LEAN TRAINING

1. TAKT.

2. FLOW.

LEAN TRAINING

1. Takt.

DEFINITION: German word which means “drumbeat”. It is the necessary temporal rhythm to deliver according to the customer demand.

$$\text{TAKT TIME} = \frac{\text{Availabe Time (in a period of time)}}{\text{Customer average demand (in the same period)}}$$

EXAMPLE 1	LABOUR TIME	8	HOURS/DAY
	CUSTOMER DEMAND	16	UNITS/DAY
	TAKT TIME	**0,5**	**HOURS/UNIT**

EXAMPLE 2	LABOUR TIME	220	DAYS/YEAR
	CUSTOMER DEMAND	400	UNITS/YEAR
	TAKT TIME	**0,55**	**DAYS/UNIT**

LEAN TRAINING

1. Takt – Times definitions.

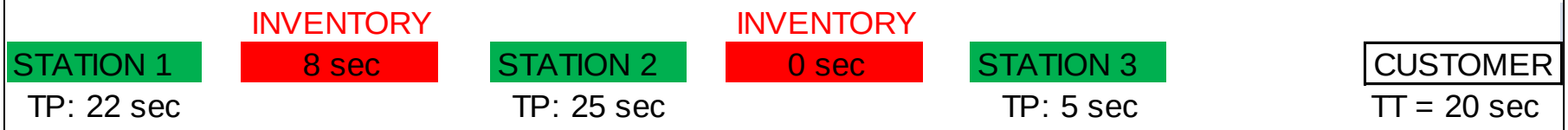
Takt Time (TT): time between each customer unit demand.

Cycle Time (CT): time needed for the line to deliver a new unit.

Lead Time (LT): total time between a new element enters in the line and the moment it is delivered to the customer at the end of the line.

Process Time (TP): time in which the element is being processed (not waiting).

LINE PRODCUTION EXAMPLE



LT= 22 + 8 + 25 + 0 + 5 = 60 sec
CT= 25 sec
TP= 52 sec

POSIBLE SCENARIOS		
CONDITION	**DELIVERY**	**OVERPRODUCTION**
TT = CT	**OK**	**NO**
TT > CT	**OK**	**YES**
TT < CT	**NO OK**	**NO**

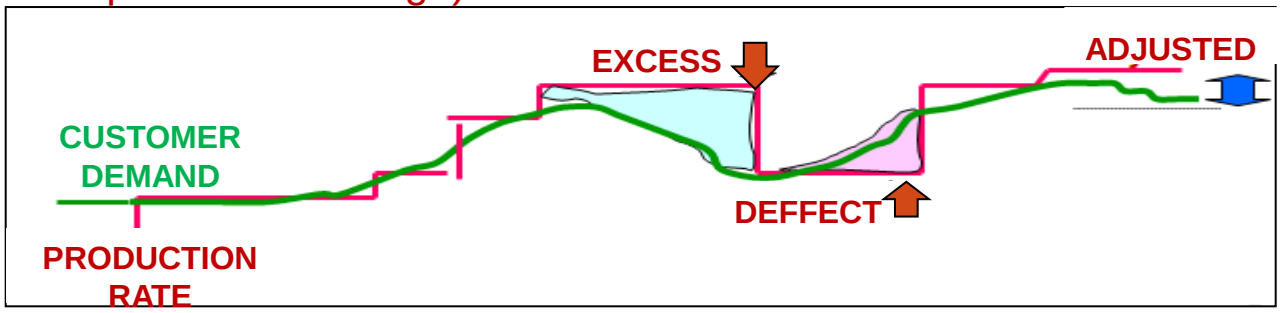
1. Takt – Times definitions

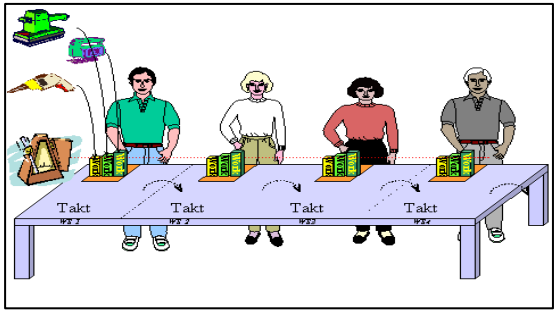
• Cycle Time must be always higher or equal than Takt Time. With this rule our line would able not only to deliver on time to our customers, but also would be able to cover our line inefficiencies.

• It is necessary to adjust periodically our production rate to deliver what it is commited with our customers but without overproduce.

• The capability to adjust the production rate is a COMPETITIVE ADVANTAGE, becasuse allows the organization to reduce waste. The quicker is the production rate change capability, the bigger is the competitive advantage.

• Furthermore, if all the production stations of the line are able to produce according to the Takt Time, intermediate inventories would be avoided and the total Lead Time reduced (another competitive advantage).

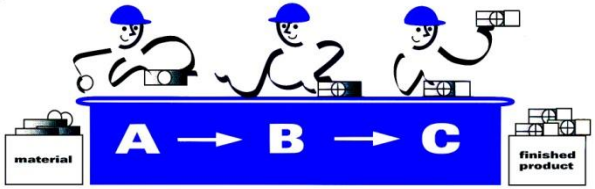




2. Flow.

Flow concept express the capacity of a process to deliver elements or activities in the lowest possible Lead Time.

ADVANTAGES OF A LOW LEAD TIME:



CONTINUOUS FLOW

- Work in process reduction (monetary founds invested).
- Reaction capability to the customer type product change request.
- Risk of product damage reduction due to the decrease of the time in the process.
- Space required reduction.

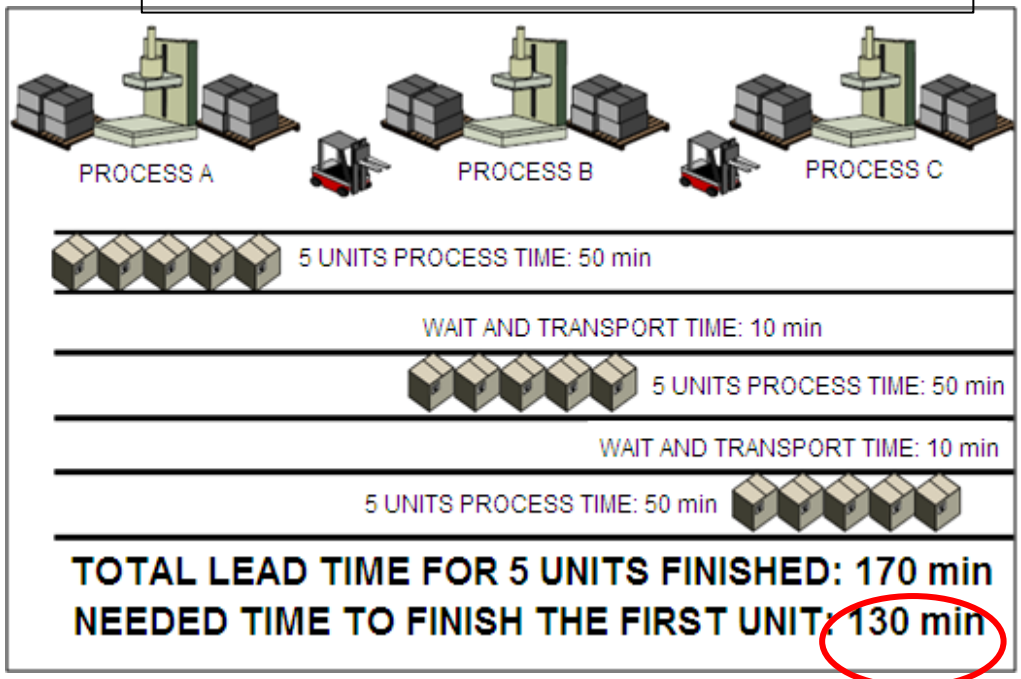
LINE PRODCUTION EXAMPLE

STATION 1	INVENTORY	STATION 2	INVENTORY	STATION 3	CUSTOMER
TP: 22 sec	8 sec	TP: 25 sec	0 sec	TP: 5 sec	TT = 20 sec

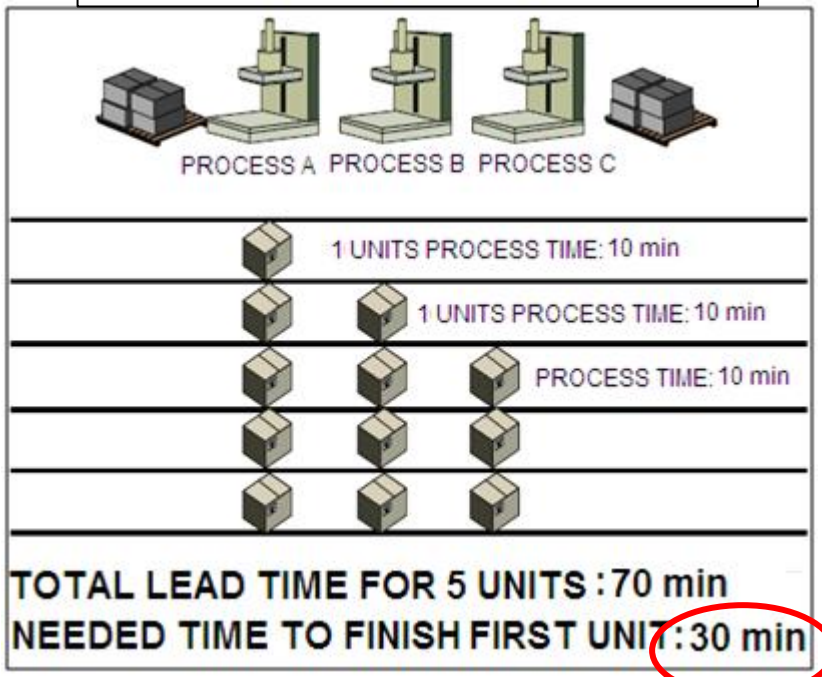
LT= 22 + 8 + 25 + 0 + 5 = 60 sec
CT= 25 sec
TP= 52 sec

2. Flow – Batch vs Continuous Flow

BATCH PRODUCTION



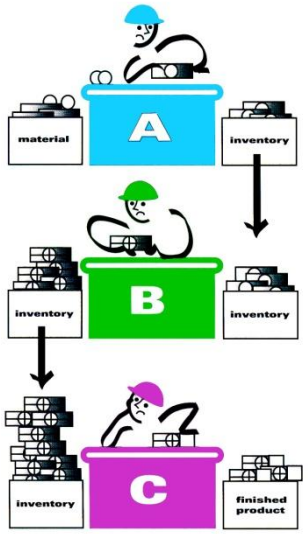
CONTINUOUS FLOW



COMPARE
LEAD TIMES!!!

2. Flow – Batch vs Continuous Flow

If continuous flow benefits are so evident… why batch production is still used?



BATCH PRODUCTION ADVANTAGES:

- Distribut machine or tool set up time between the number of elements of the batch. The bigger the batch it is, the lower is the needed set up time for each batch unit. Consequently there is a reduction in the cost per unit.

To have at the same time Continuous Flows and Batch benefits, it is necessary to define our line looking for:

The set up time needed to change the configuration from a product to an other must be: **AS SHORT AS POSSIBLE.**

To do that there are different ways and tools, as Flexible Production Cells or Quick Change techniques (SMED).