Webinar

How to reduce food safety risks in milling

Innovations for a **better world**.

BÜHLER

Today’s Speakers.

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Global Head of Food Safety

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Head of Innovation &
Academy Milling Solutions

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CEO Wingmen Group

Reducing food safety risk in flour.
Your take away from this webinar.

1. Food Safety trends, challenges and hazards in flour processing
2. Hygienic factory and equipment design, microbial reduction in milling, mycotoxin control, foreign material removal, traceability
3. Food safety management at plant level
4. Q&A

Food safety facts for flour.

2,597
recall news
Reported worldwide in 2019
*Bühler safefood.ai

63
***Salmonella* Infected people**
in 2016 outbreak associated with flour

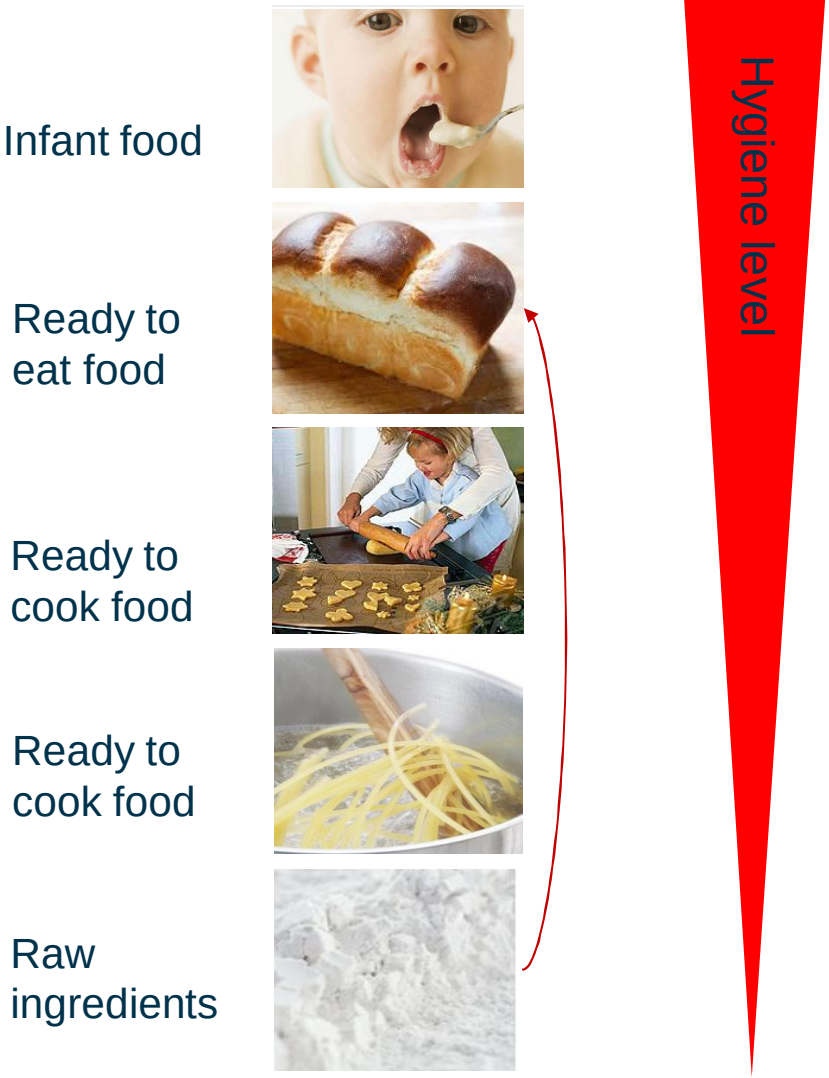
$243m
median loss in corporate value
due to a recall
*Gomez and Marks, 2020

Top hazards in 2019

1. **Aflatoxin and other mycotoxins**
2. ***E. coli*, *Salmonella* and other pathogens**
3. **Peanut and other allergens**
4. **Foreign materials**

New challenges.

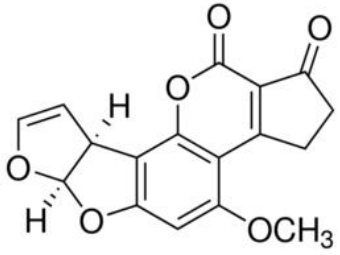
- **Stricter requirements** - FSMA (2011)
- **New detection methods** – tracking system – whole genome sequencing
- Foodborne **outbreaks** associated with flour
- **Consumer** behavior - RTE flour
- **Seed contamination** with allergen or other contaminant
- Some **pesticides banned** which contributes to alkaloids production



1st top hazard: Mycotoxins.

Toxic metabolites from fungal mold.

Fungal mold



Aflatoxin B1

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Kenya's ugali scare: How safe is your maize flour?

By Basillioh Mutahi
BBC News, Nairobi

15 November 2019 Share

> Ann Agric Environ Med. 2015;22(1):35-7. doi: 10.5604/12321966.1141366.

Occurrence of deoxynivalenol (DON) in wheat flours in Guilan province, northern Iran

Reza Kazemi Darsanaki [1], Khosro Issazadeh [2], Morteza Azizollahi Aliabadi [2], Mohammad Mohammad Doost Chakoosari [2]

Affiliations + expand

PMID: 25780825 DOI: 10.5604/12321966.1141366

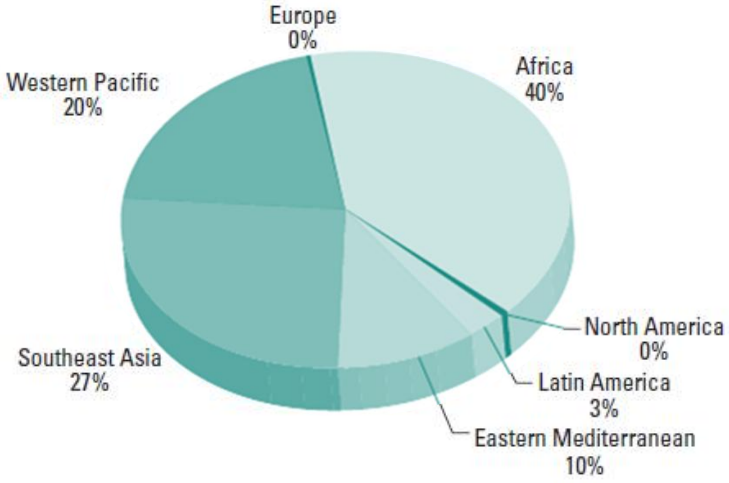
Free article

25% of crops worldwide are contaminated with mycotoxins.

The burden of mycotoxins.

Liver cancer

up to **155’000** year



Liu & Wu , 2010

Stunting of children

WHO report, 2011

Post-harvest losses

30 % of losses

- ❑ Pests
- ❑ Spoilage
- ❑ Contamination

FAO, 2011

2nd top hazard: bacteria.
Prevalence in flour.

TVC

- 100 – 10,000 cfu/g*

E. coli (STEC)

- 10 – 30 %*

Salmonella

- 1%**

Key factors making *Salmonella* high risk for flour:

- Survive in dry conditions (10 years)
- Low infection dose (reports of <1 cfu/g)
- Resistant to heat

*BfR opinion No 004/2020. 2020; German Federal Institute for Risk Assessment, Escherichia coli in flour – sources, risks and prevention, www.bfr.bund.de

**(Published by Sperber (2007) based on data from [Richter et al., 1993], [del Pozo et al., 2000], [Eiroa et al., 1975] and [Kehl and Bostel. 1999]).

Dry heat is not effective to inactivate microorganims.

Inactivation of *Salmonella* Weltevreden in flour at **65 °C**

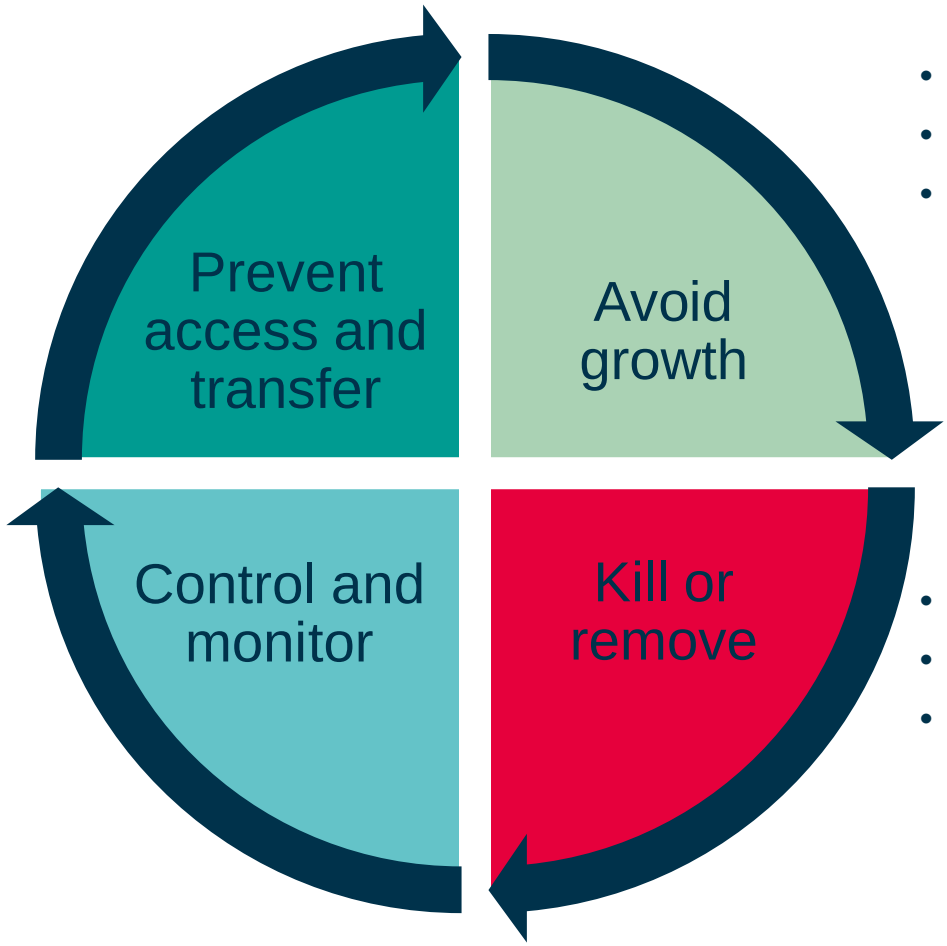
Moisture content in flour [% wb]	Processing time to reduce 1 log oder 90 % [D-Wert]
> 50 % (dough)	~ 5 min
14 % flour	~ 50 min
12 % four	~ 100 min
10 % flour	~ 500 min

(Archer et al. 1998, J. Food Sci.)

Holistic view of food safety

Holistic view of food safety.

- Plant layout
- Building design
- Quality control at intake
- Personnel hygiene
- Safe storage
- Traceability



- Hygienic design of machines
- Keep dry, avoid condensation
- Frequent cleaning of machines / bins

- Grain cleaning
- Heat treatment
- Fumigation / thermal treatment

- HACCP
- Quality control
- Pest control
- Automation

Building ventilation systems

Building ventilation system for optimal climate in the mill.

Selecting the right building concept is key – and ultimately determines the added value!

The benefits are:

- Filtrated / clean air inside processing plant
- Reduction of condensation
- Minimal cleaning requirements
- Complying to food safety requirements
- Successful customer audits

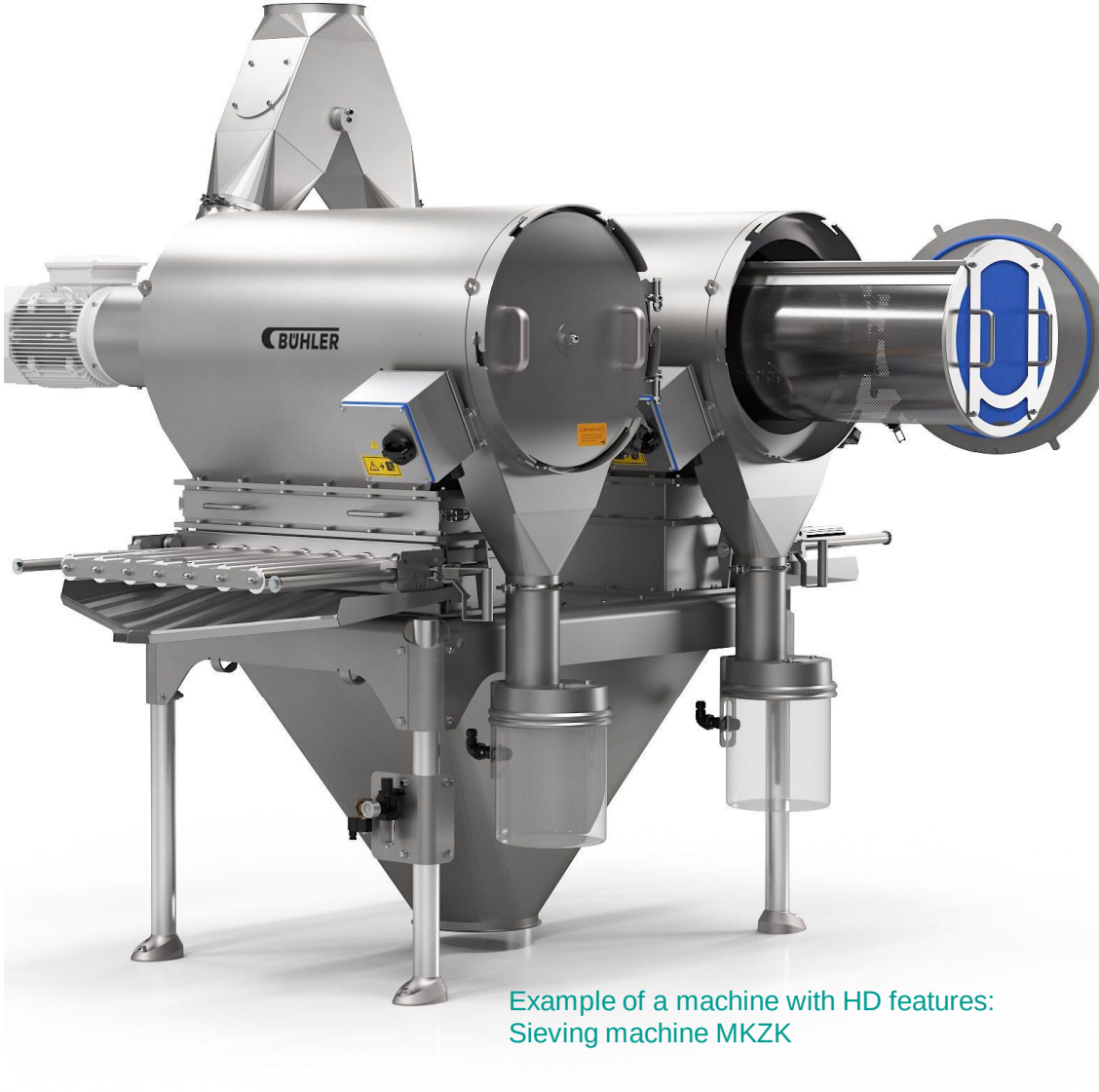
Hygienic design of equipment

What is hygienic design?

Allows the timely and effective cleaning

Minimizes risks of product contamination during the whole working life of the equipment.

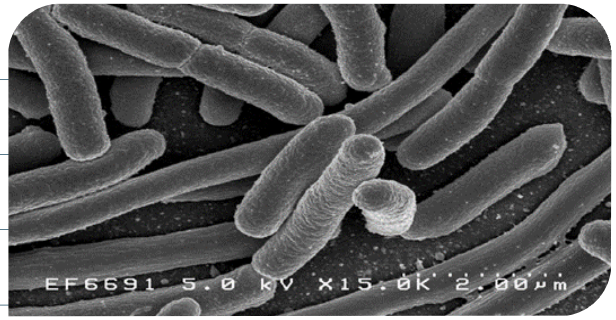
- Chemical: e.g. migration of food contact materials, lubricants, etc.
- Physical: e.g. equipment parts falling into food.
- Microbiological: e.g. prevent microbial introduction, survival and growth.

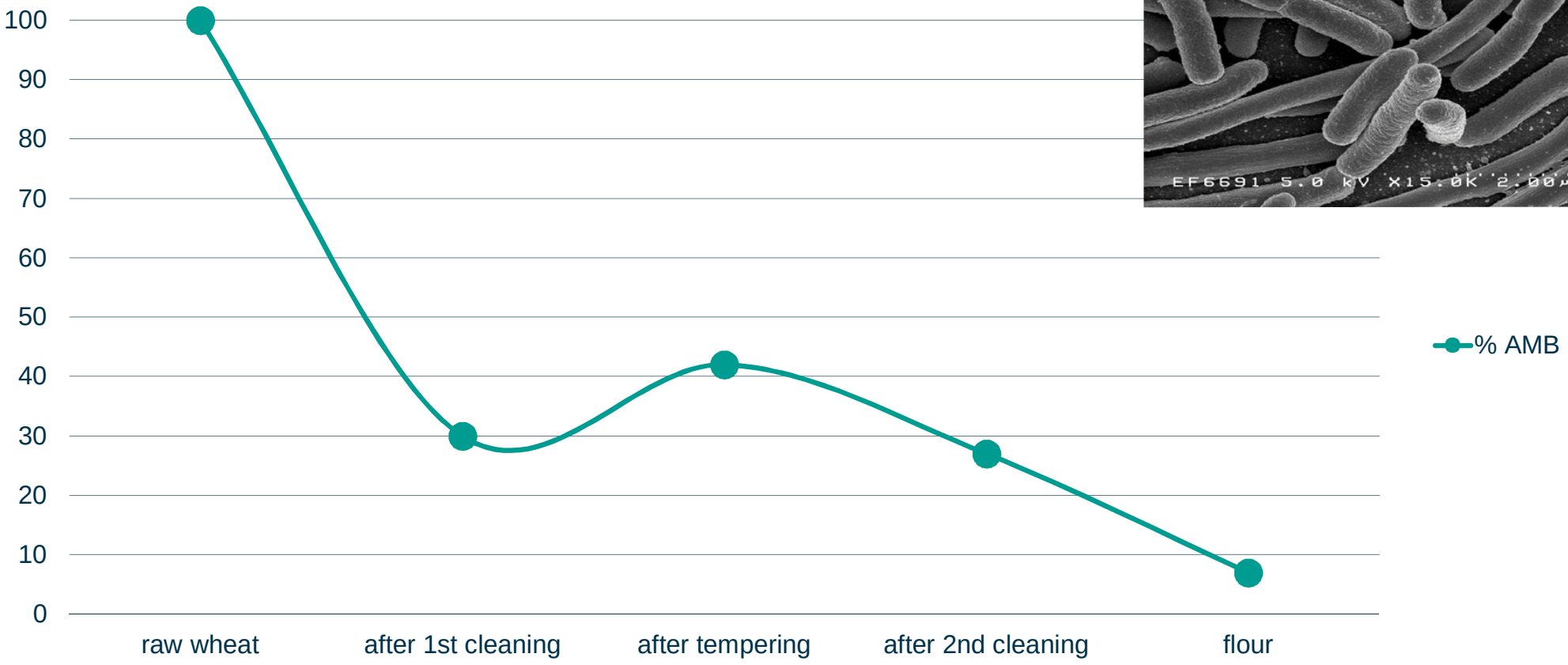


Example of a machine with HD features:
Sieving machine MKZK

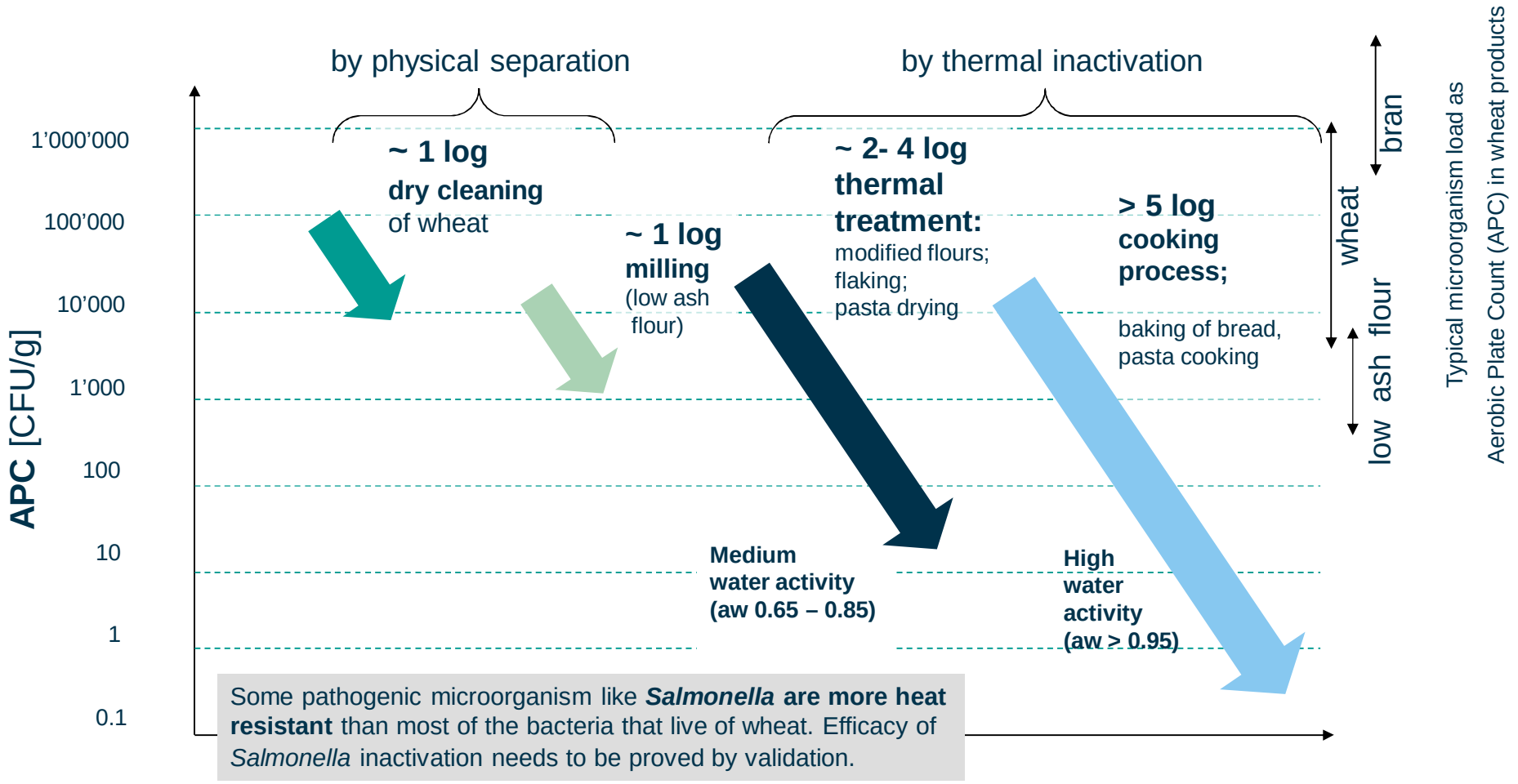
Bacteria reduction

Reduction of bacteria during wheat cleaning.





Example of bacteria removal or inactivation in wheat processing.

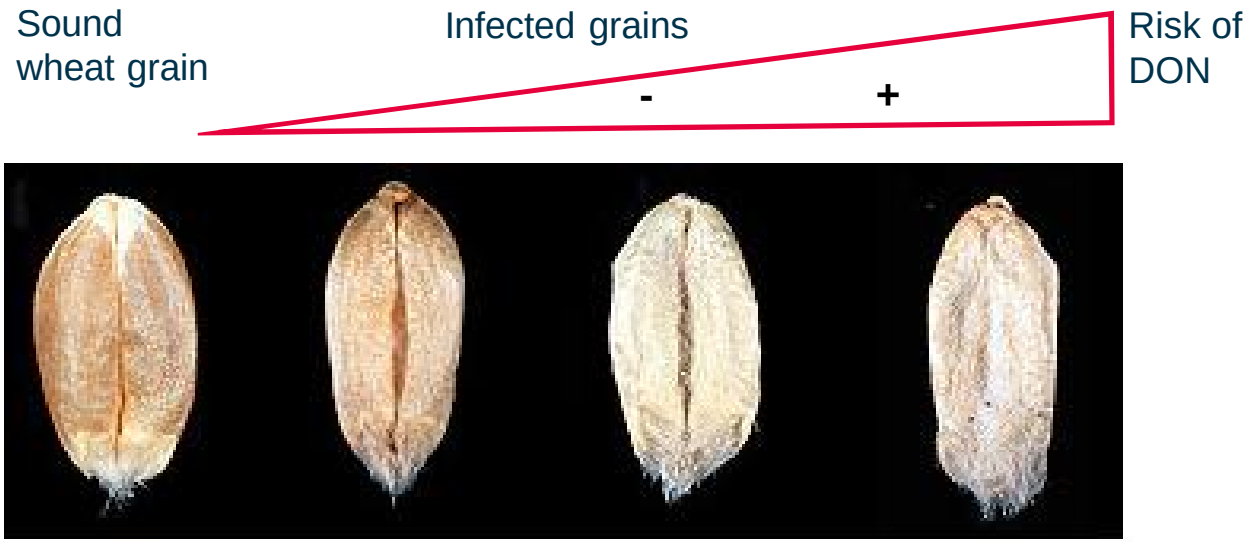


Some pathogenic microorganism like ***Salmonella*** **are more heat resistant** than most of the bacteria that live of wheat. Efficacy of *Salmonella* inactivation needs to be proved by validation.

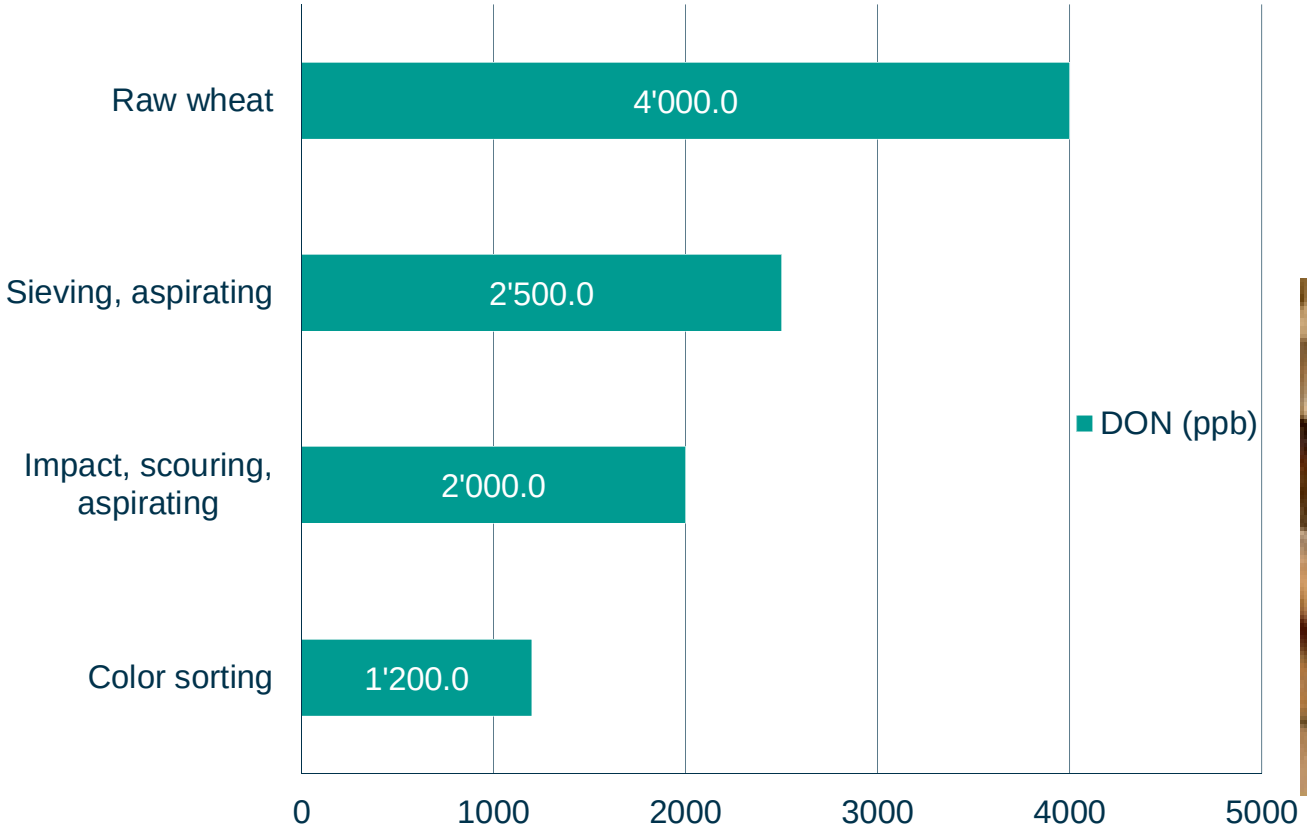
Mycotoxin reduction

DON (Vomitoxin) is the main concern in wheat.

- Different phases of the infection show different appearances.
- We use the change of the characteristic of the infected kernels to remove them form the form sound ones.

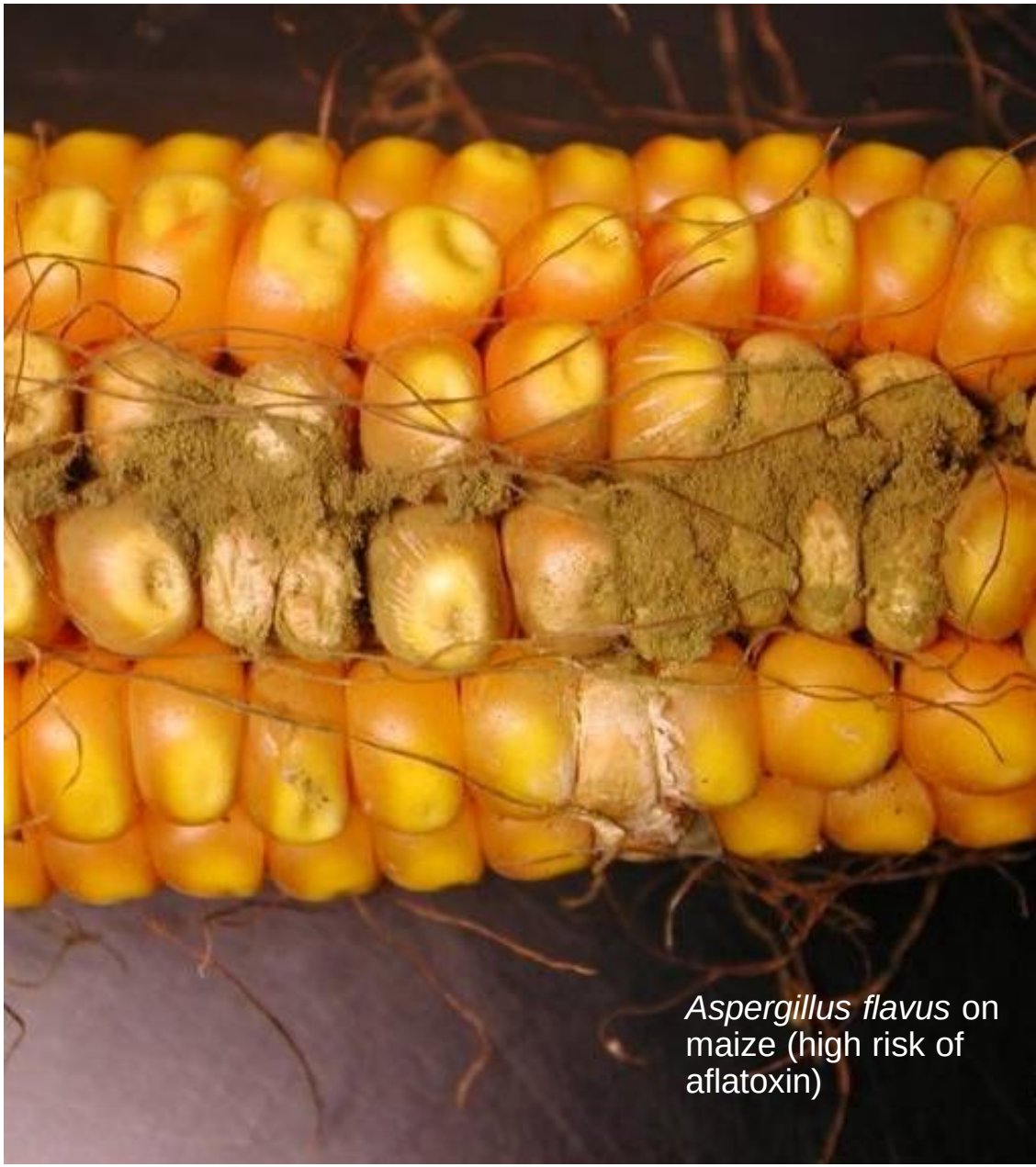


Wheat: Reduction of DON (Vomitoxin).



Aflatoxin is the main concern in Maize.

- Different phases of the infection show different appearances.
- We use the change of the characteristic of the infected kernels to remove them form the form sound ones.



Aspergillus flavus on maize (high risk of aflatoxin)

Reduction of Aflatoxin in maize.

Dust

Black spotted maize

Green mold maize

Grain with insect bites
(often internal infection,
low density grains)

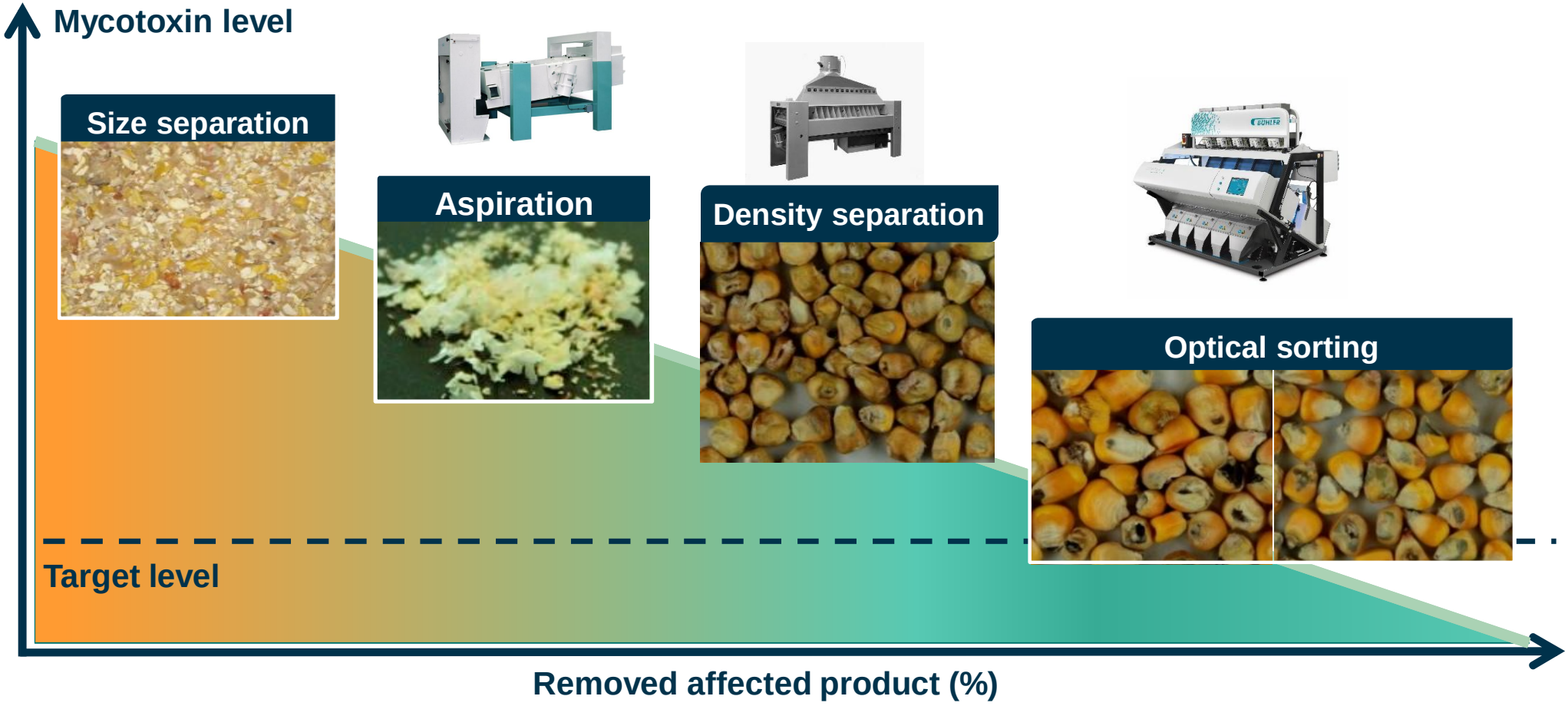
Small broken maize

Dark brown maize

Shriveled brown maize

Mycotoxin reduction by grain cleaning

Consistent reduction of Aflatoxin by grain cleaning.



Elimination of foreign material

Foreign material – what customer’s perceive as being alien to food.

Insects

Plants matter

Bones and animal matter

Plastic

Glass

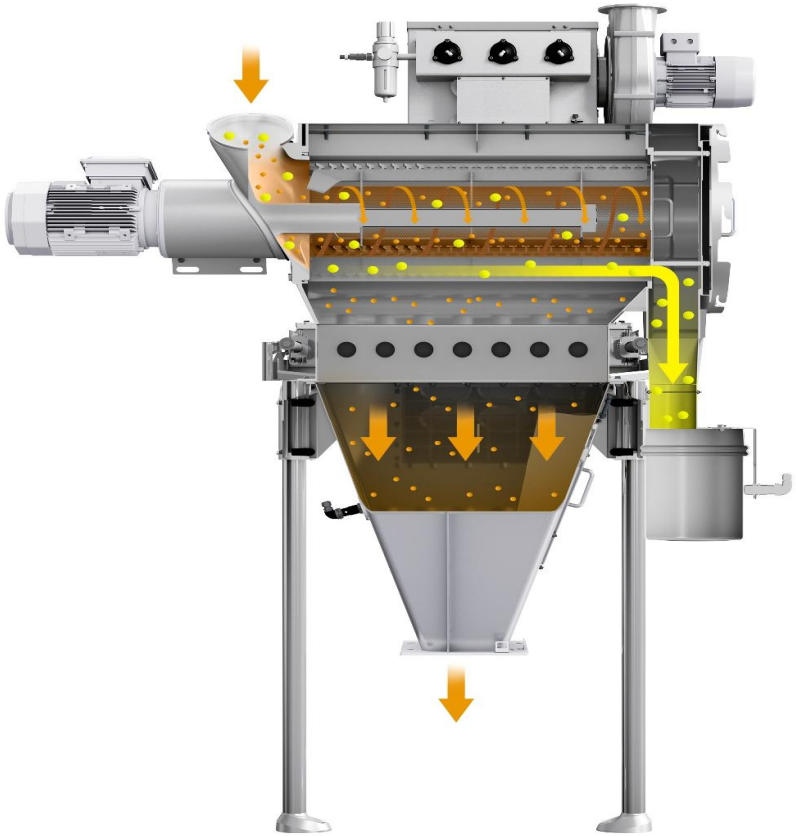
Wood

Metal

Stones

Control sifter to remove foreign material.

- The sieving machine removes foreign material in finished products.
- Easy and fast access for inspection.
- Often installed in combination with a magnet underneath.

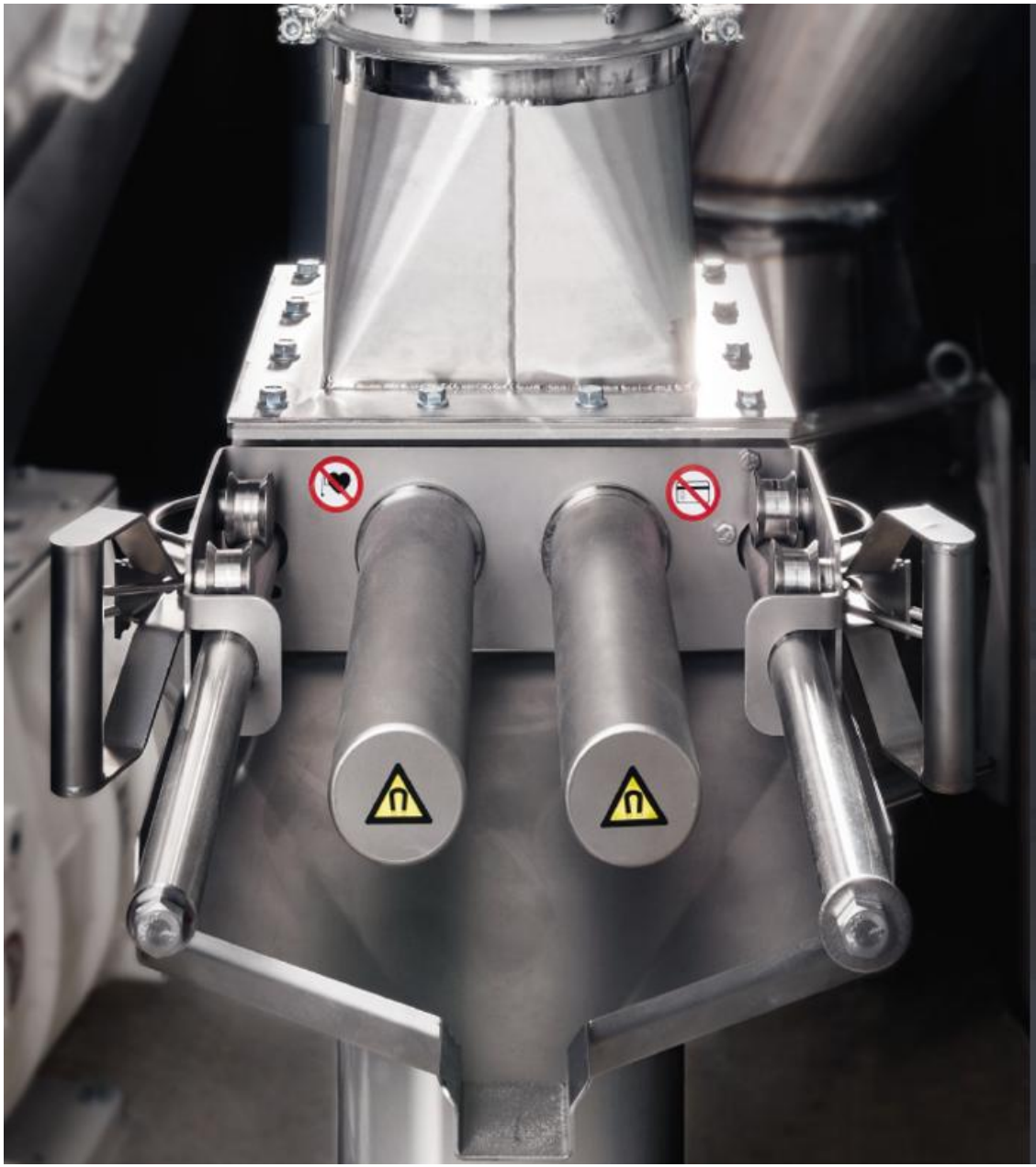


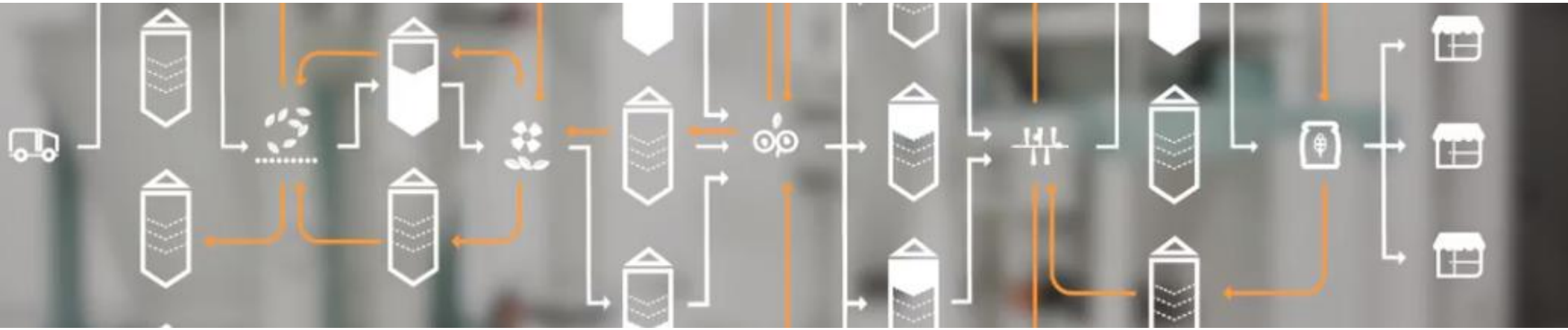
Impact machine to destroy the insect eggs.

- Killing of insect eggs by impacting the flour
- Multiple Impact during product inflow and outflow
- Increase of the shelf life

Removing of metals.

- Magnets
- Neodymium magnets with up to 10’000 Gauss
- Metal detectors
- X-Ray





Automation & traceability.

- Forward and backwards product tracing
- Traceable product quality
- Fast tracking of possible threats
- Full compliance with regulations and laws
- Minimization of human errors

Summary.

- Food safety is the responsibility of the entire grain value chain.
- The base of a food safe production:
  - Building concept, hygienic design of equipment.
  - Controlled and filtered air intake
  - HACCP and further food safety concept in place.
- The main food safety threats in the milling industry are:
  - Foreign materials, including insects
  - Bacteria
  - Mycotoxins
  - Allergens
- Modern cleaning lines are reducing contamination and the risk.
- Control sieves, impact machines, magnets, metal checks and x-ray for finish products.
- Automation system with traceability module.


Let´s make food safer
Together
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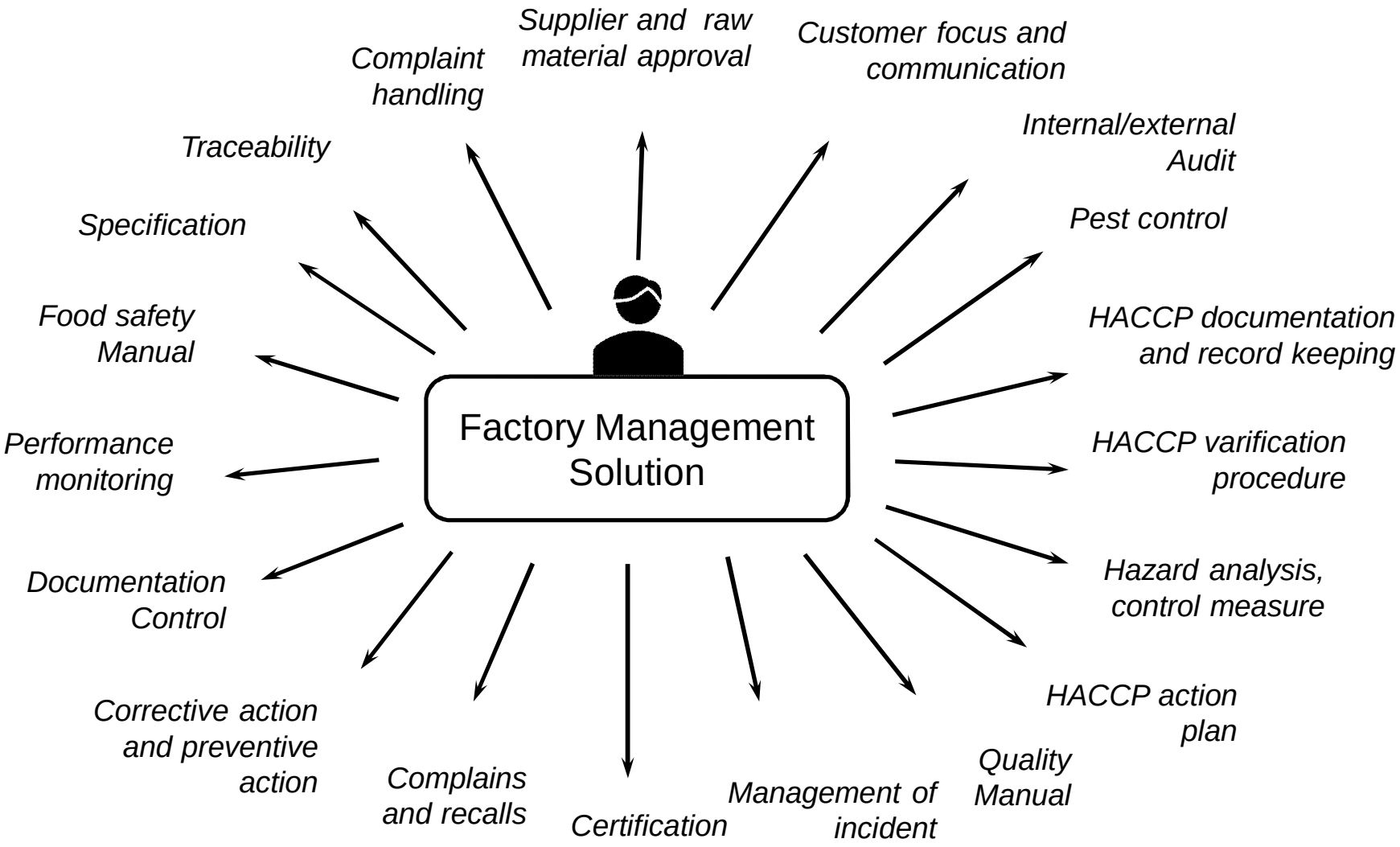
Tasks of Food Safety- and Quality Manager



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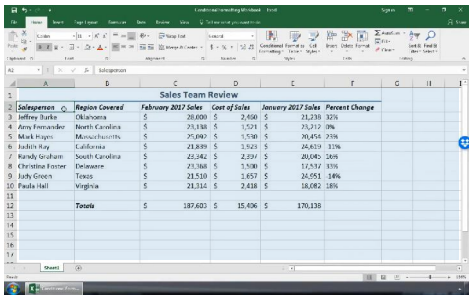
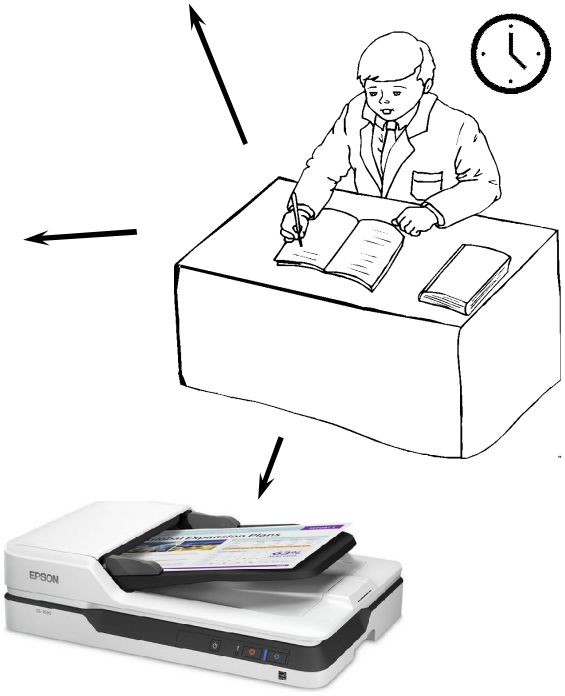
What are todays challenges of a Food Safety- and Quality manager?





- Time consuming
- Difficult to trace back
- Hard to get an overview of „what´s going on“
- Re-active instead of preventive
- Auditing is difficult
- Easy to manipulate
- Difficult to benchmark sites
- Low efficiency
- High mistake rate
- Etc..

ADVACTORY

All in one System - ADVACTORY

Assign Tasks to employees

Manage schedules

MANAGE ALL
PROCESSES
PAPERLESS

Monitor in real time

Everywhere on any device

Alerting tresholds

Audits with “one click”

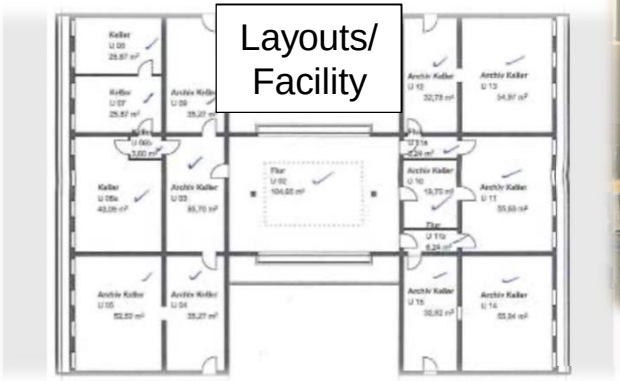
ADVACTORY

How does ADVACTORY work
1. Step – Asset management - Digitalisation of assets

Tools

Machines/
Equipment

Layouts/
Facility



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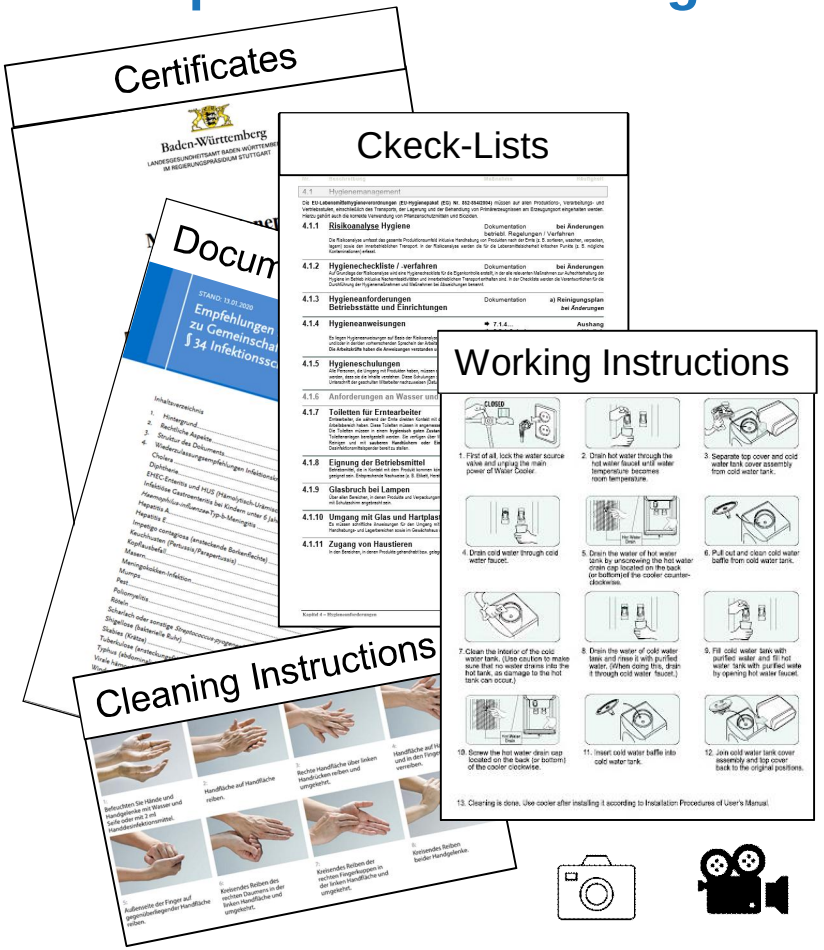
How does ADVACTORY work
2. Step – Process management -Digitalisation of processes and documents



Scheduling

ADVACTORY

ADVACTORY knows it all

Where ?

Which?

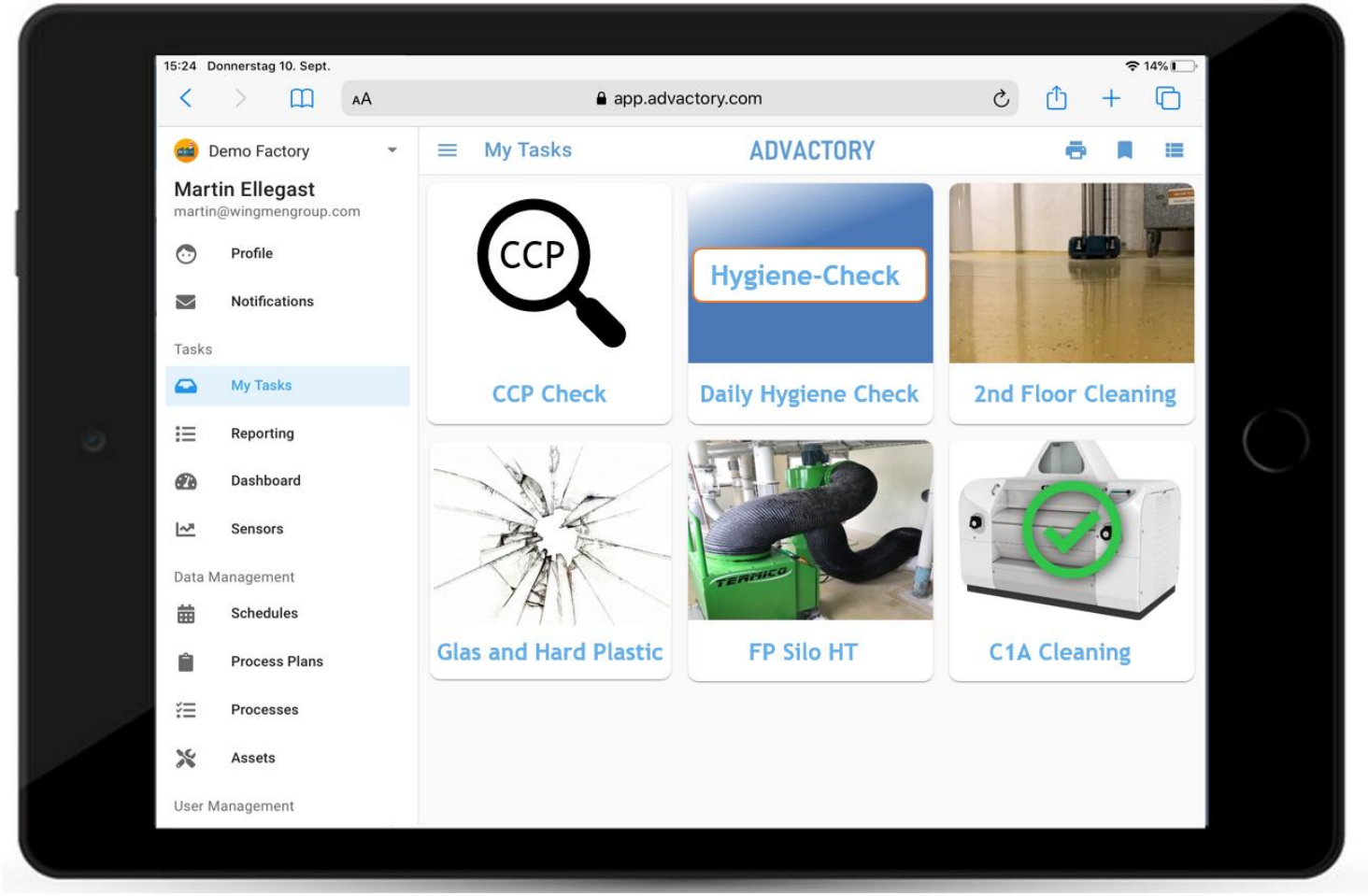
When?

Who?

What / How?

ADVACTORY

ADVACTORY - My Tasks – Operator view



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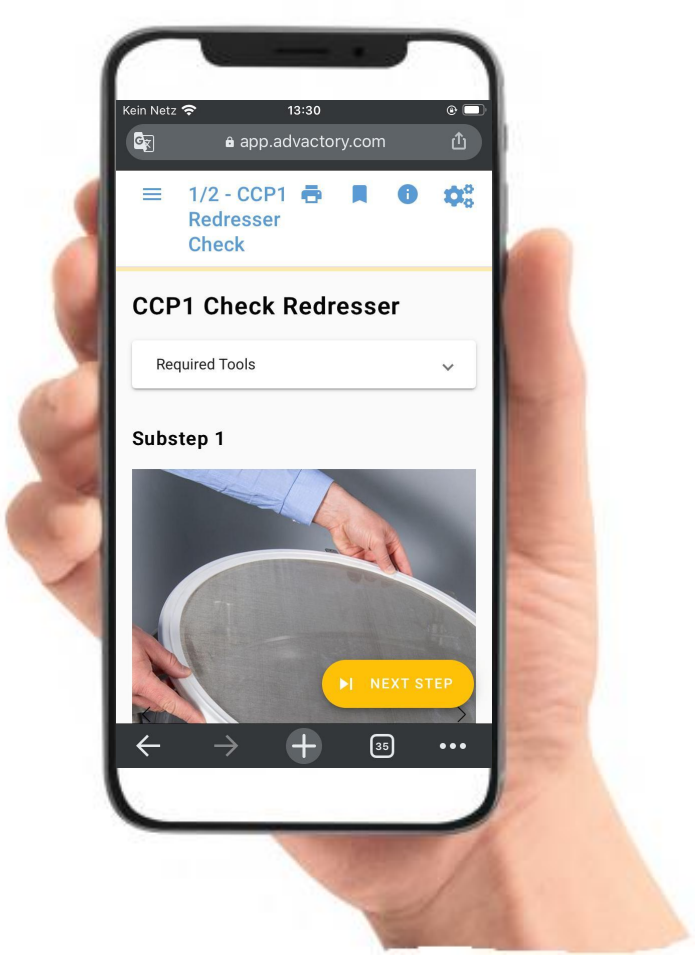
ADVACTORY - My Tasks – CCP Check

Operator gets routed through his daily tasks step by step



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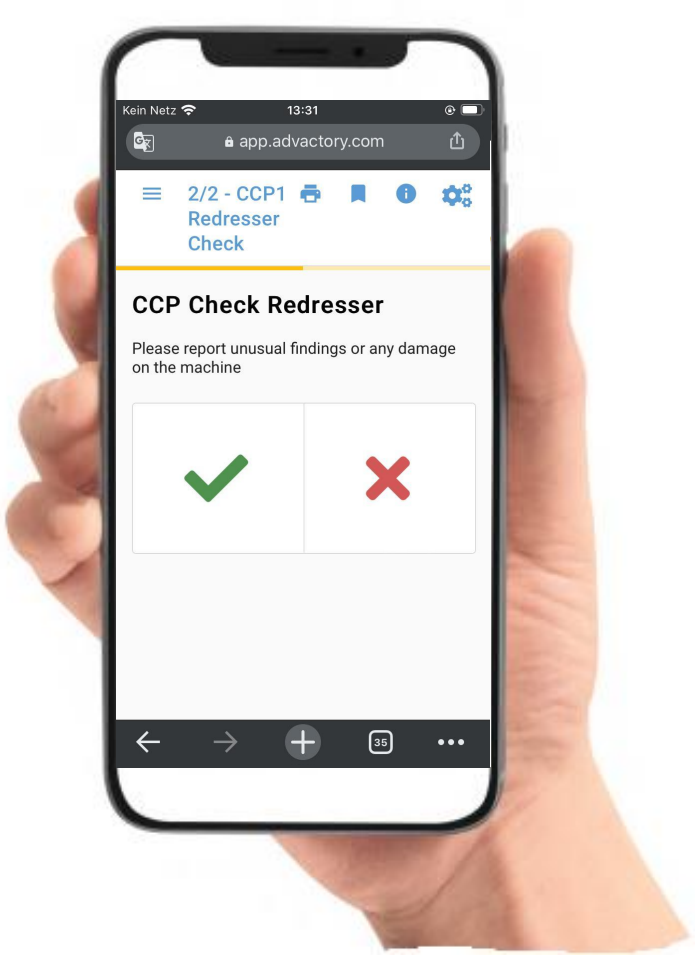
ADVACTORY - My Tasks – CCP Check

Operator gets routed through his tasks step by step - Cleaning/ Working instructions

Confirmation of tasks:

- Clicking
- Writing
- Picture/ Video
- Code Scanning



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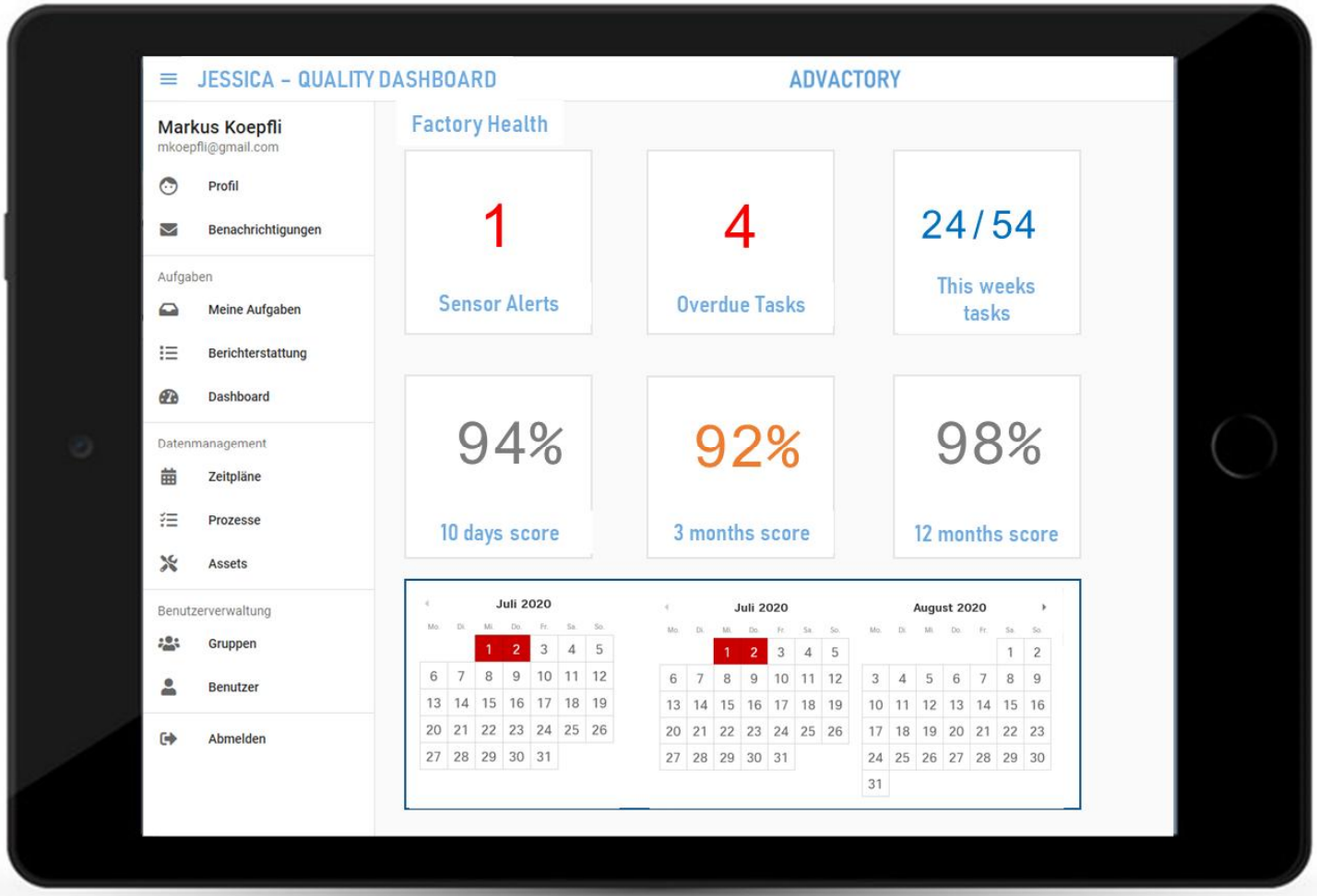
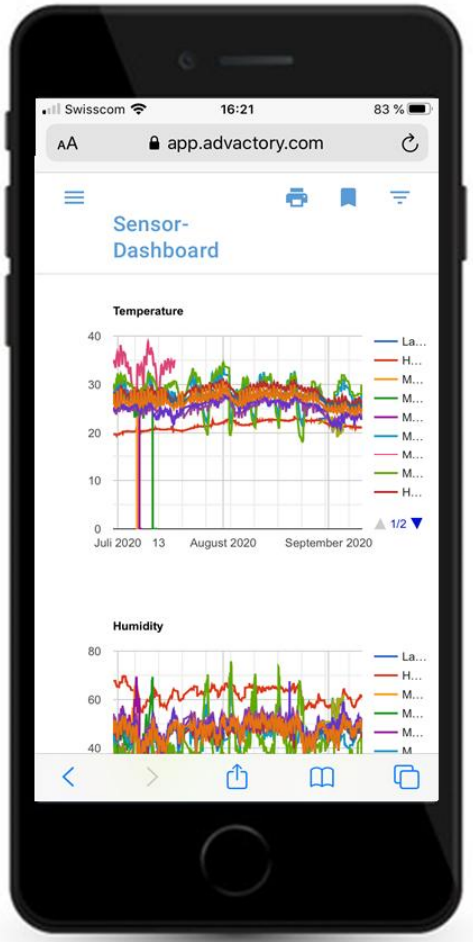
ADVACTORY – Dashboards and Documentation





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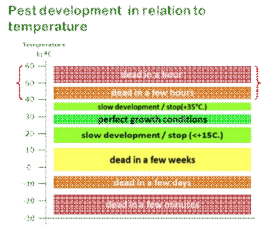
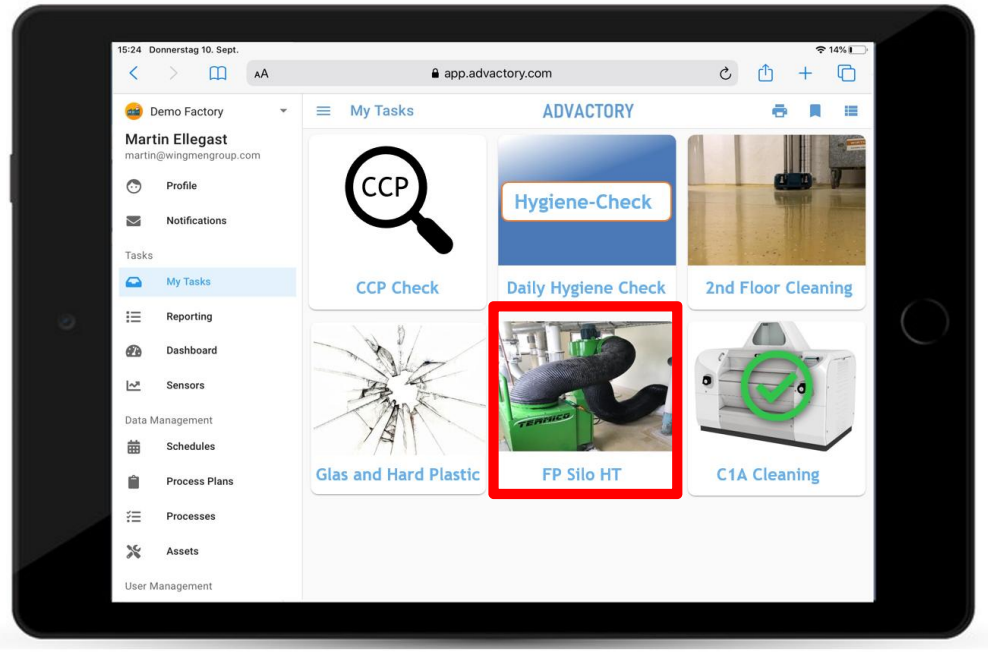
ADVACTORY – Industrial example (IOT) Preventive Cleaning

ADVACTORY SENS



Tasks are automatically generated to avoid weevil



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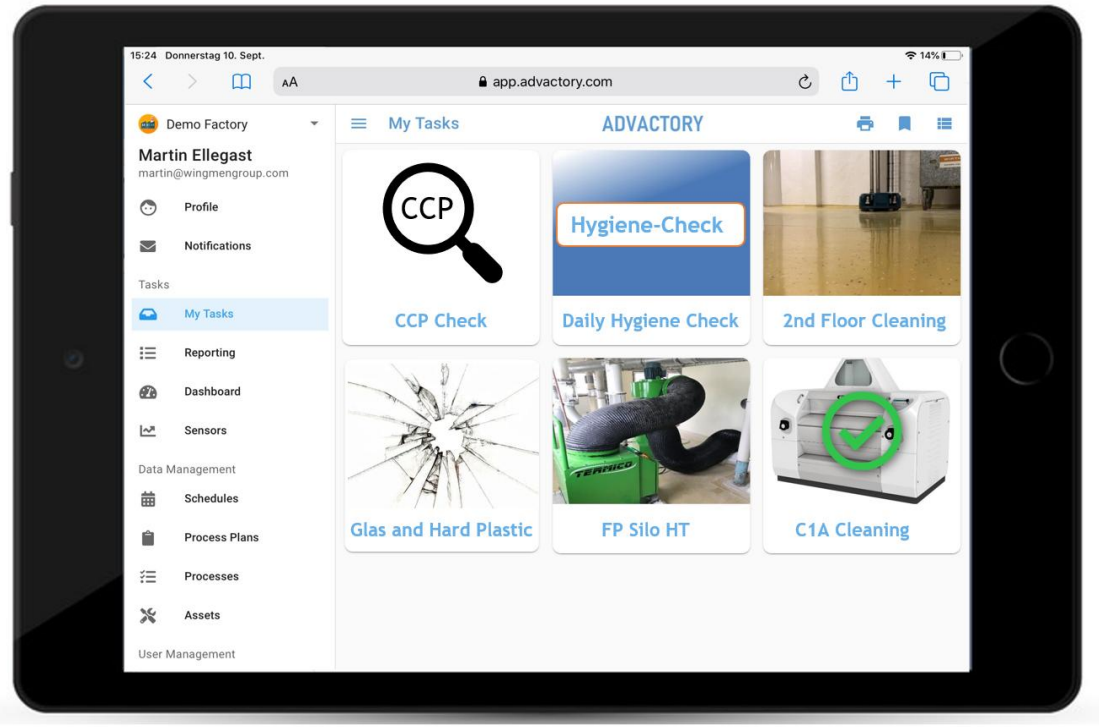
ADVACTORY – Let´s make food safer - together

- Increase Traceability
- Complete overview of „what´s going on“
- Preventive instead of Reactive
- Auditing with one click
- Highly efficient –Time saving
- Easy to benchmark sites
- Low mistake rate
- Less Recalls
- Higher Food safety
- Etc..



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Q&A
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THANK YOU FOR YOUR ATTENTION

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