Foundational Imperatives:
Sanitary Design in Retail & Restaurant Facilities

Speakers:
Sam Cole & Steven A. Lyon

Moderator: Robert Prevendar
Keys to Food Safety Success

Right knowledge & behaviors

Right equipment & environment

Start with safe ingredients
Keys to Food Safety Success

Right knowledge & behaviors

Right equipment & environment

Start with safe ingredients
It all begins @ the drawing board...
Session Agenda:

1. Facility Design
2. Equipment Design
3. Q & A
Who Are You?
Our Speakers:

Sam Cole
Director, Product Certification – Equipment & Chemical Evaluation
NSF International
Our Speakers:

Steven A. Lyon PhD
Director, Food Safety – Field Operations
Chick-fil-A, Inc.
Sanitary Restaurant Design to Reduce Infectious Disease Transmission Risk

Steven A. Lyon, Ph.D.
Chick-fil-A, Inc.
Food Safety Summit 2023
A Growing Business in a Complex Industry

- 2,900 Restaurants across 48 states and Canada
- $19.8 B annual sales
- $9 M average sales per unit
- 8 M guests served per day (except Sunday)
- 2,500 customers served per Restaurant per day
- Fresh menu that is hand prepared

> 900 M lbs. raw chicken handled annually

64 M sandwiches/month

Biological Hazards:
- Salmonella
- Campy

~ 250,000 Team Members

Biological Hazards:
- norovirus
- Hep-A
- STEC
- COVID/flu/TB
We Design the Place Where CARE Comes to Life

<table>
<thead>
<tr>
<th>Who is Design Crucial for?</th>
<th>What is Design Crucial for?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Operators</td>
<td>• CARE</td>
</tr>
<tr>
<td>• Team Members</td>
<td>• Capacity</td>
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<tr>
<td>• Guests</td>
<td>• Convenance</td>
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Safety is an intrinsic need for everyone, and everyone deserves being cared for.
Always Learning

Anticipate

Evaluate

CULTURE of CARE

Integrate

Solutions

Always Adapting
Restaurant Design – 3 Focus Areas to Reduce Cross-Contamination

Reduce Raw Chicken Footprint
- Thawing
- Handling
- Breading

Isolate RTE from Raw
- Design for barriers
- Risk based

Dedicated Production and People
- Food processing plant mindset
EQUIPMENT DESIGN PRINCIPLES & STANDARDS

DISHWASHING EQUIPMENT

Principles

- Clean dish drying rack can be across circulation aisle - maintain close proximity.
- Provide a barrier when dishwashing process is adjacent to equipment used for preparing or washing food.
- Provide a barrier when dishwashing process is adjacent to existing mop sink and cleaning chemicals.
- No shelving to be located above Dishwasher.

Standard Equipment

1. Pot sink
2. Dishwasher
3. Dishwasher Chemical Controller
4. Clean Dish Table
5. Clean Dish Drying Rack
6. Solid Sense Chemical Dispenser
7. Dishwasher Chemicals
8. Sprayer Faucet
Ventilation is an important system to **reduce risks**

Fresh air exchange, filtration and humidity control aid in limiting respiratory diseases and unpleasant odors

- SARS-CoV-2
- Influenza A & B
- RSV
- Tuberculosis
Restaurant HVAC System and Air Circulation

(Fresh outside air conditioned before entry) → HVAC → (Air exhaust from vent hood)

(Filtering air coming into Restaurant) → DROP CEILING → (This air returns into HVAC)
- Our HVAC system must maintain positive pressure inside the Restaurant despite the fact that we are losing a significant volume of air through the vent hood in the kitchen.

- To offset the loss of air from the vent hood, the HVAC system continually incorporates fresh air from outside the Restaurant.

- This process is designed to replace the air in the Restaurant over 5 times each hour with fresh air.

- It is also designed to circulate and filter the air 18-20 times per hour.

- The CDC requires that the air in a quarantined patient’s room be replaced 2 times per hour and circulated/filtered 12 times per hour.

*Taken from www.cdc.gov*
We design Restaurants to be overall positive in pressure, but certain areas of the Restaurant can be negative pressure relative to other areas.

We design to create negative pressure in the kitchens and restrooms.

Kitchen and restrooms are negative are to avoid smell transfers to the adjacent spaces.

This pressure differential creates air movement throughout the Restaurant and helps prevent stagnant air.
Adjunct Air System – Reduce Bio-Burden

Synexis provides safe and continuous emission of Dry Hydrogen Peroxide (DHP) into the restaurant environment. DHP is a propriety broad spectrum antimicrobial and the DHP devices can either be placed in the HVAC system or via standalone modules. This solution addresses 4 of the 5 Food Safety factors; pests, cross-contamination, cleaning/sanitation, and employee hygiene.

BUSINESS CONCERNS:

Chick-fil-A continues to look for a solution to reduce microbial threats (such as viruses, mold, fungi), as well as the number of live insects and odors in free standing restaurants (FSRs). The second iteration of this pilot has expanded to include strategic locations, including malls, urban/rural, older/newer, and restaurants with specific pressures (i.e. insects and mold).

RESULTS*:

1) Odors have been eliminated at all locations during the pilot
2) Flies have been 100% eliminated at all locations during the pilot
3) CFU results have exceeded the 50%–60% KPI
4) The average RLU reduction has been met

Celebrate FSU Air (CFU) and Surface (RLU) Results*
(Data called out based on ongoing significant existing airborne mold issue in the restaurant)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Baseline</th>
<th>Day 150</th>
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</thead>
<tbody>
<tr>
<td>CFU</td>
<td>13.6</td>
<td>4.3</td>
</tr>
<tr>
<td>RLU4</td>
<td>15,142</td>
<td>1,698</td>
</tr>
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</table>

Average RLU Count

Days

Food Safety Summit 2023
Air samples taken after the third-party cleaning, did not show a significant reduction in mold in the environment with certain areas of the restaurant actually spiking in fungal activity. Three Synexis baseline samples were taken prior to the installation of a Biodefense System which showed an increased presence of mold in the environment.

**Conclusion**

The subsequent installation of a Synexis Biodefense System resulted in a 95% reduction of mold in the environment after only seven days of operation.
Restrooms - Critical for Sanitary Design

Design for hand hygiene and minimizing touch points

“Ground Zero” for norovirus outbreaks
• Highest area of risk for contamination
• Guests and Team Members
• Aerosol and surface contact spread

75%

Norovirus risk reduction with avoiding hand contact of restroom high-touch contaminated surfaces

Data based on Norovirus – Duret et. al (2017) & Fanasalle et. al
High Risk – many touch points
Low Risk – minimal touch points
Our Speakers:

Sam Cole
Director, Product Certification – Equipment & Chemical Evaluation
NSF International
Food Safety Summit

Foundational Imperatives—Sanitary Design in Retail and Restaurant Facilities

Sam Cole
Global Director, Product Certification – Equipment & Chemical Evaluation
OUR FOUNDATION

In 1944,
NSF was founded as the National
Sanitation Foundation in the University
of Michigan's School of Public Health.

Today,
we are NSF, with headquarters in
Ann Arbor, MI, USA, and 53 office
and lab locations worldwide.
BRINGING INDUSTRY, REGULATORS AND CONSUMERS TOGETHER

**INDUSTRY**
Aerospace, automotive, building and construction, food, chemical, consumer products, pharmaceutical, medical device, dietary supplement, water distribution and treatment, and sustainability

**REGULATORS**
USDA, EPA, FDA, CPHC, HC and international, national, state and local government agencies

**CONSUMERS**
Educators and consumer groups
NSF FOOD EQUIPMENT STANDARDS

- NSF/ANSI Standard 2: Food Equipment
- NSF/ANSI Standard 3: Commercial Warewashing Equipment
- NSF/ANSI 4: Cooking and Hot Food Holding Equipment
- NSF/ANSI 5: Water Heaters
- NSF/ANSI 6: Dispensing Freezers
- NSF/ANSI 7: Commercial Refrigerators and Freezers
- NSF/ANSI 8: Commercial Powered Food Preparation Equipment
- NSF/ANSI 12: Automatic Ice Making Equipment
- NSF/ANSI 13: Refuse Processors
- NSF/ANSI 18: Manual Food and Beverage Dispensing Equipment
- NSF/ANSI 20: Commercial Bulk Milk Dispensing Equipment
- NSF/ANSI 21: Thermoplastic Refuse Containers
- NSF/ANSI 25: Vending Machines for Food and Beverages
- NSF/ANSI 29: Detergent and Chemical Feeders for dishwashing machines
- NSF/ANSI 35: High Pressure Decorative Laminates
- NSF/ANSI 37: Air curtains for entranceways in food establishments
- NSF/ANSI 51: Food Equipment Materials
- NSF/ANSI 52: Supplemental Flooring
- NSF/ANSI 59: Mobile Food Carts
- NSF/ANSI 169: Special Purpose Food Equipment and Devices
- NSF/ANSI 170: Glossary of Food Equipment Terminology
There are **four core zones** found within the standards. The four zones and the subsequent requirements are organized by level of risk from greatest to least public health risk and the requirements have been designed accordingly.

**PUBLIC HEALTH RISK**

- **GREATEST**
- **LEAST**

- **F** FOOD ZONE
- **S** SPLASH ZONE
- **N** NON-FOOD ZONE
- **U** UNEXPOSED NON-FOOD ZONE
FOOD ZONE: DIRECT CONTACT
Surfaces in direct contact with food

CUTTING BOARD SURFACES & KNIFE BLADES

SURFACES OF GRILLS / GRIDDLES

INTERIOR SURFACE OF POTS, PANS & BOWLS
FOOD ZONE: NON-CONTACT
Surfaces that food or condensate may contact and then drain, drip, or splash back into food or food contact surfaces.

UNDERSIDE OF EXHAUST HOOD

UNDERSIDE OF TOP COVER
SPLASH ZONE

Surfaces, other than those in a food zone, that are subject to splash, spillage, or food soiling.

EXTERIOR SURFACE OF REACH IN REFRIGERATOR

KNIFE / UTENSIL HANDLES
NONFOOD ZONE
Exposed surfaces other than those in a food or splash zone.

UNDERSIDE OF EQUIPMENT / TOP SURFACES OF TALL EQUIPMENT

CASTERS
UNEXPOSED NONFOOD ZONE
Enclosed areas unexposed under normal conditions, such as inaccessible areas or those accessed only for maintenance or service through covers, panels, or doors
REQUIREMENTS

DESIGN

MATERIALS

PERFORMANCE
Design Requirements

- Fasteners
- Internal Angles
- Equipment Mounting
- Unsealed seams
- Welded Seams
- Sealants
Easily Cleanable Fasteners

Unacceptable Fasteners
Internal Angles and Corners: Food Zone

Greater than 135° angle or;
1/8 inch minimum radius
Unsealed Seams
WELDED SEAM

Sealed but not smooth

Sealed and smooth
Sealants

- Only for structurally sound joints and seams
  - Seams less than 1/8" wide before sealing

- Can be used to fill spaces around collars, grommets, service connections
<table>
<thead>
<tr>
<th>ZONE</th>
<th>ACCESSIBILITY</th>
<th>RADIUS</th>
<th>FASTENERS</th>
<th>EXPOSED THREADS</th>
<th>SEAMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Without tools</td>
<td>Required</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Sealed</td>
</tr>
<tr>
<td>S</td>
<td>With tools</td>
<td>Not required</td>
<td>Easily cleanable</td>
<td>Not permitted</td>
<td>Sealed</td>
</tr>
<tr>
<td>N</td>
<td>With tools</td>
<td>Not required</td>
<td>Easily cleanable</td>
<td>Limited</td>
<td>Closed</td>
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Material Requirements

• Easily cleanable
• Material requirements
• Corrosion resistant
• Coatings
• Toxicity
• Brass and Bronze
• Wood
MATERIAL REQUIREMENTS: CLEANABILITY

SMOOTH
Free of rough edges or surface imperfections (pits, pinholes, inclusions) detectable by visual and tactile inspection.

TEXTURED
Any patterned surface (visual and tactile) which may hinder the removal of soil from the surface.

POROUS
MATERIAL REVIEW REQUIREMENTS

Materials must meet the requirements for the zone in which they are located.

Materials are reviewed against the FDA Guidelines.
Corrosion Resistant

Materials shall be **corrosion resistant** in their intended end use environment

**CORROSION RESISTANT**: Maintains surface characteristics under prolonged contact with:

a) Intended environment
b) Exposure to cleaning and sanitizing solutions
Toxicity

Materials in the food zone shall not contain arsenic, cadmium, lead, or mercury as intentional ingredients.
Brass and Bronze

- Brass and bronze may be used in a food zone or splash zone only where rendered corrosion resistant or;

- where exposure to food is clearly and specifically limited to water, coffee, or tea.
Wood

- Wood shall not be used in a food zone except as permitted by NSF/ANSI 2 for cutting boards and bakers tables.
- When used for nondecorative purposes (i.e., structural), wood shall be totally encapsulated so as not to be exposed.
- When used for decorative purposes, wood shall be sanded smooth and sealed with a sealant meeting the requirements of the zone of intended use. Decorative wood shall not be used on surfaces exposed to moisture or wear.
# BASIC MATERIAL REQUIREMENT SUMMARY

<table>
<thead>
<tr>
<th>Zone</th>
<th>Nontoxic</th>
<th>Smooth</th>
<th>Easy to Clean</th>
<th>Corrosion Resistant</th>
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<tbody>
<tr>
<td>F</td>
<td>Required</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>S</td>
<td>No Requirement</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>No Requirement</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
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Performance

• Temperature maintenance
• Clean in place cleaning test
• Lead content
• Organic coating tests
• Thermometer accuracy test
• Corrosion resistance testing for shelving
Q&A
THANK YOU.

SPEAKER NAME
SPEAKER TITLE