Production Capability

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- Production Capability refers to the technical and physical limitations of a plant.

- Several dimensions of this capability can be identified:
  - Technological Processing Capability, i.e. the available set of production processes
  - Physical Product Limitations, i.e. the limitations in terms of the size and the weight of the product that can be accommodated
  - Production Capacity (Productive Capacity or Plant Capacity), i.e. the production quantity that can be produced within a given time period (e.g., year)

Production Capacity

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- Production (or Productive or Plant) Capacity is defined as the maximum production that a plant can achieve in a given time period (e.g., a year) under assumed operating conditions (e.g., shifts per month, direct labor manning levels in the plant, hours per shift).

- Production Capacity is usually measured in terms of output units (e.g. tons of steel produced by a steel mill or number of cars produced by a final assembly plant). In these cases, the outputs are homogenous.

  In cases in which the outputs units are not homogenous, other factors may be more appropriate measures (e.g., available labor hours of productive capacity in a machine shop that produces a variety of parts)

Production Capacity

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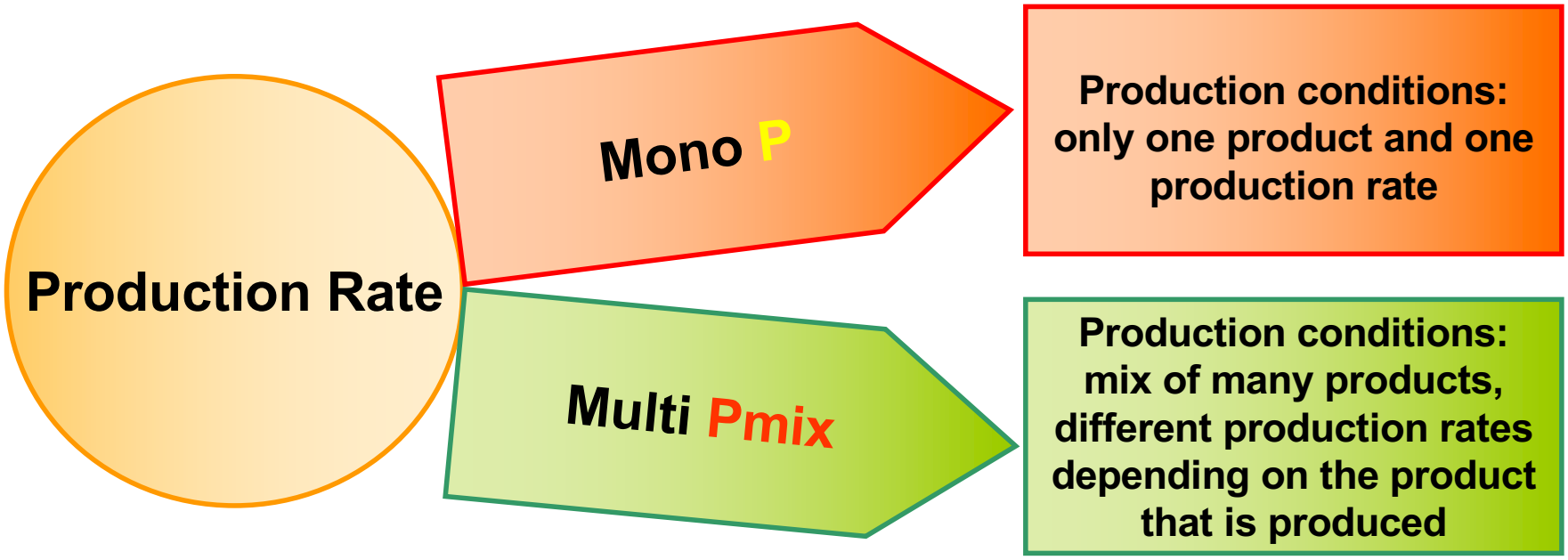
- Production capacity is always calculated with reference to a given production mix

- Even if Production Capacity is a flow (units/year), often is referred as a (production) volume (units), implying the time unit (year)

Production (Throughput or Run) Rate (Production potentiality)



- In multi product situations it is useful to use the Mix Production Rate (Pmix), i.e. the ratio between the quantities of the different codes that have been produced and the time that is needed to produce them including the setup time
- With reference to a specific mix of products, it is defined as the average number of units that can be produced per time unit.
- Pmix = quantity produced / time required

Mix Production (Throughput) Rate (mix potentiality)

$$Pmix = \frac{\sum_i (QB + QS)}{\sum_i (TPb_i + TPs_i) + TS}$$

QB = number of good pieces (units)

QS = number of scrap pieces (units)

TPb = time devoted to produce QB

TPs = time devoted to produce QS

TS = time for setup

With reference to a specific production mix

Mix Production Rate (mix equivalent unit)

$$Pmix_{std} = \frac{\sum_i (QB + QS)}{\sum_i \frac{(QB + QS)}{RS_i} + \overline{TS}}$$

$$Pmix_{std} = \frac{\sum_i RS_i \times (TPb_i + TPs_i)}{\sum_i (TPb_i + TPs_I) + \overline{TS}}$$

QB = number of good pieces (units)

QS = number of scrap pieces (units)

TPb = time devoted to produce QB

TPs = time devoted to produce QS

TS = time for setup

RS_i = standard production rate of the generic item i (e.g., pcs/h)

Mix Production Rate
(reference item equivalent unit)

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$$Pmix = \frac{\sum_i [(RS_k / RS_i)(QB_i + QS_i)]}{\sum_i (TPb_i + TPs_i) + \overline{TS}}$$

QB = number of good pieces (units)

QS = number of scrap pieces (units)

TPb = time devoted to produce QB

TPs = time devoted to produce QS

TS = time for setup

RS_i = standard production rate of the generic item I (e.g., pcs/h)

k = reference item (equivalent units base)

Mix Production Rate
exercise 1

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QB1 = 200.000 pcs	QB2 = 240.000 pcs
QS1 = 4.800 pcs	QS2 = 1.200 pcs
RS1 = 800 pcs/h	RS2 = 600 pcs/h
TPb1 = 250 h	TPb2 = 400 h
TPs1 = 6 h	TPs2 = 2 h
TS (std) = 20 h	

Calculate Pmix in mix equivalent units and product 1 equivalent (eq. P1) units