

The 7 Wastes

MUDA is the Japanese word for WASTE.



An 8th waste is the wasted potential of people



Overproduction To produce sooner, faster or in greater quantities than customer demand.

Over Processing



Processing beyond the standard required by the customer.

Inventory



Raw material, work in progress or finished goods which is not having value added to it.

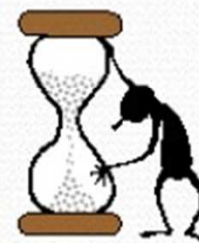
Rework

Non right first time. Repetition or correction of a process.



Waiting

People or parts that wait for a work cycle to be complete



Transportation

Unnecessary movement of people or parts between processes.



Motion

Unnecessary movement of people, parts or machines within a process



Overproduction

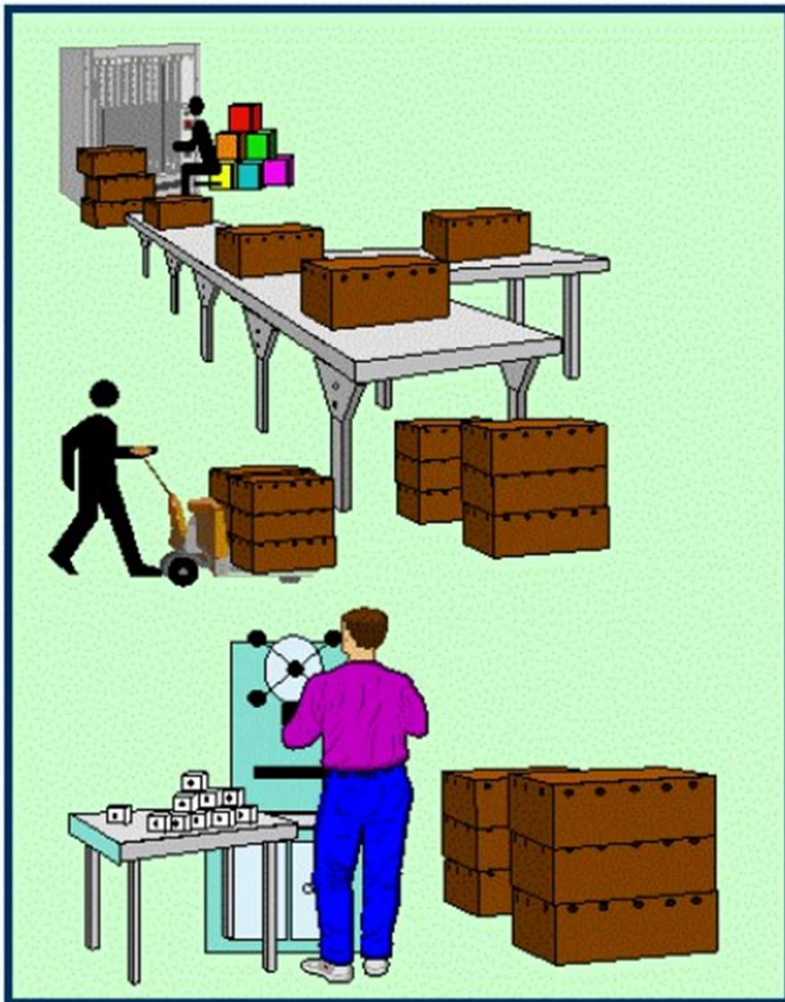
Avoid overproduction by
balancing supply to demand



- Overproduction is the worst kind of waste because it causes other wastes and obscures the need for improvement
- Overproduction waste results from producing more (or faster) than required
- Overproduction is caused by
 - Large batch sizes
 - Unreliable processes
 - Unstable schedules
 - Unbalanced cells or departments
 - Working to forecast / inaccurate information not actual demand

Inventory

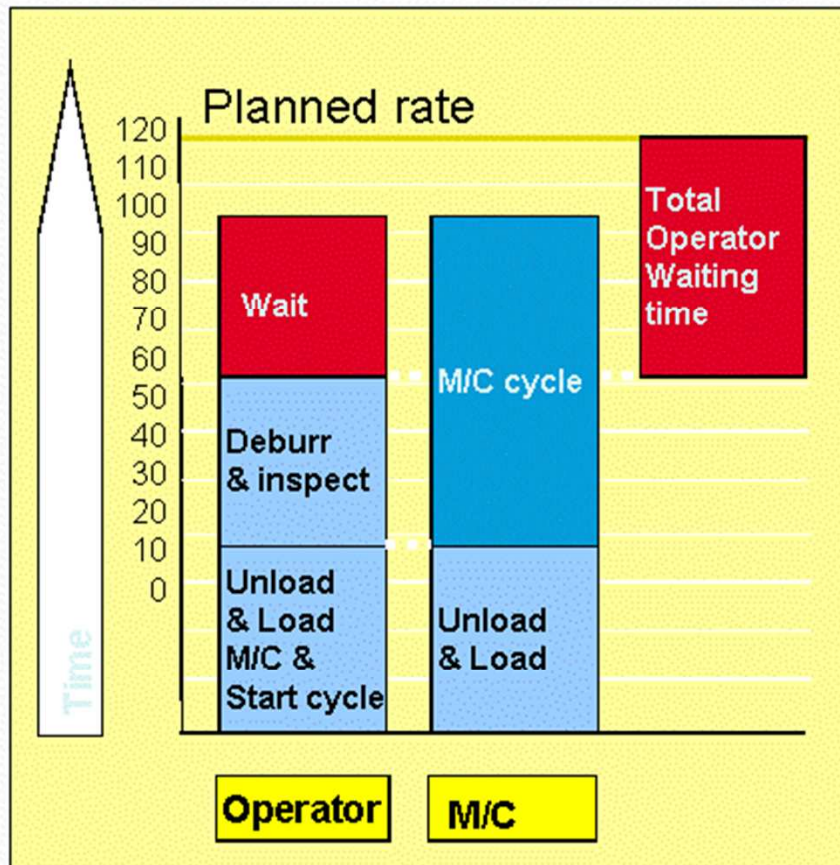
Stock wastes space and effort



- Inventory waste is stock and work in process in excess of the requirements necessary to produce goods or services 'just in time'
- Unnecessary inventory that accumulates before or after a process is an indication that continuous flow is not being achieved
- Excess inventory be caused by
- Lack of balance in work flow, forcing inventory build-up between processes
- Large batch sizes
- Failure to observe first in first out - stagnant materials
- Incapable processes
- Long changeover time
- Not adhering to procedures

Waiting

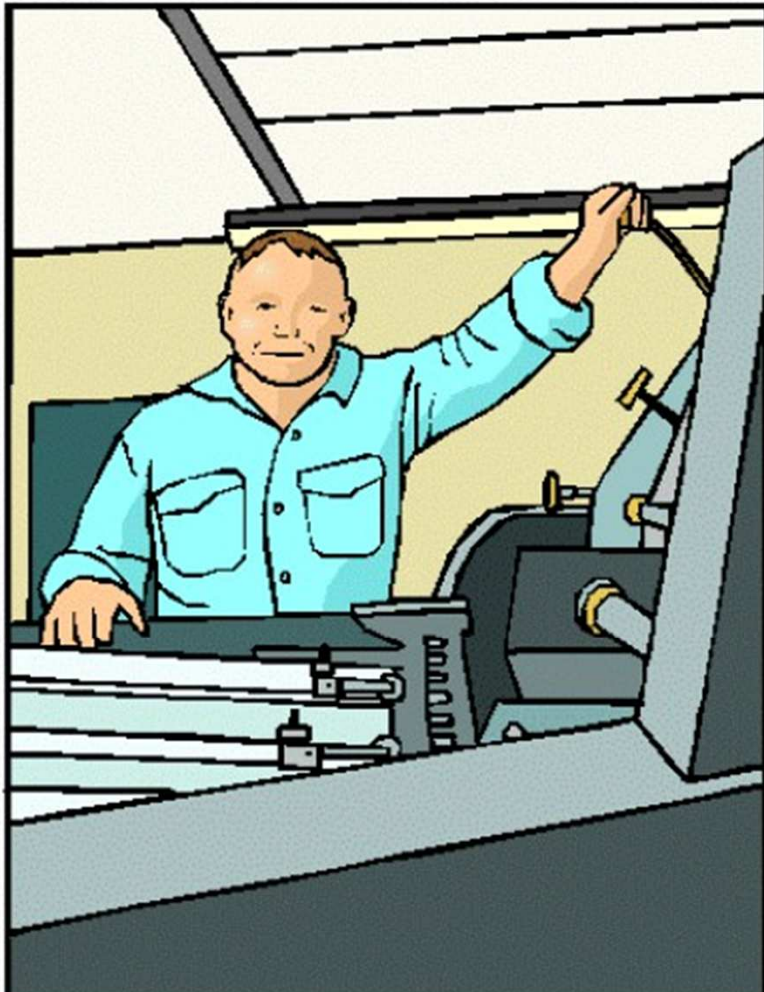
Waiting time results from failure to synchronise activities



- Waste of waiting is any idle time produced when two interdependent processes are not completely synchronised
- Operators are kept waiting, or simply work slowly whilst the machining cycles
- Waiting results from:
 - Poor man / machine coordination
 - Long changeovers
 - Unreliable processes / quality
 - Batch completion, not single piece transfer between operations
 - Time required to perform rework

Motion

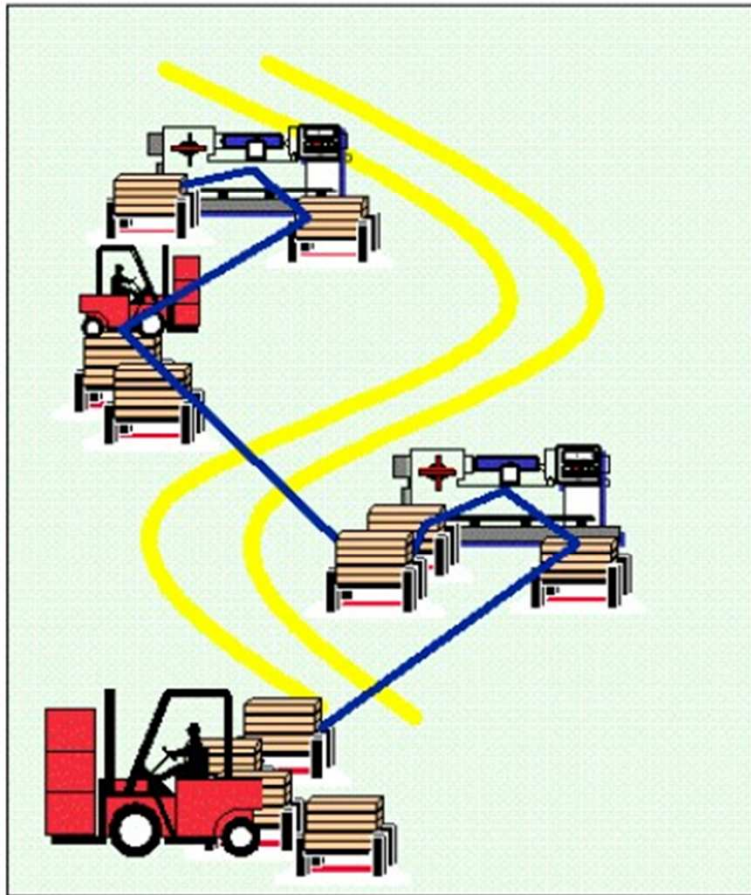
Work smarter not harder



- Waste of motion is any motion of man and / or Equipment that does not add value to the product or service
- Wasteful motion is caused by
 - Poor workstation layout - excessive walking, bending reaching
 - Poor method design - transferring parts from one hand to another
 - Poor workplace organisation
 - Large batch sizes
 - Reorientation of materials

Transportation

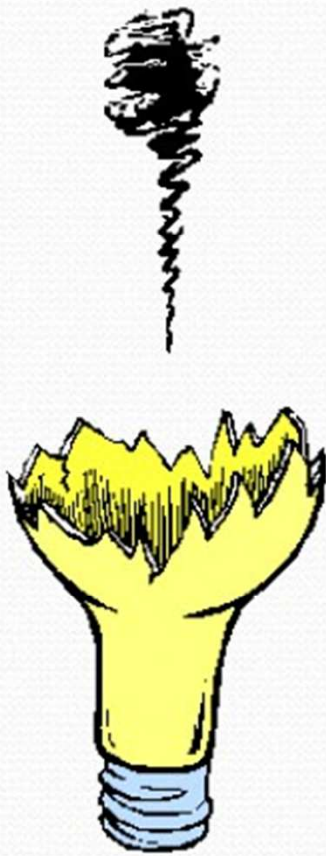
Poor layout exacerbates transportation wastes



- Transport waste is material movement that is not directly associated with a value adding process
- Processes should be as close together as possible and material flow directly from process to process without any significant delays in between
- Excess transportation may be caused by :
 - Poor layouts
 - Large distance between operations
 - Lengthy, or complex material handling systems
 - Large batch sizes
 - Working to faster rate than customer demand (overproduction)
 - Multiple storage locations

Defects

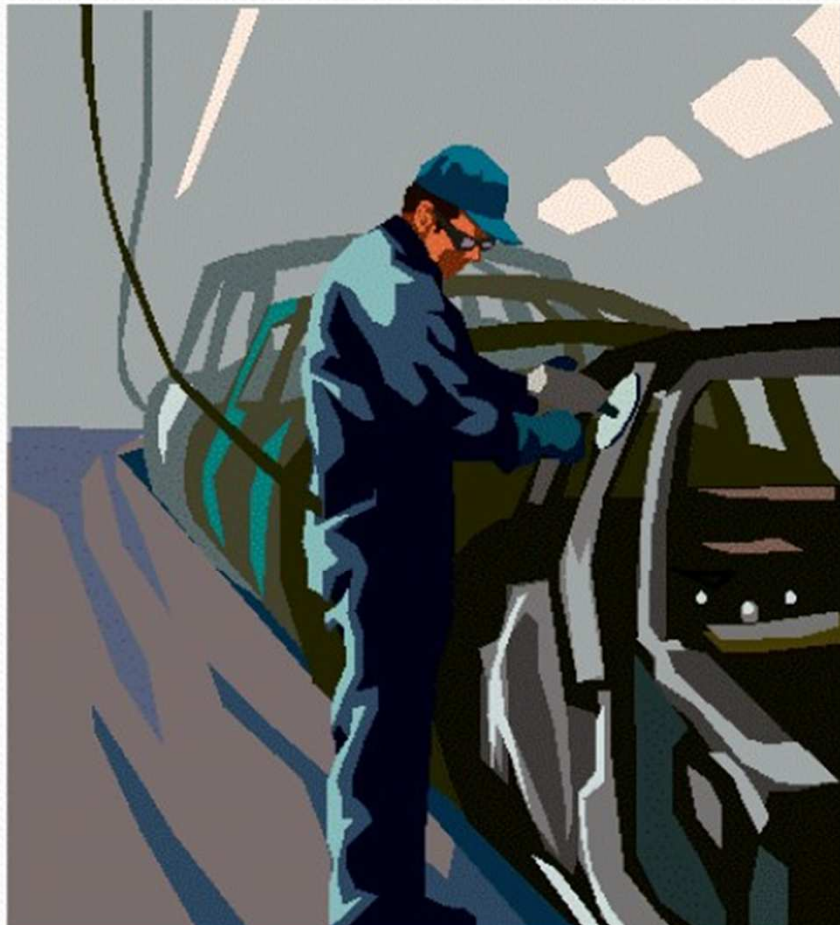
Right first time avoids scrap & rework



- Waste of correction includes additional work performed on a product or service
- Caused by or unclear operating procedure / specifications
- Defects are caused by
 - Inadequate training
 - Skills shortage
 - Incapable processes
 - Incapable suppliers
 - Operator error
 - Excessive stock
 - Transportation

Over-processing

Clear, standardised instructions avoid over-processing



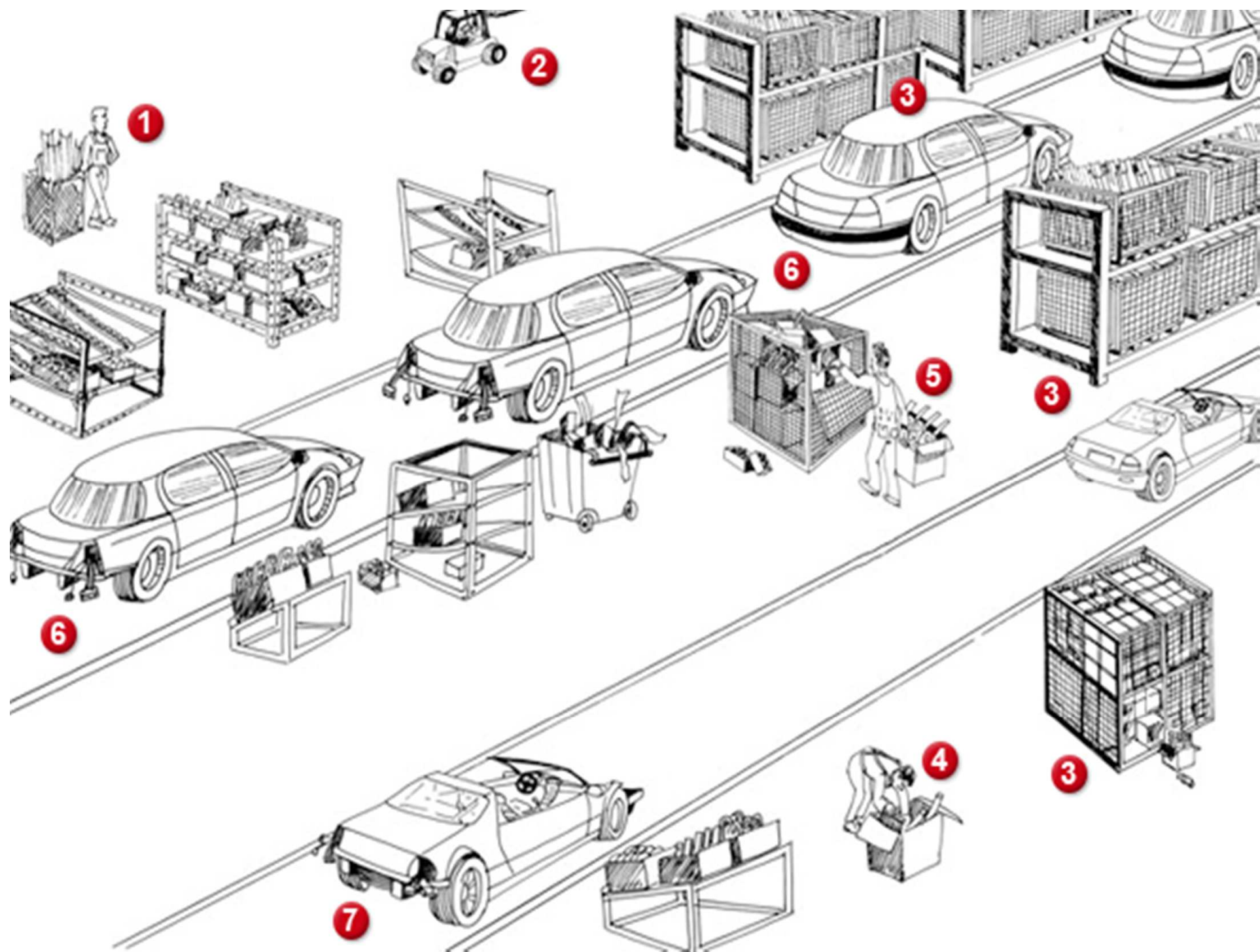
- Over processing is putting more into a product than is valued by the customer
 - painting of unseen areas
 - unnecessarily tight tolerances
 - cleaning and polishing beyond the level required
- The goal is to do only the level of processing to match that which is used and necessary
- Over-processing is caused by:
 - No standardisation of best techniques
 - Unclear specification / quality acceptance standards

Creativity

Use the waste walk to encourage continuous improvement

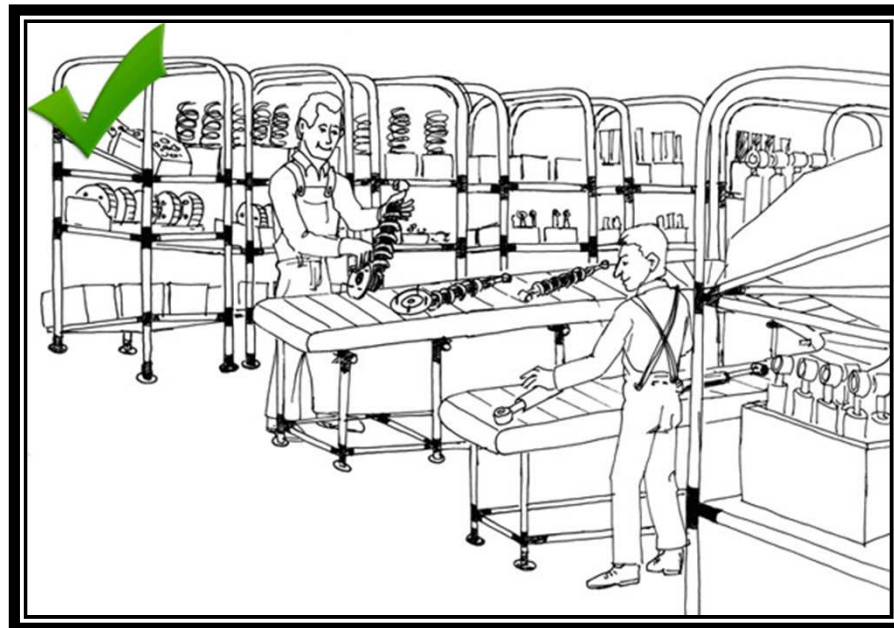
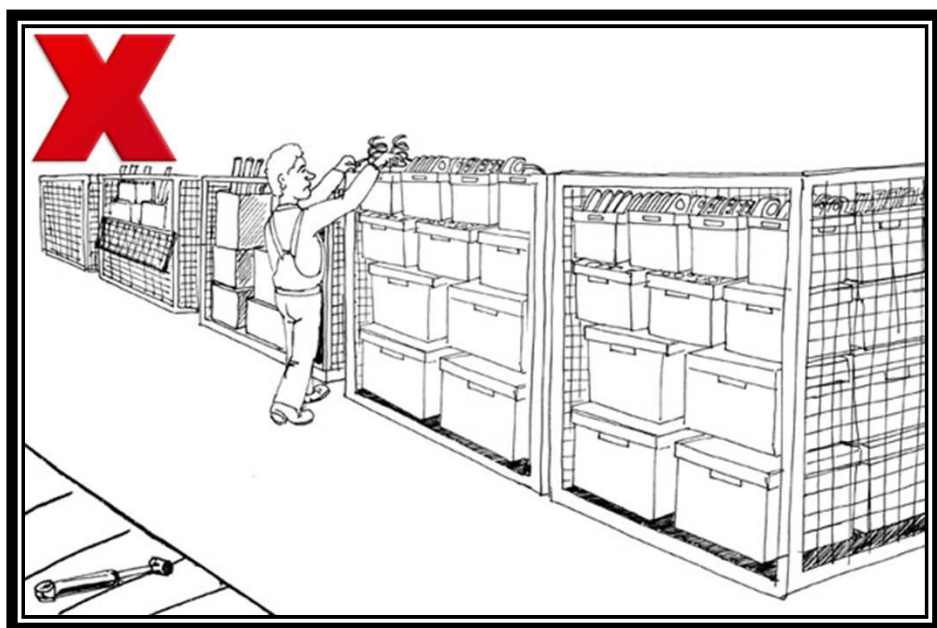
CONCERNS What wastes are present ?	CAUSES Why do they exist?	COUNTER MEASURES What can be done to eliminate or reduce	ACTION Who & When
1.OVERPRODUCTION Is producing to order or to stock?			
2.INVENTORY WIP Is there excessive stock in the area?			
3.TRANSPORTATION Are materials moved further than hand to hand?			
4.MOTION Any walking bending stretching turning ? Machine cutting air?			
5.WAITING Is there any waiting- for machine materials help?			
6.OVERPROCESSING Are all process steps essential?			

- Failure to involve the work force in the design and development of their workplace to incorporate practical solutions and build ownership leads sub-optimal performance
- Continuous development of skill levels beyond the immediate job requirements will support effective problem solving at the heart of the process
- Untapped Creativity is caused by: -
 - Inappropriate policies
 - Incomplete measures
 - No time made available in operators work schedule

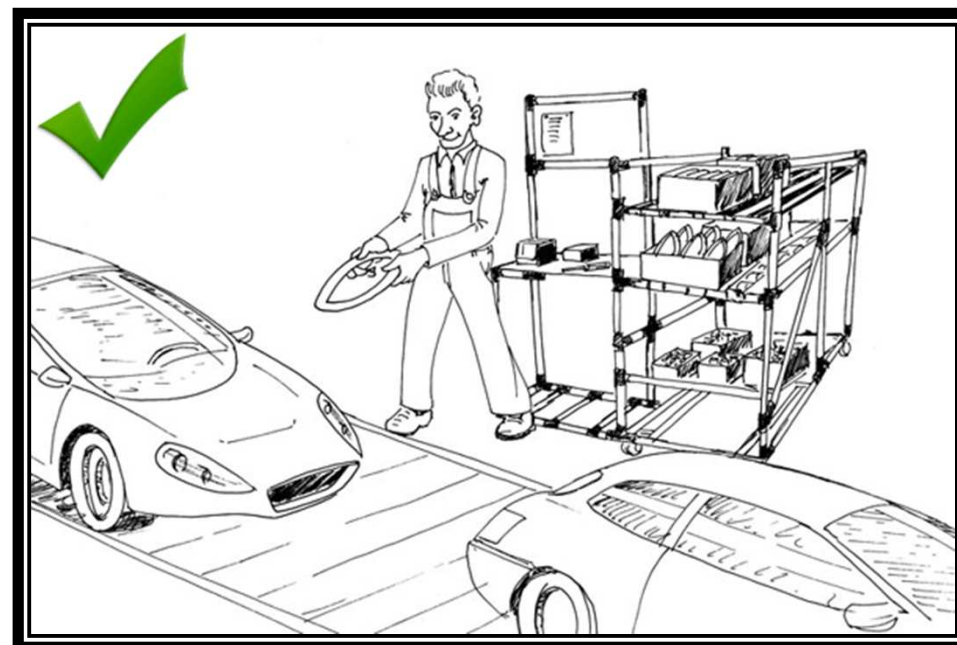
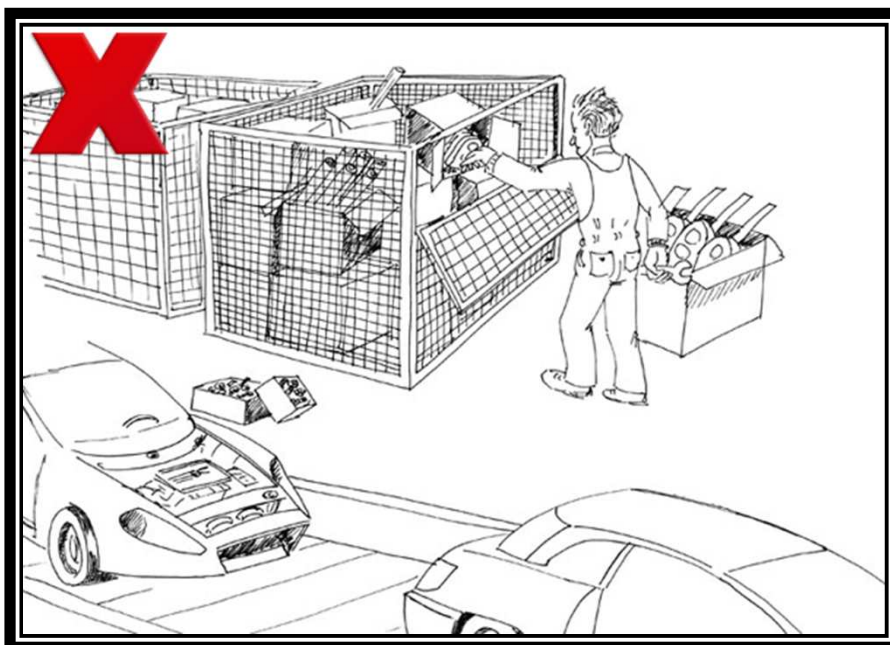


1. Muda of waiting: a waiting employee does not create added value.
2. Muda of transport: products transported from one place to another in the plant do not create any added value.
3. Muda of inventory: capital unnecessarily tied up, value destroyed.
4. Muda of processing: stress of the work.
5. Muda of motion: no value is created during motion.
6. Example of a single-product line: non-flexible heavy investment, inability to meet large variations in demand rapidly and productively. This kind of mass production system suffers from sudden fluctuations in market demand rather than absorbing them.
7. Example of a single-product line under-used through lack of demand: heavy investment under-used: poor return on investment.

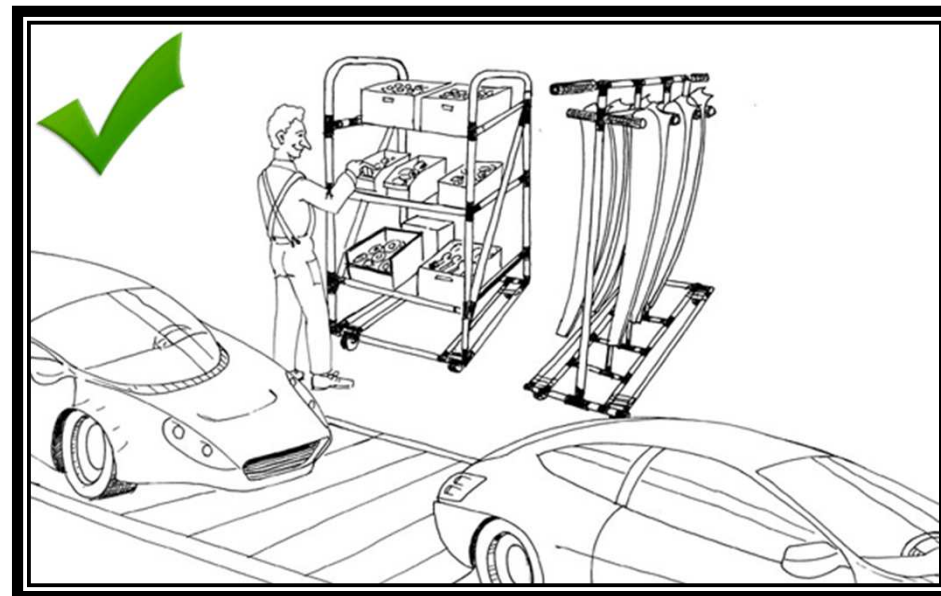
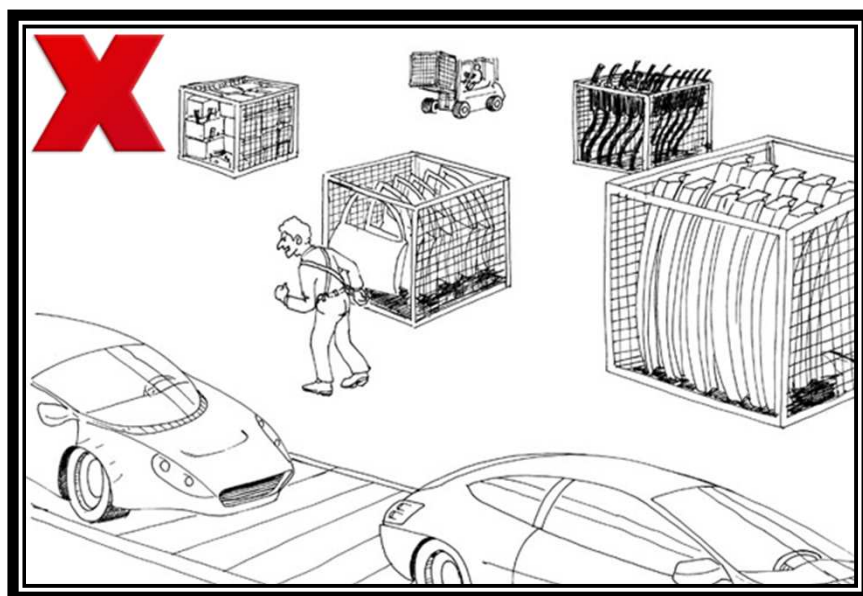
Muda caused by inappropriate processing: with Lean Manufacturing, using small front-picked containers reduces the length of the line, saving on general expenditure, reducing flow costs and saving time.



Muda caused by defects : Defects cost the company money and time. Eliminating defects means not producing them in the first place! This means creating a suitably ergonomic environment in which components and tools are all in their correct place and within immediate reach of production operations. This reduces the likelihood of impact, dropped equipment and bad workmanship. Working with **LeanTek** to design customized structures enables the volume of defects to be limited and opens the way to a natural and evolving management of any residual rejects.



Muda caused by unnecessary movement : Unnecessary movement and movement at the workstation create no added value. Quite the opposite in fact: it makes the work harder and takes up space. **LeanTek's** modular architecture allows workstations to be configured so that components are as close as possible to the operator's hand. **LeanTek** contributes to reducing the negative value generated by unnecessary movement. Operator productivity improves and there are fewer constraints on work as operators focus on productive tasks.



Muda caused by unnecessary stock :

Stocks of finished products, semi-finished products and raw materials create no added value. Quite the opposite in fact: excessive stocks increase costs as a result of the investment required to handle them.

The Muda that results from unnecessary stock is linked to that caused by overproduction. Using a **LeanTek** system in association with smaller, more frequent deliveries allows companies to reduce stocks. This is achieved by installing dynamic

supermarket-style storage as close as possible to the line: the stock handler can then

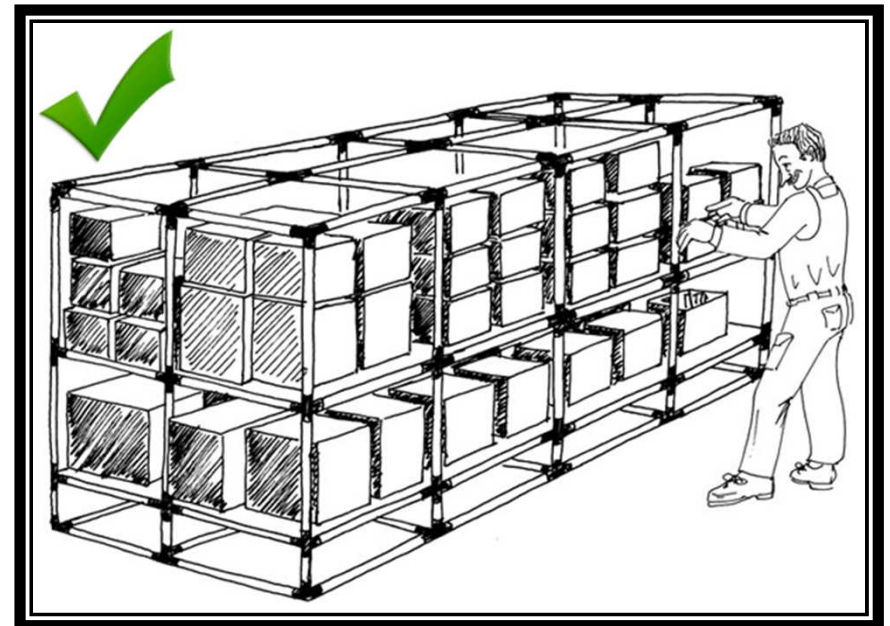
take products directly from the flow racks to supply the production line.

LeanTek allows stock to be sized to the strict minimum required and allows it to evolve simply and quickly.

The **LeanTek** contribution to eliminating this Muda is the creation of modular supermarkets, which evolve as stock reduces and containers develop.

LeanTek flexibility also delivers optimized work surfaces and ergonomic working

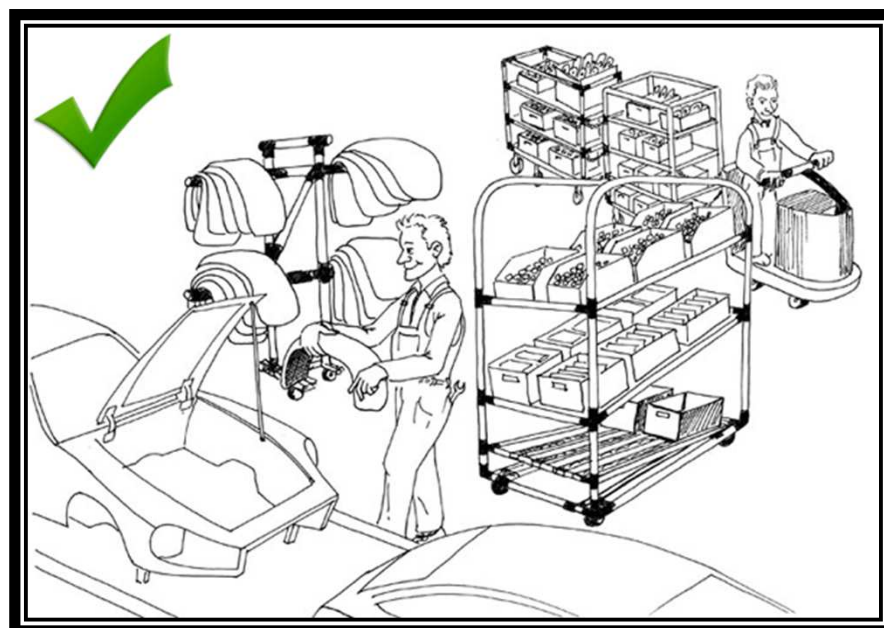
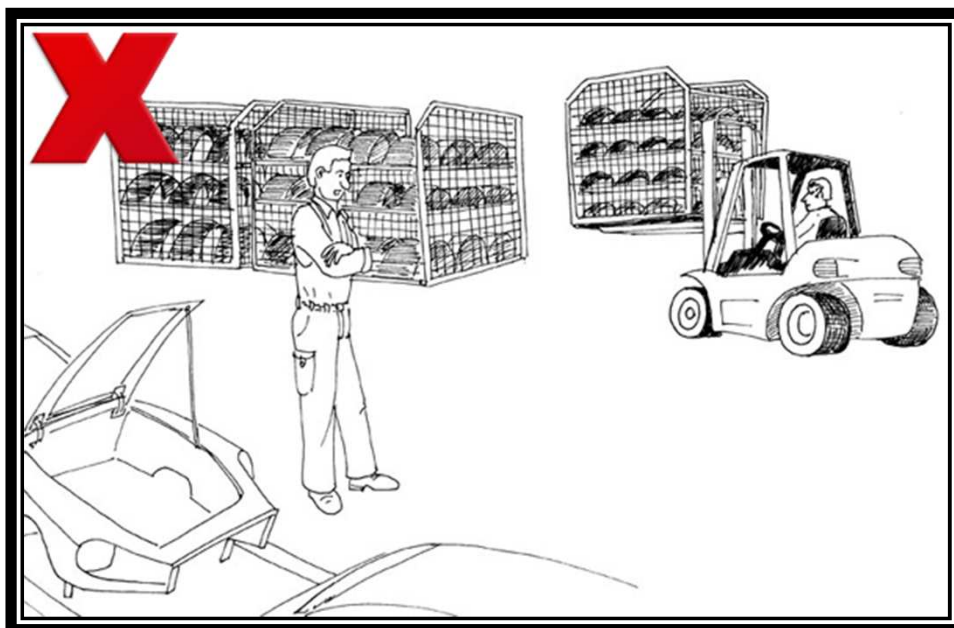
Muda caused by unnecessary stock



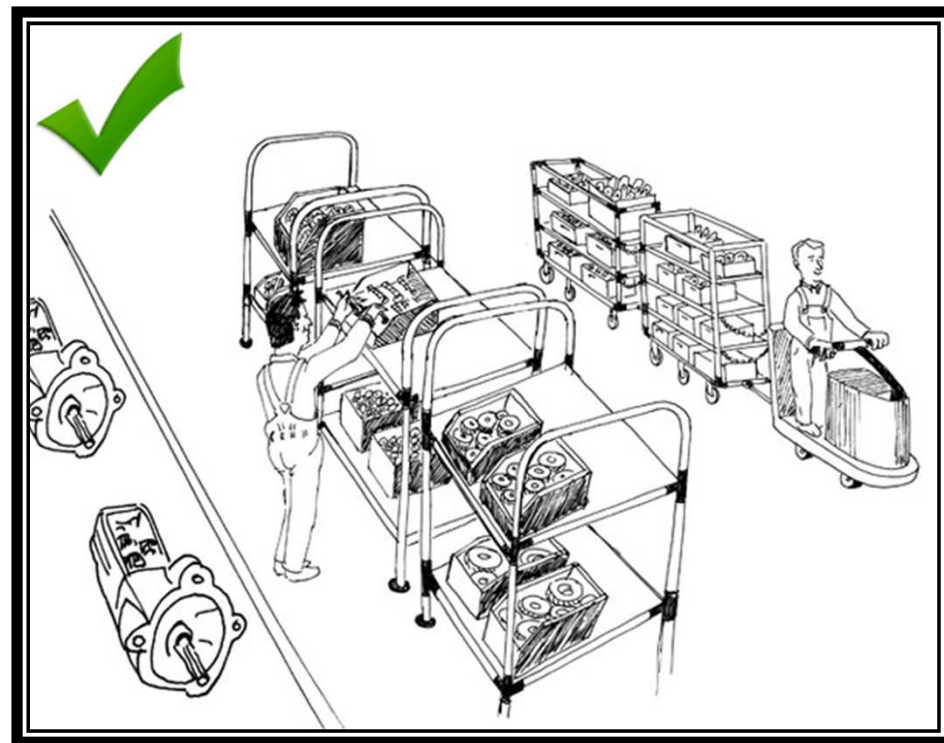
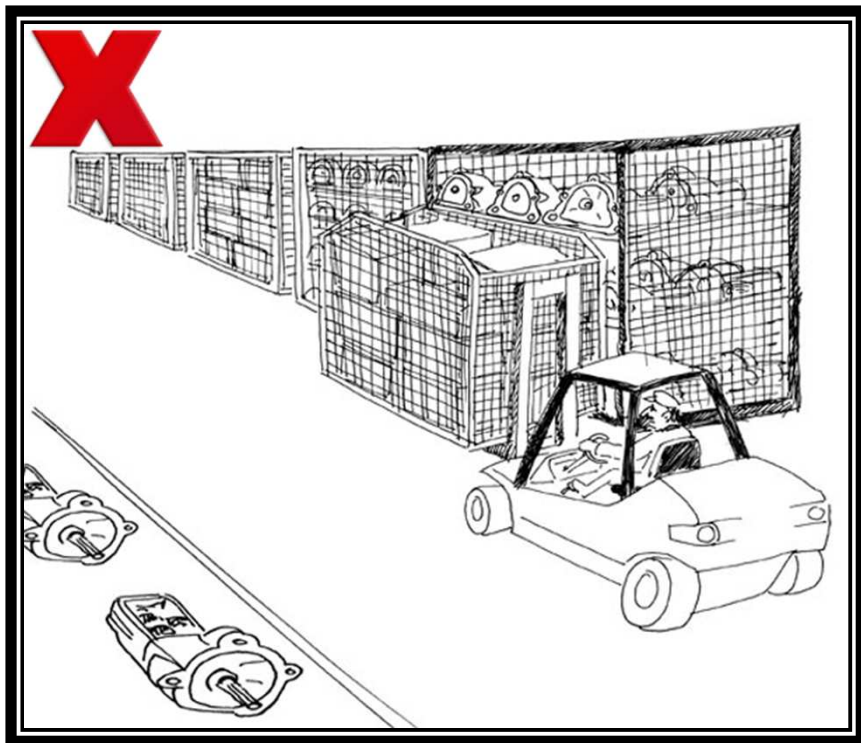
Muda caused by waiting :

This Muda is generated when the operator no longer has the components required to carry out his/her task: their hands are idle. The installation of a line-side system like **LeanTek** in conjunction with small containers removes the risk of a break in supplies.

This works through the installation of a new logistics system based on continuous flow and regular supplies. Operators can then concentrate on added value operations, whilst logistics supplies components in small trains.



Muda caused by transport : Moving products from one place to another creates no value. Quite the opposite in fact: transport eats up space and capital. The **Lean Manufacturing** method requires that logistic circuits are as short as possible in the plant, between the loading bay and the supermarket and between the supermarket and the line-side. This works through implementing a new logistics system based on flexible trains capable of distributing all the components required for production to several teams in a single journey. The flexibility delivered by **LeanTek** means that wagons can be designed specifically for each component. The implementation of this type of system cuts transport-generated Muda by a factor of 3



Muda caused by overproduction :

The introduction of a Kanban system combats waste from overproduction. **LeanTek**'s contribution is the creation of customizable JIT supermarkets as close to the line as possible.

