we're drivin' drivin' drivin' on the motorway
drivin' drivin' drivin' on the motorway

we're drivin' drivin' drivin' on the motorway
drivin' drivin' drivin' on the motorway

we're drivin' drivin' drivin' on the motorway
drivin' drivin' drivin' on the motorway

there is a wide valley ahead

the sun shines - a flickering ray

we're drivin' drivin' drivin' on the motorway
drivin' drivin' drivin' on the motorway

lane is a grey ribbon
white stripes, green verge
we're drivin'

songlyrics of "motorway" by Kraftwerk 1974

Taylorism

Fredrick Winslow Taylor started out measuring productivity based on exact time-motion studies in American steel workers who allegedly sabotaged productivity by intentionally slowing down their work tempo. Taylor's methods would eventually become a comprehensive system applied to the entire corporate hierarchy to increases productivity.
In addition to time, movement and workplace studies and analysis was the "logical" regimentation of every step of production. Knowledge concerning workplace productivity was compiled; work tools, machines and workspaces were optimized. Workers with the lowest necessary levels of qualification were hired; only select skilled workers received specialized training. Mandatory, standardized work procedures were delineated for each task, and scaled piecework rates were implemented to provide incentives for higher output (above-average work was nevertheless discouraged by capping the maximum wage earnable.) On the assembly line, managerial regulations could be replaced by the speed and pacing of the conveyer belt.

Walter Kaiser, Von Taylor und Ford zur 'lean production', (Aachen: RWTH Themen, 1994).

Fordism – "Detroit Automation"

In 1914, the first year after the introduction of the assembly line, production of the Ford Model T increased 152% to 308,162 cars. In the 1920s more than a million cars were produced per year. By the time he discontinued the Model T after 19 years in May of 1927, Ford had made 15,007,033 cars of its kind in his Highland Park Factory in Detroit.
With the mechanization of other sectors, mass production and assembly line production in the auto industry (influenced in part by Taylor), industrialization in the US reached both new quantities as well as new qualities. The economic implications raised by the output of so many cars necessitated a change in attitude toward social issues. The worker now had to be viewed as a potential consumer. The grotesquely depreciatory undertone of the "truck system" of early industrialization in Britain and continental Europe would be exchanged for concrete improvements in the worker's economic situation. For his part, Henry Ford increased wages 10-15% over "the norm". In 1914, he implemented a guaranteed wage of at least $5 per day, or $130 per month. In addition, he sank the price of the Model T from $1000-$1300 in 1909 to $290 in 1924. In 1926, the workweek was reduced from 6 days to 5 days at the same weekly salary; by 1929, minimum wage had been raised to $7 a day.

Walter Kaiser, Von Taylor und Ford zur 'lean production', (Aachen RWTH Themen, 1994).

What is Lean Production?

Lean is about doing more with less: less time, inventory, space people and money.

Lean Manufacturing (also known as the Toyota Production System) is, in its most basic form, the systematic elimination of waste - overproduction, waiting, transportation, inventory, motion, over-processing, defective units - and the implementation of the concepts of continuous flow and customer pull.
Just as mass production is recognized as the production system of the 20th century, lean production is viewed as the production system of the 21st century.

Benefits of Lean Production

Establishment and mastering of a lean production system would allow you to achieve the following benefits:
- Waste reduction by 80%
- Production cost reduction by 50%
- Manufacturing cycle times decreased by 50%
- Labor reduction by 50% while maintaining or increasing throughput
- Inventory reduction by 80% while increasing customer service levels
- Capacity in current facilities increase by 50%
- Higher quality
- Higher profits
- Higher system flexibility in reacting to changes in requirements improved
- More strategic focus
- Improved cash flow through increasing shipping and billing frequencies

However, by continually focusing on waste reduction, there are truly no end to the benefits that can be achieved.

Lean Production Overview
- Non-value added activities or waste are eliminated through continuous improvement efforts
- Focus on continuous improvement of processes - rather than results - of the entire value chain
- The lean manufacturing mindset: concept, way of thinking - not techniques; culture - not the latest management tool
- Continuous product flow is achieved through physical rearrangement and system structure & control mechanisms
- Single-piece flow / small lot production: achieved through equipment set up time reduction; attention to machine maintenance; and orderly, clean work place
- Pull reduction / Just-in-time inventory control

Applications

Lean techniques are applicable not only in manufacturing, but also in service-oriented industry and service environment. Every system contains waste, i.e. something that does not provide value to your customer. Whether you are producing a product, processing a material, or providing a service, there are elements which are considered 'waste'. The techniques for analyzing systems, identifying and reducing waste, and focusing on the customer are applicable in any system, and in any industry.

Lean thinking may also be applied for getting rid of bureaucracy in your home office. To run your home office more effectively and faster you may need just as little as 10% of its current staff. Only executives who have a direct involvement with finding, keeping, or growing customers as well as key support staff - accountants, tax, legal and human resources people - should stay. Others can be rehabilitated by sending to an operating unit.
source: Ten3 Business e-Coach

doing more with less

Flexible Production

Since the 1970s, theories of flexible production replaced the relevance of automated centralized processing or production cells (automated tool and component change) for small and midscale productions.

Flexible production is a synthesis between the Fordist assembly line, and the singular number-driven processing center. In the classical automation of the American car industry of 1920-1930, also called "Detroit automation," automated machines dedicated to the execution of a single task were linked by an automated central control. This set both the sequence of work steps along the assembly lines as well as the tasks of the individual machines, which remained the same, typically for 10-20 months.

Flexible production, as it was theoretically conceived around 1970, abandons the use of single-purpose or tightly synchronized machines. In a system of flexible production, components are retrieved from computer-controlled warehouses, transported to selected numerical control (NC) machines which process them accordingly, brought to sanitation facilities and then returned to the warehouse, or processed further. Series as small as one can be economically produced in this manner. At the core of this system is information processing: the geometric information of the design is first encoded by production software before it is converted by machines, tools and central control system (utilizing material and energy) into a material bearer of information, i.e., the work piece. Critical is the control of the production process, as well as the control of the entire flow of material, energy and information through the computer.

In industrial reality, the transition to this seemingly tangible project of flexible production is by no means quickly and comprehensively implemented. Despite the availability of computer-supported "flexible production systems" in the USA (1967), Japan (1970) and in the People's Republic of Germany (1971), only 50 such production systems had been implemented in Germany by the 1990s. Worldwide, there are about 1000 installations of the system, mostly in Japan.

Walter Kaiser, Von Taylor und Ford zur 'lean production', (Aachen: RWTH Themen, 1994).

Libidinal Production

Let us now take into consideration the possible relation between the perverse elaboration of the Phantasma on the one hand and the fabrication of consumer goods on the other. The processes differ from one another in that the Phantasma, a libidinal product, signals a threat of individual entity, while the fabricated object presupposes the stability of the individual. The Phantasma wants to survive at the expense of the individual entity; the fabricated object should serve this entity. Its fabrication and its use imply exteriority, a demarcation with regard to the context – which includes other entities. But the Phantasma, for its part, presupposes the use of something. Its elaboration intermingles with the use of some kind of pleasure or some kind of suffering. What the individual uses in Phantasma is the sign of a compulsion, to serve his entity. In this way, the elaboration of the Phantasma allows for a condition of continued compensation: the exchange. But in order to have an exchange, there must be an equivalent, which means: something that stands for something else: both in the sphere of the Phantasma, whose elaboration comes at the expense of the individual entity, as well as on the level of the individual, in the exteriorized sphere of the fabricated object.

- Pierre Klossowski, The Living Currency (La Monnaie vivante) (Paris: Losfeld, 1970).

„I will build a motor car for the great multitude. It will be large enough for the family but small enough for the individual to run and care for. It will be constructed of the best materials, by the best men to be hired, after the simplest designs that modern engineering can devise. But it will be so low in price that no man making a good salary will be unable to own one-and enjoy the blessing of hours of pleasure in God's great open spaces."
- Henry Ford 1907.

Lean Production

An excellent example of production management in the Japanese automobile industry is the production system introduced by Taiichi Ohno at Toyota Motor Corporation. Although Ohno's system is based on Fordist assembly line production, it distances itself from product standardization and the single-use processing machine.

Ohno adapted Taylor's principle of optimal use of time and labor of the worker, but abandoned the subdivision of work tasks into smaller and simpler steps. One fundamental aspect of Toyotaism is the decrease in personnel and minimization of the amount of material processed at any given time. Prerequisite for such lean personnel and material buffers is comprehensive practice of the "just-in- time" system, from the (often in-house!) suppliers and throughout the production process. The amount of material supplied and produced is calculated so that it may be completely and immediately processed at every step. Tied to the zero-buffer principle is the zero-defect principle. In the case of an error, the production process comes to a halt. In the case of personnel shortcomings or shortages, the other workers in the group must compensate for any resulting slow-down in production through overtime (not additional manpower). Since the whole group bears the responsibility for production lapses, there is strong motivation among the workers to troubleshoot their own group performance in order to maintain quality and efficiency. Any deficiencies in quality detected at the next processing stage would result in production standstill and return of the faulty components to the responsible work group.

Quality control and feedback takes place constantly throughout the production process; not – as in the Fordist oriented system practiced by the German automobile industry – at the end. The self-regulating mechanisms that maintain high claims to quality in principles of zero-buffer and zero-defect allow for rationalization in the implementation of labor. However, the phrase "lean production" does not necessarily testify to an especially social-political sensitivity.

Walter Kaiser, *Von Taylor und Ford zur 'lean production'*, (Aachen: RWTH Themen, 1994).