Acknowledgment

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Wednesday, 10:00 – 10:30, Session 3, Rheinlandsaal A

Manual dishwashing – how can it be optimised?

Manuelles Geschirrspülen – wie kann es optimiert werden?

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Abstract

Dishwashing in an automatic dishwasher is already investigated in many different ways. However, either owning or not owning an automatic dishwasher, every household still keeps washing up per hand – at least a few items. A lot of tests and consumer surveys have shown that manual dishwashing at home is done in very different ways taking also quite different amounts of resources. Therefore, it is important to optimise also the manual dishwashing process. As there must be one best way of doing the dishes manually, we have started a programme to test the parameters of manual dishwashing with the target to identify an optimum way of doing the dishes. It will be reported about the approach and first results.
Abstract

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Manual dishwashing – Natalie Fuß

„Manual Dishwashing – how can it be optimised?“

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Düsseldorf, 12th to 14th May 2009

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Agenda

1. Introduction
   - Impact factors on manual dishwashing process

2. Target and Task
   - Why and how optimise manual dishwashing?

3. Methodology
   - Developing reproducible method for experimental washing up process

4. Outlook

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Why optimise manual dishwashing?

- Manual dishwashing is used in all households – even in households owning a dishwasher
- Manual dishwashing is carried out in manifold ways using different amount of resources
- Investigation and optimisation can help to save enormous resource amounts

“...there are significant differences in consumer behaviour and washing-up techniques, with clear consequences for the amount of resources (water, energy, time, cleanser) used.”

Impact factors on manual dishwashing process

Overview

![Diagram showing the process of manual dishwashing with steps like soil, dishes, process time, water, and cleaning performance.]

Impact factors on manual dishwashing process

Soil and dishes

![Diagram with factors affecting soil and dishes, such as composition, amount, texture, drying time, drying conditions, number of soiled items, form, and material.]
Impact factors on manual dishwashing process

Process time and chemicals

Impact factors on manual dishwashing process

Mechanics and water
Target and task

- Investigate if there is one or more optimal ways of manual washing up in terms of
  - Using a minimum amount of resources
  - Achieving best possible cleaning results

- Defining what is/are this/these best practise(s)
  - in general
  - for the single resources (e.g. water consumption, energy consumption, cleanser consumption, etc.)

- Checking if the best practises can be transferred to consumer so that
  - he/she is able to apply the best practise
  - he/she is willing to change behaviour in every-day life

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Target and task

Optimised process of manual washing up

- Minimum amount of resources
- Best possible cleaning performance

Investigating impact factors
Developing reproducible method

- In laboratory tests: Process of washing up must be reproducible for each washed up item
- At the same time washing up process shall be as close as possible to what consumer does
- Important to be able to control impact factors
Adaptation of workplace 
in order to control impact factors

Definition of washing up process and factor levels for experiments

- Based on consumer surveys
  - Number of plates
  - Soil drying time and conditions
  - Amount of soil
  - Washing up time
  - Adding the sub processes soaking and rinsing
Dishes and soil

- Pizza plates → flat area for mechanical construction
- Soil: according to EN 50242 (standard for automatic dishwashing)
  - Minced meat
  - Spinach
  - Egg yolk
  - Porridge
  - Margarine
- Soil drying: 2 h at ambient conditions (differing from EN 50242)

Evaluation

According to EN 50242
- Lamp with 1000 - 1500 Lux illumination level and 3500 – 4500 K colour temperature
- Visual evaluation on a scale from 0 to 5
- Nonlinear scale
Outlook

- With reproducible washing up process
  - Investigation on impact factors possible
  - Multifactorial analysis needed
  - Evaluation of the impact on cleaning performance
  - Consideration of interactions between factors
  - Approach with Design of Experiments (DOE)

- Difficulties in this investigation
  - Number of impact factors and its interactions
  - Limitations of factors (e.g. for water reduction
  - Manually run process $\rightarrow$ difficult to keep constant

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Outlook

- Further steps
  - Development of best practise on manual dishwashing
  - Test of best practise on applicability
  - Dissemination of best practise

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Wednesday, 10:30 – 11:00, Session 3, Rheinlandsaal A

Investigation about metal surface modifications during automatic dishwashing

Untersuchungen zum Verhalten von Metalloberflächen beim automatischen Geschirrspülen

Karlheinz Hahn
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Abstract

More and more kitchens are equipped with a dishwasher, as this kind of cleaning is easy and economic. Consumers are used to clean all their dishes automatically within one load, expecting no surface modifications even after a high number of washes.

For detergent development it is important to take care of any changes that occur during the dishwashing process. Especially on metal items sometimes surface modifications appear, e.g. rust on stainless steel, tarnishing of silverware and aluminium. Even though these corrosion phenomena are known since decades, the surface reactions of metals within the dishwashing process are not yet completely investigated.

This presentation will show the chemical and physical background regarding metal surface reactions in the dishwashing process, having a focus on tarnishing of silverware. The new insights challenge some former explanation for silver tarnishing. Results of detailed examinations will be presented.