Module 9
Section B: Capital Equipment and Facilities

Term
Business plan

Module 9
Section B: Capital Equipment and Facilities

Term
Capital budgeting

Module 9
Section B: Capital Equipment and Facilities

Term
Discounted cash flow

Module 9
Section B: Capital Equipment and Facilities

Term
Economic value added

Module 9
Section B: Capital Equipment and Facilities

Term
Environmentally responsible business

Module 9
Section B: Capital Equipment and Facilities

Term
Hurdle rate

Module 9
Section B: Capital Equipment and Facilities

Term
Internal rate of return

Module 9
Section B: Capital Equipment and Facilities

Term
Net present value (NPV)

Actions relating to the planning and financing of capital outlays for such purposes as the purchase of new equipment, the introduction of new product lines, and the modernization of plant facilities. See: payback, net present value (NPV), internal rate of return.

1) A statement of long-range strategy and revenue, cost, and profit objectives usually accompanied by budgets, a projected balance sheet, and a cash flow statement. A business plan is usually stated in terms of dollars and grouped by product family, which is then translated into tactical functional plans through the production planning process or the sales and operations planning (S&OP) process. See: business planning, long-term planning, strategic plan. 2) A document consisting of the business details (organization, strategy, and financing tactics) prepared by an entrepreneur to plan for a new business.

In managerial accounting, the net operating profit earned above the cost of capital for a profit center.

A method of investment analysis utilizing the time value of money in which estimated future cash flows are converted (i.e., discounted) to their value at the present time. See: net present value (NPV), present value, time value of money.

The minimum acceptable rate of return on a project.

A firm that operates in such a way as to minimize detrimental impacts on society. See: green manufacturing, green supply chain.

A metric used to determine the profitability of an investment by comparing the present value of expected cash flowing in (revenue) with that of cash flowing out (expenses) for a certain time period. See: capital budgeting, discounted cash flow, time value of money.

The rate of compound interest at which the company's outstanding investment is repaid by proceeds from the project. See: capital budgeting.

Module 9
Section B: Capital Equipment and Facilities

Term
Opportunity cost

Module 9
Section B: Capital Equipment and Facilities

Term
Payback

Module 9
Section B: Capital Equipment and Facilities

Term
Profitability index

Module 9
Section B: Capital Equipment and Facilities

Term
Residual income

Module 9
Section B: Capital Equipment and Facilities

Term
Return on investment (ROI)

Module 9
Section B: Capital Equipment and Facilities

Term
Scheduled downtime

Module 9
Section B: Capital Equipment and Facilities

Term
Sunk cost

Module 9
Section B: Capital Equipment and Facilities

Term
Time value of money

A method of evaluating an investment opportunity that provides a measure of the time required to recover the initial amount invested in a project. See: capital budgeting, return on investment (ROI).

1) The return on capital that could have resulted had the capital been used for some purpose other than its present use. 2) The rate of return investors must earn to continue to supply capital to a firm.

The net operating income that an investment center earns above the minimum required return on its operating assets.

In financial management, the net present value of a projected stream of income from a project (potential investment) divided by the investment in the project. It is used to select among competing potential investments.

Planned shutdown of equipment or a plant to perform maintenance or to adjust to softening demand.

A relative measure of financial performance that provides a means for comparing various investments by calculating the profits returned during a specified time period. In theory of constraints, ROI is calculated by subtracting operating expenses from throughput and then dividing that amount by the investment. See: payback.

The difference in the valuation of an amount of funds at the present time and the value of that same amount of funds at a future time based on the earning power of investing the same funds at the present time at the prevailing interest rate or required rate of return. See: discount rate, discounted cash flow, present value, net present value (NPV).

1) The unrecovered balance of an investment. It is a cost, already paid, that is not relevant to the decision being made about the future. 2) Capital already invested that for some reason cannot be retrieved. 3) A past cost that has no relevance with respect to future receipts and disbursements of a facility undergoing an economic study. This concept implies that since a past outlay is the same regardless of the alternative selected, it should not influence the choice between alternatives.

Module 9
Section B: Capital Equipment and Facilities

Term
Total productive maintenance (TPM)

Module 9
Section A: Quality

Term
Basic seven tools of quality (B7)

Module 9
Section A: Quality

Term
Cause-and-effect diagram

Module 9
Section A: Quality

Term
Check sheet

Module 9
Section A: Quality

Term
Cost of poor quality

Module 9
Section A: Quality

Term
External failure cost

Module 9
Section A: Quality

Term
Field service

Module 9
Section A: Quality

Term
Fishbone analysis

Tools that help organizations understand their processes in order to improve them. The tools are the cause-and-effect diagram (also known as the fishbone diagram or the Ishikawa diagram), check sheet, flowchart (or stratification), histogram, Pareto chart, control chart, and scatter chart. Syn.: seven tools of quality. See: cause-and-effect diagram, seven new tools of quality (N7).

Preventive maintenance plus continuing efforts to adapt, modify, and refine equipment to increase flexibility; reduce materials handling; and promote continuous flows. It is operator-oriented maintenance with the involvement of all qualified employees in all maintenance activities. Syn.: total preventive maintenance.

A simple data collection tool that tallies occurrences of specific defects or complaints over a period of time (such as daily, weekly, or monthly). Check sheets are one of the basic seven tools of quality (B7).

A tool for analyzing process dispersion. It is also referred to as the Ishikawa diagram (because Kaoru Ishikawa developed it) and the fishbone diagram (because the complete diagram resembles a fish skeleton). The diagram illustrates the main causes and sub-causes leading to an effect (symptom). The cause-and-effect diagram is one of the seven tools of quality. Syns.: fishbone chart, fishbone diagram, Ishikawa diagram. See: basic seven tools of quality (B7), fishbone analysis.

A cost related to problems found after the product reaches the customer. This usually includes such costs as warranty and returns. See: failure cost, quality costs.

The costs associated with performing a task incorrectly and/or generating unacceptable output. These costs would include the costs of nonconformities, inefficient processes, and lost opportunities. See: quality costs.

A technique to organize the elements of a problem or situation to aid in the determination of the causes of the problem or situation. See: cause-and-effect diagram, fishbone diagram, five M's.

The functions of installing and maintaining a product for a customer after the sale or during the lease. Field service may also include training and implementation assistance. Field service typically occurs at a customer's location. Syn.: after-sales service. See: connected field service.

Module 9
Section A: Quality

Term
Fitness for use

Module 9
Section A: Quality

Term
Five whys

Module 9
Section A: Quality

Term
Flowchart

Module 9
Section A: Quality

Term
Frequency distribution

Module 9
Section A: Quality

Term
Histogram

Module 9
Section A: Quality

Term
Hoshin planning

Module 9
Section A: Quality

Term
Intangible costs

Module 9
Section A: Quality

Term
Internal customer

A process improvement technique that involves asking why five times when confronted with a problem. By the time the answer to the fifth why is found, the ultimate cause of the problem is identified. Syn.: five W's. See: root cause analysis.

A term used to indicate that a good or service fits the customer's defined purpose for that good or service.

A table that indicates the frequency with which data falls into each of any number of subdivisions, or classes, of the variable.

A chart that shows the operations, transportation, storage, delays, inspections, etc., related to a process. Flowcharts are used to better communicate a process and are an output of a flowcharting process. The flowchart is one of the seven tools of quality. Syn.: flow diagram. See: block diagram, flow process chart.

A Japanese strategic planning process that aligns long-term strategic goals with daily operations, feedback mechanisms, and training activities that facilitate continuous improvement.

A graph of contiguous vertical bars representing a frequency distribution in which the groups or classes of items are marked on the horizontal axis and the number of items in each class is indicated on the vertical axis. This visualization of the shape of a frequency distribution enables the identification of characteristics such as skewness or kurtosis. The histogram is one of the basic seven tools of quality (B7).

The recipient (person or department) of another person's or department's output (good, service, or information) within an organization. See: customer, external customer.

Those costs that are difficult to quantify, such as the cost of poor quality or of high employee turnover.

Module 9
Section A: Quality

Term
Internal failure cost

Module 9
Section A: Quality

Term
Management by walking around (MBWA)

Module 9
Section A: Quality

Term
Nonevident failure

Module 9
Section A: Quality

Term
Pareto chart

Module 9
Section A: Quality

Term
Pareto's law

Module 9
Section A: Quality

Term
Prevention costs

Module 9
Section A: Quality

Term
Preventive maintenance (PM)

Module 9
Section A: Quality

Term
Process flow

The management technique of managers touring a facility on a regular basis to talk with workers and staff about problems, trends, and potential solutions.

The cost of a defect in a product before it reaches the customer. Internal failure costs usually include rework, scrap, downgrades, reinspection, retesting, and process losses. See: failure cost.

A bar graph that displays the results of a Pareto analysis with the bars displayed from longest on the left to shortest on the right. Pareto charts often also include a line graph measured on a secondary vertical axis on the right representing the cumulative percentage of the total.

Failure occurring in either a product or a production process that is not immediately evident. This may be indicative of a faulty design.

The costs caused by improvement activities that focus on the reduction of failure and appraisal costs. Typical costs include education, quality training, and supplier certification. Prevention costs are four categories of quality costs.

A principle first observed by Italian economist Vilfredo Pareto that states that a small percentage of a group accounts for the largest fraction of its impact or value. In ABC classification, for example, 20 percent of the inventory items may constitute 80 percent of the inventory value. See: 80-20 rule, ABC classification.

The sequence of activities that, when followed, results in a product or service deliverable. See: flow process chart, process chart.

The regularly scheduled activities, including adjustments, replacements, and basic cleanliness, that are done to prevent machine breakdowns. The purpose is to ensure that production quality is maintained and that delivery schedules are met. Syn.: periodic maintenance.

Module 9
Section A: Quality

Term
Process flow diagram

Module 9
Section A: Quality

Term
Quality

Module 9
Section A: Quality

Term
Quality assurance/control

Module 9
Section A: Quality

Term
Quality costs

Module 9
Section A: Quality

Term
Quality trilogy

Module 9
Section A: Quality

Term
Robust design

Module 9
Section A: Quality

Term
Scatter chart

Module 9
Section A: Quality

Term
Seven new tools of quality (N7)

Conformance to requirements or fitness for use. Quality can be defined through five principal approaches: (1) Transcendent quality is an ideal and a condition of excellence. (2) Product-based quality is based on a product attribute. (3) User-based quality is fitness for use. (4) Manufacturing-based quality is conformance to requirements. (5) Value-based quality is the degree of excellence at an acceptable price. Also, quality has two major components: (1) quality of conformance, which is quality defined by the absence of defects, and (2) quality of design, which is quality measured by the degree of customer satisfaction with a product's characteristics and features.

A graphical and progressive representation of the various steps, events, and tasks that make up an operations process. It provides the viewer with a picture of what actually occurs when a product is manufactured or a service is performed.

The overall costs associated with prevention activities and the improvement of quality throughout the firm before, during, and after production of a product. These costs fall into four recognized categories: internal failure costs, external failure costs, appraisal costs, and prevention costs. Internal failure costs relate to problems before the product reaches the customer. These usually include rework, scrap, downgrades, reinspection, retest, and process losses. External failure costs relate to problems found after the product reaches the customer. These usually include such costs as warranty and returns. Appraisal costs are associated with the formal evaluation and audit of quality in the firm. Typical costs include inspection, quality audits, testing, calibration, and checking time. Prevention costs are those caused by improvement activities that focus on reducing failure and appraisal costs. Typical costs include education, quality training, and supplier certification. See: cost of poor quality.

Two terms that have many interpretations because of the multiple definitions for the words assurance and control. For example, assurance can mean the act of giving confidence, the state of being certain, or the act of making certain. Control can mean an evaluation to indicate needed corrective responses, the act of guiding, or the state of a process in which the variability is attributable to a constant system of chance causes. One definition of quality assurance is all the planned and systematic activities implemented within the quality system that can be demonstrated to provide confidence that a good or service will fulfill requirements for quality. One definition for quality control is the operational techniques and activities used to fulfill requirements for quality. Often, however, quality assurance and quality control are used interchangeably, referring to the actions performed to ensure the quality of a good, service, or process. See: quality control.

Type of design for a product or service that plans for intended performance even in the face of a harsh environment.

A three-pronged approach to managing quality proposed by Joseph Juran. The three legs are quality planning (developing the products and processes required to meet customer needs), quality control (meeting product and process goals), and quality improvement (achieving unprecedented levels of performance). Syn.: Juran Trilogy.

A set of quality improvement tools developed by the Union of Japanese Scientists and Engineers (JUSE). The N7 are affinity diagram, interrelationship digraph, matrix diagram, tree diagram, prioritization matrix, process decision program chart, and activity network diagram. See: basic seven tools of quality (B7).

A graphical technique to analyze the relationship between two variables. Two sets of data are plotted on a graph, with the y-axis used for the variable to be predicted and the x-axis used for the variable to make the prediction. The graph will show possible relationships. Although two variables might appear to be related, they might not be. Those who know most about the variables must make that evaluation. The scatter chart is one of the seven tools of quality. Syns.: cross plot, scatter diagram, scatterplot.

Module 9
Section A: Quality

Term
Total quality control (TQC)

Module 9
Section A: Quality

Term
Total quality management (TQM)

Module 9
Section C: Technology

Term
Advanced planning and scheduling (APS)

Module 9
Section C: Technology

Term
Analytics

Module 9
Section C: Technology

Term
Artificial intelligence (AI)

Module 9
Section C: Technology

Term
Automated guided vehicle system (AGVS)

Module 9
Section C: Technology

Term
Automated storage/retrieval system (AS/RS)

Module 9
Section C: Technology

Term
Closed-loop MRP

A management approach to quality improvement that is driven through customer satisfaction. TQM is based on the participation of all members of an organization in improving processes, goods, services, and the culture in which they work. The methods for implementing this approach are found in teachings of such quality leaders as Philip B. Crosby, W. Edwards Deming, Kaoru Ishikawa, J.M. Juran, and Genichi Taguchi. See: manufacturing philosophy.

The process of creating and producing the total composite good and service characteristics (by marketing, engineering, manufacturing, purchasing, etc.) through which the good and service will meet the expectations of customers.

The review of typically large sets of business data using mathematics, statistics, and computer software to identify meaningful patterns in the data to help in decision-making.

Techniques that deal with the analysis and planning of logistics and manufacturing during short, intermediate, and long-term time periods. APS describes any application that uses advanced mathematical algorithms or logic to perform optimization or simulation of finite capacity scheduling, sourcing, capital planning, resource planning, forecasting, demand management, etc. These techniques simultaneously consider a range of constraints and business rules to provide real-time planning and scheduling, decision support, available-to-promise (ATP), and capable-to-promise (CTP) capabilities. APS often generates and evaluates multiple scenarios. Management then selects one scenario to use as the "official plan." The five main components of APS systems are (1) demand planning, (2) production planning, (3) production scheduling, (4) distribution planning, and (5) transportation planning.

A material handling network that automatically routes devices, such as carts or pallet trucks, from one location to another through the use of guided paths or electronic navigation systems.

1) Machines or computer programs that can learn, reason, and take action, similar to humans. 2) An area of computer science that attempts to develop AI computer programs. See: artificial general intelligence (AGI), artificial superintelligence (ASI), expert system.

A method of material requirements planning (MRP) that incorporates production planning, sales and operations planning (S&OP), master scheduling, and capacity requirements planning (CRP). Once the initial planning phase is completed and the plans have been accepted as realistic and attainable, the execution processes come into play. These include the control processes of input-output control and detailed scheduling and dispatching. Feedback is received on actual performance to the plans, which is then used to re-evaluate the plans in order to keep them valid.

A high-density rack inventory storage system that uses robotics to sort, store, and retrieve items in a warehouse.

Module 9
Section C: Technology

Term
Cloud computing

Module 9
Section C: Technology

Term
Data governance

Module 9
Section C: Technology

Term
Decision support system (DSS)

Module 9
Section C: Technology

Term
Digital Capabilities Model (DCM) for Supply Networks

Module 9
Section C: Technology

Term
Electronic data interchange (EDI)

Module 9
Section C: Technology

Term
Enterprise resource planning (ERP)

Module 9
Section C: Technology

Term
Gap analysis

Module 9
Section C: Technology

Term
Information system architecture

The overall management of data's accessibility, usability, reliability, and security. It is used to ensure data-record accuracy.

The use of computer resources, such as data storage and applications, which are accessed by any computer through the internet. See: hybrid cloud, private cloud, public cloud.

A reference model for supply chain professionals to guide the development of digital supply networks. The model is designed in a relational manner to help envision and then build the digitally enabled capabilities required to transform linear supply chains into a set of dynamic networks.

A computer system designed to assist managers in selecting and evaluating courses of action by providing a logical (usually quantitative) analysis of the relevant factors.

Integrated business software that manages all areas of a business, including manufacturing, accounting, distribution, etc. An ERP system provides a framework for standardizing processes and common extensive databanks of information, including master files, financial details, analyses of product and customer hierarchies, and historic and current transactional data.

The paperless (electronic) exchange of trading documents, such as purchase orders, shipment authorizations, advanced shipping notices (ASNs), and invoices, using standardized document formats.

A model of how the organization operates regarding information. The model considers four factors: (1) organizational functions, (2) communication of coordination requirements, (3) data modeling needs, and (4) management and control structures. The architecture of the information system should be aligned with and match the architecture of the organization.

The assessment of the differences between the actual performance of a product or service and customer expectations.

Module 9
Section C: Technology

Term
Internet of things (IoT)

Module 9
Section C: Technology

Term
Learning curve

Module 9
Section C: Technology

Term
Machine learning (ML)

Module 9
Section C: Technology

Term
Manufacturing resource planning (MRP II)

Module 9
Section D: Continuous Improvement

Term
5S

Module 9
Section D: Continuous Improvement

Term
Acceptable quality level (AQL)

Module 9
Section D: Continuous Improvement

Term
Acceptance sampling

Module 9
Section D: Continuous Improvement

Term
Andon

A graph depicting the relationship between the number of times workers repeat tasks and the amount of time it takes them to complete each task. As workers perform a task more often, their performance improves and they take less time to complete subsequent iterations of the task. Syn.: experience curve.

An environment in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. This allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems.

A method for the effective planning of all internal resources of a manufacturing company. It is made up of a variety of processes, each linked together: business planning, production planning (sales and operations planning (S&OP)), master production scheduling, material requirements planning (MRP), capacity requirements planning (CRP), and the execution support systems for capacity and material. Output from these systems is integrated with financial reports such as the business plan, purchase commitment report, shipping budget, and inventory projections in dollars. MRP II is a direct outgrowth and extension of closed-loop MRP and is the predecessor to enterprise resource planning (ERP).

Artificial intelligence (AI) tools that allow machines to learn from experience and be capable of analysis, self-training, and observation to improve their performance.

The maximum allowable number of defects deemed statistically acceptable for the purposes of sampling inspection. See: acceptance sampling.

Five terms beginning with the letter S used to create a workplace suitable for lean production: sort, set in order (or simplify), shine (or scrub), standardize, and sustain. Sort means to separate needed items from unneeded ones and remove the latter. Set in order means to neatly arrange items for use. Shine means to clean up the work area. Standardize means to sort, simplify, and scrub daily. Sustain means to always follow the first four Ss. These practices are sometimes referred to by their Japanese equivalents: seiri, seiton, seiso, seiketsu, and shitsuke.

A sign board with signal lights used to make workers and management aware of a quality, quantity, or process problem.

1) The process of sampling a portion of goods for inspection rather than examining the entire lot. The entire lot may be accepted or rejected based on the sample even though the specific units in the lot are better or worse than the sample. There are two types of acceptance sampling: attributes sampling and variables sampling. See: acceptable quality level (AQL), attribute inspection, attribute sampling. 2) A method of measuring random samples of lots or batches of products against predetermined standards.

Module 9
Section D: Continuous Improvement

Term
Baseline measures

Module 9
Section D: Continuous Improvement

Term
Benchmark measures

Module 9
Section D: Continuous Improvement

Term
Benchmarking

Module 9
Section D: Continuous Improvement

Term
Brainstorming

Module 9
Section D: Continuous Improvement

Term
Colocation

Module 9
Section D: Continuous Improvement

Term
Computer-aided design (CAD)

Module 9
Section D: Continuous Improvement

Term
Computer-aided manufacturing (CAM)

Module 9
Section D: Continuous Improvement

Term
Computer-integrated manufacturing (CIM)

A set of measurements or metrics that is used to establish goals for improvements in processes, functions, products, and so on. Benchmark measures are often derived from other firms that display best-in-class achievement.

A set of measurements or metrics that seeks to establish the current or starting level of performance of a process, function, product, firm, or other entity. Baseline measures are usually established before implementing improvement activities and programs.

A technique that teams use to generate ideas about a particular subject. Each person on the team is asked to think creatively and write down as many ideas as possible. The ideas are not discussed or reviewed until after the brainstorming session.

Comparing products, processes, and services to those of another organization thought to have superior performance. The benchmark target may or may not be a competitor or even in the same industry. There are seven common forms of benchmarking. See: competitive benchmarking, financial benchmarking, functional benchmarking, performance benchmarking, process benchmarking, product benchmarking, strategic benchmarking.

The use of computers in interactive engineering drawing and storage of designs. Programs complete the layout, geometric transformations, projections, rotations, magnifications, and interval (cross-section) views of a part and show its relationship with other parts.

1) Placing supply chain personnel in a partner's organization to facilitate communication and collaboration. 2) The placement of servers and other data equipment from multiple companies within one facility to reduce costs and risk.

The use of computer and automation technologies to integrate and control the entire manufacturing process. CIM bridges various computerized systems and connects them into a coherent, integrated whole.

The use of computers to program, direct, and control production equipment in the fabrication of manufactured items.

Module 9
Section D: Continuous Improvement

Term
Conformance

Module 9
Section D: Continuous Improvement

Term
Continuous process improvement (CPI)

Module 9
Section D: Continuous Improvement

Term
Control chart

Module 9
Section D: Continuous Improvement

Term
Control limit

Module 9
Section D: Continuous Improvement

Term
Define, measure, analyze, improve, control (DMAIC) process

Module 9
Section D: Continuous Improvement

Term
Design of experiments (DOE)

Module 9
Section D: Continuous Improvement

Term
Employee empowerment

Module 9
Section D: Continuous Improvement

Term
Employee involvement (EI)

A never-ending effort to expose and eliminate root causes of problems through the use of small, incremental improvement steps. Syn.: continuous improvement (CI). See: kaizen.

An indication or judgment that a product or service has met the requirements of a relevant specification, functionality, contract, or regulation.

A statistically determined line on a control chart (upper control limit or lower control limit). If a value occurs outside this limit, the process is deemed to be out of control.

A graphic comparison of process performance data with predetermined computed control limits. The process performance data usually consists of groups of measurements selected in the regular sequence of production that preserve the order. The primary use of control charts is to detect assignable causes of variation in the process as opposed to random variations. The control chart is one of the seven tools of quality. Syn.: process control chart.

1) A process for structuring statistically valid studies in any science. 2) A quality management technique used to evaluate the effect of carefully planned and controlled changes to input process variables on the output variable. The objective is to improve production processes.

A six sigma improvement process composed of five stages: (1) Determine the nature of the problem; (2) Measure existing performance, and commence recording data and facts that offer information about the underlying causes of the problem; (3) Analyze the information to determine the root causes of the problem; (4) Improve the process by effecting solutions to the problem; and (5) Monitor the process until the solutions become ingrained.

The concept of using the experience, creative energy, and intelligence of all employees by treating them with respect, keeping them informed, and including them and their ideas in decision-making processes appropriate to their areas of expertise. Employee involvement focuses on quality and productivity improvements. Syn.: people involvement.

The practice of giving non-managerial employees the responsibility and power to make decisions regarding their jobs or tasks. It is associated with the practice of transfer of managerial responsibility to the employee. Empowerment allows the employee to take on responsibility for tasks normally associated with staff specialists. Examples include allowing the employee to make scheduling, quality, process design, or purchasing decisions. See: participative management.

Module 9
Section D: Continuous Improvement

Term
Fault tree analysis

Module 9
Section D: Continuous Improvement

Term
Flexible automation

Module 9
Section D: Continuous Improvement

Term
Gemba

Module 9
Section D: Continuous Improvement

Term
Genchi genbutsu

Module 9
Section D: Continuous Improvement

Term
Go/no-go

Module 9
Section D: Continuous Improvement

Term
House of quality (HOQ)

Module 9
Section D: Continuous Improvement

Term
Hypothesis testing

Module 9
Section D: Continuous Improvement

Term
Jidoka

Automation that provides short setup times and the ability to switch quickly from one product to another.

A logical approach to identify the probabilities and frequencies of events in a system that are most critical to uninterrupted and safe operation. This analysis may include failure mode and effects analysis (FMEA) and techniques for human error prediction.

A Japanese phrase meaning to visit the shop floor to observe what is occurring to facilitate problem-solving and process improvement.

The place where humans create value or the real workplace. Gemba also is a philosophy that states, “Go to the actual place; see the actual work.”

A structured process that relates customer-defined attributes to the product’s technical features needed to support and generate these attributes. HOQ is a part of the quality function deployment (QFD) process and forces designers to consider customer needs and the degree to which the proposed designs satisfy these needs. See: customer-defined attributes, quality function deployment (QFD).

The state of a unit, product, or project whereby it either conforms to specifications or requirements (i.e., go) or does not conform (i.e., no-go).

The Japanese term for the practice of stopping the production line when a defect occurs.

The use of statistical analysis to test conjectures about population parameters based on sample data.

Module 9
Section D: Continuous Improvement

Term
Job analysis

Module 9
Section D: Continuous Improvement

Term
Just-in-time (JIT) manufacturing

Module 9
Section D: Continuous Improvement

Term
Kaizen

Module 9
Section D: Continuous Improvement

Term
Kaizen blitz

Module 9
Section D: Continuous Improvement

Term
Kaizen event

Module 9
Section D: Continuous Improvement

Term
Kit

Module 9
Section D: Continuous Improvement

Term
Knowledge management

Module 9
Section D: Continuous Improvement

Term
Lean Six Sigma (LSS)

A philosophy of manufacturing based on planned elimination of all waste and on continuous improvement of productivity. The primary elements of JIT manufacturing are to have only the required inventory when needed; to improve quality to zero defects; to reduce lead times by reducing setup times, queue lengths, and lot sizes; to incrementally revise the operations themselves; and to accomplish these activities at minimum cost. In the broad sense, it applies to all forms of manufacturing—job shop, process, and repetitive—and to many service industries as well. Syns.: short-cycle manufacturing, stockless production, zero inventories.

A process of gathering information about important task-oriented activities and work requirements for employees through observation, interview, or recording systems.

A rapid improvement of a limited process area, such as a production cell. Workers in the area or cell use innovative thinking to eliminate non-value-added work and to immediately implement the changes within a week or less. Ownership of the improvement by the area work team and the development of the team's problem-solving skills are additional benefits. See: kaizen event.

The Japanese term for improvement. Kaizen refers to continuing improvement involving everyone—managers and workers. In manufacturing, kaizen relates to finding and eliminating waste in machinery, labor, or production methods. See: continuous process improvement (CPI).

1) The components of a parent item that have been pulled from stock and prepared for movement to a production area or shipment to a customer for final assembly. 2) A group of repair parts to be shipped with an order. Syn.: staged material.

A focused process improvement project carried out by a cross-functional team designed to achieve specific outcomes in a targeted work area over a short period of time. The kaizen event is an implementation arm of a lean manufacturing program. See: kaizen blitz.

A methodology that combines the improvement concepts of lean and six sigma. It uses the seven wastes of lean and the define, measure, analyze, improve, control (DMAIC) process from six sigma and awards recognition of competence through judo-style belts.

An integrated approach used by organizations to capture, share, develop, and use organizational knowledge. This information is used to more effectively produce product, interface with customers, and navigate through competitive markets.

Module 9
Section D: Continuous Improvement

Term
Learning organization

Module 9
Section D: Continuous Improvement

Term
Lower control limit (LCL)

Module 9
Section D: Continuous Improvement

Term
Manufacturing execution system (MES)

Module 9
Section D: Continuous Improvement

Term
Model

Module 9
Section D: Continuous Improvement

Term
Muda

Module 9
Section D: Continuous Improvement

Term
Mura

Module 9
Section D: Continuous Improvement

Term
Muri

Module 9
Section D: Continuous Improvement

Term
Nominal group technique

Control limit for points below the central line in a control chart.

1) A group of people who have woven a continuous, enhanced capacity to learn into the corporate culture. 2) An organization in which learning processes are analyzed, monitored, developed, and aligned with competitive goals.

A representation of a process or system that attempts to relate the most important variables to generate insights into its likely performance. Frequently, the model is used to anticipate the outcome of a particular strategy if it were to be applied to the real process or system.

A program or system used in shop floor control, including programmable logic controllers and process control computers, to improve the efficiency of production processes and allow companies to track the status of production orders. MES systems gather actual performance information, generate reports, present graphical displays, and provide alarms that inform operations personnel about production status.

A Japanese word meaning unevenness or variability.

In lean manufacturing, work that does not create value for the customer and therefore is considered waste. Total costs are reduced by reducing waste within a system. There are seven categories of waste: (1) overproduction—excess or too early, (2) waiting—queuing delays, (3) transportation—unneeded movements, (4) processing—poor process design, (5) motion—activities that do not add value, (6) inventory—stock that is sitting and is accumulating cost without necessarily providing value, (7) defective units—scrap or rework.

A technique, similar to brainstorming, used by teams to generate ideas about a particular subject. Team members are asked to silently come up with as many ideas as possible and write them down. Each member is then asked to share one idea, which is recorded. After all the ideas are recorded, they are discussed and prioritized by the group.

A Japanese word meaning strain or overburden.

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Term
Non-value-added

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Term
Nonconformity

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Term
Operator flexibility

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Term
Overall equipment effectiveness (OEE)

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Term
Perceived quality

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Term
Performance appraisal

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Term
Performance measure

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Term
Poka-yoke

Failure to fulfill a specified requirement. See: blemish, defect, imperfection.

An activity that does not add value to a product. An example is moving a product from one work center to another inside a facility. One aspect of continuous improvement is the elimination or reduction of non-value-added activities.

The measurement of the effectiveness of a company's equipment based on the product of its availability, performance, and production quality.

Training machine workers to perform tasks outside their immediate jobs and in problem-solving techniques to improve process flexibility. This is a necessary process in developing a fully cross-trained workforce.

Supervisory or peer analysis of work performance. This appraisal may be made in connection with wage and salary review, promotion, transfer, or employee training.

One of the eight dimensions of quality that refers to a subjective assessment of a product's quality based on criteria defined by the observer.

Mistake-proofing techniques, such as manufacturing or setup activity, designed in a way to prevent an error from resulting in a product defect. For example, in an assembly operation, if each correct part is not used, a sensing device detects that a part was unused and shuts down the operation, thereby preventing the assembler from moving the incomplete part to the next station or beginning another operation. This is sometimes spelled poke-yoke. Syns.: failsafe technique, failsafe work method, mistake-proofing.

In a performance measurement system, the actual value measured for a criterion. See: performance criterion, performance measurement system, performance standard.

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Term
Problem-solving storyboard

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Term
Process capability

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Term
Process capability index

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Term
Process control

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Term
Prototyping

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Term
Quality function deployment (QFD)

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Term
Quick changeover

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Term
Random sample

The ability of the process to produce parts that conform to (engineering) specifications. Process capability relates to the inherent variability of a process that is in a state of statistical control. See: Cp, Cpk, process capability analysis.

A technique based on the plan-do-check-action (PDCA) problem-solving process. The steps being taken and the progress toward the resolution of a problem are continuously planned and updated.

1) The function of maintaining a process within a given range of capability by feedback, correction, and so forth. 2) The monitoring of instrumentation attached to equipment (valves, meters, mixers, liquid, temperature, time, etc.) from a control room to ensure that a high-quality product is being produced to specification.

The value of the tolerance specified for the characteristic divided by the process capability. There are several types of process capability indices, including the widely used C_{pk} and C_p.

A methodology designed to ensure that all the major requirements of the customer are identified and subsequently met or exceeded through the resulting product design process and the design and operation of the supporting production management system. QFD can be viewed as a set of communication and translation tools. QFD tries to eliminate the gap between what the customer wants in a new product and what the product is capable of delivering. QFD often leads to a clear identification of the major requirements of the customers. These expectations are referred to as the voice of the customer. See: design for quality (DFQ), design for six sigma (DFSS), house of quality (HOQ).

1) A specialized product design and development process for developing a working model of a product. 2) A specialized system development process for performing a determination where user needs are extracted, presented, and developed by building a working model of the system. Generally, these tools make it possible to create all files and processing programs needed for the evaluation of a business application in a matter of days or hours.

A selection of observations taken from all the observations of a phenomenon in such a way that each chosen observation has the same possibility of selection.

The ability to shorten machine setups between different machine operation requirements to increase process flexibility. The first priority is reducing external setup time, and the second is internal setup issues. Quick changeover reduces economic order quantity (EOQ), queue and manufacturing lead times, and work in process (WIP) inventory. It also improves quality, process, and material flows.

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Term
Rework order

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Term
Root cause analysis

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Term
Seven wastes

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Term
Shojinka

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Term
Simulation

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Term
Single-minute exchange of die (SMED)

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Term
Six sigma

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Term
Six sigma quality

Analytical methods to determine the core problem(s) of an organization, process, product, market, and so forth. See: current reality tree (CRT), five whys, stratification analysis.

A manufacturing order to rework and salvage defective parts or products. Syns.: repair order, spoiled work order.

Continually balancing the number of workers in a work center to meet demand with a minimum number of workers to improve flow. It requires a line design—for example, U-shaped—that supports varying the number of workers.

The common forms of waste identified in the lean or just-in-time (JIT) philosophy that limit improvement. These include overproduction, inventory waste, motion waste, defects, waiting, and transport waste. These are often referred to as Shingo's seven wastes, named after Shigeo Shingo a pioneer in the lean or JIT philosophy.

The lean concept of reducing the amount of time it takes to change a production line or machine from one product to the next. See: one-touch exchange of die (OTED), setup time, single-digit setup (SDS).

1) The technique of using representative or artificial data to reproduce in a model various conditions that are likely to occur in the actual performance of a system. It is frequently used to test the behavior of a system under different operating policies. 2) Within manufacturing resource planning, using the operational data to perform what-if evaluations of alternative plans to answer the question, “Can we do it?” If yes, the simulation can then be run in the financial mode to help answer the question, “Do we really want to?” See: what-if analysis.

The six sigma approach is a set of concepts and practices that focuses on reducing variability in processes and reducing deficiencies in the product. Important elements are (1) producing only 3.4 defects for every 1 million opportunities or operations and (2) process improvement initiatives striving for six sigma-level performance. Six sigma is a business process that permits organizations to improve bottom-line performance by creating and monitoring business activities to reduce waste and resource requirements while increasing customer satisfaction. See: design for six sigma (DFSS).

A methodology that uses a set of management tools and techniques for the improvement of business processes. The intent is to reduce the probability of an error or defect by decreasing process variation and improve product quality.

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Term
Spread

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Term
Statistical process control (SPC)

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Term
Statistical quality control (SQC)

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Term
Supermarket approach

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Term
Supplier scheduling

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Term
Supplier-input-process-output-customer (SIPOC) diagram

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Term
Taguchi methodology

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Term
Upper control limit (UCL)

The application of statistical techniques to monitor and adjust an operation. This term often is used interchangeably with the term statistical quality control (SQC), although SQC includes acceptance sampling, as well as statistical process control. See: out-of-control process.

Variability of an action. It is often measured by the range or standard deviation of a particular dimension.

A way of managing inventory and improving picking by making all parts easy to take off of a shelf, much like the shelves of a supermarket. Inventory is then restocked in such a way that employees always have easy access.

The application of statistical techniques to control quality. This practice includes acceptance sampling as well as statistical process control. However, the term is often used interchangeably with the term statistical process control.

A high-level process map that shows substantial subprocesses in an organization's process together with the structure of the process represented by the suppliers, inputs, outputs, and customers. A SIPOC diagram defines the critical aspects of a process without losing the overall perspective.

A purchasing approach that provides suppliers with schedules rather than with individual hard-copy purchase orders. Normally, a supplier scheduling system will include a business agreement (contract) for each supplier, a weekly (or more frequent) schedule for each supplier extending for some time into the future, and individuals called supplier schedulers. Also required is a formal priority planning system that works well because it is essential in this arrangement to provide the supplier with valid due dates. Syn.: vendor scheduling.

Control limit for points above the central line in a control chart.

A concept of off-line quality control methods conducted at the product and process design stages in the product development cycle. This concept, expressed by Genichi Taguchi, encompasses three phases of product design: system design, parameter design, and tolerance design. The goal is to reduce quality loss by reducing the variability of the product's characteristics during the parameter phase of product development. Syn.: Taguchi methods.

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Term
Value stream

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Term
Value stream mapping (VSM)

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Term
Variation

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Term
Virtual cell

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Term
Voice of the customer (VOC)

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Term
Waste

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Term
Workplace organization

A lean production tool to visually understand the flow of materials from supplier to customer that includes the current process and flow as well as the value-added and non-value-added time of all the process steps. It is used to help reduce waste, decrease flow time, and make the process flow more efficient and effective.

The processes of creating, producing, and delivering a good or service to the market. For a good, the value stream encompasses the raw material supplier, the manufacture and assembly of the good, and the distribution network. For a service, the value stream consists of suppliers, support personnel and technology, the service producer, and the distribution channel. A value stream may be controlled by a single business or a network of several businesses.

A logical rather than physical grouping of manufacturing resources. Resources in virtual cells can be dispersed throughout a facility. Product mix changes may change the layout of a virtual cell. This technique is used when it is not practical to move the equipment.

A change in data, a characteristic, or a function that is caused by one of four factors: special causes, common causes, tampering, or structural variation.

1) Any activity that does not add value to the good or service in the eyes of the consumer. 2) A by-product of a process or task with unique characteristics requiring special management control. Waste production can usually be planned and somewhat controlled. Scrap is typically not planned and may result from the same production run as waste. See: hazardous waste.

Actual customer descriptions in words for the functions and features customers desire for goods and services. In the strict definition, as related to quality function deployment, the term customer indicates the external customer of the supplying entity. See: design for six sigma (DFSS), form-fit-function.

The arrangement of tools, equipment, materials, and supplies according to their frequency of use. Those items that are never used are removed from the workplace, and those items that are used frequently are located for fast, easy access and replacement. This concept extends the idea of “a place for everything and everything in its place.”