

Hygienic Design of Food Industry Brushware

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Background & Introduction

Thanks to the European Hygienic Engineering Design Group (EHEDG) many food manufacturers appreciate the benefits of using hygienically designed production equipment as it is quicker and easier to clean, and minimises the risk of product cross-contamination by microbes, allergens, foreign bodies etc. This, in turn, maximises food safety and quality, reduces the risk of expensive product rejection or recall, and minimises food waste. However, when it comes to the cleaning equipment used in food production, very few tools are developed with good hygienic design in mind. Due to the way in which cleaning equipment is used, i.e. over large surface areas, it is capable of collecting (and subsequently spreading) contamination. There may be an expectation that any contamination collected by the cleaning equipment is subsequently removed, as part of the cleaning process. However, unpublished data, generated by a UK Government funded study which collected 10,000 *Listeria* swab samples from high care and high risk food factories, and analysed by Campden BRI (CBRI), showed that 47% of the cleaning equipment sampled, were positive for this organism (personal comment Holah, 2015). This data was later used by CBRI to establish guidance on 'Effective microbiological sampling of food processing areas' ^[1], and gave rise to the concept of cleaning equipment as a major 'collection' point for the isolation of pathogens.

As part of the global Food Safety System Certification standard (FSSC 22000), section 11.2 of ISO/TS 22002-1:2009, 'Prerequisite programmes on food safety -- Part 1: Food manufacturing' ^[2] states, with regard to cleaning and sanitising agents and tools, that: 'Tools and equipment shall be of hygienic design and maintained in a condition which does not present a potential source of extraneous matter'. Additionally, the British Retail Consortium (BRC) Global Standard for Food Safety, issue 7 ^[3] states (in Section 4.11.6) the requirement for cleaning equipment to be 'hygienically designed'. But what determines whether a piece of cleaning equipment is of good hygienic design? and what can be done to ensure that hygienic design is incorporated into future food industry standard cleaning equipment? The purpose of this study was to investigate the hygienic design of different types of food industry cleaning brushware.

Materials & Methods

Drilled and stapled; fused filament; and drilled and stapled resin set food industry brushware were investigated, with regard to hygienic design using UV sensitive lotion, and an industrial dishwasher validation soil (Brownes soil), as contaminants. All brushware were also assessed against EHEDG hygienic design criteria, as defined in Guidelines 8 ^[4] and 32 ^[5], and EU regulations on food contact material 10/2011 ^[6] and 1935/2004 ^[7].

Results

All the brushware investigated had hygienic design issues, as indicated by the presence of difficult to clean areas and surfaces (Figs 1 & 2), and various levels of non-conformance with the EHEDG hygienic design criteria. Additionally, some resin set products were found to be unsuitable for food contact (as detailed in their Declaration of Compliance) with regard to EU food contact regulations.

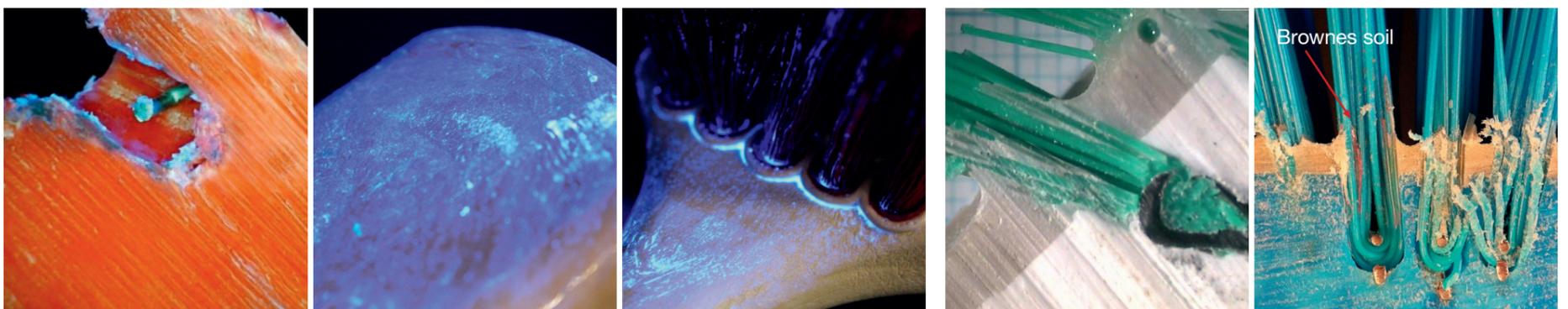


Figure 1. UV contamination remaining in the hole of a drilled and stapled brush (left), and on the surface and in the crevices of a fused bristled brush (middle & right) after manual washing

Figure 2. The channel observed in the centre of a drilled and stapled, resin set brush bristle bundle (left), and Browne's soil in the channel after decontamination in a dishwasher (right)

Discussion and Conclusions

These investigations indicate that much of the cleaning brushware currently used in food manufacturing environments is generally of poor hygienic design. Raising awareness of cleaning equipment as a source and vector of contamination, and how this can be minimised through good hygienic practice and design, should be a priority for all those involved in food safety, i.e. legislators, auditors, guidance providers, trainers, food manufacturers, and cleaning equipment manufacturers. Additionally, given the requirements of FSSC 22000 and BRCv7 there is clearly a need to develop hygienically designed cleaning equipment that ensures food safety and meets audit requirements.

References

- ^[1] Holah, J.T. (1999). Effective microbiological sampling of food processing areas. Guideline No. 20, Campden & Chorleywood Food Research Association.
- ^[2] ISO/TS 22002-1:2009. Prerequisite programmes on food safety -- Part 1: Food manufacturing.
- ^[3] British Retail Consortium (2015). Global Standard Food Safety. Issue 7, January 2015.
- ^[4] EHEDG Guideline No.8 (2004). Hygienic Equipment Design Criteria.
- ^[5] EHEDG Guideline No.32 (2005). Materials of construction for equipment in contact with food.
- ^[6] EU Regulation No 10/2011. Plastic materials and articles intended to come into contact with food (which replaces 2002/72 as of 2015). Official J. European Union, 2011. L 12/1.
- ^[7] EU Regulation No. 1935/2004. Materials and articles intended to come into contact with food, repealing Directives 80/590/EEC & 89/109/EEC. European Parliament and Council.