White Paper:

Prevention vs. Reaction as a Frontline to Reliability:
Overhauling Operator Care Programs through a Systematic Approach

by

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Operator Care Programs can be used as part of TPM implementation or as a standalone business practice to significant immediate and long-term impact on reliability. Examine the six fundamental Operating Care principles, a method to identify how they currently exist and to what extent in your organization, and how to effectively visualize, implement, measure, and improve these principles once identified.

Going to Genba

Genba is a Japanese term that means "the real place." A reporter in Japan at the site of a train derailment, for example, may refer to herself as reporting "from genba." Likewise a crime scene may be referred to as genba. The term has many applications. It is often found in literature about lean manufacturing such as the idea of the "genba walk" where managers go to the shop floor to see the problems first-hand and get input from those most directly involved.

At a high level, typical manufacturing or processing plants face a number of similar issues such as:

- An aging workforce nearing retirement
- The nation-wide skilled trades shortage
- An inability to schedule needed maintenance work due to production demands
- Having to react to an unending stream of emergencies
- Needing operators qualified to work on different areas within the plant or across multiple production lines
- The need to improve reliability, reduce the backlog and lower maintenance costs
- Opportunities to debottleneck, improve changeovers, and increase OEE

When we go to genba, we begin to see the real story of what happens on the shop floor. At a company that has won TPM Excellence Awards from the Japanese Institute of Plant Management, genba will likely wow us with plant cleanliness, organization, Five S, visual controls, color coding, SMED, One Point Lessons, and efficiencies galore. At other companies, however, genba will not impress us as much. What we observe all too commonly at genba are situations such as these listed below.

- Variation in how machines are cleaned and set up for production
- Operator equipment inspections either do not exist, are impractical, or insufficient
- Gauges on machines are unreadable
- Labels are missing off of pushbuttons, switches, and equipment
- Dessicant has not been changed out in three years
- The roof leaks onto a compressor, which is also coated with pigeon poop
- Operator confusion on whether venting to atmosphere is permissible on some pump starts
- Set Up and Operating Procedures have outdated information and photographs from old equipment and are not updated or used on the shop floor
- Oil, steam, acid, and product leaks
- Exposed wires and poor lighting
- Equipment with missing guards
- Missing rollers and broken pins on conveyors
- Unreadable sight glasses
- Valve handles broken or missing
- Massively expensive air leaks
- Reliance on mechanics for adjustments, simple fixes, and minor troubleshooting

At a large snack food manufacturer, a genba walk of a production line from beginning to end – from the mixing department upstairs, to the bake shop and their long ovens, to the packaging floor with its high speed wrappers and cartoners, to the shipping department and their robots – identified 80 issues impacting production, reliability, or safety. Documentation for production line cleaning, set-up, and changeovers was incorrect and out of date. There was no operator equipment inspection program. The oven take-off conveyor safety switch was not functioning. There was an oil leak on the mixer. One of the oven zones kept overshooting the temperature targets. A number of safety covers and guards were missing or improper. Broken conduit. Exposed wiring. Missing labels. In all, 80 defects or abnormalities that had gone unreported were identified in a facilitator-led genba walk

A Culture of Prevention vs. a Culture of Reaction

This example is not unique; it's the norm. Defects and abnormalities go unreported in a culture that tolerates that type of environment where the emphasis is on the reaction and the repair vs. early warning and prevention of the defect altogether. It costs 50% more to repair a failed asset than if the problem had been addressed prior to failure – US National Response Center.

Unreported abnormalities usually get more expensive and significant as time goes along until they erupt as emergencies and maintenance schedule breakers. All the while they are impacting something; production, quality, safety, throughput, efficiency, reliability, risk, or cost. And they exist because we either don't have an operator inspection program, we haven't been clear on expectations and coaching, we don't care, or we weren't trained.

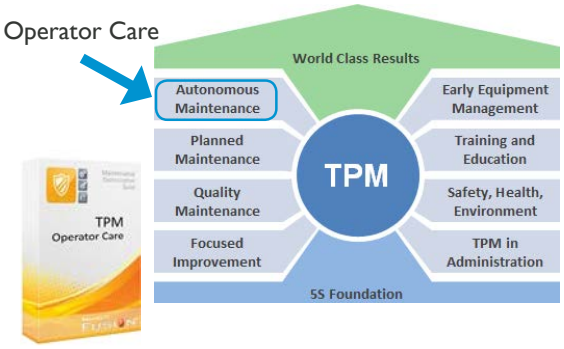
The primary gaps we see at genba that impact OEE are:

- Variation in what operators know and how operators perform tasks
- Lack of robust operator equipment inspection programs
- Insufficient documentation (or upkeep) of cleaning, set-up, changeover, and other operating procedures
- Defects and abnormalities go unreported (unless an emergency or Priority One)
- Disorganized workplaces and parts areas (not Five-S'd)
- Lack of visual controls and aids on gauges, reservoir levels, and sight glasses
- Many "front line" maintenance tasks, which could be done by operators (Cleaning, Lubricating, Adjustments, Inspections, and Simple Repairs), are still being done by maintenance staff
- Production line operators are not sufficiently leveraged to flexibly work on other production lines; they are not set up for success

What is the opportunity? How much money is being lost to these types of problems? The Penn State Applied Research Lab says that "North American industry could recover $200 billion to $500 billion annually through improved physical asset management." They estimate that, for most companies, the profit potential is "in the tens to hundreds of millions of dollars—the equivalent to 20 to 35 percent of non-raw-material Operating and Maintenance (O&M) costs."

The What and Why of Operator Care Programs

Operator Care Programs (they have numerous names such as Routine Equipment Care) are simple methods focused on strengthening genba, the shop floor, and ensuring the basics are in place on the front lines of reliability. Fancy spreadsheets and advanced methodologies cannot take the place of essential shop floor fundamentals. Operator Care Programs involve and engage the people on the shop floor, those in production and maintenance, their supervisors and support staff.



> The shop floor is where the real battle for quality and productivity is fought, where real problems are encountered, where real decisions must be made.[1]
>
> — Edward Handyside

In terms of TPM, Operator Care Programs focus on the Autonomous Maintenance Pillar, which is what many understand to be the heart of TPM. Operator Care kaizen events represent rapid improvement approaches to the ideals and goals of TPM's Autonomous Maintenance pillar and can be used in a TPM deployment, for example.

Operator Care can also be pursued independently of a larger TPM rollout. For some organizations, the full scale implementation of all the classic pillars of TPM, with its many pillar meetings and sub-teams and complex integration is too much at once, too massive an investment for them at the moment. However, they realize that they can realize a substantial, tangible benefit if they focus on this one key aspect, Operator Care (Autonomous Maintenance) and lay a good and necessary foundation for Reliability and Asset Management Best Practices.

> The shop floor is a foundation of our thinking….The shop floor…is…the place where people ultimately add value….[2]
>
> — Kiyoshi Suzaki

The objectives of Operator Care programs include:

1. Form a production + maintenance partnership on the shop floor
2. Identify and report all defects and abnormalities
3. Defect prevention and cleanliness standards
4. Operator Equipment Inspection specifics
5. Appropriate "Front Line Maintenance" type tasks identified for operators (lubrication, adjustments, repairs)
6. Free up maintenance staff from excessive "line tending"
7. Transform the workplace using visual aids, color coding, and Five S principles
8. Use of Front Line Problem Solving Tools
9. Ownership at genba and sharing of knowledge using One Point Lessons and Job Aids
10. PDCA and SDCA to drive and sustain improvements

[1] Handyside, Edward. 1997. *Genba Kanri*. Aldershot, Hampshire: Gower.

[2] Suzaki, Kiyoshi. 1993. *The new shop floor management*. New York: Free Press

The program consists of a sponsor and a leadership guidance team, a kaizen workshop approach to rapid improvement, and a simple sustainability process and routine audit.

The benefits come in many forms:

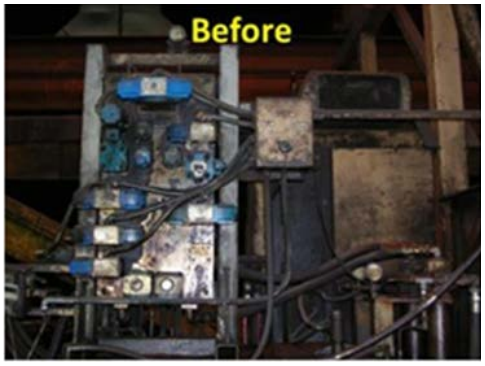
- Less emergencies
- Higher reliability
- Cost reductions
- Reduced scrap and downtime
- Changeover and setup time reduction
- Higher production numbers
- Increasing and expanding operator's knowledge and skill sets
- Solving root causes
- Engagement and ownership at genba
- Improved safety
- Risk reduction

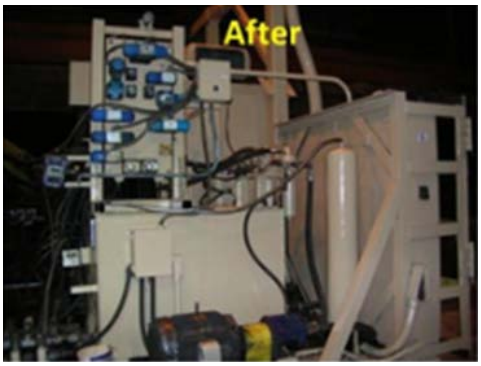
Irrespective of what the program is called, or even if there is a "program" per se, it is worthwhile to go on a genba walk and visit the shop floor in your organization. Evaluate how well your group performs in a few of the Operator Care principles described on the following pages.

> Small increases in operational reliability at each refinery from the safety program equaled a capacity gain between 100,000 and 150,000 barrels per day(BPD), or the equivalent of a new refinery.
>
> — *Petrochemical Metrics for Process & Personal Safety White Paper November 2015*

Equipment Cleaning and Upkeep

This is classically the first step in the Autonomous Maintenance pillar of TPM. Cleaning reveals hidden problems and prevents defects. How clean are your machines and production equipment? In a tour of genba, do you see steam, water, oil or product leaks? Are the cleanliness and routine sanitation standards kept up to date? Are defect and loss prevention practices in use?





Defect Identification and Elimination

If we went on a walk at genba armed with problem tags, how many defects and abnormalities would we spot? Is the work request system being used by everyone? Are operators trained in identifying defects? Are they clear on the expectations? We typically find 50 or more!

Visual Management

Does a tour of genba at your organization show a shop floor with visual controls on gauges, levels, meters, and pipes? Is everything properly labeled? Are there color-coded indicators on gauges showing the proper range? Are the operators involved in working with maintenance and reliability staff to identify the right ranges and apply visual controls? Are they given routine feedback on any audits in this regard? Visual controls enable plant staff to "tell at a glance" what is going on and whether equipment is running right. This supports faster inspection and troubleshooting.

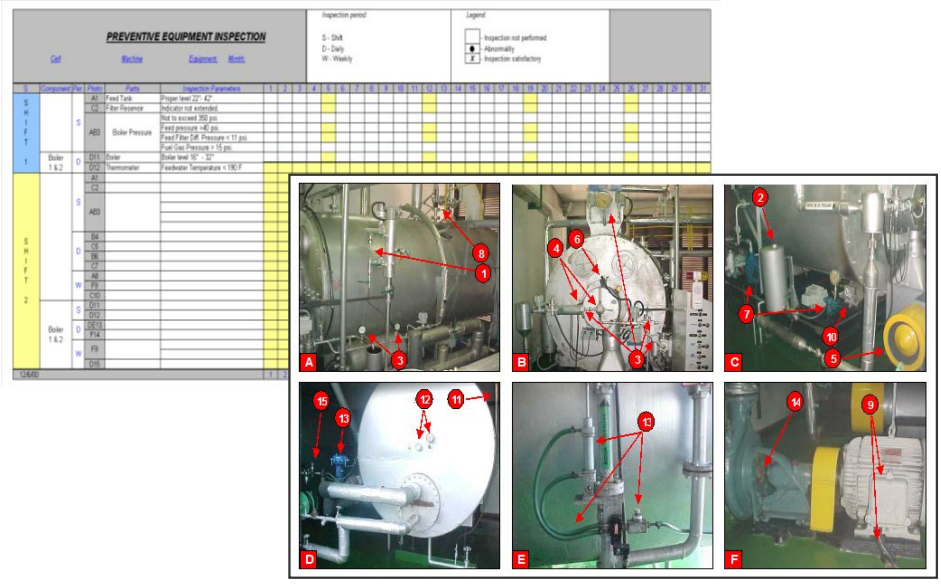
Likewise, at genba, what visual management methods are used for communication between maintenance and production? Is there a visual scorecard for performance? Are the inspection standards posted? Are the Five S roles and responsibilities posted on a communication board? Are audit results visually posted? What about the action plans subject to PDCA?

Five S

Five S is a visually-oriented system of cleanliness, organization, and arrangement designed to facilitate greater productivity, safety, and quality. Are Five S principles in use at your site on the shop floor? Are the tools and materials needed by the operators for adjustments, set ups and changeovers readily available and organized? Are material supply areas organized? Does everything including portable equipment, brooms, and totes have designated locations, or are things scattered about? How many shadow boards will we see on a tour of genba?

Operator Equipment Inspections

Operators can be the eyes and ears of maintenance. Early identification of defects requires vigilance on the front lines of production assets. How well trained are the operators regarding what good performance looks like, what the failure modes of the equipment are, and what to inspect? Is the Operator Inspection procedure detailed with specifics or is it littered with vague "Check the Box" lists? Is the inspection adequate or too cumbersome? Out of date? Not used?



Front Line Reliability

This aspect of Operator Care enables operators to be more self-reliant and respond more quickly to problems without needing to wait for maintenance or specialists as much. Sometimes where it makes sense and given the proper training, they can perform some front-line tasks that do not necessarily need to be done by maintenance staff.

What are the front line tasks your operators currently do with respect to cleaning, lubricating, adjustments, inspections, and simple repairs? Are these documented? How well do you leverage operators on PMs, production line annuals, and shutdowns?

Case Study: Over several years, the physical condition of a large plant in Texas had deteriorated considerably. Plant management decided to upgrade and implement new aspects of TPM including front-line reliability and operator care. In order to get operators' involvement in reliability, Operator Asset Care workshops were delivered in groups of 12 to 16 participants for production and maintenance employees in all production quadrants. Each workshop consisted of four days and took on a "learn and do" approach, starting with classroom instruction and physically walking the facility to define what equipment to inspect, identify ranges, and identify quantifiable specifics. Once the inspection programs have been improved at the facility, the workshops focused on front-line problem-solving tools, visual controls, and Five S. The workshops concluded with a presentation to senior management on changes implemented and demonstrations of success. The program originally started with four workshops, however, after seeing significant improvement to mean time between failures and positive impacts to OEE, the program expanded to 10 workshops.

Summary

A strong front line is necessary for production and reliability improvements. Without it, improvement efforts are often doomed. What is needed is an effective partnership between operators and maintenance at genba that is good at preventing defects, identifying abnormalities early, quickly responding to problems and getting to root causes, and faithfully following clear, documented standards for all activities. Operator Care Programs emphasize equipment cleanliness standards, operator inspections, early identification of problems, visual management, and seek always to improve the knowledge, skills, and capabilities of the workforce. Go on a genba walk at your facility and see how well your team matches up to the Operator Care principles described here. It will be evident one way or another and provide a basis for improvement.

About the Author

Ken Arthur began his career with GP Strategies in 1991. He is the author of numerous client-specific Planning and Scheduling textbooks and is the creator of GP Strategies' hands-on Planning & Scheduling simulation games. Ken has helped many clients design and implement planning and scheduling improvement strategies, standard processes, and customized training. He is currently the Director of GP Strategies' Maintenance and Reliability Consulting Practice. ■

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Ref. Code: WP-Prevention vs Reaction OperatorCare KArthur 8.23.16.indd