The Meat and Poultry Industry

Foreign Material Maturity Model Self Assessment

Published August 2023

Reviewed and published by the
North American Meat Institute

NORTH AMERICAN MEAT INSTITUTE

Introduction

This Foreign Material Maturity Model has been designed by an independent group of North American Meat Institute member companies for the meat and poultry industry. Maturity models are useful tools that companies and establishments can utilize to assess their current programs and identify opportunities for continuous improvement. This maturity model may be used to help guide a company and align team members along the journey to improved foreign material control and prevention. For best use, companies should conduct an initial evaluation exercise, identify areas for improvement, develop action plans, and reevaluate on a regular basis, such as annually. The tool is not intended to discourage companies who may be less mature and it is likely unreasonable to set a goal to be in the most mature state (5) in all areas during the first or second evaluation. Instead, companies should let the maturity model be a guide to make targeted improvements in focused areas, one level at a time, over time.

The suggested use is to start with the broader Self-Assessment Tool on **page 4**. Evaluate the current program with a multi-disciplinary group to get multiple perspectives. Alternatively, have multiple individuals evaluate independently and compile the results. Note which maturity level 1-5 (Uncertainty, Awareness, Competence, Preventative Mindset, or Predictive Approach) best describes the company at that time in each of the competency areas (Management commitment and oversight, FM Organization Status, Problem Solving approach, and Proactive improvement actions). Evaluations of 1 (Uncertainty) are the least mature and 5 (Predictive Approach) the most mature. Companies can then elect to drill down into competency elements and sub-elements in more detail. Each competency element has subsequent criteria companies can use to evaluate and further identify specific actions for improvement. To avoid getting overwhelmed, companies should try focusing on their least mature competencies first.

Although this maturity model was designed for the meat and poultry industry, it may be applicable for other food processing sectors.

Contributing Companies

- Cargill Meat Solutions
- Hormel Foods Corporation
- Kraft Foods, Inc.
- Land O'Frost Inc.
- Maple Leaf Foods, Inc
- OSI Group
- Tyson Foods, Inc.

Glossary

5S - the five S's of Lean Manufacturing: sort, set in order, shine, standardize, and sustain. 5S is a systemic way to implement a clean, organized, and disciplined manufacturing environment.

AI - artificial intelligence

AM - autonomous maintenance. Basic maintenance tasks performed by front line operators.

CAPA - corrective action and preventive action. A plan, usually informed by a root cause analysis, to immediately address an issue through corrective action and reduce the likelihood of recurrence through preventive action.

CIL - clean, inspect, lubricate

CONC - cost of non-conformance

COPQ - cost of poor quality

FM - foreign material

FMEA - failure mode and effects analysis. A structured process analysis tool originally designed by the U.S. military to identify all possible failures.

FSQA - food safety and quality assurance, generally referring to the department or personnel within the department with responsibility and/or oversight of food safety and quality. Some companies may utilize a different nomenclature (i.e., food safety and quality control, food safety and regulatory compliance, quality assurance, etc.) or divide duties into multiple departments.

Gemba walk - a physical walk through of the process to understand the process first hand.

Kaizen - a cyclic approach to continuous improvement in Lean Manufacturing based on small changes implemented from the bottom-up instead of top-down.

KPI - key performance indicator

OEE - overall equipment effectiveness

OEM - original equipment manufacturer

PM - preventive maintenance. Regular and routine maintenance performed by a skilled tradesperson.

RCA - root cause analysis. An investigative exercise conducted to determine the root cause of an incident.

SME - subject matter expert

SOP - standard operating procedure

SPC - statistical process control

WI - work instructions

WIP - work in process

XRF - X-ray fluorescence. A non-destructive analytical technique to determine the chemical makeup of a sample.

Competency	1. Uncertainty (Early Awareness, Denial)	2. Awareness (Understanding, Early Results)	3. Competence (Creating Significant Value)	4. Preventative Mindset (Excellence, Sustained Value)	5. Predictive Approach (Mastery, Role Model, Externally Focused)
Management Commitment and Oversight	FM issues are not considered either food safety or quality. Front line employees and supervision are unaware of the FM risks in the manufacturing process. Management treat incidents as "one offs" and focuses blame entirely on raw material suppliers.	FM issues are managed only when business is negatively impacted. There is minimal accountability on Operations to control FM. Capital investment for FM control is mainly tied to mandated business requirements.	FM control is led by Operations through a well defined program that has proactive elements. The FM team's mandate is clear and structured through process and procedures. Resources and capital investment are deployed beyond mandated requirements.	FM performance is governed by senior site leadership and corporate oversight. FM KPI and action plan status are a standing agenda item. Capital investment is a budget input with a clear objective to drive out FM risk.	Everyone is passionately committed to being FM performance leaders. The plant/organization share knowledge openly and are forward thinking to new technology. Capital investment is focused on the long term and includes the entire end to end process from raw materials, processes, finished products and target consumers.
FM Organization Status	What team? Front line employees are trained peer to peer without the benefit of SOPs. When FM issues occur, FSQA is solely responsible to identify and destroy the affected product as a cost of doing business.	FSQA is assigned to lead stakeholders through firefighting to address FM issues by attempting to salvage as much product as possible and assign blame. Front line employees receive FM training as part of onboarding by competent individuals using available SOPS to perform basis tasks under supervision.	Operations leads a cross functional FM team to drive FM control. Front line employees are formally trained in their native language, competency assessed and documented with training records. They are self managed on their assigned tasks and participate as FM team members. FM issues are investigated to a root cause, leading to corrective actions that drive continuous improvement.	Training materials for all front line stakeholders include technical knowledge and information specific to the role. Knowledge retention is evaluated. Continuous improvement in FM control leads to the development of preventative measures that reduce FM risk before issues occur.	The FM team is encouraged to scan the horizon internally and externally for best practices and innovation. Training materials are comprehensive and targets every stakeholder internal and external to the plant. All front line stakeholders participate in evaluating current and proposed FM control technology. Since FM issues rarely occur, periodic activities are scheduled to keep the FM team engaged.
Problem Solving Approach	RCA and CAPA is not completed for FM incidents. Denial leads to a continuation of production to meet throughput requirements regardless of the FM incident. There is a pattern of repeat incidents where firefighting is rewarded or encouraged. Data is not collected. Rather, tribal knowledge is often used to drive decisions and actions unless customer or regulatory enforcement requires it.	A RCA is completed for the most significant FM incidents. CAPA, as a result of the RCA, are not documented and limited to immediate actions only. Plant FSQA leads the investigation and communicates with Operations to resolve the issue. Data is collected but not reacted to. Investigations are only triggered when limits are exceeded.	A structured RCA process with a cross functional team is executed for significant FM incidents (including any negative trends). CAPAs are documented including responsibilities, defined timelines and effectiveness checks performed for the immediate corrective actions. Communication is cross functional, led by Operations and partnered with FSQA. Data analysis is used to verify that each action was effective and sustainable. Data trends are used to drive continuous improvement actions and to support critical business decisions related to FM control investment.	RCA and CAPA outcomes are applied broadly across the entire plant to address underlying FM contamination risks. Findings by front line stakeholders are communicated and escalated to prevent FM risks becoming real. Data analysis and trending compares line performance within a plant and compares line performance across other plants to strive for "best in class" performance.	A post review is conducted for all completed site RCAs and CAPAs in order to identify opportunities to remove process waste while continuing to mitigate risk . An analysis of CAPAs from previous incidents at the site and across the plant network identify potential leading indicators that would be more responsive than lagging indicators. Internal communication focuses on the "why" and "now what" of FM investigations. Data analytics is a key component of the FM control culture that: sets team direction, identifies plans to mitigate plant risks, including to preferentially selecting raw material suppliers based on FM performance.
Proactive Improvement Actions	There is no motivation to invest in FM technology and when mandated to do so. FM equipment parameters are set so that throughput is not impeded. Front line equipment operators have no authority to perform tasks other than to keep the production equipment running. Equipment maintenance is reactive, with no SOPs, planning or scheduling process in place.	FM detection sensitivity is not considered when sourcing FM technology to meet minimum regulatory or customer requirements. Front line equipment operators are trained to perform Autonomous Maintenance (AM) tasks such as Clean, Inspect and Lubrication (CIL) tasks when time permits. A PM plan exists based on OEM recommendation but is not always followed. Equipment failures are so frequent that the attitude is "if it is not broken, don't touch it".	FM detection sensitivity is a major factor when sourcing FM technology and is validated against formulation and physical attributes for all products being scanned. CIL tasks are planned, scheduled and performed by front line equipment operators. The PM standard is executed and managed through measurement and verification. FM asset performance is maintained to meet the OEM specifications.	FM investment is focused on prevention to address leading indicators and there is a bias to scan for new and emerging innovation. CIL tasks by front line equipment operators evolve based on inherent production/process risk and line performance. PMs are revised based on data analysis and operational risk through strong stakeholder engagement. FM asset age, age of process equipment and raw material variability are considered.	Data forecasts future needs and drives FM investment decisions. Front line equipment operators are stakeholders and feel "ownership" of their equipment and are empowered to remediate issues that may negatively impact FM risk. PMs are completed based on data and not solely based on a schedule. FM failures where the root cause was related to equipment are designed out. The majority of maintenance is proactive and is "calm and controlled". Maintenance is predictive and driven by actions as a result of data "signals" before equipment failure occurs.

Competency	Elements	Sub Elements
Management Commitment and Oversight	**Senior Leadership**	- Commitment to FM Elimination (plant) - Dedicate FM resources (plant) - Capital investment (corporate)
	Empowerment	- Standard work - Communication - Incident - FM team
FM Organization Status	**Team Engagement**	- Strategy - Incident Response - Approach - Metrics
	Training	- Design - Delivery - Output
Problem Solving Approach	**RCA & CAPA**	- RCA - CAPA - Internal Communication - External Communication
	Analytics & Insights	- Data collection - Analysis/Implementation - Tools
Proactive Improvement Actions	**Maintenance**	- AM - PM
	Technology	- Assessment - Maintenance - Investment

	1. Uncertainty (Early Awareness, Denial)	2. Awareness (Understanding, Early Results)	3. Competence (Creating Significant Value)	4. Preventative Mindset (Excellence, Sustained Value)	5. Predictive Approach (Mastery, Role Model, Externally Focused)
Commitment to Foreign Material Elimination (Plant Level)	Site leader says they are committed to food safety and quality to meet minimum regulatory or customer requirements, yet do not call out foreign material as a risk.	Site leader recognizes that FM is important when it negatively impacts business. Addresses FM issues by providing FSQA resources after significant rise in consumer or customer complaints related to foreign material or a significant FM event occurs.	Site leader demonstrates the importance of FM by committing appropriate resources to identify root cause and to transition from reactive to proactive approaches to reduce the reoccurrence of FM issues. Some evidence to show FM metrics are improving.	Site Leader has FM control status as an agenda item at every Senior Site Leadership meeting to provide governance by reviewing KPIs and the status on action plans. Evidence of knowledge transfer to different areas of the plant is available and implemented.	Site Leader demonstrates a commitment to being a plant network leader in FM performance (both leading and lagging indicators).
Dedicated Resources to Address and Prevent Foreign Material Incidents (Plant Level	Does not see value in investing in resources to investigate foreign material (FM) risks, instead utilizes current FM detection devices as FM removal devices to remove contaminants. There is no thought link between an issue (such as a breakdown) to potential for FM contamination.	Demonstrates some actions are being taken to mitigate FM risks and there is some evidence of cross functional investigations, especially when significant FM issues are persistent or when linked to customer/ consumer feedback.	Assigns an Operations Lead as the FM team leader to drive operational change and mindset. A charter exists, defines expected results, identifies the cross function team members and their responsibilities. Regular meetings occur to review incidents and RCA.	Holds FM team leader and team accountable for monitoring and identifying FM risks at the plant through regular reporting rhythms. Drives continuous improvement by analyzing leading FM indicators and developing prevention programs to mitigate the risk of FM getting into the product stream. Education and training is provided at all levels to strengthen awareness.	Maturity in FM management is evident through passionate leadership and organizational participation from front line employees to senior management. Lessons learned are openly shared and there is a willingness to volunteer support to other plants.
Capital Investment (Plant Level)	Does not see the merits to invest in technology to reduce inherent FM risks.	Invests in FM reduction only when mandated to do so and when throughput is not negatively impacted.	Views FM reduction as part of the entire quality system and views investment as meeting the overall goal of improving product food safety and quality. Evidence of investment above and beyond what is mandated is available to demonstrate commitment.	Develops a short term capital investment plan as part of the annual budget process.(equipment & digital technology), monitors Investment justifications post installation to ensure performance and cost benefits met original budget assumptions and trend metrics to evidence the investment is functioning as intended.	Develops a long term capital investment plan by considering the end to end process i.e. the capability of raw material suppliers (choosing only those suppliers that meet the expectations of the plant). Performs a technology scan within and outside of the company to consider the merits of all available FM control systems to match design expectations to FM risks, sensitivity, product size and throughput.
Senior Leadership Engagement (Corporate Level)	Reviews FM customer and consumer complaints periodically but there are no actions to proactively manage these complaints. Complaint responses are treated as "one off" incidents with the focus to blame the upstream suppliers.	Reviews FM complaints monthly. The plant is aware of the top FM complaints through data trending. Few FM complaints are investigated and when they are, the team is mainly FSQA with minimal cross functional participation.	Reviews FM complaints data and the status of any open action items related to FM incidents. Plant KPI performance are tracked and trended against plant targets. Action plans are reactive and related to resolving incidents. A Company Standard for FM sets expectations, roles and responsibilities, performance expectations, reporting rhythms etc. enables corporate oversight to actions when adherence is missing and rewards when there is successful execution.	Reviews FM complaints data and the status of action plans related to FM as a standing agenda item 1:1 with each plant and at plant network meetings. KPI performance is measured against plant targets and comparable plants in the network. Once incidents are resolved, the focus shifts to preventive measures that maintain sustainable control. FM Performance reviewed by Senior executive leadership. Admired performance is rewarded and recognized.	Directs plants to design out FM risk. Seeks industry best practices and are open to consider novel technology. Design considers the capability/risk associated with raw materials, process and equipment design.
Direction Setting & Stakeholder Alignment (Corporate Level)	Decentralized structure, lack consistent standards and controls. No coordinated effort between corporate and department levels results in no FM ownership at ANY level.	FM ownership responsibility is shared between FSQA, Regulators or Customers. Some common standards are in place. Relationships with suppliers form, facilitated by supply chain. Participation on FM team is ad hoc with no link to the business.	FM ownership is inconsistent between FSQA and other areas of the business. Standards are in place, there is basic annual training, it is assumed the staff know what to do. Cross functional teams form that include senior executives who hold the team accountable.	FM ownership and responsibility is defined across the organization. Decision making is centralized. Standards and controls are well defined and educated across functions. Cross functional teams are mature.	FM ownership is active with internal checks, layered audits and taking immediate action according to internal standards and controls. Expect excellence in food safety and foreign material prevention. Cross functional teams achieve consensus without hierarchal barriers. Annual plans are developed with foresight to budgeting, people and business alignment.

	1. Uncertainty (Early Awareness, Denial)	2. Awareness (Understanding, Early Results)	3. Competence (Creating Significant Value)	4. Preventative Mindset (Excellence, Sustained Value)	5. Predictive Approach (Mastery, Role Model, Externally Focused)
Standard Work	Front line employees adhere to work instructions but unsure why they are needed and the role they play in FM prevention	Front line employees adhere to Standard Operating Procedures (SOP) and Work Instructions (WI) and have an awareness in the role they play in achieving audit success through training	Front line employees not only adhere to company WI, SOP or policies but are fully aware of how they are intended to prevent FM issues and the role they play in executing FM control / monitoring tasks as a critical aspect of their job.	Front line employees not only adhere to company WI, SOP or policies but are fully aware of how they are intended to prevent FM issues and the role they play to execute and demonstrate ownership of each FM control / monitoring task assigned to them.	Front line employees not only adhere to company WI, SOP or policies but are fully aware of how they are intended to prevent FM issues and the role they play to execute and to demonstrate ownership of the area in which they work, beyond their assigned tasks.
Communication	FM issue are shared only when they exceed a certain threshold for magnitude (i.e., high impact / product loss).	FM issues are review by the management team in regularly scheduled meetings, but in a summary "state of the union" manner only.	FM issues are posted for all staff to see, however there is limited two-way communication regarding follow up or status of issues.	Documented issue and resolution feedback (positive and constructive) is provided and consistent communication back to the team on any follow up ideas/concerns that the employees have.	Employees are active in communication of issue resolution, solution provision and deployment with their peers.
Incident	Front line employees do not understand the relevance and are afraid to bring up issues when they occur.	When issues arise, the resulting actions appear as firefighting and often results in blame. This results in front line employees not speaking up when issues arise.	When issues arise, front line employees will immediately notify supervision and will participate in problem solving when asked without fear of blame.	Operation Supervisors regularly discuss FM opportunities and listen openly, without bias, for input from all front lime employees.	Employees demonstrate personal ownership for any corrective or preventative actions required for their area, follow up on these actions and communicate closure to other employees or their supervisor.
FM Team	No direct feel of ownership in the facility beyond key FSQA members. Ad hoc and peer to peer training leaves FSQA teams lacking confidence in staff to manage effectively	The Facility FSQA team own the FM mantle and drive actions through the use of and training against SOP's. Front line employees feel supported but not empowered.	A diverse multidisciplinary team with clearly defined roles and responsibilities documented in a project charter and front line employees understand how their role impacts the prevention of FM, especially related to CCP's.	FM team is led by an Operations leader and is cross functional (Operations, Maintenance, Sanitation and FSQA) with a mix of salaried and hourly staff. Front line employees volunteer to participate and represent their function in a professional and constructive manner. The extended team has clearly defined roles and responsibilities including champions for operations, maintenance, and quality. Employees are fully aware of their role in taking ownership for the FM prevention and solutions.	Front line employees are key members of the FM team and routinely bring insights (Internal and external) and input in the development of effective and sustainable solutions. Employees demonstrate competence and confidence to see "what" is happening and "how" to approach the situation effectively allowing the FSQA teams to hand over all routine prevention and programs management to facility staff and turn focus to external best practices and internal continuous improvement activities.

FM Organization Status - Team Engagement

	1. Uncertainty (Early Awareness, Denial)	2. Awareness (Understanding, Early Results)	3. Competence (Creating Significant Value)	4. Preventative Mindset (Excellence, Sustained Value)	5. Predictive Approach (Mastery, Role Model, Externally Focused)
Strategy	What team? The immediate reaction to a FM issue is to find out what went wrong and who to blame. It is often a choice to assign the failure to either execution (Operations) or program (FSQA).	The FSQA team directs people from different functions to work as a team when the scope or severity of the FM incident demands it.	The site leader directs the FSQA team to charter a multi-disciplinary FM team led by Operations to manage and prevent FM issues. The focus is on the elimination of root causes (sources) of the most significant plant FM risks. Front line employees are encouraged to participate on the incident team.	The site leader supports a FM team that is led by Operations, supported by FSQ and has team members from all functions and all levels. The focus is on continuous improvement and actions that prevent reoccurrence of FM incidents. Front line employees have a "seat at the table".	The site leader encourages the FM team to be both internally and externally focused. Internal focus strives for front line employee empowerment. External focus strives to utilize SMEs outside the plant.
Incident Response	Product contaminated with FM is discarded (as a cost of doing business) and production continues.	Firefighting by the team is focused on reducing the impact to the plant with no intent to improve the overall production process.	FM issues are seen as an opportunity to improve and implement control programs that are effective and sustainable.	FM issues are looked at as opportunity for improvement with prevention strategies identified, implemented and layer audited to ensure that the gains are sustained.	Supply chain / industry FM issues are assessed for internal opportunities with CAPAs implemented where relevant. Auditing of prevention strategies to ensure that the identified gains are sustained.
Approach	Equipment maintenance occurs on an ad hoc basis in response to events with limited preventive maintenance effort.	Equipment is operating as designed, maintained and inspected as recommended by the OEM with a clearly defined escalation process. 5S process employed (e.g., simple tool / part reconciliation) but with little risk assessment beyond incident response.	FM team looks for potential FM risks that could be introduced into the product independent of a FM incident driving investigation (e.g., FMEA). Preventive maintenance schedules are adjusted in response to data that monitors equipment health through its asset lifecycle.	The site leader provides governance for the FM team by providing positive and constructive reinforcement of behaviours to support a fully functional FM control and prevention program.	Team members recognize and/ or nominate each other when strategic solutions are implemented that are "outside the box" and promotes a predictive approach to improving performance. Where multisite operations exist the solutions are proactively shared across other FM teams to determine adoptability of solutions.
Metrics	None exist or are strictly production related.	Complaints information shared on notice boards	A reporting rhythm to routinely review the KPIs and action status related to FM complaints, FM related variance, & related Costs (COPQ/CONC) is established and a communication plan is deployed to socialize employees at all levels.	FM control / monitoring measures are identified by the FM team and used to address leading indicators of potential FM contamination. The leading indicators are explained to staff to ensure they understand how their role(s) can affect the reduction in FM risks of a process.	Analytical methods such as MTBF / FMEA are used to drive leading indicators and generate new ideas for enhancing preventative control measures.

	1. Uncertainty (Early Awareness, Denial)	2. Awareness (Understanding, Early Results)	3. Competence (Creating Significant Value)	4. Preventative Mindset (Excellence, Sustained Value)	5. Predictive Approach (Mastery, Role Model, Externally Focused)
Design (peer to peer, fitness for audience - theory, experiential, etc.)	No design thought.	Reactive /corrective retraining is administered following significant FM events. Generic FM training is part of front line employee onboarding. Training covers the basic generic risks of FM and hazards.	Front line employees are formally trained in their native languages. Training is designed around SOP's and how employees roles impact product and process safety. Training also includes facility based foreign material hazards, risk, and the company's prevention programs.	Knowledge development through general understanding of prevention and detection, routine equipment testing requirements, SME and a higher-level training for engineers has been cascaded and is tailored to specific team roles and starts to include wider stakeholders such as procurement, supply chain etc.	The outcomes of: complaints, plant FM incidents, FMEA, MTBF, supplier findings, external best practices are all used to update training materials and routinely train all stakeholders. Training extends beyond the facility to corporate support stakeholder groups such as procurement, logistics, commercial teams, maintenance contractors and OEM suppliers.
Delivery (audience and how)	Front line employee training is informal i.e., knowledge is transferred peer to peer, no training records maintained.	Front line employees are formally trained by a competent individual against available SOPs that are regularly updated following 3rd party audit non-conformance identification. Formal training records / briefings against SOPs maintained.	Front line employee training records are audit ready. Delivery is appropriate to the audience (Theoretical, Live examples and/or experiential). Training involves a knowledge assessment appropriate to the role. Formal training records maintained together with knowledge assessment.	Front line employees are assessed for knowledge retention (example 3 months post training) with training records retained for all trained front line employees.	Annual stakeholder training (plant, corporate and external) provided to continually advance competency to understand the "so what" and "now what" of their role in the FM control program.
Output (std of work, autonomy)	FM control / monitoring measures are performed by front line employees without the benefit of an SOP, resulting in unsatisfactory work requiring close supervision and instruction.	Front line employees are able to complete straightforward tasks to an acceptable standard and are able to use their own judgement as required. Supervision needed for overall completion. Decisions are based only on application of the SOP rules. Front line supervision required to manage the immediate issues around FM events.	Capability of front line employees are fit for purpose, have the ability to connect the various rules from the SOP's to be effective in the role and able to achieve most tasks through own judgement. They are able to manage the immediate event occurring in facility, allowing supervision to focus on the wider prevention program activities.	Front line employees are able to take full responsibility for their own work and support the "buddy" coaching of others. Their ability to make consciously competent decisions and formulate effective actions lead to ongoing prevention improvement. Supervision is able to deliver the training to the front line employees and can perceive deviations from the normal patterns and act on the most important aspects effectively.	Front line employees are able to see "what" is happening and "how" to approach the situation effectively. Supervision and facility managers take joint responsibility for prevention activities in their functional areas. Corporate and supplier stakeholders have a good grasp of situations and decision making is safe and intuitive. Ability to go beyond existing standards and proactively make improvements to processes. The extended team are seen as experts in their areas with a focus on predictive control.

	1. Uncertainty (Early Awareness, Denial)	2. Awareness (Understanding, Early Results)	3. Competence (Creating Significant Value)	4. Preventative Mindset (Excellence, Sustained Value)	5. Predictive Approach (Mastery, Role Model, Externally Focused)
Root Cause Analysis (RCA)	A root cause analysis (RCA) is not completed for FM incidents because the plant believes that incidents are "one off" issues or the plant does not have the resources, experience, skills and ownership to carry out RCA.	RCA is completed for most FM incidents but lacks a sense of urgency, given the time required to complete it properly or absent of cross function participation. Pattern of repeat incidents are recognized but tools to prevent reoccurrence have not been implemented. When a FM incident occurs, the plant is focused on getting production started without thought to correct or prevent a reoccurrence. Effort is aimed to identify and HOLD suspect finished goods, to be later inspected for FM inclusion. Any investigation is closed quickly before full analysis is complete to enable operations to move on.	A structured RCA process with a cross functional team is executed immediately for significant FM incidents to identify root cause and inspection measures to control the immediate risk. This includes GEMBA walks that are performed cross-functionally to investigate each specific FM incident. RCA trained participants brainstorm on evidence obtained. Immediate corrective actions identified and implemented. Hazard analyses confirm the effectiveness of the implemented control measures. Should repeat incidents occur, the original RCA is revisited and updated, along with risk assessment review.	Prevention strategies and best practices identified are applied from RCAs more broadly across the entire plant (including shop floor) where similar concerns could be present. There is a Subject Matter Expert (SME) nominated on every site to develop and conduct training (Basic level, product specific, technical and equipment specific). The SME is responsible to build up an effective FM structure/process in the plant and will also be responsible for the training program.	RCAs are critically examined to identify opportunities to remove waste while continuing to mitigate risk. Advanced phases of equipment and process redesign and layered auditing from operators, supervisors and external internal auditors are evident. Audit results trigger FMEA and/ or other project work including FM Kaizens.
Corrective Action Preventive Action (CAPA)	Denial leads to a continuation of production to meet throughput requirements regardless of the FM incident. No CAPA leading to a pattern of repeat incidents where firefighting is rewarded and encouraged.	CAPA, as a result of the RCA are not documented and effectiveness of corrective actions are not verified.	The CAPA for each RCA is documented including roles, tasks and timelines. Effectiveness checks are performed for the immediate corrective actions. A 5S assessment is completed where the incident was first identified. Known wear points (ex. grinder plates/blades, pumps, agitators etc.) are managed through monitoring and potential loose parts are identified.	The CAPA for each RCA is implemented and verified in all similar areas of the site. 5S is fully implemented to manage potential FM and account for parts (including gaskets). Known wear points (ex. grinder plates/blades, etc.) are redesigned and eliminated, where possible. GEMBA walks are part of the regular rhythm of the site management to identify potential FM risks by area throughout the year without a FM trigger. Robust validation and verification processes are in place. Audits verify that the FM corrective/ preventative programs implemented are effective and sustainable. Potential FM sources are mapped to identify hot spots. FM team uses data to identify autonomous maintenance (AM) tasks for operators to prevent risks in real time. Clean Inspect Lubricate (CIL) tools used prior to FM events (since high-risk points already known). New pieces of equipment reviewed to ensure AM compliances with CIL sheets prior to install. Kaizen events performed cross functionally when a significant risk is identified.	Analysis of CAPAs from previous incidents at the site and across the plant network are reviewed to identify potential trends that could be predicted and CAPAs implemented proactively without a lagging indicator at the site. Opportunities identified are shared across the plant network as a "call to action" for others to implement. Industry knowledge and best practices are integrated into control measures. Horizon scanning used to identify risks in supply chain to address potential supplier related FM issues. Heat map created based on what is happening in industry and other plants in the company network. Work with OEM in the industry to design out flaws based on lessons learned.

	1. Uncertainty (Early Awareness, Denial)	2. Awareness (Understanding, Early Results)	3. Competence (Creating Significant Value)	4. Preventative Mindset (Excellence, Sustained Value)	5. Predictive Approach (Mastery, Role Model, Externally Focused)
Internal FM Communication	Communication of internal FM incidents is limited to telling plant leadership team that there was an FM issue. FM incidents managed internally only by FSQA.	Communication of internal FM incidents is still communicated to site management of the issue; however, FSQA engages with production to help identify the issue.	Internal communication on FM incidents is being initiated by Operations to FSQA to facilitate more timely investigation. FM events are communicated to operations staff through posting summaries and communicating through daily huddles.	Potential FM risks are being communicated before they become an issue (such as a funny noise is starting to occur - line stopped to facilitate investigation before an FM is identified). FM events are communicated to ALL staff from receiving through to shipping to ensure awareness. Staff are encouraged to report any off conditions that could lead to FM to their supervisor in their areas.	Internal communication ensures everyone understands the FM control results, including the "why". Predictive tasks to monitor equipment for potential off conditions before they failure occur (ex. monitoring for bearing failures, temperatures of motors, etc.). Conditions identified during monitoring are communicated to Operations to facilitate effective investigation prior to a visible off condition.
External FM Communication	External sourced FM incidents (from supplier) is manage internally only by FSQA without notifying the supplier.	Communication of external sourced FM incidents (from supplier) from FSQA is still communicated to site management of the issue; however, FSQA engages with supplier(s) to help identify the issue.	Communication on external sourced FM incidents (from suppliers) is being initiated jointly by Operations and FSQA to facilitate more timely investigation with the supplier. Shared exchange of information communicating together with the supplier and the site. External FM events are communicated to operations staff through posting summaries and communicating through daily huddles.	Communication of external FM incidents from suppliers is shared with all suppliers of similar processed raw materials is completed including potential RCAs and CAPAs as a learning tool to drive improved supplier performance. External FM events are communicated to ALL staff from receiving through to shipping to ensure awareness. Staff are encouraged to report any off conditions with supplied raw materials that could lead to FM to their area supervisor.	Direct communication with suppliers, including on site visits at their manufacturing sites help to develop a deeper understanding of their processes and collaborate on monitoring activities the supplier can implement to identify and predict potential issues before shipments are sent to the plant.

	1. Uncertainty (Early Awareness, Denial)	2. Awareness (Understanding, Early Results)	3. Competence (Creating Significant Value)	4. Preventative Mindset (Excellence, Sustained Value)	5. Predictive Approach (Mastery, Role Model, Externally Focused)
Data Collection	Data is not collected/used to drive action consistently other than what customers/ regulatory require. Data is primarily collected on paper and only reviewed when there is an incident.	Data is collected but only used ad hoc; investigations are triggered when limits are exceeded. Data is recorded and collected on paper.	Data is collected in a rigorous and standardized way using electronic means.	Data is collected automatically and through manual entry as tests are performed or monitored.	Data is collected automatically as tests are performed or monitored and is generated to facilitate predictive analytics.
Data Analysis/ Implementation	Tribal knowledge and not data analysis drives decision making related to FM. Reporting is limited to critical business tasks; Cost of Poor Quality is not known or considered.	Data analysis is starting to be utilized for standardized reporting (KPI) on a business-wide platform. Leadership recognizes there is a cost associated with FM incidents and can categorize the cost(s) (ex. disposed product, additional production scheduled, wasted labour, etc.). Actions to address issues are limited to immediate actions.	Data analysis is used to identify trends and to trigger continuous improvement actions or critical business decisions. Pareto (or other analysis tools) identifies the critical few issues that contribute to sum of all FM incidents from various data sources (cost of poor quality, direct product cost variances, internal non-conformances, complaints, etc.). FM reduction targets and actions are established for each FM type.	Data analysis is used to drive deployment of network preventative actions and solutions. Cost of poor quality is measured, analyzed and reported in a standardized way across the network, enabling plant-to-plant comparison. Site FM teams track and trend cost of poor quality and take action based on changes. Cost of poor quality extends to both internal and external suppliers. Suppliers are engaged proactively to ensure their FM prevention programs are in place and are robust.	Data analytics are embedded in business processes and is a part of the culture; it is used to prescribe direction, identify future risks and identify key drivers of trends. FM incidents are primarily due to supplier introduced FM. Supplier is now using predictive analyses to identify potential issues before shipping. Changes in cost of poor quality trends can be used to predict future FM incidents.
Tools	No formal analytics tools are in place; manual analysis occur ad hoc in response to FM incidents.	Analytics tools are in their early stages of implementation and are used only to report on activity; Spreadsheets are used as primary means of reporting; Data systems are not standardized.	Analysis tools are inconsistently leveraged to “mine” the data; use of queries and extracts create some value. Data analytics tools are sometimes available for use on the shop floor.	Data analytics tools are readily accessible and are being used on the shop floor as part of normal business practice.	AI modeling tools are used to predict future FM events. Machine learning is leveraged to identify and predict potential FM incidents. Users no longer need to input data into the system to predict future outcomes: Machine Learning and AI make it possible to detect issues before they are even considered.

	1. Uncertainty (Early Awareness, Denial)	2. Awareness (Understanding, Early Results)	3. Competence (Creating Significant Value)	4. Preventative Mindset (Excellence, Sustained Value)	5. Predictive Approach (Mastery, Role Model, Externally Focused)
AM (Autonomous Maintenance: Basic Maintenance tasks performed by front line operators CIL (clean, inspect, lubricate))	Front line equipment operators are not trained or expected to perform equipment tasks beyond those required to operate the equipment. When issues occur, they will escalate issues but have no responsibility or ownership to remediate issues themselves.	Front line equipment operators are trained to perform Clean, Inspect and Lubrication (CIL) tasks during production and equipment disassembly/reassembly tasks during the transition to and from routine sanitation. CIL tasks are completed as time permits.	CIL tasks are planned and scheduled as part of the daily work by front line equipment operators. "Clean" is limited to what is required to perform the inspection and lubrication tasks.	CIL tasks are revised based on inherent production/process risks and line performance (OEE and downtime). Front line equipment operators are often sought for their input and feedback.	Front line equipment operators "own" their equipment and are empowered to detect abnormalities and prevent equipment failures which may lead to FM risk.
PM (Preventative Maintenance: Regular and routine maintenance performed by a skilled tradesperson)	Reactive maintenance with no planning (what) and scheduling (when) process.	A PM standard (planning and scheduling) exists, is based on OEM recommendations but it is not always followed.	The PM standard (planning and scheduling) is adhered to and execution compliance is managed through verification and measurement. Both scheduled and unscheduled tasks are measured. Recurring unscheduled tasks challenge the frequency and scope of the relevant PM.	The PM standard (planning and scheduling) is revised based on data analysis and operational risk. Analytical tools such as trend charts, heat maps, FMEA and root case analysis can help to define risk. Verification and analytical insights drive continuous improvement and stakeholder engagement.	The root cause(s) of equipment failures that pose FM risk are designed out. The majority of maintenance is proactive and is "calm and controlled". Where applicable, statistical process control (SPC) is used to monitor for data "signals" and to act before failures occur.

	1. Uncertainty (Early Awareness, Denial)	2. Awareness (Understanding, Early Results)	3. Competence (Creating Significant Value)	4. Preventative Mindset (Excellence, Sustained Value)	5. Predictive Approach (Mastery, Role Model, Externally Focused)
Assessment	Technology assets are only in place as mandated by customers or regulatory bodies (ex. Metal detectors). Higher sensitivity is only used for some specific customer due to their requirements. For other customers, the higher sensitivity is not used even though the equipment is able to have an better detection capability.	Technology assets are implemented to address FM contamination based on a specific need (reactionary). For example, remediation technology (with higher sensitivity capability) is used to re-inspect product to address a FM incidents and not implemented as part of the regular process.	Standard FM detection technology assets are adopted and proactively implemented to address known risks. For example (not all inclusive), metal detection on all finished products.	Novel technology is reviewed to consider upgrading current technology assets. Current technology asset age, age of process equipment and raw material variability are considered. Use of a tool to investigate FM (ex. XRF gun to identify potential root causes of metal FM found in, improved X-rays, emerging technology, etc.) All bulk packaged WIP sent to internal and external customers uses FM detection technology prior to leaving the plant.	Use data analytics to track and trend the sources of all FM and predict where future incidents will occur.
Maintenance	Technology assets are maintained based on tribal knowledge.	Technology assets are maintained using some of the OEM recommendations and fixed when equipment fails. High rate of maintenance due to lack of knowledge to operate the equipment, resulting in a higher risk of misuse.	Technology assets have PMs to maintain their condition based on OEM and historical data related to equipment performance and asset condition found during repeated PM tasks.	Technology assets are maintained in optimal condition as per OEM recommendations within the PM systems. PMs are updated based on previous contamination issues at the site. Equipment is optimized for removal of FM for a single raw material or work in process (WIP) (ex. vision systems, bulk x-rays, etc.) which is based on challenging the system through validation. Settings are documented and will apply to all materials using this technology. A control plan is implemented for documenting the functional elements that must be implemented for the technology asset to ensure consistent removal of foreign material from the equipment based on raw material inputs.	Technology asset PMs are updated based on data vs solely on a defined frequency. Equipment is optimized for particular raw materials or WIP and the settings are validated and documented. These settings change based on the raw material/WIP to maximize the effectiveness of FM removal. PMs are updated based on previous contamination issues identified within the plant network and/or industry.
Investment	Willingness to invest in technology assets are minimal, reactive and driven by mandated compliance by the customer or by regulation.	When technology assets are sourced for new detection equipment, sensitivity is not weighted heavily during purchasing. Equipment capability is not fully utilized (sensitivity) due to the negative impact on product throughput and to meet minimum requirements. Little investment in training	When technology assets are sourced for new detection equipment sensitivity is weighted heavily during purchasing and is based on a formal validation that meets process capabilities in production mode and considers formulation, physical attributes of the product to be scanned, scan volume and the scanning time.	Recognize the need for resources and investment in prevention to address leading indicators instead of focusing on lagging indicators for FM contamination. Strong training for all users, and 'super-users' identified and recognized.	Justifying investment in technology based on data.