Production Technology MAP

January 2009

Guide to Strengthening Constitution

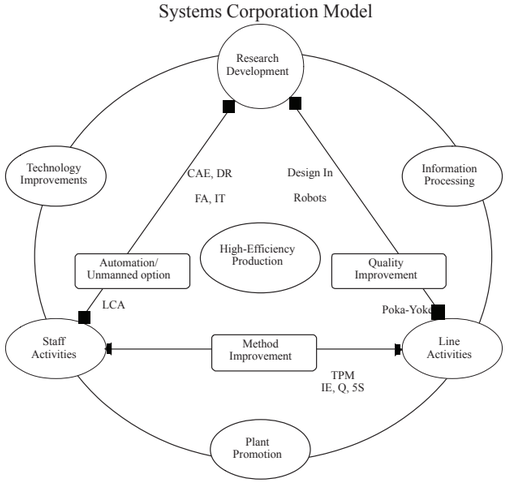
Main Techniques	Representative Examples
Work Design (WD)	Step-by-Step Approach — Material Engineering Innovation
System Engineering (SE) Design Review (DR)	Materialization of Ideal System — Unmanned Operations and IT Controls
Low Cost Automation~ TPM Countermeasures	Equipment Improvement — Utilization of Poka-Yoke Devices and Sensors
Value Engineering (VE)	Measuring Instruments Jig Improvement — Improvement of Karakuri
Video Analysis for IE, QC	Standardization Countermeasures — ISO 9001
	Human Skills — Craftsmanship: Precision Surfacing and Spinning Machining Techniques

Policy: Promote technological improvement and innovation in a systematic manner while reflecting the corporate identity.
1. Establish a technological innovation program based on the five stages of design—People's knowhow -> Methods -> Measurements -> Equipments -> Items
2. Set up benchmarks and systematically promote a step-by-step and continuous development of production technology countermeasures.

A Guide to Systems for Strengthening Production Technology MAP

Key points of activities:
1. Promote the thorough elimination of wastes.
2. Breakdown production technology into elements and introduce the low-cost and effective findings from other industries.
3. Set the future targets from the beginning and achieve them by understanding Ideals – Current Situation = Improvement Gaps

Systems Corporation Model



Application Procedures

1. Examine and set up numerical targets.
2. Examine status targets and develop the contents for achieving No.1.
3. Select efficient human development means for achieving No. 2.
4. Decide on the methods and contents of human development through aligning No.1 ~ 3.
5. (The same as the team building methods for team sports)

Specific Items and Categories
Numerical Targets ~ Follow-Up

Examples of Countermeasures

Examples of Excellent Companies to Be Benchmarked

low — high

Team Formation

Numerical Targets Follow Up

Indicator Setting

Specific Items	Examples of Countermeasures	Examples of Excellent Companies to Be Benchmarked	Level 1	Level 2	Level 3	Level 4	Level 5
Quality	Zero defects, claims; Halve near-misses DR at the development stage to get closer to zero defects	The Second Stage TZD Line Zero Defects, GE 6 sigma Cannon Design-in, use of CAE for design	Take measures based on defect statistics	Use of QTAT, attack one by one	Zero defects at the close-call stage	Zero defects for existing products	Zero defects from the stage of new product development
Cost	Maintain P-10 (10% profit rate). Materialize target costs.	Okano Industrial, Kyocera, Nissan's V-Shape recovery Suzuki's Choinori scooter	Minimum earnings and securing capitals	Maintaining small profits	Maintaining profits at the same industry level	Achieving P-10 and further progressing	Marinating more than P-10 level profits
Delivery, Production	Productivity of more than 2 million yen/person Halve delivery ~ shortest in the industry	Toyota, A-One Seimitsu, Nidec, INCS' 45-hour-die making, Dell	Occasionally take measures on problems	A few delivery problems/year	Average delivery and productivity levels	Better than average in the same industry	The benchmark level by others
Safety, Ecological	Zero injuries Achieve the world Co2 reduction goal (COP).	DuPont. Sanyo, Mitsui Chemicals, Seiko Epson	Taking measures on industrial accidents	Conducting KY T training and taking Eco measures	Zero injuries, Eco system established	Either safety or Eco at the industry level	Both safety and Eco at the industry benchmark levels
Morale	3 improvement ideas/person, autonomous improvement New technology study, 15% allowance	Softbrain, Google, Murata	Taking measures by setting up the month of suggestions	Pockets of active workplace with suggestions	Suggestions at level of workplace common sense	Autonomous improvement, 3/month/person	Suggestions directly linked with business needs

Management by Objectives

Specific Items	Examples of Countermeasures	Examples of Excellent Companies to Be Benchmarked	Level 1	Level 2	Level 3	Level 4	Level 5
Management Indicators	Profitability, efficiency, liquid assets turn-over rate Zero defect production	Omitted due to so many examples	Questioning achieving targets	Achieving 50% of activity targets	Achieving 80% of activity targets	Achieving 95% of activity targets	Achieving 100% or more of activity targets
Standard Manpower	> 100% std. time achievement rate + 3% improvement/mnth Day-to-day management by objectives	Old Canon Production System, Daily Management System by Takashi Harada	Use of ST based on actual results	Application of scientific ST to bottlenecks	Almost all is under control with ST.	Operates with ST + 3%/month improvement	Use of ST based on targeted time
Reviews in Advance	DR coverage rate, Vertical start-up of new products CE rate Systematic risk countermeasures (PPA)	Toyota's GD 3, Juken	DR is informal and confusion exists about new products.	Take preventive measures against past troubles.	Operate with DR system and obtain some results.	Address about 85% problems with DR	CAE and DR are at the benchmark levels

Status Targets Benchmark Improvement

Manufacturing Capabiliites

Specific Items	Examples of Countermeasures	Examples of Excellent Companies to Be Benchmarked	Level 1	Level 2	Level 3	Level 4	Level 5
Reviews in Advance	PPA (Problem Potential Analysis);DR (Design Review), CADAM - (Computer Augmented Design And Manufact.)	GE 6 Sigma, NASA's PPA, Taguchi Method, Toyota's GD 3, TZD Quality Function Tree Diagram	DR discussion from past experience	Operate with DR system, but still many problems.	Prevention of most of the past troubles	Cleared the method for world-wide measures	Practical DR deployment, at top level in the industy
Set-up Improvement	Automation of work loading and unloading, SMED Multi-pattern die exchange system	Toyota's Die Exchange, Hitachi Metal's Multi-Pattern Modeling Machine, MC in general	Set-up operations are left up to the workplaces	Taking measures for the priority set-up operations	Achieved SMED almost all set-up operations	SMED for changing to new products	One-touch set-up capabilities
Equipment Mgmt.	Zero failure production, preventative maintenance Alarm system, Machine checker	JIPM/PM award-winning companies' activities, Mitsubishi Electric's equip. monitoring and diagnosis sys.	Taking measures against accidental failures	Conduct preventive maintenance, cost problems still exist	Progressing with corrective maintenance	Improving failure countermeasures by prediction	Zero failures and increased speed
Automation	Low cost automation (including karakuri mechanism) DNC (Direct NC), FA Factory Automation	Aisin's Dream Carry, Kitchen Jiro's Tama Jiro, Sushi Robots, etc	Automation relying on OEM	Automation partly with machines made in-house	Operates with an in-house automation system	LCA measures are in place	Automation at the level sellable to outside
Zero-defect Production	Quality Assurance Status Chart (hazard countermeasures) QTAT (Quick Turn Around Time) countermeasures	Masakatsu Nakaigawa's Skill Management, Shigeo Shingo's and GE's Autonomous Process Quality Assurance	Countermeasures just for "death certificates"	QTAT application to hazardous areas	Promotion of preventive measures through ATAT	Complete app.of PPA countermeasure on hazardous areas	Operation of zero-defect lines
Technology Transfer	Skill Olympics, Skill transfer utilizing IT and transfer streamlining	Aisin's and Hitachi's Skill Olympics, INCS' 45-hour-die making	Passing down relying solely on workplace	Developing manuals for skill passing down	Developing skill passing down MAP	Some activities are models in the industry	Benefits at the new product development stage
First-Class Skill	Skill transfer strategy MAP, System for implicit knowledge ~ Sensitivity robot training system	CRM (Crew Resource Management), Okano Industrial, Nagashima	Passing down with memos and standards	Engineers finished analyzing the contents	Finish countermeas. except implicit knowledge	Analyzing implicit knowledge areas for passing down skills	Analyzing sensitivity levels and computerize with IT

Improvement Capabilities for Elimination of Wastes

Specific Items	Examples of Countermeasures	Examples of Excellent Companies to Be Benchmarked	Level 1	Level 2	Level 3	Level 4	Level 5
Connection Improvement	AGV, Automated storage, packaging automation SLP (Systematic Layout Planning)	Auto manufacturers' welding lines, Beverage manufacturers such as Kirin	Layout design based on knack and experience	Studied SLP and its partial application	Process evaluation with SLP and countermeasures	Materialization of the industry's leading linkage	High level including automation
Target Time Improvement	Work Design Zero-Look VE	Suzuki's Choinori scooter development, Brother's $390 facsimile	Mainly the collection of improvement ideas	Application of the 2nd Look VE	Application of the 1st Look VE	Application of the Zero Look VE	Application of WD
Hazard Countermeasures	Food AIB Audit, Earthquake Hazard MAP Design, CAE (simulation for weak point prediction)	TZD Research Group II companies and Food Contamination Research companies, SolidWorks Japan	Risk Management left up to the workplaces	Placement of person in charge in each hazardous area	Company-wide deployment of hazard analyses	Clarify hazards and establishment of preventive measures	Establishment of measures for mgmt. by small manpower
Defect Countermeasures	QC, FTA, FMEA, Design-In	Canon's design-in, Honda's design-in with affiliated companies	Completion of improvement tool education	Expecting natural generation of improvements	Linking organizational issues and improvements	Smoothly operating preventive measures	Operating taking countermeasures at the source
IE - 5S Improvement	IE, PTS Method, 5s directly linked business management Workplace improvement idea activity, Cell production	Toyota's OJT, Kawamura Electric's measures to turn around from red-ink, Canon Toride Plant's Cell/Meister System	Completion of improvement tool education	Expecting natural generation of improvements	Linking organizational issues and improvements	Cleared the industry level	Activities at the industrial benchmark level
Autonomous Maintenance	TPM step, small group activity MTBF, MTTR analysis, PM study outside the company	JIPM/PM award-winning companies' activities	Mainly equipment maintenance	Introducing TPM	Established autonomous maintenance	Detailed corrective improvement on equipment	Taking countermeasures at the source
Workplace Task Forces	FTP (Forman Taskforce Project) Mutual diagnosis	Nissan Diesel's 3-day improvement	Doing improvement without much resources	Improvement during the company's allocated time	Began forming specialized improvement teams	Active improvement teams for high level improvements	Improvement activities at the benchmark level
Supplier Supports	Associated company support system, diagnosis, audit Joint VE	Honda America's design-in, Nidec President Nagamori's measures against Sankyo Seiki	Guidance based on contracts	Inviting suppliers to in-house education and training	Implementing auditing and support system	Operating the support system with dispatched personnel	Operating an integrated improvement system
Total Participation Improvement	TP Management Balance Score Card	Hitachi Singapore, Toshiba China, etc.	Set budgets and leaving the rest up to the workplace	Implementing bottom-up adjustments	Incorporating objectives with improvement	Applying the world-class level methods	At the benchmark level

Human Resource Development

Workplace Management Capabilities

Specific Items	Examples of Countermeasures	Examples of Excellent Companies to Be Benchmarked	Level 1	Level 2	Level 3	Level 4	Level 5
Workplace Mgmt. Technology	QWL, MBA, BMP ~ Coaching	Many companies' flat organizations, Toyota's Workplace Management	QWL is taught somewhat	Specific outputs are set	Develop people based on each individual's theme	Materializing the world-class level	At the benchmark level
JIT - SCM	JIT, Kanban system, AP (Action Plan) system SCM Network	Toyota, Tabio's SCM system form socks production to sales	Completed the study of JIT/SCM	Start implementing JIT/SCM in the company	Operating JIT/SCM	Appling JIT/SCM including IT networks	At the benchmark level
Movement Mgmt.	Bar code production control, designated placing control Pull system	7-Eleven and suppliers, Panasonic's home appliance production	Manage actual materials through stocktaking	Operate the mgmt. through designated addresses	Finish integration of materials and information	Manage with an integrated system through IT	At the benchmark level
IT Online Mgmt.	SAP, Lan, Production Control System MRP	SAP user companies, Uchida Yoko's SuperCocktail, a food management system	Manage actual materials through stocktaking	Apply IT/Production control systems	Operate with optimization through production planning	Implement autonomous responses to changes	At the benchmark level
Various Visualizations	Prodn. Control Board, Abnormality indicator lights, Placing Control ~ New Product Start-up, PERT	TP Deployment Chart user companies (for example, Sekisui)	Implement various visualization measures	Problems become surfaced (after the fact)	Partially implement preventive measures	Visualization centering around alarm systems	At the benchmark level
Attached Information Management	Designated location control, die charting IT Inventory Control	Iwane Springs' one-piece production and sales	Manage actual items based on hand-written information	IT based inventory control with after-the-fact problems	Implement alarm systems based on IT utilization	JIT Management system	At the benchmark level
Alarm Management	Hardware Pokayoke , Software Pokayoke Various sensing devices	Daikin's Air Conditioner Life Management, Komatsu's GPS Forklift Utilization management	Report, communicate and consult as problems occur	Organized the contents of possible problems	Implementing Pokayoke systems	Fully operating JIT alarm systems	At the benchmark level

Consciousness Innovation

Specific Items	Examples of Countermeasures	Examples of Excellent Companies to Be Benchmarked	Level 1	Level 2	Level 3	Level 4	Level 5
Materialization of Model Lines	Champion Challenging Model, Materialization of Meister Line ~ Enhanced stimulation	Canon Toride Plant's Cell, Toyota's RAV4 Line, Olympus' superior operations	Ad hoc HR development	Organized HR development and outputs	HR development according to clarified outputs	Future-oriented HR development based on a model	The overall HR development led by the model
On-site Studies	First-Class Line Study Visits Introduction of speedy OJT education	Negoro Sangyo's recycling, Juken's1-100mm gears	Visiting other companies just for stimulation	Apply the learning from the other companies internally	Visit other companies based on objectives	Other companies' levels are simply for evaluation	At the benchmark level
Case Presentation Conferences	Skill Olympic Competition, Open Set-up demonstration Audition Professional Education	Craftsmanship education (Nagashima's precision surfacing training, Panasonic's craftsmanship training Dojyo)	Repeat scheduled presentation sessions	Corporate objectives and the contents of presentation linked	Business objectives + advanced models	Business related information sharing superior technicians	Improvement activities at the benchmark level

Off JT Education

Specific Items	Examples of Countermeasures	Examples of Excellent Companies to Be Benchmarked	Level 1	Level 2	Level 3	Level 4	Level 5
In-class Education	OJT, Deployment of 3-Gen concept Output pre-setting (TFP type education and training)	Companies practicing a training system for special skills in other companies	Training in response to the needs of the moment	Pursue the number of trained and achieve certain level	Business-related training by strategic themes	The same as the above with increased levels	Improvement activities at the benchmark level
Small Group Activities	Small groups directly aligned with business management Vertically organized small improvement group activity	Toshiba, Hitachi Diesel, and others' improvement activities by self-nomination	Activities imitating other companies	Driven by presentation session intent of stimulation	Business problems and the activities are linked	Sm. group activities directly connected to business	At the benchmark level

OJT Education

Specific Items	Examples of Countermeasures	Examples of Excellent Companies to Be Benchmarked	Level 1	Level 2	Level 3	Level 4	Level 5
Coaching	Guidance for management by objectives, Evaluation for 5-level achievement~ Day-to-day recording countermeasures	Kyocera's ameba-like organization, Takashi Harada's Daily Mgmt. by objectives and measures for achieving target levels	Management methods at the level of QWL	Practical management methods	Management to foster the merits of individuals	Practical application to foster miesters	At the benchmark level
Job Enlargement and Multi-skills	Countermeasures ~ Evaluation for multi-skills Evaluation system for merits	Nippon Ham's evaluation system for 5-skill level achievement and merits, Daikin's skill MAP	Fostering single-skilled workers and T-type development	Workers skilled at overlapping processes	Developing workers to be multi-skilled at three processes	Multi-skilled workers in the entire processes	At the benchmark level