Management of production

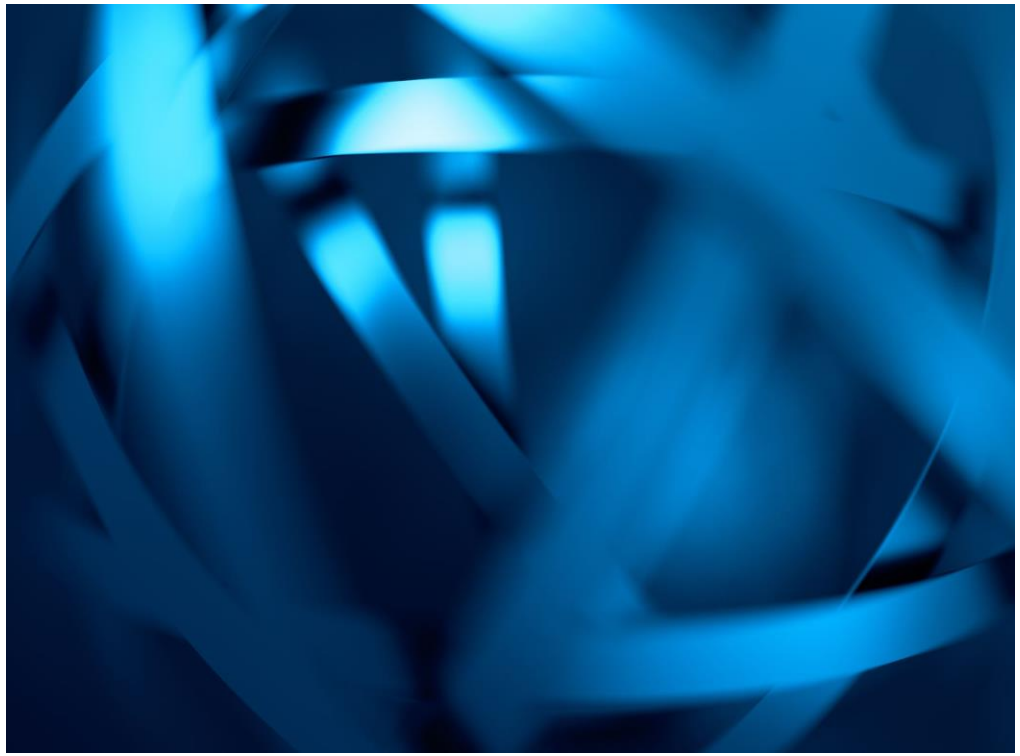
Exercise: Production Capacity

Introduction

Management dilemma - how much to produce?

What does the number of products depend on?

How can production be increased?



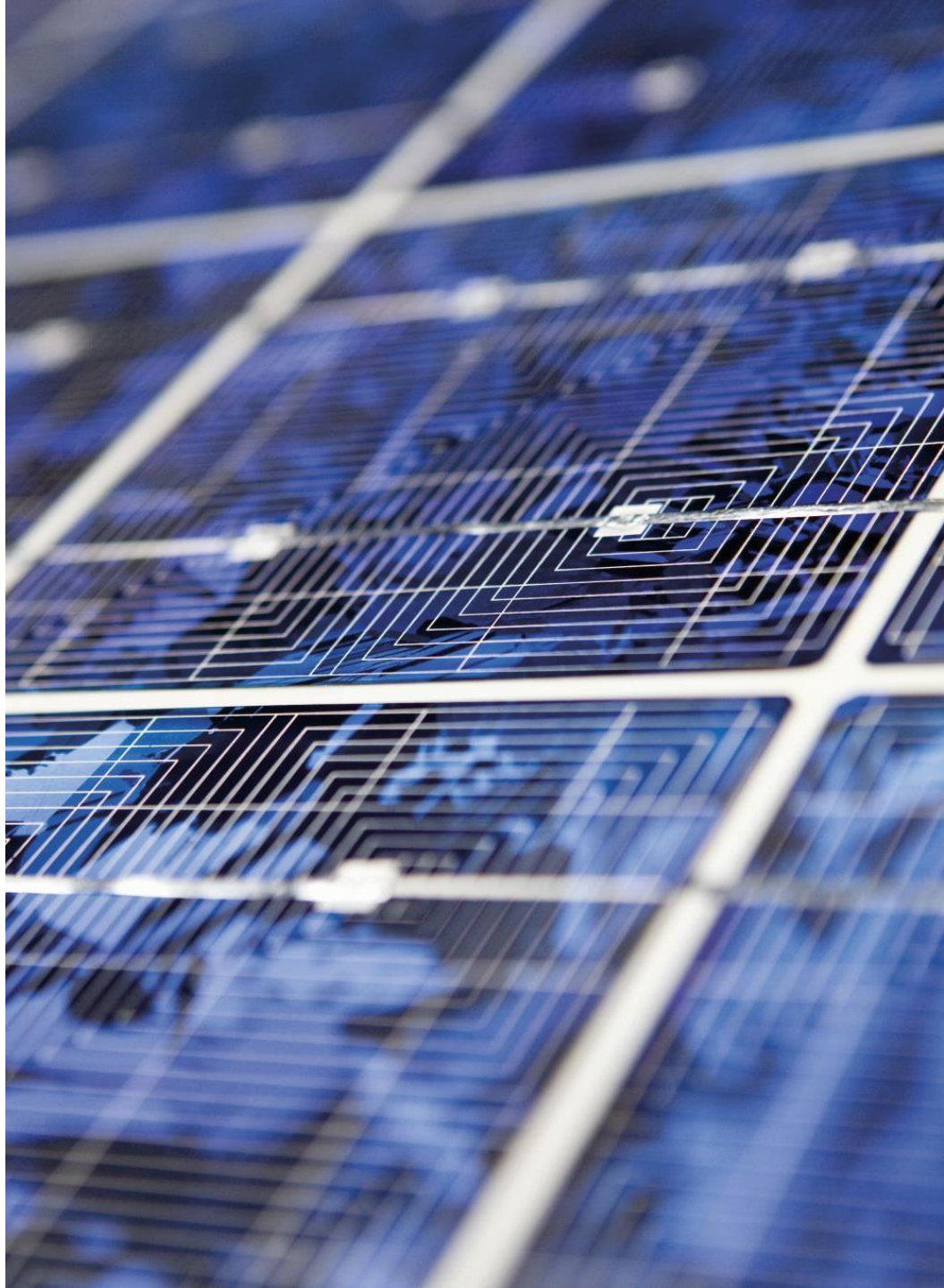
Production size factors

market requirements (demand - customers / supply - competition)

own production possibilities and capabilities - finance, capacity, technology ...

possibilities of obtaining resources (inputs) on the market - raw materials ...

economic efficiency indicators - labor productivity



Production capacity

It represents the maximum amound of products that a production unit (line, group ...) can produce in a defined period (year, month, day ...) in compliance with the defined conditions (number of shifts, technological and organizational conditions ...).

The total production capacity is directly connected to the

- length of the period and
- the performance

.....of the two basic factors - production equipment and human labor

Factors affecting production capacity

- technical base - depends on production equipments and its use
- technical performance of the equipment
- assortment and labor of products
- staff qualifications and production experience
- usable working time fund

Determination of total production capacity

Calculation of the usable time fund standard

Calculation of the standard of human labor and production equipment

Determination of total capacity

1. Calculation of the usable time fund standard

UTF - usable time fund (**usually in hours**) → maximum time employees can work without breaks

NTF (working days) - nominal time fund (**usually in days**)

CTF - calendar time fund (**in days for the relevant period**)

T - number of work units in one day (number of changes * number of hours per shift)

PD - planned downtime in the given period

Sa, Su, Ho - Saturdays, Sundays, holidays

2. Standard of performance of human labor and production equipment

Standard of performance of human labor and production equipment: can take the form of a labor standard (**time standard**) or a performance standard (**quantity**)

- **labor standard (LS):** the time required to perform a work operation

Tm = time of the main technological run → **N of shifts * Hrs per shift**

Ta = time of auxiliary (supporting) technological operation

RT = rest time (of machines)

- **performance standard (PS):** the number of units that can be processed,

production per unit of time (inverse value of the labor standard) - depends on the product (shape, quality ...); requirements for packaging, logistics ...; the technical level of the production facility; work organization

3. Determination of total capacity

Tcap - total capacity

UTF – Usable time fund (usually in hours)

LS – Labor standard (usually in working days or minutes, hours)

PS - performance standard

Example A – yogurt filling line

Calculation of the capacity of the yogurt filling line

- The technical parameters of the line allow you to fill ***50 quarter-liter yogurts*** per minute
- The production technology always requires one production batch (***filling volume 1250 L***) to interrupt the operation for ***15 minutes*** (cleaning and exchange of contents)
- Rest time for the necessary manual activities is 0.5 min. for the handling batch
- The carton (manipulative dose) contains **100 yoghurts**
- Production is ***two-shift*** (after 8 hours), it does not work on Saturdays or Sundays
- Line maintenance is preventive and regular (always 15 minutes before the start of the first change - outside working hours) and **2 hours** (within working hours) always once a month

Determine the production capacity of the line for the month of November (4 weekends and 1 holiday)

The solution

1. The UTF for November (hours) shall be computed first

2. Calculation of the standard of time (labor) per one manipulative dose (100 pcs) and the standard of quantity per hour

3. Calculation of Tcap - Total capacity

Example B – Beer filling line

Calculation of beer filling line capacity

- The technical parameters of the line enable the filling of 900 half-liter beers per hour
- Production technology always requires one production batch (filling volume 1500 L) to interrupt the operation for 20 minutes (cleaning and exchange of contents)
- Rest time for the necessary manual activities is 0.6 min. for the handling batch
- The carton (handling batch) contains 48 beers
- Production is two-shift, it does not work on Saturdays or Sundays
- Line maintenance is preventive and regular (always 15 minutes before the start of the first change – i.e. outside working hours) and 1.5 hours (within working hours) always once a month

Determine the production capacity of the line for the month of April (4 weekends and 2 holidays)

The solution

1. UTF for April will be set first

2. Calculation of the LS - standard of time (labor) per one manipulative dose(48 pcs) and the standard of quantity per hour

3. Calculation of Tcap total capacity

Example C- Total annual capacity I.

The company produces 4,000 parts per hour. This year there are 114 days of weekends and holidays. Other time losses (holidays, illnesses, etc.) account for 35 days. The company is working on 2 shifts (each for 8 hours).

a) Calculate the total annual production capacity.

b) Calculate the capacity utilization in the company (in%), if the company actually produced 12,985,000 pieces.

Example D- Total annual capacity II.

The company produces 3,500 parts per hour. There are 113 days of weekends and holidays. Other time losses (holidays, illnesses, etc.) take 40 days. The company is working on 2 shifts (each for 8 hours).

a) Calculate the total annual production capacity.

b) Calculate the capacity utilization in the company (in%), if the company actually produced 10,782,000 pieces.

Questions?.?