Cleaning Equipment Maintenance:
Ensuring that your tools remain safe and effective

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Global Hygiene Specialist

20 YEARS
OF FULLY COLOUR CODED CLEANING TOOLS

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Why is cleaning & maintenance important?

Regulatory & Standard requirements

- Improves food safety, quality and shelf-life
- Minimises the risk of product rejection and recall
- Minimises the risk and cost of prosecution
- Protects/improves company reputation and income
- Reduces waste
- Associated cost savings

Cleaning & maintenance

Regulatory requirement:

Food Safety Modernization Act

Critical Sanitation requirements have been upgraded from mere GMPs to Preventive Controls requiring greater accountability.

Title **21 CFR Part 117** contains Preventive Control for Human Foods (PCHF) Requirements for FDA regulated facilities.

- https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfCFR/CFRSearch.cfm?CFRPart=117

- **21 CFR § 117.135**, (c)(3): *"Sanitation controls include procedures, practices, and processes to ensure that the facility is maintained in a sanitary condition adequate to significantly minimize or prevent hazards such as environmental pathogens, biological hazards due to employee handling, and food allergen hazards."*

Regulation (EC) No. 852/2004 (29 April 2004)

CHAPTER I: General requirements for food premises.

- 1. Food premises are to be kept clean and maintained in good repair and condition.
- 2. The layout, design, construction, siting and size of food premises are to:
  - (a) permit adequate maintenance, cleaning and/or disinfection, avoid or minimise air-borne contamination, and provide adequate working space to allow for the hygienic performance of all operations;
  - (b) be such as to protect against the accumulation of dirt, contact with toxic materials, the shedding of particles into food and the formation of condensation or undesirable mould on surfaces;
  - (c) permit good food hygiene practices, including protection against contamination and, in particular, pest control.

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US Regulatory requirements:

Title **9 CFR 416** contain sanitation requirements for FSIS Meat and Poultry establishments.

- https://www.ecfr.gov/cgi-bin/text-idx?node=pt9.2.416&rgn=div5

- **9 CFR § 416.6:** "*When an FSIS program employee finds that any equipment, utensil, room, or compartment at an official establishment is insanitary or that its use could cause the adulteration of product, he will attach to it a "U.S. Rejected" tag. Such tagged items cannot be used until made acceptable. Only an FSIS program employee may remove a "U.S. Rejected" tag."*

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EU Regulatory requirements:

Regulation (EC) No. 852/2004 (29 April 2004)

CHAPTER 2: Specific requirements in rooms where foodstuffs are prepared, treated or processed.

1. (f) surfaces (including surfaces of equipment) are to be maintained in a sound condition and be easy to clean and, where necessary, to disinfect.
2. Adequate facilities are to be provided, where necessary, for the cleaning, disinfecting and storage of working utensils and equipment.

Cleaning equipment maintenance?

Cleaning equipment can be a major source of contamination

CampdenBRI[1]

- Survey of cooked product areas for Listeria monocytogenes - 10,000 samples
- Production equipment - very low
- Floors - 17% positive
- Drains - 25%
- Cleaning equipment - 47%

1. Holah, J.T. (1998). Effective microbiological sampling of food processing areas. Guideline No. 20, Campden & Chorleywood Food Research Association.

Cleaning equipment maintenance

Regulatory requirement:

- Oct 2020
  - **FDA warning letter** issued to food manufacturer highlighting critical food safety violations including the improper movement and use of an **unclean broom** from a wet cooler passageway to a ready-to-eat **(RTE) food production area**.
  - **Whole genome sequencing traced *Listeria monocytogenes*** found in the RTE area back to the broom.
  - FDA concluded that the food manufacturer **did not clean and sanitize their utensils and equipment in a manner that protected against contamination of food**, food-contact surfaces, or food-packaging materials.

https://www.foodsafetynews.com/2020/11/two-california-food-companies-warned-over-violations/

https://remcoproducts.com/how-to-keep-cleaning-tools-from-becoming-vectors-of-contamination/

Cleaning equipment maintenance

Food safety scheme requirements:

SQF

Sections 10.2.9.2 & 10.2.9.8

- Equipment and utensils shall be designed, constructed, installed, operated, and maintained so as to meet any applicable regulatory requirements and not pose a contamination threat to product.
- All equipment, utensils and protective clothing shall be cleaned after use or at a frequency to control contamination and stored in a clean and serviceable condition to prevent microbiological or cross-contact allergen contamination.

FSSC 22000

Clause 11.3 Cleaning and sanitising programmes:

- Cleaning and sanitising programmes shall be established and validated by the organisation to ensure that all parts of the establishment and equipment are cleaned and/or sanitised to a defined schedule, including the cleaning of cleaning equipment.

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Cleaning equipment maintenance

Food Safety scheme requirements:

IFS Food Code

- Section 4.10 Cleaning and disinfection:
  - 4.10.6 The intended use of cleaning utensils shall be clearly identified. Cleaning utensils shall be used in a way to avoid contamination.
- Section 4.16 Maintenance and repair
  - 4.16.1 An adequate system of maintenance shall be in place, maintained and documented, covering all critical equipment

BRCGS v.8

- Section 4.11.6
  - Cleaning equipment shall be cleaned and stored in a hygienic manner to prevent contamination.

Cleaning equipment maintenance

Equipment selection

Hygienic design:

Something that is easy to clean

Good hygienic design principles*

- No sharp internal angles
- All areas accessible for easy cleaning and disinfection
- Avoid deep recesses, nooks and crannies
- Of one-piece construction, or quickly and easily dismantled / re-assembled
- Smooth surface finish
- Made of appropriate materials
  - Durable; Food contact compliant

*EHEDG Guideline 8 "Hygienic Equipment Design Criteria" https://www.ehedg.org/guidelines/free-documents/

Cleaning equipment maintenance

Equipment selection:

BRCGS

- Section 4.11.6.
- Cleaning equipment shall be:- hygienically designed and fit for purpose

FSSC 22000

- ISO/TS 22002-1:2009 - Part 1: Food manufacturing
- 11.2 Cleaning and sanitising agents and tools: ‘Tools and equipment shall be of hygienic design

The Consumer Goods FORUM GFSI

New GFSI Benchmarking requirements on Hygienic Design

- https://mygfsi.com/news_updates/built-in-hygiene-from-farm-to-fork-an-update-from-the-gfsi-technical-working-group-on-hygienic-design/
- https://www.ehedg.org/ehedg/new-gfsi-hygienic-design-benchmarking-requirements/

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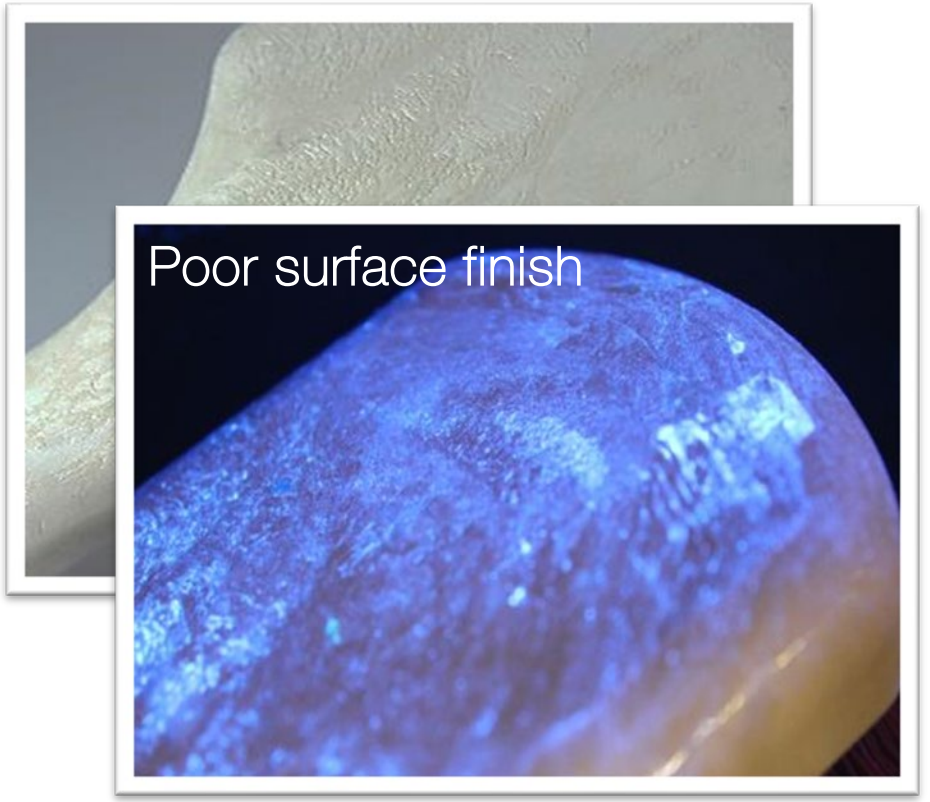
Bad hygienic design

Biofilm build-up under the screw thread handle fixing

Site-made floor scraper contamination traps / difficult to clean



UV gel ‘contamination’ trapped in surface defects after cleaning

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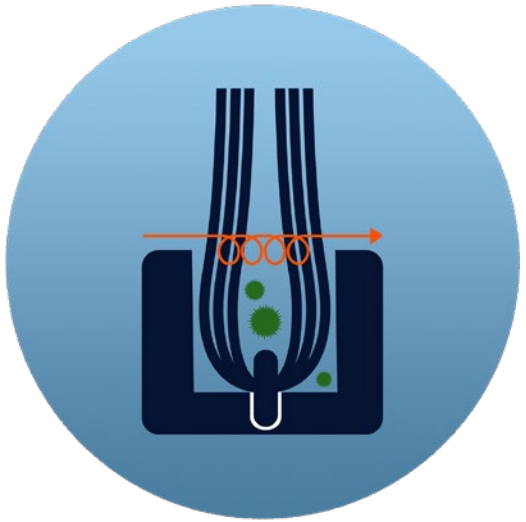
Cleaning equipment maintenance

Good hygienic design

Fully moulded construction



Drilled & stapled

UST

Cleaning equipment maintenance

Preparation for first use

- Most cleaning equipment is not decontaminated before it is sent to the user
- Equipment may be contaminated with:
  - micro-organisms
  - chemical residues (inc. allergens)
  - foreign bodies
- All cleaning equipment should be decontaminated, as appropriate to its future use, before use

Remove all labels!

Cleaning equipment maintenance

Risk Assessment

Identify Hazards and determine risks (Likelihood x severity) - based on knowledge, experience and any available information/data.

- Type of food product/environment
  - wet
  - dry
- Type of clean
  - interim
  - daily
  - weekly
  - periodic deep clean
- Type of consumer
  - infants
  - elderly
  - allergic
  - health compromised
- What is being cleaned
  - environmental surface
  - food contact surface
- Type of contamination (hazard)
  - microorganisms
  - foreign bodies
  - product residues (inc. allergens)
  - chemical residues
- Risk level of the food being produced
  - low risk
  - high care
  - high risk
  - ambient stable

Cleaning equipment maintenance

Hazard identification

A **Hazard** is a biological, physical, or chemical agent that has the potential to cause harm.

Example:

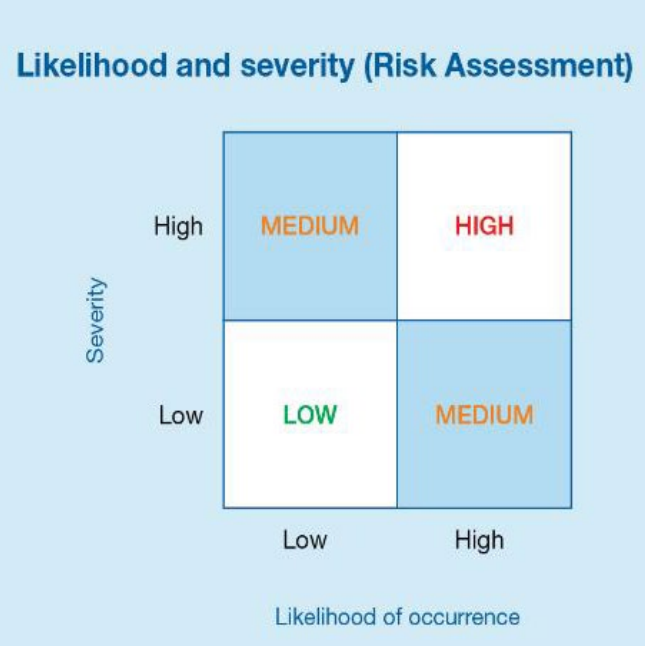
- How do I clean a soft bristled brush used to clean product contact surfaces in a dry baby food production area?

- Identify the possible **hazards** associated with the cleaning activity
  - Physical – brush bristles
  - Chemical – allergens; toxins from inappropriate materials of construction; cleaning chemicals.
  - Microbiological – harmful microbes that can survive in dry environments - *Cronobacter spp. Salmonella, Bacillus cereus*

Cleaning equipment maintenance

Determine risk

The risk associated with each hazard is determined by comparing the **Likelihood** of the hazard occurring with the **Severity** if it does.



Examples:

Hazard – brush bristles
Likelihood – brushes are used throughout production; dependent on quality & maintenance
Severity – choke hazard for infants

Hazard – Allergen cross-contamination
Likelihood – brushes used throughout production;
Severity – severe reaction/death for sensitive infants

Hazard – Toxins from non-food contact compliant materials
Likelihood – brushes used throughout production;
Severity – severe reaction/death for sensitive infants

Hazard – *Salmonella*
Likelihood – carried by people; can survive for a long time in a dry product/environment;
Severity – severe illness/death in infants

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Implement controls

Controls are any action and/or activity that will prevent or eliminate a food safety hazard or reduce it to an acceptable level.

There may be more than one control.

Priority should be given to the control of the high-risk scenarios identified

Examples:

- Physical – brush bristles
  - Use of high quality brushware
  - Regular inspection and replacement
  - Use of sieves to remove bristles
- Allergen cross-contamination
  - Use brushes of a different colour for allergen cleaning
- Material toxins
  - Use brushes made of suitably food contact compliant materials
- Microbiological – *Salmonella*
  - Personal hygiene policy
  - Regular cleaning & disinfection, or replacement of the brush
  - Use of hygienically designed brushware

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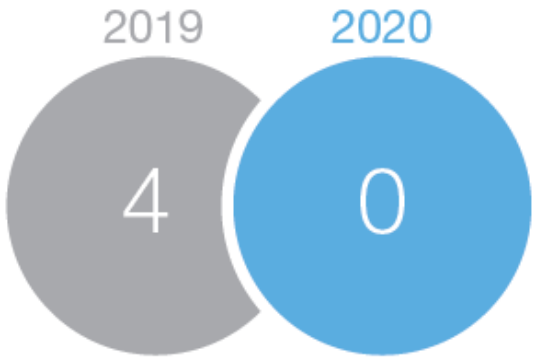
Hazard control

Industry case study: Bristle control

Nestle has always been at the forefront of safe and high-quality food production. One of the challenges they, and many others in the food industry, face is the control of plastic foreign bodies in the product. A potential source of these foreign bodies are the bristles of plastic cleaning brushes.

By using Vikan UST-brush products in a Nestle factory in Germany, the risk of such foreign bodies has been largely eliminated.



Bristle incidence in product

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Implement controls

Cleaning & disinfection: General principles

Wet cleaning

- Hosing down
- Immersion in a ‘detergent/sanitiser bath’
- Immersion in detergent/sanitiser bath, followed by agitation or scrubbing
- Use of an automated washing system, e.g., tray/equipment washer; industrial dishwasher or washing machine

Dry cleaning

- Brushed, knocked, shaken to remove gross debris & replace regularly, or when no longer fit for purpose.
- Not cleaned - thrown away after first use

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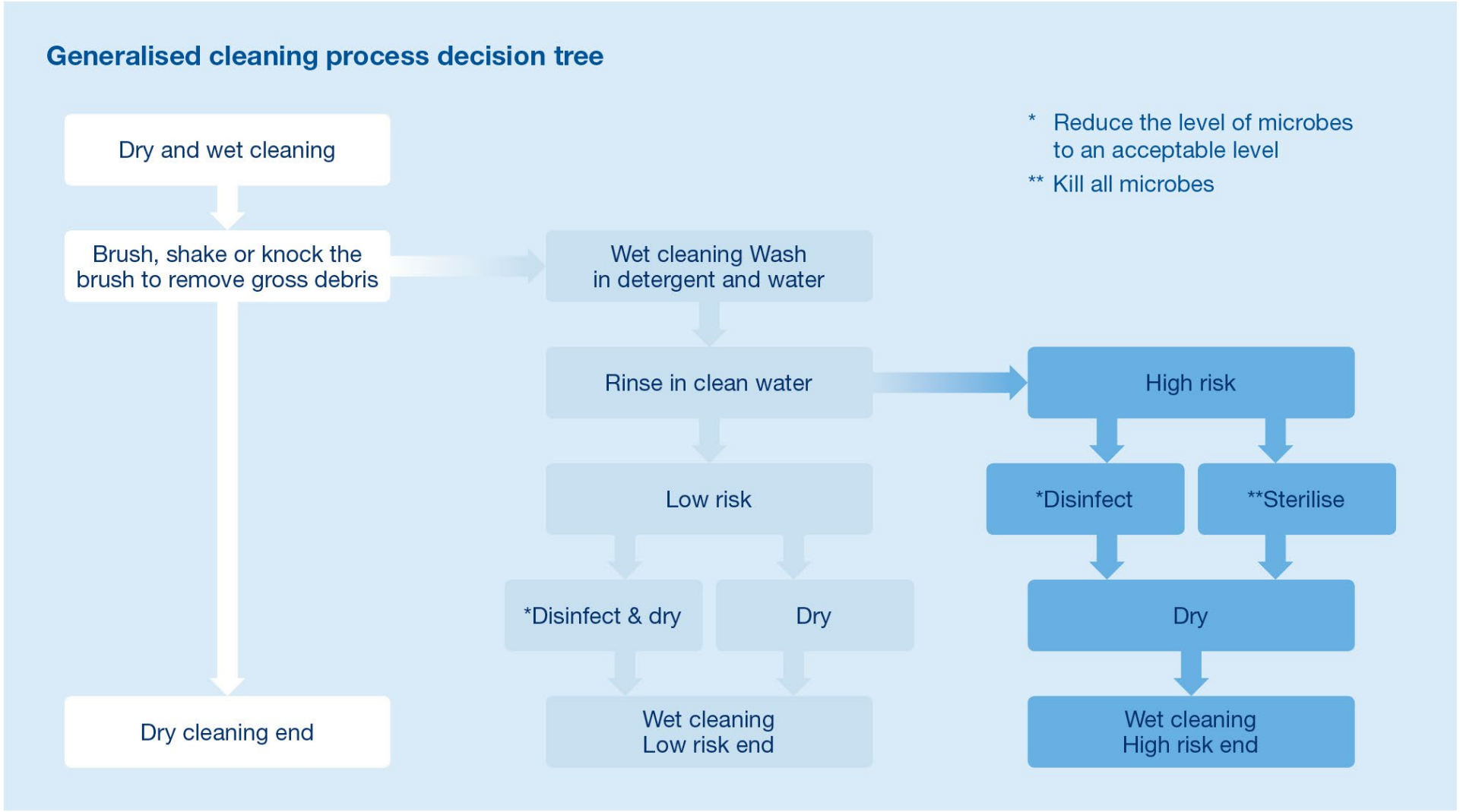
Cleaning & disinfection



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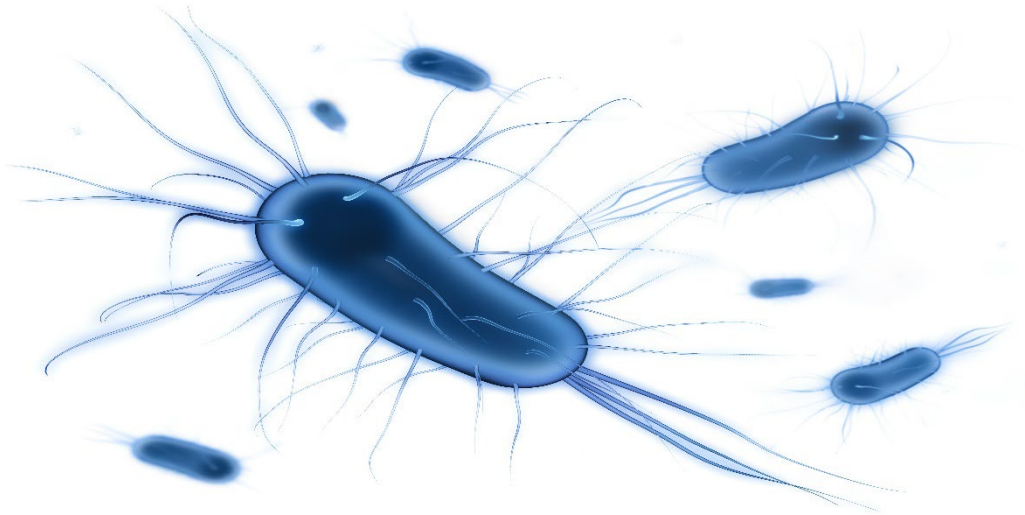
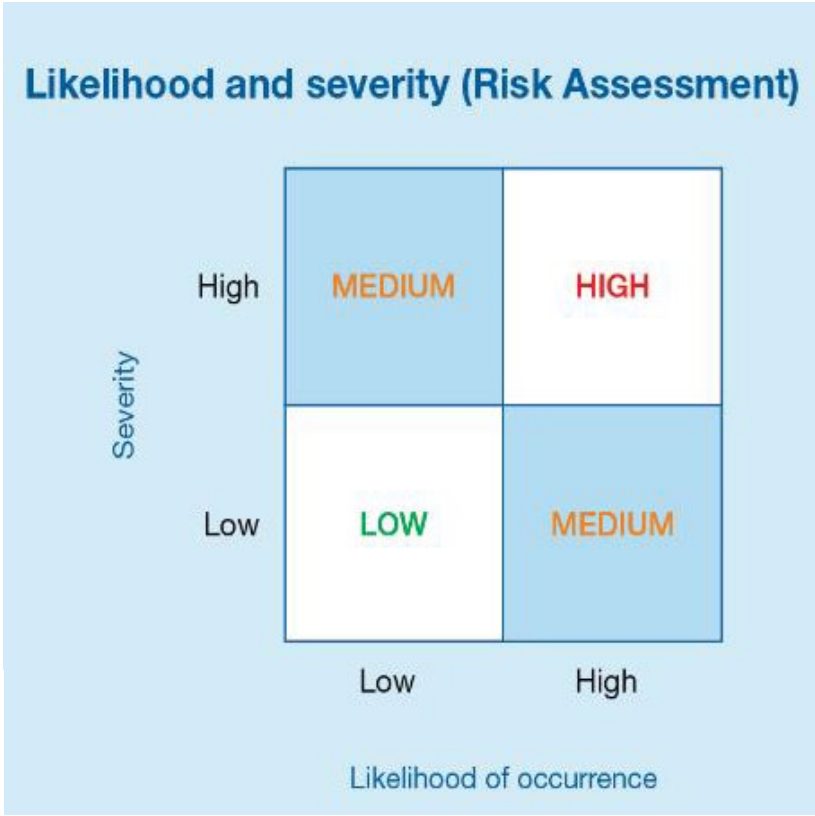
Cleaning & disinfection

Risk assessment identified *Salmonella* contamination of brushware used for cleaning in a dry infant formula production plant as a high risk.

The risk of *Salmonella* growth and spread is increased by the presence of water.





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Cleaning & disinfection

What would you do?

Dry cleaning?

- Brush, knock, or shake the brush after use to remove loose dry debris, & replace it regularly
- Dry clean it and replace it when it was no longer fit for purpose – worn, clogged
- Use it once and it throw away,

Wet cleaning?

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Cleaning equipment maintenance

Cleaning & disinfection

What would you do?

Wet cleaning

- Manual cleaning in water containing a detergent/sanitiser
- Use an automated washing system, e.g., tray / equipment washer or an industrial dishwasher.
- Use an industrial washing machine.

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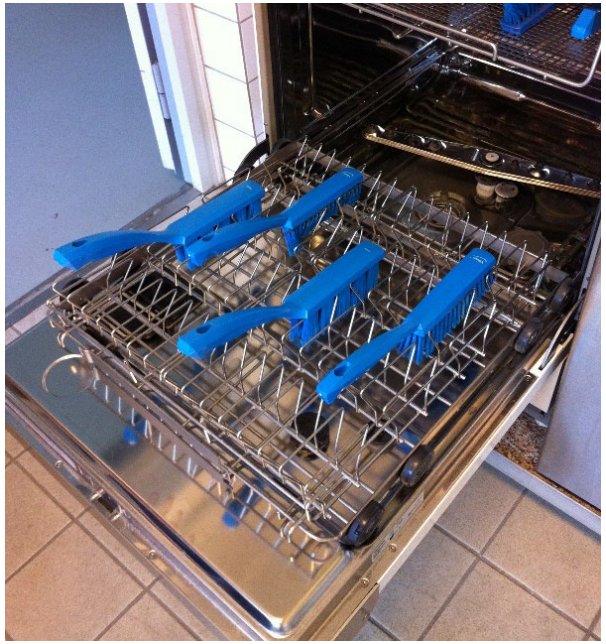
Cleaning equipment maintenance

Cleaning & disinfection

Chemical disinfection

- Followed by thorough rinsing

Thorough drying (hot cabinet / oven)



To ensure disinfection and aid equipment drying use a hot water final rinse, rinse aid, and open dishwasher asap after cleaning programme is complete.
Note: Dishwasher jets may cause some deformation of soft bristles

https://www.linkedin.com/posts/kurt-fryer-5411236_haccp-foodsafetyandhygiene-electroluxprofessional-activity-6660535624031965184-yZP9
Includes a thermal disinfection step that also aids equipment drying

Cleaning equipment maintenance

Validation, Monitoring and Verification

FSSC 22000

Clause 11.3 Cleaning and sanitising programmes:

- Cleaning and sanitising programmes shall be established and **validated** by the organisation …..including the cleaning of cleaning equipment.

Clause 11.5 - Monitoring sanitation effectiveness:

- Cleaning and sanitation programmes shall be **monitored** at frequencies specified by the organisation to ensure their continuing suitability and effectiveness.

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Cleaning equipment maintenance

Validation

Development of a consistently effective and appropriate method of cleaning equipment decontamination.

Different methods may need to be developed for different types of cleaning equipment or for the same type of cleaning equipment used for different tasks

The method development may require a degree of trial and error to determine a consistently effective method that achieves the level of decontamination required

https://www.ehedg.org/working-groups/working-group-clusters/cleaning-validation/

Each different method should detail the,

- cleaning equipment (types and usage) that the method is suitable for
- cleaning and disinfection chemicals to be used (water, detergent, disinfectant, supplier name, product code, temperature, concentration and contact time of chemicals)
- decontamination equipment to be used, e.g., brush, tray washer
- decontamination method/actions, e.g.,scrubbing, rinsing
- decontamination frequency, e.g., daily, weekly
- level of decontamination required and how this is measured and recorded

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Cleaning equipment maintenance

Monitoring

The use of methods that determine whether the validated cleaning methods have been conducted effectively, in a time frame that allows for rapid detection and correction of any shortfall in the decontamination achieved.

Should shortfalls be identified, the decontamination procedure can be repeated immediately until the desired level is achieved.

Examples of monitoring methods include,

- Visual inspection
- Adenosine Tri-Phosphate (ATP) rapid detection sampling swabs
- Protein rapid detection sampling swabs
- Allergen rapid detection Lateral flow sampling devices

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Verification

The use of methods, in addition to monitoring, which determine whether the validated cleaning methods have been conducted effectively and/or are still effective.

These tend to involve sample analysis, where results can take longer (days) to obtain, and the review of monitoring data (trend analysis)

Examples of verification methods include,

- Periodic review of visual inspection check/sign off sheets
- Microbial sampling and analysis

and

- Periodic review of microbial, ATP, protein, and allergen swab test results

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Cleaning equipment maintenance

Inspection & replacement

All legal and standard requirements include that cleaning equipment must be maintained through appropriate inspection, replacement and storage

- Cleaning tools should be:
  - regularly inspected for damage and wear & tear
  - replaced as appropriate, based on risk assessment
- Have descriptions/images of what is acceptable & what is not, & keep records of tool inspection & replacement for auditing/due diligence purposes.
- Don’t make poor quality repairs to damaged equipment as this can increase the safety risk to the food product.

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Cleaning equipment maintenance

Equipment replacement frequency

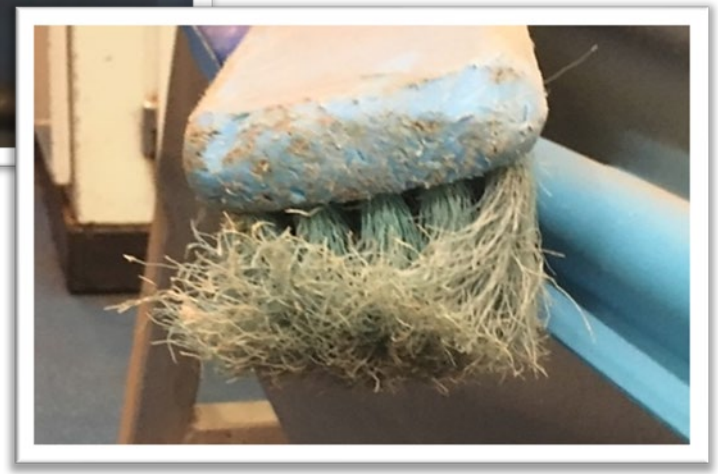
Industry case study

- To investigate the lifespan of a Vikan bench brush used to dry clean complex, metal, dry powder processing equipment with high usage, i.e., worse-case scenario at their site.
- The brush was used as normal and its condition assessed and recorded (notes and photos) daily until it reached an unacceptable condition.
- After 3 months the brush had reached an unacceptable condition, as defined by the Nestle Plant.
- **Conclusion:** Brushes used for this purpose should be replaced, at a minimum, every 3 months.

Cleaning equipment maintenance

Efficacy

Good maintenance of cleaning equipment ensures that they remain effective, efficient and safe



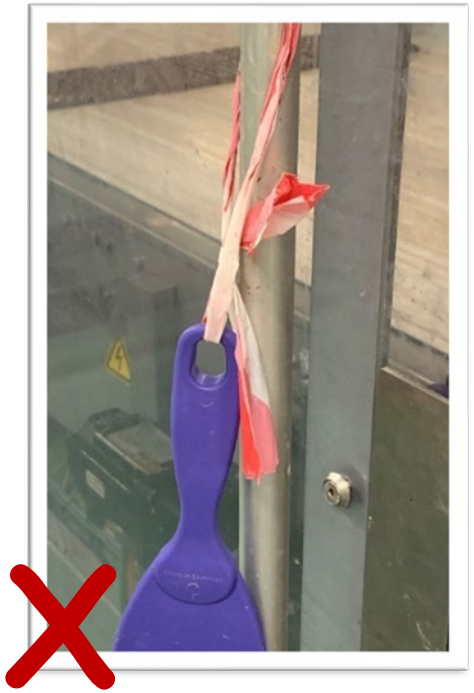
Cleaning equipment maintenance

Equipment storage

- Cleaning equipment can be stored on colour-coded wall racks or shadow boards,
  - help minimise equipment damage and cross-contamination
  - improve efficiency - provide a place for tools to be stored and found quickly when needed.

- Use of colour-coded cleaning equipment storage provides a visual check that the right-coloured tools are being used and stored in the right area.

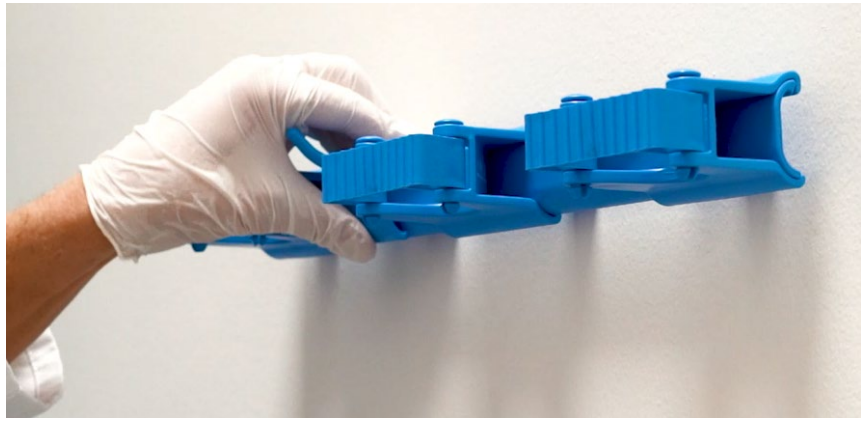
- Aids compliance with HACCP prerequisite programs and provides auditors with evidence of equipment control.



Cleaning equipment maintenance

New High-flex wall bracket

- Unique features
- Unmatched flexibility
- High durability
- Quick, easy installation
- Easy to disassemble for cleaning
- Hygienically designed components



Watch the videos at:
https://www.vikan.com/uk/services/hygienic-hi-flex-wall-bracket-system/

Cleaning Equipment Maintenance

Cleaning equipment storage

Shadow boards provide a quick visual check as to whether something is missing from a cleaning station

- To minimise the risk of cross-contamination brushes, squeegees, scrapers etc.. on racks and shadow boards should be stored:
  - head down
  - with heads distant from other equipment handles
  - in a single row so that equipment above does not drip onto hygiene critical surfaces below
  - on racks and shadow boards that are regularly cleaned and disinfected

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Why is cleaning equipment maintenance important?

Regulatory & Standard Requirements

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- Minimises the risk of product rejection and recall
- Minimises the risk and cost of prosecution
- Protects/improves company reputation and income
- Reduces waste
- Associated cost savings

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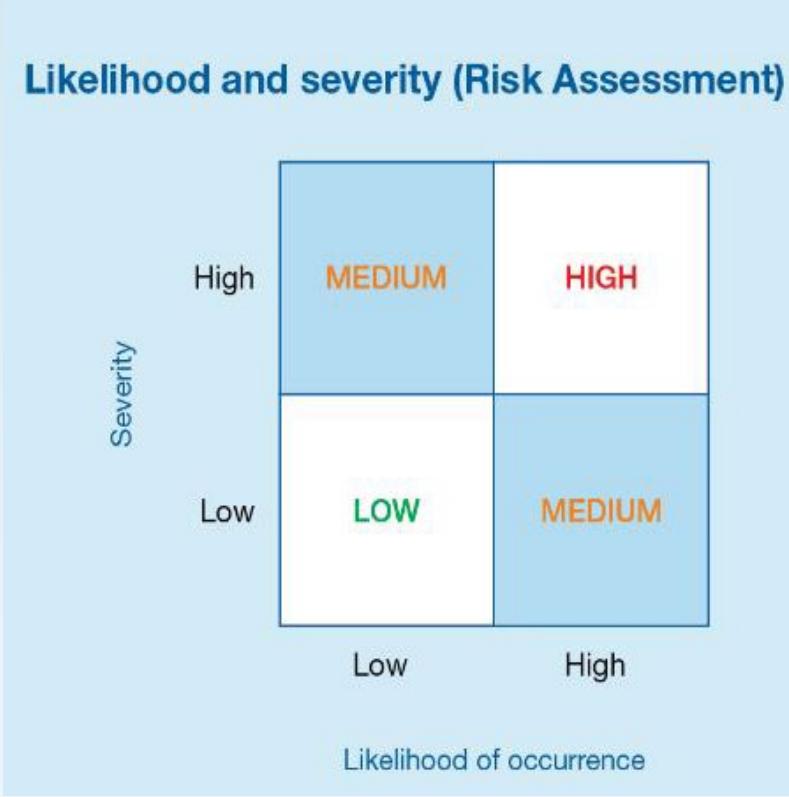
Cleaning equipment maintenance

How can it be achieved?

1. Conduct a **Risk Assessment**
    a) Identify Hazards,
    b) Determine Risk = Likelihood x Severity
2. Implement **Controls**
    i. Develop validated cleaning & disinfection methods
    ii. Clean and disinfect using the validated method at a defined frequency/schedule
    iii. Inspect and replace equipment to a defined frequency/schedule
    iv. Store appropriately
    v. Monitor/verify the controls



3. **Record** what you do and retain for audit inspection

Final thoughts

Food safety and hygiene culture

- None of this will work without the people that make it happen.
- The Hygiene Team and the equipment they use are critical to ensuring food safety and future business.
- Senior Management should be fully committed to train, equip and support those responsible for food safety and hygiene management….
- ….. and recognise them for the hygiene heros they are!

Cleaning equipment maintenance

Further information

- White Paper
  - Optimising food safety through good cleaning tool maintenance
    - Webinar ‘Handout’ download
    - ·http://viewer.ipaper.io/vikan/white-papers/cleaning-tool-maintenance/cleaning-tool-maintenance-whitepaper-en-300/

- Vikan.com

https://www.vikan.com/uk/services/download-centre/

Hygiene/food safety team support

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Providing

- Troubleshooting & Advice
- Guidance & Information
- Training & Workshops
- Documentation