

The logo consists of the letters 'EOQ' in a bold, orange, sans-serif font. The letters have a slight 3D effect with a darker orange shadow on the right side. The logo is centered within a white rectangular box.

**EOQ**

**Jaromír Skorkovský**  
KPH-ESF-MU Brno, Czech Republic

Brno, 2015

## Simple questions -qualifications

- Type of material
  - Raw material
  - Semi-products (WIP)
  - Final products
- Questions :
  - How much do we have to order (order quantity=Q)
  - When do we have to order (question related to Reorder Level=Reorder Point)

# Demands

## ○ Type of demands

- Deterministic – known demand

- Probabilistic

  - Under risk (distribution of demand is known)

  - Under uncertainty (distribution of demand is not known)

## ○ Lead time (time between placing order and getting items)

## Costs

- **Order Costs =  $C_o$** 
  - **Transport**
  - **People work**
  - **Inspection cost**
  - **Reject costs**
  - **Follow up costs**
  
- **Cost of item =  $C$** 
  - **Purchase cost**

## Costs

- **Inventory Holding Cost= Carrying Costs =  $C_C$** 
  - Cost of space
  - Cost of guarding
  - Cost of obsolete items
  - Special equipment
  - Pilferage (act of item stealing)
  - Cost of capital (most important )
  
- **Backorder Cost =  $C_{bo}$** 
  - Lost of goodwill

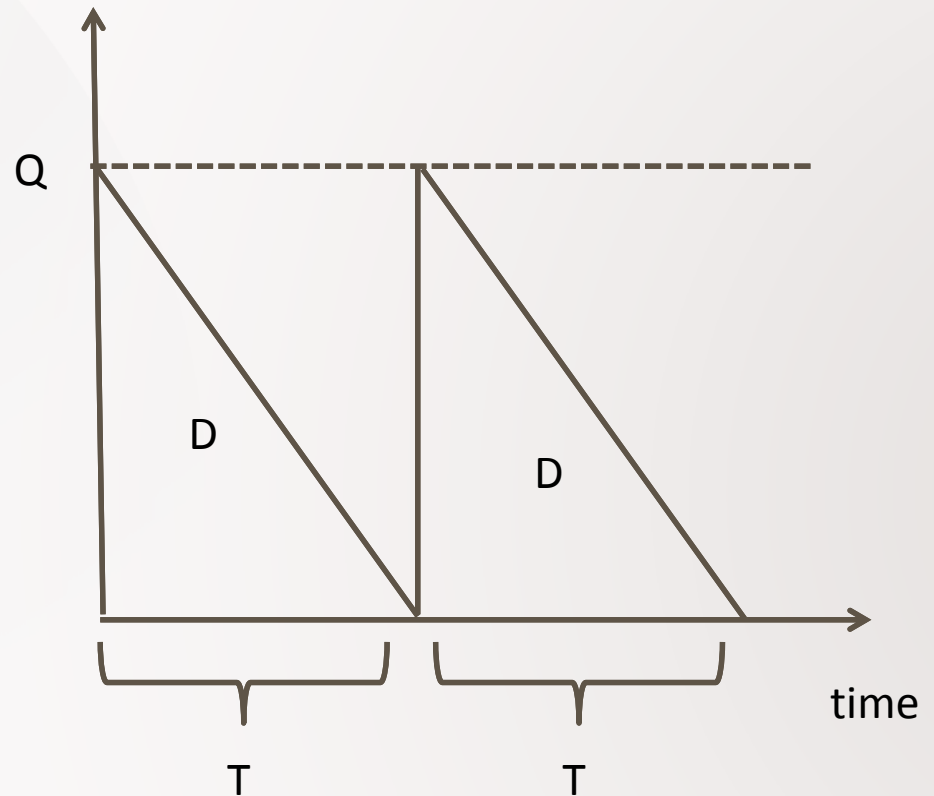
## Costs

- **Backorder Cost =  $C_{bo}$** 
  - **Lost of goodwill**
  - **Lost of opportunity**
  - **Cost of additional capacity**
  - **Cost of rescheduling and rework**
  - **Lost of sales**

## EOQ model 1

### Prerequisites

- Single item only
  - Continuous demand =  $D$
  - No stock shortage
  - Instantaneous shipment
- Lead time = constant



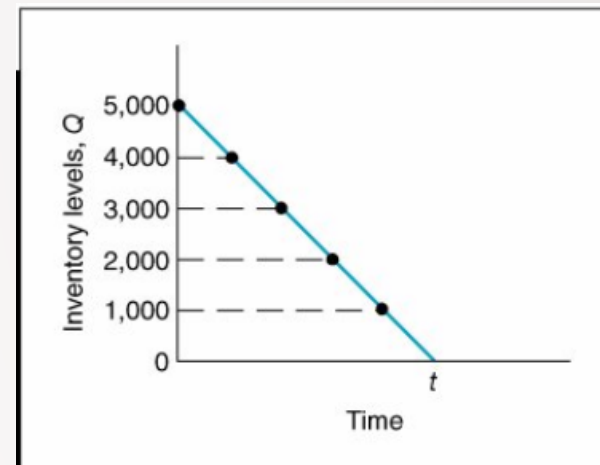
Notice, that inventory never goes below zero; shortages do not exist !!

## Carrying cost (will be presented -see next slide)

$$\text{Average inventory (carrying) cost} = \frac{Q}{2}$$

To verify this relationship, we can specify any number of points values of Q over the entire time period, t , and divide by the number of points. For example, if Q = 5,000, the six points designated from 5,000 to 0, as shown in shown figure, are summed and divided by 6:

$$\begin{aligned} \text{average inventory} &= \frac{5,000 + 4,000 + 3,000 + 2,000 + 1,000 + 0}{6} \\ &= 2,500 \end{aligned}$$

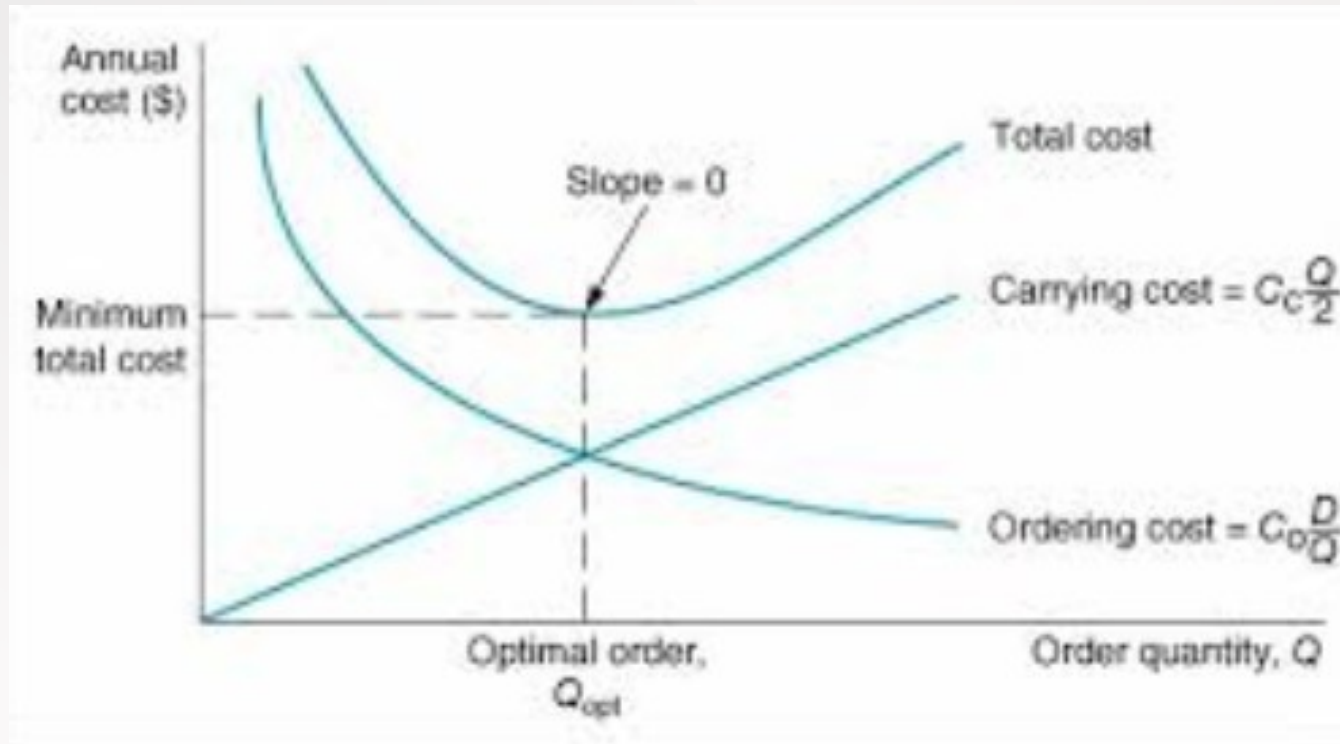




## EOQ model 1

- Annual demand /year =  $D$
- Number of orders/year =  $\frac{D}{Q}$
- Total order cost =  $\frac{D}{Q} * C_o$ , where  $C_o$ =order cost
- Average inventory (carrying) cost =  $\frac{Q}{2}$
- Total holding (carrying) cost =  $\frac{Q}{2} * C_c$ , Where  $C_c$ =carrying cost
- Cost of the item =  $D*C$
- Total cost =  $TC = \frac{D}{Q} * C_o + \frac{Q}{2} * C_c + D*C$  (*non-linear function with one variable*)
- $\frac{dTC}{dQ} = -\frac{D}{Q^2} * C_o + \frac{C_c}{2} = 0$
- $Q=EOQ = \sqrt{\frac{2DC_o}{C_c}}$

# EOQ





Děkujeme za Vaši pozornost a čas