

If the objective is to determine and cross check where you are in terms of “Behaviors and Overall Operational Effectiveness” then examine the behaviors described below and compare them to the values calculated from –

Overall Operational Effectiveness =

$$\frac{\text{Current operating rate}}{\text{Best Demonstrated / design}} \times \frac{\text{Current operating reliability}}{\text{Total available hours}} \times \frac{\text{Quality "Right - Fist - Time"}}{\text{Total volume produced}}$$

Performance Standards

Improvement initiative	0	1	2	3	4	5
1 (a). Leadership	The improvement program is viewed with suspicion and doubt. The majority of hourly workers leave the creative part of their brains at the plant main gate.	The improvement program strategy is developed and communicated at all levels. The senior people are spread across the spectrum from full supporters to obstructionists ●	The program manager with his lieutenants and a few others demonstrate enthusiasm after a few early wins. Clear goals and plans are set out to achieve results in all the main program elements. The management team is seen to be actively involved. Supervisors begin to see the benefit of releasing some control in favor of doing more problem solving themselves	Critical mass has been established. Benefits are quantified and adequate money and resources are allocated to maintain forward momentum. Local leadership recognizes the risk of complacency from early success and pushes past that point.	The site program manager communicates success across the organization. He trains individuals as coaches and mentors to support the program (Six Sigma black belts) going forward. Best Practices are written and followed routinely. The plant has a reputation for getting the job done.	The values and standards established by the program are institutionalized in a formally accepted "Manufacturing Reliability Program" Nothing less than World Class Performance is accepted

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1 (b). Communication	There is no system by which operating status is communicated clearly. Meetings have no agenda or form and are overly long	Daily informal closed meetings are held depending on individual availability. There are no formal issues reviews. The condition monitoring information is made available to all interested parties ●	15 minute daily meetings are held to report operating status. Significant problem / issues solving is discussed in subsequent small group meetings. There is no formal major issues review. Production & Maintenance meet twice each day to set up work schedule	The daily meeting data is published on an electronic notice board. A formal "Monthly Issues review" meeting is held to assign responsibility to individuals. RCA reports are circulated across the organization	The view that openly sharing information empowers both the individual and the organization is beginning to be realized. Simultaneously the need to preserve the knowledge gained continuously by writing it down in some easily accessible format such as a best practice is also realized	Individuals move across the organization sharing the knowledge gained by working in a World Class Manufacturing organization. The participate in "Breakthrough" thinking sessions to propel the organization to higher levels

● Place marker at selected level

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2. Benchmarking (a) & Performance Measurement (b)	The plant only has the total number of pounds of product made and costs by department	Some tracking of quality losses and downtime is made but not in detail. The maintenance group keeps costs by areas of plant	Monthly measurement of cost by major equipment entity is kept. Quality loss at multiple stages is recorded. Downtime by cause – Mechanical, electrical, operations etc is recorded	A formal benchmark and measurement process exists. The performance of departments and individual production units is accurately measured and compared to other similar operations	Data is generated by the comparative process which is used to study weaknesses and eliminate the associated defects. The data generation is electronically automated The plant DCS is used to give early warnings of rate, reliability and quality issues.	Simplified to recognize the exceptions the plant is able to preempt possible problems.

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3 (a). Operational Accuracy (Operational Discipline)	Operating errors are accepted as being part of running the plant	Major operating errors are investigated and individuals are demoted or fired. There is not a comprehensive set of SOP's	Unit engineers are charged with eliminating errors and with writing a set of SOP's. These are written in narrative or play script format. The unit engineer checks the DCS history module and assigns a cause	A cross functional group has gathered information and are writing procedures in a simplified pictorial format with separate trouble shooting and critical alarm guides	The Standard operating Procedures are in simplified pictorial format. Individually assigned checklists are followed for every start and stop. "Process Deviation Reports" are written each shift which are formally analyzed every three months	Process upsets are detected early and "nipped in the bud". Plans exist and checklists are made to deal with every known emergency shutdown situation. SOP's are subject to annual multi level review annually

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3 (b). Operator Asset Care	No attempt is made to record defects	Inspections are made but the checklist is "pencil whipped". Obvious defects are ignored. Work orders don't adequately describe the defect and what the solution should be.	Quality of inspections is highly variable. Typically only large defects are recorded. No attempt is made to fix minor items	Inspections are performed as time allows and most defects get reported	Operators are diligent about reporting defects of all types. They routinely fix those which can be done in 10 minutes or less. Work orders are comprehensive in style and minor meetings are held the best way to resolve the issue described	Operators fully understand the impact of finding and reporting defects. They fix any defect that time and personal skill allows

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4. Technology (a) & Mechanical Integrity (b)	<p>The technologies in use do not meet commonly available standards.</p> <p>The installed equipment does not meet recognized and accepted standards of engineering or safety</p> <p>●</p>	<p>The technologies barely meet standards</p> <p>A comprehensive review of the equipment was made and recorded in the form of an Equipment Inspection, Test Plan. Fields in the Computerized Maintenance Management System are being populated</p>	<p>The technologies meet commonly available standards</p> <p>Attempts to implement the plan and upgrade the equipment and test methods are in its infancy. Some best practices have been written but they are largely ignored by the engineering and maintenance groups. The CMMS is in regular use.</p>	<p>A small part of the technologies were developed by the plant many years ago and the remainder meet standards</p> <p>All the designated PM's are in the system and the condition monitoring system is linked. Equipment life is being extended by upgraded design, materials selection, craft training, lubrication and quality assurance. The CMMS is fully implemented</p>	<p>The plant uses some leading edge technologies some of which were developed here.</p> <p>Catastrophic equipment failure because of poor maintenance practices has been eliminated. The average "Mean Time Between Failure" for major equipment is approaching five years</p>	<p>The plant is continuously developing new technologies and methods for doing things.</p> <p>In addition to their routine problem solving duties craftsmen concentrate on inspections and servicing in preparation for major outages.</p>

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4 (c). Maintenance Materials / Stores	There are no significant parts & materials held. There are frequent delays waiting on parts. OEM's are called in for major repairs ●	A lot of new and old parts are held but no records are kept of what is or isn't good or bad. Hot shots and frequent OEM visits are needed	Following the Equipment Inspection Test planning exercise a program to purchase an appropriate amount of spare parts is made.	Most parts are held in a suitable location and managed in a closely controlled and organized manner. Occasionally there are stock outs	Replacement parts, non installed spares and frequently used materials are routinely available as needed. There is some scope for reduction. A system of "Quality assurance" for parts received has been set up.	The store room value reflects the highly reliable operation it supports and is minimal other than for long delivery items. As an open stores periodic cycle counting is necessary which shows very few discrepancies

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5. Condition Monitoring / Risk Based Inspection	There is no condition monitoring and the technology isn't understood ●	The technology is understood but not used	Some tools are available but not used in a systematic "Routine Scheduled" manner. EITP are being conducted	EITP has been completed but the results have not been put into the JDE CMMS system. There is a lack of commitment to base major decisions on the data. Prediction of ERL is being attempted	Most critical equipment has routine scheduled or continuous monitoring. Accurate ERL's are provided to operations management	The cutting edge data generated is used as a basis for all maintenance activities

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6. Work Planning & Scheduling	There is no individual designated as a planner/scheduler. All work is reactive. There is no attempt to plan work and only verbal communications support the scheduling effort.	First line supervisors recognizing the need attempt to plan and schedule work as pressure allows. Production supervision dictates what will be worked on.	It is appreciated that planning is a separate function to scheduling. Planning is done for very large jobs. After the daily production / maintenance meeting a schedule is made but it is frequently scrapped because of major breakdowns. A start is made to have all equipment ready for maintenance including permits. Comprehensive hard bid turnaround planning is in its infancy	50% of all jobs longer than 4 hours are planned and a library of standard job plans is being created. A work schedule is created at least 18 hours before work is to commence and 70% schedule adherence is achieved. On average less than 5 - P1 work orders are received each week.. Operations people are included on the daily work schedule	In addition to the planner(s) craftsmen plan jobs. The daily schedules stretch out three plus days in advance. 95% + schedule adherence is normal. Because of shared common goals the daily production / maintenance meetings are cursory. The opportunistic maintenance planning is pushing the major turnarounds to 2 + years	In addition to daily planning and scheduling major turnaround planning is undertaken. This has been extended to 3 years plus.

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7. Gain Sharing	There is no system by which individuals or teams are rewarded for their improvement efforts	A simple annual bonus is paid on corporate profitability	A annual bonus is paid on corporate profitability and the contribution of the site	A site wide annual bonus is paid on the four basic measures of safety, total production, quality and cost for the site.	A quarterly bonus is paid on the individuals level of involvement in teams producing measurable results including those items in section 2	A complex quarterly bonus is paid which reflects the individuals contribution to the overall improvement incorporating some form of residual value

PROBLEM SOLVING
(Preliminary Step)

Improvement initiative	0	1	2	3	4	5
8 (a). Rate, Reliability, Quality & Bottleneck Analysis	The concept is not understood ●	Problems are prioritized based on experience and current issues	Engineers and managers pass problems to an appointed "Reliability Engineer" for solution.	A team assesses problems based on repair and downtime cost on a one time basis.	A cross functional team meets annually to assess priorities based on the total cost including "safety, environmental, customer services etc	The RRQ & BA team meets several times a year to focus the RCA teams efforts

PROBLEM SOLVING

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8 (b). Root Cause Analysis (Maxi)	People use the term RCA but have received no formal training ●	A few people have received training but it is not used by the organization. Individuals appointed to lead the effort have insufficient experience and status	Key professionals have received training and 50% of them are occasionally involved. There is no budget or system to execute "solutions projects"	More than 50% have received training and the "Maxi team" meets on a fairly regular basis. There is a budget for "solutions projects"	Most people on site have received training and 50% or more participate on a regular basis. Successes are communicated and celebrated	The use of RCA is routine and scheduled with formal systems for executing "solutions projects"
Root Cause Analysis (Midi)	Midi analysis by very small groups or individuals must be written up and circulated					
Root Cause Analysis (Mini)	Mini analysis follows the same methodology but a written report is not necessary					