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Representing the Makers of the World's Favorite Food, Beverage and Consumer Products

Nut Safety, Then & Now, Some Novel Approaches

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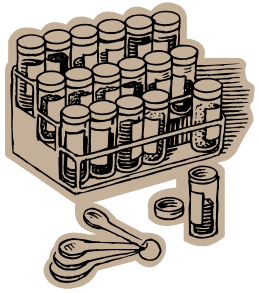
www.gmaonline.org

Agenda

1. *Salmonella* in Low Moisture Foods
2. Nuts and *Salmonella* in Low Moisture Foods
3. GMA's *Safe Processing of Nuts*
4. Sanitary Design
5. GMA Sanitary Design Checklist
6. Moisture Control: The War on Water
7. What's Next?

Salmonella Low Moisture Food Outbreaks and Recalls

- Illustrate the wide range of low- moisture products, including nuts, that can be contaminated with *Salmonella.*
- Underscore the difficulty in eliminating *Salmonella* from dry products, as well as in the environment of dry product manufacturing facilities.
  - Chocolate
  - Cereals
  - Infant dry milk
  - Dry seasonings and spices
  - Sesame seeds
  - Snacks, potato chips



Salmonella Outbreaks – Chocolate Products

Year	Country	Serovar	Source	cfu/g	#ill
1970	Sweden	Durham	Cocoa powder	?	110
1973-74	US, Canada	Eastbourne	Cocoa beans/ Environment	0.2-1.0	200
1982	England, Wales	Napoli	Choc. Bars (Italy)/ water	2-23	245
1985-86	Canada, US	Nima	Cross-contamination (?)	0.04-0.24	33
1987	Norway, Finland	Typhimurium	Avian contamination (?)	<1	349
2001-02	DE, AT, DK, BE, NL, SE, CZ, Fi (?)	Oranien-burg	Unknown	1.1-2.8	439

Salmonella Outbreaks – Beyond Nuts

- *Salmonella* outbreaks from low-moisture products often impact a large numbers of people
  - Cereal (1998, US) – 209 cases
  - Chocolate (2001-02, Europe) – 439 cases
  - Peanut butter (2008-09, US) – 691 cases

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Control Of *Salmonella* in Low Moisture Foods

http://www.gmaonline.org/downloads/wygwam/SalmonellaControlGuidance.pdf

Annex to Control of *Salmonella* in Low Moisture Foods

http://www.gmaonline.org/downloads/wygwam/Salmonellaguidanceannex.pdf

"Control of *Salmonella* in Low-Moisture Foods"

- Seven elements in the Guidance
  - Prevent ingress or spread of *Salmonella* in the processing facility.
  - Enhance the stringency of hygiene controls in the PSCA.
  - Apply hygienic design principles to building and equipment design.
  - Prevent or minimize growth of *Salmonella* within the facility.
  - Establish a raw materials/ingredients control program.
  - Validate control measures to inactivate *Salmonella.*
  - Establish procedures for verification of *Salmonella* controls and corrective actions.

Need for Nut Safety Advancement

- Food borne outbreaks and recalls due to *Salmonella* in low-moisture products, including peanuts and tree nuts, indicated the need for multi-disciplinary guidance on preventive controls to reduce risk.
- Industry has been called to further actions to protect public health.

Salmonella scare causes congressional hearing

Rep. Greg Walden, R-Oregon, holds up a container holding products made with peanut butter from the Peanut Corporation of America at a House hearing Wednesday.

By H. Darr Beiser, USA TODAY

Fallout Widens as Buyers Shun Peanut Butter

"Many consumers, apparently disregarding the fine print of the *Salmonella* outbreak and food recall caused by a Georgia peanut plant, are swearing off all brands of peanut butter, driving down sales by nearly 25 percent.

The drop-off is so striking that brands like Jif are taking the unusual step of buying ads to tell shoppers that their products are not affected..."

NY Times, Feb 6, 2009, A. Martin & L. Robbins

GMA Nut Handbook

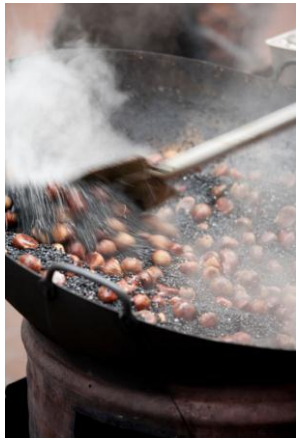
- Focuses on safe processing of peanuts and tree nuts, with two addenda:
  - Industry Handbook for the Safe Shelling of Peanuts
  - Good Agricultural Practices for California Pistachio Growers
- Represents a “tool chest” for nut industry members seeking successful food safety practices.
  - A comprehensive “how-to” manual
- http://www.gmaonline.org/downloads/technical-guidance-and-tools/Industry_Handbook_for_Safe_Processing_of_Nuts_1st_Edition_22Feb10.pdf

GMA Nut Safety Task Force – An Industry Coalition

- GMA members from Kraft Foods, Nestlé, General Mills, Kellogg's, Mars, ConAgra, Campbell's, Ocean Spray, Silliker, Hershey's, Diamond Foods
- Members from Golden Peanut, John B. Sanfilippo, Green Valley Pecan, Navarro Pecan, Birdsong Peanuts
- Trade Groups: PTNPA, APC, CPRB, ACP, CWB, CPB, NCA, NPSA, WPA, ACFSQ, JLA, CBC

To specifically assist the nut industry

- A cross section of growing, shelling and processing industry involved in development of guidance.
- Sharing best practices and promote voluntary adoption of guidance



Handbook Focus Areas

- Four chapters in the Nut Handbook
  1. Management Responsibility
  2. Food Safety Plan
     - HACCP and Process Validation
  3. Other Preventive Controls/Prerequisite Programs, including:
     - **Facilities and Sanitation**
     - **Allergen control**
     - Hygiene zoning (segregation of raw vs. RTE areas)
     - Pathogen environmental monitoring (PEM)
     - Control of raw materials and products
  4. Principles of Equipment Design

Appendices in the Nut Handbook

- Provide further guidelines on topics such as:
  - Considerations for sampling and testing as a verification tool.
  - Time/temp guidelines for *Salmonella* inactivation.
  - Registration information for PPO and ETO as a control measure.
  - Examples of HACCP forms.
  - Examples of roaster validation.
  - Hygiene zoning example.
  - The 7-steps of dry sanitation.
  - The 7-steps of wet sanitation.

Addendums

- Addendum I: Industry Handbook for the Safe Shelling of Peanuts
- Addendum II: Good Agricultural Practices for California Pistachio Growers
- Addendum III: Good Agricultural Practices for Almond Growers

Nut Safety – Major Components

- Control of *Salmonella*
  - Process validation
  - Prevention of post-lethality environmental contamination
- Allergen management
  - Proper labeling
    - Design
    - Storage of labels
    - Application
  - Ingredient control
  - Prevention of cross-contact

Process Validation

- Nut Handbook
  - Includes a list of technologies for *Salmonella* inactivation.
  - Provide guidelines on how to validate a process, e.g., study design requirements, data collection, time/temperature profile, challenge studies.
- *Salmonella* inactivation
  - A 4-log reduction is adequate for certain nuts such as almonds.
  - Studies underway to validate appropriate reduction for peanuts and other tree nuts.

Nut Safety

- Prevention of post process environmental contamination
  - Organism of concern: *Salmonella*

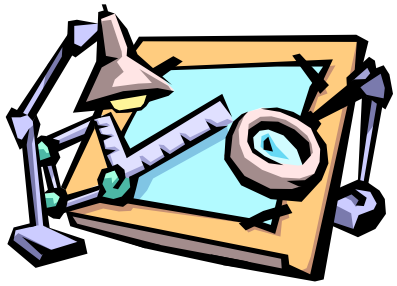
- Allergen Management
  - Supplier management (keep undeclared allergens out)
  - Label management (put properly designed label information on the container)
  - Avoid cross-contact

Environmental issues: microbial contamination and allergen cross-contact

- Design and maintenance of sanitary conditions can serve in addressing the two major adulteration (misbranding) issues facing nut processors

Design and maintenance of sanitary conditions

- Sanitary Design
  - Especially useful since low moisture processors often use dry sanitation procedures
- Moisture Control: War on Water



Sanitary Design Principles

- Sanitary design is the application of design techniques that allow the timely and effective cleaning of the entire manufacturing asset
- Building and installation of food manufacturing facilities and equipment is a key component of an organization's future success in the food industry

Evolution of Control By Design
Early Phases of Design Circa 1950

- Industry started to scale up mass production.
- Equipment was not sophisticated -- cleaning was an after thought.
- Materials of construction were not ideal, mostly paint on mild steel.
- Heavily mechanical, without computer controls.
- Product protection devices were not in place.
- Equipment was installed in locations which made accessibility a concern.

Evolution of Control By Design Improvements are Apparent

- Materials of construction are much improved.
- Equipment is more cleanable, however opportunities continue
- Product protection devices are in place.
- Equipment installation has improved which improves accessibility for cleaning.

Improvements apparent but still opportunity areas

Difficult to remove for cleaning and is a catch point for product and microbes

Difficult to clean area – not easily accessible and potential for infestation growth.

Difficult to remove for cleaning and is a catch point for product and microbes and infestation.

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Using the GMA **Equipment** Design Checklist

Checklist developed

- Aids in developing a more sanitation friendly facility
- Used to audit existing facilities to help with improvement
- Compare facilities/equipment
- Serves as necessary documentation

Introduction

Equipment Design Checklist for Low Moisture Foods

Version 2.0 - May 2010

For detailed directions on the use of the checklist, please click on the tab marked "Directions."

Date:	
Completed By:	
Location:	
Equipment:	

Purpose or Use (check one)	RTE	Further Processing

Facilities, equipment and machinery must meet all federal, state and local food safety requirements as well as personnel safety requirements during operation, cleaning and sanitizing. Any modifications must not affect compliance with these requirements.

#	Description	S	M	U	NA	Comments	Points Awarded	Points Available

Let's Start

#	Description	S	M	U	NA	Comments	Points Awarded	Points Available
PRINCIPLE #1 - CLEANABLE								
1.1	Surfaces can be cleaned to a visually clean standard and meet pre-op inspection requirements.						Needs X	15
1.2	Surfaces can be monitored prior to start up for a visually clean standard, and for allergen residues, ATP and microorganisms as needed.						Needs X	15
1.3	Construction of equipment meets the GMP definition of "easily cleanable" (21 CFR 110.40).						Needs X	15
1.4	A HACCP based product risk evaluation was completed during the product design/selection phase and the equipment is designed to address those risks. The choice of equipment has been validated as a proper choice for the product and operation.						Needs X	15
1.5	Method of cleaning needed for the product risk was incorporated into the chosen design of the equipment, or in choosing the proper equipment.						Needs X	15
1.6	Equipment design meets cleaning time targets established by the equipment user.						Needs X	10
1.7	Equipment has no apparent flaws that will fail over its life and make it uncleanable.						Needs X	15
1.8	If belting is used as product contact surfaces, it should be non-absorbent, fully encapsulated, cleanable and should be designed to be compatible with the cleaning methods employed at the location (wet or dry).						Needs X	15
TOTAL POINTS FOR THIS SECTION							0.0	115

Criteria

PRINCIPLE #4 - NO LIQUID COLLECTION								
4.1	All surfaces should be designed to eliminate product collection or water pooling during production. If water is used during cleaning, all surfaces must be self draining.						Needs X	10
4.2	Materials used in construction shall be non-absorbent.						Needs X	10
4.3	Round framework is used for horizontal framework pieces wherever possible.						Needs X	10
4.4	Where square or rectangular tubing is used, the flat surface is turned 45 degrees to horizontal where possible.						Needs X	10
4.5	All open surface areas are made of sufficient strength to prevent warping and any subsequent pooling of water.						Needs X	15
4.6	Moisture does not drip, drain, or draw into product zone areas.						Needs X	15
TOTAL POINTS FOR THIS SECTION							0.0	70

PRINCIPLE #5 - HOLLOW AREAS HERMETICALLY SEALED								
	Note: In general, equipment with hollow areas should be avoided, especially in wet operations. When hollow areas cannot be avoided, the standards in Principle #5 should apply.	*****	*****	*****	****			
5.1	All rotating components, such as drive sprockets or belt pulleys, are to be solid or filled with dye (in high moisture applications only) and fully sealed with continuous welds.						Needs X	15
5.2	All stationary hollow tube construction, such as frame members or blade spacers, is fully sealed with continuous, sanitary welds to prevent interior contamination.						Needs X	15
5.3	There are no fastener penetrations into hollow tube construction.						Needs X	15
5.4	Threaded leg adjusters (for equipment) are internal and do not penetrate the tube frame members.						Needs X	10
5.5	Name plates and tags are minimized. When attached, plates and tags are continuously welded to the machinery surface. Rivets or plates attached with screws and/or sealed with caulk are not used.						Needs X	10
TOTAL POINTS FOR THIS SECTION							0.0	65

A completed section

#	Description	S	M	U	NA	Comments	Points Awarded	Points Available
PRINCIPLE #1 - CLEANABLE								
1.1	Surfaces can be cleaned to a visually clean standard and meet pre-op inspection requirements.	x					15.0	15
1.2	Surfaces can be monitored prior to start up for a visually clean standard, and for allergen residues, ATP and microorganisms as needed.	x					15.0	15
1.3	Construction of equipment meets the GMP definition of "easily cleanable" (21 CFR 110.40).		x				7.5	15
1.4	A HACCP based product risk evaluation was completed during the product design/selection phase and the equipment is designed to address those risks. The choice of equipment has been validated as a proper choice for the product and operation.	x					15.0	15
1.5	Method of cleaning needed for the product risk was incorporated into the chosen design of the equipment, or in choosing the proper equipment.		x				7.5	15
1.6	Equipment design meets cleaning time targets established by the equipment user.			x		Takes too long to disassemble	0.0	10
1.7	Equipment has no apparent flaws that will fail over its life and make it uncleanable.		x				7.5	15
1.8	If belting is used as product contact surfaces, it should be non-absorbent, fully encapsulated, cleanable and should be designed to be compatible with the cleaning methods employed at the location (wet or dry).				x		0.0	0
TOTAL POINTS FOR THIS SECTION							67.5	100

Automatically generated summary

CATEGORIES	Points Earned	Possible Points	Percent Earned
PRINCIPLE #1 - CLEANABLE	75	115	65%
PRINCIPLE #2 - MADE OF COMPATIBLE MATERIALS	55	80	69%
PRINCIPLE #3 - ACCESSIBLE FOR INSPECTION, MAINTENANCE, & CLEANING/SANITATION	95	140	68%
PRINCIPLE #4 - NO LIQUID COLLECTION	42.5	60	71%
PRINCIPLE #5 - HOLLOW AREAS HERMETICALLY SEALED	60	65	92%
PRINCIPLE #6 - NO NICHES	140	185	76%
PRINCIPLE #7.0 - SANITARY OPERATIONAL PERFORMANCE	55	80	69%
PRINCIPLE #7.1 - HYGIENIC DESIGN OF MAINTENANCE ENCLOSURES	27.5	30	92%
PRINCIPLE #7.2 - HYGIENIC COMPATIBILITY WITH OTHER SYSTEMS	20	30	67%
PRINCIPLE #8 - VALIDATED CLEANING & SANITIZING PROTOCOLS	47.5	70	68%
PRINCIPLE #9 - SEPARATE PROCESSES WHEREVER POSSIBLE.	12.5	25	50%
PRINCIPLE #10 - EQUIPMENT & PERSONNEL AT INSTALLATION MEET HYGIENE & SANITATION REQUIREMENTS	30	40	75%
TOTAL	**660**	**920**	**72%**

Scoring System (Points)

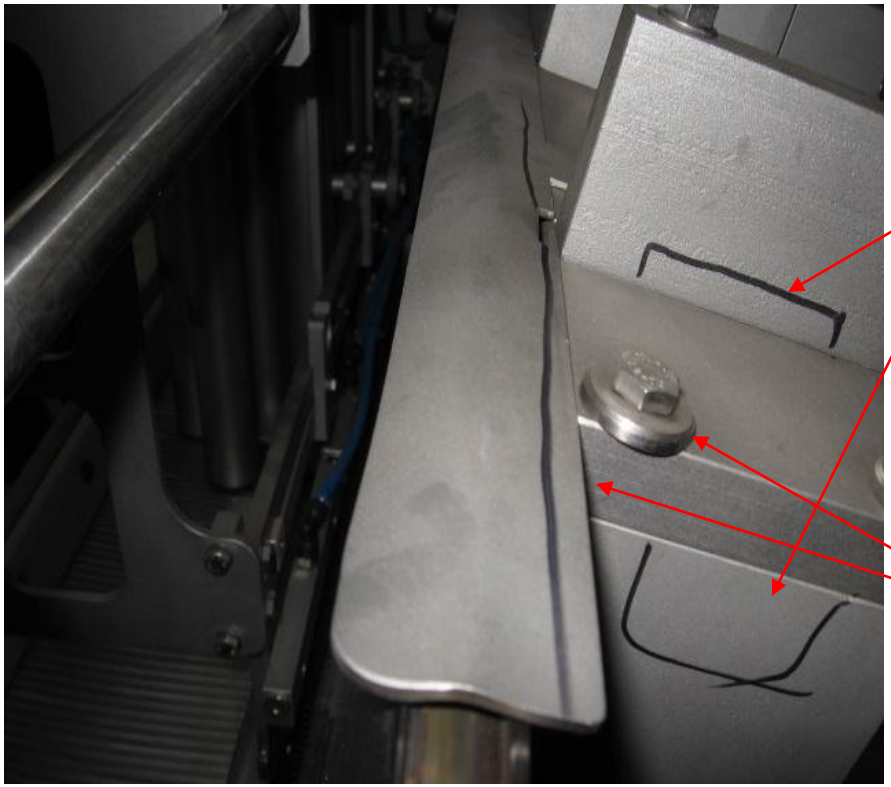
Rating System

Satisfactory = Full points

Marginal = 1/2 points

Below 1/2 points = Unsatisfactory

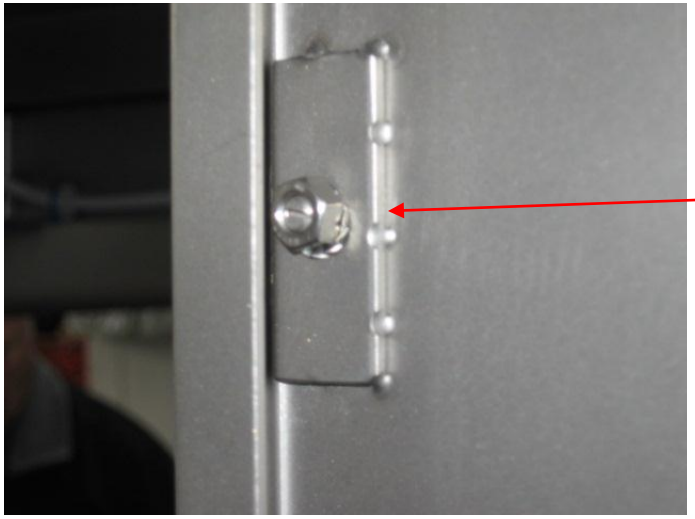
An example feedback to a equipment supplier



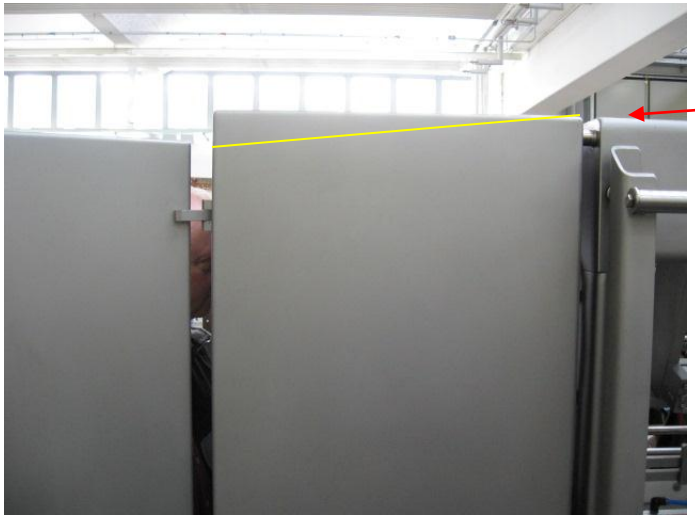
Areas will be cut out to allow for better access for sanitation and reduce harborage areas

This guard will be reduced in size and and spaced off the frame for better drainage and improved cleanability

An example feedback to a equipment supplier

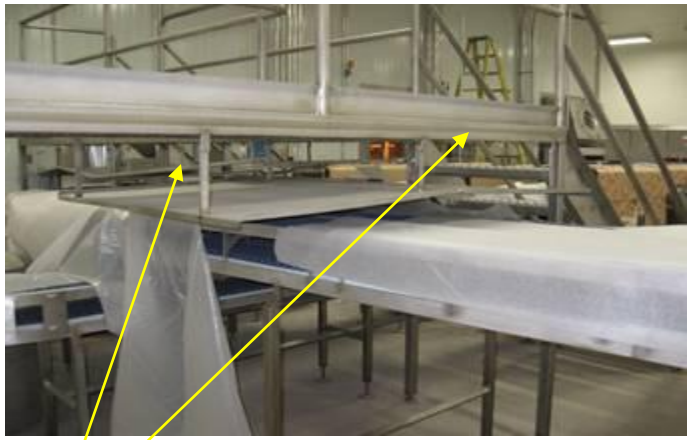


Hinge mountings will be improved to continuously welded and bolt elimination

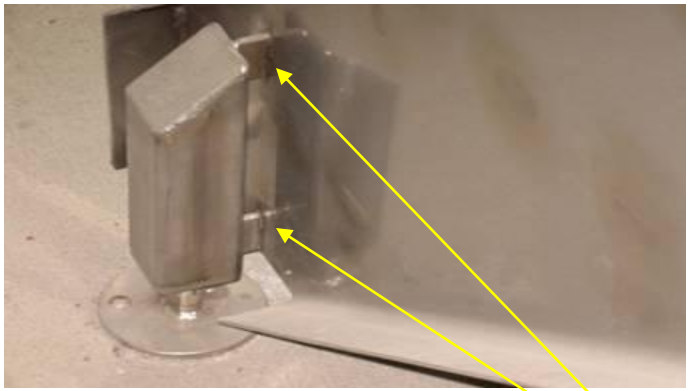


Cabinets will be sloped on top

Evolution of Design Examples



All protection panels on line crossovers are pitched and sloped to promote drainage away from the product stream

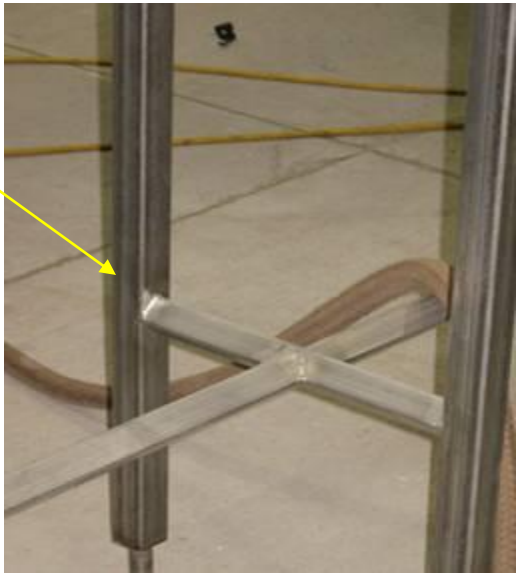


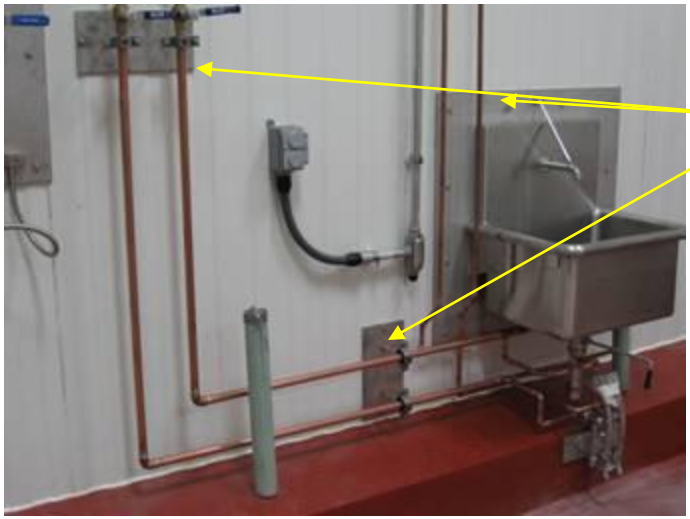
Stair riser leg, sloped top totally sealed and set off the riser

Manual belt lifts on conveyors to provide improved access for sanitation

Evolution of Design Examples

Round stock and square stock turned on 45 degree angle, totally welded used for framework





All plumbing pipes And electrical conduits are set off the wall for better cleaning ability

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Facility Design Checklist

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GMA Facility Design Principles

1. Distinct Hygienic Zones Established In The Facility
2. Personnel and Material Flows are Controlled to Reduce Hazards
3. Water Accumulation Controlled Inside Facility
4. Room Air Flow and Room Air Quality Controls
5. Site Elements Facilitate Sanitary Conditions
6. Building Envelope Facilitates Sanitary Conditions
7. Interior Spatial Design Promotes Sanitation
8. Building Components and Construction Facilitate Sanitary Conditions
9. Utility Systems Designed To Prevent Contamination
10. Sanitation Integrated Into Facility Design

Passive controls rely on administrative procedures, training, and auditing to ensure success

Cross Traffic Aisle

Lessons Learned "Bacteria do not honor either orange or yellow barrier lines"

Active Controls

- Active controls rely on engineered solutions such as physical barriers to ensure success
- **Active controls prevent personnel from easily circumventing your control**

GMA Equipment and Facility Sanitary Design Checklists

http://www.gmaonline.org/issues-policy/product-safety/food-and-product-safety/manufacturing-processing-and-regulatory-support/preventing-foodborne-illness/preventing-salmonella/

Control of Moisture

- The drier your facility, the easier it will be to control microbial growth
- Even in a wet facility, water flow needs to be managed to control risk

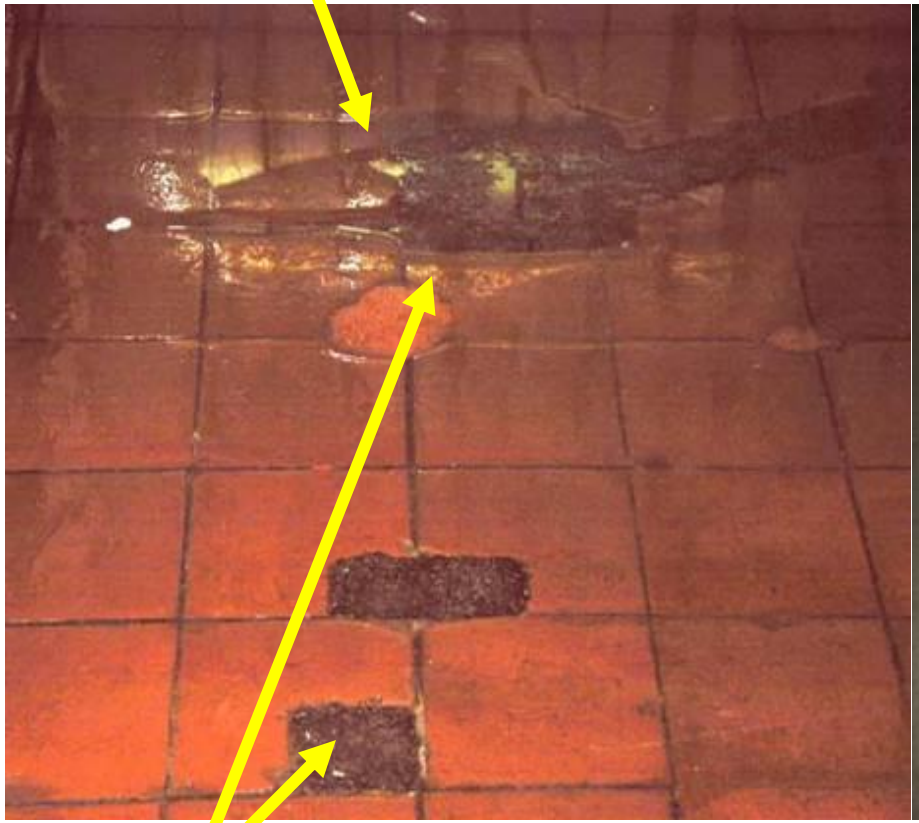
Moisture Control

- “Moisture control is critically important in preventing *Salmonella* contamination in low moisture products.
- Water in the dry processing environment is one of the most significant risk factors for Salmonella contamination, because the presence of water allows the pathogen to grow in the environment, where normally the lack of moisture would prevent this.”

International Commission on Microbiological Specifications for Foods 2005.

… requires designs that facilitate free draining of any moisture that is introduced into the facility environment.
Pooling water is a sign of trouble.

Ponding water



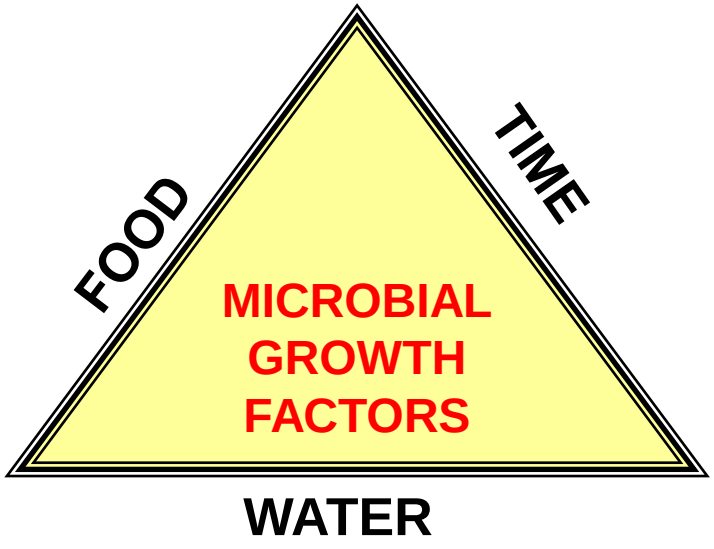
Poor repairs

From This **To This More**

Design **Sanitary Design**

Why Dry Sanitation?

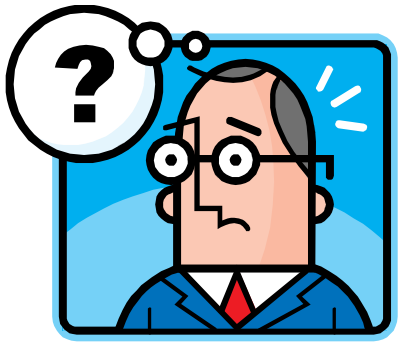
A primary concern is the prevention and control of microbial hazards in the processing environment. Microbes need water to grow. Low moisture foods, such as nuts, cereals, crackers, snacks etc, do not support microbial **growth** due to their low water activity. Maintaining the food processing environment in a dry state, including during sanitation activities is a microbial hazard control strategy.



Of the three essential factors required to support microbial growth, it is **WATER** that we have the greatest ability to control.

Example of dry cleaned belts

What's Next?



Observations from Technical Visits (25+ suppliers 2008 – 2010)

- Suppliers of nuts and tree nuts felt that they were not effected by contamination with *Salmonella*.
- Many were not monitoring the environment for pathogens.
- Many were not monitoring the process, felt that the process was a quality step.
- Many had inadequate HACCP and GMP programs.
- Many had inadequate air filtration/ handling systems.
- 75% did not meet our FS requirements, some were disqualified as suppliers.

FSMA: Proposed Part 117

- Hazard Analysis & Preventive Controls
- Requires anyone who processes or stores food to have a food safety plan
  - Evaluate hazards that could affect food.
  - Identify and implement preventive controls to significantly minimize or prevent occurrence.
  - Monitor performance of those controls.
  - Maintain records of monitoring
  - Give FDA access to those records

Sources and Risk Factors for Contamination, Survival, Persistence, and Heat Resistance of *Salmonella* in Low-Moisture Foods.

Richard Podolak, Elena Enache, Warren Stone, Darryl Black and Phillip Elliott

Journal of Food Protection, Vol. 73, No. 10, 2010, Pages 1919–1936

- Sources and Risk Factors
  - Ingredients
  - Sanitary Design & Maintenance
  - Prerequisite Programs
  - GMPs
  - Poor Sanitation Practices
- Salmonella Survival
- Heat Resistance in Low Moisture Foods

"Thermal Inactivation and Survival of *Salmonella* in Food as a Function of Water Activity and Fat Level."

- The project investigates inactivation of *Salmonella* Tennessee in a model peanut butter matrix with 16 formulations
  - Temperature: 70, 75, 85, 90°C
  - Fat levels: 47, 50, 53, 56%
  - Water activity (a_w): 0.3, 0.4, 0.5, 0.6
- The thermal inactivation data will be used to develop a model to predict inactivation as a function of fat, water activity, time and temperature
- In addition, thermal inactivation of *Salmonella* Tennessee, *Salmonella* Typhimurium, and *Enterococcus faecium* has been established at 75°C in four peanut paste formulations at extreme conditions of fat level and water activity
- In addition as second project investigates the survival of heat-stressed *Salmonella* Tennessee, *Salmonella* Typhimurium, and *Enterococcus faecium* in four peanut paste formulations at the extreme conditions of fat level and water activity
- Contact Melinda Hayman, Ph.D. for more information (mhayman@gmaonline.org)

Current research: ILSE

- Enache, E., A. Kataoka, D. G. Black and, R. Podolak. 2012. **Thermal inactivation and survival of *Salmonella* in food as a function of water activity and fat level.** 2012. Presentation at ILSI Symposium "*Salmonella* in low moisture foods: a continued challenge". 2012 IAFP Meeting. Providence, RI.

- Enache, E., A. Kataoka, D. G. Black, R. Podolak, M. Hayman, P. H. Elliott, and R. Whiting. 2013. **Heat Resistance of *Salmonella* Tennessee, *Salmonella* Typhimurium DT 104 and *Enterococcus faecium* in Model Peanut Paste Formulations at Two Different Levels of Fat and Water Activity** (Abstract submitted for 2013 IAFP)

- Enache, E., A. Kataoka, M. Hayman, R. Podolak, D. G. Black, P. H. Elliott, and R. Whiting. 2013. **Heat Resistance of *Salmonella* Tennessee in Peanut Paste Formulations at four Different Levels of Fat and Water Activity** (Abstract submitted for 2013 IAFP Meeting)

Current research: ILSE (cont)

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- Kataoka, A. E. Enache, C. Napier, R. Podolak, M. Hayman, D. G. Black, P. H. Elliott and R. Whiting. 2013. **Survival of *Salmonella* in Food as a Function of Water Activity and Fat Level** (Abstract submitted for 2013 IAFP Meeting)

GMA Tools

- Ingredient Supplier Questionnaire Results - 2012
- Food Supply Chain Handbook (English, Spanish, French, Chinese, Japanese, Russian)
- Industry Handbook for Safe Processing of Nuts
- Equipment Design Checklist for Low Moisture Foods
- Facility Design Checklist
- Salmonella Control Guidance
- Annex to Salmonella Guidance
- Minimizing the Presence of and Handling Abnormal Containers of Commercially Sterile Foods
- Guidelines for Validation of Consumer Cooking Instructions for Not-Ready-to-Eat (NRTE) Products

Grocery Manufacturers Association

Science Forum

Connecting Sound Science and Responsible Solutions

Save the Date

for the

GMA Science Forum

April 1-5, 2013

Washington, D.C.

www.GMAScienceForum.com

GMA HACCP Courses

Workshop	Descriptions
HACCP Online course*	This online workshop provides flexible, affordable and effective training for food safety personnel who need to learn and apply the principles of HACCP in plan development and implementation.
GMA Online HACCP Follow-up Workshop	This course complements the online HACCP training by providing hands-on experience with the development of a "mock" HACCP plan to facilitate understanding of the online material. Completion of the online course is prerequisite to this 1-day certificate workshop. The online course plus this 1-day follow-up workshop meet the educational requirements cited in the FDA & USDA HACCP regulations.
Advanced HACCP, Verification &Validation	This workshop, accredited by the International HACCP Alliance, concentrates on verification activities included in the sixth principle of HACCP. It explores activities in-depth and how to implement them in a successful HACCP system.
HACCP Train the trainer	The HACCP Train the Trainer workshop is designed to prepare and qualify candidates as International HACCP Alliance Lead Instructors. In addition to providing a greater understanding of the 7 HACCP principles, the workshop covers adult learning styles and delivery techniques to more effectively present HACCP course material. Hands-on working group exercises facilitate the learning process.
Basic HACCP (Meat, Poultry, Juice, Seafood and other products as needed)	This introductory workshop, accredited by the International HACCP Alliance, is composed of lectures and group exercises.. Each of the seven HACCP principles is discussed. The workshop focuses on strategies for HACCP plan development and implementation. GMA instructors can accommodate and provide lectures for specific areas of interest based upon the participants' needs.

*http://www.gmatraining.com/HACCP_Purchase_Info.html

GMA HACCP Resources

Textbooks

- HACCP: A Systematic Approach to Food Safety - English http://www.fpa-food.org/store_product.asp?inve_id=221
- HACCP: A Systematic Approach to Food Safety - Spanish http://www.fpa-food.org/store_product.asp?inve_id=66
- HACCP Verification and Validation: An Advanced HACCP Workshop
  - English: http://www.fpa-food.org/store_product.asp?inve_id=118
  - Spanish: http://www.fpa-food.org/store_product.asp?inve_id=69

Other Materials

- PowerPoint slide sets to accompany the above HACCP manuals:
  - English: http://www.fpa-food.org/store_product.asp?inve_id=64
  - Spanish: http://www.fpa-food.org/store_product.asp?inve_id=196

Other Courses Offered by GMA

- **Thermal Process Development**
- **Thermal Process Deviations**
- **Better Process Control School**
- **Aseptic Better Process Control School**
- **Food Labeling**

- Contact Audrey Rubio at: arubio@gmaonline.org

¿Preguntas?

QUESTIONS?

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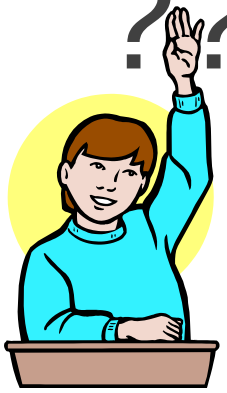

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