



CELEBRATING
25 YEARS
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MAGAZINE

Foundational Imperatives:

Sanitary Design in Retail & Restaurant
Facilities

Speakers:

Sam Cole & Steven A. Lyon

Moderator: Robert Prevendar

Right knowledge & behaviors

Keys to Food
Safety Success

Right equipment
& environment

Start with safe ingredients



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It all begins @ the drawing board...



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Session Agenda:

1. Facility Design
2. Equipment Design
3. Q & A





Who Are You?



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25 YEARS

Our Speakers:

Sam Cole

Director, Product Certification –
Equipment & Chemical Evaluation
NSF International



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Our Speakers:

Steven A. Lyon PhD

Director, Food Safety – Field Operations
Chick-fil-A, Inc.



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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

Who is Design Crucial for?

- Operators
- Team Members
- Guests

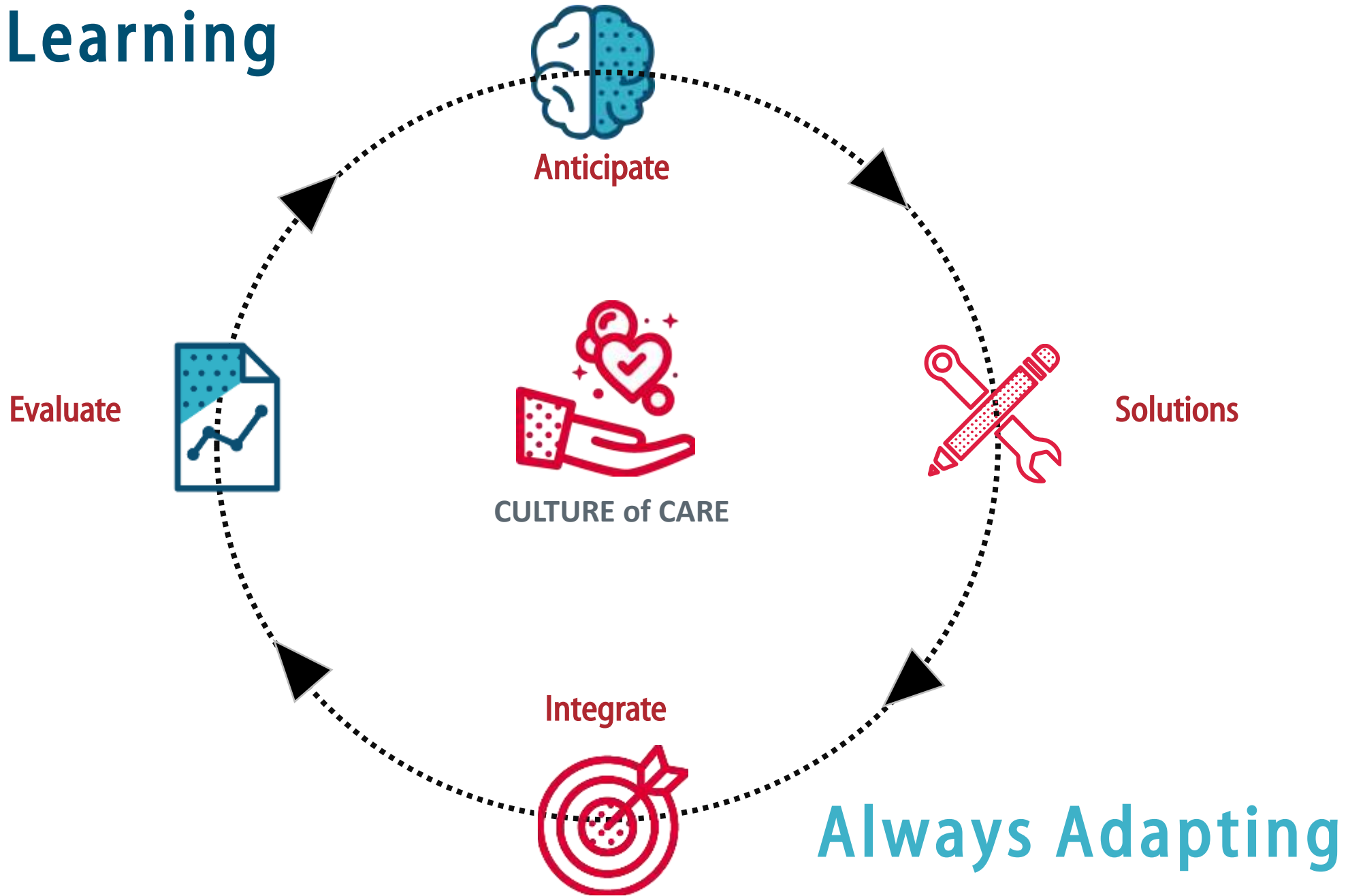
What is Design Crucial for?

- CARE
- Capacity
- Convenience

Safety is an intrinsic need for everyone, and everyone deserves being cared for



Always Learning



Restaurant Design – 3 Focus Areas to Reduce Cross-Contamination

Reduce Raw Chicken Footprint

- Thawing
- Handling
- Breeding



Isolate RTE from Raw

- Design for barriers
- Risk based



Dedicated Production and People

- Food processing plant mindset





Cross-Contamination

Leverage Restaurant Design/Food Flow to Reduce Raw Footprint

SERVICE ←

RECEIVING →

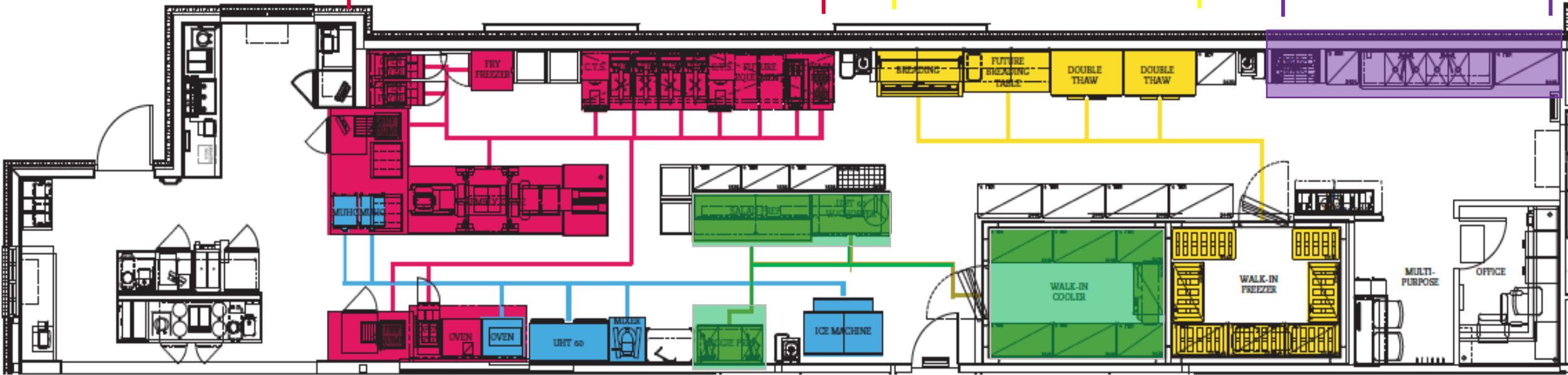
RTE Assembly

Raw Chicken

Dish wash

Beverage

Produce Prep



EQUIPMENT DESIGN PRINCIPLES & STANDARDS

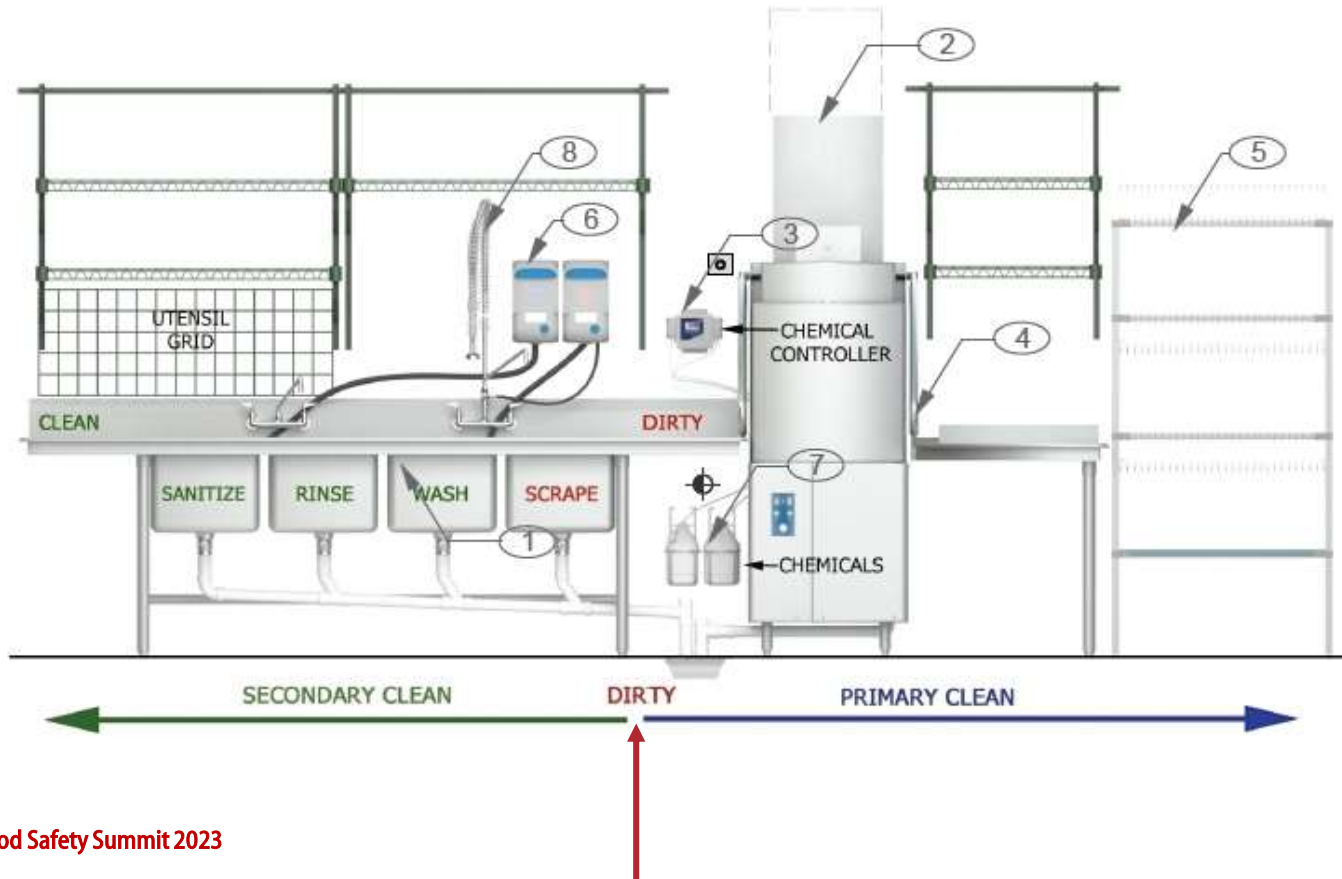
DISHWASHING EQUIPMENT

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



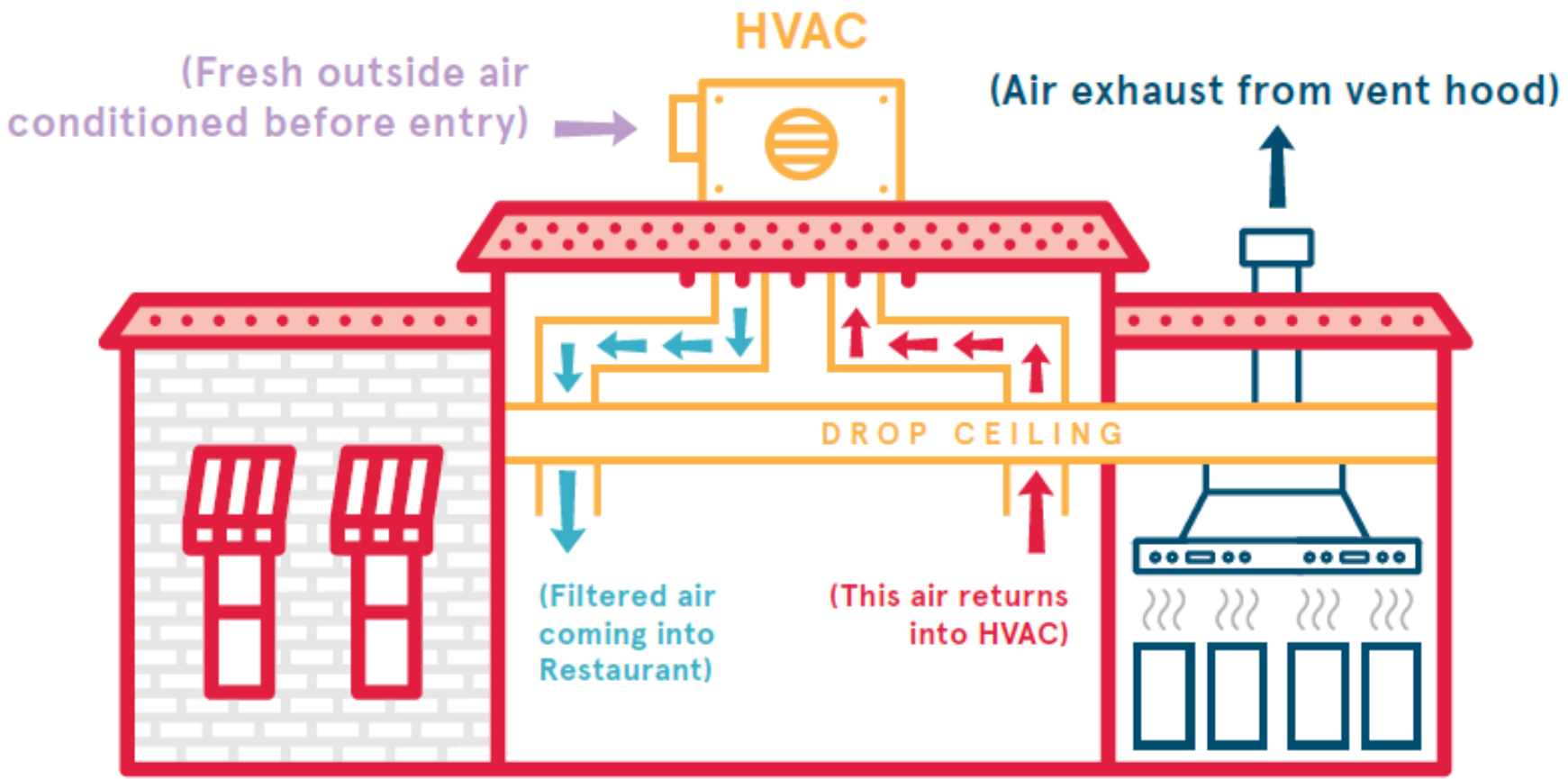
SARS-CoV-2
Influenza A & B
RSV



Tuberculosis

Restaurant HVAC System and Air Circulation

...



INSIDE VIEW

- 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**.

Nursing

Area designation	Air movement relationship to adjacent area ²	Minimum air changes of outdoor air per hour ³	Minimum total air change per hour ^{4,5}	All air exhausted directly to outdoors ⁶	Recirculate by means of room units
Patient room	-	2	6 ¹⁶	-	-
Toilet room	In	-	10	Yes	-
Newborn nursery suite	-	2	6	-	No
Airborne infection isolation room ^{17, 18}	In	2	12	Yes ¹⁵	No
Airborne infection isolation room ^{17, 18}	In	2	12	Yes ¹⁵	No
Isolation alcove or anteroom ^{17, 18}	In/Out	-	10	Yes	No
Labor/delivery/recovery	-	2	6 ¹⁶	-	-
Labor/delivery/recovery/postpartum	-	2	6 ¹⁶	-	-
Patient corridor	-	-	2	-	-

[Top of Page](#)

*Taken from www.cdc.gov

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).

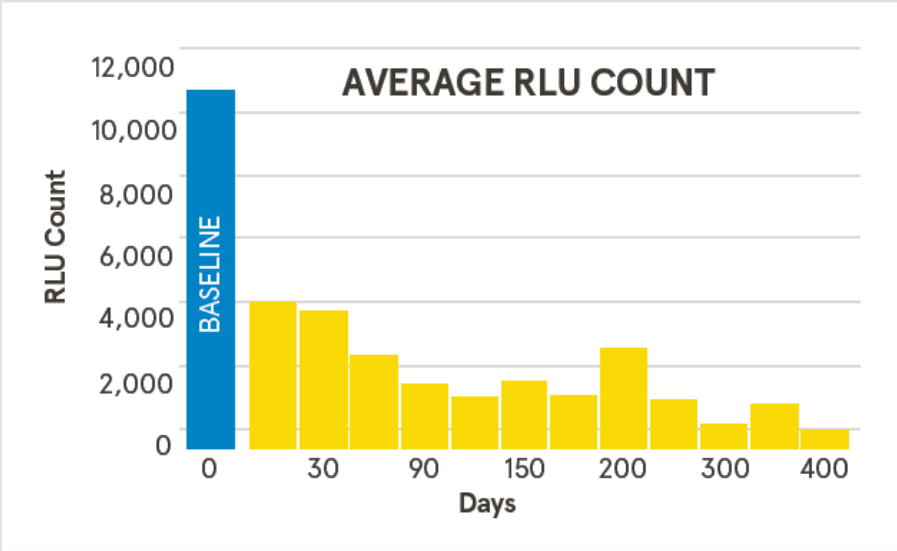
RESULTS*:

- 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)

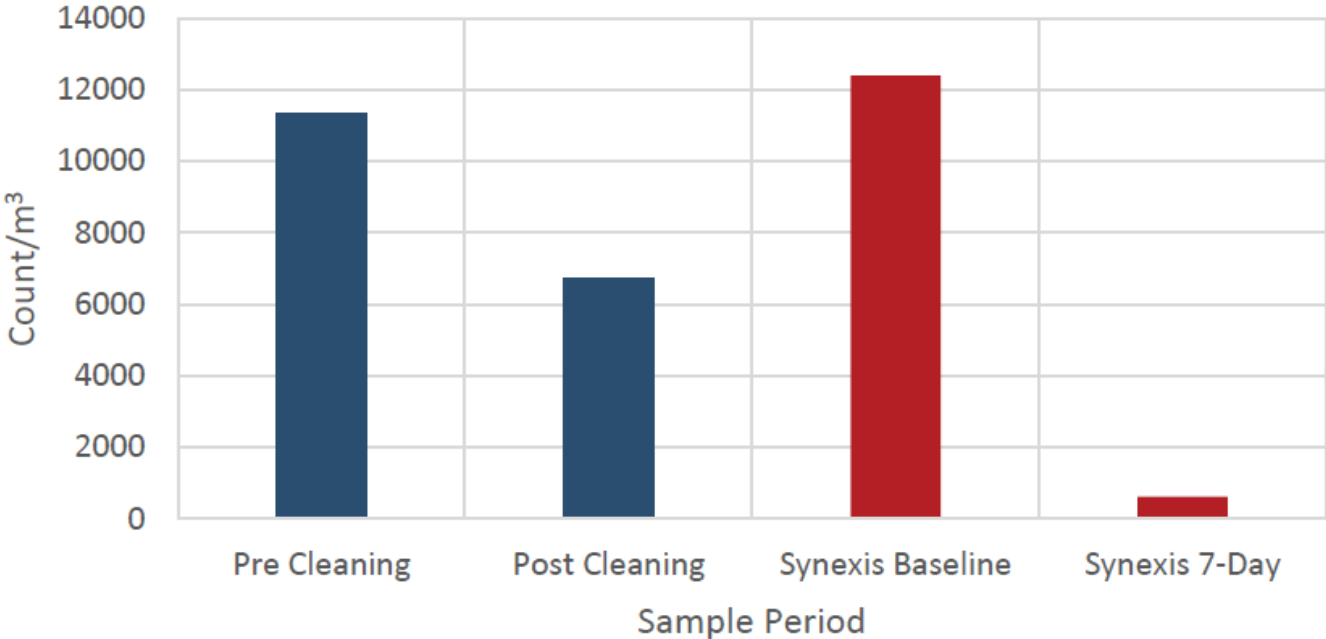
Measurement	Baseline	Day 150
CFU	13.6	4.3
RLUs	15,142	1,698



Adjunct Air Systems – Mold Remediation

Results

Total Restaurant Fungi Count



	Baseline Count/m ³	7-Day Count/m ³
Ascospores	57	0
Aspergillus	9,427	540
Basidiospores	1,313	80
Cladosporium	1,583	0
Epicoccum	13	0
Myxomycetes	13	0
Total	12,407	620

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



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

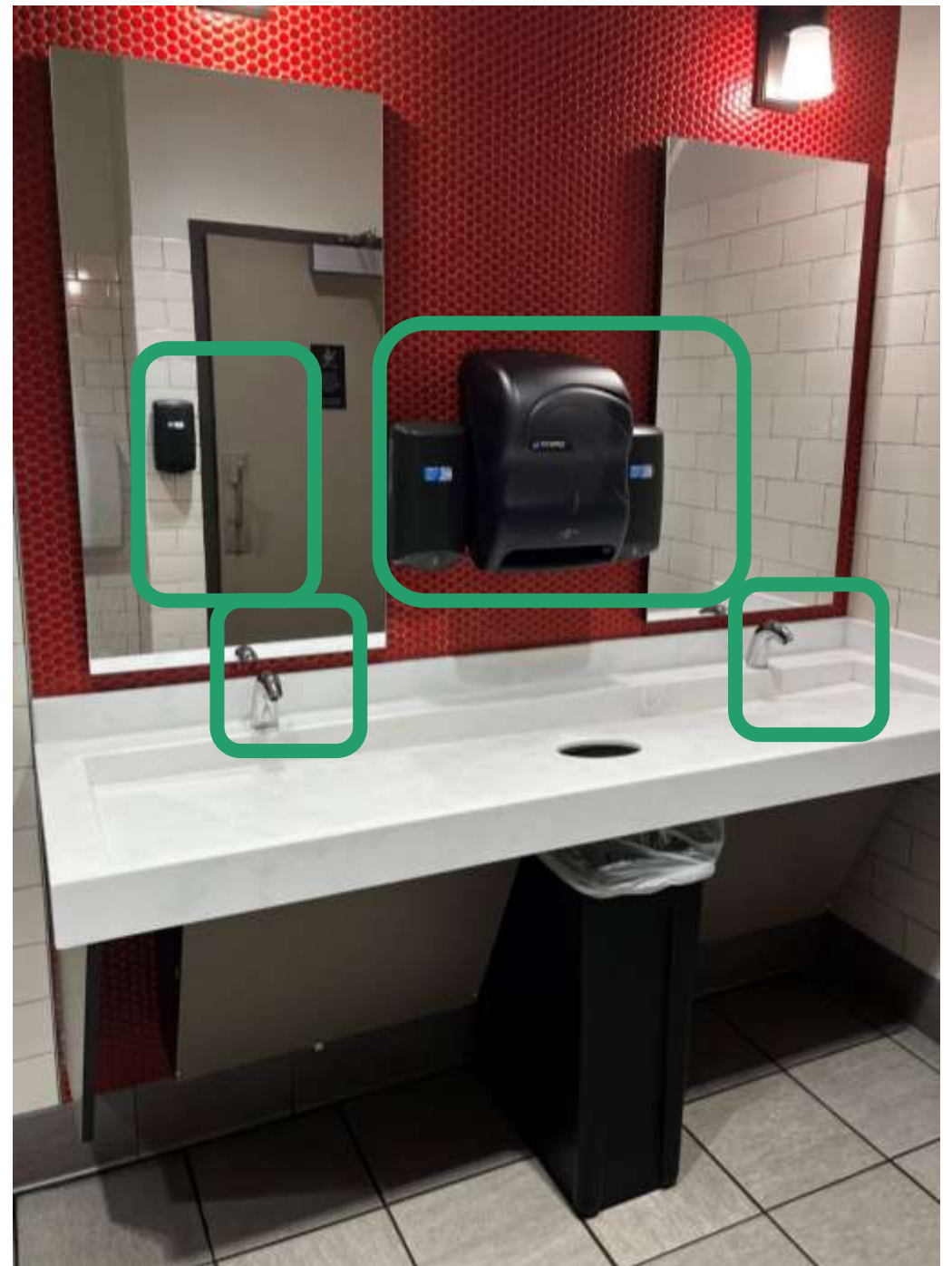
Data based on Norovirus – [Duret et. al \(2017\)](#) & [Fanasalle et. al](#)



High Risk – many touch points



Low Risk – minimal touch points



Our Speakers:

Sam Cole

Director, Product Certification –
Equipment & Chemical Evaluation
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May 2023



Food Safety Summit

Foundational Imperatives—Sanitary Design in Retail and Restaurant Facilities

Sam Cole

Global Director, Product Certification – Equipment & Chemical Evaluation

OUR FOUNDATION

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In 1944,

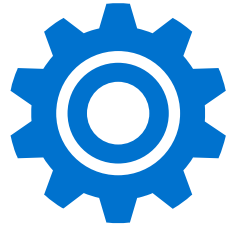
NSF was founded as the National Sanitation Foundation in the University of Michigan's School of Public Health.



Today,

we are NSF, with headquarters in Ann Arbor, MI, USA, and 53 office and lab locations worldwide.

BRINGING INDUSTRY, REGULATORS AND CONSUMERS TOGETHER



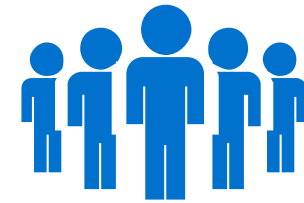
INDUSTRY

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



TYPES OF ZONES

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



FOOD
ZONE



SPLASH
ZONE



NON-FOOD
ZONE

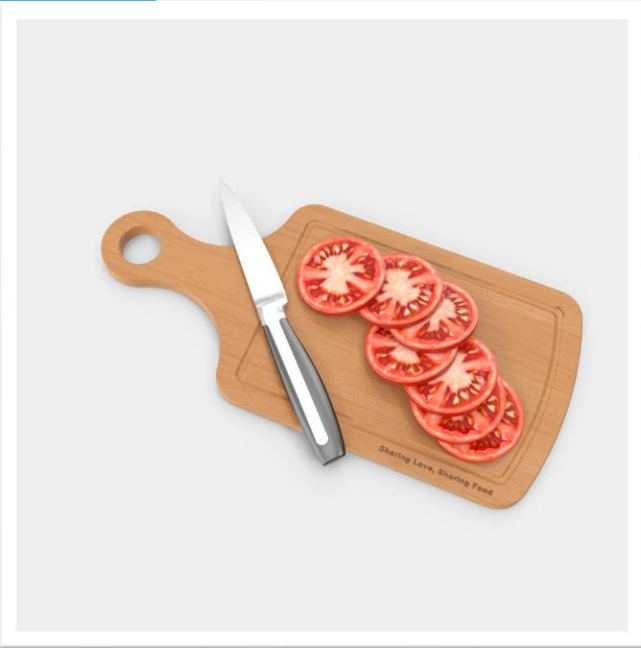


UNEXPOSED NON-FOOD
ZONE



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

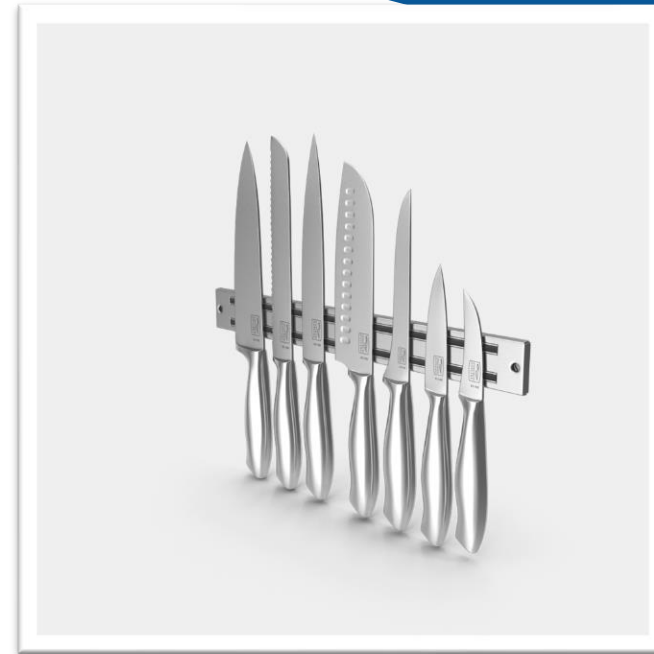


SPLASH ZONE

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



EXTERIOR SURFACE OF REACH IN
REFRIGERATOR

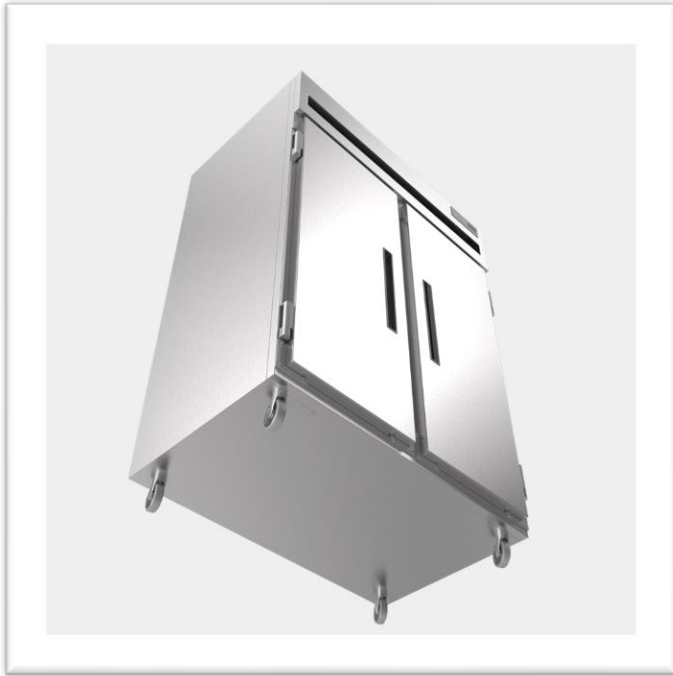


KNIFE / UTENSIL HANDLES



NONFOOD ZONE

Exposed surfaces other than those in a food or splash zone.



UNDERSIDE OF EQUIPMENT / TOP SURFACES OF TALL EQUIPMENT



CASTERS

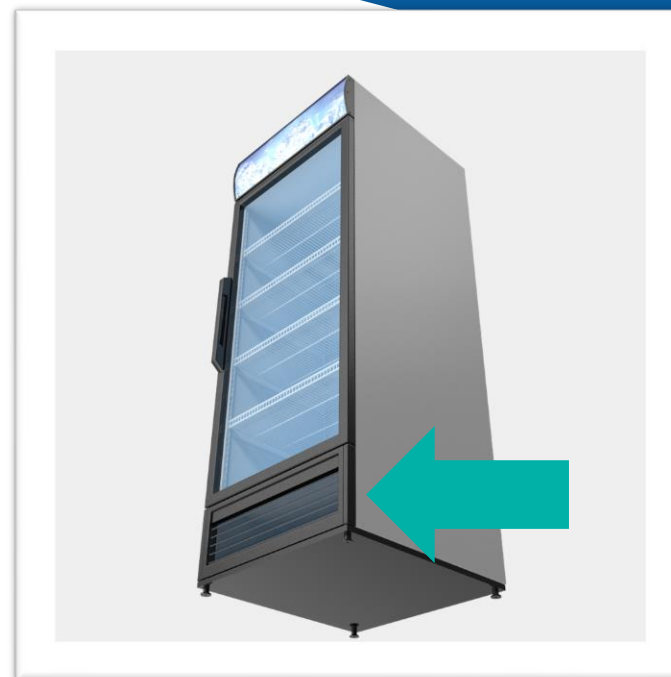


UNEXPOSED NONFOOD ZONE

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

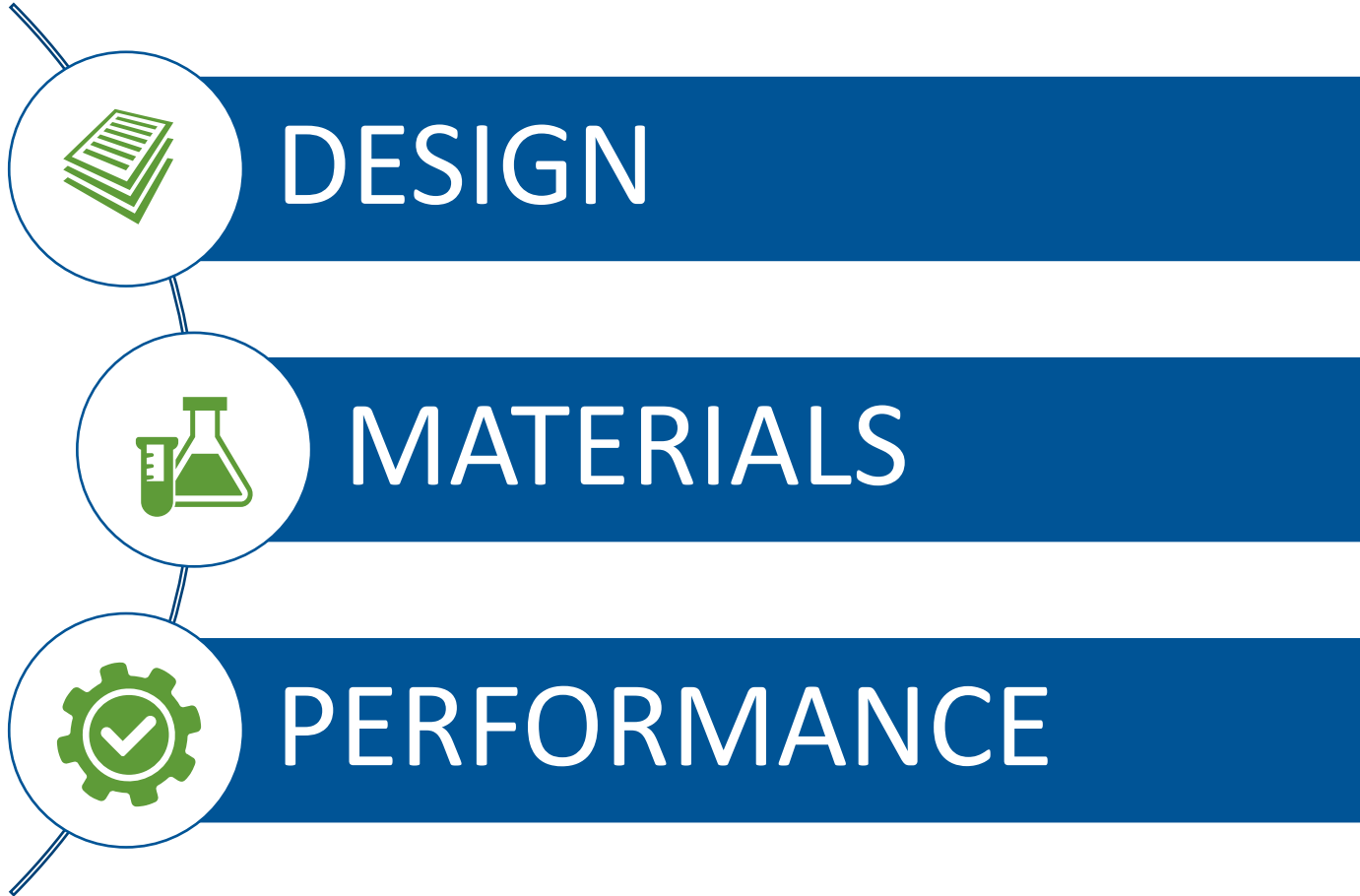


**AREAS ONLY ACCESSED FOR
MAINTENANCE**



**ENCLOSED CONDENSER
COMPARTMENTS**

REQUIREMENTS

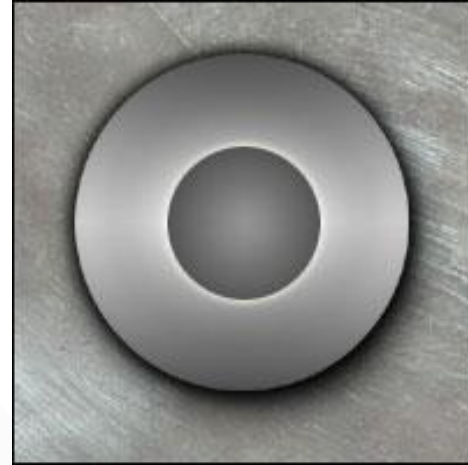
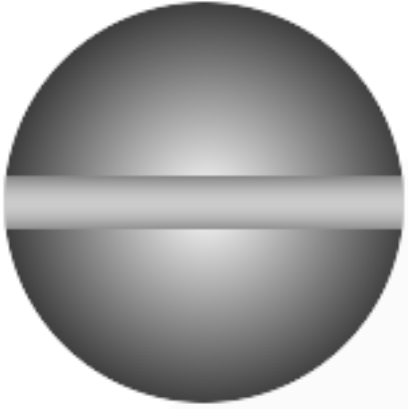


Design Requirements

- 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



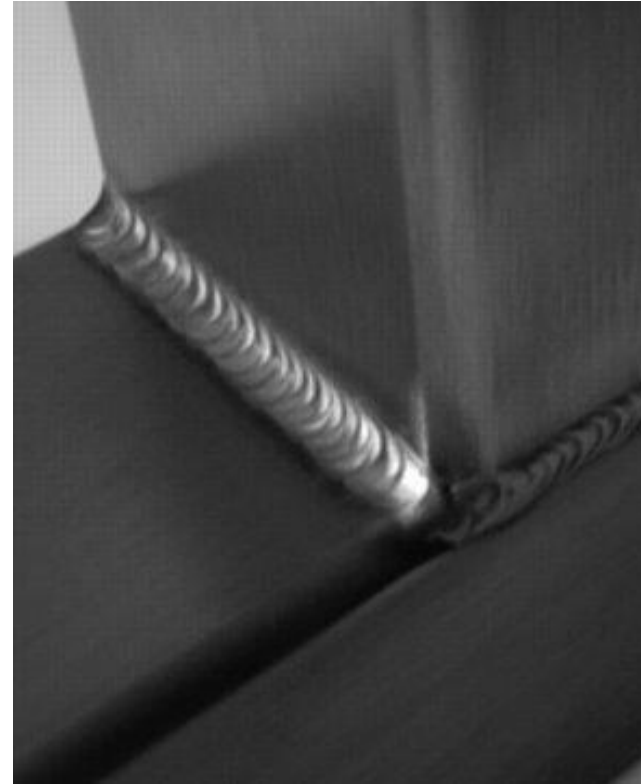
Unsealed Seams



WELDED SEAM



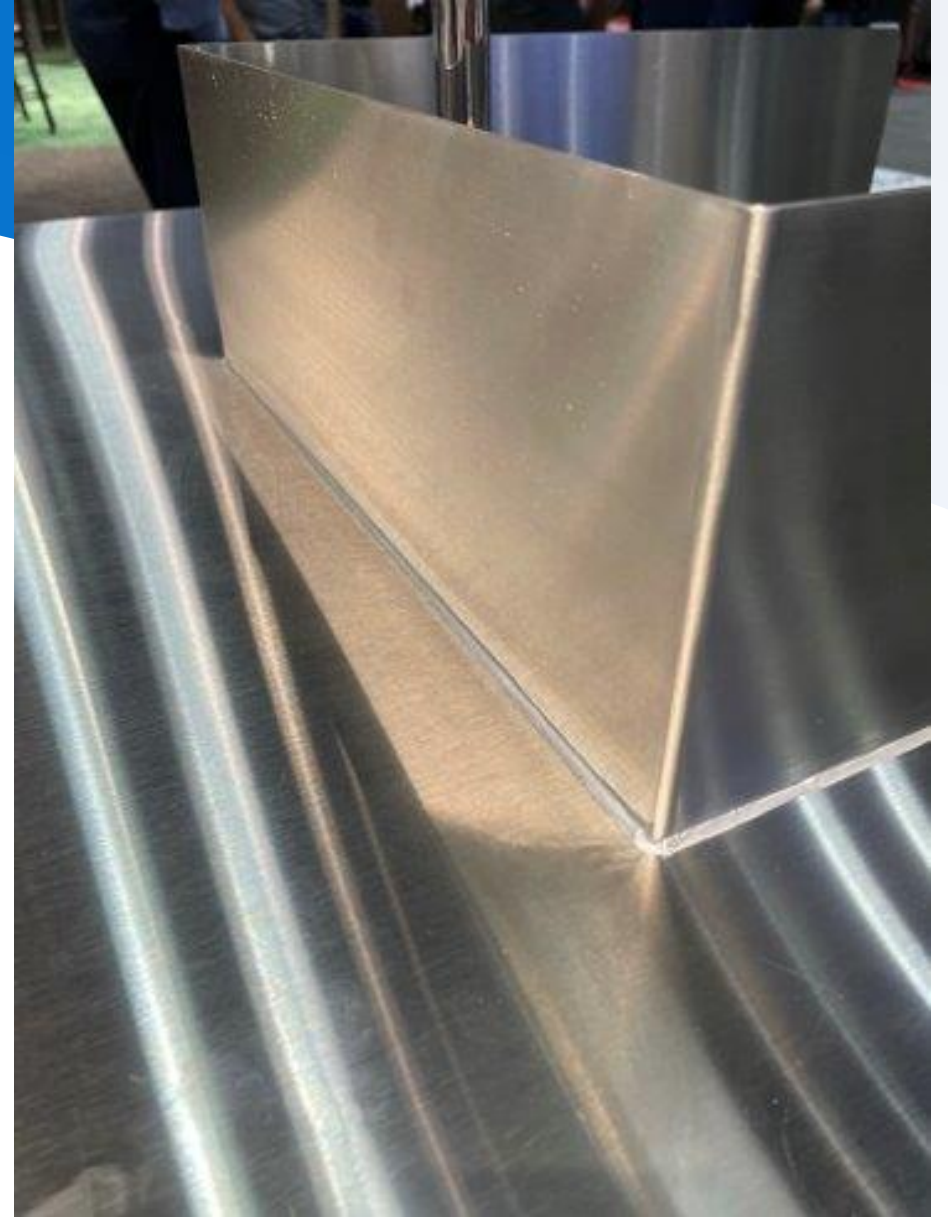
Sealed but not smooth






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



Basic Design and Construction Requirement Summary

ZONE	ACCESSIBILITY	RADIUS	FASTENERS	EXPOSED THREADS	SEAMS
	Without tools	Required	Not permitted	Not permitted	Sealed
	With tools	Not required	Easily cleanable	Not permitted	Sealed
	With tools	Not required	Easily cleanable	Limited	Closed

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



21 CFR
& FCN

GRAS

TOR



Corrosion Resistant

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

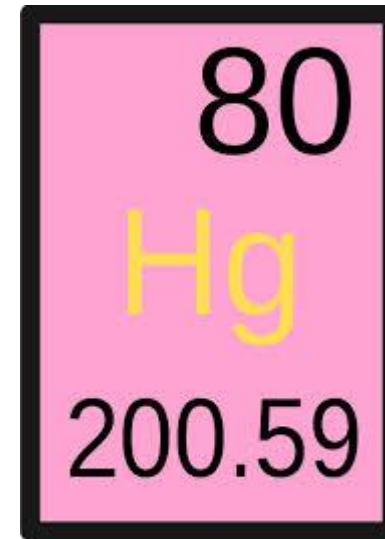
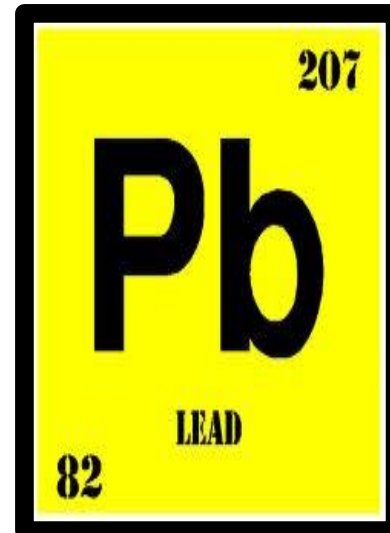
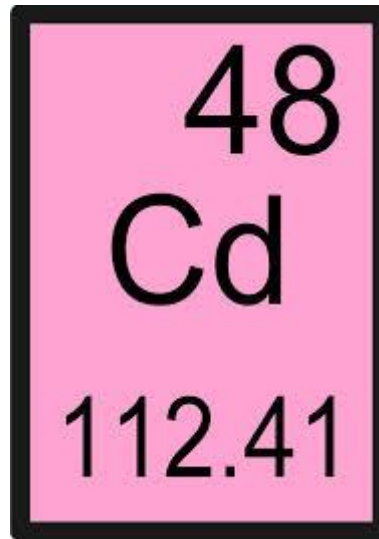
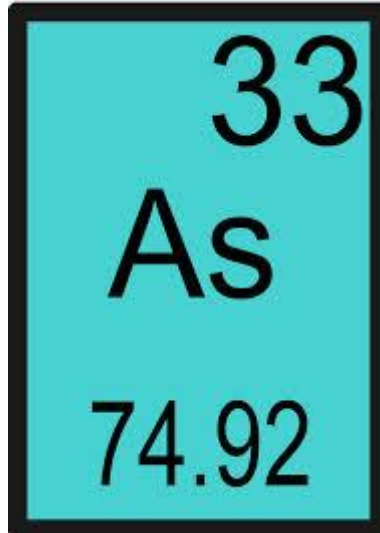


CORROSION RESISTANT: Maintains surface characteristics under prolonged contact with:

- 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

Zone	Nontoxic	Smooth	Easy to Clean	Corrosion Resistant
	Required	Yes	Yes	Yes
	No Requirement	Yes	Yes	Yes
	No Requirement	Yes	Yes	Yes

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