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| **EFFECTIVE DATE: 04/05/2009** |

**Measuring Mean Time To Repair (MTTR) & Mean Time Before Failure (MTBF)**

This document outlines the procedures for measuring Mean Time To Repair (MTTR) and Mean Time Before Failure (MTBF) within a food manufacturing facility (NIC Code: 10101). Accurate measurement of these parameters is crucial for optimizing production efficiency, minimizing downtime, and ensuring compliance with food safety regulations.

1. Defining MTTR and MTBF

* Mean Time To Repair (MTTR): The average time taken to restore a failed piece of equipment to its operational state. A lower MTTR indicates more efficient maintenance and reduced downtime.
* Mean Time Before Failure (MTBF): The average time a piece of equipment operates before it fails. A higher MTBF indicates greater equipment reliability and reduced maintenance needs.

2. Data Collection Procedures

To accurately calculate MTTR and MTBF, meticulous data collection is essential. This involves:

* Establishing a Comprehensive Maintenance Log: All maintenance activities, including preventative maintenance (PM), corrective maintenance (CM), and breakdowns, must be meticulously documented. The log should include:
* Date and time of failure/maintenance activity.
* Equipment ID (unique identifier for each piece of equipment).
* Description of the failure/maintenance task.
* Time taken to repair (for CM activities).
* Parts used and their costs.
* Personnel involved.
* Status (e.g., completed, pending).
* Utilizing a Computerized Maintenance Management System (CMMS): A CMMS significantly streamlines data collection, analysis, and reporting. Features such as automated work order generation, inventory tracking, and reporting dashboards are invaluable.
* Data Accuracy: Ensure data is entered accurately and consistently. Inaccuracies can significantly skew the results and render the analysis unreliable. Regular audits of the maintenance log are recommended.

3. Calculation of MTTR and MTBF

* MTTR Calculation: Sum the total repair times for all failures within a defined period (e.g., a month or a year) and divide by the total number of failures.

`MTTR = (Sum of repair times) / (Total number of failures)`

* MTBF Calculation: Sum the total operating time for all equipment within a defined period and divide by the total number of failures during that period.

`MTBF = (Total operating time) / (Total number of failures)`

4. Compliance Notes

* Food Safety Regulations: Accurate maintenance records are crucial for demonstrating compliance with food safety regulations (e.g., HACCP, GMP). Downtime due to equipment failure can affect product safety and quality. MTTR and MTBF data can be used to demonstrate continuous improvement efforts.
* Regulatory Audits: Be prepared to present MTTR and MTBF data during regulatory audits. Clearly documented procedures and analysis will help demonstrate compliance.

5. Practical Guidelines

* Regular Preventative Maintenance: Implementing a robust preventative maintenance program significantly reduces the likelihood of failures and improves MTBF.
* Training for Maintenance Personnel: Well-trained maintenance staff are more efficient in diagnosing and repairing equipment, lowering MTTR.
* Spare Parts Inventory: Maintaining an adequate inventory of spare parts minimizes downtime during repairs.
* Data Analysis and Improvement: Regularly analyze MTTR and MTBF data to identify trends, pinpoint problem areas, and implement corrective actions.

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