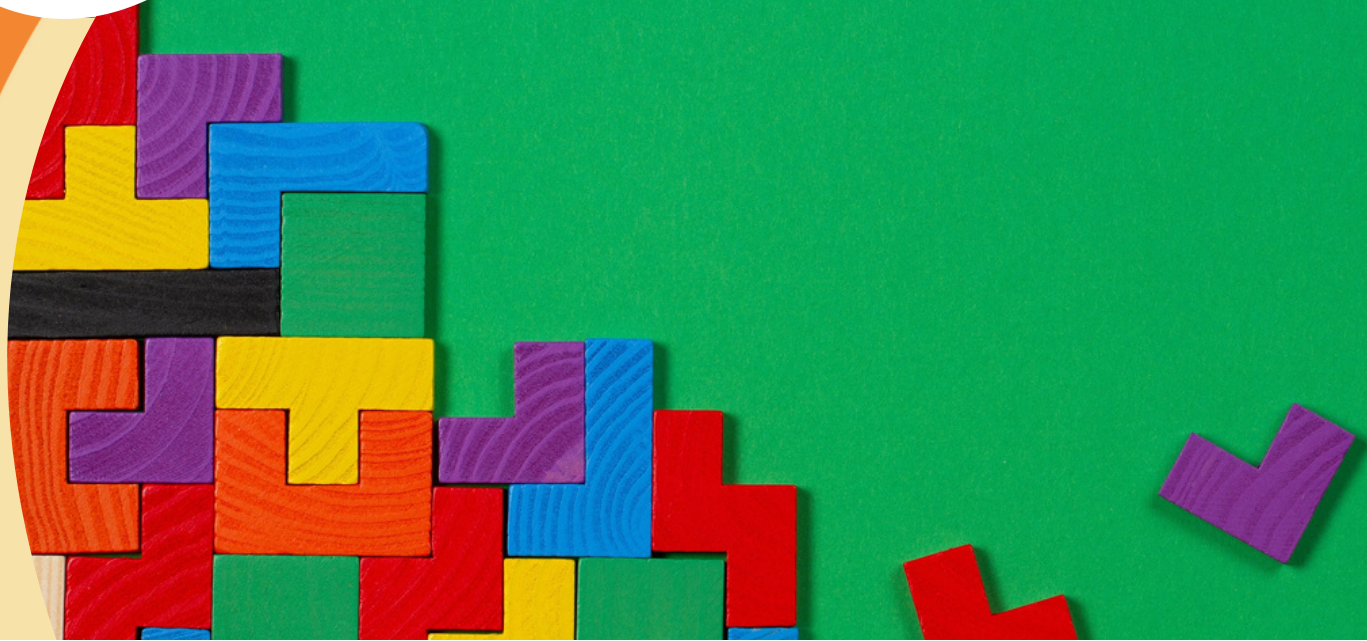# How to overcome common inventory replenishment challenges

A guide to calculating when and how much to replenish.

Contents

Meeting customer demand

"Sorry, we're out of that item."

How often have you heard that comment during a shopping trip? Even popular eCommerce stores are littered with out-of-stock notices, whether for a top-selling fashion item or the latest piece of tech.

Despite businesses pushing demand-driven mantras, many still struggle to ensure their stock mirrors what their customers want. Often the buck stops with the inventory planning and purchasing teams.

When a stock balance hits zero, an inventory management team has failed to manage its inventory correctly. The stock has not been replenished in time, and consequently, there's the stress of stockouts and back orders, as well as an unhappy sales team and uncomfortable questions from management.

The reasons behind poor inventory management are extensive. They often include poor demand forecasting, a lack of control over stocked items, inadequate inventory systems or human error when manually calculating what, when and how much to order.

According to the 2018 MHI Annual Industry Report, 73% of businesses list their customers' demands on the supply chain as one of their top challenges.
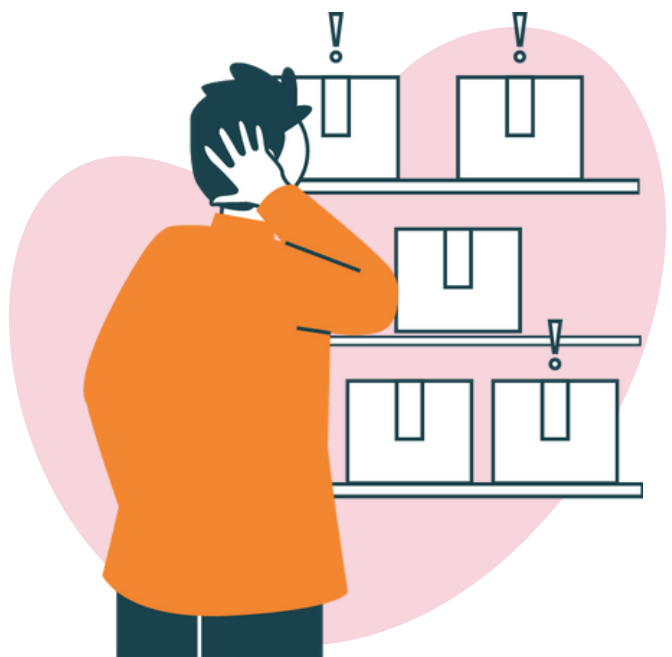
Customers are continually demanding more. We now live in a world where companies like Amazon offer free same-day shipping. If an item is out of stock from one vendor, customers can find another with a simple, quick online search.

While stockouts of best-selling items cause warehouse racks to lie empty, the irony is that companies also waste millions of pounds each year carrying excess stock. Finding the balance between the two costly challenges is difficult for many inventory managers.

Whether you work for a manufacturer, wholesaler, distributor, supplier or retailer, an effective replenishment strategy is key to ensuring stock availability and hitting fulfilment targets (or service levels).

In this eGuide, we'll look at two replenishment aspects – when and how much to order. We'll also help you find tactics to balance the cost of holding stock while ensuring availability – in the most cost-effective way possible.

Replenishment challenges

To ensure stock availability and carry out effective stock replenishment, inventory purchasers must pay special attention to three things:

What to order

When to order

How much to reorder

These factors are vital to keeping costs contained and inventory levels under control. The key is to find the optimal reorder time and quantity for an item to ensure a continuous inventory balance and meet demand while ensuring inventory isn't piling up in stock locations.

The goal is to minimise total warehousing and ordering costs while carrying just enough stock to prevent shortages.

Identifying and calculating what items to reorder and carry comes from accurate demand forecasting and intuitive stocking policies. These are both huge topics in their own right, and we go into more detail in our demand forecasting accuracy and demand forecasting accuracy and inventory classification eGuides. In this eGuide, we focus on when and how much to replenish.

Four inventory replenishment models

Let's remind ourselves of four simple replenishment models that inventory managers can use to help replenish inventory. These consider when and how much to order.

The question about when to place an order can be answered by specifying either a definite quantity or date. For example, an order can be placed if inventory falls below a defined quantity (or level) or a predetermined, fixed period (fixed order cycle or FOC) has passed.

When looking at how much to order, the ordered quantity is either a pre-determined fixed order quantity (FOQ) or a variable quantity that tops up the current stock level to a certain capacity.

Four possible inventory replenishment models exist based on a combination of these criteria.

<div align="center">

When to order

	Fixed order cycle (FOC)	Variable order period
Fixed order quantity (FOQ)	Fixed replenishment	Order point or minimum/maximum
Variable order quantity	Periodic replenishment	On demand

How much to order

</div>

1 Fixed replenishment

Fixed replenishment is a simplistic replenishment model where the ordering period and quantity are fixed, e.g. the same amount of goods is ordered at a set frequency.

Fixed replenishment is only suitable when demand is constant over time, and an item has a low acquisition cost. For most companies, this replenishment model is insufficient.

Quantity

Maximum inventory

Q

Q

Q

Time

t

t

t
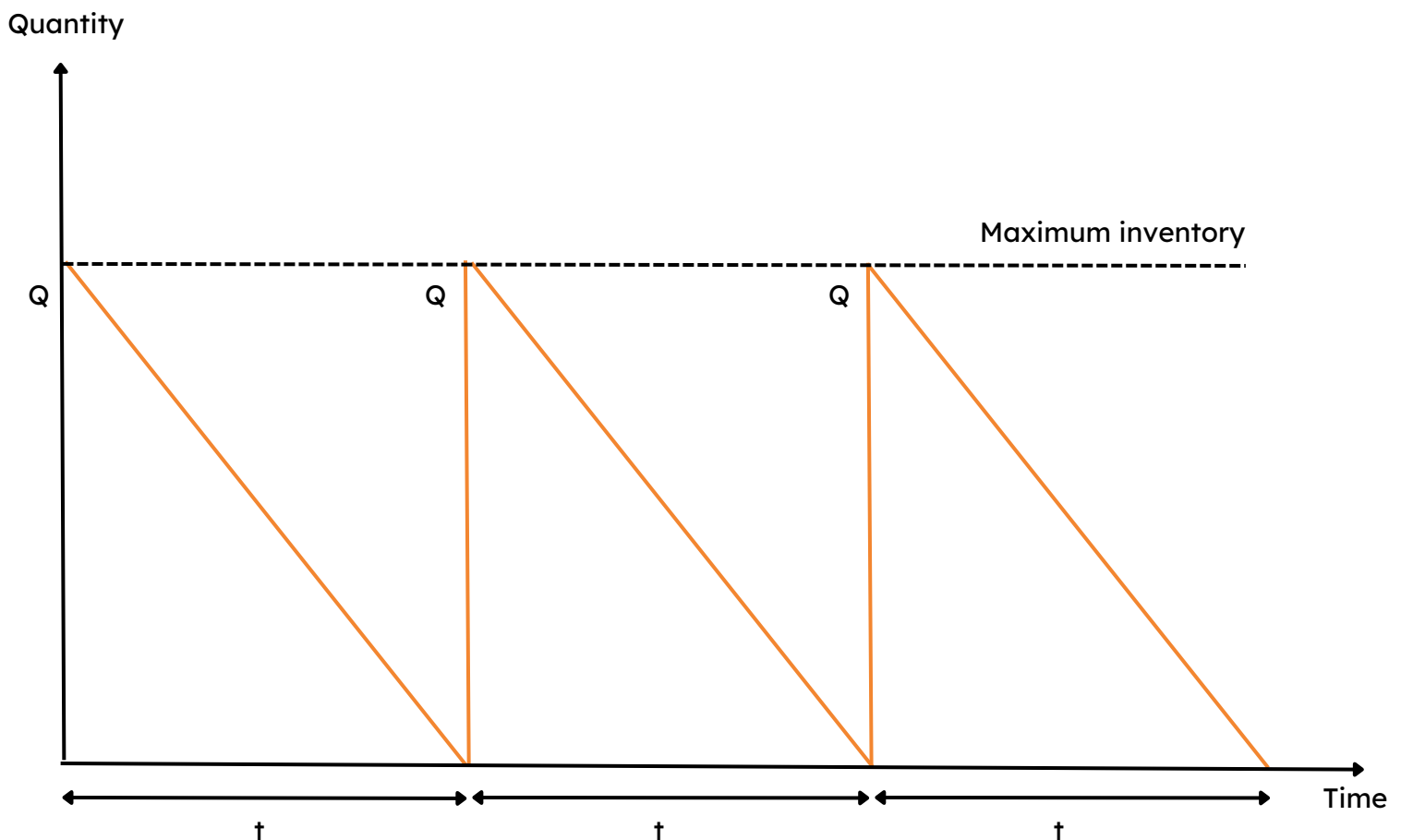
2 Order point or minimum/maximum replenishment

Order point or minimum/maximum (MIN/MAX) replenishment works when your demand is highly variable over time. You need two values for this calculation:

- The reorder point – the threshold that defines if any reorder is necessary.
- The reorder quantity – the fixed quantity to be reordered (difference between minimum and maximum value)

This model tracks stock levels and reordering is triggered when the inventory drops to a reorder point. An order is initiated, regardless of frequency. The quantity to be ordered is a pre-determined fixed quantity.

The reorder point is specified so that demand can be met from the existing inventory during the delivery lead time or through safety stock.

The prerequisite is that inventory levels are monitored well so ordering is done in time. Moreover, this model assumes that the delivery lead time is constant even though the order periods are not.
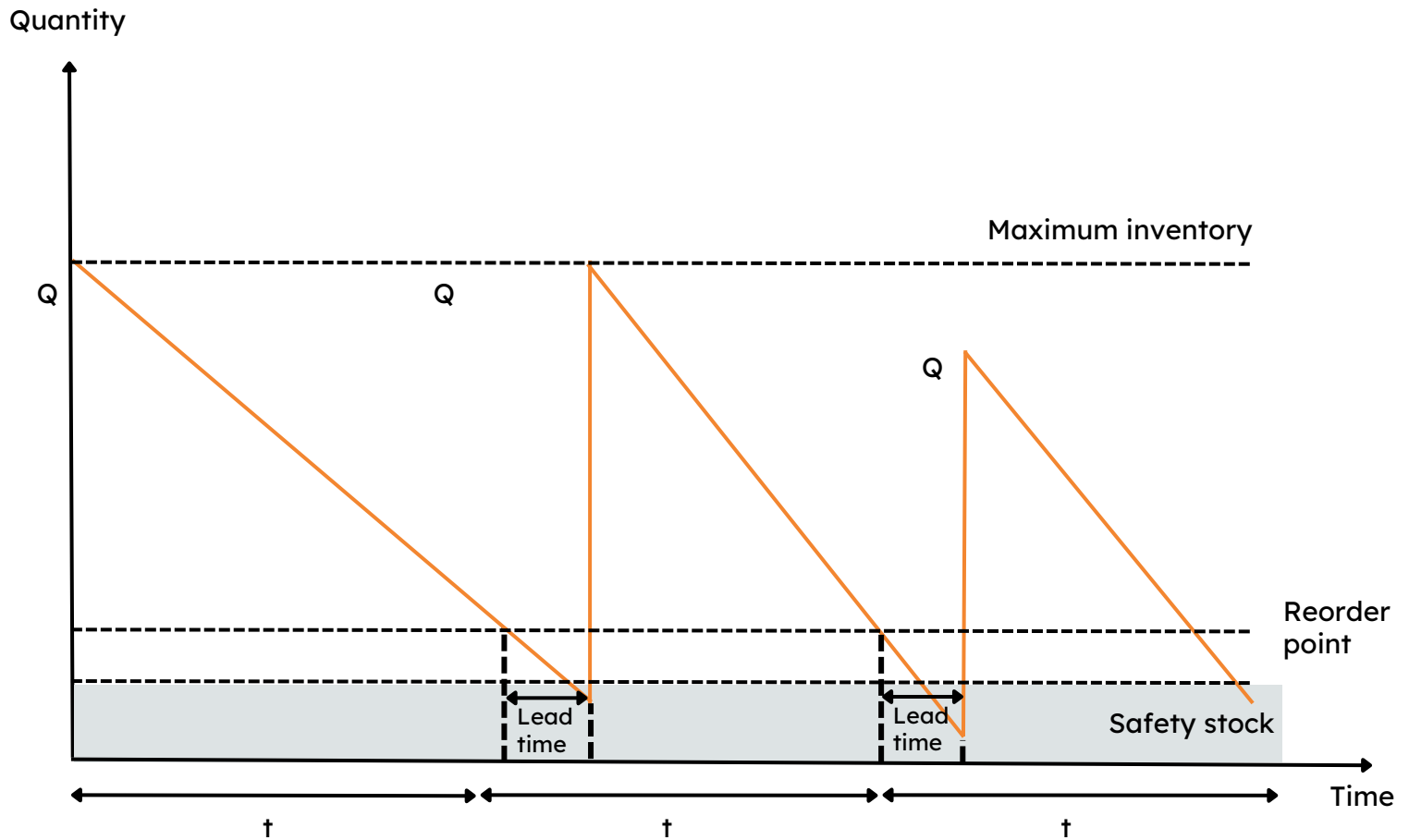
3 Periodic replenishment

Periodic replenishment executes maximum replenishment when reaching a reorder date in a fixed cycle.

The variable order quantity calculation corresponds to demand during the order cycle and the lead time minus stock on hand.

As the inventory is replenished to its fullest extent during each new delivery, this model is only relevant if the demand is constant.

If the demand varies too much, it requires very high safety stock levels, which can cause high carrying costs and diminished profit margins.
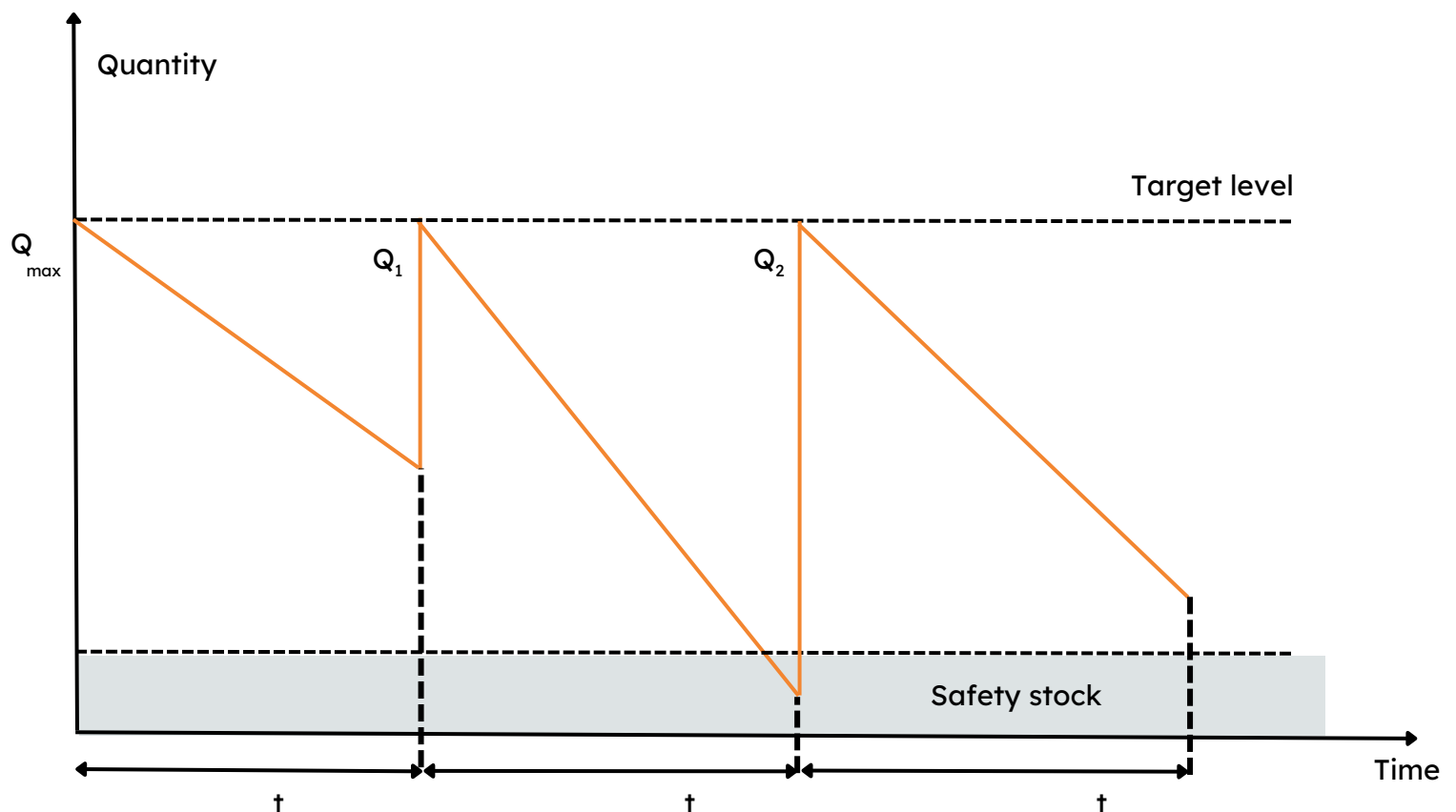
4 On-demand replenishment

On-demand replenishment is where an order is initiated if the inventory has dropped to a reorder point, regardless of frequency.

The order point is determined to meet demand with the existing inventory during the delivery lead time.

The reorder quantity is also variable, enabling it to supplement the inventory up to the level required to meet forecasted demand.
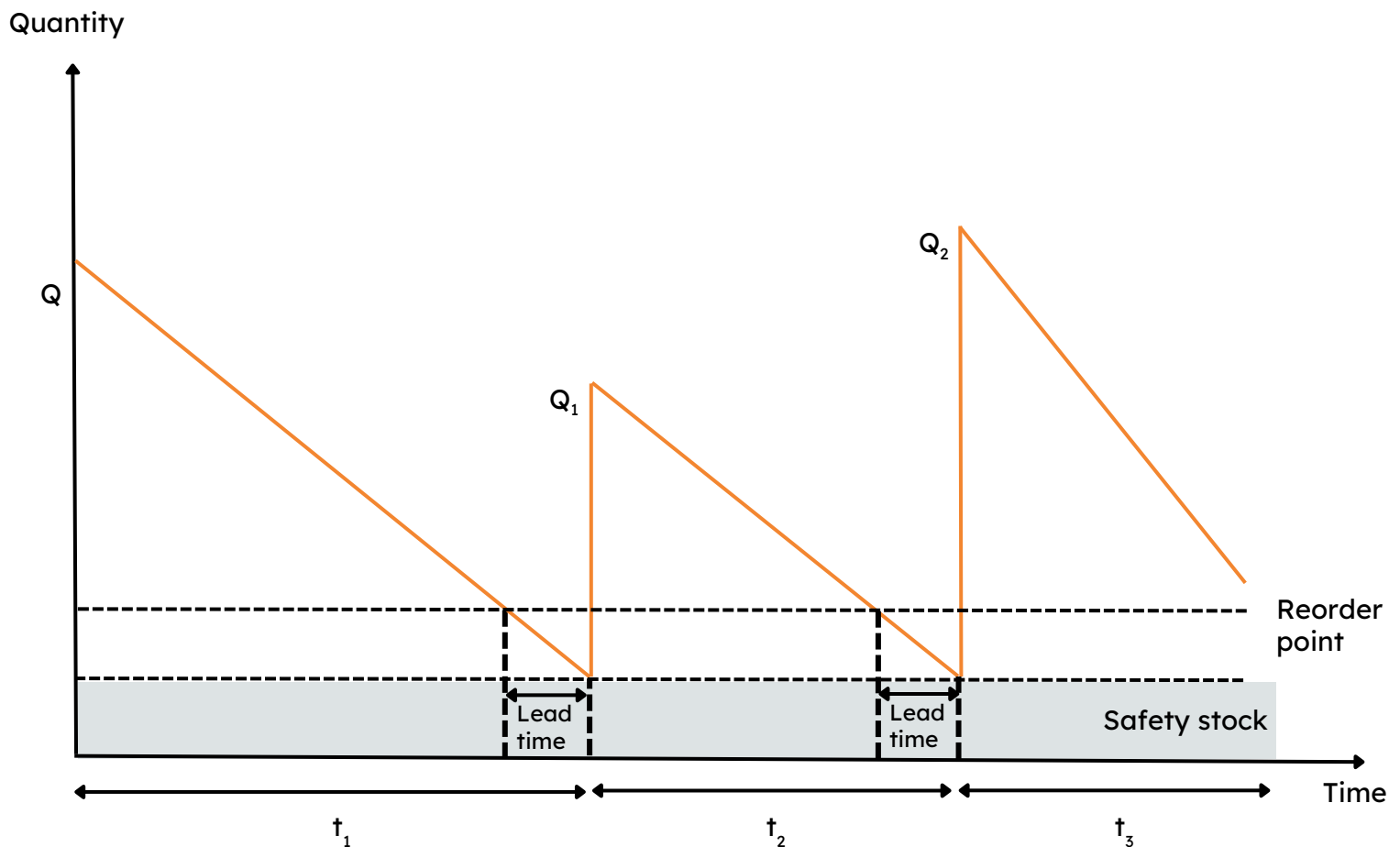
Factors that affect order quantities

Most inventory planners and purchasers aim to buy every item at the lowest total cost per unit. This can often mean buying in bulk or agreeing on maximum order quantities with suppliers. You must also consider the costs of carrying and ordering every stock item to maintain profits.

Every replenishment strategy should, therefore, consider the following:

1. Carrying costs – the costs of maintaining inventory in your warehouse before it's sold, transferred or used.
2. Ordering costs – the costs of issuing, receiving and paying for a line item on a supplier purchase order.

You can then balance the costs of holding inventory against the savings from supplier discounts and economies of scale. Let's look at both factors in more detail.

Carrying costs

1. Carrying costs

The cost of carrying inventory includes all the overheads you incur by stocking items in your warehouse. These costs are split into four parts:

Capital costs

This is the most significant component of the total cost of carrying inventory. It includes everything related to the investment in buying stock, e.g. the interest on working capital and the opportunity cost of the money invested.

Storage space costs

Storage space costs combine warehouse rent or mortgage and maintenance costs, such as lighting, heating and air conditioning.

Inventory service costs

Inventory service costs include insurance, security, IT hardware and the cost of physically handling the goods.

Inventory risk costs

This cost covers the risk that items might fall in value over the period they are stored, shrinkage and the risk that they become obsolete.

Carrying costs are calculated by combining the above overheads and dividing them by the average annual inventory value. Carrying costs are expressed as a percentage, and the average values typically range between 15-20%.

For example, if your combined carrying costs equal £500,000, and your inventory value is £3m, your carrying costs expressed as a percentage would be £500,000/£3m, which is 16.7%.

2. Ordering costs

The ordering cost or cost of replenishing inventory is the expense incurred every time you place an order. These can be split into two parts:

Cost for processing orders

This typically includes fees for placing the order and all costs related to invoice processing, accounting and communication. Using automated systems that enable supply chain integration significantly reduces ordering process costs.

Inbound logistics costs

These costs are related to transportation and receiving goods (unloading and inspecting). A simple way to calculate your cost per order is to divide the total annual cost of purchasing an item by the number of purchase order line items in the past year:

$$\text{Ordering Cost} = \frac{\text{Annual cost of issuing purchase order line items}}{\text{Purchase order line items issued in the past year}}$$

There are ways to determine the right trade-off between carrying and ordering costs vs volume discounts (balancing the cost of ordering too much against the cost of ordering too little).

This is usually achieved by calculating the Economic Order Quantity (EOQ).

Economic order quantity

The Economic Order Quantity (EOQ) model calculates the optimal purchase (or production) quantity) to minimise carrying and ordering costs.
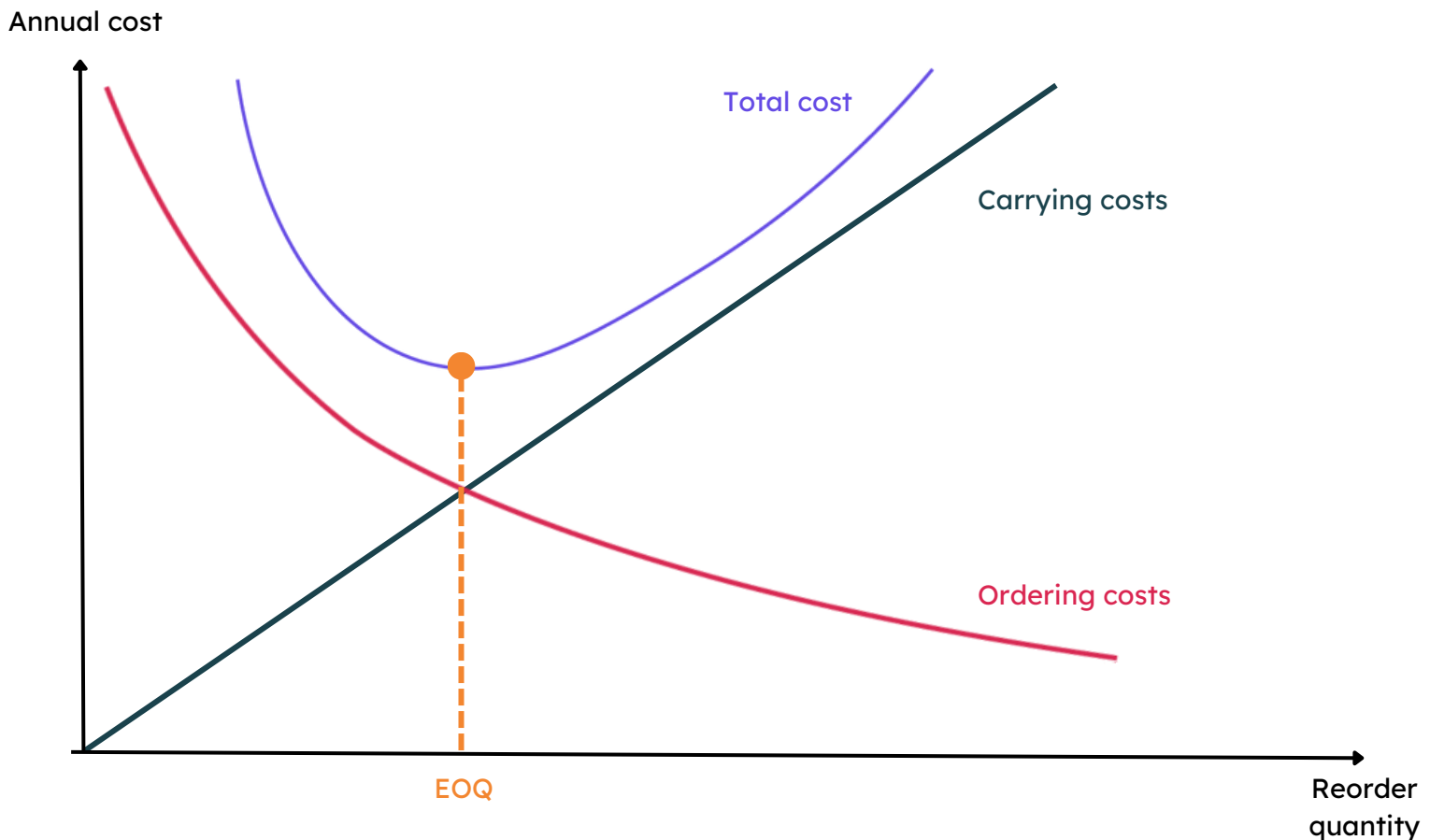
Notice that the total cost is at its lowest where the tangent equals zero. We can then draw a straight line from this point through the intersection of the carrying cost and ordering cost curves. This is the EOQ.

You can calculate the EOQ like this:

Total cost = carrying costs + ordering costs

$$\sqrt{\frac{2*D*C_p}{C_h}}$$

Where:

D $\quad$ = Demand for the year

C_h $\quad$ = Cost to hold one unit of inventory for the year (carrying cost)

C_p $\quad$ = Cost to place a single order (ordering cost)

This model is built on a number of assumptions:

- A relatively uniform and known demand rate
- Fixed item costs
- Fixed ordering and carrying costs
- A constant lead time

Economic order quantity calculation: a working example

A car manufacturer stocks approximately 20,000 service parts. Let's consider one specific SKU, a taillight. The demand for this part is almost steady throughout the year - at a rate of 100 units per week.

Additional costs include:
Carrying costs, including warehouse rent, maintenance and depreciation: £0.80 per unit
Invoice preparation, postage and time cost: £100 per order

The first task is to prepare the cost parameters:

D = 5200 units $\quad$ C_h = £0.80 $\quad$ C_p = £100

We now substitute these parameters into the EOQ formula to calculate the optimal order quantity for this spare part.

$$Q_{EOQ} = \sqrt{\frac{2*D*C_p}{C_h}} = \sqrt{\frac{2 * 5{,}200 * 100}{0.80}} = \sim 1{,}141 \text{ units}$$

Get optimised!

If you reorder products at the right time and in the right quantities, you'll be well on your way to ensuring you can meet customer demand.

Effective inventory replenishment ensures stock levels are adequate to meet service level targets while preventing over-stocking.

However, calculating reorder points, quantities or EOQs for every SKU can be time-consuming and complex. While enterprise resource planning (ERPs) and stock control systems may offer some functionality to support, many purchasers are now turning to inventory optimisation software for more advanced solutions.

Inventory optimisation tools, such as EazyStock, automate replenishment activities. They use clever algorithms to calculate exactly how much of each SKU to order and when. They also automatically generate a list of recommended orders daily, which takes into account the following:

- Forecasted demand (also automatically calculated)
- Current stock levels, stock on order and safety stock
- The pick frequency and demand volatility of each SKU
- The cost to sell each item (or profitability)
- Supplier lead times (even if these continually change)
- Supplier ordering constraints, e.g. min and max order quantities
- Internal constraints, e.g. if you can only place orders on specific days of the month, or accept deliveries on specific days of the week.

These variables are constantly changing. Keeping on top of them with manually updated Excel spreadsheets or an inadequate inventory management system will lead to replenishment issues.

Purchasing teams are, therefore, using EazyStock to improve their ordering accuracy. The software 'crunches the numbers', and purchasers can easily sense-check the recommendations and then place orders with the confidence that they'll have the right stock in their warehouse the meet demand.

EazyStock is a powerful replenishment calculator and easy to set up and use daily. It provides all the information you need to make simple but informed purchasing decisions. The result is that teams can reduce their stock levels while ensuring fulfilment, ordering more economically while still meeting customer demand.

eazystock

Learn more about automated inventory replenishment

Book a demo