World Class Manufacturing

Audit Criteria

8 Technical Pillars:

- Safety
- Cost Deployment
- Focus Improvement,
- Autonomous Maintenance
- Professional Maintenance
- Quality Control
- Logistic
- People Development

Audit Criteria Guidelines

a) Evaluation score ranges from level 0 to level 5, in that level 0 is the first in the evaluation scale.

b) Evaluation score is expressed in integers and decimals can not be used.

Example

If a pillar should get a 0.8 points equivalent evaluation, the official score will be 0, since the implementation of level 1 has not been completed yet.

The same is for level 2 ~ 5.

Technical Pillar Criteria

Safety

Criteria to evaluate achievement score – Safety & Working Environment

(1) Safety Scores

0. [No action]

- There are almost no activities to improve safety.

Criteria to evaluate achievement score – Safety & Working Environment

1. [Reactive]

- 1)There is an appointed person responsible for safety and an organization including finance.
- 2) There are reports of accidents (fatal, severe, lost time), and non-absence accidents with investigation and countermeasures taken.
- 3)Safety statistics (S-matrix) available. Separation between routine work and non-routine work made. Classification of areas :
  [AA covers 50% of area of the safety concerns; A up to 70%; B, 90%; C, 100%.]
- 4)Register and compliance analysis of legal safety requirements.
- 5)The site manager and team are aware of legal and company safety standards.
- 6)Legal, statutory and business safety information is displayed, the basics followed with compliance gaps covered by an action plan.
- 7)Plant and equipment visually appears to conform to all legal and company safety standards.
- 8)Machinery safety guarding is visually compliant with safety standards.

Criteria to evaluate achievement score – Safety & Working Environment

- 9)Site meets basic safety standards for pedestrianization (walkways are clearly marked out and free from clutter), control of vehicles, work at height, etc.
- 10)Emergency plan and facilities in place for accident, fire, explosion, etc.

Criteria to evaluate achievement score – Safety & Working Environment

2. [Preventive, the model areas]

- 1)Site safety steering group established and functional.
- 2)Evidence displayed about the safety communication system within the plant.
- 3)The principle of Heinrich pyramid understood and used.
- 4)Safety data collated and analyzed
- 5)All injury incidents are reported, thoroughly investigated up to root causes (lack of knowledge, skills; unsafe tools, equipment; unsafe procedures, system; poor attitude, behavior; lack of care, attention; personal conditions).
- 6)Correct usage of S-RCA (for accidents and non-absence accidents).
- 7)Countermeasures to avoid repeats for the similar injury in the similar areas implemented.
- 8)The Pareto diagrams of root causes against accidents and non-absence accidents (separately) made.
- 9)Professional safety tools in place and used (Responsibility matrix with named persons with H+S responsibilities, accident trend analysis).
- 10)Visual safety standards at the right places, standards gap analysis.

Criteria to evaluate achievement score – Safety & Working Environment

- 11)Housekeeping 5S in model areas and a good standard elsewhere.
- 12)Correct way of risk analysis (risk assessment + risk prediction) in place and job safety information available.
- 13)Risk analysis made up to detail of necessary level (operation level, task level, movement level).
- 14)Proper risk analysis for non-routine work.
- 15)A safety improvement action plan in place, displayed from the model areas.
- 16)Management SMAT applied and correctly used.
- 17)S – RCA + TWTTP
- 18)Management SMAT schedule displayed and up to date.
- 19)Basic occupational health system in place (eye sight and hearing regular checks, etc.).

3. [Preventive, all the major areas]

- Regular meetings of health & safety steering group chaired by the plant manager which sets objectives, assesses progress and identifies resource requirements.
- Evidence of regular compliance checks with national safety legislation plus an action plan.
- Up to date safety information boards including green cross
- Safety pyramid of incidents is displayed, regularly updated.
- Written local standards and procedures with full of sketches are available and communicated.
- Safety data from fatal, severe, lost time, non-absence accidents, near misses and unsafe acts fully analyzed up to root causes.
- Formal recorded safety risk analysis carried out, reviewed and updated.
- There are visible safety standards established by risk analysis (pillar and workshop boards active, PPE requirements, etc.)
- A fully developed action plan and preventive countermeasures prioritized against accidents and non-absence accidents in the past.
- Effective H&S management system in place.

Criteria to evaluate achievement score – Safety & Working Environment

- Manager uses SMAT as a reinforcing tool : Visible SMAT audit schedule displayed – and 100% adhered to by the management . Root causes of unsafe behaviours analysed with corrective actions.
- Evidence of contractor involvement in safety program.
- FI of LTA : ca 1 against 1M worked hours, GI of LTA : ca 1 against 1M worked hours,

  FI of NAA : ca 10 against 1m worked hours.
- Occupational health program to include : an active program to reduce noise exposure where significant, health assessment and job risk assessment for all employees.
- Evaluation of total site risk level.

4. [Proactive, the model areas]

- Shape of safety pyramid is positive.
- Risk analysis made up to detail of necessary level (operation level, task level, movement level .Human nature, physical & psychological conditions, personal characters and impact of the features of the workstation on human nature).
- Team initiated safety activities with more eyes.
- Demonstrable involvement of employees at all levels in safety system development : Employee participation in all areas is evidenced by use of check lists, identification and control of hazards, and employees involved in SMAT type observations.
- Autonomous safety model areas fully active and successful. People are responsible for their own safety, and take countermeasures autonomously against safety problems.
- All near misses and unsafe acts are reported, thoroughly investigated up to root causes and countermeasures are implemented. The observation of the near misses, unsafe conditions and acts are decreasing steadily after the increase of the number of observations and taking proper countermeasures against them.
- Root cause analysis is made up to at what stage (recognition, consciousness, judgment and act) unsafe act takes place. S- RCA + TWTTP + human error identification at one of four phases and its proper countermeasures.

Criteria to evaluate achievement score – Safety & Working Environment

- Assessment of safety leadership by use of employee attitude questionnaires – determine appropriate action plan.
- Employees in all areas demonstrate their participation in the safety management program:
  - Shift, daily, weekly safety inspections and check sheets.
  - Regular use of dynamic risk assessments.
  - Identification of a significant number of unsafe conditions and acts.
  - Involvement in the risk analysis process.
  - Ownership and contribution to safe working procedures. System to create motivation to record all kinds of near misses, unsafe condition and acts.
  - Employee participation in incident investigations.
  - Employee writing of SOP's
- Autonomous safety model in place with significant involvement and risk reduction.
  - Eliminating or reducing risks where possible
  - Workplace and work practice improvements in safety
  - Evidence of contribution and involvement of team members
- Safety pillar board and workshop boards are maintained to a high standard.
- The site has good levels of housekeeping (5S) in all areas.

5. [Proactive, all the major areas]

- Proactive approach to safety.
- No Lost Time Accidents for the last three years. No NAA for the 1 year.
- Safety leadership at all levels is visible and appreciated by the employees.
- Employees take leadership in some elements of the safety program:
  - Use SMAT skills to change behaviors in the workplace
  - Coach and train other employees
  - Review SOP's + risk analysis
  - Demonstrated evidence of continuous risk elimination/reduction.
  - Analyze near miss incidents and unsafe acts
- Health campaign.
- Health advice to include well-being program (diet, weight, obesity, smoking and stress issues).
- All employees are fully informed about relevant health and safety issues.
- Checking body age and actual age.
- Employee satisfaction for health and safety.

Criteria to evaluate achievement score – Safety & Working Environment

- Employee questionnaires demonstrate continuous improvement and high levels of employee satisfaction with health and safety.
- Autonomous safety is a way of life in the plant.
- Contractors and suppliers actively involved in safety improvement program.
- Intrinsic safety design for equipment and process.
- Intrinsic safety design for workshop and plant
- System to make people not able to make mistakes.
- Safe driving during commuting.
- Fully implemented Safety Management System.

Cost Deployment

Criteria to evaluate achievement score – Cost Deployment

(2) Cost deployment Scores

0. [No CD activities]

- No proper understanding, definitions and measurement of waste and losses.

Criteria to evaluate achievement score – Cost Deployment

1. [First cost deployment is made]

- 1)Operations & finance have a basic understanding of how to identify waste and losses.
- 2)A rough system for measuring and recording waste & losses is established.
- 3)Construction of a qualitative A matrix has been completed by a cross-functional team.
- 4)An effort to change the qualitative A matrix to a quantitative A matrix has been made.
- 5)The difference between causal losses and resultant losses clearly understood. B-matrix available.
- 6)Data collection sheets have been devised and used by operations to get accurate data as much as possible.
- 7)Approximate translation of waste and losses into cost. C-matrix available. (There is a lack of cooperation between Finance and Production).
- 8)Projects are listed in D Matrix.
- 9)The team can, almost correctly, identify the right methods/tools to attack the waste and losses.

Criteria to evaluate achievement score – Cost Deployment

- 10)The benefit/cost ratio has been estimated in E Matrix
- 11)Some projects selected based ICE analysis to prioritize activity and activity programs created.
- 12)There is an improvement plan and progress is monitored using the F matrix. For each project a project manager selected. But the results of improvement activities not financially checked yet.

Criteria to evaluate achievement score – Cost Deployment

2. [Cover more than 80% of WCM perimeter, not detail enough]

- 1)Second ~ forth cost deployment is complete (covering more than 80% of cost base of plant, i.e., total plant costs excluding depreciation and external logistics cost).
- 2)Clear understanding where major losses are (stratify).
- 3)A quantitative A-Matrix has been made and the plant manager and CD pillar leader understand the major losses.
- 4)All major waste and losses are identified jointly by the co-operation between Finance and Production.
- 5)B-Matrix correctly separates causal losses and resultant losses and these are clearly understood by the plant manager and CD pillar leader.
- 6)C-Matrix almost correctly translates waste and losses into cost.
- 7)D-Matrix correctly identifies projects in detail based on the loss definition at a single workstation/root cause level for major losses using the joint effort of operations and CD pillar leaders.
- 8)Each D-Matrix project identified has a consistent approach to the ICE analysis involving operations, finance and pillar leaders and right correct projects have been selected.

Criteria to evaluate achievement score – Cost Deployment

- 9)E-Matrix assesses the cost and benefit of each prioritized project.

- 10)F-Matrix plans details the timeline for each stratified project and assesses the assignment to a manager/team leader.
- 11)The plan includes the time for each phase of PDCA or systematic application of the pillar steps.
- 12)F-Matrix plan has a logical projects distribution across the year.

- 13)F-Matrix is produced for each pillar leader, to provide a focus of activity, to include basic project planning, team selection development and support resources.

- 14)Cost deployment pillar team uses the F-Matrix at the weekly pillar meeting to assess the progress of the projects and the results achieved.
- 15)Cost deployment pillar team applies rigorous benefits management , tracking for the projects and direct correlations to the activities and the benefiting KPI's can be seen.
- 16)Cost deployment is complete (covering more than 80% of cost base of plant, i.e., total plant costs excluding depreciation and external logistics cost).
- 17)Good results achieved and meet or exceed the budget plan for the year.

Criteria to evaluate achievement score – Cost Deployment

3. [Cover 100% of the WCM perimeter, sufficiently in detail, logical linkage between budget and cost deployment]

- Cost deployment matrices of A, B, C, D, E and F matrices are correctly used in all the major areas (especially correct B matrix).
- Logistics cost deployment done.
- Environment cost deployment has done.
- Initial Energy Losses stratification into 7 types of energy loss done.
- Cost deployment done in time for budget.
- Clear link between E-matrix and budget.
- Cost deployment properly used for making G matrix
- The appropriate time and budget are allocated to execute the F-matrix to a high standard
- Annual budget is correctly followed.

Criteria to evaluate achievement score – Cost Deployment

- Collection of waste & losses information is continually updated using computer data capture where appropriate.
- Consistent 5 years cost deployment is available demonstrating to what degree losses have been attacked and also still left
- New losses are identified with better eyes
- The necessity of the growth in knowhow to attack left and newly identified losses well recognized.
- Cost deployment of new equipment installation (with EEM) under domain of plant operations.
- EEM cost deployment done but not sufficiently enough.
- The plant is exceeding the savings plan target set by the company. Substantial cost reduction has been achieved..

Criteria to evaluate achievement score – Cost Deployment

4. [Extended and expanded cost deployments]

- The cost perimeter is further refined to cover 100% of the total cost.
- Data collection on waste & losses is now more than 50% automated
- Computerized cost deployment is available (half automated inputting data, and product costs continuously monitored monthly and daily, and daily real time measurement of waste and losses).
- Supply chain cost deployment done.
- EEM cost deployment done thoroughly.
- EPM cost deployment made.
- The cost deployment iterations allow for variances, e.g. G Matrix .
- Continuous searching of hidden losses such as indirect waste and losses and their measurement.
- Benchmarking with competitors done.
- Substantial cost reduction has been achieved. (>30%)

Criteria to evaluate achievement score – Cost Deployment

5. [Continuously searching opportunities to reduce cost]

- Whatever improvements have been made, there is a philosophy to continuously seek for opportunities to reduce cost and increase productivity. New opportunities for cost savings continuously identified. For this purpose, 30% of the Cost of Conversion is regarded as waste and losses, and efforts are continuously made to try to identify such (probably hidden) waste and losses.
- Cost deployment is used to target the ideal cost having mastered actual cost, standard cost and target cost. External losses and impact on plant clearly identified in detail (e.g. supply chain) and improvement programmes developed and implemented.
- Each time waste or losses are reduced, the lessons learned are horizontally expanded to other areas.
- Cost deployment combined with financial risk deployment.
- Financial risk deployment is used to sustain what has been achieved.
- Fully computerized real time cost deployment and cost controlled and managed state.
- Outstanding cost reduction has been achieved. (>40%)
- Based on proper benchmarking manufacturing cost is minimal among competitors.

Focus Improvement

(3) Focused improvement Scores

0. [No action]

- There are no projects or programs based on Cost Deployment. All the projects are chosen ad hoc, and no systematic approach or proper method and tools are used.

Criteria to evaluate achievement score – Focus Improvement

1. [Reactive]

- 1)Site costs and losses are understood and prioritized. Analysis of waste & losses made from the Safety matrix, QA matrix, breakdown map and the value estimated using CD.
- 2)The team practice and can show “learning by doing” from using the following tools : 5W + 1H, 5 Why’s, 7 WCM tools, 7 QC tools, 7 steps of problem solving approach, quick & standard Kaizens.
- 3)There is a system to choose subjects for Focused Improvement but no proper cost and benefit analysis is made.
- 4)For the chosen projects, phenomena are visualized by the use of pictures and sketches, helping to identify the real root causes .
- 5)Countermeasures are implemented and the results have been checked against the original loss identified .
- 6)Good project results are shared by constructing GPL’s. But, there is no system to horizontally expand the knowledge gained after each Focused Improvement.
- 7)Logical activity boards have been constructed on the shop floor, to record the activity and involve people in improvement activity .
- 8)The principles and operating standards for zero breakdowns and ones for zero defects are continuously searched.

Criteria to evaluate achievement score – Focus Improvement

2. [Basic techniques]

- 1)Based on Cost Deployment, proper subjects for Focused Improvement have been selected.
- 2)Based on the needs of the Focused Improvement, a proper cross-functional team is formed.
- 3)Knowledge to reduce or eliminate waste and losses is created step by step, by using and the 7 WCM tools (prioritization, systematic, logical and detailed deployment of objectives, problem description with sketches, 5W + 1H with the 5G principles, root cause analysis, phenomena description with sketches and TWTTP) and proper methods.
- 4)Sketches are used extensively to visualize.
- 5)A good range of projects have been deployed and completed with rigor and pace.
- 6)Quick Kaizen in less than 1 week; Standard Kaizen in less than 1 month, and Major Kaizen in less than 3 months.
- 7)Costs/benefits are known for each completed FI project (QK, SK, MK) and are tracked monthly involving the financial service department.

Criteria to evaluate achievement score – Focus Improvement

- 8)For each FI project, clear results have been achieved with a minimum B/C ratio of 4:1.
- 9)The know-how being developed is expanded.
- 10)Documented lessons/knowledge is used for training.
- 11)Involvement of operators in FI is extensive in all major waste and losses areas.
- 12)50% of people involved.
- 13)The plant maintains a FI know-how database for waste and losses along with FI tools used and the people that have the knowledge.
- 14)FI activity boards are following a standard that is logical, detailed and recording the results with clarity.

Criteria to evaluate achievement score – Focus Improvement

3. [Substantial KH, many FI project covering the major issues, areas and machines]

- There is substantial knowledge to eliminate or reduce waste and losses.
- Both basic and intermediate FI techniques are used extensively and routinely at all levels of the organization.
- Extensive use of 7 WCM tools
- Extensive use of IE tools (process analysis, operation analysis, motion study, time study, material handling, line balancing and layout)
- Extensive use of SMED to increase flexibility and shorten lead time is being made.
- The pillar team is extending their knowledge to intermediate level such as basic PPA.
- Extensive use of fool proofing and error proofing for human errors.
- Proper value stream mapping (VSM) for logistics is being made.
- The specialists have many major Kaizens and advanced Kaizens showing competence of solving difficult problem such as minor stop reduction using PPA.

Criteria to evaluate achievement score – Focus Improvement

- The competence in the plant is portrayed through a comprehensive number of successful projects that have been verified and shared as GPL's.

Criteria to evaluate achievement score – Focus Improvement

4. [Advanced level, many FI projects with major Kaizen and advanced PPA]

- No more use of ICE.
- The various tools of intermediate and advanced levels such as advanced PPA

  are utilized to attack and solve difficult problems which have been left unattended.

- The FI project portfolio now contains good know-how and published GPL's for :
  eg. Reduction of material cost
  Improvement of productivity (Golden Zone, Strike Zone, one motion movement)
  Set-up time reduction
  EEM
  Quality improvement
  Quality control
  Defect reduction
  Lead time reduction
  Inventory reduction, etc.

- The pillar team are using an effective and appropriate combination of basic, intermediate and advanced FI tools.

- The FI team are working extensively to support QM projects and WO/LO projects.

Criteria to evaluate achievement score – Focus Improvement

- The lessons learned are horizontally expanded to others.
- Use of high speed camera.
- FI projects are now identifying suitable low cost automation and related technology to improve productivity.
- FI projects contain examples moving from inductive (analytical) to deductive (design) approach.
- Extensive use of VA/VE.
- DOE/ ANOVA projects have been successfully completed with good results.
- More than 80% of the operators are involved in continuous improvement activity.

5. [Involvement of everybody in FI with many, many Kaizens]

- There is a system to continuously increase the in-house knowledge to reduce or eliminate all possible (and probably hidden) waste and losses.
- Advanced techniques are used, more knowledge is created.
- Many DOE & ANOVA applications.
- Advanced tools are confidently deployed and a knowledge creation system, in partnership with PD, is operating effectively with the value accurately monitored by cost deployment.
- The FI pillar has an extensive database know-how and has a large number of published GPL's.
- 100% of the people are involved in continuous improvement and many, many Kaizens are produced each week.
- Additional losses are attacked.
- Improvement projects are attacking complex and hidden losses and utilize cross-functional teams.
- The new 7 QC tools (Relations diagrams, systematic diagrams, matrix diagrams, affinity diagrams, allow diagrams, process decision program charts, matrix data analysis) are widely used.

Criteria to evaluate achievement score – Focus Improvement

- Separation of labor from equipment is carried out.
- Many examples of LCA to improve productivity.
- Increase of exceptional production engineers.
- The pillar team can visualize ideal production system and continuously challenge toward the ideal production system.

Autonomous Activities

Criteria to evaluate achievement score – Autonomous Activities

(4) Autonomous Activities

4-1 Autonomous Maintenance (Capital Intensive Area) Scores

0. [No action]

- There are no activities to involve operators in daily maintenance and improvement.

Criteria to evaluate achievement score – Autonomous Activities

1. [Reactive to Preventive for the model machines]

- 1)Proper classification of machines into model machines, AA, A, B and C for AM at the reactive stage based on cost deployment.
  [AA covers 50% of the total breakdown loss due to lack of basic condition
  A up to 70%; B, 90%; C, 100%.]
- 2)AM pillar team show the three fundamental understandings to establish a well organized AM.
  - visual machine ledger at the single component level with component classification into A, B and C
  - machine ledger with AM calendar
  - measurement of TBF or TBAB (time from AM to breakdown due to the lack of basic condition)
- 3)Model machines for AM from the AA machines of which breakdown losses are the major ones due to the lack of basic conditions, have been chosen and Step 1 ~ Step 3 have been implemented to correct standards.
- 4)Visual CILR (Cleaning, Inspection, Lubrication, Refastening) schedule displayed at the machine and followed. Visual management is introduced (e.g. safety, tools, manuals, oil levels, gauges, …).
- 5)AM calendar with a machine ledger made.
- 6)Regular step audits conducted, visualized and followed up.

Criteria to evaluate achievement score – Autonomous Activities

- 7)AM Step 1 implemented
  - the number of tags placed and removed
  - the distribution of tags
    - - type of anomaly
    - - responsible people
      - - - red for maintenance people
      - - - white for AM people
      - - - green for safety people
- 8)AM Step 2 applied
  - how much cleaning time was reduced by taking various countermeasures against contamination sources [remove – block – (guide – localize) – encircle – receive – collect – make it visible and easy to be handled]
  - hopefully cleaning-less operation
- 9) AM Step 3 was executed
  - Visual AM calendar (ECRS applied)
  - How long does it still take for CILR?
  - Correct calculation of OEE by operators
  - How much OEE has been improved.
- 10)Proper evaluation of B/C ratio for each step calculated by finance people.

- 11) Operators have grown through from AM Step 1 to Step 3 (radar chart).

Criteria to evaluate achievement score – Autonomous Activities

2. [Preventive for the model machines where AM can be justified]

- 1) Classification of operators into 4 levels (1, 2, 3 and 4)

  - 1: Understands process performance and functions; operates process correctly.

  - 2: Understands properties of materials being handled; performs correct adjustment and setting.

  - 3: Detects process abnormalities promptly; takes emergency action against them.

  - 4: Achieving zero breakdowns and zero defects with the help of PM and QC people. Responsible for daily production.

- 2)Step 4 for model machines applied with the operators of the best level.

- 3)If Step 4 cannot be economically justified, modify Step 4 to delete part of Step 4 and include new elements such as FI or QC by operators to take care equipment related issues so that Step 4 can be justified and operators still grow and enjoy learning.

- 4)X matrix, QM matrix and Q components are understood and properly used by operators.

Criteria to evaluate achievement score – Autonomous Activities

- 5)The AM calendar with Q component checking by the operators for those Q components which can be inspected by the operators..
- 6)OEE and OLE measurement and calculations by the operators at each shift.
- 7)The numbers of suggestions and quick Kaizens/operator are good.
- 8)AM Step 1 ~ Step 3 for all top 50% of AA class machines have been completed.
- 9)KPI being regularly measured by operators.
- 10)Training room(s) with excellent texts to educate and train operators .
- 11)Cost and benefit analysis proves benefit of AM Step 4.

Criteria to evaluate achievement score – Autonomous Activities

3. [Preventive for the major machines]

- OEE and OLE are automatically measured. Operator involvement in inputting data regarding the type of loss for each stoppage .
- Continuous improvement in CILR time reduction.
- If economically justified. Step 5 for the model machines and AM step 5 applied.
- If Step 5 cannot be economically justified, modify Step 5 to delete part of Step 5 and include other losses such as change over losses, startup and shutdown losses, etc. or FI by operators to take care more of process so that Step 5 can be justified and operators still grow and enjoy learning.
- Completion of AM Step 4 for all top of 50% of AA machines .
- AM Step 1 ~ Step 3 for the rest of 50% of AA machines .
- Careful evaluation of B/C ratio.
- Cleaning time (greater than 90% reduction against base line).

Criteria to evaluate achievement score – Autonomous Activities

- Inspection time (greater than 90% reduction against base line).
- Reclassification of machines into A, B and C as a result of moving from the reactive to the preventive stage based on cost deployment + [P, Q, C, D, S and M].
- Breakdown loss due to the lack of basic condition is not any more a major loss.
- Logical linkage between AM, PM and shutdown maintenance.
- The increased number of suggestions and quick kaizen as step activities move on.
- Lubrication (moved from PM work to AM work for those points manageable by operators).
- KPI’s being regularly measured by operators.

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4. [Proactive for the model processes]

- If economically justified, Step 6 for model processes.

- AM Step 6 applied for model machines. Machine data analysis by operators.

- Process data analysis by operators for model machines.
- If AM Step 6 cannot be economically justified, modify Step 6 to delete part of Step 6 and include other losses such as WIP or FI by making operators become responsible for their process and guarantee quality and output so that Step 6 can be justified and operators still grow and enjoy learning.
- Autonomy starts to take place from model machines, gradually AA class machines and then up to major machines with economical justification.

- AM Step 5 for all top 50% of AA machines.
- AM Step 4 for the rest of 50% of AA machines.
- AM Step 1 ~ Step 3 for A machines

- People grow by moving from AM Step 4 to AM Step 6.

- From operators to technicians or engineers.

- Quick Kaizens/suggestions.

5. [Proactive for the major areas]

- No breakdown from model machines, AA and A machines.
- Continuous challenge to cleaning-less operation.

- If economically justified, Step 7 for model machines and AM step 7 applied .
- If Step 7 cannot be economically justified, modify Step 7 to delete part of Step 7 and include new elements such as involvement of operators in EPM and EEM to take care of production problems coming from poor design of the product and/or equipment so that Step 7 can be justified and operators still grow and enjoy learning.

- Autonomy starts to take place from model machines and AA machines, gradually A class machines and then up to B class machines with economical justification.

- AM Step 6 for all top of 50% of AA machines.
- AM Step 5 for the rest of 50% of AA machines
- AM Step 4 for A machines.
- AM Step 1 ~ Step 3 for B machines.

- The development of engineering operators.
- Production data analysis by operators.
- Careful financial evaluation of AM activities.
- Operators involved in EEM and EPM.

Professional Maintenance

(5) Professional Maintenance

1. [Reactive to preventive]

- 1)Equipment definitions of workshops, process steps, equipment, sub-assemblies and components available.
- 2)Proper classification of machines into model machines, AA, A, B and C for PM at the reactive stage.]

[AA covers 50% of the total breakdown loss due to lack of PM;
A up to 70%; B, 90%; C, 100%.]

Note : Classification into AA, A, B and C shown in the PM context can be applied only when breakdown losses have become minor issues.

- *3) Correct calculation of*
  - OEE in case of a single machine
  - OLE in case of an integrated line
  - OPE in case of plant effectiveness.
- 4)A system for maintenance work flow management.
- 5)Managing breakdowns and the emergency work order (EWO) system.
- 6)Breakdown maps used visibly showing downtime and number of breakdowns per process area by failure type (e.g. mechanical, electrical, process, etc.).

Criteria to evaluate achievement score – Professional Maintenance

- 7)MTBF correctly measured
- 8)The meaning of SMP and its availability when needed.

- 9)Well organized maintenance shop .
- 10)Equipment drawing management .
- 11)Oil lubrication management.
- 12)5S in the spare parts room. Proper quality control of spare parts. Any requested spare part can be found in less than 3 minutes.

- 13)Model machines for Professional Maintenance chosen.
- Maintenance goals set.

- 14)PM pillar team show the three fundamental understandings to establish a well organized PM.
  - visual machine ledger at the single component level with component classification into A, B and C, updated with breakdowns/problems.
  - machine ledger with a PM calendar
  - measurement of TBF or TBPB (time from PM to breakdown)

- 15)Time between two consecutive failures and MTTR of the major components of the machines measured.

Criteria to evaluate achievement score – Professional Maintenance

- 16)PM schedule on the machine ledger (maintenance calendar) available at machines and followed (compliance at least 80%, i.e., scheduled but not completed .
- 17)The statistics of breakdowns based on root causes.
- 18) PM Step 1 ~ Step 3 fully implemented to correct standards.
- 19) Machine functionality restored to original condition.
- Contamination eliminated/ controlled/contained (greater than 90% reduction against base line).
- 20)Regular step audits conducted, visualized and followed up.
- 21)KPI tracking.

2. [Preventive for the model areas]

- 1)PM Step 4 to model machines.
- 2)No breakdowns except those caused by human errors and MTBF of them is approaching ca. 2,000 hrs.
- 3)Detailed breakdown of MTTR to find a way to shorten it (Model machines)
- 4)PM team measure activity based maintenance costs to each machine. (Model machines)
- 5)Correct financial evaluation of PM activities. PM costs and production losses are monitored on a combined trend chart. (Model machines)
- 6)Prioritization of components for corrective maintenance based on the costs of spare parts and labor costs for replacing them. (Model machines)
- 7)PM costs reduced substantially after corrective maintenance. (Model machines)
- 8)Classification between hard saving and cost avoidance to budget the necessary PM cost (Model machines) .
- 9)A clear linkage between AM, PM and shutdown maintenance. (Model machines)

Criteria to evaluate achievement score – Professional Maintenance

- 10)PM Step 1 ~ Step 3 to top 50% of AA class machines
- 11)From broken components, the lessons learned are horizontally applied to the similar components under the similar condition.
- 12)Development of MP information

3. [Preventive for the major areas]

- Computerized OEE and OLE measurement.
- PM Step 5 to model machines.
- MTBF of the model machine is approaching ca. 5,000 hrs.
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- PM Step 4 to top 50% of AA machines.
- MTBF of all the major machines is approaching ca. 2,000 hrs.

- PM Step 1 ~ Step 3 to the rest of 50% of AA machines.
- The loss due to breakdowns is not any more a major loss.

- The classification of machines into AA, A, B and C as a result of moving from proactive to preventive stage based on cost deployment + [P, Q, C, D, S and M].

- Component maintenance if applicable for those machines which are not covered by AM and/or PM.

- Maintenance crew's time breakdown is available.
- Maintenance time spent mainly for PM Step 3 (Initial TBM), PM Step 4 (CM) and PM Step 5 (refined TBM).
- Trend management system in place for applicable components
- MTTR stratified.

4. [Proactive for model areas]

- From Time Based Maintenance to Condition Based Maintenance.
- Introduction of trend management system in place for applicable components.
- Step 6 for model machines. MTBF of the model machines ca. 7,000 hrs.
- Establishment of an efficient and effective CMMS.
- Real time maintenance management (time, power, temperature, etc.)
- Step 5 for top 50% of AA class machines.
- MTBF of these AA machines ca. 5,000 hrs.
- Step 4 for the rest of 50% of AA class machines.
- Step 1 ~ Step 3 for A class machines.
- Establishing various maintenance standards to support maintenance activities (various maintenance documents, various maintenance controls, etc.)
- Unmanned operation during lunch break, time between shifts .
- Involvement of PM people to refurbish/modernize existing/used equipment.

5. [Proactive for the major areas]

- Step 7 for model machines.
- MTBF :ca.10,000 hrs.
- 99.0~99.9% reliability.
- Step 6 for top 50% of AA machines
- Step 5 for the rest of 50% of AA machines .
- Step 4 for A class machines.
- No breakdown from AA and A machines except few cases.
- Step 1 ~Step 3 to B class machines.
- Integrated CMMS for stores, work orders, equipment history, PM tasking and reporting.
- Pursuit of optimum maintenance [BM + TBM + CBM]
- Maintenance cost management.
- Correct evaluation of the necessary PM cost (hard saving and cost avoidance).
- Continuous challenge to new PM techniques such as RCM if proved useful.

- Many pieces of MP information and feed back to EEM.
- Involvement of PM people to equipment design for reliability and maintainability. Equipment FMEA.
- Standardization of spare parts from the design stage of equipment.

Quality Control

(6) Quality Control Scores

0. [No action]

- No proper Quality Control is practiced. Based on inspection the good and rejects are sorted out. No measurement of Cp, Cpk.

Criteria to evaluate achievement score – Quality Control

1. [Overall view, 4M analysis, measurement of Cp, Cpk]

- 1)A clear understanding of 10 QC viewpoints (quality first, consumer orientation, the next process is your customer, the PDCA wheel, priority consciousness, management by facts, process control, dispersion control, recurrence prevention, standardization).
- 2)The customer complaints and claims management system. Customer complaints and claims trend analysis.
- 3)Quality problems are divided into manufacturing issues and design issues.
- 4)Reactive QA matrix developed – analyzing external (customer) quality issues and internally identified defects due to poor manufacturing.
- 5)Quantity and cost impact of quality defects clearly identified. Managing defects and emergency defect prevention work order system.
- 6)Based on reactive QA matrix (detailed description of defect modes (items, issues, measurements, point where they occur) , major quality problems for Quality Control chosen, and 4M analysis at critical processes of these problems areas applied properly.
- 7)Process capability measurement of Cp and Cpk against the specified tolerances set by design people.

Criteria to evaluate achievement score – Quality Control

- 8)Conditions under which defects occur (during operation, at the beginning of the operation when the type of article changes, or when equipment fail).

- 9)Treatment (scraps, repair)

- 10) Defect mode occurrence situation (still taking place, in the past, continuously, occasionally, seldom).

- 11)The basic QC knowledge to attack easily attackable but rewarding quality issues have been created to the followings:
  - QC of the incoming materials (material classification and positioning the material at one of 9^{th} stages including 0 stage).
  - SOP establishment for the lack of method.
  - HERCA analysis and right solutions for human errors.

2. [Establishment of conditions for zero defects for model issues]

- 1) Complete quantitative QA matrix available.
  AA covers 50% of the quality problems in number identified by QA matrix
  A up to 70%; B, 90%; C, 100%.

- 2)QM Step 1 ~ Step 4 applied using basic PPA for model quality issues related to machines.
  - Carry out restoration based on the design and check results.
  - Formulate a system concerning the design of restoring and the preparation of components replacement.
- 3)Cp, Cpk improvements and greater than 1.33

- 4)QC Step 1 ~ Step 7 have been implemented for non equipment related quality problem:

  - for Materials, material input control established.

  - for Methods, SOP is properly used to avoid quality problems due to lack of standard methods.

Criteria to evaluate achievement score – Quality Control

5)- HERCA is properly used for major quality issues related to human errors and if necessary TWTTP applied.
- For the lack of knowledge and skills, proper education and training done
- There is a clear logic between an identified human error and its countermeasures.
- Fool proof or error proofing devices well installed.

- 6)Incorporated inspection processes into the model process so that quality can be built-in at the process (prevention of occurrence and prevention of releasing).

- 7)The approach is moving from reactive to preventive.

- 8) Conditions for zero defects are known for more than 30 percent of the identified quality problems and operating standards are well established for them.

- 9)Easy to assess it is to check conditions for zero defects:
  1. Is it possible to easily define zero defect conditions for the various products?
  2. Once these conditions are set, are they stable?
  3. In case change took place, is it easy to recognize it?
  4. In case change took place, is it easy to restore the conditions for zero defects?

3. [Establishment of conditions for zero defects, application of PPA for difficult and chronic problems]

- For equipment related quality problems, X-matrix and QM-matrix are made to establish operating standards. X-matrix is correctly used.
- QM Step 5 for model quality issues related to machines. PPA is applied at the critical processing points to determine unknown causes of quality problems.
- Five questions for zero defects are raised at the critical processing point to identify root causes of quality problems:
  1. Determine the Q components
  2. Define control criteria (control methods and management criteria)
  3. Review the different types of standards (equipment control process sheet, maintenance calendars, control sheets, QA matrices)
  4. Indicate the appropriate Q components for the various parts of the equipment
- QM Step 1 ~ Step 4 for all AA quality issues related to equipment .
- QC Step 1 ~ Step 7 have been implemented for non equipment related quality problem:
  - No items at zero stage, they are at stage 4 or higher for model quality issues related to in-coming materials.

Criteria to evaluate achievement score – Quality Control

- Five questions for zero defects due to in-coming materials raised.
- No items at zero stage for all AA quality issues related to in-coming materials.
- Visual SOP is applied for model quality issues related to methods.
- Visual SOP guarantees zero defects and zero safety issues if it is followed.
- Five questions for zero defects due to method are raised.
- SOP is available for all AA quality issues related to methods.

Q gate used to avoid repetitive human errors for model quality issues related to human errors.

- Five questions for zero defects due to human errors are raised.
- FTQ in and FTQ out at Q gate are checked.
- HERCA is applied for all AA quality issues related to human errors.
- Fool proofing and error proofing are properly used.
- Fool proof devices are extensively used in case of absent-mindedness, forgetfulness, carelessness, inattention, etc.

- Incorporated inspection processes into the line so that quality can be built-in at the process (prevention of occurrence and prevention of releasing).
- Conditions for zero defects are known for more than 70 percent of the quality problems and operating standards are well established for them.

4. [Application of more advanced methods]

- QM Step 6 including advanced PPA for model quality issues related to machines:
  1. Carry out control based on control criteria
  2. Derive the trend from the data coming from SQC application
  3. Obtain quantitative variations of control limit values.
- To identify quality factors, DOE and/or Taguchi Methods are applied to those quality problems which proved to be difficult to analyze even by PPA.
- Analysis of variance (ANOVA) is applied to identify the contribution rate of each factor.
- QM Step 5 for all AA quality issues related to machines.
- QM Step 1 ~ Step 4 for A class machines.
- Control charts are used to control quality not by results but by causes for major quality factors.
- QC Step 1 ~ Step 7 have been implemented for non equipment related quality problem:
  - Stage 6 or higher for model quality issues related to in-coming materials.
  - Five questions for zero defects due to in-coming materials are raised for model quality issues related to in-coming materials.
  - Stage 4 or higher for all AA quality issues related to in-coming materials.

Criteria to evaluate achievement score – Quality Control

- Visual SOP guarantees zero defects and zero safety issues if it is followed for all AA quality issues related to methods .
  - Five questions for zero defects due to method are raised.
  - QA network is properly used.
  - Advanced HERCA applied. for all AA quality issues related to human errors .

- Incorporated inspection processes into all the major lines so that quality can be built-in at the process (prevention of occurrence and prevention of releasing).

- Quality control level is in terms of single digit ppm.

Criteria to evaluate achievement score – Quality Control

5. [The process is well stabilized and under full process control]

- QM Step 7 for model quality issues related to machines including advanced PPA.
  1. Reduction of control limits values, concentration of check items, lengthening of check cycles
  2 .Improvement aiming at simplifying control methods, reduction of check times through critical points' improvement
  3. Transformation of check methods using a scientific approach, by using diagnostic techniques
- For all quality factors, control charts are used to control quality not by results but by causes.
- Visualization of invisible processing points has been made.
- QM Step 6 to AA quality issues have been correctly implemented.
- QM Step 5 for A quality issues.
- Feedback to EPM and EEM.
- The process is well stabilized and under full process control.
- Involvement of QC people at the design stage of the new product and the new equipment.

Criteria to evaluate achievement score – Quality Control

- Taguchi methods and DOE together with Analysis of variance (ANOVA) are applied to find quality parameters when it is difficult to analyse quality issues analytically at the time of designing new products.

- Proactive quality assurance established.

Logistic & Customer Service

(7) Logistics & Customer Service Evaluation Levels

0. [No action]

- Lack of consideration of synchronization among sales, production and purchasing. Inventory level is high due to the lack of JIT concept and the traditional production method. The principle of minimum material handling is not yet understood and practiced.
- There is no system to measure Customer Service (CSI). Only availability and stock level is checked.

Criteria to evaluate achievement score – Logistic & Customer Service

1. [Reactive]

- 1)There are an appointed person responsible for logistics and customer service and an organization including finance.
- 2)The application of 5S to remove clutter and 5T to establish a proper route, etc. completed for internal logistics.
- 3)The KPI's for internal logistics measured :
  - Finished stock level (hrs)
  - WIP (hrs)
  - Line side stock
    - A materials (minutes or times/tact time)
    - B materials (hours)
    - C materials (hours)
  - Raw material stock
- 4)The KPI's for external transportation cost, etc.
- 5)System in place to measure Customer Service in terms of Q, C and D.

  Note: Q = Quality, C = Cost, D = Delivery. Results of the Customer Survey.
- 6)Availability is not 100%.
- 7)No checking of lost customer orders due to non-availability of stock or inability to manufacture.
- 8)There exist high Inventory losses, freight losses and inventory handling losses.

Criteria to evaluate achievement score – Logistic & Customer Service

2. [Preventive, the model issues]

- 1)There are various activities to create a flow across the entire plant.
- 2)Not only mixed loading but also mixed (shared) transportation for purchased goods are practiced to shorten lead times and maximize stock turns.
- 3)Synchronization between purchasing and assembly is well established.
- 4)FIFO is taking place.
- 5)Standardization of the packing size is well established.
- 6)B class parts are supplied not based on the information obtained by patrolling, but they are done in a cyclic way by a proper call off system.
- 7)There is a system to measure Customer Service in terms of Q, C and D.
- 8)ABC classification per items and per networks (volume, cost, etc.)
- 9)There is a procedure to check for lost customer orders due to non-availability of stock or inability to manufacture.
- 10)Results of the Customer Survey communicated to the whole organization .
- 11)Stratification of the plant lost orders communicated to the whole organization.
- 12)Stratification of the plant claims and complaints communicated to the whole organization.
- 13)CSI over 90%

Criteria to evaluate achievement score – Logistic & Customer Service

- 14)Selected model product groups and networks.
- 15)Targets in term of Q, C, and D on the model issues.
- 16)RCA on the model issues.
- 17)Production and planning processes (from monthly schedule to weekly schedule) to improve flexibility (over inventory losses).
- 18)Warehouses to improve their organization (over handling losses).
- 19)Flexible procurement involving suppliers.
- 20)Mixed loading and mixed (shared) transportation for purchased items practiced.
- 21)Distribution organization to handle over freight losses.
- 22)Lost Order level on the model issues below 0.*1%.*
- 23)CSI on the model issues over *99.9%.*
- 24)IRA (Inventory Record Accuracy) measured . IRA over 99%.
- 25)Lead time is measured for the model issues.
- 26)Substantial change over time reduction to be flexible enough.
- 27)Stock level is above 2 weeks.

3. [Preventive, all the major issues]

- Lead time is measured.
- Regarding internal logistics:
  - Frontal feeding concept with clear separation between logistics and workplace organization
  - Proper call-off system for material supply .
  - Synchronization between workplace operation and material feeding into golden zone and strike zone.
- Internal logistics and external ones are continuously refined to minimize material handling and to help improve visualization.
- Inside the plant, synchronized production for major in-house made materials made.
- FIFO is applied for many items.
- Expensive items, bulky items, items of many variations at the line: max 2 hours
  Normal items: max 0.5 day
  Small and cheap parts: max 1 day
- Order to delivery lead time is substantially reduced.
- Availability and stock level of the major products is checked at SKU level.
- Logistics cost deployment made.

Criteria to evaluate achievement score – Logistic & Customer Service

- Supplier flexibility improvement
- Supply chain cost deployment made
- All Lost Orders and claims of the major issues analyzed.
- Countermeasures implemented
- CSI of the major issues above *99%.*
- Customer survey on the selected issues improved .
- Marketing, Controlling, Procurement, Logistic and Production are involved and there is a system to synchronize production and sales.
- Every effort of the sales department makes it possible to sell products as evenly as possible to practice level production which creates a smooth flow across the entire plant.
- Improvement of forecasting reliability and order handling.
- Substantial improvement of production flexibility & planning processes (from weekly schedule to 3 days frozen period schedule)
- Overall KIP’s results

4. [Proactive, the mode issues]

- FIFO is practiced in most of the items.
- At the line side:
  - Expensive items, bulky items, items of many variations: max 1 hour
  - Normal items: max 2 hours
  - Small and cheap parts: max 0.5~1 day.
- No more patrolling on the shop floor.
- Materialization of minimum material handling concept visible on the shop floor.
- CSI of the all items over *99%.*
- Lost Order level of all the items below *1%.*
- The production lead times are at minimum.
- *A*vailability is close to 100%.
- Stock level is less than 2 weeks.
- Customer survey very positive.
- Customer needs & wants regularly captured.
- Order to delivery lead time below 2 weeks.
- Sales, distribution, production and purchasing functions are fully integrated to create an accurate flow from order receipt to delivery.
- External benchmarking with competitors has been made and the plant manages CSI with more various quality items far better than the competitors.

Criteria to evaluate achievement score – Logistic & Customer Service

5. [Proactive, all the major issues]

- FIFO is fully applied everywhere
- At the line side:
  Expensive items, bulky items, items of many variations: max 30 min
  Normal items: max 1 hour
  Small and cheap parts: max 4 hours.
- Minimum material handling concept is well understood and practiced.
- Availability 100%.
- Plant results:
  - Working capital efficiency is world class
  - Manufacturing lead time at minimum
  - FIFO everywhere
  - 100% visibility
  - Minimum MH is seen everywhere.
- Control of incoming material quality is mostly at 8 stage.
- IPS.
- CSI over 99.9%.
- Lost orders are 0.
- Full synchronization among sales, distribution, production and purchasing exist to create a controlled flow from order receipt to delivery.
- Supply chain standards defined (planning, procurement, production, inventory handling & order management).

Criteria to evaluate achievement score – Logistic & Customer Service

- Daily schedule.
- Stock level less than 1 week.
- Lead time from the point of receiving an order to delivery to customers at minimum among competitors Customers are fully satisfied with the products they bought in terms of Q, C and D.
- At the time of making a new layout, a good consideration to logistics has been made.
- More proactive approach to logistics .
- Purchasing policy at the design stage.
- Supplier's involvement at the design stage.
- VSM from design stage.
- SCM at the design stage.
- All functions integrated (Marketing, Product Management, Procurement, Production, Logistic)
- Customer voices are collected periodically and analyzed in detail to understand customer wants and needs.
- Product development based on Customers needs & wants knowledge.

Criteria to evaluate achievement score – Logistic & Customer Service

- The plant always takes a proactive approach to satisfy customers.
- Customer voices are collected periodically and analyzed in detail to understand customer wants and needs.
- Product development based on Customers needs & wants.
- The plant always takes a proactive approach to serve and eventually satisfy customers.
- Overall KIP’s results.

People Development

(8) People Development Scores

0. [No action]

- No system to evaluate required knowledge and skills of each employee, and actual levels of their knowledge and skills.

Criteria to evaluate achievement score – People Development

1. [Reactive]

- There are an appointed person responsible for people development and an organization including finance.
- The plant manager and the pillar leaders have been educated to lead the attack to the major losses.
- Determining education and training priorities based on safety statistics, cost deployment, QA matrix, breakdown maps, human errors, etc.
- Cost deployment is used to identify the necessity of people development for each discipline.
- QA matrix is used to identify the necessity of people development for each discipline especially for quality control related people.
- Stratification of human errors by process step.
- The prioritized E&T plans link to the plant KPI's.
- At PD Step 2 the system for initial E & T established to develop competencies of the concerned people.

Criteria to evaluate achievement score – People Development

- The critical roles of the plant manager, managers and pillar leaders identified, educated and trained to lead to attack identified problems.
- Project leaders and their teams are scheduled to receive timely, specific and targeted E&T to attack the problems.
- Radar charts are individually constructed for the plant manager, managers and pillar leaders about their critical roles.
- Radar charts are individually constructed for the plant manager, managers and pillar leaders about their critical roles.
- The plant manager and the pillar leaders understand 5 simple criteria (logic, methods/tools, rigor, pace and results) to apply WCM efficiently and effectively.
- At PD Step 3 projects deployed are properly realized to develop competence.
- Initial good results achieved and the growth of the plant manager and the pillar leaders can be seen in competence radars.
- A clear link to the benefiting KPI and B/C ratio.

Criteria to evaluate achievement score – People Development

- There is a rough evaluation system for checking required knowledge and skills of each discipline, (but no measurement system for checking their actual knowledge and skills).
- A system to verify skills is in place and used (measured by radar charts).
- A system to identify human errors and resulting training.
- No system to evaluate required knowledge and skills of each employee, and actual levels of his (her) knowledge and skills.) but education and training are carried out ad hoc.
- No financial evaluation of losses due to lack of knowledge and skills.
- A job cover matrix is available and used to identify gaps where there is a lack of skill or insufficient quantity to enable effective cover for absence, sickness and vacation.

[Recruitment]

- The recruitment process uses a basic job description.

Criteria to evaluate achievement score – People Development

2. [Preventive]

- PD pillar team have implemented a reliable evaluation system for checking required knowledge and skills of all employees including the plant manager, and a measuring system for checking their actual knowledge and skills.

- A system to check actual knowledge is in place and used. The PD pillar team have collected and analysed data to evaluate levels of competence and identify any knowledge and skill gaps.

- There is a clear plan to develop competence in people, where required, across the range of World Class Manufacturing pillars.

- E & T are based on good understanding of human nature.

- PD pillar team are actively involved with Kaizen events to “learn by doing” and gaining an understanding of the individual pillars and subsequent E & T needs.

- The people responsible for E & T evaluate their effectiveness and improve the delivery of competence to the shop floor people through 4-step method, SOP’s and TWTTP, correct follow-up and on the job observations.

- HERCA is used correctly to identify human error issues and to design an appropriate training package.

Criteria to evaluate achievement score – People Development

- Radar charts provide a comprehensive picture of the knowledge and skill gaps between required ones and actual ones and are updated after each education or training event to reflect the knowledge and skill gains.

- The PD pillar team can demonstrate a direct link between E & T and benefiting KPI's. A plan has been devised by the team to restructure absence management, PDR process, grievance procedure and reward & recognition, based on People Survey Results.
- The PD pillar team have engaged other pillars to create a clear and concise system of communication to keep managers informed of plant organization and roles, and to provide advice and support on company policy relating to all HR issues.

[Recruitment]

- The recruitment process uses a basic job description agreed between HR and the line manager.
- The process is managed by HR rather than local management.
- The induction process is basic with no active probation management.

3. [Preventive up to detail]

- People Development has evolved from ad hoc E & T plans into systematic E&T and evaluation programs which are delivered and sustained via PDCA i.e., there is a systematic education and training system, for minimizing the gap between the required knowledge and skills of each employee, and their actual knowledge and skills.

- Systematic training program developed based on losses, errors and (quantified) opportunity i.e., there is a logical linkage between CD and PD and the PD pillar leader can demonstrate how he could attack identified waste and losses by increasing competence of the plant manager and pillar leaders.

- The cost of education, training and the costs caused by lack of knowledge and skills are continuously followed up.

- The PD pillar have introduced a system to review and update E & T plans every six months and tracked for all employees by engaging with the other pillars and together, assessing the effectiveness of the E & T.

- Training on/off job monitored for every employee.

Criteria to evaluate achievement score – People Development

- Evaluation system to be applied across entire plant.

- With input from the plant manager and managers, the PD team has systematically produced a job description for all levels and roles within the plant. clearly identifying the competency requirements for success within the organization.
- There are many learning methods used to increase the competence of the plant manager and the pillar leaders such as documentation of improvement work and LUTI.

- There are many teaching methods used to increase the skill of the shop floor people such as 4 Step method.

- There are many, many well written texts with full of sketches to educate and train people.

- Human resources KPI and process are analyzed ((sickness absence, PDR process, grievances, regrettable losses, pay and benefits, staff turnover and loyalty, use of organization provided facilities and benefits (life skills training, IT facilities), occupational health provision, stress management)) and proactive feedback/corrective actions are taken (anonymity and data protection are preserved).

Criteria to evaluate achievement score – People Development

- Competency requirements for each role have been based on data collected from each work area in conjunction with Kaizen events and previous PD interventions.
- People Development can demonstrate their transition from the reactive phase to the preventive phase by showing where preventive measures against Human Error, based on knowledge of short term/long term memory, have been introduced.
- Plant organization and roles clearly defined and communicated (for managers).
- All HR policies have been comprehensively and effectively implemented.
- HR policies are visible in the work place and communicated effectively and consistently covering recruitment and selection, attendance management, training and development, performance management and equal opportunities.

[Recruitment]

- The recruitment process uses the competency based job description and is carried out by local management assisted by HR.
- The induction process is systematic with an active probation during which time progress is regularly assessed and reviewed by the line manager.

4. [Proactive]

- PD pillar team has progressed from the preventive phase to the proactive phase of PD.
- Development of specialists. Training facilitators and specialists continue to refine their knowledge & skills and improve the effectiveness of E&T.
- E & T are delivered with rigor and pace.
- There is continuous effort to make education and training as efficient and effective as possible.
- Everyone has clear objectives and goals aligned to the vision and strategy of the business /plant.
- The management team is effectively cultivating good behaviours in regard to executive capability, human relations and people understanding.
- On the shop floor operator classification and skill levels are recorded and developed.
- Operators are practicing good behaviors in regard to engagement, team working and continuous improvement.

Criteria to evaluate achievement score – People Development

- Employees are willing to make improvements. The number of suggestions per employee is substantial and exceeds 20 per employee/per year; the number of quick kaizen is around 15 per employee/ per year.
- People are highly motivated to take on additional skills.

[Recruitment]

- Selection of new recruits matches their attitudes against the organization's required characteristics.
- Operators input to the selection of new entrants following specific person specifications derived from WCM skills and behaviors.
- Member of the shop floor teams are given the opportunity to become involved with the recruitment and selection process and to express their view on the suitability of an individual for insertion into the organization.

5. [Proactive up to detail]

- The PD pillar team is operating fully developed E & T systems, motivating and engaging all the people.
- All E & T are continuously evaluated to improve E & T effectiveness.
- Business leaders have knowledge and are skilled in harvesting and channeling creative thought processes to generate strategy that leads to “cutting edge” business dominance : There are a systematic system to make leaders to be more competitive and its measurement system.
- There is a systematic education and training programme to create competent human resources at every level such that the company can be continuously developed into a World Class one. Refined and optimized roles and specific skills.
- The organization is full of competent people learning and teaching everyday.
- The E & T systems have the capability step by step to create exceptional people.
- The organization foresees the necessity of creating new Know-How to attack left waste and losses and future possible problems.

Criteria to evaluate achievement score – People Development

- People feel valued and regular recognition events encourage more ideas for World Class people to grow.

- Success events recognize and promote continued generation of new innovative ideas. The principle of creating an eternal learning organization is being realized.

- Deployment plans for the mid to long term development of exceptional people are being delivered.