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# Key Components of Food Safety Management System Role of Equipment Cleaning in Panko Bread Industry

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**ABSTRACT: Food safety and quality are paramount concerns in the global agri-food sector, extending from farms to food enterprises worldwide. In the panko bread industry, maintaining stringent food safety standards is essential to avoid contamination and ensure product quality. This paper examines the application of a Food Safety Management System (FSMS) focused on equipment cleaning, a critical factor in preventing foodborne illnesses. Specifically, the study emphasizes the importance of ISO 22000, a hybrid standard combining ISO 9001 and HACCP, which enhances food safety by integrating hazard analysis and critical control points across the supply chain. The synergistic application of ISO 22000, replacing separate GMP, HACCP, and ISO 9001 practices, is crucial for improving both food safety and international trade practices. The Food Safety and Standards Authority of India (FSSAI) was established as the supreme authority for standard-setting and regulating food production, distribution, and importation by the Food Safety and Standards Act of 2006.**

**This paper advocates for comprehensive FSMS protocols, emphasizing quality control from raw materials to the final product, with a particular focus on the cleaning of production equipment. Effective FSMS implementation is vital for the consistent production of safe and high-quality panko bread, especially for micro, small, and medium enterprises (MSMEs), where food safety systems can be more challenging to implement.**

**Keywords:** Food safety, contamination, HACCP, Good Manufacturing Practices, Food Quality Assurance.

## INTRODUCTION

Food safety and quality are key concerns in the agri-food sector, influencing actions from farms to enterprises globally. ISO 22000, a hybrid of ISO 9001 and HACCP, was developed as an international standard to improve food safety in the supply chain. Instead of separately applying good manufacturing practices, HACCP, and ISO 9001:2000, ISO 22000:2005 combines these to ensure a synergistic effect. It provides an auditable framework for global food safety, integrating critical control points and hazard analysis to enhance reliability, food quality, and safety in international trade (Panghal *et al.,* 2018).

India enacted the Food Safety and Standards Act in 2006, establishing the Food Safety and Standards Authority of India (FSSAI) as the apex body for setting standards and regulating food production, distribution, and import (Kohli & Garg 2015; Tanveer, 2022). The FSSAI is responsible for implementing global food safety norms such as Good Manufacturing Practices (GMP), Good Hygienic Practice (GHP), and Hazard Analysis Critical Control Point (HACCP) (Mahajan *et al.,* 2014). The National Standardization Body (BSN) provides food safety standards that are safe for consumption. For that, it is necessary to have quality control in the production process, starting from raw materials, through processes, to finished products.

The production of panko bread involves multiple steps where contamination risks can occur, such as during raw material use, handling, processing, packaging, and distribution. Its light, airy texture and application in fried or baked dishes make it vulnerable to moisture retention, microbiological hazards, and contamination from allergens or foreign materials. A comprehensive FSMS ensures that every stage, from sourcing ingredients to distributing the final product, adheres to strict safety standards to prevent contamination, spoilage, and quality degradation.

## METHODS

A Food Safety Management System (FSMS) is crucial for ensuring food safety throughout the supply chain. Key components include Hazard Analysis and Critical Control Points (HACCP), which forms the framework for identifying and controlling significant food safety hazards (Stevens & Hood 2019). Prerequisite programs, such as Good Manufacturing Practices (GMP) and sanitation regulations, are essential foundations for HACCP implementation (Stevens & Hood 2019). The integration of management tools like HAZOP, FMEA, Ishikawa, and Pareto can enhance the effectiveness of FSMS and promote a positive food safety culture (Lee *et al.,* 2021). However, focusing solely on minimizing quality costs rather than producing safe food can compromise food safety (Manning & Baines 2004). Effective FSMS implementation is particularly challenging for small and medium-sized food processors, potentially leading to foodborne illness outbreaks (Lee *et al*., 2021). Therefore, a comprehensive approach that balances cost considerations with stringent safety measures is essential for maintaining food safety throughout the production process.

**Key Components of a Food Safety Management System.** An effective FSMS for panko bread production should be built on several key frameworks:

**Good Manufacturing Practices (GMPs):** In the panko industry, GMPs would involve proper sanitation of equipment, cleanliness of the production environment, and hygienic practices by personnel. Good Manufacturing Practices are foundational to ensuring food safety within the food industry. They not only help prevent contamination but also enhance overall product quality and compliance with regulatory standards. By adopting these practices, food manufacturers can protect consumer health while improving operational efficiency (Health & Family Welfare Commissionerate of Food & Drugs Administration).

**Hazard Analysis and Critical Control Points (HACCP):** HACCP is a preventive food safety system that focuses on identifying potential hazards in the food production process and establishing critical control points (CCPs) where these hazards can be effectively managed. It is based on seven principles standardized by the Codex Alimentarius Commission, which provide a framework for developing effective food safety management procedure. Some key areas of HACCP implementation in panko production might include:

**Ingredient Sourcing:** Ensuring that flour and other raw materials are free from contaminants like mycotoxins, heavy metals, or pesticides.

**Baking and Cooling Processes:** Monitoring temperatures to ensure that bread is properly baked, preventing the survival of pathogens or spoilage organisms.

**Shredding and Packaging:** Preventing contamination from foreign objects (e.g., metal fragments) during mechanical shredding and ensuring proper moisture control to avoid mold growth in the final product.

**ISO 22000:** It is an international standard that outlines the requirements for a Food Safety Management System (FSMS), applicable to any organization involved in the food chain, from production to consumption. This standard is designed to ensure food safety and enhance overall performance in managing food safety risks.

**Traceability and Recall Systems:** A key component of an FSMS is the ability to trace ingredients and products throughout the supply chain. In the event of contamination or safety risks, the company must have an efficient product recall system in place. This ensures that any batch of contaminated panko can be quickly removed from shelves, protecting consumers and reducing potential legal liabilities.

**Common Food Safety Hazards in Panko Production.** Several potential hazards can be introduced during the panko production process. Effective control of these hazards is crucial for maintaining product safety:

**Microbiological Hazards:** Pathogens such as Salmonella, E. coli, and molds may thrive in improperly stored ingredients or finished products, especially in warm and humid environments. Poor sanitation in bakeries, including inadequate water supply and waste disposal, contributes to contamination risks (Muhammad & Galadima 2022). It should ensure that all raw materials, especially flour, are free of contaminants and that the production environment remains clean and dry.

**Allergen Management:** Panko bread can be made using wheat flour, a known allergen. Cross-contamination risks must be managed, especially if the production facility also handles other allergens, such as dairy or soy. The FSMS should enforce strict segregation and cleaning protocols to prevent accidental exposure to allergens. Effective allergen management requires a comprehensive approach, including risk analysis, preventive actions, and proper labeling (Pacholek *et al*., 2018). Key factors in allergen control include cleaning procedures, employee training, and equipment design, with recalls due to allergen cross-contact being a significant expense for companies (Gupta *et al*., 2017).

**Physical Hazards:** Foreign materials, such as metal fragments from shredding machines or plastic from packaging materials, pose a significant hazard. Metal detectors, sieves, and X-ray machines should be integrated into the production line to detect and remove such contaminants. Physical hazards in the food industry, particularly in bread production, pose significant health risks and economic losses. Common contaminants include glass, metal, plastic, insects, and bone fragments (Onyeaka *et al*., 2023; Khairi *et al*., 2020).

**Chemical Hazards**: Chemical residues from cleaning agents, pesticides, or packaging materials can also poserisks. Chemical hazards in the bread industry include acrylamide, furan derivatives, polycyclic aromatic amines, monochloropropanediols, glycidol, mycotoxins, toxic metals, and pesticides (Maher & Nowak 2022). Acrylamide, classified as a Group 2A carcinogen, is a major concern in bakery products due to its neurotoxic, genotoxic, and reproductive effects (Sarion *et al.,* 2021). Potassium bromate, another hazardous additive, has been found in bread samples at

levels exceeding FDA recommendations, potentially causing chemical and carcinogenic risks to consumers. Bakers exposed to potassium bromate reported symptoms such as eye pain, cough, and sore throat. The FSMS should establish guidelines for safe cleaning and sanitation practices and ensure the sourcing of raw materials that meet safety standards.

**Critical Control Points in Panko Production.** In the panko bread industry, several critical control points (CCPs) are essential for minimizing food safety risks:

**Ingredient Reception and Storage:** Monitoring for contamination in flour and other ingredients. Proper storage conditions (cool, dry, and airtight) are critical to preventing microbial growth or pest infestations. Critical Control Points (CCPs) have been identified in various stages of production, including ingredient reception, storage, mixing, and thermal processing (Puspitawati *et al*., 2022; Rochman *et al.*, 2020; Toregeani-Mendes *et al*., 2011).

**Mixing and Fermentation:** Controlling ingredient ratios, water content, and fermentation times to ensure consistent product quality and prevent microbial growth. The mixing process presents chemical hazards from metal contamination, while fermentation can introduce biological hazards like Salmonella or E. coli (Rochman *et al.,* 2020; Puspitawati *et al.,* 2022). Implementing Hazard Analysis and Critical Control Point (HACCP) systems in bakeries can help fulfill quality requirements, increase consumer confidence, and prevent contamination (Rochman *et al*., 2020; Puspitawati *et al*., 2022).

**Baking:** Ensuring that the bread reaches the proper internal temperature during baking to kill pathogens and mold spores. In baking processes, such as infrared baking of dried tofu, monitoring physical properties and volatile compounds is important for quality control. Key aroma compounds and their precursors, including specific amino acids and fatty acids, have been identified as crucial for flavor development in baked products (Chen *et al*., 2024). Proper baking temperature is essential for pathogen elimination, with internal bread temperatures reaching levels sufficient for starch gelatinization (Kim *et al*., 2004).

**Shredding and Drying:** Monitoring the shredding process for foreign material contamination and ensuring that bread is sufficiently dried to prevent microbial growth.

**Packaging:** Ensuring that the packaging environment is clean and free from contaminants and that proper sealing methods are used to maintain the freshness and quality of the panko. A study focused on BPA migration from packaging materials, emphasizing temperature as a critical factor influencing contamination (Agarwal *et al*., 2024).

**Distribution:** Monitoring storage and transportation conditions (e.g., temperature and humidity) to avoid spoilage and ensure the product remains within its shelf life. In self-service restaurants, temperature control during food distribution is essential, with hot dishes ideally maintained above 60°C and cold dishes below 10°C (Nogueira *et al*., 2019)

**Training and Employee Awareness.** A key aspect of an FSMS is ensuring that all employees, from production workers to quality control staff, are properly trained in food safety practices. Studies have shown that training significantly improves employee knowledge and behaviors related to information security (Stefaniuk, 2020). However, in Zimbabwe's tea industry, insufficient knowledge was identified as a major barrier to FSMS implementation, with general workers demonstrating only 50% knowledge levels (Nyoka *et al.,* 2023). This highlights the need for targeted training programs to enhance FSMS understanding across all employee levels. This includes:

Hygiene and sanitation protocols.

Proper handling of raw materials and equipment.

Recognizing potential food safety hazards and responding appropriately.

Conducting internal audits and inspections to maintain high standards.

**Compliance with Food Safety Regulations.** Food safety compliance is a complex issue that goes beyond simply following regulations. While compliance is important, effective food safety requires a combination of good regulation, well-designed enforcement, and competence among food business operators (Macrae & Blanc 2021). The concept of a "food safety culture" has emerged, emphasizing the importance of how organizations interpret and apply rules rather than strict compliance (Havinga, 2019). To meet both local and international market demands, panko bread producers must comply with various food safety standards. In the U.S., compliance with FDA regulations, including the Food Safety Modernization Act (FSMA), is crucial. In Europe, adherence to EU food safety regulations and EFSA guidelines is mandatory. For global export, certification from bodies such as the Global Food Safety Initiative (GFSI) can be beneficial for building trust with retailers and consumers. GFSI recognition offers a "passport to the global market" for certification program owners and certified companies, requiring compliance with benchmarking requirements (International Finance Corporation, 2020).

**Equipment Cleaning SOP.** Equipment should be hygienically designed to minimize any cross-contamination risk. Hygienic equipment design is essential for mitigating contamination risks and reducing environmental impact (Benezech & Faille 2020). Sanitation Standard Operating Procedures (SSOPs) are detailed protocols specifying cleaning methods, frequency, and monitoring records for food-contact and non-food-contact surfaces (Ho & Sandoval 2020). Cleaning validation verifies the efficacy of cleaning procedures and prevents cross-contamination between products (Sumukha *et al.,* 2020).

Equipment & containers that come in contact with food and used for food handling, storage, preparation, processing and packaging shall be made of corrosion free materials which do not impart any toxicity to the food material and should be easy to clean & disinfect.

Physical hazard can result through part of equipment breaking off and gaining entry to the product. If equipment has any dead-leg areas, is difficult to clean or is poorly cleaned. Microbiological buildup could contaminate the product. Chemical contamination

could occur through lubricants (grease etc) or cleaning residues remaining on the equipment food contact surfaces.

Various control measures in respect of equipment would include:

- Cleaning and sanitizing the equipment before use.
- Regular physical inspection for cleanliness and microbial infection.
- Annual microbiological assessment (swab testing)

**Table 1: Master Cleaning Schedule (MCS) for equipment cleaning and Sanitation has been defined as given below.**

| Sr. No. | Equipment | Cleaning/Sanitation Method | Frequency |
|---|---|---|---|
| 1. | Flour handling system | Outside- dry clean body with duster. Inside- Empty out hopper and clean body and Screw conveyors with duster. | Outside- Start of each shift. Inside- Weekly |
| 2. | Flour sifter | Clean sifter body with duster. Dismantle sieve & clean it with Nylon brush/air. | Sifter body - start of shift Sieve - weekly |
| 3. | Water weighing system | Scrap off the material adhered with surface. Wipe the tank and pipe with wet & dry duster | Daily |
| 4. | Ice trolley/box | Inside- Clean with water. Outside- Wipe the tank with wet & dry duster | Daily |
| 5. | Premixing batch container | Clean with water. Wipe with dry duster. | Daily |
| 6. | Premixing bulk containers | Dry-wipe outside with wet/dry duster. Wet- Clean with water and wipe with duster. | Dry cleaning- Shift wise Wet cleaning- Weekly |
| 7. | Table/ Platform | Wipe with clean wet/dry cloth. | At start of each shift |
| 8. | Mixer Blade and inside top | Dry - Scrap off all adhering dough. Wet- Clean with water and wipe with clean duster. | Dry - after each batch. Wet - Daily |
| 9. | Mixer (outside body) | Scrap off any adhering dough. Wipe with wet/dry duster | Start of each Shift |
| 10. | Mixer bowl | Dry- Scrap off all inside adhering dough. Wipe outside with clean duster. Wet- Clean with water and wipe with clean duster. | Dry- Inside Scrapping after each batch. Outside cleaning shiftwise. Wet Cleaning- Weekly |
| 11. | Divider Hoist | Scrap the adhered dough. Wipe with wet/dry duster | Start of each Shift |
| 12. | Divider body | Outside- Wipe with wet & dry duster. Inside- remove the dough with scrapper & clean body/catch tray with duster. | Outside & inside surface- start Of Shift. Catch tray –Hourly |
| 13. | Divider piston & cutter | Dismantle & scrap off adhered dough. Scrub with nylon pad & water. Wipe with clean dry duster. | Weekly/Production gap |
| 14. | Moulder (outside body) | Scrap off adhering dough. Wipe with wet/dry duster | start of each shift |
| 15. | Moulder rollers pressure board, Curling chain | Scrap off adhering dough. Wipe with wet/dry duster | Weekly/Production gap |
| 16. | Mould conveyor body | Inside-Scrap off the residue & wipe with duster. Outside- Wipe with clean wet/dry cloth | Weekly/Production gap |
| 17. | Mould conveyor chain | Dismantle chain and clean with oil & brush. Dry with duster. | Monthly |
| 18. | Mould conveyor catch trays | Dry -Empty out the scrap from trays and clean with wet/dry duster. Wet- Clean with water/soap solution and dry with duster. | Dry cleaning - Daily. Wet cleaning- weekly |
| 19. | Moulds | Scrap carbon off the moulds from outside. | Monthly |
| 20. | Lids | Scrap carbon off the lids. | Monthly |
| 21. | Proover body (outside) | Wipe with clean wet/dry cloth. Use detergent solution & nylon pad to remove any discolouration. | Weekly |
| 22. | Proover Trays | Scrap each tray & remove dough residue/dirt. | During weekly shutdown |
| 23. | Oven body (outside) | Wipe with clean dry/wet cloth. Use detergent solution & nylon pad to remove any discolouration | Weekly |
| 24. | Oven Trays/conveyor | Scrap each tray & remove burnt residue. | During weekly shutdown |
| 25. | Depanner | Dismantle & empty out the dust collection box. Clean bellow with water, wipe with cloth & spray sanitizer. | During weekly shutdown |
| 26. | Depaning Table | Brush off bread dust regularly. Clean table & rubber pad with dry/wet cloth. Spray sanitizer. | Start of each Shift |
| 27. | Bread conveyor | Remove bread dust with air. Dismantle & clean | Dry cleaning-weekly, |

| | | | |
|---|---|---|---|
| | | conveyor with water. Wipe with cloth & spray sanitizer. | Wet cleaning – monthly |
| 28. | Cooling trolley | Remove bread dust with Nylon brush/compressed air. Remove SS mesh & dip in soap/caustic solution. Clean mesh with brush & water. Dry with duster & spray sanitiser. | Dry cleaning-weekly, Wet cleaning – Monthly |
| 29. | Lid trolley | Scrub with nylon brush & soap solution. Rinse with water and dry with duster. | Monthly |
| 30. | Bun Proofing Trolley | Scrub with nylon brush & soap solution. Rinse with water and dry with duster. | Monthly |
| 31. | Slicer | Open covers, dedust and clean with compressed air/duster. Wipe slicer body with wet/dry cloth. Sanitise blades before use. | At start of shift |
| 32. | Packing table | Wipe with clean dry/wet cloth. Spray the sanitizer. | At start of shift |
| 33. | Packet Sealer | Wipe with clean cloth | Daily |
| 34. | Packet conveyor | Wipe with clean dry/wet cloth | Daily |
| 35. | Metal detector | Wipe with clean dry/wet cloth | Daily |
| 36. | Round table | Wipe with clean dry/wet cloth | Daily |
| 37. | Coding machine | Wipe with clean dry/wet cloth | Daily |
| 38. | Crate Trolley | Wipe with clean dry/wet cloth | Weekly |
| 39. | FG crates | Wipe with clean dry/wet cloth. Wet clean with water & dry with duster. | Dry – daily; Wet - Monthly |
| 40. | Fire Equipments | Wipe with clean dry/wet cloth | Weekly |
| 41. | AHU & Duct | Wipe body with clean dry/wet cloth. Remove & clean air filters with compressed air & water. Clean fins & sump with water. | Weekly |
| 42. | Pallets | Dry cleaning- Wipe with dry/wet duster. Wet cleaning- dip in Soap/caustic solution. Clean with nylon brush & water and dry with duster. | Dry cleaning- whenever gets empty Wet Cleaning- monthly |
| 43. | Cold room | Mop the floor & wipe the sides of the room with wet/dry cloth. | Body-Weekly. Floor- During unloading |
| 44. | Fans | Dismantle the fan. Clean blade and cage with wet/dry duster | Monthly |
| 45. | Light/Camera/ Switches | Wipe with clean cloth | Monthly |
| 46. | Electrical Panel | Clean outside with wet/dry cloth. Clean inside with nylon brush | Monthly |
| 47. | Storage Racks | Wipe with clean dry/wet cloth | Weekly |
| 48. | Phone Equipment | Wipe with clean dry/wet cloth | Daily |
| 49. | Dust bins | Empty out the dustbin. Wash with disinfectant water. | Daily |
| 50. | Weighing scales | Wipe with clean dry/wet cloth | Weekly |
| 51. | Water chiller | Clean outside with wet/dry duster. Empty the tank & rinse with clean water. | Outside cleaning – Weekly; Inside cleaning-Monthly |
| 52. | Water storage tank | Empty the tank & rinse with clean water. | Monthly |
| 53. | Ice machine | Wipe machine body & inside the duct with dry/wet cloth | Weekly |
| 54. | RM/FG Lift | Wipe with clean dry/wet cloth | Daily |
| 55. | Motors & gearboxes | Clean with nylon brush/scraper. Wipe with clean duster | Weekly |

In food processing, proper cleaning methods can significantly reduce Listeria populations on equipment surfaces, with a focus on effective wax removal and the use of appropriate materials like 100% nylon brushes (Ruiz-Llacsahuanga *et al.,* 2022). The pharmaceutical industry emphasizes cleaning validation to manage contamination issues during manufacturing (Dahiya *et al*., 2022).

**Quality and Food Safety Policy.** Providing safe, high-quality products and services that not only satisfy but exceed customer expectations can be achieved through continuous improvement, sustainability, and profitability. Food quality refers to the degree to which a product meets consumer requirements, while food safety focuses on preventing foodborne illnesses through proper handling, preparation, and storage (Farooq *et al*., 2021). In food industries, all associates must:

- Foster a culture of quality and food safety, providing ongoing training to ensure effective, efficient, and safe operations.
- Guarantee the quality and safety of raw and packaging materials.
- Collaborate with suppliers for continuous improvement, building long-term trust to enhance the materials and services we need.
- Utilize tools and systems to ensure processes meet customer requirements and maintain consistent quality and food safety.

• Adhere to all quality and food safety standards across the value chain, complying with legislation, customer requirements, and top industry standards.
• Ensure proper hygiene in receiving, storing, producing, packaging, and distributing materials.
• Follow the quality strategy and objectives through specific goals and actions.
• Design products and services in collaboration with clients, incorporating market feedback and studies.
• Continuously enhance processes, products, services, and systems for improved quality.
• Performance and reduce food safety risks.
• Achieve tangible results that represent added value for our stakeholders.

## COMPLAINT SAMPLE TRACKING RECORD

| SENDING DATE | COMPLAINT NO. | SAMPLE DETAILS | FROM (DEPOT & PERSON NAME) | TO (PLANT & PERSON NAME) | THROUGH VEHICLE/ BOX NO. | SIGNATURE OF SENDER | SIGNATURE OF RECEIVER WITH DATE |
|---|---|---|---|---|---|---|---|
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**Kind Attention: All the visitors are informed that it is mandatory to fill this health declaration forms before entering the plant premises to comply with Food Safety Requirement.**

Date of visit-

Name of the Visitor-

Purpose of Visit-

Meeting to Whom -

Visitors Address with Contact Details-

**1.Are You at Present suffering from any kind of illness mentioned below: -**

| | |
|---|---|
| Infectious Respiratory Ailments, Tuberculosis | YES/NO |
| Skin lesions, Cuts, Boil Infections, Measles | YES/NO |
| Infectious Gastro Intestinal Ailments | YES/NO |
| Eye, Nose, Throat Infection & Common Cold | YES/NO |
| Viral Fever, Hepatitis, Dengue, Typhoid | YES/NO |

**2. Have you suffered from any of the above mentioned illness in last 14 days? Please specify the illness with approximate date.** YES/NO

**3. Have you been in contact with any individual suffering from any of the above mentioned illness during the period of last 14 days?** YES/NO

**4. Have you been to foreign land in last 14 days? please specify where and when.**

**If yes, have you been vaccinated before, during, or after the visit with any kind of vaccine?** YES/NO

**I have gone through all GMP norms as mentioned on display board/visitor card & I will follow these norms during my visit to food handling area.**

**Signature of Visitor**

**The Visitor is permitted/not permitted to enter in food handling area -** **Signature of Security Supervisor**

Preflight Checklist

| | | PREFLIGHT CHECKLIST | | | | | | Document # | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Plant & Line– | Date & Time– | Effective Date: | | | | Supersedes: Ni | | Prepared By: | | | |
| Sr. No. | Task | Receiving–Ingredient | Scaling | Mixing | Divider–Moulder | Proofer–Oven–Depanner | Cooler–Wrapping | Basket Stacking | Dispatch | Sanitation | IF "NO" - WHAT ACTION WAS TAKEN? |
| 1 | Are all unused cleaning supplies removed from the | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | | | |
| 2 | Ingredient bags are undamaged & stored off the floor? | Y / N | Y / N | | | | | | | | |
| 3 | Damaged ingredient/ containers are repaired or | Y / N | Y / N | | | | | | | | |
| 4 | Is the area, including overheads, under equipment and ledges above product zones, free of flaking paint, mold or rust, condensation, pipe or roof leaks/puddles on floor,? | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | |
| 5 | Is the area, including overheads, under equipment and ledges above product zones, free of missing, cracked or broken glass, hard plastic, ceramic or metal shavings? | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | |
| 6 | All bulk ingredient receiving locations are locked & | Y / N | | | | | | | | | |
| 7 | Magnets and screens are in place in all devices for bulk ingredient receiving? | Y / N | Y / N | | | | | | | | |
| 8 | Equipment is free of abnormal noises, unusual heat, | Y / N | | Y / N | Y / N | Y / N | Y / N | | | | |
| 9 | All pallets are cleaned & stored properly? | Y / N | Y / N | | | | | | | | |
| ## | Clean containers are in place for waste? | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | | | | |
| ## | FIFO is being followed? | Y / N | | | | | | | Y / N | | |
| ## | 18" perimeter is free of anything other than rodent | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | |
| ## | Walkways, floors, storage areas are clean & clear of | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | Y / N | | |
| ## | Are all ingredient bins and buckets; the correct color, undamaged, properly labeled, covered, each container has its own scoop and free of contamination | | Y / N | Y / N | Y / N | Y / N | | | | | |
| ## | Are the equipment and utensils in your work area free of any chipped, cracked or broken plastic ? | | Y / N | Y / N | Y / N | Y / N | | | | | |
| ## | Are chemical and ingredient containers, parts, tools, brushes, scrapers, gloves, etc. stored in the designated places away from the product zone? | | Y / N | Y / N | Y / N | Y / N | | | | | |
| ## | scissor is clean and in good condition? A designated holder is provided for when the scissor is not being used? | | Y / N | | | | Y / N | | | | |
| ## | All scales are working properly. | | Y / N | | Y / N | | Y / N | | | | |
| ## | Are the fans clean? | | Y / N | Y / N | Y / N | Y / N | Y / N | | | | |
| Sr. No. | Task | Receiving–Ingredient | Scaling | Mixing | Divider–Moulder | Proofer–Oven–Depanner | Cooler–Wrapping | Basket Stacking | Dispatch | Sanitation | IF "NO" - WHAT ACTION WAS TAKEN? |
| ## | All moveable equipment is free of food safety risks such as metal-on-metal contact, wear, or FM contamination? | | | Y / N | Y / N | Y / N | Y / N | | | | |
| ## | Are all nuts and bolts present and secure? | | | Y / N | Y / N | Y / N | Y / N | | | | |
| ## | Are all tools, parts, and equipment free of | | | Y / N | Y / N | Y / N | Y / N | | Y / N | | |
| ## | Are the catch pans clean, empty and in place above any areas where product is exposed? | | | Y / N | Y / N | Y / N | Y / N | | | | |
| ## | Are containers (inside & outside ) free of | | | Y / N | | | | | | | |
| ## | Are the mixers (inside and out) free of contamination? *(Check beater bar bushings, seals, top of mixer)* | | | Y / N | | | | | | | |
| ## | Gear boxes are free of any leaks? | | | Y / N | Y / N | Y / N | Y / N | | | | |
| ## | Ice machine is free of any sources of contamination? | | | Y / N | | | | | | | |
| ## | Is the area free of any chemical residue or over | | | Y / N | Y / N | | Y / N | | | | |
| ## | liquid containers and buckets are clean? | | Y / N | Y / N | | | | | | | |
| ## | Are SS scrapers for hoppers/bowl clean and | | | Y / N | Y / N | | | | | | |
| ## | Check dough conveyors from the rounder to the moulders (while running); conveyor belts are clean (no old dough, dust, trails, debris), are free of any excess wear and the conveyor belt seams/ lacings are in good condition? | | | | Y / N | | | | | | |
| ## | There is no source of contamination on the beam(s) above the divider hopper or inside the hopper? | | | | Y / N | | | | | | |
| ## | No contamination on the rounder belt, rounder cone, rounder bars, rounder sifter/ rounder sifter flour | | | | Y / N | | | | | | |
| ## | Depanner cups are clean and undamaged? | | | | | Y / N | | | | | |
| ## | Bread racks are clean and in good repair? | | | | | | Y / N | | | | |
| ## | Check slicers. There are no possible contaminates in | | | | | | Y / N | | | | |
| ## | Metal detector's to insure that it is functioning properly? | | | | | | Y / N | | | | |
| ## | Coder is set up with correct code? | | | | | | Y / N | | | | |
| ## | Dirty baskets are segregated and tagged for cleaning? | | | | | | | Y / N | | | |
| ## | Broken baskets/trollies are segregated ? | | | | | | | Y / N | | | |
| ## | Sifters are operating correctly without significant leaking? | | Y / N | | | | | | | | |
| ## | All cleaning supplies are put away? | | | | | | | | | Y / N | |
| ## | Chemical Storage area is locked? | | | | | | | | | Y / N | |
| ## | Hand wash stations are clean and well supplied? | | | | | | | | | Y / N | |
| Sign (Production) | | Sign (Maintenance) | | | | | | Verification (QFS) | | | |

**Bins as per Color Code**

| | |
|---|---|
| | For common garbage |
| | For cattle feed |
| | For recyclable material |
| | For canteen (waste food) |
| | For toilets |

| Sr. No. | Type of bin | Capacity (L) | Use | Image | Company | Raised Req. Number |
|---|---|---|---|---|---|---|
| 1. | Blue flap type lid | 60 | For common garbage |  | NACS | 20 |
| 2. | Blue round shaped lid | 60 | At sifter section for thread or common garbage |  | Cello | 20 |
| 3. | Black round shaped lid | 120 | Rejected bread at slicing for cattle feed | | Cello | 10 |
| 4. | Black round shaped lid with foot paddle | 50 | Under scoring table for product scoring waste (cattle feed) |  | Cello | |
| 5. | Black round shaped lid | 60 | At sifter feeding /maida godown for cattle feed. Rejected dough | | Cello | 10 |
| 6. | Green round shaped lid | 100 | For rejected poly at packing area |  | Cello | 20 |
| 7. | Green flap type lid | 80 | Outer area for recyclable material. (wrapper, paper etc.) |  | NACS | 20 |
| 8. | Green small round shaped bin | 20 | Under sealing area at packing for waste cellotape, plastic strings etc | | Any | 10 |
| 9. | Yellow foot operated bin | 25 | Toilet area |  | Any | 40 |
| 10. | Grey, Foot operated | 60 | Canteen (food waste) |  | Any | 4 |

**Pre- Despatch Inspection (PDI) Report**

| Plant- RRSK2 | | | | | | | Sample size : 1% of the lot quantity. Sampling Frequency: Max 4 hours | | | | | | | | | | | | | Supersedes: New document | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Time | Variety | Lot Quantity (crates) | Batch Code | No. of packets Checked | Damaged Crate | Coding defect | Less packet/ crate | Open/ Torn poly | Dented pack | Under wt | Over baked | Under baked | Slicing defect | Foreign matter | Total defectives | % Defective | Quality Satus Hold /OK | Action Taken by production, in case of hold status | Quality status Post Correction | Sign Packing supervisor | Sign process controller | Sign production I/C | Sign QPS I/C | Sign Plant Head |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
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**Vehicle Cleaning Report**

| | | | | | | |
|---|---|---|---|---|---|---|
| | | **FG Vehicle Outside (Branding) Cleaning Checklist** | | | | |
| Date: | | | | | | |
| **Sr. No.** | **In Time** | **Vehicle No.** | **Driver Name** | **Cleaning (OK/NOK)** | **Checked By (Security)** | **Verified By** |
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| 5. | | | | | | |
| 6. | | | | | | |
| 7. | | | | | | |
| 8. | | | | | | |
| 9. | | | | | | |
| 10. | | | | | | |

## CONCLUSIONS

The essential components of a robust Food Safety Management System (FSMS) within the panko bread industry, emphasizing the critical need for maintaining food safety at every stage of production. Regular microbiological assessments, particularly swab testing, have proven vital in minimizing contamination risks and ensuring consistent product quality, which is fundamental to stakeholder value. The identification and management of Critical Control Points (CCPs) throughout the panko production process are key strategies in reducing potential hazards, while the integration of Hazard Analysis and Critical Control Points (HACCP) with Good Manufacturing Practices (GMP) ensures that food safety is not compromised. GMP focuses particularly on the proper sanitation of equipment, which plays a crucial role in preventing contamination. Moreover, employee training and awareness programs are highlighted as an indispensable aspect of FSMS implementation, ensuring that all personnel are well-informed and compliant with food safety regulations. A comprehensive FSMS approach, covering the entire production process, ensures the consistent delivery of safe and high-quality products. While larger organizations may find FSMS implementation more feasible, small and medium enterprises (SMEs) face unique challenges. However, the paper stresses that even these businesses can mitigate food safety risks through well-structured FSMS practices, thus reducing the incidence of foodborne illnesses. Overall, systematic food safety management practices, combined with continuous employee training and adherence to integrated safety protocols, are crucial to the success of the panko bread industry in delivering safe and high-quality food

products. Food safety is an evolving field, with new challenges and technologies emerging regularly. A robust FSMS must include mechanisms for continuous improvement, such as:

- Regular internal audits.
- Staying updated with new food safety standards and regulations.
- Incorporating new technology, such as blockchain, to improve traceability.
- Adapting production methods in response to new research or customer feedback.

By establishing a rigorous Food Safety Management System, panko bread producers can ensure the safety, quality, and consistency of their product, while also gaining consumer trust and maintaining compliance with global food safety standards. A well-implemented FSMS not only reduces the risk of foodborne illnesses but also improves operational efficiency and competitiveness in the marketplace.

The study on "Food Safety Management System-Equipment Cleaning in Panko Bread Industry" explores key factors necessary for maintaining food safety and quality. It stresses the importance of thorough equipment cleaning to prevent foodborne illnesses and advocates for an FSMS that incorporates Hazard Analysis and Critical Control Points (HACCP) and Good Manufacturing Practices (GMP). The paper highlights the unique challenges small and medium enterprises (SMEs) face in implementing FSMS compared to larger organizations, which can increase foodborne illness risks. Continuous employee training and the use of technology, such as blockchain for better traceability, are also essential.

Ultimately, the study emphasizes the need for a comprehensive FSMS to ensure the consistent production of safe, high-quality panko bread.

## FUTURE SCOPE

The study on "Food Safety Management System-Equipment Cleaning in Panko Bread Industry" identifies key areas for further research to enhance food safety practices. Incorporating advanced technologies like artificial intelligence and machine learning can improve monitoring and hazard identification. Expanding FSMS frameworks for small and medium enterprises (SMEs) is essential for effective safety practices. Longitudinal studies could evaluate the long-term impact of FSMS on food safety and consumer trust. Future research should aim to raise consumer awareness, adapt communication strategies, and examine evolving regulations to help producers compete internationally. Additionally, the effectiveness of regular microbiological assessments and the integration of sustainable practices into FSMS without compromising safety standards warrant investigation. These approaches can collectively improve food safety management in the panko bread industry and beyond.

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