Henry Ford and the mass production

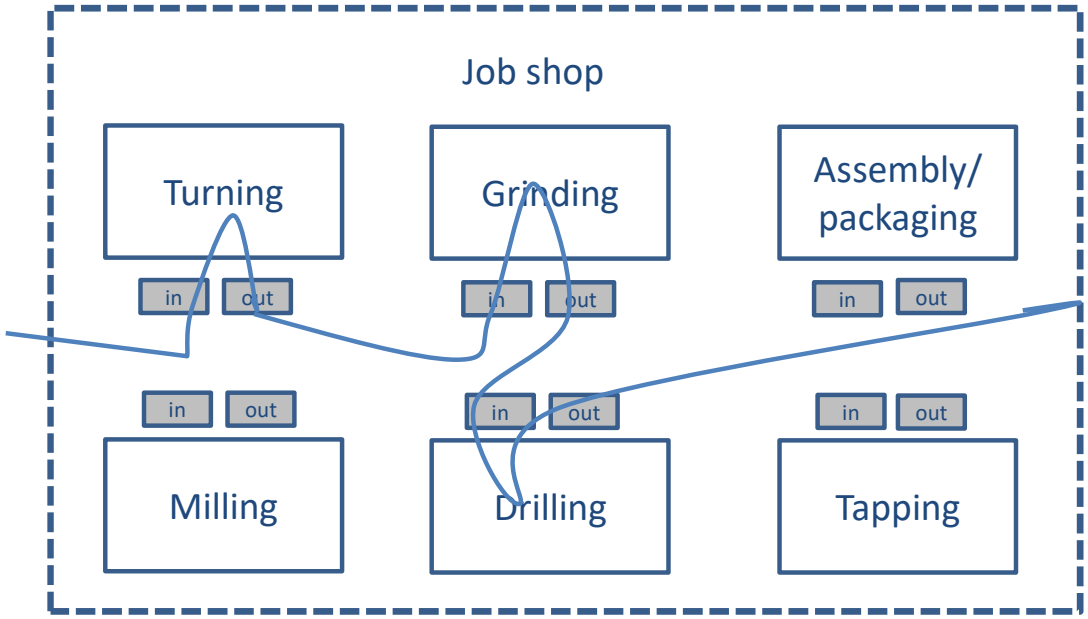
Fordism and mass production

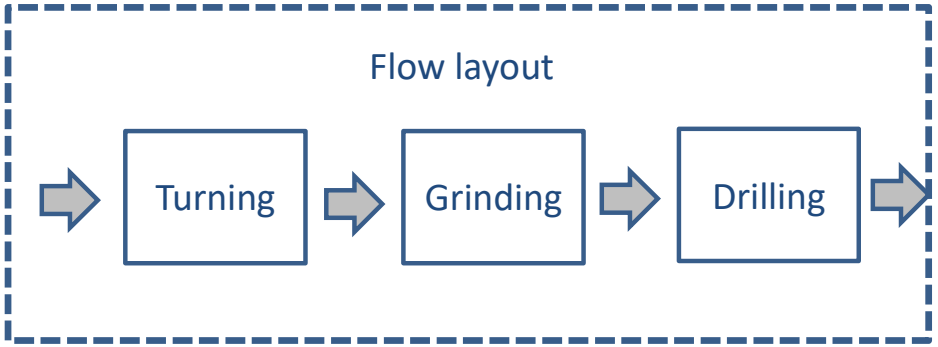
- **Fordism** is a manufacturing technology that was the basis of modern economic and social systems in industrialized, standardized mass production even if often shadowed by a negative meaning.
- The concept is named after Henry Ford emerged as the most successful car producer in North America starting from 1913 and reaching his maximum development in all the world until 1960.
- **Fordism is designed to produce standardized, low-cost goods and afford its workers decent enough wages to buy them.**
- The Taylor's principle of mutual benefit for employer and employees is stretched in the first half of the XX century, transforming the workers in consumers and boosting in that way the volumes increase, through the introduction of a virtual loop of growing business.
- In other words, is a model of **economic expansion and technological progress** based on **mass production**: the manufacture of standardized products in huge volumes using special purpose machinery and unskilled labor.

Mass production technology

The approach of mass production to the production process as said was based for complex activities on special purpose machines, of which the most popular were the **transfer lines**, and for assembly on **synchronous lines** using unskilled workers.

In general, transform the traditional structure of **job shop** is transformed into a **flow layout**.



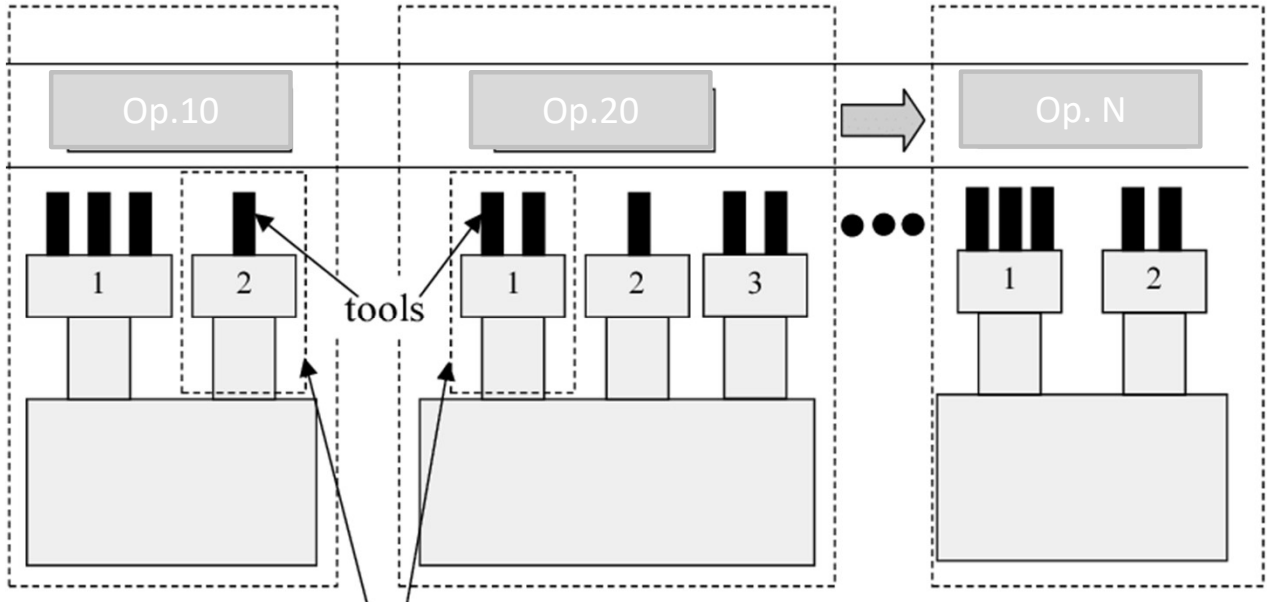


Machining transfer line

The transfer line is the most used special purpose machine created for the mass production in machining, characterized by high speed and high efficiency

In each operation, an often multi spindle head, rigidly designed to do a unique task, executes the work through a fast advance, slow during cutting, back fast movements controlled by sensors. No CNC. The spindle is driven by a gear box.

Anyway, other special purpose machines, driven by mechanical devices (cams), have been introduced in other processes as well



multi-spindle head

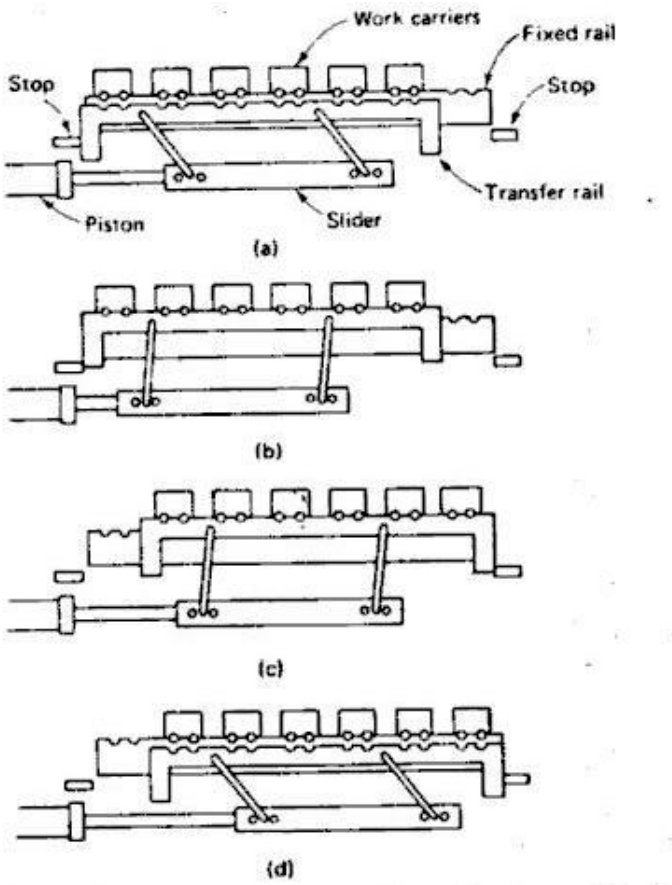
The transfer device

The transfer line is based on sequential operations where the handling consists of a so called " walking beam", a lift and translate rail that moves the part from a station to the next one.

The phase (b) is a lift-up that frees the parts from the fixtures. The phase (c) is the translation to take the parts to the next station. During the phase (d) the parts are moved down to engaging the reference pins of the next work position.

Before starting the cutting operation all the parts are blocked rigidly.

The cycle time is common for all the operations and is defined by the time between two successive bar transfers



(Synchronous) Assembly line

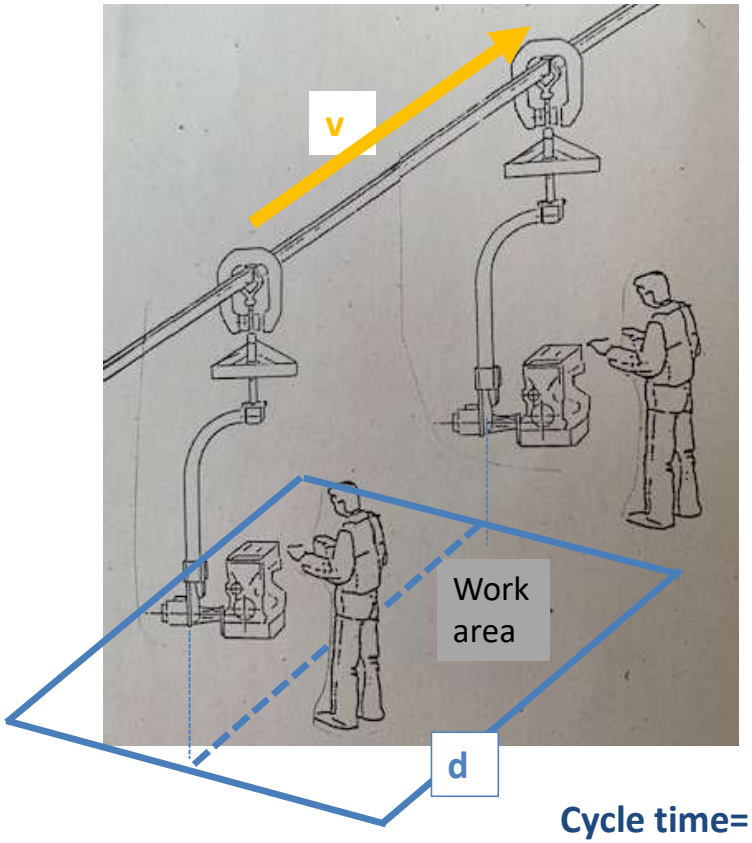
A serial synchronous line is an assembly line so called since all the workers must do their task at the same time one after the other

Each men is assigned to a certain position where he does his task moving along the line with the product and coming to the initial point at the end.

The materials to be assembled are arranged around work area, normally behind the operator.

There are different handling system using a transfer system overhead as is shown in the picture or an underground one.

The cycle time is common for all the operations and is defined by the distance between two products divided by the line speed (that is adjustable)



Cycle time= d/v

Evaluation of the mass production technology

- The transfer line as the synchronous assembly line offered a lot of advantages and were the **successful base of all mass production systems**, primarily for automotive , without any alternative until 1960.
- The transfer line offered a **high productivity** due to the short cycle time and together a **high reliability** because of the use of components simple and repetitive that allowed a great standardization.
- A disadvantage was the **huge investment** required to design and build “ad hoc” all the multi spindle heads that needed to be fully rebuilt in case of a new product and cannot manage easily different shapes.
- The **assembly line, diversely, were cheap** but to work inside a rigid timeframe was stressing and any diversification implied higher costs and inefficiencies and sometime forced loss of production.
- In both cases, transfer line or synchronous lines, to manage the diversity was incredibly difficult that took Henry Ford to say the “**customer can have a car painted any color that he wants so long as it is black”**