve against demand and quantity deviations. The two instruments complement each other and are usually managed in combination on a material-specific basis in ERP systems.

### How is the safety time buffer stored in the ERP system?

In Material Requirements Planning (MRP) systems, the buffer is typically stored as safety time in days or as a lead time surcharge at material master or planning level. Based on this, planning shifts the order trigger forward. Clear release processes and regular updating of the values are important.

### What are the risks of a safety time buffer that is too large?

Excessive buffers lead to premature ordering, higher capital tie-up and increased obsolescence risk. They also mask genuine supplier problems because poor delivery performance goes unnoticed. Ongoing monitoring of buffer consumption and delivery reliability is therefore recommended.

### What role does the safety time buffer play in supply chain resilience?

It is one of several instruments alongside safety stock, second sources, framework agreements and contingency plans. In volatile markets and with long lead times it gains in importance, but should only be applied generously in a targeted manner for critical materials. The combination of buffer and active supplier management is more efficient than large hidden reserves.