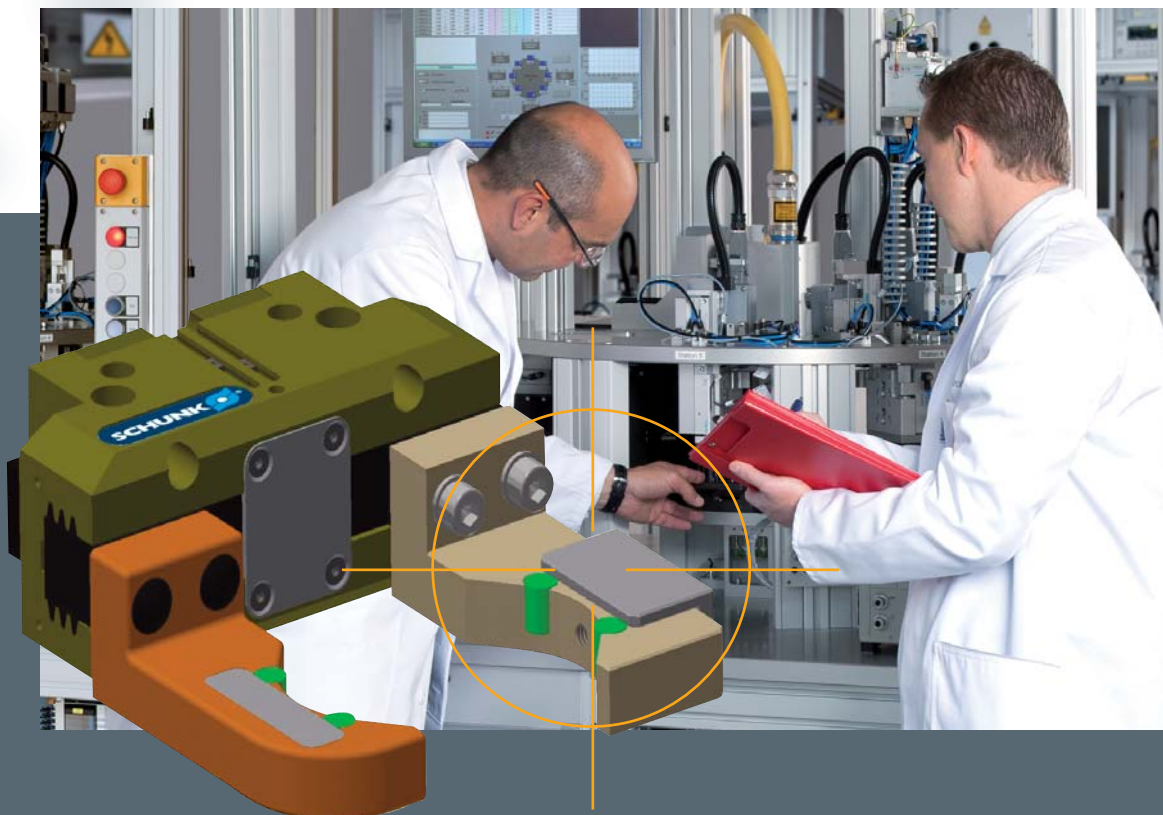
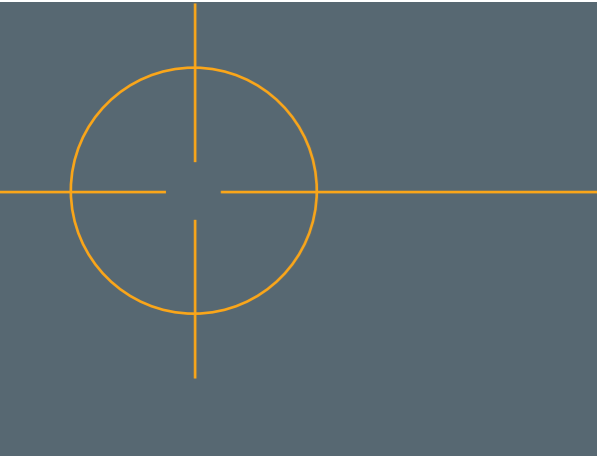


## TECHNICAL CLEANLINESS

- TRAINING
- CONSULTATION
- QUALIFICATION
- PRODUCTS
- ANALYSIS
- CONFERENCES





**CleanControlling GmbH is a leading international company in the field of technical cleanliness for industry and the automotive sector.**

The extensive experience gained from over 45,000 cleanliness tests and the profound knowledge accumulated from over 10 years of laboratory analysis, consulting and training on the topic of technical cleanliness makes us the leading specialist in the field of technical cleanliness.

We are committed to practice-oriented technical cleanliness with active participation in the committees for creation and further development of standards, guidelines and directives, like VDA 19, ISO 16232 and in the AdhãSa industrial association on the topic of adhesive cleanliness or film contamination.

With this expertise we also continually develop our consulting services and training contents further and utilize the experience gained from over 250 consulting projects with international customers in the process. The consultations focus on the optimization of the process chain to lastingly ensure the required cleanliness of your products with the best possible cost/benefit ratio.

Our comprehensive know-how on the topic of technical cleanliness in assembly is the basis for the development of a specialized product range that supports you in meeting your requirements and objectives for the technical cleanliness of your products and processes.

The reference for this are our renowned, successful customers from the sectors:

- ◆ Automotive and supplier industry
- ◆ Cleaning technology
- ◆ Aerospace technology
- ◆ Hydraulic components
- ◆ Precision engineering
- ◆ Medical technology



**YOUR CLAIM** Your gain control over your interests in technical cleanliness!

**OUR CONTRIBUTION** We create reliable, expressive cleanliness inspections, consult you comprehensively and neutrally, can educate and train you and help you choose the products and processes suitable for you. Put your trust in excellently trained specialists and use our experience and expertise.

**Training (6 - 14)**  
 Training, qualification, conferences and conventions like

- ◆ Basic training on technical cleanliness
- ◆ Specific training for production planning, product development, quality management, logistics, ...
- ◆ Employee sensitization
- ◆ Qualification as a specialist, qualified employee, auditor
- ◆ Conferences and conventions on specific topics - see the current offering on our homepage [www.cleancontrolling.com](http://www.cleancontrolling.com)

**Consulting (15 - 39)**  
 Customer-oriented, focused consulting and support for

- ◆ Production cleanliness assessment
- ◆ Audit/potential analysis
- ◆ Process chain analysis
- ◆ Design assessment
- ◆ Planning and implementing of cleanliness areas
- ◆ Requirement analysis
- ◆ Laboratory expertise
- ◆ Environmental cleanliness analysis
- ◆ Laboratory planning including equipment

**Qualification (40 - 43)**

**Products (44 - 45)**  
 Development, sale and marketing of proven products for technical cleanliness

- ◆ Products for particle monitoring
- ◆ Products for assembly cleanliness
- ◆ Products for laboratory technology

**Analytics (46)**

**Conferences (47)**

# Overview of our training and consulting services along the product development process (PDP)

## PDP - product development process - focus on technical cleanliness



### TRAINING

#### Your objective

Technical cleanliness - as much as required - no more than necessary!

#### Our solution

As we already accompany and support you in the early concept decision phase and consult you during the entire product development process, with us you can achieve your cleanliness-related requirements quickly, specifically and with optimized effort and expense. CleanControlling offers you exactly the independent consulting service you and your products require.

Basic training	Basic training				
Assembly cleanliness			Assembly cleanliness		
Equipment design			Equipment design		
Product design development	Product design development				
Standards testing	Standards testing				
Advanced quality planning		Advanced quality planning			
Cleanliness inspection		Cleanliness inspection			
Logistics and packaging		Logistics and packaging			
Training and sensitization of production employees				Training and sensitization of production employees	

### CONSULTATION

#### Our principles

#### As clean as necessary, not as possible!

The cleanliness specification is the starting point for us. We identify the areas of activity which represent the optimum cost/benefit ratio for our customers.

#### From the inside out

Particle sources are all the more critical the closer they are to the components or assemblies. We prioritize our recommendations for our customers to efficiently achieve specifications.

Also see the offering on our homepage regarding current conferences.

All services can be carried out both in German and in English.

Assessment					Production cleanliness assessment according to VDA19 Part 2
Audit					Audit/potential analysis according to VDA19 Part 2
Consultation	Requirement analysis		Environmental cleanliness analysis		
		Product design assessment	Process chain analysis		Laboratory assessment according to VDA 19.1
			Concept assessment of assembly equipment in CAD stage		Laboratory audit
				Microscopic component assessment	
	Standards testing		Planning and equipping of cleanliness areas		
		Limit determination	Creation of cleanliness-oriented design guidelines of assembly equipment	Supplier development	
		Creation of specifications			Troubleshooting in the field of technical cleanliness
		Creation of test specifications	Creation of logistics concept and packaging design		Process analysis
		Creation of company standards			Particle origin identification
			Laboratory planning incl. equipment		

### QUALIFICATION

Qualified employee of Technical Cleanliness

Specialist for Technical Cleanliness

Auditor for Technical Cleanliness



## BASIC TRAINING

The basic training course teaches the core elements of technical cleanliness and offers an overview of the relevant areas and influencing factors on the cleanliness of products and components. Specific solution options for improving the cleanliness quality are also taught.

### Targets

Project managers  
Product developers  
Process planners  
Production managers  
Quality managers  
Purchasing managers  
Logistics managers  
Sales managers  
Technical cleanliness managers

### Training course duration

0,5 - 1 day  
(basic training course – in-depth basics)

### Training location

At your company,  
on request at CleanControlling

### Article number

20002

## Contents

- ◆ "Technical cleanliness" motivation
- ◆ Particle types
- ◆ Damage mechanisms
- ◆ Relevant standards and customer-specific regulations
- ◆ Basics of testing the technical cleanliness according to VDA19.1/ISO16232
- ◆ Particle generation and carry-over along the value chain
- ◆ Basics of assembly cleanliness according to VDA 19.2
- ◆ Influencing factors of the areas
  - Environment
  - Logistics and packaging
  - Personnel
  - Processes and assembly devices
- ◆ Solution approaches for avoiding particle generation and carry-over
- ◆ Particle monitoring

## ASSEMBLY CLEANLINESS

The course on assembly cleanliness is directed at employees, who plan and design the processes within the assembly department. The course provides information on planning a cleanliness-oriented assembly department, focuses the influencing factors and describes the measures for reducing the particulate contamination.

### Targets

Project managers  
Process planners  
Production managers  
Quality managers  
Technical cleanliness managers

### Training course duration

1 day

### Training location

At your company,  
on request at CleanControlling

### Article number

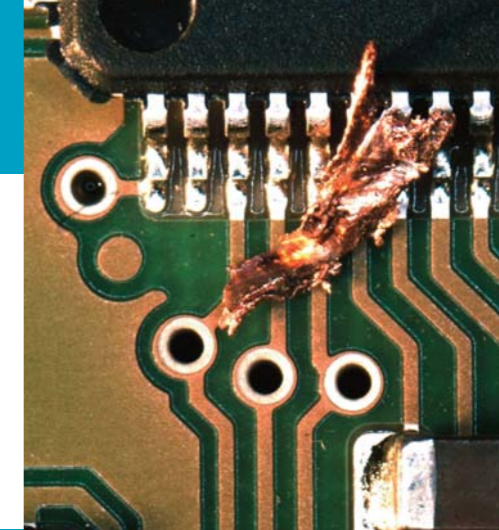
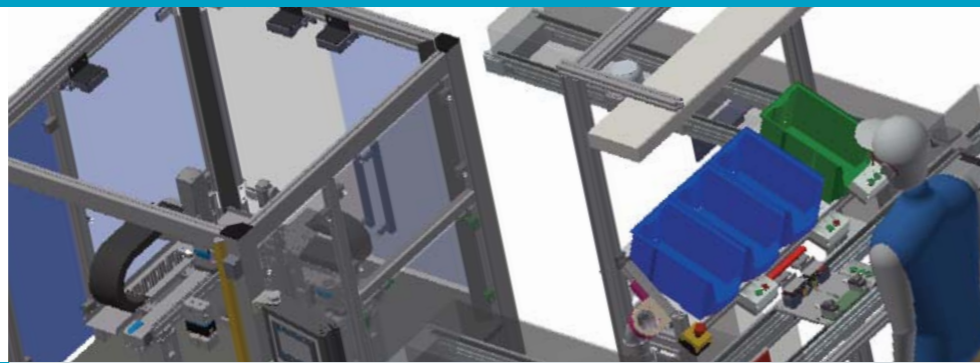
20003

## Contents

- ◆ Basics of assembly cleanliness according to VDA 19.2
- ◆ Cleanliness strategy along the value chain
- ◆ Planning while taking the influencing factors into account
  - Environment
    - Planning of assembly environment
    - Particle monitoring
  - Logistics and packaging
    - Logistics concepts
    - Packaging concepts
  - Personnel
    - Personnel influence
    - Clothing
    - Personnel qualification
  - Processes and assembly devices
    - Design of assembly equipment
    - Influence of processes
    - Assembly-integrated cleaning
- ◆ Verification of assembly systems according to VDA 19.1+2
  - Detection and evaluation of cleanliness influences of the assembly system
  - Particle monitoring in the process

## Optional / advanced

Discussion of the topics using the example of a production line in your company



## EQUIPMENT DESIGN

The equipment design training course explains the design principles of a cleanliness-oriented design using practical examples. In particular, the design of product contacting surfaces and the structure of cleanliness-sensitive assembly equipment is covered.

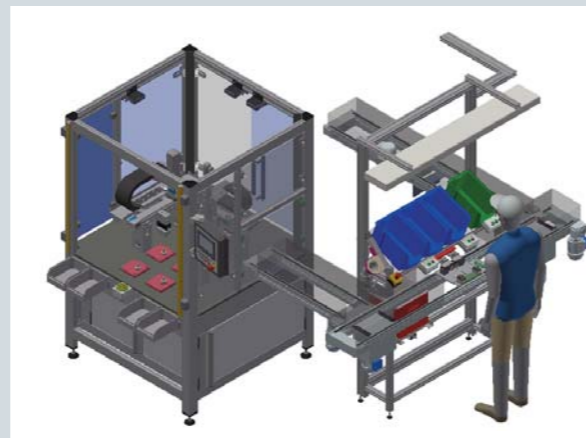
The course also includes the possible use of assembly-integrated cleaning processes for ensuring component cleanliness.

### Contents

- ◆ Basic training course on "Assembly cleanliness" according to VDA 19.2
- ◆ Presentation of criticality within areas of the assembly systems (especially surfaces that contact product)
- ◆ Design of assembly devices
  - Design principles
  - Operating equipment technology (transport systems, feeding)
  - Workpiece carriers and grippers
  - Encapsulation
  - Assembly-integrated cleaning
  - Commissioning (basic cleaning)
  - System care (keeping clean)
  - Influences and evaluation of various joining processes
  - Process chain analysis

### Optional / advanced

Discussion of the topics using the example of a production line in your company



#### Targets

Automation specialists  
System designers  
Project managers

#### Training course duration

0,5 - 1 day  
(basic training course - advanced training course)

#### Training location

At your company,  
on request at CleanControlling

#### Article number

20028

## PRODUCT DESIGN DEVELOPMENT

To take the customer's requirements for technical cleanliness into account, a cleanliness-oriented design must be developed in order to integrate the design criteria for technical cleanliness at an early stage. This in turn has a positive influence on particle development and carry-over.

The product development course should be seen in combination with the product design assessment workshop in which theoretical knowledge is illustrated using an actual product to jointly determine the potential for improvement.

### Contents

- ◆ Basics of technical cleanliness according to VDA 19.1+2
  - Particle types
  - CC Code, drawing entries, basics of standards
  - Qualification, declining curves
  - Cleanliness inspection procedure
  - Damage mechanisms of particles
- ◆ Specification of cleanliness requirements for individual areas of use
- ◆ Specification and budgeting of requirements
- ◆ Possible escalation scheme
- ◆ Implementation and interpretation of customer and supplier requirements
- ◆ Example of design implementation and its effect on product cleanliness

Practical module - see Product design assessment workshop

#### Targets

Project managers  
Product developers

#### Training course duration

0,5 days preferably in combination with the product design development workshop

#### Training location

At your company,  
on request at CleanControlling

#### Article number

20004





FMEA												
		Design-FMEA			Prozess-FMEA			Produktname		Produkt-Nr.		
		Modell/Systementwurf			Techn. Änderungsstand							
		Erstellt durch (Name/RL)			Verarbeitet			Erstellt	Überarbeitet	Aufwand (in h)		
Systemelement / Funktion	Mögliche Fehlerfolgen	Bedeutung	Möglicher Fehler / Fehlfunktion	Mögliche Fehlerursache	Derzeitiger Zustand			Empfohlene Abstellmaßnahmen	Verantwortlichkeit / Termin	Verbesserter Zustand		
					Vermeidungsmaßnahmen	Auftreten	Entdeckungsmaßnahmen			Entdeckung	RPN	Getroffene Maßnahmen
1												
Schnittstelle												
2												
Schnittstelle												

## STANDARDS TESTING

With this training course the contents and basics of standards for technical cleanliness are trained and its importance is explained using practical examples.

The course consists of the procedure for standards testing and the interpretation of the technical cleanliness regulations.

**Targets**  
 Technical cleanliness managers  
 Project managers  
 Product developers  
 Quality managers  
 Sales managers

**Training course duration**  
 0,5 days preferably in combination with the standards testing workshop

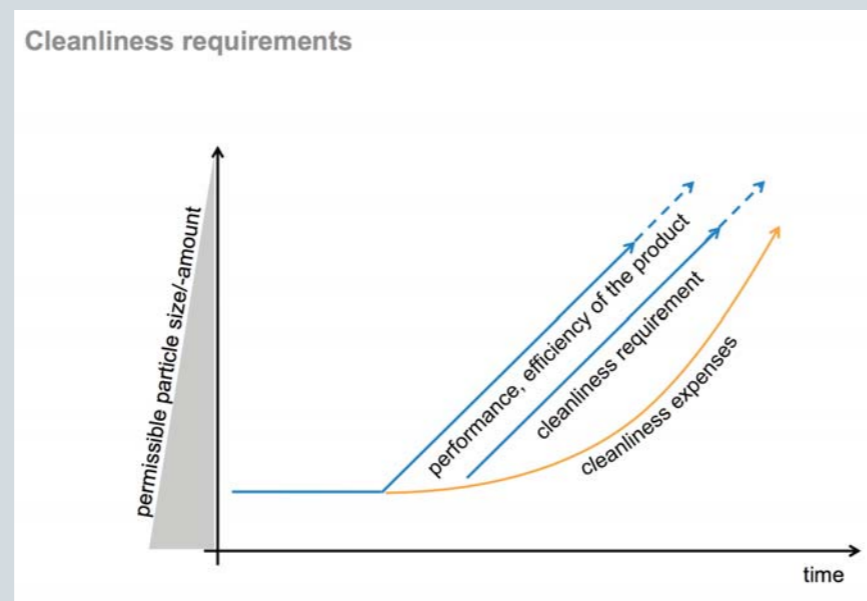
**Training location**  
 At your company,  
 on request at CleanControlling

**Article number**  
 20006

### Contents

- ◆ Basics of technical cleanliness according to VDA 19.1
- ◆ Customer and supplier requirements and their connection
- ◆ International standards structure
- ◆ Company standards of the OEMs
- ◆ Detailed joint discussion of example specifications and company standards
- ◆ Interpretation and implementation examples of customer requirements
- ◆ Approach of the standards testing

Practical module - see Standards testing workshop



## ADVANCED QUALITY PLANNING

The early planning and taking into account of the aspects of technical cleanliness in the product development process makes a major contribution to quality improvement. The course shows how technical cleanliness can be anchored in the various methods.

### Contents

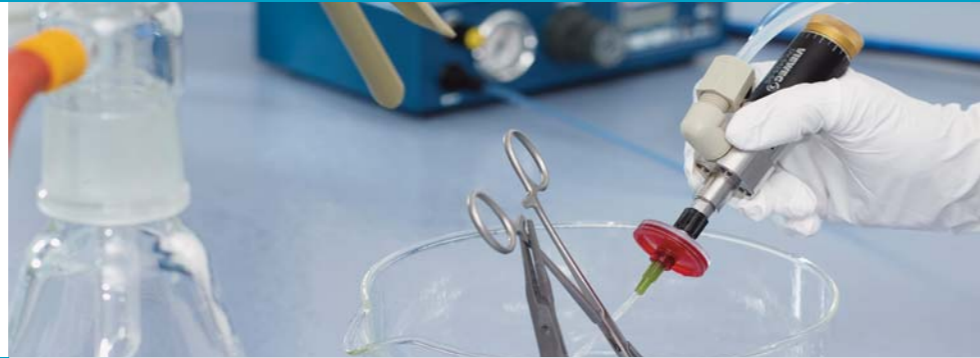
- ◆ Background of advanced quality planning
- ◆ Technical cleanliness in individual stages of APQP process
- ◆ Standards testing of customer company standards and drawings
- ◆ Process chain analysis for identification of influencing factors in manufacturing concept
- ◆ Technical cleanliness in various FMEAs
- ◆ Technical cleanliness in production steering plan/control plan
- ◆ Monitoring of product cleanliness in sample and series phase
- ◆ Planning of clean assembly
- ◆ Evaluation of suitability of assembly environment
- ◆ Particle monitoring

**Targets**  
 Technical cleanliness managers  
 Project managers  
 Product developers  
 Process planners  
 Quality managers  
 Logistics managers

**Training course duration**  
 0,5 day

**Training location**  
 At your company,  
 on request at CleanControlling

**Article number**  
 20009



## CLEANLINESS INSPECTION

This course teaches the standard- and guideline-conform performance of the cleanliness inspection for determining the technical cleanliness.

### Contents

- ◆ Basics of technical cleanliness
- ◆ Particle types
- ◆ Standard basis (ISO 16232/VDA 19.1)
- ◆ Special aspects of customer-specific standards
- ◆ CC-Code
- ◆ Filter preparation
- ◆ Extraction
- ◆ Filtration
- ◆ Analysis methods
- ◆ Qualification, declining curves
- ◆ Blank value tests
- ◆ Laboratory equipment
- ◆ Discussion of individual customer company standards
- ◆ Environmental conditions within the laboratory
  - Laboratory auditing
  - Cleanliness inspections of rooms using particle traps
- ◆ Visit of cleanliness inspection laboratory if desired

### Targets

Laboratory managers  
Laboratory employees  
Technical cleanliness managers

### Training course duration

1 day

### Training location

At your company,  
on request at CleanControlling

### Article number

20005

## LOGISTICS AND PACKAGING



Logistics, and in particular the packaging concept, has a major influence on the component cleanliness. This course teaches both the subject-matter of the factors and the measures for reducing these influencing factors.

### Contents

- ◆ Basics of technical cleanliness according to VDA 19.2
- ◆ Particle contamination in logistics
- ◆ Packaging types and concepts
- ◆ Constructive measures in logistics
- ◆ Operational measures in logistics
- ◆ Effect of air locks, onion-shell principle
- ◆ Cleaning packaging and verification of cleanliness
- ◆ Transport and air lock concept
- ◆ Unpacking and commissioning
- ◆ Practical examples

### Optional/advanced (additional 0.5 days)

Inspection of the logistics routes in the company and reflection of the theoretical contents in practice

### Targets

Logistics managers  
Production managers  
Technical cleanliness managers

### Training course duration

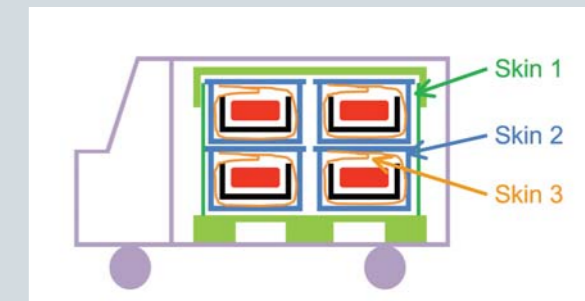
0,5 day

### Training location

At your company,  
on request at CleanControlling

### Article number

20010





## TRAINING AND SENSITIZATION OF PRODUCTION EMPLOYEES

The production employee is in many ways involved in the quality of the product. Sensitive handling of the products and early recognition of deviations and increased particle entry are taught. The employees are informed and sensitized with regard to technical cleanliness.

The training course is adjusted to the individual assembly system and products were possible.

### Theory

- ◆ Basics of technical cleanliness
- ◆ Particle types and their damage mechanisms
- ◆ Why are there cleanliness requirements in production?
- ◆ Insight into inspection of technical cleanliness
- ◆ Influencing factors for the technical cleanliness in production
- ◆ Particle monitoring

### Optional / advanced

Adjustment of the course documents to the assembly and products of your production department (additional expense for creating the training documents)

### Practical module

- ◆ Production tour, sensitization in production at exemplary workplaces
- ◆ Illustration of influencing factors, in particular cleanliness-sensitive handling in assembly

#### Targets

Production managers  
Production employees  
Logistics employees  
Technical cleanliness managers

#### Training course duration

0,5 day

#### Training location

At your company

#### Article number

20007

# CONSULTATION





## PRODUCTION CLEANLINESS ASSESSMENT

This inspection structured as a workshop combines theoretical basic knowledge with the practical approach so that experience can be gained using the example of one's own product and production department. The customer's requirement and/or internal requirements, as well as the specification are analyzed to focus the assessment on the necessary points. During the practical assessment along the value stream, deviations from the requirements are localized and measures and suggestions for optimization are recommended. In the process, the assembly equipment and the devices are inspected in great detail.

### Targets

Project managers, product developers  
Process planners Production managers  
Quality managers  
Purchasing managers  
Logistics managers  
Sales managers  
Technical cleanliness managers

### Duration

1 day  
The date can be expanded depending on the scope of the assembly steps to be inspected.

### Location

At your company

### Article number

20023

## Contents

- ◆ Basic training course on "Technical cleanliness" according to VDA 19.1
- ◆ Basic training course on "Assembly cleanliness" according to VDA 19.2
- ◆ Discussion of cleanliness requirements (internal/customer-side) of a specified product
- ◆ Assessment of the entire process chain or material flow from Receiving to Shipping
- ◆ Assessment of an example production or assembly line from the standpoint of assembly cleanliness (environment, logistics, personnel, assembly devices)
- ◆ Positioning and activating of particle traps for determining Ilig values (cleanliness figures)

## Optional / advanced

Summary of the entire workshop including discussion of the abnormalities, potential for optimization and suggestions for improvement in a comprehensive assessment report.

## AUDIT / POTENTIAL ANALYSIS ACCORDING TO VDA 19.2

With the potential analysis, systematic errors of the company are analyzed and weak points in the cleanliness are recognized. As a result, the potential analysis is an aid for locating possibilities for efficiently increasing and stabilizing the cleanliness quality.

The potential with regard to the technical cleanliness is evaluated using a selected product.

### Targets

Technical cleanliness managers and those responsible from the areas of Quality, Production and Logistics

### Duration

1 day

### Location

At your company

### Article number

20027

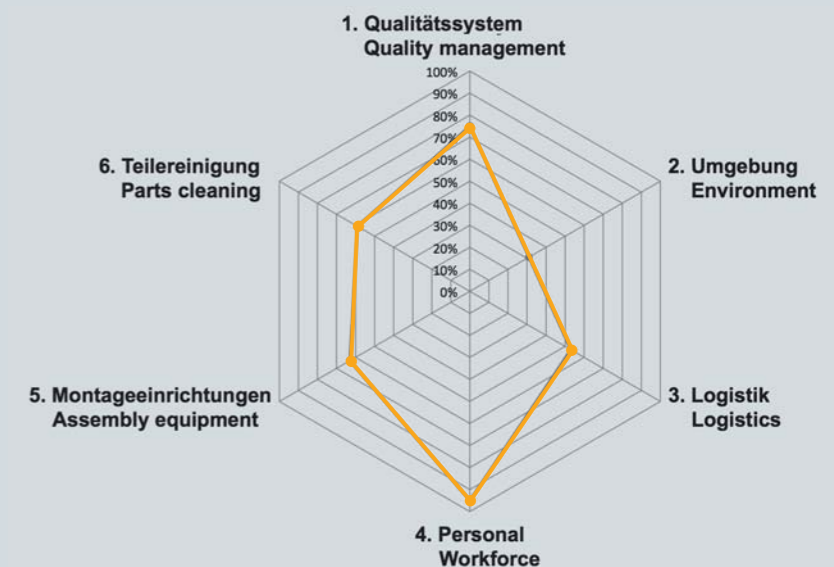


## Contents

- ◆ Assessment of the entire process chain based on questions on the potential analysis of a selected product
- ◆ Answering and evaluation of questions from the areas
  - Quality
  - Environment
  - Logistics
  - Personnel
  - Assembly equipment
  - Parts cleaning

## Optional / advanced

Summary of the results in a report with specification of the weak points and solution approaches.





## ENVIRONMENTAL CLEANLINESS ANALYSIS

The environmental cleanliness analysis is used

- ◆ for "validation" the influence and risks of the environment on the component cleanliness
- ◆ for localizing increased "risk areas"
- ◆ for monitoring changes to the environmental conditions

### Contents

The scope of the environmental analysis includes the following content

- ◆ Positioning and activating particle traps for the environmental cleanliness inspection by CleanControlling
  - At locations with an increased risk for component cleanliness
  - In a grid for analysis of an entire area and its general influence
- ◆ Particle traps: Number depending on size of area to be examined and prevailing conditions
- ◆ Deactivation of particle traps (optional: by CleanControlling)
- ◆ Microscopy of particle traps
- ◆ Creation of analysis reports

### Optional / advanced

- ◆ Creation of a report on the environmental cleanliness analysis with summary of the results and depiction of cleanliness figures and largest particles in a diagram, including discussion of abnormalities.

#### Targets

Production managers  
Technical cleanliness managers

#### Duration

In accordance with the number of particle traps to be activated

#### Location

At your company

#### Article number

20013

## PROCESS CHAIN ANALYSIS

In this workshop the individual process steps are listed and the specific influencing factors on the technical cleanliness are evaluated accordingly. With this method the critical particle sources can be determined in order to initiate specific measures.

#### Targets

Project managers  
Process planners  
Production managers  
Quality managers  
Technical cleanliness managers

#### Duration

1 day

#### Location

At your company

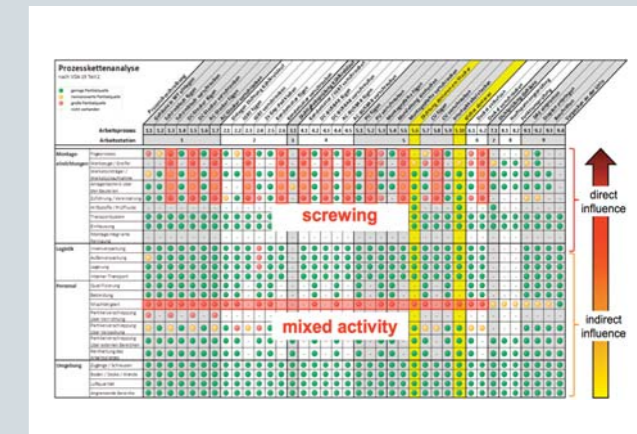
#### Article number

20008



### Contents

- ◆ Evaluation of the influencing factors from the environment, logistics, personnel and assembly devices on the detailed process steps.
- ◆ Interpretation of results
- ◆ Identification of process steps with increased risk



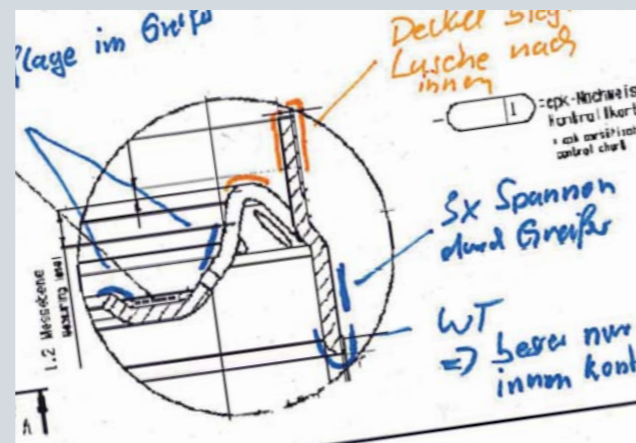


## PROCESS ANALYSIS

During the process analysis defined processes are individually examined for their danger potential. For this analysis processes are selected which present a high risk for the technical cleanliness. In the process, different methods are possible, as described in the contents.

### Contents

- ◆ Analysis of all geometries and surfaces which come into contact during the manufacturing process.
- ◆ Derivation of particle generation risks based on the interaction of the product and the process.
- ◆ If possible, visualization of the particle generation using a side light recording and a high-speed camera.
- ◆ Observation of particle generation in the process area
  - by means of pre-cleaning and particle extraction
  - with cleanliness inspections



### Targets

Project managers  
Process planners  
Production managers  
Technical cleanliness managers

### Duration

1 day

### Location

At your company

### Article number

20011

## CONCEPT ASSESSMENT OF ASSEMBLY EQUIPMENT IN CAD STADIUM

Before the assembly equipment is produced and change are no longer possible without additional costs, an assessment of the design is advisable.

Using the CAD data, the design is evaluated, weak points are identified and possible solutions are described.

### Targets

Automation specialists, system designers, project managers, technical cleanliness managers

### Duration

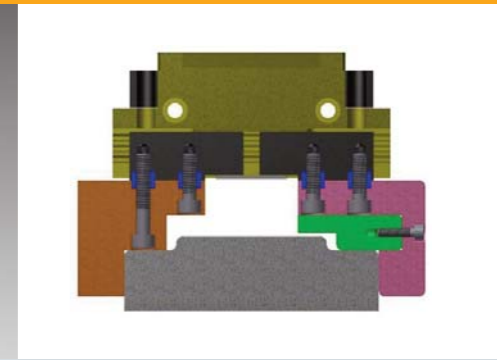
1 day

### Location

At your company or at the system designer's location

### Article number

20017

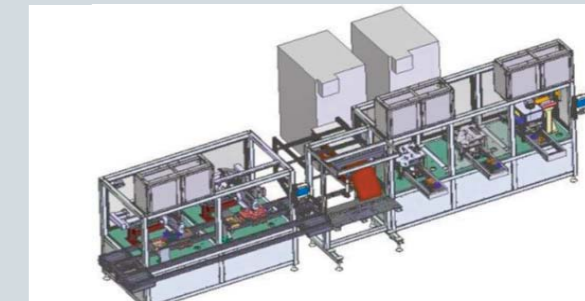


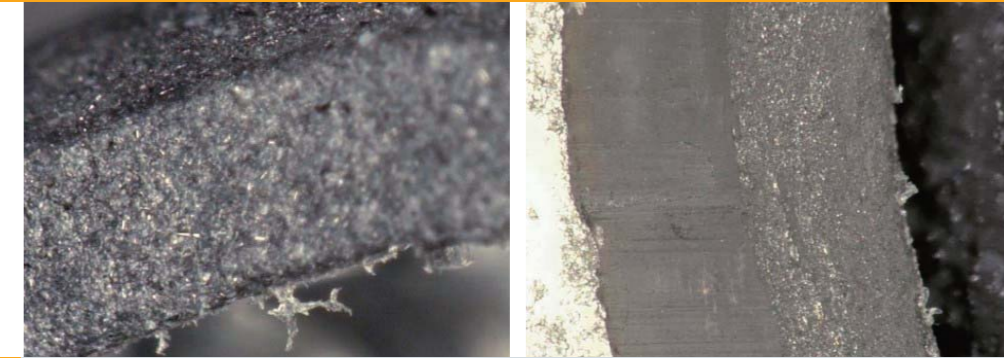
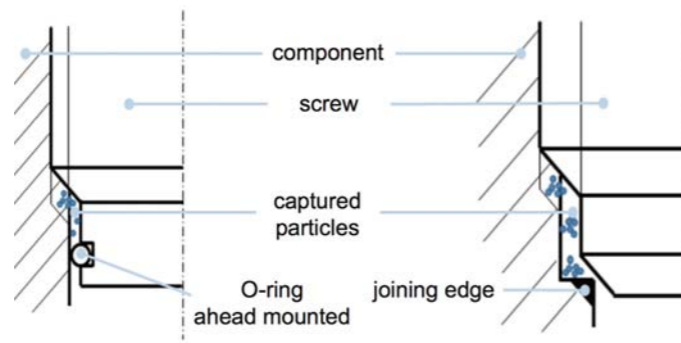
### Contents

- ◆ Assessment of equipment design according to the design principles of VDA 19.2
- ◆ Estimation of risk and recommendation of possible measures for avoiding particle generation or carry-over.

### Optional / advanced

Summary of the deviations including discussion of the abnormalities, potential for optimization and suggestions for improvement in a comprehensive assessment report.





## PRODUCT DESIGN ASSESSMENT

To take the customer's requirements for technical cleanliness into account, a cleanliness-oriented design must be developed in order to integrate the design criteria for technical cleanliness at an early stage. This in turn has a positive influence on particle generation and carry-over.

The Product Design Assessment workshop should be seen in combination with the Product Design Development training course in which theoretical knowledge is taught.

### Contents

- ◆ Assessment of the design of a relevant product
- ◆ Description of cleanliness-related weak points
- ◆ Specification of solution approaches
- ◆ Depiction of effects of design on manufacturing process

#### Targets

Project managers  
Product developers

#### Duration

0,5 days preferably in combination with the Product Development training course

#### Location

At your company,  
on request at CleanControlling

#### Article number

20019

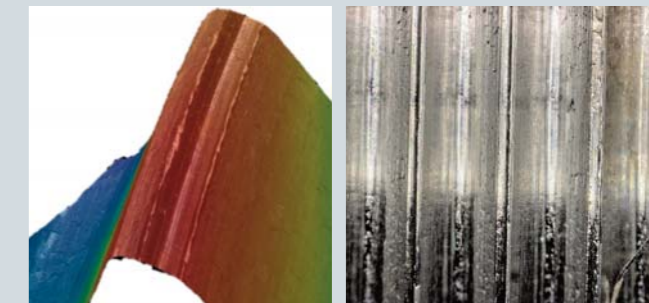
## MICROSCOPIC COMPONENT ASSESSMENT

The quality of the individual parts and assemblies flowing into the assembly decisively affect the cleanliness of the product. Decisive is, on the one hand, the component cleanliness, (measurable with the cleanliness inspection), but also the condition of the components, e.g. fixed burrs that can break during assembly. Abnormalities and damages of the surface are assessed using microscopic examination.

### Contents

Visual inspection of the components

- ◆ Microscopic component examinations for identification of particle generating geometries.
- ◆ The individual parts are examined for particulate contamination, burrs, anomalies and other particle generating influences using a microscope.



#### Duration

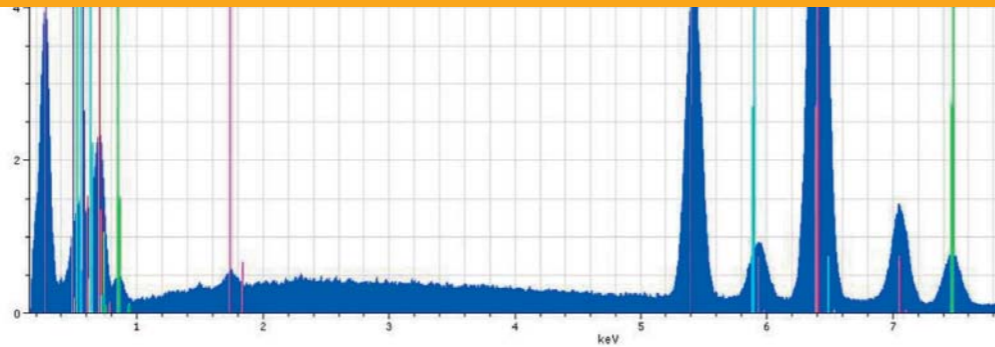
In accordance with the components to be assessed

#### Location

CleanControlling,  
on request also at your company

#### Article number

20020

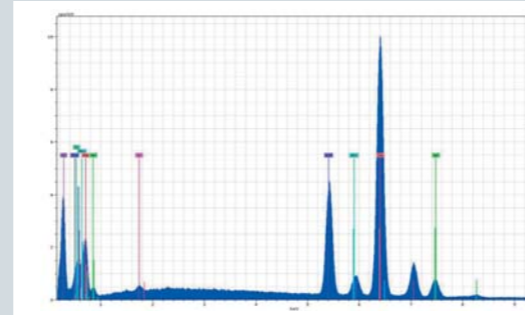


## PARTICLE SOURCE INVESTIGATION

Assessment for identification of the particle source based on detected particles from the cleanliness inspection or direct inspection.

### Contents

- ◆ Particle analysis for identification of material or comparable material
  - EDX particle analyses
  - Infrared spectroscopy of particles
- ◆ Material comparison with materials used in assembly in accordance with influencing factors: environment, logistics, personnel, assembly equipment
- ◆ Assessment of localization of the particle source



### Targets

Technical cleanliness managers  
Project managers  
Process planners  
Production managers  
Quality managers

### Duration

1 day + material analyses

### Location

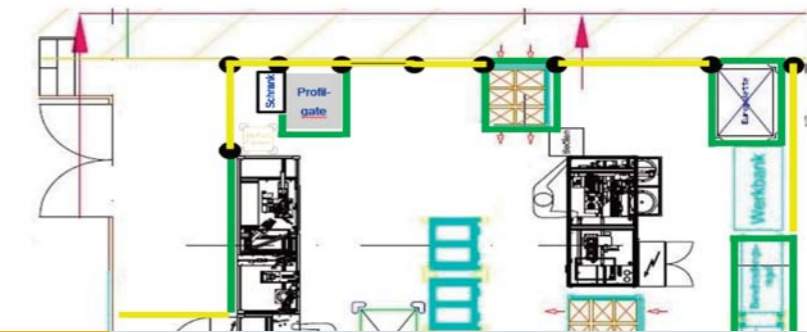
At your company

### Article number

20021

## PLANNING AND EQUIPPING OF CLEANLINESS AREAS

The workshop serves for the concept development of the cleanliness area in accordance with the requirements for the product to be produced.



### Contents

- ◆ Training course for designing the cleanliness areas (cleanliness zone/cleanliness room)
- ◆ Requirement analysis
- ◆ Development of concept for cleanliness area including inspection of the areas
  - Spatial design necessities, air lock concept if necessary
  - Clothing concept
  - Effect on logistics concept
  - Behaviors in designed cleanliness area
  - and other requirements for cleanliness area

### Targets

Technical cleanliness managers  
project managers  
Process planners  
Production managers  
Quality managers

### Duration

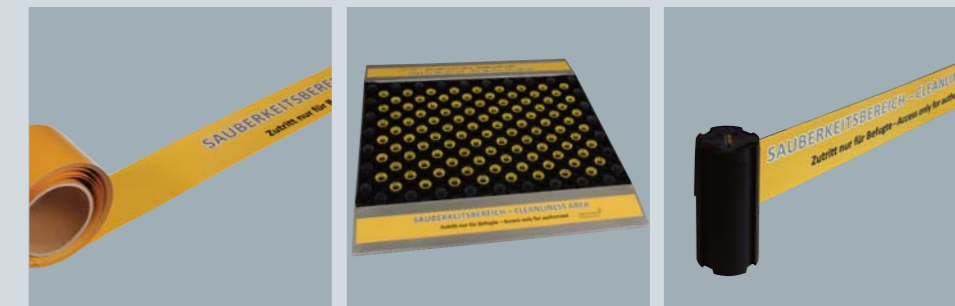
1 day

### Location

At your company,  
on request at CleanControlling

### Article number

20034





## REQUIREMENT ANALYSIS

In this workshop the customer's requirements and/or internal requirements are to be analyzed and derived.

### Contents

- ◆ Detailed analysis of customer specifications for a product with reference to
  - Particle types
  - Particle quantity
  - Specification for cleanliness inspection
- ◆ Effects on production and logistics
- ◆ Depiction of requirement in dispersibility diagram
- ◆ Definition of cleanliness grade in accordance with the requirements

#### Targets

Technical cleanliness managers  
 Project managers  
 Product developers  
 Process planners  
 Production managers  
 Quality managers  
 Sales managers

#### Duration

0,5 days

#### Location

At your company,  
 on request at CleanControlling

#### Article number

20035

## STANDARDS TESTING

Using a current standard, the contents are analyzed and the significance for the product and production is interpreted.

### Contents

- ◆ Testing and analysis of a specific customer standard
- ◆ Detailed joint discussion of a current company standard
- ◆ Interpretation of company standard with regard to implementation in areas
  - Environment
  - Logistics and packaging
  - Personnel
  - Processes and assembly equipment

#### Targets

Technical cleanliness managers  
 Project managers  
 Product developers  
 Process planners  
 Production managers  
 Quality managers  
 Sales managers

#### Duration

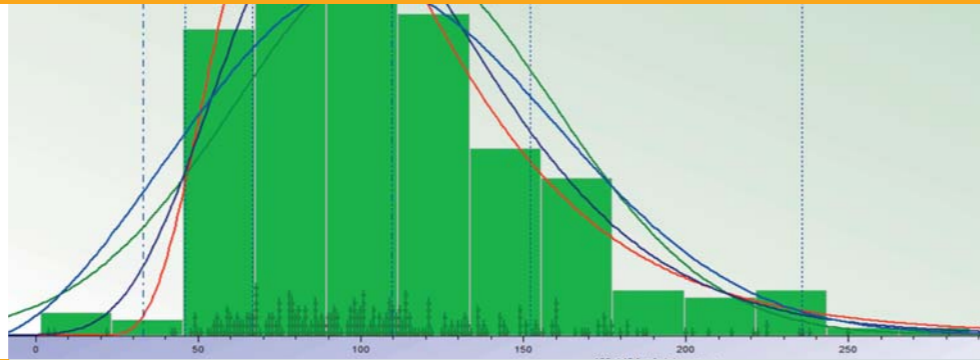
0,5 days preferably in combination with the Standards Testing training course

#### Location

At your company,  
 on request at CleanControlling

#### Article number

20036



## LIMIT DETERMINATION

The limit determination is carried out according to an explanation of the various methods. The corresponding, collected information is evaluated and limits determined/derived.

### Targets

Technical cleanliness managers  
Project managers  
Product developers  
Process planners  
Production managers  
Quality managers  
Sales managers

### Duration

The duration is dependent on the scope of the data to be analyzed. The limits are determined by CleanControlling. The evaluated data and results are discussed as part of a workshop.

### Location

Determination of the limit values at/by CleanControlling

General discussion at your company on request at CleanControlling

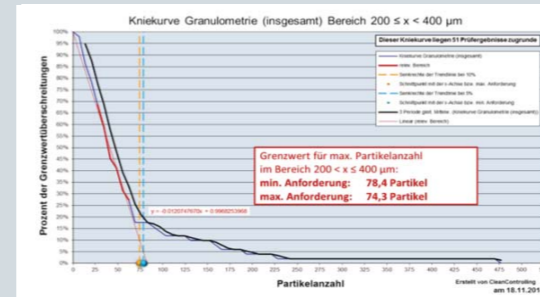
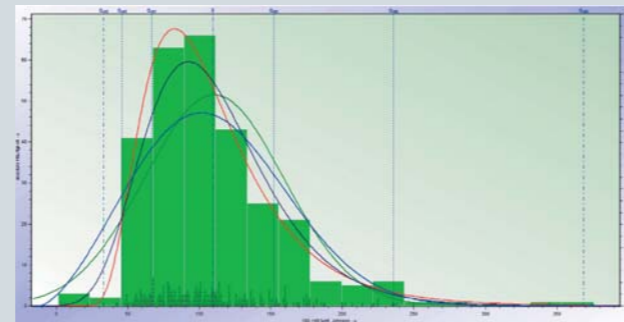
Article number  
20037

## Methods

- ◆ Knee graph - BMW
- ◆ ZVEI
  - Exponential distribution
  - Weibull distribution
  - Johnson transformation
- ◆ Statistical methods

## Topics

- ◆ Budgeting
- ◆ Escalation



## CREATION OF SPECIFICATIONS

To pass on the component requirements with regard to the technical cleanliness to the supplier, required measures and information on the cleanliness inspection process, etc. are summarized in a product-specific specification.

### Targets

Technical cleanliness managers  
Project managers  
Product developers  
Process planners  
Production managers  
Quality managers  
Sales managers

### Duration

The duration for creating the specification is based on the scope and the contents to be taken into account.

### Location

Initial meeting at your company, on request at CleanControlling. Additional processing by CleanControlling at own company.

Article number  
20038

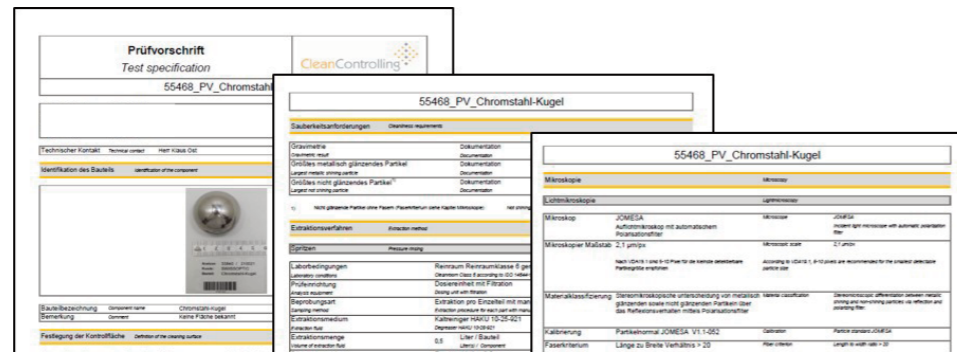
Partikelgröße (bzgl. der Partikellänge)	nicht begrenzt	nicht begrenzt
B-E 5 $\mu\text{m} \leq x < 100 \mu\text{m}$	200	500
F 100 $\mu\text{m} \leq x < 150 \mu\text{m}$	100	150
G 150 $\mu\text{m} \leq x < 200 \mu\text{m}$	50	75
H 200 $\mu\text{m} \leq x < 400 \mu\text{m}$	3	4
I 400 $\mu\text{m} \leq x < 600 \mu\text{m}$	0	0
J 600 $\mu\text{m} \leq x < 1000 \mu\text{m}$	0	0
K-M 1000 $\mu\text{m} \leq x$	0	0

## Procedure

- ◆ Determination of necessary content topics
- ◆ Development of topics
- ◆ Creation of raw version
- ◆ Discussion and creation of final version



Größenklasse	Partikelgröße x (bzgl. der Partikellänge)	Met. Partikel (Anzahl / 5 Bauteile)	Partikel insges. (Anzahl / 5 Bauteile)	Fasern (Anzahl / 5 Bauteile)
B-E	5 $\mu\text{m} \leq x < 100 \mu\text{m}$	nicht begrenzt	nicht begrenzt	nicht begrenzt
F	100 $\mu\text{m} \leq x < 150 \mu\text{m}$	200	500	
G	150 $\mu\text{m} \leq x < 200 \mu\text{m}$	100	150	
H	200 $\mu\text{m} \leq x < 400 \mu\text{m}$	50	75	
I	400 $\mu\text{m} \leq x < 600 \mu\text{m}$	3	4	
J	600 $\mu\text{m} \leq x < 1000 \mu\text{m}$	0	0	
K-M	1000 $\mu\text{m} \leq x$	0	0	



## CREATION OF TEST SPECIFICATIONS

The inspection of the technical cleanliness can be carried out differently with a large range of methods. To obtain comparable results for a product or component, the method, process and parameters should be specified. The test specifications determine this information product and component-specific.

### Targets

Technical cleanliness managers  
Laboratory managers  
Project managers  
Product developers  
Quality managers  
Sales managers

### Duration

The duration for creating the specification is based on the scope and the contents to be taken into account.

### Location

Initial meeting at your company, on request at CleanControlling. Additional processing by CleanControlling at own company.

Article number  
20039

## Procedure

- ◆ Determination of necessary requirements from customer-specific standards and specifications
- ◆ Specification of the method and parameters
- ◆ Development of process
- ◆ Creation of raw version
- ◆ Discussion and creation of final version

## CREATION OF COMPANY STANDARDS

In order to regulate the standards for the topic of technical cleanliness, the individual points have to be determined. The specified measures and decisions are summarized in a company standard.

### Targets

Technical cleanliness managers  
Project managers  
Product developers  
Process planners  
Production managers  
Quality managers  
Sales managers

### Duration

The duration for creating the factory standard is based on the scope and the contents to be taken into account.

### Location

Initial meeting at your company, on request at CleanControlling. Additional processing by CleanControlling at own company.

Article number  
20040

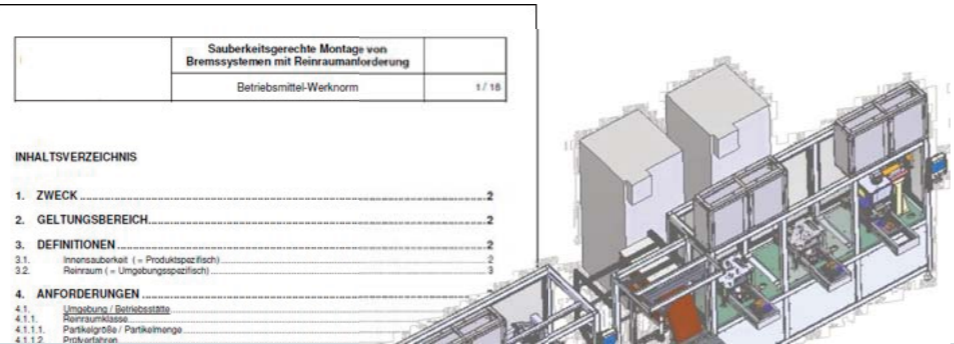
## Topics, e.g.

- ◆ Information on technical cleanliness and the understanding in the company
- ◆ Standard information on environmental cleanliness and verification measurements
- ◆ Definition of various cleanliness areas and clothing concepts in these areas
- ◆ General information for process devices
- ◆ General information on cleanliness inspections
- ◆ General regulations of the company

## Procedure

- ◆ Determination of necessary content topics
- ◆ Development of these topics
- ◆ Creation of a raw version
- ◆ Discussion and preparation of final version





## CREATION OF CLEANLINESS-ORIENTED DESIGN GUIDELINES OF ASSEMBLY EQUIPMENT

To reduce the particle generation and carryover by the assembly systems and devices, a cleanliness-oriented design of the assembly equipment must be ensured. The design of the equipment and device is carried out according to certain criteria. These design criteria are described and detailed specifications for the individual elements of the assembly equipment are defined in the design guidelines.

### Targets

Project managers  
Process planners  
Technical cleanliness managers  
Production managers  
Quality managers

### Duration

The duration of the creation of the design guidelines is based on the scope and the contents to be taken into account

### Location

Initial meeting at your company, on request at CleanControlling. Additional processing by CleanControlling at own company.

Article number  
20041

## Topics, e.g.

- ◆ General regulations of company
- ◆ Standards for process equipment
  - Design of product contacting surfaces
  - Choice of materials
  - Surface quality
  - etc.
- ◆ Equipment-specific designs
- ◆ Covers/encapsulations
- ◆ Cleanability of equipment and devices
- ◆ Assembly-integrated cleaning processes
- ◆ Measures for maintenance and repair

## Procedure

- ◆ Determination of necessary content topics
- ◆ Development of topics
- ◆ Creation of raw version
- ◆ Discussion and creation of final version

## TROUBLESHOOTING IN THE FIELD OF TECHNICAL CLEANLINESS

If short-term problem solutions and their implementation are required in the field of technical cleanliness, we will be glad to support you.

### Targets

Project managers  
Technical cleanliness managers  
Production managers  
Quality managers  
Sales managers and others according to the points to be covered

### Duration

Flexible adjustment in accordance with our recommendations and your specifications

### Location

At your company, on request at CleanControlling and in accordance with the tasks to be carried out

Article number  
20042

## Contents

Support for the following points

- ◆ Determination of contamination risks
- ◆ Recommendation of measures for improving determined weak points
- ◆ Accompanying and consulting during project phase
- ◆ Communication with customer



## CREATION OF LOGISTICS CONCEPT AND PACKAGING DESIGN

The logistics and especially the packaging which represents a surface with direct contact in some cases plays a major role in product cleanliness. The workshop serves to identify the weak points and to develop an optimized concept.

### Contents

- ◆ Collection of current logistical concept data
- ◆ Identification of weak points
- ◆ Development of possible solutions
- ◆ Creation of a logistics concept according to approaches of VDA 19.2
- ◆ Evaluation of sensitivity of components, assemblies and products
- ◆ Development of packaging concepts
- ◆ Support for packaging design

#### Targets

Logistics managers  
 Technical cleanliness managers  
 Purchasing managers  
 Project managers

#### Duration

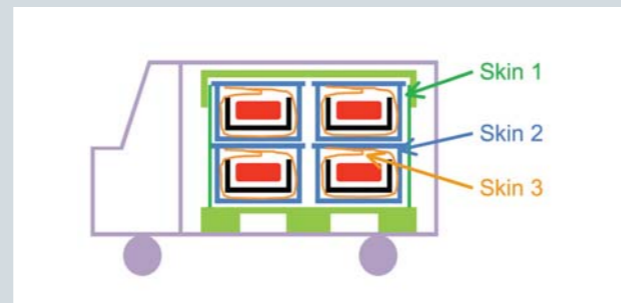
1 day

#### Location

At your company,  
 on request at CleanControlling

#### Article number

20043



## SUPPLIER DEVELOPMENT

The component cleanliness has a decisive influence on the product cleanliness. As a result, the participation of the supplier is also necessary for meeting the cleanliness requirement. The workshop offers the development of the supplier or the preparation of your employees for the development of the supplier.

#### Targets

Supplier developers  
 Purchasing managers  
 Technical cleanliness managers  
 Project managers  
 Quality managers

#### Duration

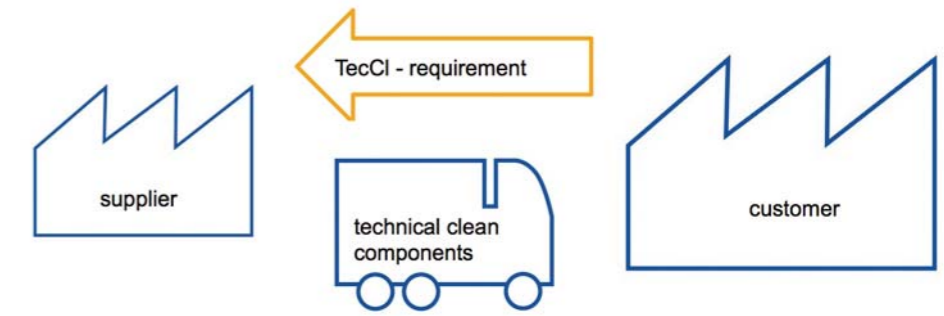
1 day  
 The date can be expanded depending on the scope of the assembly steps to be inspected.

#### Location

At the supplier's company  
 or at your company

#### Article number

20044



### Contents

- ◆ Definition of required information and documents for suppliers
- ◆ Evaluation of packaging concept for supplier

On-site appointment at supplier's plant

- ◆ Assessment with evaluation of influencing factors on component at supplier's plant
- ◆ If necessary, training of supplier

Training course for supplier developer

- ◆ For developing the supplier
- ◆ For identifying weak points



## LABORATORY ASSESSMENT

With this workshop the rooms of the laboratory and the inspection are assessed and weak points are indicated. In the process, recommended measures and potential for optimization are named and discussed, as the significance of the cleanliness inspection is directly dependent on the quality of the laboratory, the processes and the handling.

### Contents

Assessment of

- ◆ Rooms (laboratory, air lock)
- ◆ Equipment
- ◆ Processes
- ◆ Handling
- ◆ Clothing
- ◆ Documentation

### Optional / advanced

Summary of the entire workshop including discussion of the abnormalities, potential for optimization and suggestions for improvement in a comprehensive assessment report.

#### Targets

Laboratory managers  
Laboratory employees  
Technical cleanliness managers

#### Duration

1 day

#### Location

At your laboratory

#### Article number

20045

## LABORATORY AUDIT

The potentials of the laboratory are evaluated using an audit in the laboratory. The influencing factors on the results of the cleanliness inspection are evaluated using the developed list of audit questions. As a result of the audit, the degree of fulfillment of the individual evaluation criteria is determined.



### Contents

- ◆ Auditing using a specified list of questions
- ◆ Tabular documentation of audit and depiction in a diagram

#### Targets

Laboratory managers  
Laboratory employees  
Technical cleanliness managers

#### Duration

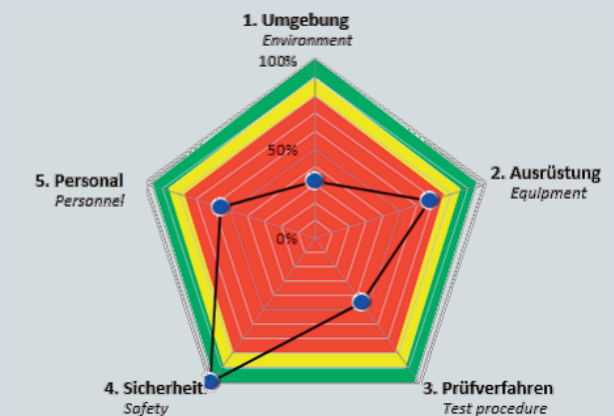
1 day

#### Location

At your laboratory

#### Article number

20046



# Establishment of your cleanliness laboratory

## LABORATORY PLANNING AND EQUIPMENT

Many aspects in addition to the general and customer-specific standards and specifications must be taken into account for the establishment of a laboratory for testing the technical cleanliness. With the consulting concept describe below, we would like to support you in the establishment of your cleanliness laboratory with optimized and effective processes customized for your products and their specific requirements.

Basics, training, qualification and consulting is carried out according to VDA 19.1 and VDA 19.2

### Planning and equipping

- In accordance with specifications or drawing requirements of your components
- Spatial detailed planning of cleanliness laboratory in accordance with requirements of your components
- Training of laboratory personnel and/or laboratory management
- Verification of cleanliness inspections from in-house laboratory
- Advanced training/optimization of laboratory operations

### Support and service

Your cleanliness specification is the starting point for us. From it we create an adjusted, reliable overall concept. Our experience of over 10 years of laboratory practice and our cooperation in the standards committees are incorporated in realizing of your laboratory and in the training of your laboratory personnel

### You are provided with

Your individually customized cleanliness laboratory with optimized, effective processes





# QUALIFICATION

## QUALIFIED EMPLOYEE OF TECHNICAL CLEANLINESS

This training teaches the detailed standard and regulation-compliant conducting of cleanliness inspections for determining the technical cleanliness. In addition, all steps from test planning to execution of the cleanliness inspection to documentation are developed and carried out in a practical module. The practical module of the training is carried out at your laboratory with your test equipment and your specific components.

### Targets

Laboratory employees  
Laboratory managers  
Technical cleanliness managers

### Duration

2 days

### Location

At your laboratory, with your equipment

### Article number

20024

## Contents

### First day - Theoretic section

- ◆ Basics and background for technical cleanliness
- ◆ Basics of standards
- ◆ Detailed analysis of inspection procedure
- ◆ Filter preparation, extraction process, filtration
- ◆ Analysis process: Gravimetry, microscopy, material determination via SEM and IR
- ◆ Qualification process: declining curve, blank value, double sampling
- ◆ Practical example of cleanliness inspection

### Second day - Practical section

- ◆ Processing of test procedures in compliance with VDA 19.1 / ISO 16232
- ◆ Determination of blank value, avoidance of particle contamination during testing
- ◆ Practical implementation of various extractions
- ◆ Implementation of analyses (gravimetric, microscopic)
- ◆ Evaluation and report preparation

Written examination for qualified employee for technical cleanliness

After the test is successfully completed, a certificate is issued.

Number of participants limited: max 5 Person

## SPECIALIST FOR TECHNICAL CLEANLINESS

The training as a specialist provides knowledge required for successfully implementing and establishing the topic within the company. It comprises all aspects of technical cleanliness.

### Contents

- ◆ Basics and background of technical cleanliness
- ◆ Basics of standards, committees for standards, corporate associations
- ◆ Inspection of technical cleanliness according to VDA19.1/ISO16232
  - Test planning
  - Extraction
  - Filtration
  - Standard analysis and further analysis
- ◆ Analysis and influence of inspecting process
- ◆ Limits of cleanliness inspection
- ◆ Cleanliness strategy along the value chain
- ◆ Quality management and technical cleanliness
- ◆ Content of VDA Volume 19 Part 2
  - Processes and assembly equipment
  - Logistics, packaging
  - Environment
  - Personnel
- ◆ Particle monitoring at assembly and cleaning systems
- ◆ Use and evaluation of particle traps
- ◆ Planning example of a cleanliness-sensitive production line
- ◆ Process chain analysis / environmental analyses with practical examples
- ◆ Assembly-integrated cleaning systems
- ◆ Technical cleanliness in product development
- ◆ Cleanliness specifications
- ◆ Limit budgeting
- ◆ Interpretation and reaction when limits are exceeded

Written test for technical cleanliness specialist  
After the test is successfully completed, a certificate is issued.

Prerequisite for participation in qualification training  
◆ Basic knowledge of technical cleanliness

#### Targets

Technical cleanliness managers  
Project managers  
Process planners  
Production managers

#### Training course duration

2 days

#### Training location

At CleanControlling,  
on request also at your company

#### Article number

20025

## AUDITOR FOR TECHNICAL CLEANLINESS

The qualification as an auditor provides contents and the importance of the potential analysis of technical cleanliness according to VDA 19.2.

In a practical module the potential analysis is conducted and the results are documented in an extensive report.

### Contents

- ◆ Determination of goals and importance of questions
- ◆ Description of implementation possibilities
- ◆ Conducting of a potential analysis for a selected product
- ◆ Creation of a potential analysis report

Written test for technical cleanliness auditor

After the test is successfully completed, a certificate is issued.

Prerequisite for participation in qualification training

- ◆ Basic knowledge of technical cleanliness
- ◆ Passed qualification training as Technical Cleanliness Specialist according to VDA 19.2
- ◆ Conducting ideally in combination with an assessment or following an assessment already carried out with CleanControlling, as information of assessment is included in potential analysis.  
(If this is not possible, then the duration must be increased accordingly.)

#### Targets

Technical cleanliness managers  
Project managers  
Process planners  
Production managers

#### Training course duration

2 days

#### Training location

At your company

#### Article number

20032

		Logistics	
1	How is consistent traceability been planned and documented throughout the entire material flow?		
		Assembly facilities	
1	Are processes, measuring devices, auxiliary materials and tools suitable for use in the		
		Staff	
1	Who is in charge of the clean area?		
		Environment	
1	What levels of clean area are planned?		
		Quality Control	
1	What cleanliness requirements exist and which forms of contamination need to be controlled?		
2	What are the requirements based on and how do they affect deviations in the end-product?		

You will find more detailed information on the use and the designs in our product catalogue and our ordering shop on the Internet at [www.cleanccontrolling.com](http://www.cleanccontrolling.com)

## PARTICLE MONITORING

Particle traps are used to evaluate the environmental influences in assembly and relevant areas.

Particle stamps are used to verify the processes.

- ◆ Particle traps
  - ◆ Assembly angle for particle traps
  - ◆ Particle trap stands
  - ◆ Particle stamps in various sizes
  - ◆ SEM particle stamps
  - ◆ Sterile particle stamps
  - ◆ Particle rocker
  - ◆ Particle trap holders for various types of microscopes
- u.a.



## ASSEMBLY CLEANLINESS

Cleanliness areas according to VDA 19.2 regulate the particle entry and protect the products.

The assembly cleanliness can be optimized with various measures which result from the recommendations of VDA 19.2.

### CLEANLINESS AREAS

- ◆ Floor marking tape
  - ◆ Barrier/marking tape
  - ◆ Clean mats
- u.a.

### ASSEMBLY CLEANLINESS

- ◆ Suction systems
  - ◆ Hand/glove cleaner
  - ◆ Visualization lamps
- u.a.

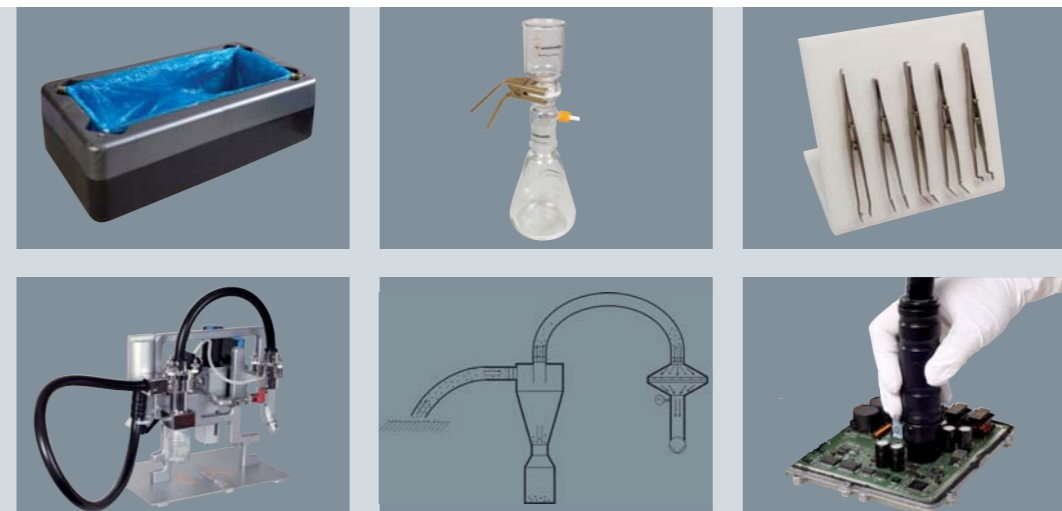


## LABORATORY EQUIPMENT

The right laboratory equipment and accessories are decisive for the results of the cleanliness inspections.

CleanControlling offers laboratory technology matched to the needs of a cleanliness laboratory.

- ◆ Particle suction systems
  - ◆ Dust-binding mats for shoe soles
  - ◆ Diaphragm filters
  - ◆ Laboratory clothing/clean room clothing
  - ◆ Laboratory equipment
  - ◆ Particles
- u.a.



Current, more detailed information on planned conferences is available at [www.cleancontrolling.com](http://www.cleancontrolling.com)



## CLEANLINESS INSPECTION

Cleanliness inspections according to VDA 19.1 or ISO 16232 and specific customer standards

- ◆ Liquid extraction



## AIR EXTRACTION

### Analysis of component cleanliness using air extraction

Analysis method for quantitative description of the component cleanliness of air-carrying components (according to ISO 16232, Part 5)

### Advantages

- ◆ Analysis of components which would be destroyed by liquid treatment is possible
- ◆ Concealed inner surfaces are not moistened with liquid
- ◆ Particles cannot sediment on inner cavities
- ◆ No problems when removing test medium

The procedure is basically similar to the analysis with liquid

- ◆ The particles (residual dirt) are collected on an analysis filter and - depending on the requirements - characterized using gravimetry, microscopy or elemental analysis.
- ◆ The measuring result is highly independent of the execution of the extraction procedure.
- ◆ Calibration and capabilities of the measuring equipment used are decisive for the result of the cleanliness values to be determined.

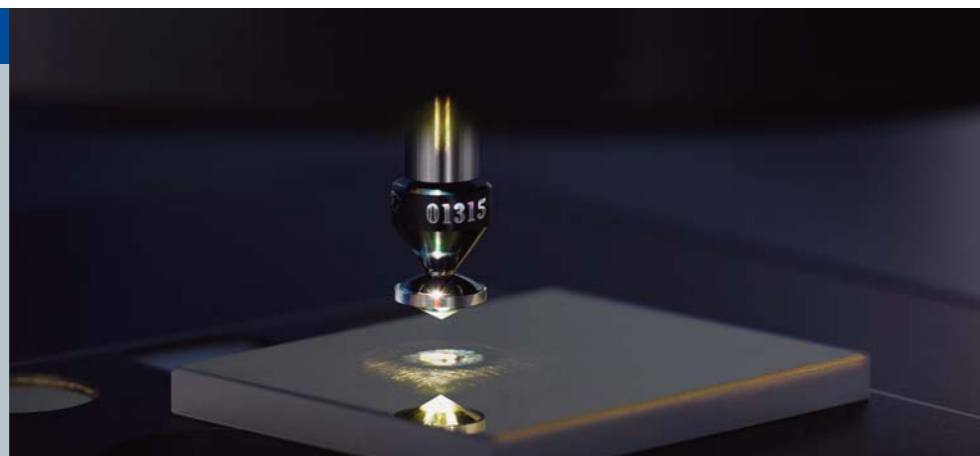


## FURTHER ANALYSIS

Analyses for determining the particle source

- ◆ IR spectroscopy
- ◆ EDX analysis of individual particles
- ◆ EDX scan

Analyses for determining filmic contamination



## CONFERENCE

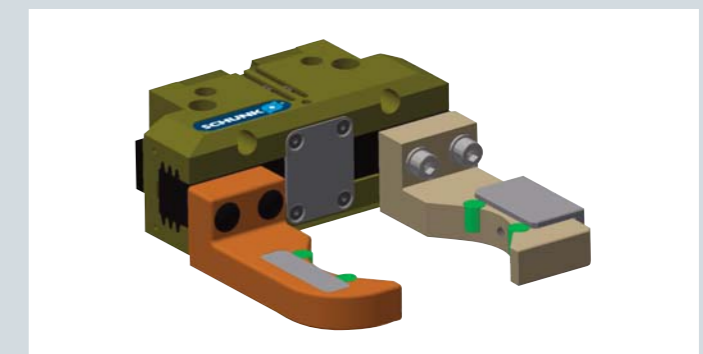
The CleanControlling conferences not only impart the technical contents, they also provide an opportunity for networking in the world of technical cleanliness and a chance for exchanging experience.



- ◆ Basics of technical cleanliness according to VDA 19.1 / VDA 19.2



- ◆ Planning and design of cleanliness-sensitive assembly devices according to VDA 19.2



- ◆ Additional conferences on current topics of technical cleanliness







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