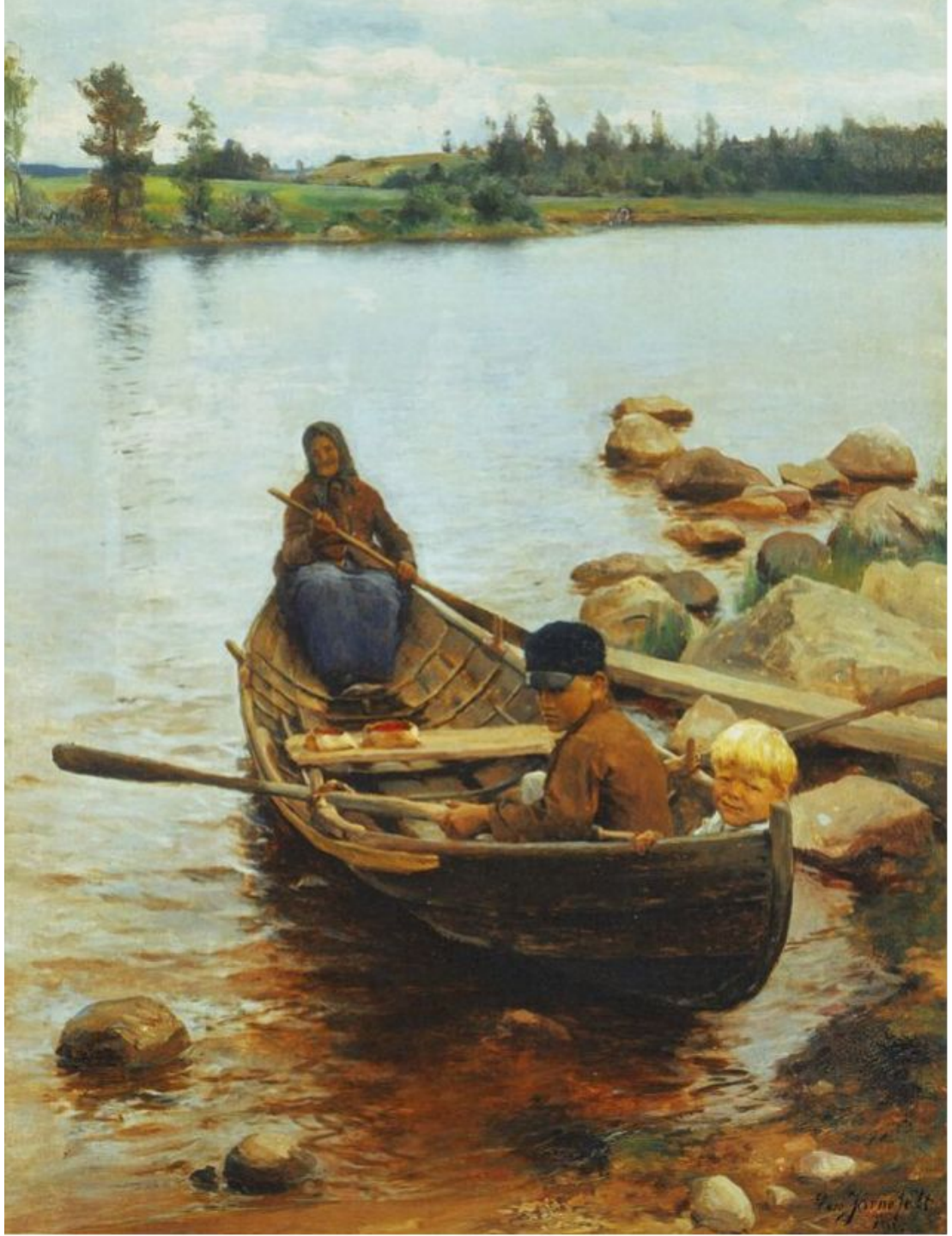
7 Japanese Manufacturing Systems - JIT (Just In Time),

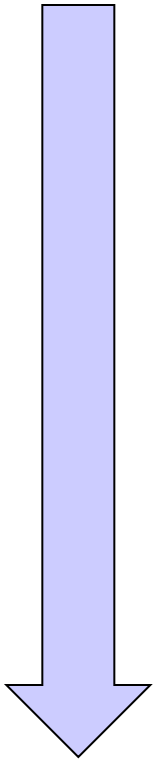
known also by names:
Stockless Production (HP),
Zero Inventories,
Kanban Production,
Material as needed (Harley-Davidson)


Eero Järnefelt.
1893.

Savo-type rowing boat year 1888



From JIT there is only a small step to



Optimized production technology, OPT or later named Theory on Constraints - TOC

Total Quality Management, TQM and ”Kaizen”

LEAN PRODUCTION, Toyota Production System (TPS)

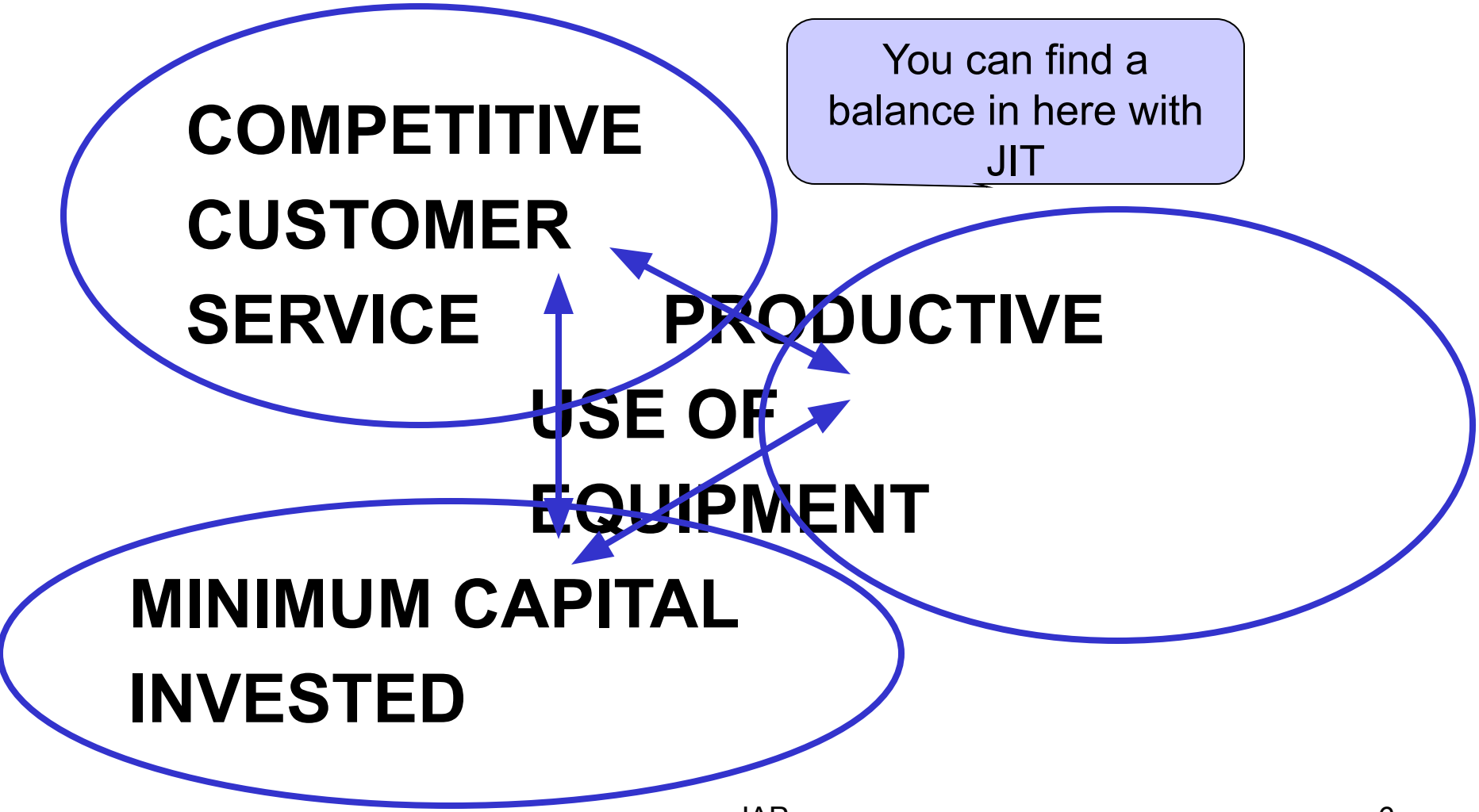
and MASS CUSTOMIZING + Agile Product and manufacturing / Production

From Traditional JUST IN CASE, JIC, system to modern era of manufacturing – case TPS

https://www.youtube.com/watch?v=P-bDlYWuptM

Factory 4.0
https://www.youtube.com/watch?v=HPRURtORnis

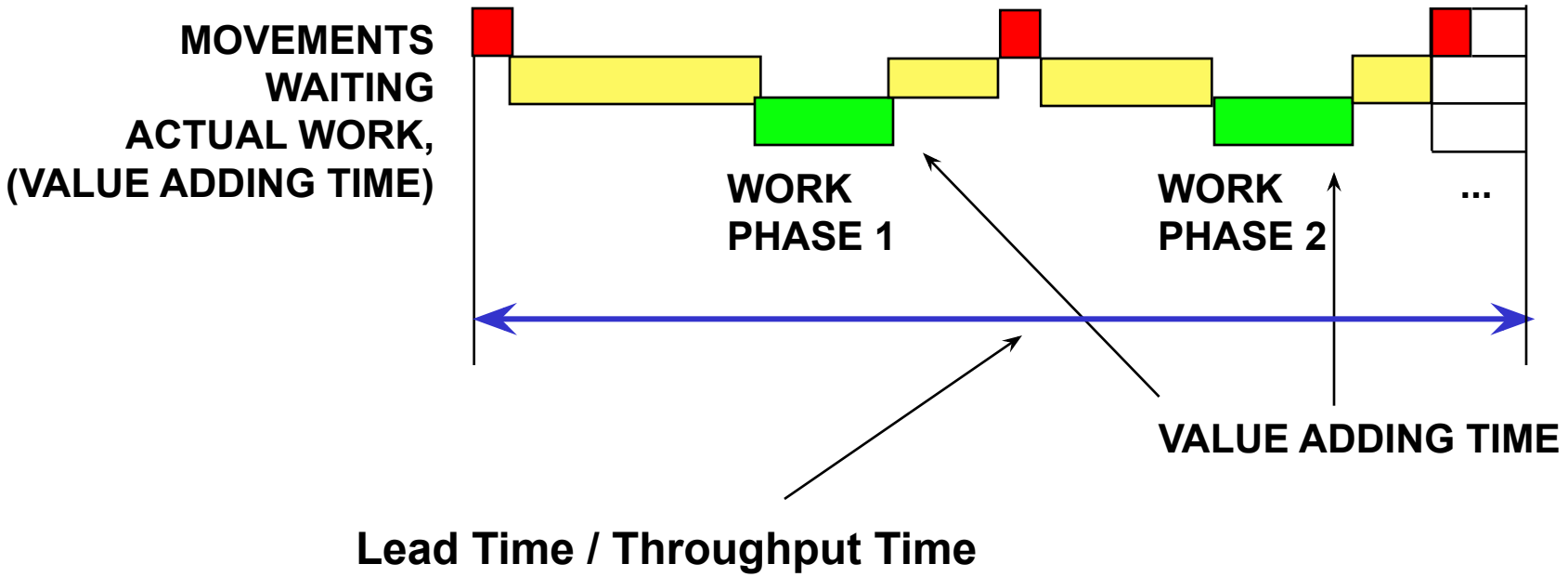
The contrary goals of production management and JIT:



Just in time or Just in case
Just in Time by Toyota
https://www.youtube.com/watch?v=cAUXHJBB5CM

The **just-in-time** philosophy is simple but powerful – eliminate waste by cutting unnecessary inventory and removing non-value-added activities in operations.

Principle 1: Get rid of ”Muda” (unnecessary)



Basic principles of JIT
- minimizing the material

- Reduction of lot / batch sizes to one
- Equalize the Production
- Shorten set-up times
- Standardization of production and modular products
- Kanban and control by pulling

Basic principles of JIT - developing the production system

- Product and production cells
- Small Group Activities => Autonomous Teamwork,
- Visual and simple control
- Multi skilled workforce
- Use automation, free people
- TOTAL PREVENTIVE MAINTENANCE
- Order and tidiness (look 5-S at LEAN)

Basic principles of JIT
- developing the supply chain

- JIT purchasing means
- Long-Term stable relationships - partners
- Simple Purchase Agreements, supplier as part of production (call off orders straight to production line by production people)
- Small but Frequent Deliveries

=> LEAN purchasing

Basic principles of JIT
- managing people Z-theory

- Lifetime employment - means safety and positive attitude to development
- Company unions, 100% attendance and common goals, dedication to work and company
- Before one gets a managers position one proceeds step by step in organization
- Respect and responsibility for employees

JIT management and doctor William Edward Deming, (seminar, London 7/1988)

“Why are we here ? We are here to come alive, to have fun, to have joy in work"

"If management stopped demotivating their employees then they wouldn't have to worry so much about motivating them."

“Why should people do a good job instead of merely time serving and getting away with the minimum they can? I'd suggest three possible reasons:

1. Fear
2. financial incentive or
3. they want to

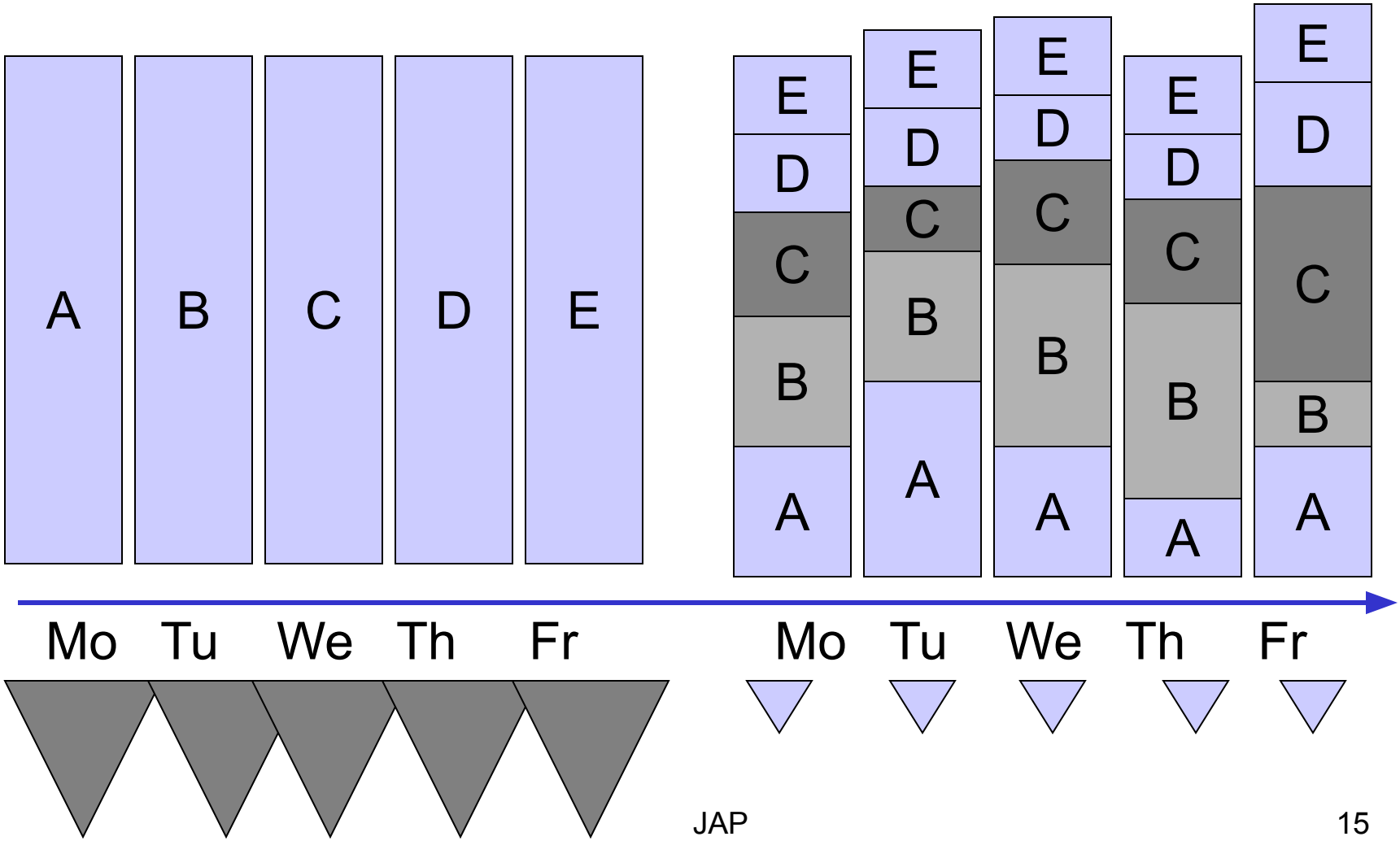
Which do you think will be the most effective?”

What do these JIT principles mean in practice?

Shortening the set-up-times is essential for smaller lot and batch sizes

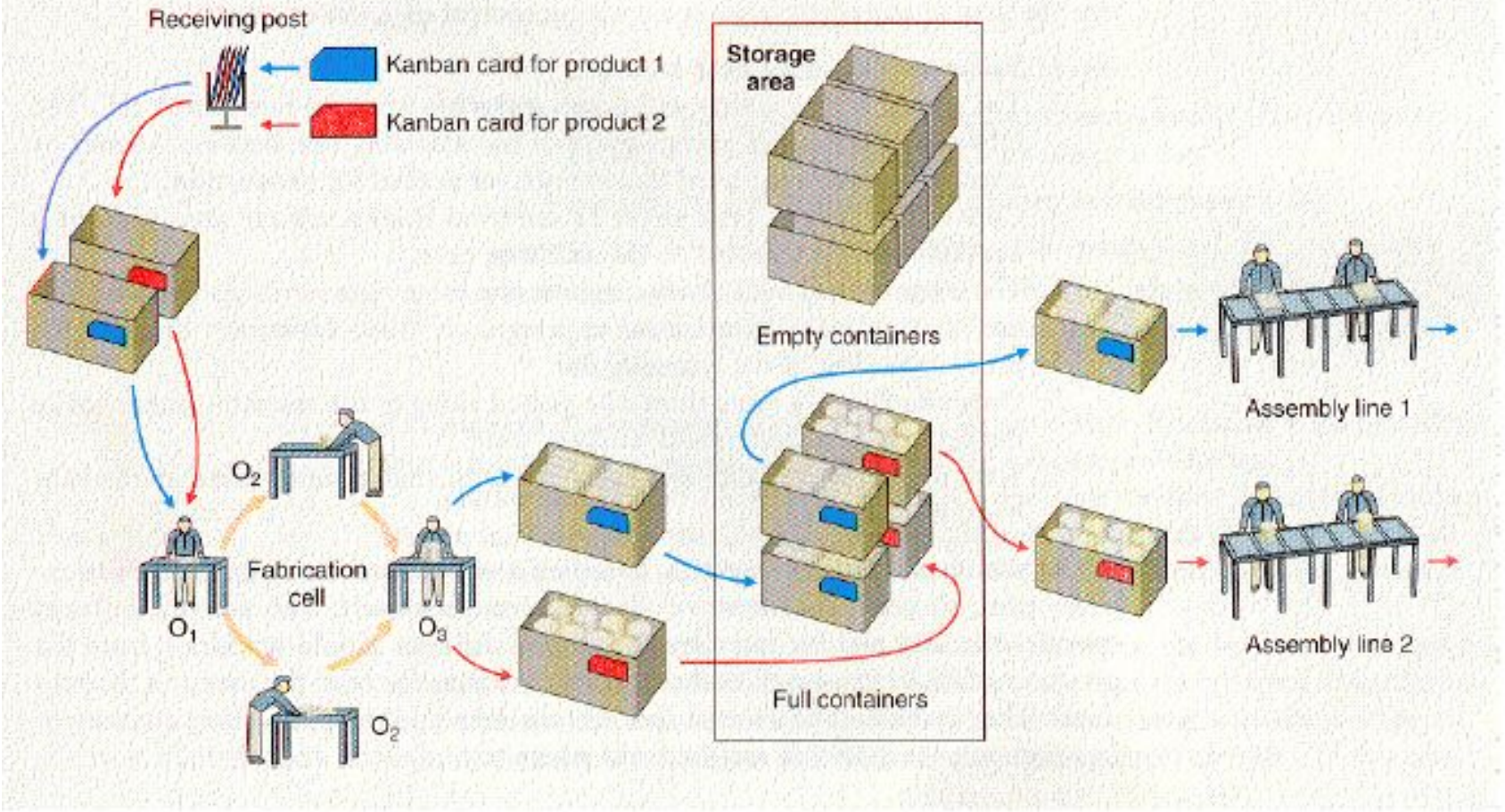
Possibilities / technologies:
JIGS
Set-up outside the machine
AWC, Automatic Work piece Changer

Equalize the Production by chancing the production program daily => significant positive effects on inventory, service level, quality



Kanban is a word meaning “card” or “visible record” in Japanise; refers to cards used to control the flow of production through a factory

FIGURE 16.3
Single-Card Kanban System



JIT LAYOUT supports cell production and prefers Straight-, U-, L-, S-, O-, W- or product based layout => simpler control by lining and tightening the operations. Also hybrid/Chancing layout is an option.

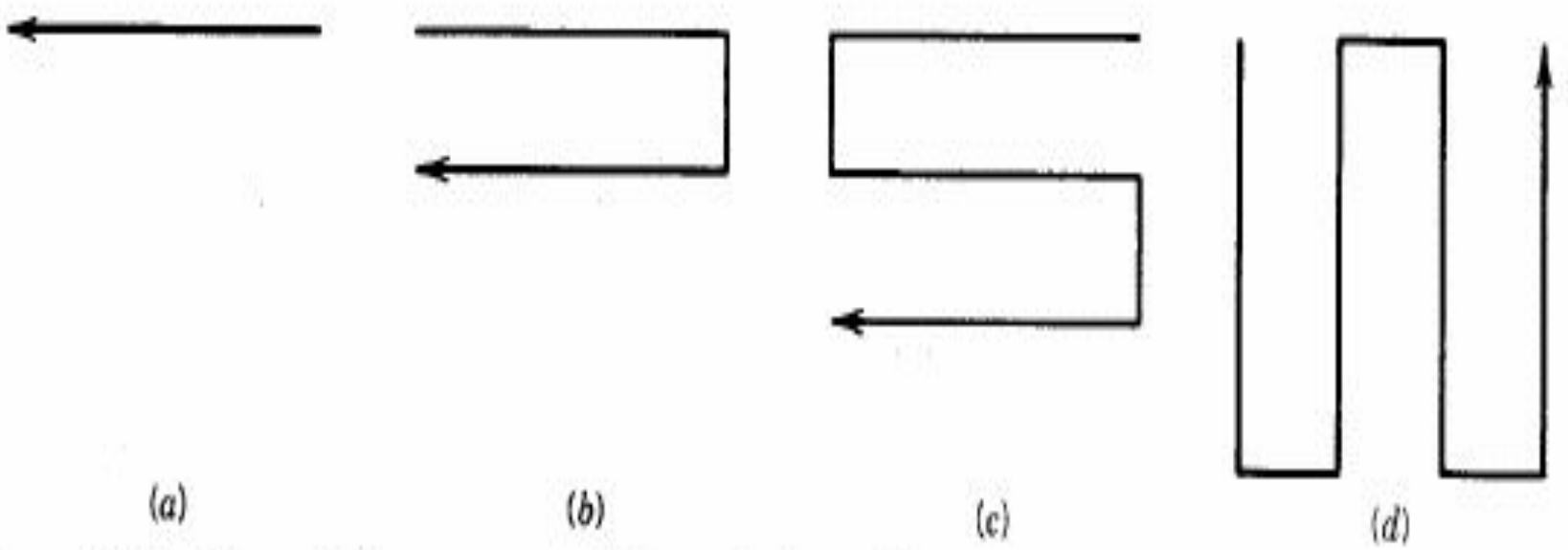
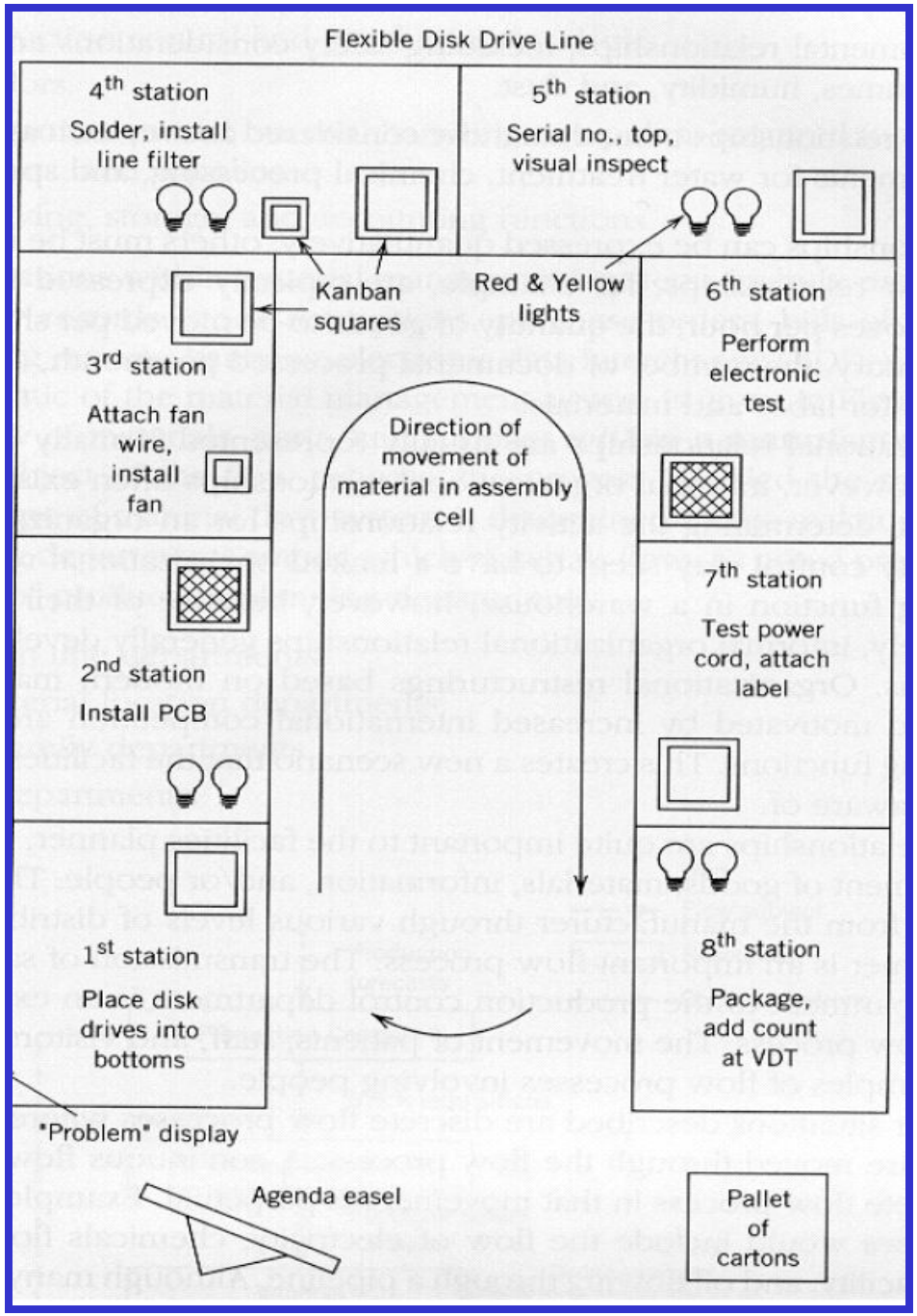


Figure 4.15 General flow patterns. (*a*) Straight line. (*b*) U-shaped. (*c*) S-shaped. (*d*) W-shaped.



PC hard disk assembly-cell in Hewlet Packard's Greely factory

Group technology (GT) is an option for achieving product layouts with low-volume processes; creates cells not limited to just one worker and has a unique way of selecting work to be done by the cell.

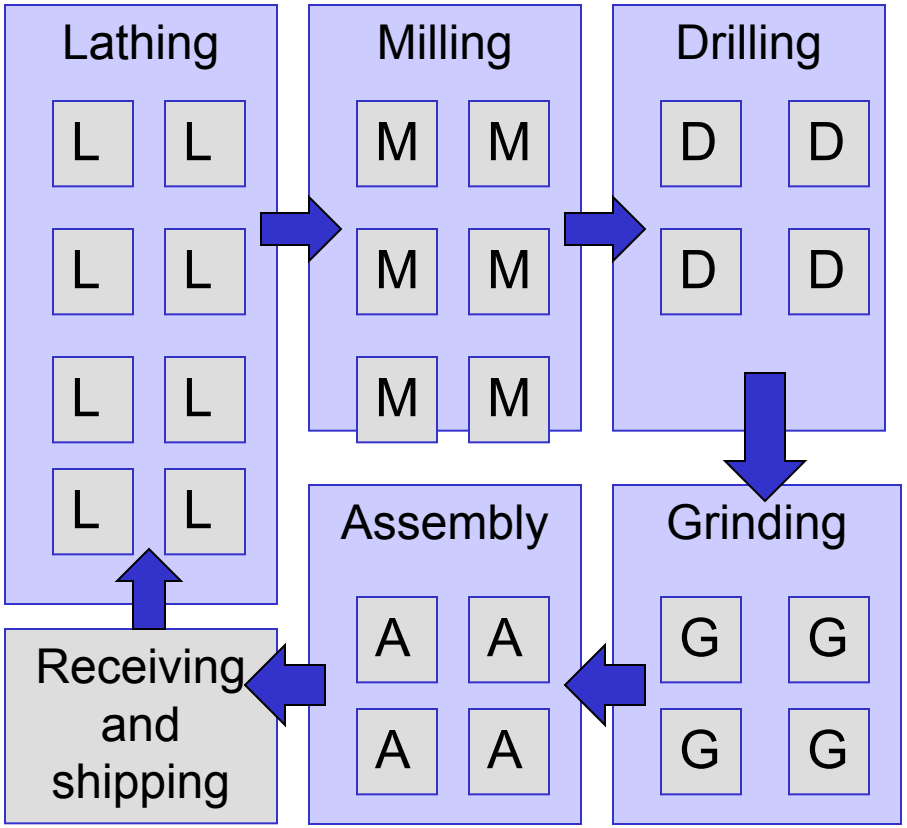
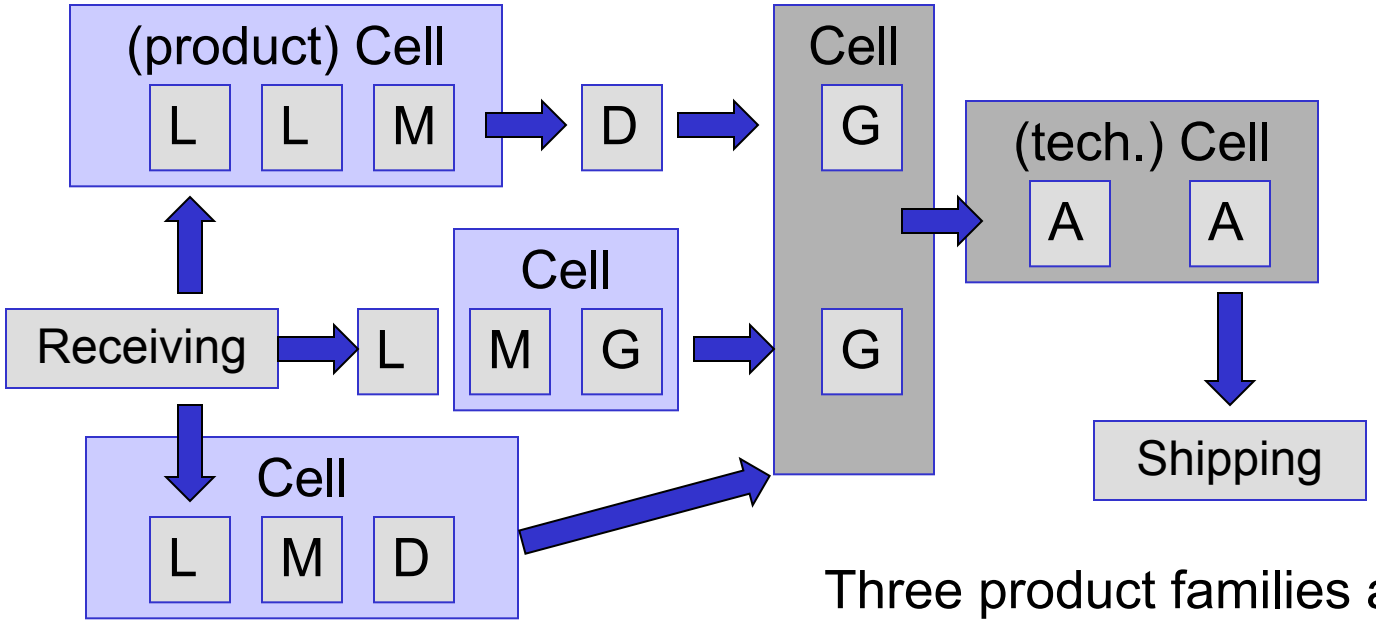


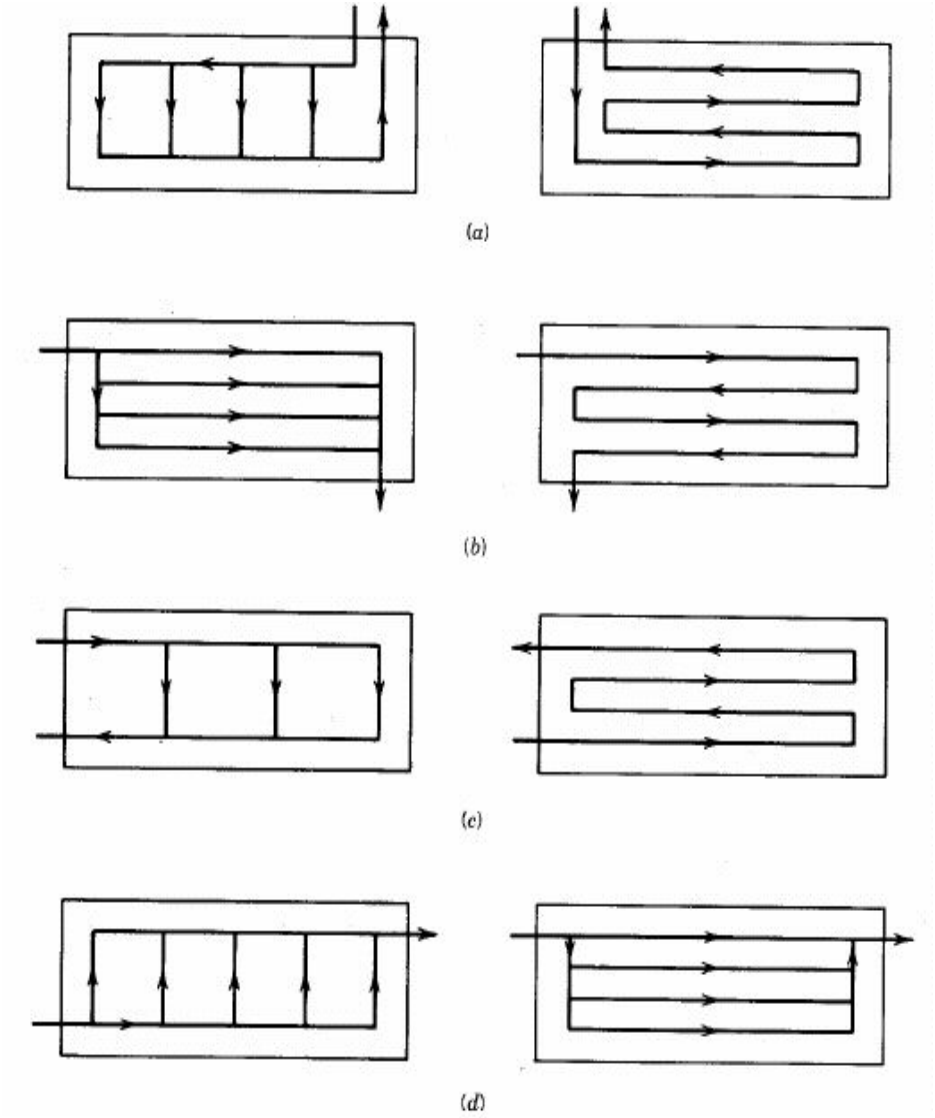
Figure shows a shop floor where machines are grouped according to function. For example after lathing a part is moved to one of the milling machines, where it waits in line until it has higher priority than any other job competing for the machine's capacity.

Jumbled (many different routings) production flows in a job shop without GT cells often lead to long queues and significant time delays. Also it requires a lot of foreman work in controlling.

The other possibility is to arrange the job shop into line flows with GT cells.



Three product families and two technology cells



Possible flow-models inside a factory or department.

Just in Time (JIT) supplies

JIT is not a technique. It's a management philosophy, now adopted by many successful manufacturing businesses, which aims to bring certainty and smoothness to the flow of materials through the supply chain, and to eliminate wasteful practices such as holding safety stocks. Businesses hold stocks because of uncertainty, either about the future level of demand or about the lead time to manufacture or replenish stocks. As well as coping with extra demand, buffer or safety stocks are held to cover an unexpected extension of lead times or to carry you if a supplier delivers a poor quality batch. The more unreliable your supplier, the bigger your safety stocks need to be.

What you are trying to develop with a JIT approach is a network of quality-assured supply partners who can deliver the right quantity to the right place at the right time, every time. The delivery point may be to a retail outlet or it may be to a production line. Your supplies are delivered against an agreed schedule with absolute certainty on the day they are required, rendering expensive safety stocks redundant. Working towards JIT will make your entire business more competitive, for its implications spread far beyond purchasing and stock management.

Among JIT requirements are:

- improving your own sales forecast and, where appropriate, your production planning so that both purchasing and suppliers can be better informed about requirements. JIT hinges on planning and certainty
- forging close working relationships with probably a smaller number of suppliers for whom your business is important. JIT can only work where there is co-operation and trust
- setting up effective information systems so suppliers are immediately aware of any changes to programs. Without tight communications, JIT will break down
- awarding suppliers long-term contracts which give them the confidence to invest in meeting your future requirements
- a quality assurance program under which suppliers are accepting responsibility for quality, monitoring quality during rather than after production, and working towards zero defects
- of course, not all things will be achievable. If, for example, transport costs rule out many small deliveries, your optimum ordering quantity may remain above the quantities needed for Just in Time. However, by working away at improving these factors, you can increase your stockturnover and service level, thereby realizing many of the economies of the JIT approach.

TQM and DR. DEMINGS FOURTEEN POINTS; the viewpoint of JIT and LEAN

1. Achieve constancy of purpose
2. Learn a new philosophy
3. Do not depend on mass inspections
4. Reduce the number of vendors
5. Recognize two sources of faults:
   Management and production systems
   Production workers
6. Improve on-the-job training
7. Improve supervision
8. Drive out fear
9. Improve communication
10. Eliminate fear
11. Consider work standards carefully
12. Teach statistical methods
13. Encourage new skills
14. Use statistical knowledge

Source: 'The Roots of Quality Control in Japan: An Interview with W. Edwards Derning," Pacific Basin Quarterly, Spring/Summer 1985.

CONSTANCY OF PURPOSE

- *Create constancy of purpose for continual improvement of products and service, allocating resources to provide for long-range needs rather than only short-term profitability, with a plan to become competitive, to stay in business, and to provide jobs.*
- *A good way to assess a company's constancy of purpose is to evaluate the source of ultimate authority in that company. To whom does the president of the company answer? Does anybody own the company? Do the owners answer to the stockholders? The stockholders, thousands of them, who want dividends-to whom do they answer? See next page*

Do they answer to their consciences? Do they answer to a built-in institution? Do they answer to a constitution of the company? Is there a constitution for the company?

- *Some companies have a constitution. In medical service, for example, you have some constancy of purpose. Not all, but some nursing homes or other medical institutions are under the governance of a religious board, and they're very exact about service. The head of the organization answers to constancy of purpose. There is a constitution with an aim of going beyond the making of dividends.*

THE NEW PHILOSOPHY

- *Adopt the new philosophy. We are in a new economic age, created in Japan. We can no longer live with commonly-accepted levels of delays, mistakes, defective materials, and defective workmanship. Transformation of Western management style is necessary to halt the continued decline of industry.*
- *It is a whole new philosophy. It is not merely just a few guidelines, ideas, rules, or techniques which you can tack on to the end of whatever you do now.*

Cease dependence on mass inspection

Eliminate the need for mass inspection as a way to achieve quality by building quality into the product in the first place. Require statistical evidence of built-in quality in both manufacturing and purchasing functions.

End lowest-tender contracts

- End the practice of awarding business solely on the basis of price tag. Instead, require meaningful measures of quality along with price. Reduce the number of suppliers for the same item by eliminating those that do not qualify with statistical evidence of quality. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust. The aim is to minimise total cost, not merely initial cost. Purchasing managers have a new job, and must learn it.

Improve every process

Improve constantly and forever every process for planning, production, and service. Search continually for problems in order to improve every activity in the company, to improve quality and productivity, and thus to constantly decrease costs. It is management's job to work continually on the system (design, incoming materials, maintenance, improvement of machines, supervision, training, retraining).

Institute training on the job

Institute modern methods of training on the job for all, including management, to make better use of every employee. New skills are required to keep up with changes in materials, methods, product design, machinery, techniques, and service.

Institute leadership

Adopt and institute leadership aimed at helping people to do a better job. The responsibility of managers and supervisors must be changed from sheer numbers to quality. Improvement of quality will automatically improve productivity. Management must ensure that immediate action is taken on reports of inherited defects, maintenance requirements, poor tools, fuzzy operational definitions and other conditions detrimental to quality.

Drive out fear

Encourage effective two-way communication and other means to drive out fear throughout the organisation so that everybody may work effectively and more productively for the company.

"Figures, like fear, have in many cases become a weapon of conventional management. Indeed, figures are often used to generate fear, particularly through some of Deming's strongest abominations of bad management: Management by Objectives (MBO), arbitrary goals and targets, merit rating, and grading in schools."

(Henry R. Neave: The Deming Dimension, page 153)

Break down barriers

- Break down barriers between departments and staff areas. People in different areas, such as research, design, sales, administration, and production, must work in teams to tackle problems that may be encountered with products or service.

Eliminate exhortations

Eliminate the use of slogans, posters, and exhortations for the work-force, demanding zero defects and new levels of productivity, without providing methods. Such exhortations only create adversarial relationships; The bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the work-force.

Eliminate arbitrary numerical targets

- *Eliminate work standards that prescribe quotas for the workforce and numerical goals for people in management. Substitute aid and helpful leadership in order to achieve continual improvement of quality and productivity.*

Permit pride of workmanship

Remove the barriers that rob hourly workers, and people in management, of their right to pride of workmanship. This implies, inter alia, abolition of the annual merit rating (appraisal of performance) and of Management by Objective . Again, the responsibility of managers, supervisors, foremen must be changed from sheer numbers to quality.

Encourage education

Institute a vigorous programme of education, and encourage self-improvement for everyone. What an organisation needs is not just good people; It needs people that are improving with education. Advances in competitive position will have their roots in knowledge.

Top management commitment and action

-Clearly define top management's permanent commitment to ever-improving quality and productivity, and their obligation to implement all of these principles. Indeed, it is not enough that top management commit themselves for life to quality and productivity. They must know what it is that they are committed to-i.E. What they must do. Create a structure in top management that will push every day on the preceding 13 points, and take action in order to accomplish the transformation. Support is not enough: action is required.

W.E. Deming:

"Experience teaches us (enables us to plan, to predict) only when we use it to modify and understand theory"

"If you cannot measure it, you cannot manage it. Totally wrong - nonsence"

(Out of the Crisis, page 15)