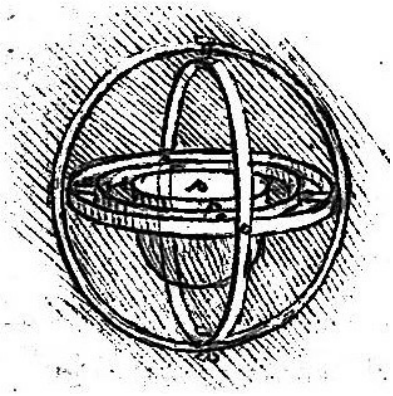
Hoshin Kanri for the Lean Enterprise, 1st Edition

Companion CD
Volume 2



Volume 1 contains PDFs of templates and instructions for Chapter 8 of *Hoshin Kanri for the Lean Enterprise*. Templates, tools and instructions for Chapters 1-7 will be found in Volume 1. All of these documents originally shipped with the 1st edition on a CD-ROM.

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Standardize Work	Standards not documented. No two people could do same job twice in the same way if they wanted to.	Some standards documented. Training sporadic. Adherence to standards very poor.	Everyone trained in how to create & maintain standardized work, but standards still documented by engineers. Adherence to standards poor	Hourly associates & staff document standards. Good adherence because of understanding and buy-in. Standards reinforced by effective audit system.	Standardization of work content, sequence, timing, & work-in-process inventory obvious "at a glance". Standardization used to drive kaizen activities
Flow The process	Non-value adding waste chokes process flow. Value-added ratio < 5%. Flow not a primary consideration of layout. Process flow looks like a bowl of spaghetti	Individual strategy of waste elimination & variability reduction seen as thrust of lean enterprise. Value stream mapping begins.	Value stream mapping techniques taught to all. Flow of products & services improves as gross process waste identified & removed.	There is a good flow of products & services as waste in operations greatly reduced. Product flow primary consideration in advanced engineering and product development.	Direct flow of products & services w/ little process or operations waste. Goods & services flow like water as waste of movement is addressed systematically.
Zero Ambiguity	Customer requirements unclear in daily work. Poor feedback & feed forward hinder supply chain management.	Customer and supplier requirements clear and data being used to evaluate and improve performance	Visual controls such as kanban introduced in all business functions to clarify customer requirements. Feedback/feed forward improved.	Visual control systems identify defects, errors, & abnormalities & support real-time problem solving.	Visual controls replace written standards. Systems anticipate customer.
Speak w/ data (PDCA)	No plan-do-check system. Problems go unaddressed for years.	The company firmly grasps concept of PDCA and its central role in lean enterprise. New PDCA system designed.	New plan-do-check system formally introduced. Managers & associates systematically trained in PDCA methods. Old problems addressed but new ones crop up quickly.	A sound plan-do-check system focuses on defects & errors. New problems addressed as y are.	A refined plan-do-check system focuses on abnormal conditions. Problems anticipated before they occur.
Develop Leaders Who are Teachers	Leaders are bosses. People expected to do what the boss says. Messengers who carry bad news are frequently shot.	Leaders see potential in their people, but most training dollars still spent on managers.	Development of leaders who are teachers begins as managers train in lean methodologies, & learn how to teach & coach workforce.	Decision making done at levels close to actual processes.	Managers come running when hourly associates & staff signal for assistance in solving problems.

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Diagnostic Form

Control point		Checkpoint		
Unit diagnosed	Production area A		Date	Month/day/year
Diagnostic team				
Diagnostic questions			• What problems did you encounter in pursuing the company's annual policy targets for this control point? • Did you use reliable, PDCA methods? • What problems do you foresee in the near future? • When do you expect the next improvements? • What information or resources will you require to reach higher targets? • What recommendations does the team have for management?	

Notes

scan	plan	do	check	act
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		mass	Management Systems			lean
		scan	plan	do	check	act
plan	Strategy Design	No clear mission, vision, or long-term strategy	Improvement initiatives not linked to strategy or based on regular, companywide diagnosis. Plans focused on results, not process.	Some clear improvement policies emerge from diagnosis & analysis of last year's results, but analysis of critical problems & factors weak. Systematic training in hoshin kanri begins.	Annual diagnosis focuses on critical problems, but planning still focused on budget control. Profit plan strong but hoshin kanri still viewed as a formality.	Hoshin kanri is how you run the business. Improvement & breakthrough plans linked to a focused profit plan. Links and actions clear at every level of company.
	Metrics	No vision & no measurement system tied to vision. Management by results, not by means.	Attainment of departmental goals measured but not tied to vision. Company builds a "balanced scorecard" of process improvement measures.	Management by means begins. Some common objectives between departments measured companywide, but deployment is still not very strong.	All work teams have defined financial and process improvement goals all linked to attainment of vision.	Improvement goals visually displayed at each work area so all associates know status of projects. Key metrics reviewed in "real time" for rapid action
	Strategy Deployment	No clear organization, lines of authority nonexistent, misconnects & disconnects normal. No coordination of improvement activities occurs between different levels of organization.	Lines of authority clarified, cross-functional teams initiated to address chronic problems. Preliminary efforts at vertical & horizontal deployment & coordination of plans.	First full deployment completed. Policy plans & useful measures extend to floor level but horizontal coordination weak. Rational organization & division of responsibilities, cross-functional teams in most major areas	Good horizontal & vertical coordination w/ team targets linked to company goals. Good company alignment. Policy balances cross-functional teams & departments	Department, team, & individual goals reflect clear understanding of company goals. An all-weather organization that can respond to changing markets & technologies. Integrated corporate strategies cross organizational boundaries.
do	Strategy Implementation	The company doesn't have a sensei. Poor definition of roles & responsibilities & no training program has been developed to educate workforce in standardized work, process flow, customer linkages, or PDCA.	You find your sensei. Organizational roles & responsibilities redefined & a multi-year training program developed & launched to educate total workforce.	A team of lean champions & six sigma champions has been certified. y support management in implementation of annual hoshin & train associates as necessary in new PDCA methods.	Transformation program extended to all major areas of marketing, design & manufacturing & to your suppliers. Leaders certified at all levels in lean & six sigma methods & tools.	Everyone at every level adheres to standardized work & practices PDCA every day. The sensei can think about finding other work.
check	Business Operating System	No effective means of auditing & verifying implementation of companywide policies	Each area establishes own measures, reporting mechanisms exist, but reporting haphazard	Regular policy auditing & reporting established in all as, but not adhered to fully. Standards adhered to, but not in a timely manner.	Visual management tools help assure that links between policy, plans, & results timely & clear	Visual tools permit at-a-glance assessment of current conditions & progress. Hoshin fully integrated w/ business & quality operating systems. Corrective action taken in real time.
	President's Diagnosis	Management practices the "five who's," not the "five whys." Top managers rarely visit actual operations. When they do, they focus on results, not process.	Visits to line more frequent, but sporadic. Criteria for organizational development established & deployed.	First president's diagnosis completed, but review still mainly critical, not diagnostic.	Site managers visit line regularly. Managers understand their systems & can identify waste. Top management visits every site annually. Review diagnostic, not critical.	Visits to line occur daily. Managers can identify waste & explain tools & system changes required to eliminate it. Hourly associates & staff look forward to top management's visit.
act		No analysis of previous year's experience, only review of results. No long-range plans. Limited knowledge of core capabilities. No expectation of change.	The company models the future, but unsystematically. Differences between targets & actual results reviewed but not analyzed.	"What if" scenarios & core capability studies begin. Data support 3-5 year hoshin, but hoshin not clear or streamlined. Entire workforces trained in a standardized problem solving method such as PDCA, CEDAC or DMAIC. Target/actual analysis continuous & consistent w/ PDCA.	Grand strategy & 3-5 year plans consistent, but links to mid-term & annual hoshin weak. Feedback for next planning cycle. Good system in place to gather strategic ideas from all levels	Clear links between strategy, mid-to-long-range plans & annual hoshin, supported by PDCA at every level every day. Feedback procedures streamlined w/ easy access to companywide results, analysis, & ideas

	1	2	3	4	5
	mass	Finance & Accounting Systems			lean
	scan	plan	do	check	act
Profit Management	No profit planning. Company uses externally focused, GAAP-based accounting systems to maximize paper profits for Wall Street and minimize them for the IRS.	Focus on results does not ensure results. Share price eroding despite efforts to please Wall Street. Company begins to question its understanding of "profit."	Company adopts EBITDA or other valuation-focused measure of profit. External and internal accounting systems differentiated, but externally-focused system still dominates.	Internal and external accounting systems strictly differentiated, with internal systems focused on long-term cash flow improvement.	Profit planning has replaced traditional budgeting and is fully integrated with hoshin kanri. The company routinely meets its profit targets.
Performance Management	No evidence of any performance measurables. Results based measures used w/out awareness that they hinder improvement.	Performance measurables based on traditional accounting system but not reacted to. Top management makes balanced scorecard of financial & process improvement measures, but doesn't deploy it beyond the executive suite.	Measurables based upon traditional accounting, but now used to target improvements. Beginning to switch from financial to nonfinancial measurables, such as OEE, total people cost, inventory turns, etc. New scorecard deployed to managers & supervisors; but old financial measures still used.	Use of "balanced scorecard" or X-matrix to put tactics in place to improve nonfinancial measures, the true causes of financial success. New process improvement measures improved, results based measures support cause/effect analysis.	The company is focused on process improvements that build competitive capability. Performance measures are stratifiable to support front-line decision-makers as well as top-level strategists. Modeling of financial implications of various policy alternatives during strategy re-vision.
Cost Accounting	No evidence of standard costing or budgeting processes. No evidence of any process improvements.	Company run using traditional accounting tools such as standard costing & departmental budgets. Improvements based 100% on budget variance reporting	Company has a good idea of what product costs & runs departments based on variance from standard cost. Pareto analysis used to identify major improvement projects.	Overhead allocation based on activities caused by product flow. Company beginning to use kaizen or kaizen.	Kaizen costing & kaizen staples of financial system. Measurement system includes OEE, total people cost per unit, inventory turns, & customer satisfaction. Kaizen methods totally integrated into fiber of company..
Target Costing	Direct costs targets primarily set for materials. Model: Cost + Profit = Price. Company designs product, determines its costs, & adds in a profit to determine selling price. Cost reductions focused on material price.	Semi-structured process to identify direct product costs for "go/no go" product development decisions. Model: Cost + Profit = Price. Company designs product, determines its costs, & adds in a profit to determine selling price. Some cost reduction efforts during product development phase. "Targets" are set, but not met.	Structured decision process to evaluate & improve product development. Model: Price - Profit = Target Cost. Company identifies market price of a product, subtracts its required profit, & determines a true target cost. Target costs normally met, products.	Target costing process for product development, product costs evaluated & undergo value engineering to obtain lowest costs. Target Cost model uses marginal pricing strategy in estimating market price. Target costs routinely met on all major new product introductions.	Addition of vendors & customers into target costing process. Target cost model constantly challenges organization understanding customers' perception of value. Target costs regularly beaten. Savings realized. Companywide plan to attack all part numbers & beat all costs.
Strategic cost Management	No plan. Profits eroding. Designs of critical components dictated to suppliers. Heavy pricing pressures, but unable to reduce costs.	Contentious improvement attempts, price reduction pressure.	Informal lean liaison w/ customers & suppliers, moderate savings results. Seeking mutual benefit w/in framework of target costing.	Close working relationship involving many cross-functional teams, sharing information & technology based on long-term objectives. Kaizen framework well established both at company & key suppliers.	Formal lean programs w/ customers & suppliers, sharing of savings & knowledge. Mature lean product development programs w/ customers & suppliers
Life cycle Costing	Capital equipment expenditures are based solely upon equipment utilization. Maintenance budgets are prime targets for cost cutting. Plant and equipment in obvious disrepair.	Manufacturing has begun to implement OEE. Good information is created about equipment conditions, but finance questions need to restore equipment.	Finance now sees the value of OEE as a true measure of capacity and supports restoration decisions in most cases. Life cycle costing applied to capital equipment acquisition for the first time, with focus on maintainability and quick changeover capability.	Life cycle costing now applied to most equipment acquisition decisions, with input from maintenance and production. No new equipment decisions are sanctioned until production can prove exiting equipment achieves > 85% OEE.	Life cycle costing applied to all equipment acquisition decisions, based upon major input from production and maintenance.

	1	2	3	4	5
	mass	Human Resource Systems			lean
	scan	plan	do	check	act
People Are the key	Management & labor don't communicate, except over bargaining table or at annual address	Planning begins to radically decentralize decisions-making by empowering workforce. Initial discussions between labor & management leadership establish business direction & PDCA system implementation.	Further discussions address competitiveness issues & establish timing, responsibilities & expectations. Joint improvement teams have been established to address key areas such as quality, training, safety, & to establish appropriate directions.	Labor & management focus on PDCA system implementation. Key union leaders on board. Joint labor/management leadership can separate contractual from customer and industry sues.	Competitiveness jointly addressed to assure superior customer satisfaction & provide long-term job security. Improvement teams utilize most effective combination of hourly & management personnel to improve customer satisfaction.
Team Building	No structured work groups. Wasteful motion & too many associates. Fixed job assignments & poor balance.	Planning begins to involve entire workforce on teams Work groups forming. Roles & responsibilities defined.	Associates rotate jobs by shift, not by task. Team members set own goals, but not fully aligned w/ hoshin.	Most associates on formal teams. Supervisors trained in new coaching role. Halfway toward achieving smooth multi-process operations. Better alignment w/ hoshin.	Teams & work groups all trained. Cross-training charts posted to track versatility. Job assignments flexible. Company hoshin determines improvement initiatives.
Leadership Development	Only managers & new associates trained. No systematic training in PCDA methods.	Industry & benchmarks assessed & planning begins to develop all top, middle, & front-line managers in principles, concepts, & practices of lean enterprise	Company wide training in PDCA methods begins & leaders participate in teaching. One kaizen event per site in last 12 months. But skill transfer still sporadic & retention of methods poor.	Development programs support education & training in basic skills & PDCA methods. 6 kaizen events per site in past 12 months Training available to support company's hoshin.	Continuous training & retraining of office staff & machine associates in best practices systematized. 24 kaizen events per site in past 12 months.
Cross-training & Job rotation	Each associate only knows one job. No training or instructions. No formal rotation.	Each associate knows more than one job & has some training. Changes job monthly.	Each associate knows several processes & has some training. Rotation weekly or sooner.	Multi-skilled associate w/frequent cross training. Daily rotation.	Operations utilizing standardized work. Staffing levels vary by demand. associates rotated w/in shift..
Compensation & Recognition	Compensation based on hours & seniority, recognition arbitrary or based on seniority.	Industry & benchmarks assessed & planning begins to adapt best compensation practices to needs of business.	Performance-based pay initiated for managers, suggestion schemes initiated for hourly associates	Limited gain sharing, Recognition system based on monetary & nonmonetary motivators.	Variable pay based on gain sharing. Compensation & recognition clearly linked to company policy & PDCA measurables
Safety	Health & safety not a concern. Improvements reactions to government intervention. Numerous accidents each year, some serious.	Safety measures developed. Industry & benchmarks assessed, pilot projects completed, & planning begins to implement best safety practices.	Associates systematically trained to discover & eliminate unsafe operations. Occasional lost-time accidents, some serious.	Health & safety standard & procedures documented & clearly posted. Measures reflect improvement. No major lost-time accidents	Regular, standardized safety audits by teams & management reinforce safety standards. Factory almost accident free. Safety and ergonomics primary consideration in 3P (preproduction pioneering).

	1	2	3	4	5
	mass	Supply Chain Management Systems			lean
	scan	plan	do	check	act
Supplier Quality	Too many supplier quality issues. Supplier PPMs not measured. No feedback to supplier. Arms length relationships. All contact clerical in nature or reaction to problems. No cost reduction process.	Limited feedback to suppliers, all reactive. Suppliers' problems not found until they reach manufacturing. 100% Incoming inspection required.	Incoming inspection based on high PPMs or batch defect. Supplier inspects own material. Established supplier defect allowances. Chargebacks for defective material.	Audit of incoming inspection. Minimal defects guaranteed by supplier & top suppliers certified w/ no incoming inspection. Formal cost reduction activities in place.	No incoming inspection. Supplier involved in product development & problem resolution. Lean events held jointly w/ supplier.
Supply base Selection & Supplier Measurables	Purchasing & Engineering each try to impose own favorite suppliers. No supplier performance rating or scorecard used to monitor Technology, Quality, Cost, Delivery (TQCDs).	Purchasing & Engineering select suppliers together w/ some criteria to assist in decision making. Some site-based criteria used to score supplier TQCDs.	Project team makes final selection w/ some feedback. Purchasing covers production & non-production purchases, selects suppliers, defines needs, draws up contract or purchase order & begins to monitor supplier performance.	Selection based on a standard measurables used to monitor supplier TQCDs. Philosophy of a "win-win". Formal feedback sessions improve TQCDs. Suppliers, measured against annual goals w/ attention on productivity improvements.	Supplier base evaluated annually & action plans implemented for "kaizen". Suppliers receive regular performance updates / reports. Suppliers & customer work closely together for shared cost reductions.
Purchasing	Purchasing has no strategic direction & reacts to requests of other functions. Time spent on quick fixes. Little cross-functional communication. Arms-length dealings w/ suppliers norm. Buying criterion lowest price w/ supplier's role to provide goods or services that you can't make	Use competitive negotiation to challenge suppliers for piece price reductions.	Systematic training of purchasing in latest techniques & practices begins. Coordination links established w/ technical disciplines. Order processing & service characterize the process. Buying criterion lowest cost w/ supplier's role to provide goods or services in a cost-effective manner.	Purchasing strategies strengthen competitive position. Buyers now on sales proposal teams. Suppliers & associates seen as resources. Markets, products & suppliers continuously monitored & analyzed. Buying criterion to maximize mutual benefit w/ goods supplied according to customer requirements.	Purchasing fully integrated into firm's competitive strategy. Permanent lines of communication established w/ or functions. Performance measured in terms of firm's success. Buying criterion to maximize total supply network benefit w/ goods provided. Focus on value improvement & cost reductions.
Supplier Reduction and Certification	Quality certified suppliers < 5%. Too many suppliers who ship poor quality, chosen based upon lowest bid & immediate need. Many suppliers for single products. Change suppliers often. Contracts awarded strictly on piece price.	Several suppliers for each product.	Supplier reduction and development begin w/ focus on budget, management of finished goods & customer service. Quality certified suppliers < 50%. Suppliers drop in for goodwill visits & ask for quality assistance. A few suppliers used to keep competition & recovery.	Certified suppliers > 50% but < 90%. Company evaluates suppliers, carriers, & routes. Certification reduces number of suppliers. Most products have one or two suppliers. Self-certification promoted.	Supplier certification required. Certified suppliers > 90%. One supplier w/ long-term contract. Suppliers considered an extension of manufacturing process. Support provided to bring partners to world-class status. Daily deliveries.
Supplier Development	Doing nothing to improve supplier competitiveness. Demanding that suppliers have 3rd-party accreditation such as ISO or QS 9000, forcing suppliers to have internal systems.	Willing to help suppliers solve problems on an ad hoc bas. Response ranges from quick fixes to in-depth solutions.	Taking a systematic approach to helping suppliers improve. Training & certifying first-tier suppliers' internal lean champions w/ qualified sensei. A few JIT deliveries piloted. Suppliers sit in on lean training.	Systematic approach extends to suppliers in second tier.	Systematic approach to develop extends to key suppliers in second & third tier. Working w/ direct & second- & third-tier suppliers & customers. Flow techniques provide platform for competitive position.
Enterprise-level Scheduling	Focus on short-term distribution efficiency, w/ reactive management & preoccupation w/ cost. No Master Production Scheduling (MPS) w/ constraint based planning.	Master Production Scheduling (MPS) process in place. Sporadic or some use of lean or other improvement tools.	Cross-functional MPS process achieves smoothing & level loading & finished good's management. Enterprise Value Stream Map drives lean development activity.	Management of sourcing & production planning key to competitive strategy. MPS achieving stable production plans. Product-level value stream maps across entire business.	MPS integrated w/ a senior management review process. Product level roadmaps established to achieve future state maps.
Supplier of Choice	You do not measure your effectiveness as a supplier to your customers.	Your overall supplier effectiveness (OSE) low. OSE = external quality x customer cost x delivery performance.	Immediate steps ensure perfect quality. Value stream maps show opportunities for quality, cost & delivery improvements	OSE strong compared to your competitors, & steadily improving.	Delivery on demand w/ lean thinking & continuous replenishment. OSE > 98%.

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	mass	Information Systems			lean
	scan	plan	do	check	act
Workplace Organization	Hard for visitors to tell what goes where & when. Associates may or may not know either.	Unneeded items and information have been removed from the workplace or placed at a distance related to frequency of use. Factory uses outlining & location indicators for visual control,	The workplace is neatly organized. All items have a specific address and return address.	Clean, neatly organized w/ mess-prevention measures in force/	Lean culture is fully established. Associates would not return to old way of doing things if given the option.
Visual Control Systems	The workplace is full of ambiguous messages. There is no way to tell what internal or external customers want or how to satisfy them. Errors & abnormalities often occur & only create confusion,	Errors & abnormalities often occur & usually resolved in some way.	Supervisors & team leaders can tell when defects, errors & abnormalities occur.	Knowledge of customer requirements and how to fulfill them is encoded into the workplace .	Zero ambiguity about internal and external customer requirements. Immediate action taken to resolve errors & abnormalities
Suggestion System	No suggestion program of any kind, because there is no perceived value to company.	Still no formal suggestion program. There are some contributions, but no systematic implementation.	Companywide suggestion program averages less than 5 suggestions per person per year.	Companywide suggestion program averages 6-19 suggestions per person per year.	Companywide suggestion program averages > 20 suggestions per person per year.
Computer Architecture and Data Processing	Limited access to computers, use limited to administrative personnel. Batch updating overnight. Significant lags in data input.	Limited use in admin. only, & by individual shop on an "as need" basis. Batch postings at end of shift.	Two or more separate computer systems, still uses mostly paper. Frequent posting of smaller batches.	One computer system, links customers, vendors & production but w/ some paper. Data captured at time of physical processing.	Paperless factory, one computer system, electronic links to customers, suppliers. Real time online data processing.
Accounting/ MRP Systems	Outdated or legacy systems. Inflexible monolithic systems or disparate subsystems. "Canned" or preformatted reports or reporting on offline systems, spreadsheets & databases.	W/out dated or legacy systems, but enhanced by customized applications. Pre-defined customized reports.	Customized applications to support manufacturing & value added activities. Reporting supplemented by simple reporting module w/ minimal lead-time to prep new reports.	Modular applications w/ transparent integration. Flexible reporting modules. Customization on fly.	Modular, flexible systems based on commonized platform. Web-based interface w/ customers & suppliers. Addition of "drill down" reporting traceable to source documents & data.
Bill of Materials Accuracy	Several different bills of materials (BOMs) and/or BOMs in excess of 4 levels, many maintained on private spreadsheets. Quality has to physically measure parts to know what they are.	Multi-level Uncontrolled & inaccurate. Intervention required to make correct product.	BOM accurate, & includes all material required. Updated & controlled on regular bas. BOM used to backflush inventory.	Simplified , single-level BOM Use of phantom levels on BOM to facilitate pull systems.	One common single level BOM. Updating tied to engineering change process & timely. BOM simplified to only carry uncommon components.
Scheduling/ MRP	Push-based, build-to-inventory production planning. Little or no forecasting. Large expediting staff, premium freight & production disruptions. Little or no inbound/outbound tracking.	Some products based on build-to-order. Some products on pull in final process. Heavily dependent on forecasting. Few production disruptions, some expediting staff, industry average premium freight. Tracking of inbound/outbound limited to windows of 2 days or more.	Build-to-order production planning. Some build to inventory products. No expediting staff. Some premium freight & expediting performed w/in job functions. Key products tracked w/ automatic shipping notifications or some type of on-time delivery measurement.	Mostly build-to-order products. Many products on pull-based production systems. Minimal premium freight & expediting. Most inbound & outbound tracked w/ manual on-time delivery methods.	Many products based on pull systems. Virtually no finished goods inventory. Rarely any premium freight or production disruption. Web-based shipping notices. External pull systems in effect.
MRP System	MRP system inaccurate, not used on floor. Extensive use of off-line, manual systems. Significant non-value added work for material transfers.	Use MRP for short term scheduling. Significant amounts of adjustments & expediting due to inaccuracies.	MRP used sparingly. Near-term scheduling & planning. Pull systems being implemented for internal moves.	MRP used for inventory control, w/ receiving & back flushing only transactions.	MRP for long-term planning & external communication. Pull systems internally & externally for scheduling & authorization to ship/move.

	1	2	3	4	5
	mass	Quality Systems			lean
	scan	plan	do	check	act
Quality Organization	Large centralized quality control function. Inspection & quality decisions performed by QC. QC personnel check finished goods. Associates have no quality responsibility	Quality organization making decisions & process most product knowledge. Associates perform some quality inspection.	Quality organization performs roving inspection audits. Work w/ finished goods. Personnel to resolve quality sues. Associates perform go / no go tests	Inspection done as part of finished goods. Job. Quality organization training & auditing process. Associates perform Statistical Quality Control (SQC).	Quality Assurance organization focused on training, systems auditing, problem solving, & improvement processes. Associates 100% responsible for quality of the process.
Problem Solving Methodology	A few people familiar w/ PDCA tools. No poka yoke. Reliance on inspection or customer to find defects. Processes not designed defect-free.	Defects & errors identified, compiled, analyzed, & improvement actions implemented. Training in PDCA tools under way. Some type 1 poka yoke (can't accept); but not based on FMEA.	Everyone trained in PDCA tools. Tools applied widely & fully. Some type 2 poka yoke (cannot pass); some based on FMEA. Defects addressed where & when they occur.	Individuals & teams know how to select & use tools. Many poka yokes of all three types (can't accept, can't pass, cant' make) based on FMEA, but not focused on priorities. Rework prohibited.	Related tools used systematically. poka yoke based on FMEA, many type 3 poka yoke (can't make). All activities based on principle of zero defects.
Control	Random inspection-based controls in place. Process control data not monitored effectively or used as basis for improvement activity.	Limited statistical Process Control (SPC) or in-line inspection in place. Limited poka yoke in place.	In-line inspection being performed on periodic bas. Some poka yoke in place but not being validated. Inspection moving closer to point of source characteristic	Automated test equipment. "Cannot accept" poka yoke.	Automated inspection on majority of machines. "Cannot pass" poka yoke. SPC & process controls give associates real time feedback. "Cannot make" poka yoke.
Reduction of Variation and Six Sigma	Very high defect rate. No traceability of product through multiple streams of variation. No statistical controls or problem solving.	Multiple streams of variation w/ some limited traceability & standardized methods. Six sigma black belt trained. Starting to use statistical tools.	Reduced number of streams, product traceable but hard to manage. Some statistics used for control & problem solving.	Work standardized w/ a few streams of variation. Statistics being used to control & solve problems on regular basis, but not focused on priorities.	Standardized work adhered to. Problem solving & process controls institutionalized. Products go through one-path of variation. Poka yoke on all high-risk failure modes.
Standardization & Kaizen	No standards visible at job. Uncoordinated local efforts to address quality problems. High scrap and reject rate.	Some standards, but often hard to follow. Some coordination of companywide efforts, still reactive.	Standards for most problems, a few out of date or inaccurate. Plant quality data tracked & measured.	Standards for major problems in place & being adhered to. Info available to associates. More than 50% of workforce involved in some form of kaizen activity.	Standards for key quality problems easy to find & follow. Clear & accurate information about specs & reaction required. Full time staff train, implement, monitor, control. Companywide kaizen process ensures improvements incorporated into standards.
Value Added Work	Significant non-value added work; walking, waiting, getting parts. Task varies from cycle to cycle. Value added <35%.	Cycle fairly repetitive. Poor parts presentation & workplace layout. Value added 35%- 50%.	Parts and/or information presented to associates. Some wait time & wasted motions. Value added 50%-65%.	Associates focused on value added activity. Good parts presentation & workplace layout. Value added 65% - 75%.	Associates in constant motion performing non-strenuous value-added work. Good workplace layout. Little wasted movement. Value added > 75%.
Scrap Reduction	Process variability unknown. Scrap not measured. Raw materials not inspected. Problem solving does not exist. Scrap cost improvement >40%	Processes variable. Many paths w/no control. Scrap measured & raw material inspected occasionally. Problem solving sporadic. Scrap improvement 30% to 40%	Most processes in control. Many paths w/traceability, limited control. Measuring scrap in most areas. Sampling plans for raw materials. Organized problem solving. Scrap improvement 20% to 30%	All processes in control. A few controlled, identifiable paths. Scrap collection routine. Very little incoming inspection. Team-based improvement process. Scrap improvement 10% to 20%	No uncontrolled variability. One stream per product. Scrap reporting and reduction institutionalized. All suppliers certified or controlled. Prioritized improvement process using statistical tools. Scrap improvement 0% / 10%
Gage Control	No gage control. Gages in use w/ no formal documentation.	No formal Gage System in effect, but some calibration performed.	Gage Calibration established using NT traceable standards. All Gages identified, labeled, & documented.	Performs formal Gage Control & some Gage R&R (Repeatability & Reproducibility) studies.	Performs MSA (measurement systems analysis). 100% Gage R&R & documentation & calibration of all gages per NT standards.

	1	2	3	4	5
	mass	Marketing & Sales Systems			lean
	scan	plan	do	check	act
Voice of The Customer	No one listens to customer. No one knows what quality functional deployment (QFD) or why they may need it.	QFD not practiced. Customer sees product only after it's launched. No one knows what customer says let alone what she wants.	Marketing personnel have been trained in QFD, but voice of customer still not clear. Customer offered chance to comment on a prototype. Quality teams trained in QFD, but while customers' spoken needs sometimes met, unspoken needs not known	QFD & value engineering routinely applied & customers involved in critiquing prototypes. QFD captures voice of customer in a project for both marketing & engineering. Spoken needs met in all cases. Unspoken needs met in many cases.	Customers formally part of new product team from concept to design & execution. You know what customer dreaming about.
Market Segmentation	No good picture of value stream. Surveys infrequent. Markets not segmented.	Total value stream mapped. Regular surveys begin. Market segments sorted out w/ a product/market matrix indicating customer and product types and segment profitability. Company's strategic positioning reevaluated.	In next iteration of company strategy, major products are repositioned to meet needs of customers in specific markets and improve profitability.	Value streams well understood. Markets segments yield benefits to customers in the form of better products, and strategic benefits to the company in deploying its core capabilities.	Competitors, suppliers, & market trends well understood. Markets properly segmented & surveyed once a month.
Marketing & Sales Methods	Customers don't get right information. Prices based on cost-plus. Marketing and sales make promises that cannot be delivered because they don't understand company's processes.	Product-out orientation. Order-to-delivery process has been mapped & obvious problems fixed. But marketing and sales still cannot balance customer needs with the company's capabilities.	Marketing & sales staff trained to understand strengths and weaknesses of companies core value-adding processes.	Market-in orientation. Internal as well as external customers get information they need. Prices competitive. Order-to-delivery process has been streamlined.	Service orientation. Customers are perceptive. Product pricing based on perceived value. Order-to-delivery process runs like clockwork.
Customer Relationships	Firm has no system for managing customer relations & has a product-out market orientation.	Orientation still product-out but has begun managing systems for quality, cost & delivery.	Customer relations have been established. Market-in orientation reflected in company's vision & mission.	Customer requirements cascaded to all associates through policy deployment and visual management. Customer feedback to manufacturing & design is immediate.	Customer relations strong. There is a refined system of interaction & feedback. Customer needs anticipated. After sales service delights customer.
Perfect Service	Firm has no system for managing customer satisfaction. Customers don't know whom to turn to for service. Associates not well informed. Customer retention rates low.	Your service process mapped. Obvious problems fixed.	Marketing & sales staff trained in how to deliver perfect service. Key personnel are trained in problem solving, but problems are not always resolved at the root cause level. Therefore, the same concerns are sometimes repeated	Front-line associates empowered to please customer & have information they need to act. All associates trained in root cause analysis thus corrective actions get to root cause. No repeat concerns.	Entire organization organized to respond to customer requests. You regularly surprise your customers w/ great service. Customer requirements all addressed in system, process, & product design.
Knowledge of The Customer	Customer experience not tracked. Cross-functional communication contentious.	Only serious customer complaints tracked.	Systematic customer tracking begins, but cross-functional communication still a problem.	A cross-functional database developed to support front-line associates in serving customer. All customer concerns tracked, communicated, & corrective actions taken.	Cross-functional database tracks customer experience. associates can take appropriate & timely action to serve customers.
Brand Equity	The brand has no clear position. Don't know what customer says let alone what she wants in most market segments.	A brand charter created, but while customers' spoken needs sometimes met, unspoken needs not known.	Brand charter now effectively communicated to customer in all important market segments. Customer has clear idea of products / services and after sales support offered by the company.	Brand well positioned. Spoken product / service and after sales support needs met in all segments. Unspoken needs met in major market segments.	You know what customer dreaming about. Your brand excels at giving customers what they really want. Loyalty soars.

	1	2	3	4	5
	mass	Engineering Systems			lean
	scan	plan	do	check	act
Design Process	No gated product development system. Sequential engineering. Time to market much longer than average. Fragmented, sequential design cycle, no connection to manufacturing. No coordination of product lines.	Gated system planned. Sequential engineering. Incomplete information about customer. Design tossed "over wall" to manufacturing. Time to market much longer than average. Gates still lack discipline	Gated system established. Product development team leaders teams have been trained in program management. Concurrent engineering & manufacturing feedback used, but design review still weak.	Strong design review. Cross-functional & inter-organizational teams routinely used. Time to market on par w/ industry. Strong design review.	Company first to market w/ innovative products. Product managers heavyweights who report directly to CEO..
Design Platforms	Distinct product platforms & part variety proliferate. New product launches late, over budget, & don't meet customer expectations.	Company undertakes a serious parts-reduction program attacking obvious waste in product & parts variety.	Company develops a serious platform-based cost-reduction strategy	Product platforms, modules, & systems facilitate fast, flawless execution of engineering, order entry, documentation, procurement & creation of work instructions.	New designs require no new drawings. Running changes handled in factory. Supply chain fully integrated into zero engineering.
Design for X	Engineering knows best. No one listens to voice of customer.	Engineering can't hear voices of customer. Bureaucratic design control. No QFD or target costing.	Cross-functional team initiates TQCD design improvements using quality tools: QFD, target cost, FMEA, DFMA, DOE, Taguchi DOE, & VE.	Concurrent engineering applied to all new products & extended to rapid prototypes & reliability engineering.	Target costs routinely met on all major new product introductions. CAD/CAM & computer simulations introduced after process wastes eliminated.
Technical Risk Management	Risk analyzed by experts in undisciplined fashion after fact.	Risk management treated as a business process, but applied only to technical issues upon request.	Engineering staff trained in FMEA, its application still mainly pro forma.	FMEA scorecards always prepared for technical issues & sometimes to track schedule & cost.	FMEA scorecards proactively used to assess & clarify technical, cost, & schedule risk.
Preproduction Pioneering (3P)	Engineering throws product over wall to manufacturing, after ignoring what marketing had to say about customer requirements.	Cross-functional teams of engineering, marketing, production, & suppliers begin to cooperate in launching new products.	Marketing, engineering, & manufacturing trained in 3P.	Cross-functional "how's it built" review teams construct 2-D & 3-D models of process & brainstorm 7 alternatives for critical process steps.	Products designed to target cost, designed for lean production w/ guaranteed process capability. Quality built in into system w/ extensive poka yoke.
Process Capability	No process validations or validation on start-up only. Sporadic attempts improve process capability driven by crisis & major cost or quality problems. Little process capability data.	Industry & benchmarks assessed & planning begins. Validations w/ occasional supplier input. Management has little training on process capability & control techniques & training cascaded to workforce.	Validations routinely w/ supplier input. Management & leadership have been educated on process capability & control techniques & training cascaded to workforce.	Leadership & workforce aware of all incapable processes & can readily produce machine capability study data & corrective action plans.	Computer-modeled validations. Processes designed w/ data from computer validation history. Process & pre-control techniques in use. On-floor verification. Process in place to capture and act upon lessons learned
Launch Management	No understanding about launch risks. Organizational misconnects and disconnects are common.	Poor understanding about launch risks, including supplier deliveries, production, & shipment, service, & installation requirements.	Cross-functional launch team formed, but ramp-up still slow. Suppliers disorganized, & documentation is poor & training for sales & service	Launch improves, but documentation & training lag product availability. Product ready for market, sales & service ready for product.	Market ready for product, product ready for market, sales & service ready for product.
Environmental Impact	Low awareness of impact of products & processes. Regulatory noncompliance and fines commons.	Industry & benchmarks assessed & planning begins for implementing cellular manufacturing. Occasional infringement of regulations.	Initiation of programs to improve thru appropriate technology & equipment improvement activities.	Companywide programs for improving environmental conditions, compliance w/ regulations improved. Design process includes criteria for environmental impact	Full compliance w/ regulations in each market. Provides leadership in environmental affairs, useful to government as information source
Supplier Effectiveness	Unable to reduce costs. No plan. Profits eroding. Designs transmitted to suppliers from company; supplier feedback limited to cost	Industry & benchmarks assessed & planning begins for implementing cellular manufacturing	Supplier TQCD feedback solicited on new designs before finalization. Long-term contracts offered to best suppliers.	Formal lean programs w/ customers & suppliers, sharing of savings & knowledge. Involvement in design & analysis projects begins.	Supply partners & customers actively involved in product development from earliest stages. 85% of all suppliers have long-term contracts.

	1	2	3	4	5
	mass	Manufacturing Operations Systems			lean
	scan	plan	do	check	act
Balanced Operations	Operations not linked to previous or next operations. WIP between all stations.	Operations produce to predetermined schedule. Not linked to or operations. Inventory waits in queue for next processes.	Operations produce at varying rates, but linked to subsequent operations.	Processes produce at a planned cycle time based takt time. Constraints managed w/ safety stock. Transfer in small batches w/ minimal WIP. Production stops at predetermined WIP level.	All steps in process produce at takt time. Items move through process one at a time. Virtually no WIP.
Flow Production	Machines located in separate departments and buildings. Cannot see parts flow. Parts routings fixed. Flow arranged by types of processes, not by products or customers. Little FIFO & too much transport & overproduction.	Value stream mapping done & plan is made to realign processes into product families.	Production organized by product families. Product flow clear. Constraint processes identified. Lot sizes fixed.	Product flow close to 1:1 w/ standard packs at many processes. Processes grouped by product flow. Processes outside of flow linked w/ pull systems.	Processes set up to combine jobs to maintain productivity. Most processes that can be integrated into product-focused modules have a continuous one-piece flow.
Cellular Manufacturing	Single skilled associates run only one machine. Work not balanced. Inventory builds up between processes.	Process focused equipment layout. Material flow fragmented w/ a lot of WIP. Industry & benchmarks assessed & planning begins for implementing cellular manufacturing .	No min/max WIP levels; more WIP than needed. A product-focused JIT cell formed. Associates run several machines, but workflow & WIP isn't standardized. Quality, material flow, & responsiveness need improvement.	Product-focused cells. Min/max WIP levels established & controlled. operation visibly focused on customer. Multiskilled associates run several machines. WIP inventory standardized. Mistake proofing reduces defects.	Cell layout w/ one-piece flow. Lowest cost/unit. Cannot add WIP. associates only load equipment. Cells balanced & material movement ergonomic. Production boards display status of production vs. requirements.
Linear Staffing and Associate Utilization	Staffing level constant w/out regard to volume. No flexibility in staffing levels. One associate per machine. Associate waits on machine/process to finish cycle. associate utilization <50%.	Adjustment of staffing only accomplished for significant volume changes. Associate runs several machines of same process. Monitors operation. Utilization 50%-60%.	Limited, periodic staffing adjustments made based on projected output. associate runs several similar machines w/ some self-stopping features & poka yoke. Utilization 60%-70%.	Staffing levels adjusted daily based on production schedules associate loads/unloads several machines. Self-stopping features w/andon alert system. Utilization 70%-85%.	Staffing adjusted based on volume. Labor per unit constant or improving. Constant adjustments made during day. Associates only load w/auto eject. Run several machines w/andon alert system & self-stop. Utilization >85%
Jidoka	All processes require manual assistance. Oversized equipment designed for large lots & speed. No poka yoke. Defects passed to customers	Industry & benchmarks assessed & planning begins for implementing jidoka to separate human work from machine work.	Systematic training in jidoka & mistake proofing begins. Some machines equipped w/ automatic shut-off, but associates always present while machines work.	Human & machine work separate. Warning lights indicate when a problem occurs. process stops when an abnormality occurs.	Complete traceability of all parts & all attributes. Defect & error information helps teams create more poka yoke devices.
Constraint Management	All operations standalone. Workstations isolated & separated by obstacles and inventories. Measures suboptimal based on standards & efficiencies. Associates not grouped together. Machines different from each or & often there is just a single machine of each type.	Focusing on a few vs. all equipment based on cursory bottleneck analysis. Assembly lines dedicated to a single family of products. Assembly lines have fixed cycle times. Analysis of equipment. Work has been started on simplifying & standardizing equipment.	Bottlenecks identified & managed, but lack overall constraint focus. Limited inventory at non-bottleneck locations. Aftermarket requirements inform equipment & tooling. Workstation design not an obstacle in grouping associates. Some lines can work at different rates. Equipment simplified; a standard defined by process type.	No non-bottleneck inventories. Non-bottleneck operations run less than bottleneck & resources adjusted to bottleneck as required. Most lines can adapt to several different takt times. All new equipment complies w/ standard & in line w/ requirements of developed production system.	Bottlenecks identified. Overall performance linked and resources prioritized to bottleneck. All lines multi-process, multi-product and capable of producing at different takt times w/ no loss of productivity. No additional investment needed for aftermarket. Process Engineering & Production act together to simplify equipment.
Quick Changeover	No program to reduce setup times. Lot sizes = 1 or more weeks. Infrequent changeover requires 4 hours to 2 days. Tools & tooling disorganized, stored off-line or off-site.	Industry & benchmarks assessed & planning begins to reduce changeovers on constraint equipment & processes.	Training in changeover begins. Changeover teams separate internal & external changeover on constraint equipment. Setups reduced 50—80%. Lot sizes still too large.	Teams convert internal to external setup. Setup times now measures in minutes. Lot sizes standardized & support pull production. All associates trained.	One-touch changeovers done in 3 minutes on constraints. Tools color coded. Everyone follows a standard procedure. Lot sizes only a few hours.

	1	2	3	4	5
	mass	Maintenance Systems			lean
	scan	plan	do	check	act
Maintenance Management	No priorities assigned. No work requests or jobs planned. Schedules not issued. Utilization < 50%. VA time 10% to 15%. Labor reduction opportunity >40%.	Work orders written & top 10 priorities established. Approximately 25% planned w/ schedules being issued. No backlog. Utilization 50% to 60%. VA time 15% to 25%. Labor reduction 30%.	Work order flow established. Priorities definition established. 30% to 40% planned & scheduled. Compliance to schedule 50%. Building backlog. Utilization 60% to 75%. VA time 25-35%. Opportunity 20%	Work orders well controlled. Priorities established. 50% planned. Compliance to schedule of 60% to 70%. One-week workable backlog. Utilization 75% to 85 %. Labor opportunity 10%.	Clearly defined work order flow & feedback. Priorities ensure work performed. 60% to 70% planned & scheduled. Compliance 80% to 90%. Manage workable proactive project list to 2-3 weeks. Utilization >85%. VA 50% & no labor reduction.
Focused Equipment Improvement	Many breakdowns; OEE not measured. Company uses maintenance specialists. Result: many breakdowns & " fire-fighting" maintenance. Machine downtime not tracked OEE = 35—50%.	OEE baselined by a team of specialists. Planning begins to implement total productive maintenance (TPM) to raise OEE on constraint equipment to 85% or better. Downtime tracked but only as part of controlling direct labor hours earned	Systematic training in TPM begins. Company pilots preventive maintenance system. Downtime tracked & Pareto analysis done. Major reasons addressed. OEE = 50%--60%.	OEE = 60—85%. Company has preventive maintenance system installed & pilots predictive maint. All downtime tracked & addressed. Overall Equipment Effectiveness calculated & from 65% to84%	OEE > 85%. Company modifies machines to allow for computer diagnosis & prediction of problems. OEE >85%
Preventative Maintenance	No preventive maintenance (PM) program. All maintenance strictly reactive. Company has many breakdowns & lives in "fire-fighting" mode.	Company pilots preventive maintenance system, but lacks measures & tracking of results. Many missed tasks due to scheduling problems. No associate involvement.	Company has preventive maintenance system installed & pilots predictive maintenance. Autonomous maintenance improves maintenance response	PM program that measures performance & tracks results. Company wide usage of predictive maintenance tools.	Well structure, visible, organized PM system based on lean principles. Associates involved & based on FMEA. Company has modified machines to allow for computer diagnosis & prediction of problems.
Capacity & Throughput	Poor machine utilization. Unpredicted downtime. No predefined set-up times. Demand not achieved. Uptime <50%	Minimal scheduled set-up times. Planning occurs for machine usage. Frequent downtime. Uptime 50% to 60%	Non-value activities exist in set-up & downtime. Machine occasionally down. 70% to 80% uptime	Minimal non-value activities exist in setup & scheduled downtime. Rare downtime on machines. Schedule always met. 80% to 90% uptime	Minimal setup time & downtime. >95% uptime, >95% throughput. Demand always achieved w/in scheduled time.
Autonomous Maintenance	Company uses maintenance specialists. Associates "break it," and maintenance "fixes it."	Company completes steps 1-3 of autonomous maintenance on model equipment.	Steps 1-3 of autonomous maintenance completed on constraints. Company completes 4-6 of autonomous maintenance on model equipment.	Company completes steps 4-6 of AM on all equipment. Company completes all steps of autonomous maintenance on all critical equipment.	Autonomous maintenance concepts incorporated as standard for new purchased machinery.
Equipment Design	Finance department makes equipment decisions based on least cost. Manufacturing & maintenance have zero input.	Life cycle cost considered as an investment criteria. Equipment improvement teams gather data on problems w/ new equipment.	Finance, engineering, & maintenance personnel trained in life cycle costing, which applied to new projects.	Life cycle cost & QA major equipment investment criteria. Startup problems routinely documented & fed into design process.	TPM & MP (maintenance prevention) criteria guide design. Early equipment management data systems streamlined.
Early Equipment Management	Worn out tools, machines, no standardizing, new machines selected for availability	Book shelving equipment improvements, machines selected because of least cost	Process developed for standardization of equipment, new machines chosen for least cost/ piece	Limited standard tooling used, new machines selected for lowest life cycle cost	Standardized tooling, reduced life cycle costs, machines chosen based on reliability performance

	1	2	3	4	5
	mass	Materials Management Systems			lean
	scan	plan	do	check	act
Production Scheduling	Push-based scheduling. system difficult to comprehend. Daily production not tied to takt time. Supervisor sets schedule daily w/ frequent adjustments. Production instruction generated from printed schedule. Processes experience hour-to-hour variation in quantities w/ downtime & overproduction. Associates have to ask what to make next.	Planning begins to level production schedules to extent that natural variation in customer demand will permit. But MRP still used, based on forecast. Daily or weekly scheduling meetings. Adjustments made daily. Associates often still in doubt about status of production and don't know when the next changeover will happen.	Actual orders & demand used to schedule. Pull signals control most internal movement & production. Schedule fixed for weekly or daily requirements based on replenishing finished goods inventory. Associates usually know status of production and when the next changeover will happen.	Takt time, begins to control rhythm of production. Pull systems used to instruct final assembly, subassembly, & fabrication operations. Level production scheduled daily & in smaller, more frequent lots. Schedule visible to suppliers. Associates always know the status of production and when to prepare for the next changeover.	Completely pull-based scheduling. Kanban used to pull orders, signal production. One-piece flow dominates all intra-process steps. Associates & suppliers all know "at a glance" & in real time if customer requirements are being met. Practice of "one less" to discover limitations of system.
Kanban	No kanban, no visual min/max levels, and no FIFO lanes to control material movement. MRP transactions required to move material.	Some visual controls and FIFO lanes introduced but not visible or unambiguous on shop floor.	Min/max in-process inventories control material movement. FIFO lanes visible & unambiguous. Kanban implementation begins, but. system requires extensive maintenance. Interruptions result from material outages & schedule changes.	Kanban sized to support no more than a few hours production. All material flow synchronous. Signals & loop sizes reviewed periodically. Smaller lots, more frequent replenishment.	Kanban used to w/draw material from designated storage areas. Signal cycle 1 hour or less. Rules of pull strictly observed.
Raw & In-process Inventory	Large quantities of WIP. Not well organized or at fixed location. Inventory stored everywhere.	Limited WIP, amount controlled. Organized but not pull-based.	Well-organized, limited quantities of WIP. Replenished w/pull.	WIP standardized & controlled. Low levels of Movement on pull systems. Visual controls in place	Standard in-process stock level controlled. Kaizen efforts systemized to reduce inventory.
Stock Location	Quantities unclear but organized in central warehouse controlled by select few.	Mostly centralized, well organized & controlled. Some fixed point-of-use inventory, locations not clearly identified & controlled.	Some point-of-use, clearly identified & controlled. Good organization & visuals, but WIP sometimes accumulates between processes	Point-of-use locations throughout facility. Using supermarket replenishment for bulk items. Slow moving stock area centralized and controlled.	Point-of-use inventory close to production cells, controlled & delivered direct to production area by suppliers.
Material Handling	Stock picking & push methods used. Large lot sizes. Dedicated material handlers. Not convenient for associate use.	Assigned material handlers w/ large quantity moves. No standardization. Still not convenient for associate use.	Standardized material handlers w/pull signals, large lots. Some standardization. Improved ergonomics.	Frequent moves of small lots w/pull. Standard routes w/flexible material handlers. Flow racks make stock picking easy and efficient.	One-piece flow of material through process. Highly utilized, flexible material handlers.
Packaging & Containerization	Large pallets or bins used. Fork trucks required. No standardization.	Incorporating smaller, returnable type of containers. Containers over 40 lbs & not convenient to work space.	Most parts put into small totes at operation for better presentation. Some parts moved manually.	Repacking of material into "right size" container to perform task. Some returnable containers. Using tugs & manual movement of material.	Small, user friendly, returnable containers that can be placed directly at workstation. All containers less than 40 lbs.
Finished Goods	Finished goods stored in warehouse. Disorganized & mixed. Cannot determine inventory required to support customer demand. Over 1 month inventory on hand.	Finished goods in warehouse, organized & segregated. One week's inventory on hand.	Finished goods well organized. Quantities needed for customer demand easily identifiable. FIFO used. 3 days inventory on hand.	Finished goods visible to operation. Replenished w/ pull. 2 days of inventory on hand.	Finished goods level based on capability of process. Managed w/pull systems. Kaizen activities to reduce finished goods inventory. Less than 1 day of inventory on hand.
Outbound Shipping	Finished goods in warehouse pulled when truck at dock. Some staging done but methods & procedures unclear.	Staging used but not tied to outbound schedule. Not managed.	Staged at fixed time before shipping. Problems found too late. No corrective action process	Staging used, problems found & fixed. Corrective action taken	Staging used w/ some degree of "live loading".