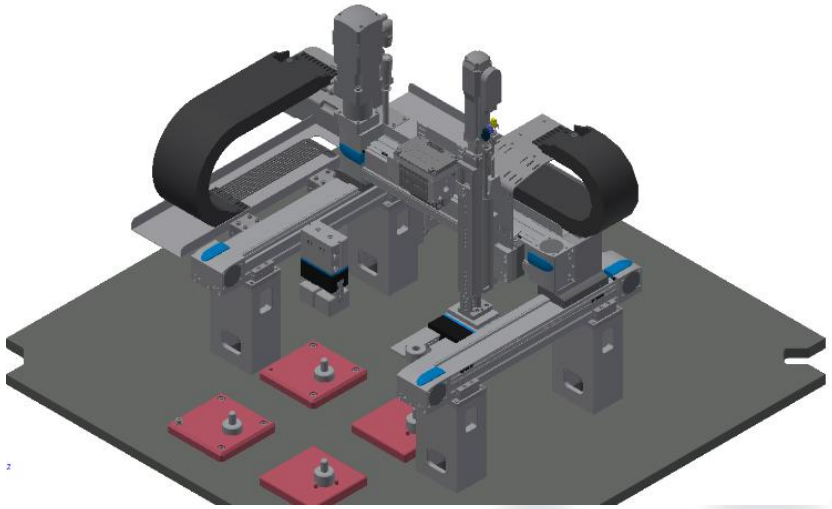


Dr. Manuel Ulmer
Senior Consultant

CleanControlling®

Online Basic-Seminar
TECHNICAL CLEANLINESS
VDA 19.1 and VDA 19.2



Logistics concept and design guidelines of assembly facilities according VDA 19 part 2

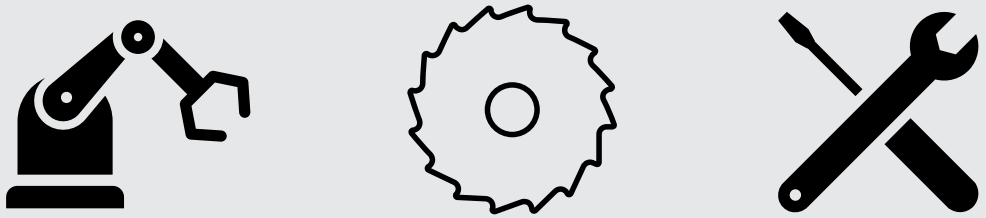
Dr. Manuel Ulmer, CleanControlling GmbH

CONCEPTION OF A CLEAN PRODUCTION

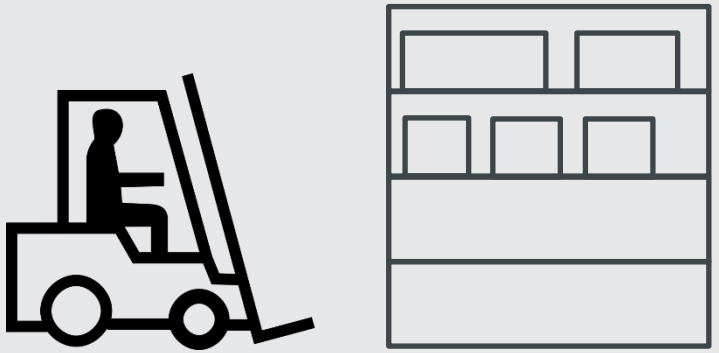
Logistics

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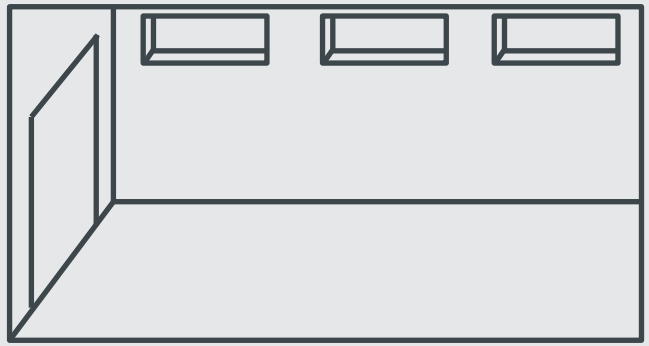
Processes / Production equipment



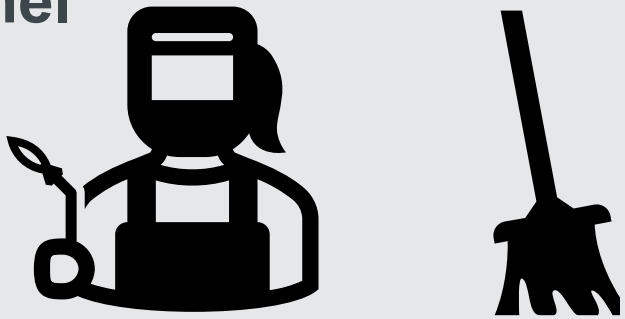
Logistics



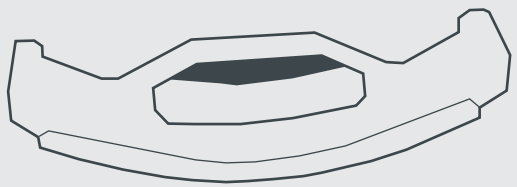
Production environment

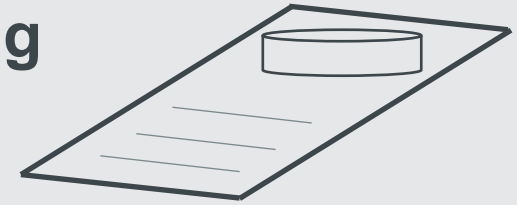


Personnel



Particle monitoring





INFLUENCE ON PRODUCT CLEANLINESS

Contamination risks in logistics



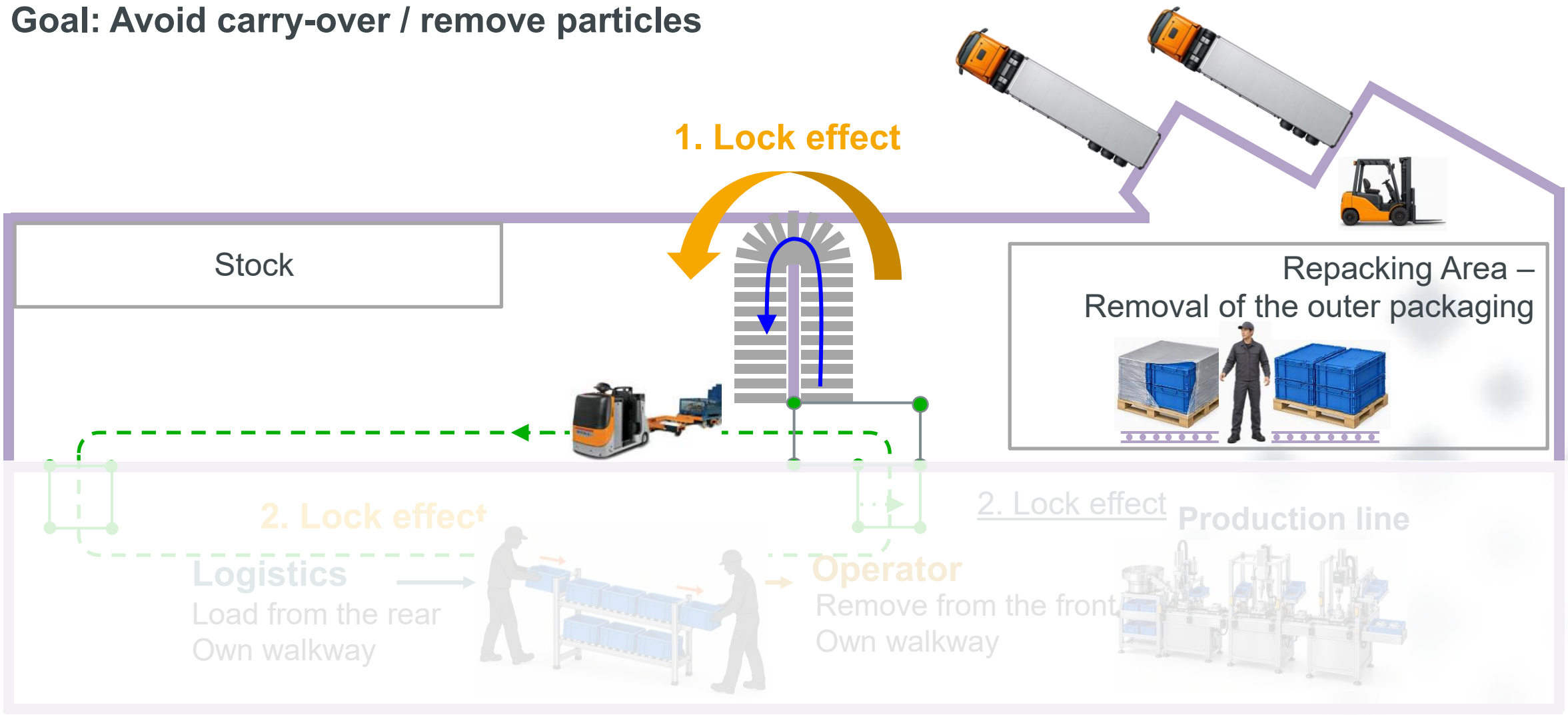





INFLUENCE ON PRODUCT CLEANLINESS

Concept of optimized plant layout with 2 lock effects

Goal: Avoid carry-over / remove particles



Separate walkways prevent dirt carry-over.

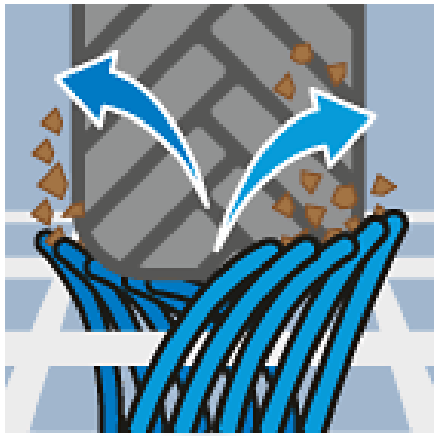
INFLUENCE ON PRODUCT CLEANLINESS

Entry areas into cleanliness areas

Goal: Avoid carry-over







How the lock works

- Inclined brushes in the walk-on grid clean soles and wheels as they pass.
- Dirt and particles are brushed off and fall through the grid.
- Easy removal: the collected dirt below the grid can be removed and cleaned.

source: ProfilGate

INFLUENCE ON PRODUCT CLEANLINESS

Packaging concepts

Onion-skin principle: Preserving cleanliness through protective layers

Skin 1: Outer packaging

Pallet closing lid

Stretch film and wooden pallet

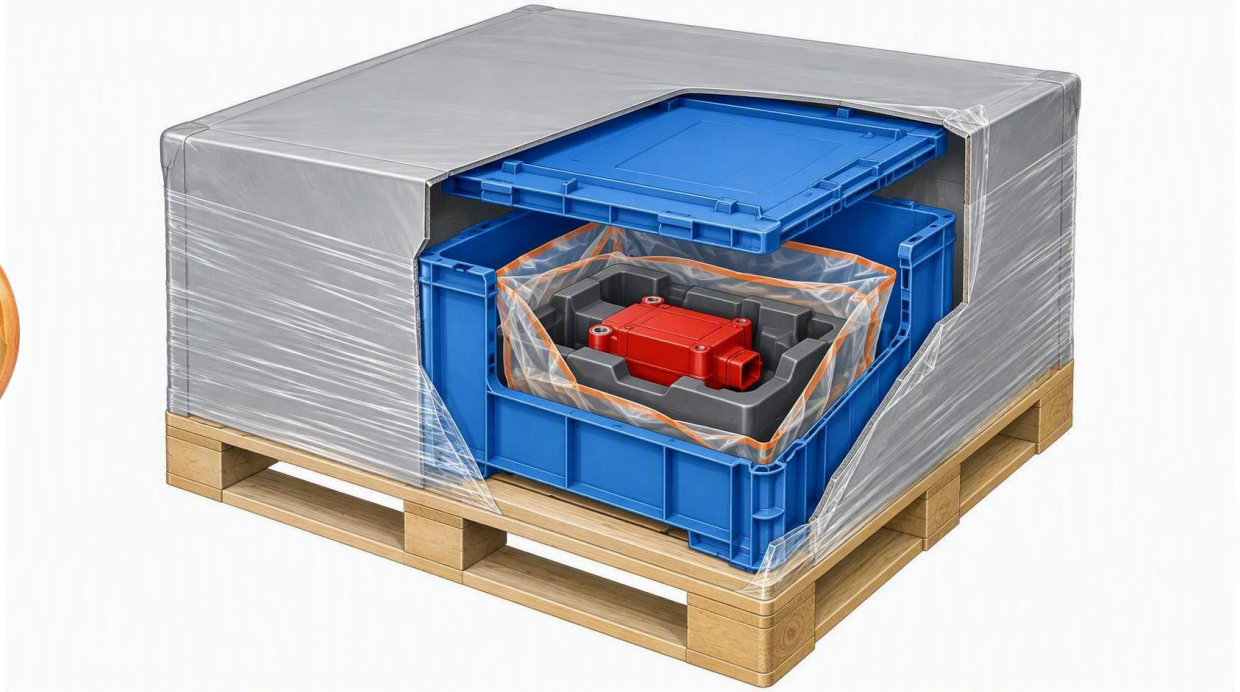


Skin 2: SLC packaging

SLC lid and SLC

Skin 3: Component packaging

PE bag and blister



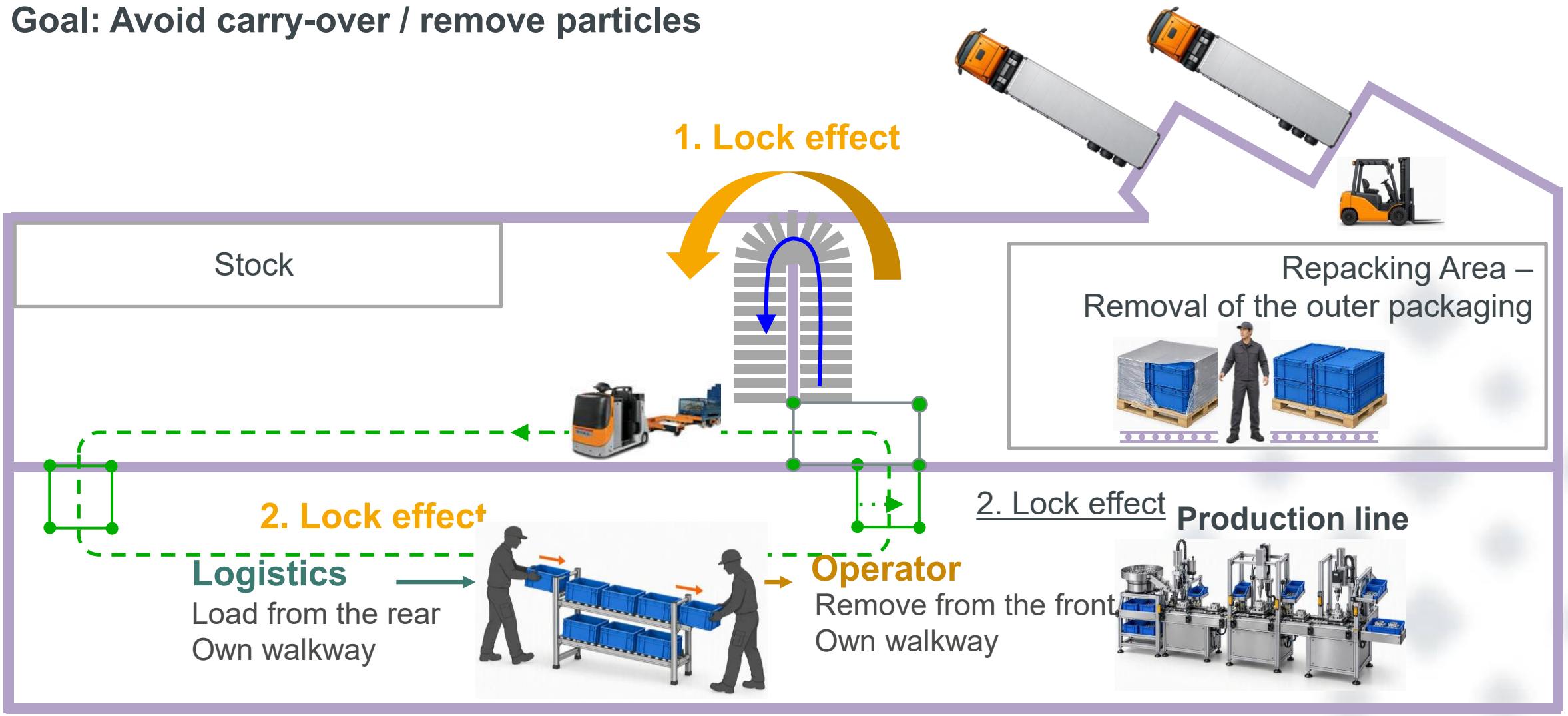
Component in protected core

INFLUENCE ON PRODUCT CLEANLINESS

Concept of optimized plant layout with 2 lock effects

CleanControlling®

Goal: Avoid carry-over / remove particles



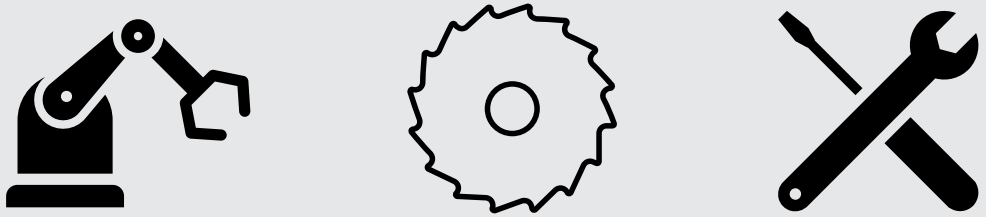
Separate walkways prevent dirt carry-over.

CONCEPTION OF A CLEAN PRODUCTION

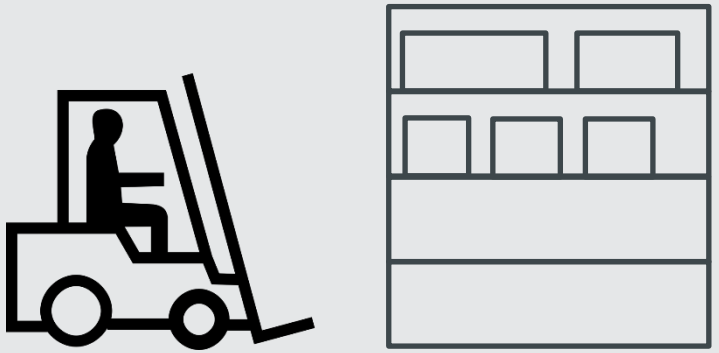
Processes and production equipment

CleanControlling®

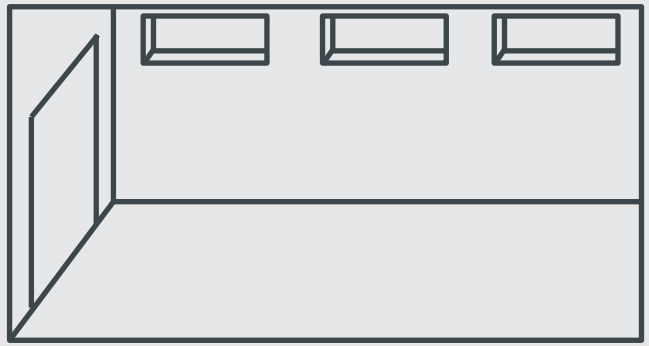
Processes / Production equipment



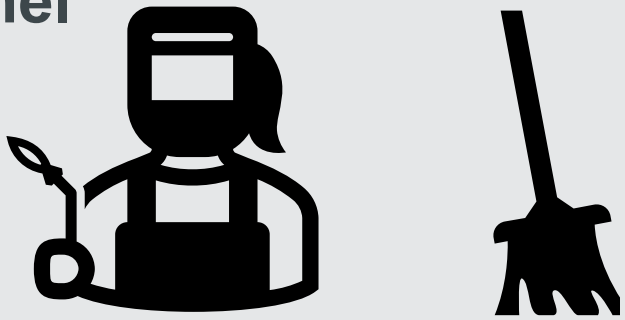
Logistics



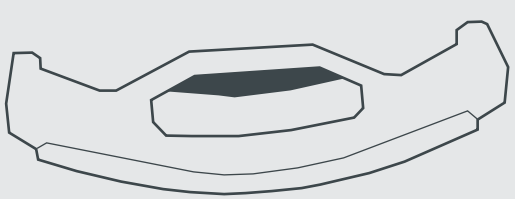
Production environment

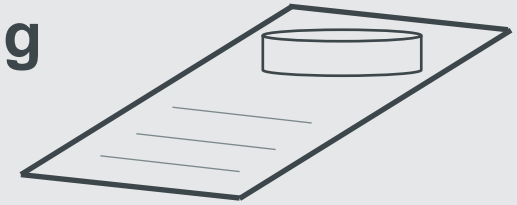


Personnel



Particle monitoring

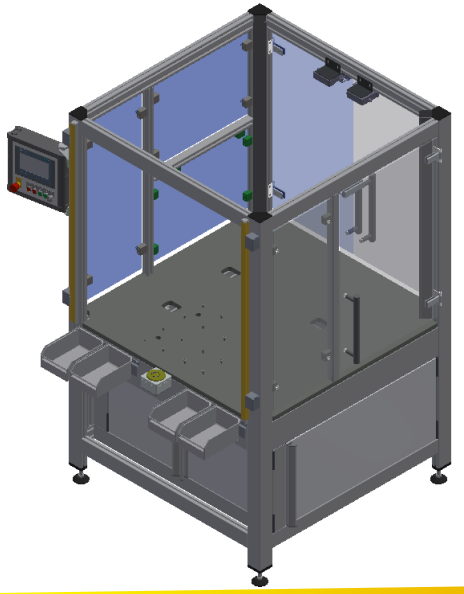




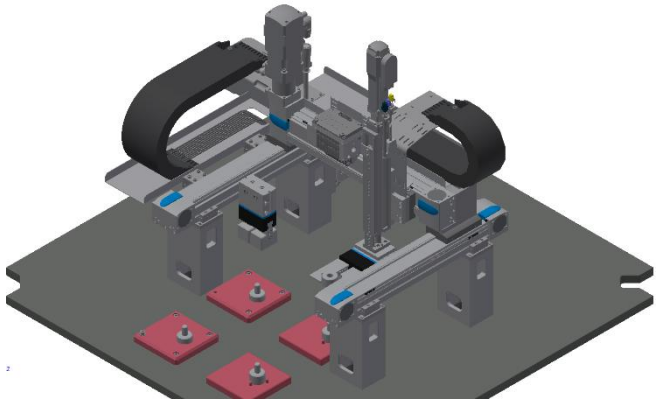
CLEANLINESS-ORIENTED ASSEMBLY EQUIPMENT

Risks of contamination in assembly equipment

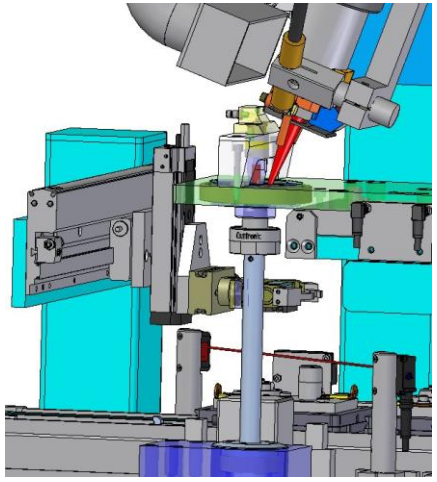
BASE CONSTRUCTION



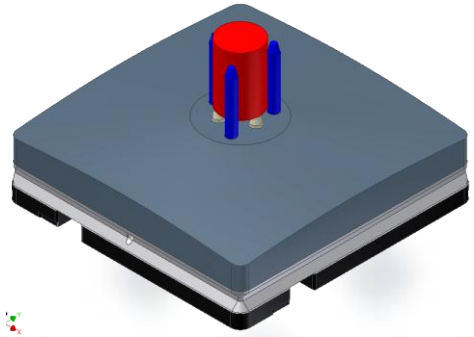
EQUIPMENT TECHNOLOGY



PROCESSES



DIRECT CONTACTING SURFACES



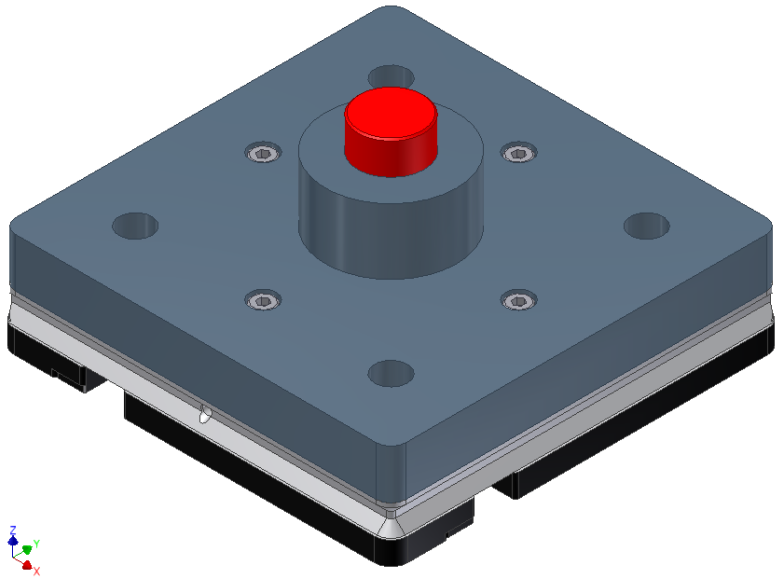
Probability of particle transfer

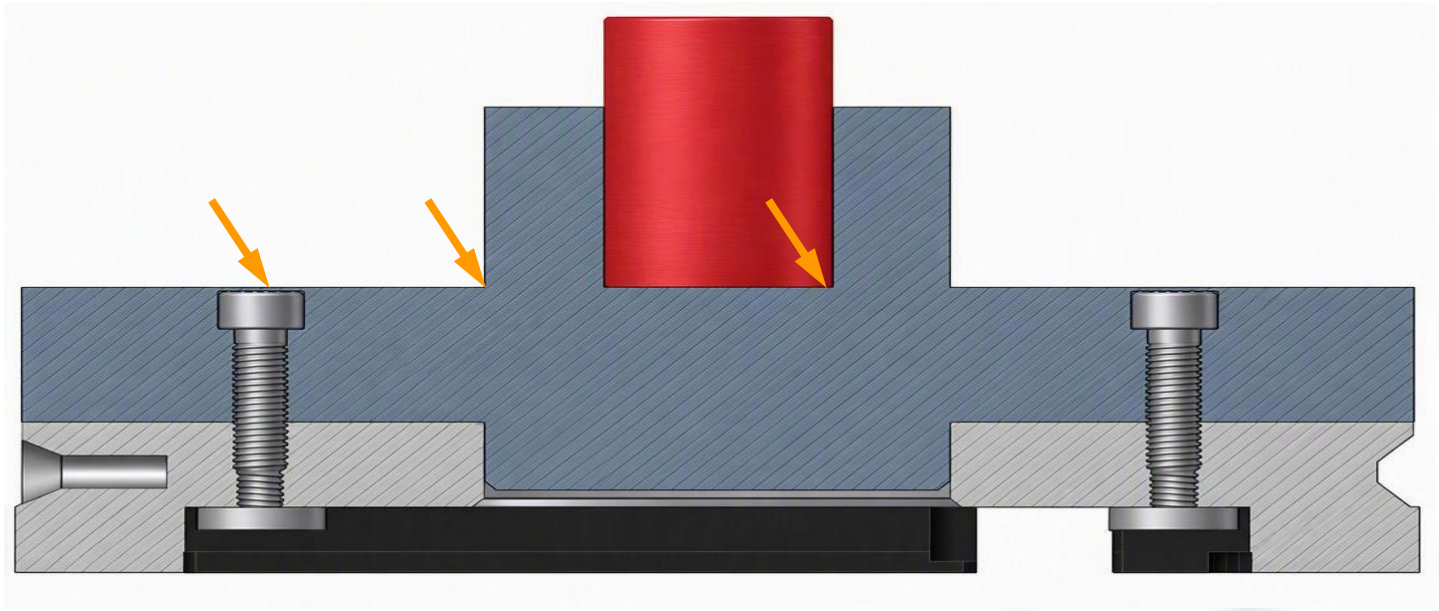
Particle carry-over by environment	Particle carry-over by operating equipment	Particle generating processes	Direct contacting surfaces

CLEANLINESS-ORIENTED ASSEMBLY EQUIPMENT

Design of product contacting surfaces

Conventional workpiece carrier without consideration of technical cleanliness

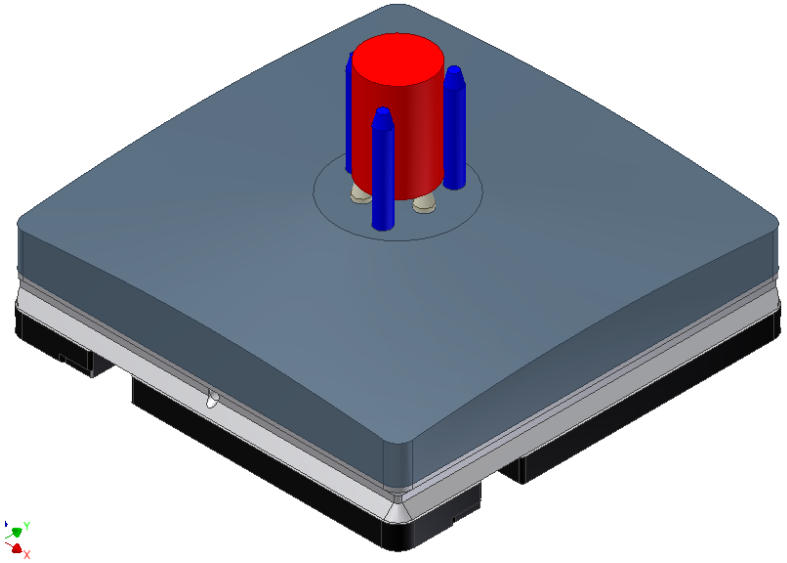


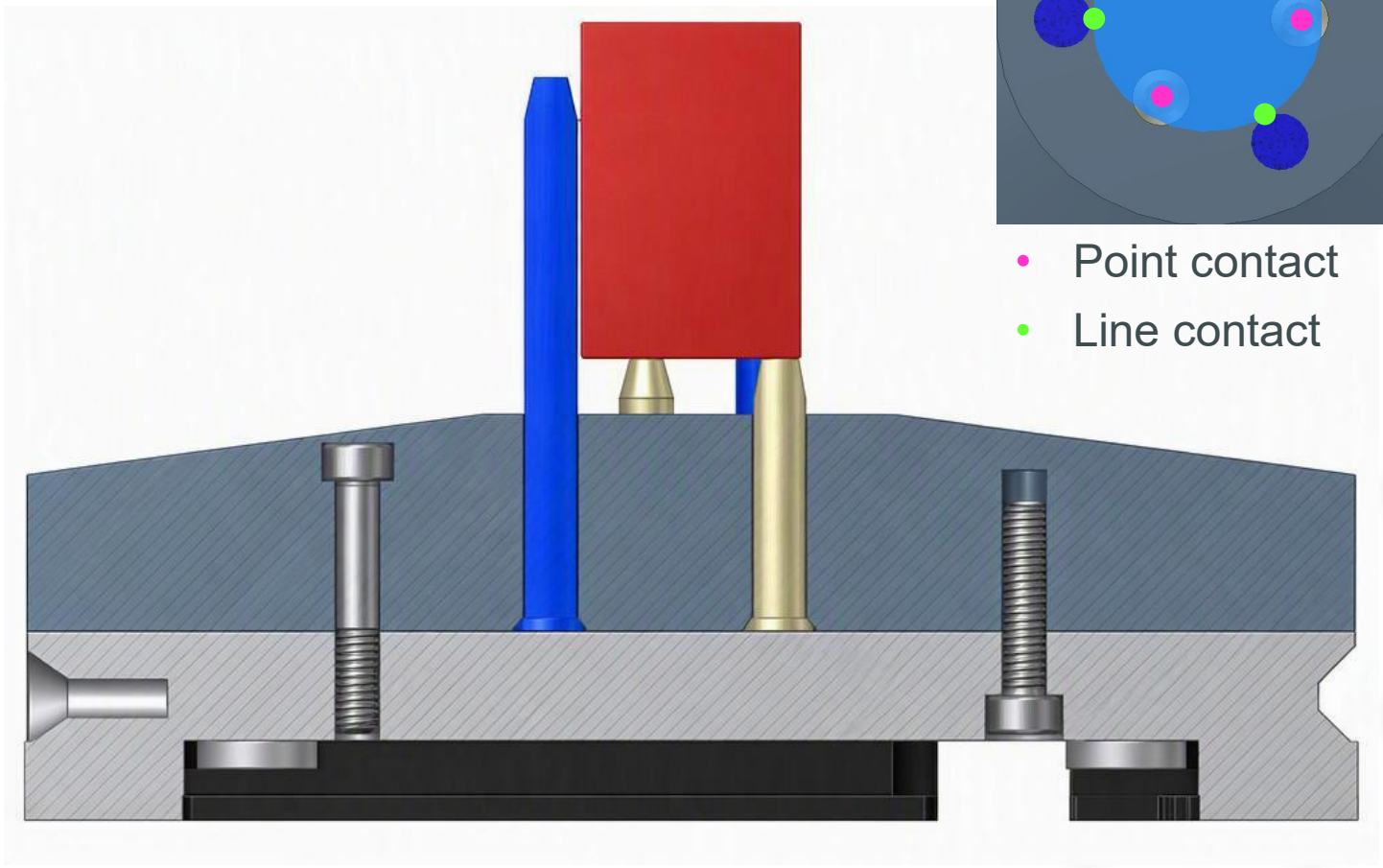


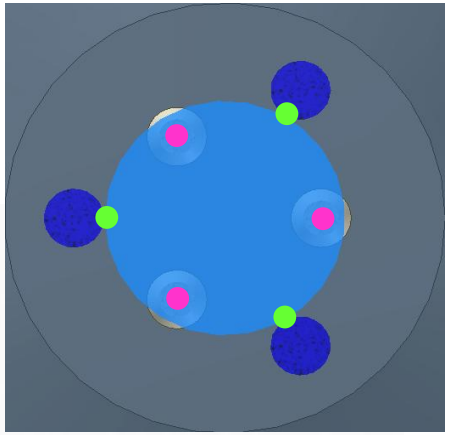
CLEANLINESS-ORIENTED ASSEMBLY EQUIPMENT

Design of product contacting surfaces

Workpiece carrier - optimized for cleanliness-sensitive production



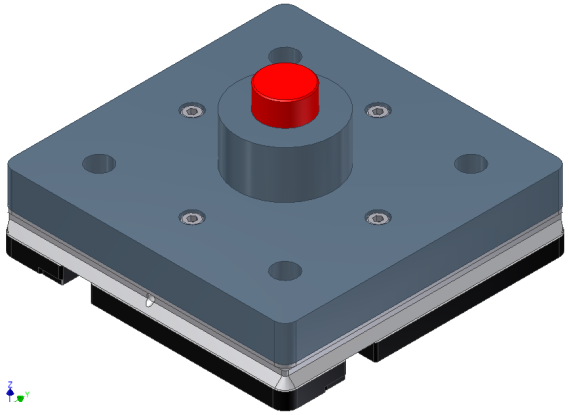




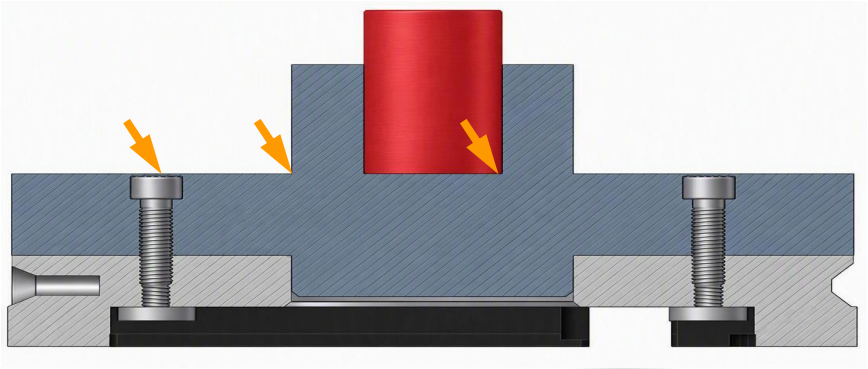
- Point contact
- Line contact

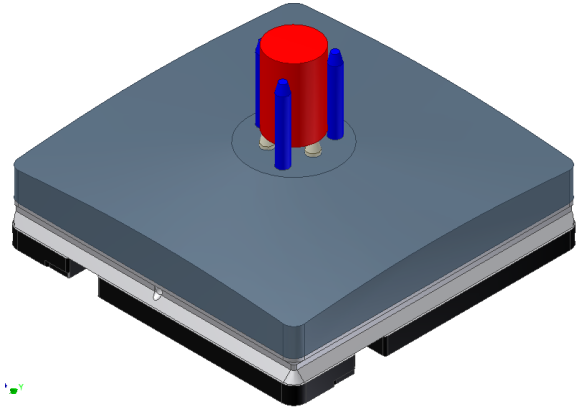
CLEANLINESS-ORIENTED ASSEMBLY EQUIPMENT

Design of product contacting surfaces

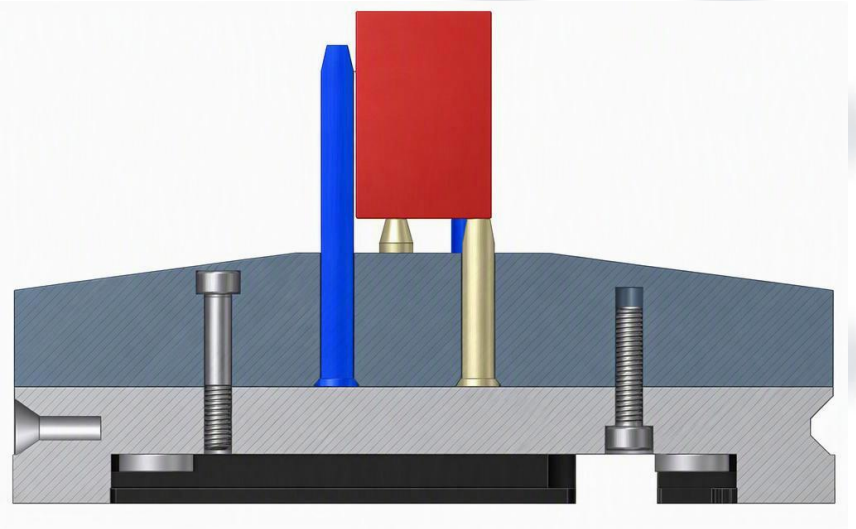


Product contacting surface	
Standing surface [mm²]	324
Shell surface [mm²]	1275
Line contact [mm²]	0





Product contacting surface	
Standing surface [mm²]	21,2
Shell surface [mm²]	0
Line contact [mm²]	63,8

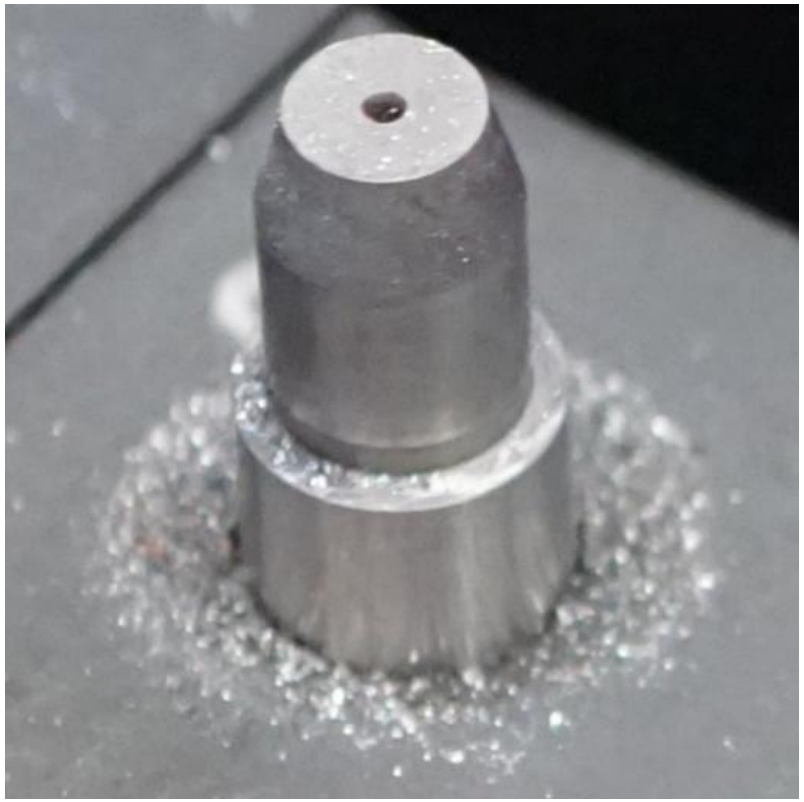


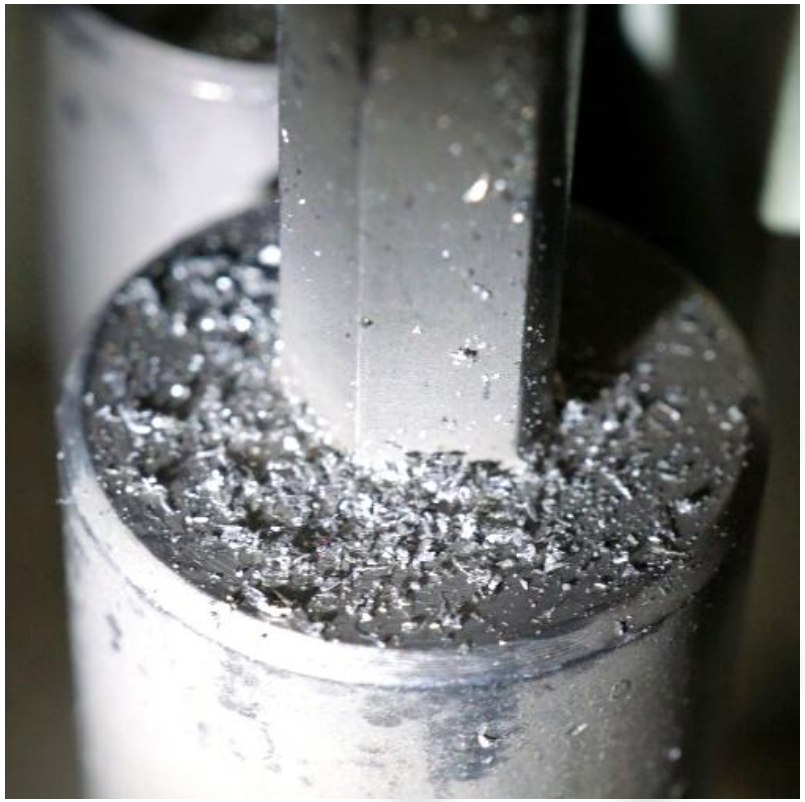
CLEANLINESS-ORIENTED ASSEMBLY EQUIPMENT

Design of product contacting surfaces

- Sharp edges generate particles
- Large contact surfaces transfer particles



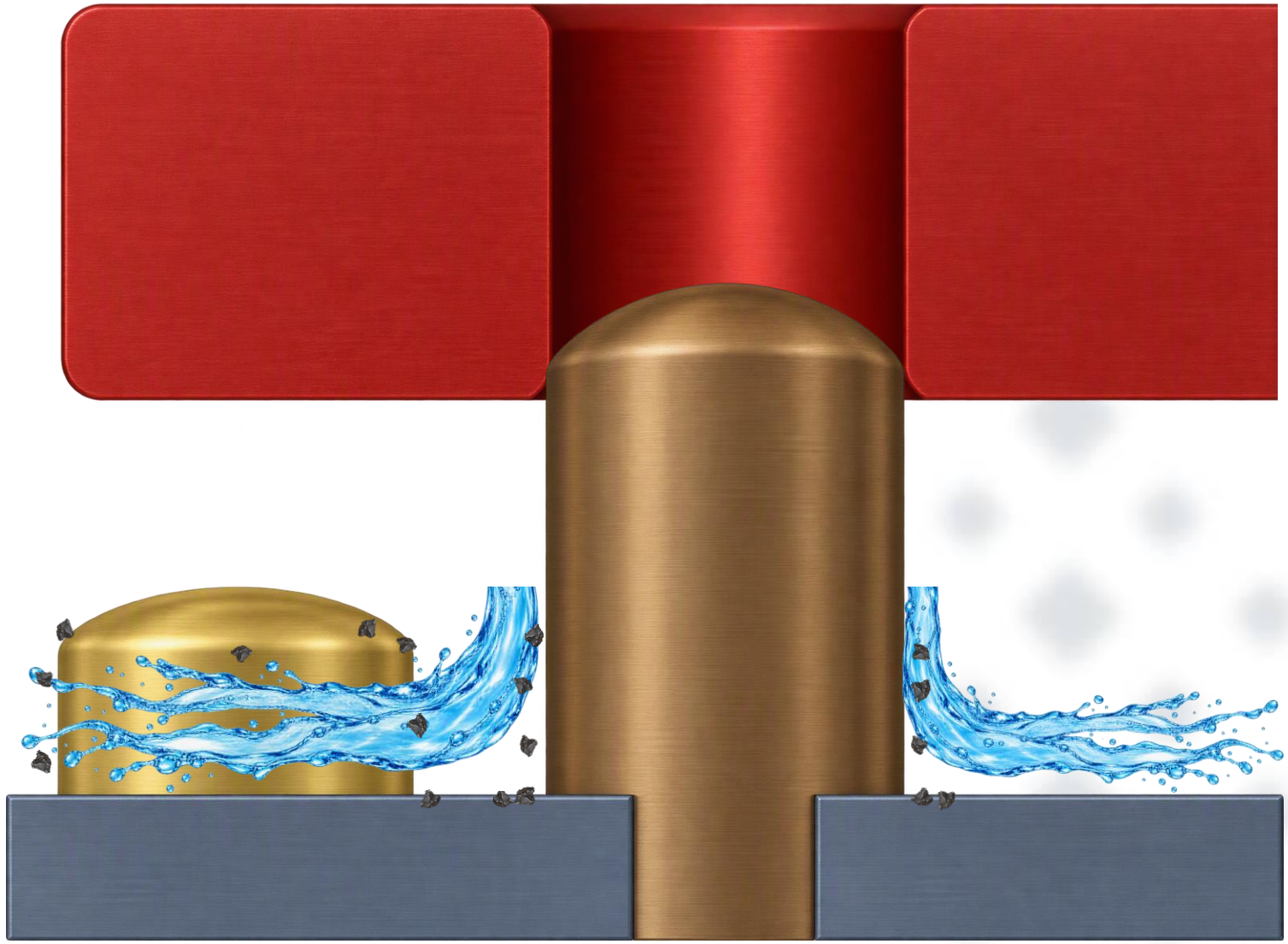


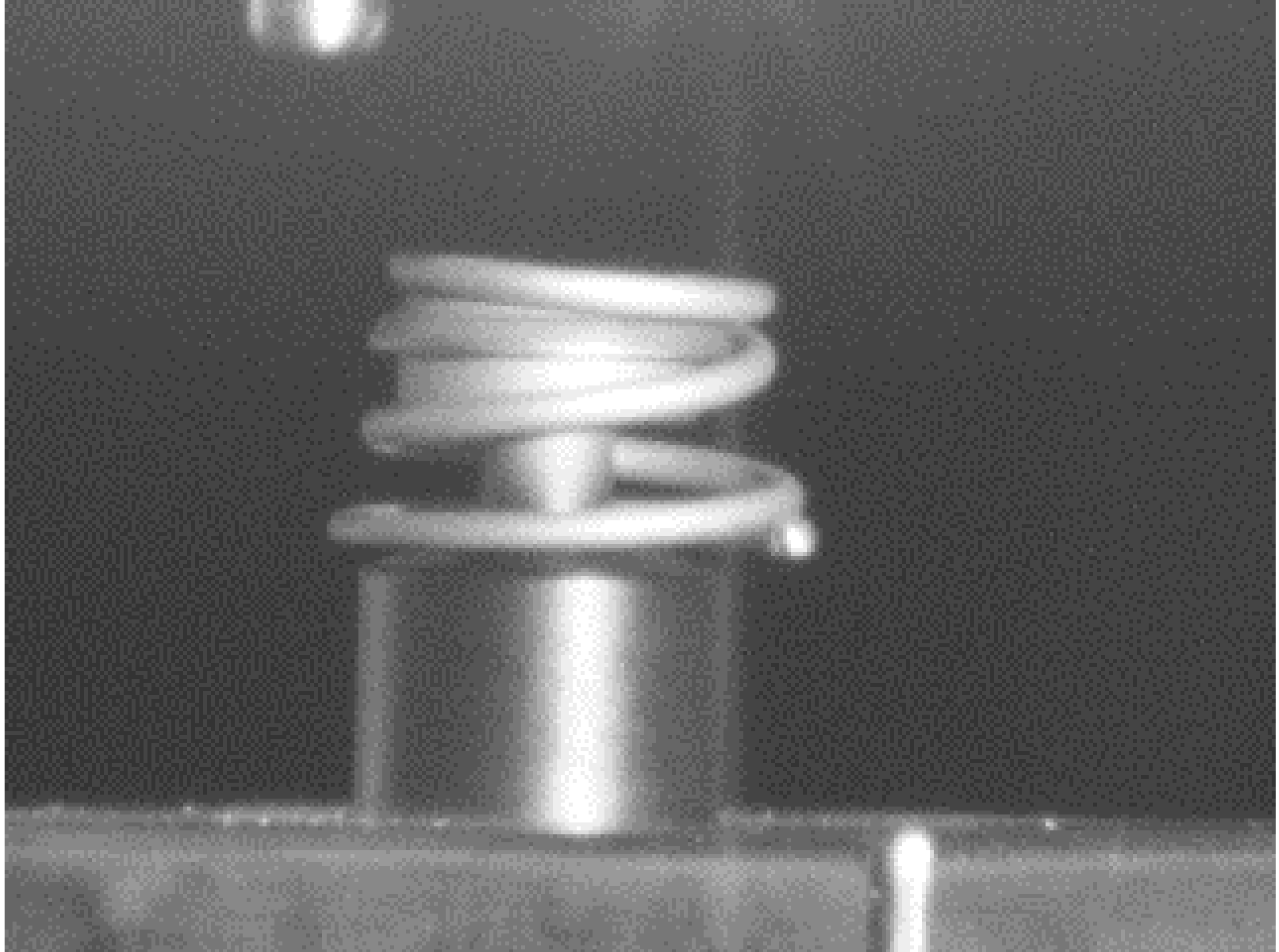


CLEANLINESS-ORIENTED ASSEMBLY EQUIPMENT

Design of product contacting surfaces

Separation of product placement and positioning



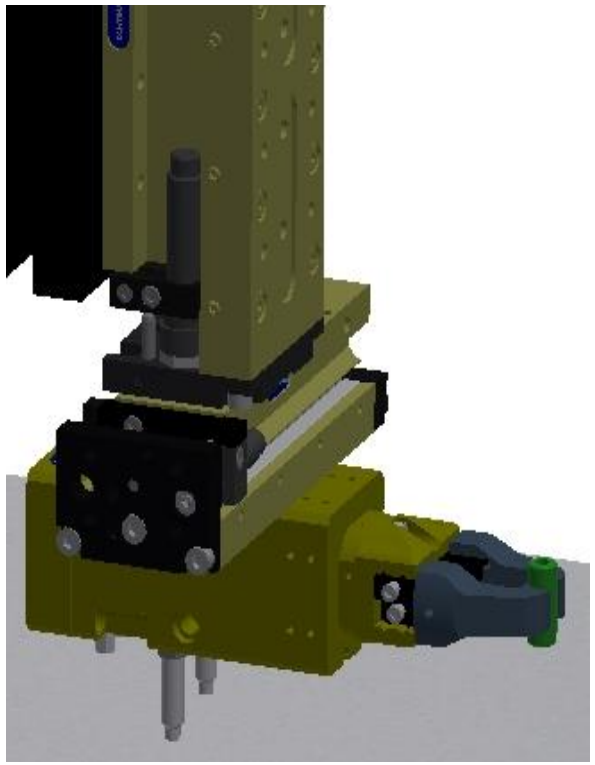


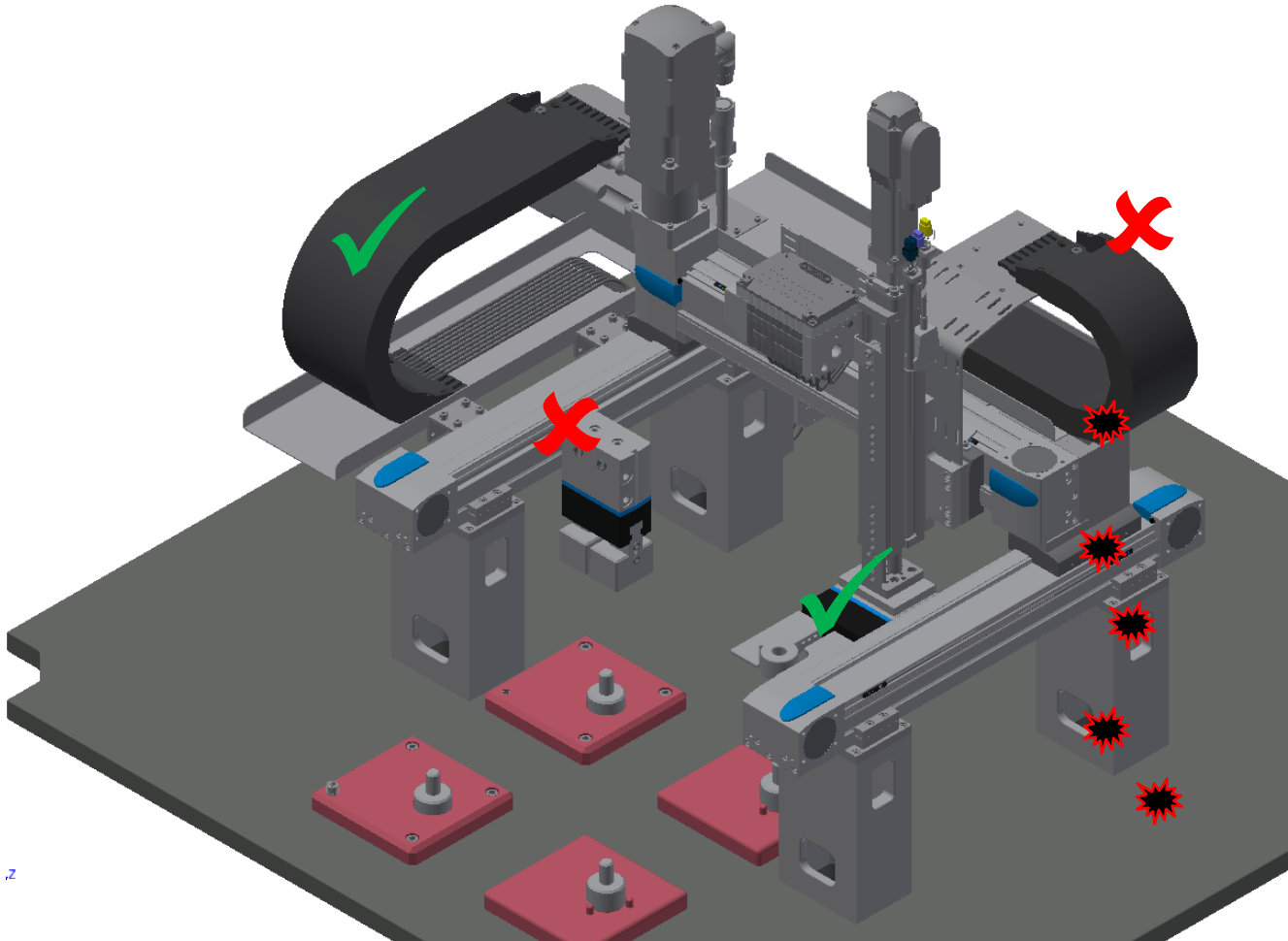
CLEANLINESS-ORIENTED ASSEMBLY EQUIPMENT

Design of the equipment technology

- Do not place particle-generating equipment above components or devices
  → Separations (sidewards), drip pans (underneath)
- Cranked gripper design







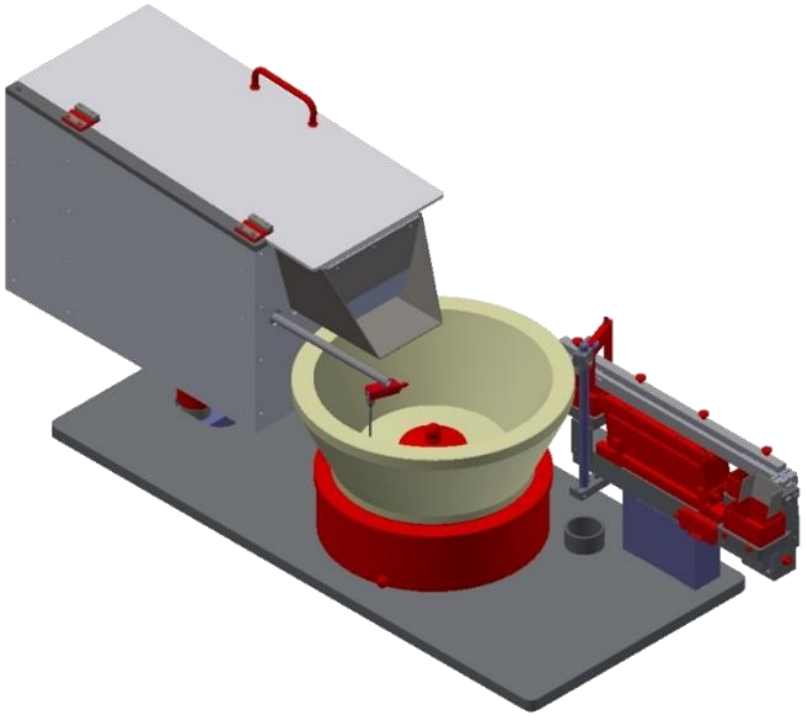
Source: Schunk

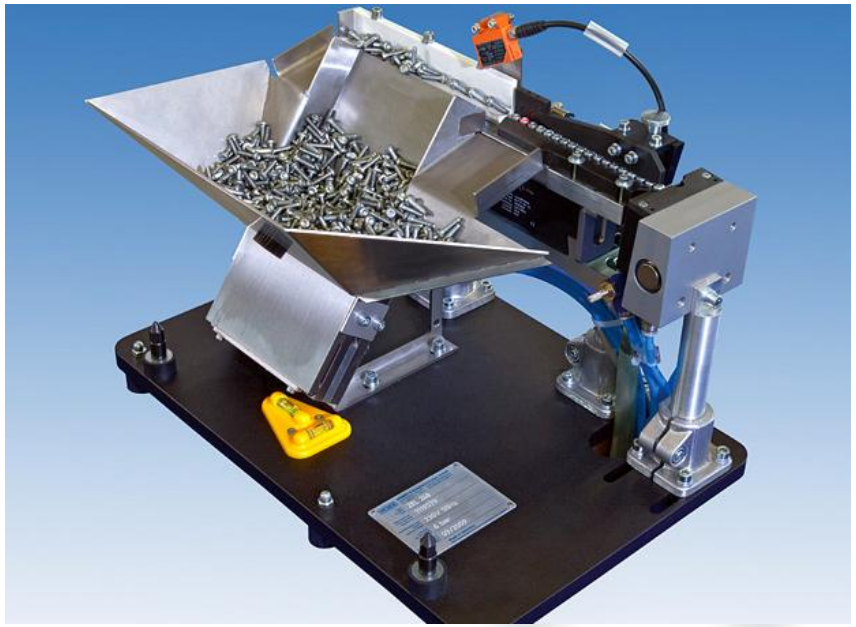
CLEANLINESS-ORIENTED ASSEMBLY EQUIPMENT

Design of the equipment technology

Separation systems

- Vibrating spiral conveyor ✗
- Segment conveyor ✓
- Step conveyor ✓





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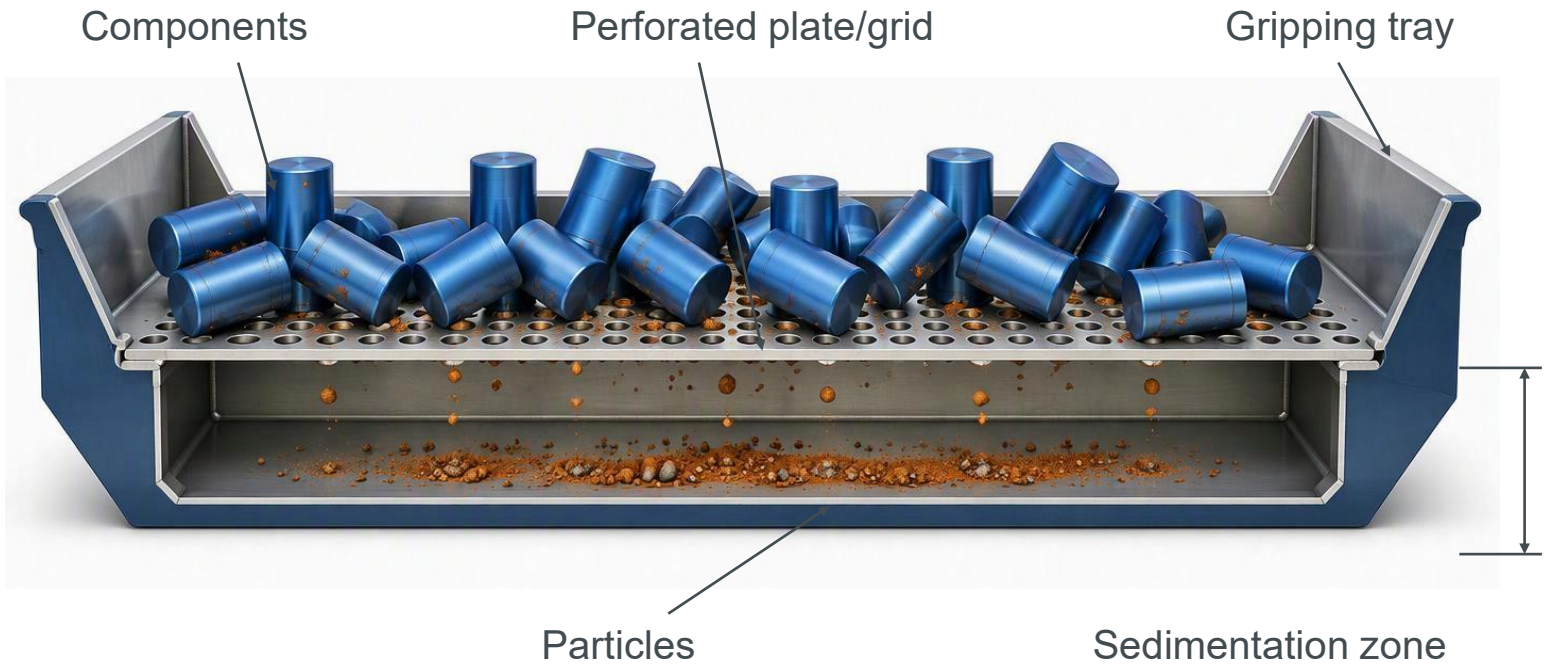
www.stoeger.com

CLEANLINESS-ORIENTED ASSEMBLY EQUIPMENT

Design of manual workplaces

Grid bottom in gripping containers

- No particle accumulation on the ground
- Accumulation in non-critical areas
- Cleaning effect









ASSEMBLY-INTEGRATED CLEANING ACCORDING VDA 19.2

Cleaning methods

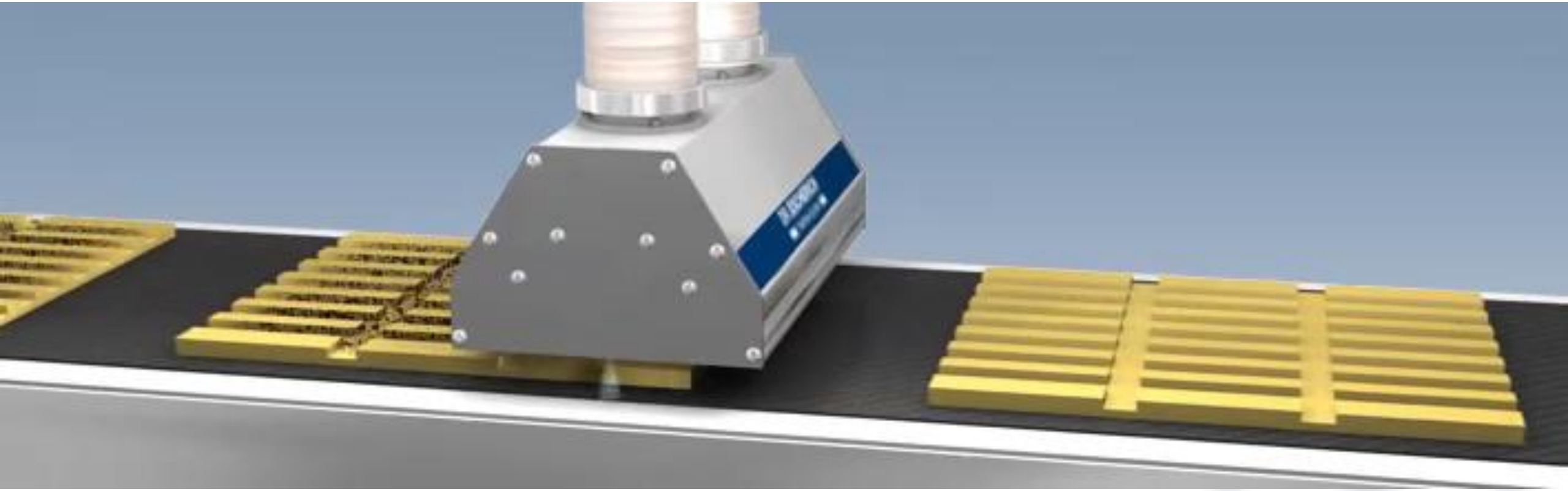
Cleaning procedure

- Suction Cleaning
- Blowing (with suction cleaning)
- Internal rinsing with pressurized gas
- Internal rinsing with negative pressure gas
- Internal rinsing with fluid
- Brushing (with suction cleaning)
- Dry ice snow (with suction cleaning)
- Vibration (with suction cleaning)
- Atmospheric pressure plasma
- Damp wiping
- Tapelift
- Magnet
- Demagnetisation

ASSEMBLY-INTEGRATED CLEANING ACCORDING VDA 19.2

Cleaning methods

Taifun-clean



www.dr-escherich.de

CONCLUSION

- Prevent contamination carry-over
- Apply the onion-skin principle to packaging
- The closer to the product, the higher the contamination risk
- Prioritize measures from the inside out
- Minimize product-contacting surfaces
- Avoid particle generation at the source
- Use assembly-integrated cleaning as a complementary measure:
  - Apply directly at or immediately after particle generation
  - Use when other measures are not sufficient
  - Use when simpler and more cost-effective than alternatives

QUESTIONS

CleanControlling®



Do you have any questions?

Chat



E-Mail

seminar@cleancontrolling.de

Thank you for your attention



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Senior Consultant

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