

Performing Triage to Return a Food Manufacturing Facility to Profitability

David Rosenthal, PE, CMRP

Owner

Reliability Strategy and Implementation Consultancy, LLC

Summary

Case studies that detail the improvement in operating performance of a manufacturing facility based on a well thought out strategy and implementation plan are in every program at every conference. They detail the progression of an approach from several months to year timeframe of improvement. However, what would you do to improve a facility where the desired timeframe was a matter of weeks or a few months?

Imagine you are faced with a facility losing money, low OEE's, not meeting schedules, missing orders, working excessive overtime, failing assets, poor morale and with other risks that possibly jeopardize its near future. How would that situation change how you would go about quickly turning around the facility towards profitability?

I was hired as a contract maintenance manager in a food manufacturing facility that prior to my arrival was being prepared to be sold which dictated the use of limited financial support for the maintenance of its assets. The overall equipment effectiveness of the facility did not exceed 50% on a good day. The assets were not being maintained from a lack of parts and a culture of just "keep it running".

This situation required triage (in the medical sense) involving eliminating bad acting assets, remediating electrical issues, getting the right consumable and critical parts in the storeroom, bringing safety and electrical standards back to acceptable practices, changing sanitation practices, developing operator ownership, and building the maintenance and operating systems to begin to move towards achieving higher OEE and budget targets.

This paper will show how a food manufacturing site was turned around in a matter of few months restoring the confidence in the site from their business leaders and providing a morale boost to those at the site knowing they have a pathway to achieve what is required for the business. The approach started with the most important factors: (1) plant and business recognition of the situation, (2) support of the new owner, and (3) complete support for what I needed to accomplish in a short amount of time. The approach was based on the strictest application of prioritization for remediating issues with asset care, electrical components, safety issues, parts inventory, operating and sanitation practices, and work system installations.

The result was an absolute rise in OEE of 20%, reduction in daily labor losses, ability to accomplish their schedule in a week's time frame, elimination of electrical component failures, development of daily cadence used to manage the facility, and restoration of confidence in the future of the facility. This paper will detail the steps entailed and barriers that were overcome.

Introduction

Maintenance and reliability consulting provide a wide variety of experiences, diverse industry exposures, and different business cases for improvement. Merger and acquisition activity can provide a business case for improvement in productivity and cost performance after the sale and when the new owner is in place. In some cases, although due diligence is performed by the purchasing company, the acquired site “condition” may need immediate triage to remedy safety, productivity and cost gaps in performance in line with the new owner’s goals. Often the seller may not address these issues prior to sale. The situation I was presented at this food manufacturing facility site required remediation of urgent issues that was part of my contractual agreement as maintenance manager until a permanent hire could be obtained.

Guidance provided me by the new owner was to remedy issues that affected the safety, productivity, and cost performance of the site as quickly as possible. The timeframe was only a few months. Traditional methods of performance turnaround requiring a full business analysis and implementation last a year or so was not part of my guidance. My timeframe was only a few months which resulted in restoring the confidence of the new owner in the facility. The triage approach provided a boost to the site employees that provided the tools that resulted in meeting the new owner’s goals.

Food Industry is Unique

Most of my experience has been in the Chemical Manufacturing. I dealt with large equipment like pumps, vessels, columns, etc. but the food industry is unique from many perspectives. First, Food Safety such as Sanitation, Pasteurization, and GMP offer challenges to equipment care due to aggressive cleaning and designs that can accommodate easy cleaning. The complexity of its Supply Chain and Product Lines for both Retail and Commercial distribution channels is much broader than most Chemical supply chains. The diversity of its processing equipment from food preparation, mixing, cooking, pasteurizing, packaging and palletizing requires a broader variety of care strategies. Its variety of packaging types also broadens the equipment variety utilized. Finally, the utility demands from cooking (Hot Water, Gas) to Refrigeration (Ammonia) introduces an element of Process Safety Management but is smaller than most Chemical manufacturing operations. All these perspectives require food manufacturers to build extensive care strategies and broaden participation level of those involved in both operating and maintaining these assets.

Situation and Support of the New owner

The site was sold to an owner after an extended time on the market. There was limited spending on expense and capital to provide a “leaner” cost profile. The site was mostly reactive “fit it” maintenance and the fixes were temporary at best. The site had an insufficient supply of parts. The OEE for the site did not exceed 50% and they could not meet their schedule causing weekend work. Production and Sanitation had little accountability for the care the assets resulting every day failing of assets from ineffective care and being wet. Maintenance was not viewed as a valued partner. Electrical practices and the quality of capital work from previous projects were particularly poor which contributed to the root causes of failure. The leadership team was barraged with a major issue each day and there was no Management Operating system in place for either Production or Maintenance to deal with these occurrences. The site was a poor performer across all maintenance and reliability practice elements.

Path forward If the patient is on life support

The approach used was based on "Pain Point" Management. This is like criticality when one does not have the time to perform a criticality analysis. I started with asking all departments what their major pain point assets were in the plant based on failure, performance, safety, etc. I collected that list and within a few days I had the top ten assets in a list and in an order that everyone approved. I based subsequent improvement strategies on this list.

For instance, I developed run-time inspection lists for Maintenance for each asset to check each shift. I had Maintenance review the current parts stocking for each of the top 10 and then made requisitions for missing parts. I called in vendors for each of the top 10 to perform an evaluation of the machine to return it to original condition and got recommendations for improvement. I developed Operations inspection lists for the top 10 for Startup, Operation, and Shutdown. Daily we discussed the status of the top 10 in the AM Production meetings. We corrected the Consumables parts list for the needs of the top 10 assets. Focused training for all crafts based on the tasks required to maintain the top 10 list.

Besides the top 10 asset activities there were safety, operations, sanitation, and maintenance systemic issues which had to be dealt with in order to ensure the care tasks of the top 10 could be performed. These are detailed below.

Safety Issues

The two areas of concern in safety were the lack of proper machine guarding and interlocks on hazardous machines that processed meat. The guards were either removed or disabled by Operations and Maintenance to "ease" access from failed conditions or just not replaced. A third party was used to correct all guarding around the facility. In addition, interlock designs were redone by two OEM's for their equipment after deficiencies were relayed to them. These interlocks were disabled by Operations and Maintenance to both ease Operation and because they did not function properly when installed. My direction to not disable any interlock or guard without permission was a cultural change but it did take hold after a few weeks of messaging.

Equipment Failures

Equipment failure was a daily occurrence. It occurred from various reasons as poor design, poor maintenance, operations practices, running it beyond its "sweet spot", getting soaked in Sanitation, poor installation practices, improper parts and the acceptance of the abnormal conditions. The focus on both the top 10 assets along with systemic practices began to reduce the failure rates. The systemic practices prevented the proper care of the equipment. Later I will detail the use of a Production Operation system aimed at correcting systemic practices and developing the root causes of issues seen with the equipment.

Storeroom and Parts Issues

As detailed above, the Storeroom did not have enough parts and had the wrong parts. It did not have enough Consumable items to supply Maintenance's needs. The Storeroom also had Production supplies which were eliminated. Improvement started with a general cleaning of obsolete equipment from the Storeroom. Next the Maintenance crew reviewed the parts listings for the top 10 assets from the Pain Points lists. Requisitions and quotes were obtained from vendors and the inventory was corrected. The

site opened a Satellite stores since travel contributed to higher Mean Time to Repair. This process continued when the new Maintenance Manager was hired.

Electrical Practices

There were many safety issues dealing with electrical practices that needed to be addressed. Termination panels for instance were not secure and employees often stored personal items in them in addition they adjusted controls not meant for their use. This was stopped immediately. Several panels needed to be rewired from poor installation practices. They were visible signs of “shorts” in the box along with poor wiring practices. Two panels were rewired included a major panel serving one of the refrigeration compressors. Several electrical boxes had no covers on them, and excess wire was coiled up everywhere leading to instrument issues which were remediated. The Storeroom did not have electrical parts that complied with the NEMA 4X washdown standards (boxes, cords, connectors) and that was corrected. Mechanics were going to local hardware stores to pick up “rain” boxes prior to my arrival.

Another curious phenomenon was the constant failure of VFD's around the facility. Although Sanitation practices below reduced some failures the number of failed VFD's was alarming and expensive. As Maintenance “warmed up” to me they explained that all VFD's were tied to building steel grounds and no earth grounds existed. I gave them permission each week to install earth grounds around the facility and the VFD failures stopped.

Sanitation Practices

Sanitation practices were the root cause of many failures. Sanitation meant that everything got hosed down each night including electrical boxes, VFD's, and other devices. This was not an easy turnaround of behaviors. The typical Sanitation person was someone who worked the night shift and was given a hose with little instruction but to soak everything. There was a process of steps to be followed which included using some “nasty” cleaning chemicals. Turnover was very high among this crew and all they wanted to do was to finish and leave. My steps to draw attention to these issues was to show the staff the number of items each day that were destroyed by chemicals and water. The Sanitation lead did retrain his folks to not spray certain items and reduce the pressure of the water used. However, failures still occurred. We developed the “Bag List”. Each night before Sanitation arrived, Operations put bags over critical electrical equipment and moved items like check weighers and other mobile assets out of the area. We finally saw a drop-off in failures. This took several months to standardize the Operation, but it got support from Operations which led to its success.

Maintenance Support

Maintenance was not “viewed” as a valued provider of service in the facility. However, they kept the facility running and most of the times they were the “scapegoat”. This view prevented them from getting the right tools and training they needed. Every week we met to discuss our strategy and the what they needed to perform their jobs. We brought in 17 OEM representatives for them to train with and exchange solutions to their equipment issues. We ordered pipe fitting machines, tools, troubleshooting instruments, and other items as they required. We sent one individual to Precision Maintenance school to provide us the gaps that he saw from the training. We purchased a press for putting on bearings instead of hitting them with hammers! I promoted the Storeroom clerk to Planner and Scheduler, and she provided the schedule and coordination of priorities with Production. PLC troubleshooting as an everyday occurrence

and thankfully we had one individual who had the skill and interest and I needed to keep him in the plant, so I signed him up for PLC accreditation with Houston college.

To raise their profile, it required my leadership with the staff to demonstrate their value. Before I left the staff had a different perspective on the value of Maintenance.

Operator Ownership

Practices that demonstrated Operator ownership did not exist. It was a diverse multi-cultural workforce but that was not the issue. This issue was that Operations did not understand the importance of their role in asset care and their impact on failure. The first initiative was to train the Operations leadership on their role in care for the equipment and the early recognition of failure was vital. Food manufacturing equipment has many failure modes that result in corrective maintenance in a short timeframe. If a motor is noisy on a conveyer belt drive, it is not long after till it stops functioning. They needed to be a partner in the asset care strategy.

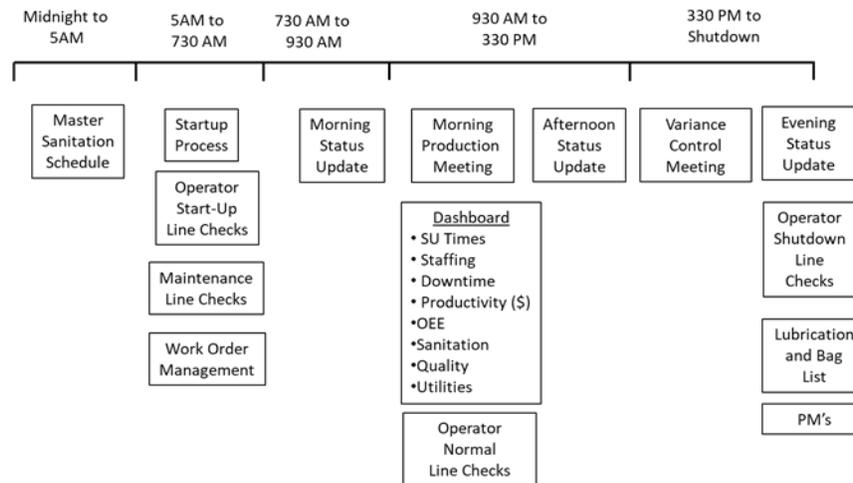
Just as Maintenance had their run-time PM's, we developed Inspection lists for Operations covering all top 10 Pain Point assets for Startup, Operations and Shutdown. An example is below. We use work order data, downtime data, and OEM recommendations to develop the list.

LOCATION #: EQUIPMENT		WHAT TO CHECK	DESIRED CONDITION	Condition Found	Action Take WO # (if needed)
Line 6 Pre-Cook East Shift Inspection Procedure Code - 101 Version 1.0 November 1, 2017					
Area: Pre-Cook, Lenox, IA 🔒 = Lockout/Tagout Required ① = See Notes					
PPE: Bump cap, safety glasses, steel toes shoes, hearing protection, hairnet					
Tools: Flashlight, Screwdrivers, Wrenches, and Utility Knife					
SHIFT PROACTIVE MAINTENANCE ROUTE			Start Time _____	Stop Time _____	
TIMING = START OF SHIFT AND COMPLETED BY 9AM / 6 PM / 1 AM EACH SHIFT					
NOTIFY SUPERVISOR/LEAD IF NOT ON TRACK					
#1: ENVIRONMENT					
	LIGHTING		NO BURNED OUT LIGHT		
	EMERGENCY LIGHTS AND SIGNS		ALL LIGHTS IN STANDBY WITH INDICATOR ON AND SIGNS LIT		
	DOORS		ALL DOORS CLOSED		
	SANITIZER		SPRAYING AT DESIRED FREQUENCY AND SUPPLIES ARE NOT EMPTY		
#2: LINE 6 FEED					
	CHECK PRODUCT FEED PRESSURE		EXPECTED: 10 PSIG	PRESSURE _____ PSIG	
	CHECK AIR PRESSURE		PRESSURE 65 PSIG, NO AIR LEAKS	PRESSURE _____ PSIG	
	CHECK FEED PUMP (SEALS, BEARINGS, COUPLING, MOTOR) FOR PROPER CONDITION		NO LEAKS, HIGH TEMPERATURE, NOISES, SMELLS, OR EXCESSIVE VIBRATION		
	CHECK FEED TANK FOR INTEGRITY		NO LEAKS		
	CHECK MIXER		NO UNUSUAL NOISES OR VIBRATIONS, NO GEARBOX LEAKS		
#3: LINE 6 OVEN INLET					
	CHECK DEPOSITOR PUMPS		ROOTS HAVE NO RIPS OR TEARS, CONSISTENT PRODUCT DEPOSIT PATTERN		
			SOLENOIDS ARE NOT LEAKING		
	CHECK TEFLON SCRAPER		GOOD CONDITION NO DAMAGE		
	CHECK FEED LINES AND HOSES		NO LEAKS OR DAMAGE		
	CHECK CONVEYER BELT		CENTERED, TENSIONED, AND IN GOOD CONDITION, NO WIRES BROKEN	CHECK CONVEYER BELT	
	CHECK CONVEYER MOTOR		RUNNING SMOOTHLY, NO NOISE OR EXCESSIVE VIBRATION, NOT RUNNING HOT	CHECK CONVEYER MOTOR	
	CHECK GEARBOX		NO LEAKS, NOT RUNNING HOT	CHECK GEARBOX	
	CHECK CHAIN		TENSIONED PROPERLY, NO EXCESSIVE WEAR	CHECK CHAIN	
	CHECK GEAR WHEEL		GREASED	CHECK GEAR WHEEL	
	CHECK RACK SPINDLE		GREASED	CHECK RACK SPINDLE	
#4: LINE 6 OVEN OUTLET					
	CHECK CONVEYER BELT		CENTERED AND IN GOOD CONDITION, NO WIRES BROKEN	CHECK CONVEYER BELT	
	CHECK CONVEYER MOTOR		RUNNING SMOOTHLY, NO NOISE OR EXCESSIVE VIBRATION, NOT RUNNING HOT	CHECK CONVEYER MOTOR	
5					

Management supported the effort. Each morning, the Plant Manager would ask for their completed inspections. He would go over what they found and make sure that Maintenance provided the fix, or he would correct an Operations practice that led to the issue.

Production Management Systems – Daily Cadence

I cannot stress enough how important it is for Operations to know what a “good day” looks like. In order to achieve a good day, every aspect of the day from meetings to information that is generated must be standardized. We established the cadence of activities below. This is what occurred each day. The expectation was established for the owners of each aspect and their performance was evaluated on what they delivered.



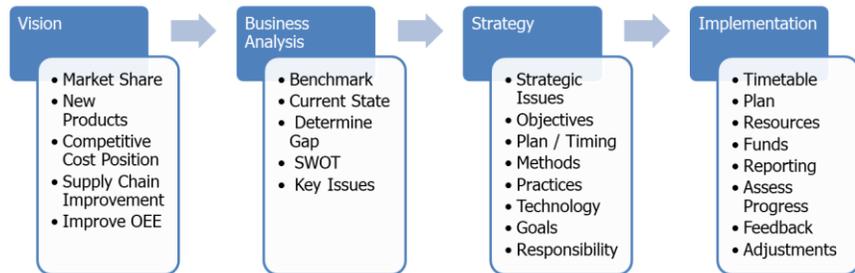
Metrics and OEE

OEE is king! It is one of the most important metrics a site can measure along with safety. OEE reporting starts with a standardization of downtime reporting. We established a standardized hierarchy for OEE reporting covering each shift, asset, line, type of downtime and reason code. Supervision reported downtime under this system into a downtime database which provide daily morning reporting. An action log captured any tasks to remediate a downtime occurrence if needed. Each element of OEE was analyzed and root causes where established.

OEE was part of a dashboard of metrics covering EHS, Production start times, labor costs, Utility performance, Maintenance metrics, Shipping, Quality and Budget performance. The staff was required to have their metrics completed by the AM Production meeting. The dashboard was a STOP Light review with windows established for each metric and a Green, Yellow, and Red range established. We only discussed the metrics in the red.

Path Forward

If time permits, creating a strategic plan is the key to success. It starts with a business analysis to understand the gap in performance and to quantify that gap in dollars for management. Using the understanding which levers needs to be adjusted through a SWOT analysis which are



then identified as strategic issues. Improvement techniques become part of the implementation plan which then turn into practices for the business. This is all put together in a timetable along with a cost benefit analysis for buy-in from company leadership.

However, certain business cases require one to quickly assess what is needed and act accordingly. Experience plays a large role in deciding what to tell an owner. In this case the use of Pain Points to the facility in order to “cut through” to the immediate issues was used as a sort of triage method. The use of site experience to create the list and the remediation of systemic issues can be a successful combination for success.

Outcome and Results

The patient survived the triage approach! OEE rose from < 50% to over 70% during a span of five months! Multiple safety issues were addressed including machine guarding, electrical standard compliance, and employee practices. Daily operations turned profitable with lower equipment failures and reduced labor usage. Production schedules were met for the week decreasing the need for weekend scheduling. The dashboard defined what a “good day” meant for the site. Equipment failures from electrical issues “disappeared”. Production understood what it meant to operate and care for the equipment. Maintenance believed they were a valued partner for the site.

Biography

David Rosenthal, CMRP, PE has over 39 years of manufacturing experience covering chemicals, consumer goods, pharmaceuticals, food, beverage, paper, and oil and gas industries. He has held numerous positions in operations, maintenance, and engineering with Rohm and Haas Company and others. He has a bachelor’s degree in chemical engineering from Drexel University and a master’s degree in chemical engineering from the University of Texas at Austin. He is board member of SMRPCO.

Keywords

Productivity, Improvement, Care Strategies, Strategic Plan, Lean Manufacturing, Performance Gap