



More than cleaning





“THE SOLUTION OF COMPLEX
CLEANING REQUIREMENTS NOT ONLY
INVOLVES THE ASSESSMENT OF THE
CURRENT TASK.
RECOGNITION OF THE CHALLENGES
OF TOMORROW PLAYS AN EQUALLY
IMPORTANT ROLE”

TRADITION AND INNOVATION

Industrial cleaning technology has its origins in the German speaking world – with systems to degrease components as a preprocessing step for the follow-on treatment. Due to the increasing requirements for surface quality under gravimetric and particular principles as an addition to the solvent-based cleaning technology, another efficient sector developed in the 1980s: the industrial cleaning technique on water-basis. Ever since the 1960s quality systems have been produced under the name of LPW which back then already had a pioneering role in aqueous cleaning. Today, surface quality is a quality feature all over the world when it comes to the development and production of premium and innovative industrial products. The LPW Reini-gungssysteme GmbH from Riederich lives up to these quality standards with a high level of flexibility, innovation skills of a mid tier business as well as a strong network of partner companies all true to the motto “quality made in Germany”.



Selection of the suitable cleaning technique

The Optimisation of the overall process plays an important role in order to achieve a well-defined surface quality and thereby outlines the essential task for the operator, in close cooperation with the system supplier, as a carrier for know-how and innovation.

The design of the actual cleaning technique is split into four sections:

1. REMOVAL OF LOOSE AND INHERENT CONTAMINANTS

Core task of the cleaning technique is the removal of unwanted particular or filmogen contaminants on an organic or inorganic basis. Therefore process reliable wash-mechanical techniques such as injection flooding-, blast- and brush treatments as well as ultrasound are deployed, as well as wet chemical or thermal processes.

The selection depends on the respective requirement and quality of the component.

2. PREVENTING RE-CONTAMINATION

After having separated the contaminants from the component's surface one can judge an efficient treatment if it is capable of transporting the dirt through suitable carrier mediums (in general aqueous or solvent-based fluids) immediately from the components section in order to avoid effects of re-contamination and to direct it to the appropriate processing medium.

3. PROCESSING MEDIA

The right choice of processing systems is crucial for the cleaning quality, the duration of process efficiency as well as the life time of the deployed cleaning media. One distinguishes between the classical circuit filtration systems and the processing systems with partial flow power. Style, costs and complexity strongly depend on the respective cleaning tasks.

4. REQUIREMENTS DUE TO THE FOLLOW-UP PROCESS

From a modern and innovative industrial cleaning technology one may expect a customized adaption, for example through a modular building kit, that adapts to current and future requirements of the respective follow-up processes. A variety of wash-mechanical skills, a great choice of suitable cleaning media that keep operating costs low as well as an option for the perfect integration in existing logistic processes requires a perfectly fitted and demand-oriented design.



The style of the material and treatment influences substantially the design of the cleaning plant

... for more questions and answers visit www.lpw-reinigungssysteme.de, PR

“MODERN INDUSTRIAL CLEANING TECHNOLOGY IS NOT ONLY A QUESTION OF TECHNOLOGY”



WASH MECHANICAL ACTION // CHEMISTRY // TIME // TEMPERATURE

“IN AQUEOUS CLEANING TIME, TEMPERATURE, MECHANICAL ACTION AND CHEMISTRY ARE THE BASIS FOR ALL FEASIBLE SOLUTIONS”

Influencing factors

in aqueous cleaning

To fulfil the respective tasks aqueous component cleaning basically has four interacting domains to choose from. They form the basis for all feasible solutions:

MECHANICAL WASH ACTION



The introduction of mechanical treatments (for example ultrasound, brush and nozzle systems, compression and volume power) greatly influence the cleaning result and also the necessary processing time.

TIME



Foremost, this factor includes the necessary overall processing time of the cleaning, rinsing and drying in order to fulfill the desired cleaning result. If the total time exceeds the required processing cycle time, it will have a serious impact on the choice of the suitable manufacturing equipment.

CHEMISTRY



Special purifiers, depending on the performance and material requirements, will be added to the aqueous media in order to support the resolution of organic and inorganic contamination, moreover to have a crucial influence on the manner and quality of the bath treatment capacity. Additionally, these additives can take over i.e. pickling, phosphating, conservation or other tasks.

TEMPERATURE



The temperature influences both the quality of the cleaning effect and drying as well as the time of the overall process. Due to the component's features and the physico-chemical background there are limits regarding the design of the adequate treatment.

FURTHER INFLUENCING FACTORS

- A. Efficiency / Cycle time
- B. Wash- / Drying process
- C. Temperature need of the goods

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... for more information visit www.lpw-reinigungssysteme.de, Allgemeines/Energieeffizienz

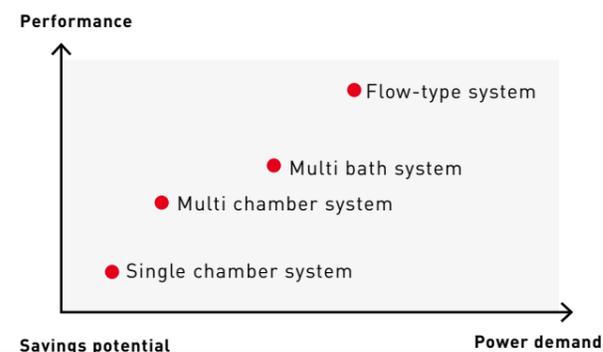
Comparison of plant systems

ENERGY CONSUMPTION

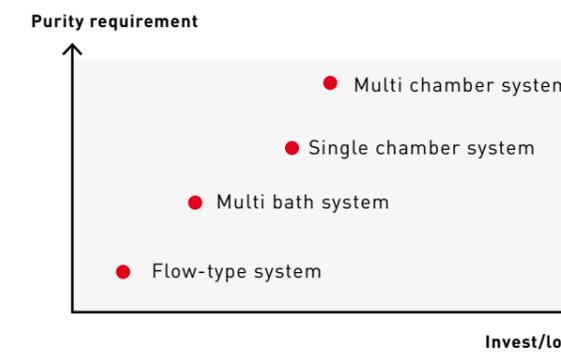
	Single chamber system	Double chamber system	Serial immersion bath system
Power input full load activity [kW]	27,5	45,0	91,0
Max. efficiency (lots/h)	5 Cycle time 12 min.	9 Cycle time 6,5 min	11 Cycle time 5,5 min
Power demand [kWh/lot]	5,5	5,0	6,8

Regardless of the effects of a fresh cleaning bath, the aqueous single chamber system proves to be the more efficient system with the biggest chances to increase efficiency even more. In designing it as a double chamber system this performance will be intensified through the distribution of the base load.

RELATION THROUGHPUT/POWER DEMAND



RELATION REQUIREMENTS/INVEST





Overview LPW Range

The aqueous full-range for industrial tasks

“OUR CLEANING SYSTEMS ARE ADAPTED TO OUR CUSTOMERS' NEEDS AND NOT THE OTHER WAY ROUND”

DESIGNING

The design criteria for an aqueous cleaning plant are fixed in cooperation with the consumer on the basis of the customer requirement specifications, defined requirements and realistic tests in comparable plants or the on-site technical centre. One usually selects from the established solution possibilities depending on the required performances, residual-dirt-requirements and organisational parameters.

SOLUTION POSSIBILITIES

In general, there are spray- and flood-processes available which differ according to goods movement:

- Single-/Multi-chamber flood washing systems
- Single-/Multi-chamber spray washing systems
- Belt washing systems
- Multi bath systems
- Alternative-/Special-systems

MODERN AND FUTURE-ORIENTED AUTOMATION SOLUTIONS

Industrial cleaning technology requires a robust and process reliable automation with the following features: Suitability for basket and pallet goods. Sufficient size-tolerance for the delivery/receipt of the goods to and from the treatment chamber. Possibility to separate cleaned and dirty goods. Suitable media- and contamination-resistant-components in the wet zones. Temperature stability within the dry zones. Corrosion-protected surfaces as well as reduced complexity of technical performance. Along with classical roller track systems, LPW also delivers solutions for complex tasks with several drop and delivery stations in multi-stage cleaning processes.

SPECIAL SOLUTIONS

Not every task can be solved with a standardized modular component. Often there are spatial, component or process related influences that demand special solutions. LPW Reinigungssysteme GmbH has many years of experience in this field and is very well prepared for designing customized solutions as a result of our own in-house process development as well as a technical centre with its own residual-dirt-analysis.



“ADAPTING TO THE TASK DOES NOT MEAN REALISING AN EXPENSIVE SPECIAL SOLUTION”



Learn more at www.modulare-bauteilreinigung.de

System PowerJet

The modular all-rounder

FEATURES AND STANDARDS

- High standardisation grade and use of standard parts
- High quality performance in production and assembly
- Can be extended and expanded at a later date
- Low operating costs at high availability

Flexible plant systems that allow the maximum freedom within defined geometrical boundaries and subsequently efficient cost-optimized production processes are only possible through a mostly freely combinable modular concept. The System PowerJet was developed on that basis and comes in three standard sizes. In addition to a variety of options regarding cleaning quality, output, upgrade competence and operating costs, it also offers the flexibility for customized adaptation to customer needs.

Moreover, several other different automation solutions are available which help to integrate the quality module cleaning technology in existing production processes. Bottom line: With the modular LPW-System PowerJet the technical risk is decreased on the one hand by the deployment of established module components. On the other hand, the investment costs are much lower in comparison to other conventional special solutions.



LPW CONVEYING SYSTEMS

are designed for special needs in the area of industrial cleaning processes and can be tailored through standard components or specifications. Along with classical roller and chain conveying variants LPW offers a highly flexible low-floor shuttle system. It is equipped with consistent clean- /dirt separation in order to link highly diverse single processes and connect subsequent clean or cleanroom systems.



THE LPW-ULTRAMODULE



is a stand-alone processing component within the modular concept of PowerJet. After a single or multi-stage pre-cleaning step it fulfills the fine-cleaning task in a separate and specially designed working chamber with optional finest-filtration in the forward and return flow and in connection with optimized container and pipe versions to avoid re-contaminations due to particle deposits in the circuit.

Selection process of the modular system PowerJet

WORKING CHAMBER	1
Number, size and performance requirements of the working chamber.	LPW-Ultramodule: the fine-cleaning task in a specially designed working chamber.
MECHANICAL WASH ACTION	2
Determination of the pump pressures and volume flow quantities in connection to the required design with the nozzles.	On demand, according to the requirement, determination of suitable ultrasound performance and frequency.
TANK DESIGN	3
Determination of number and size of media templates according to their respective tasks.	With the option Ultramodule a standing container is deployed.
CIRCUIT FILTRATION / MEDIA PROCESSING	4
Determination of type and version adjusted to the particular treatment steps and process parameters. The circuit filtration (i.e. bag or cartridge filtration)	takes place at full power. Other processing units (i.e. ultra distillery, still, centrifuge etc.) work with partial flow.
DRYING	5
Generally, all conventional hot-air/vacuum drying systems can be operated.	The selection is determined according to cycle times and the relevant component geometries and materials.
AUTOMATION	6
For standard sizes LPW offers a module kit for the full range of classical roller track or low-floor shuttle systems.	The incorporation of cooling systems, demagnetising stations or off-site vacuum dryings is always possible.
CUSTOM TAILORED	7
Based on the modular structure a customized solution in the areas of	process technology, mechanical wash action or automation is always possible.

- » Flexible and extremely efficient system
- » Designed for high residual-dirt requirements
- » High disposability at low operating costs



Single/Multi flood washing system

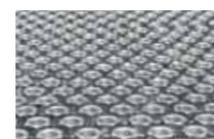
PowerJet - the all-rounder

GENERAL FEATURES

In the PowerJet process (compression flooding) a strong turbulence by high pumping pressures is caused during flooding. Combined with the basket rotation or rocking motion during the washing treatment (relative movement) constantly changing dynamic pressure ratios occur. These pressure drops range from over-pressure to vacuum so that a reverse flow with corresponding impact on the cleansing of hollows and bore holes occurs. This pressure flooding happens principally with fully filtered media and with fully immersed goods. With a high circulation rate during the cleaning process dirt and chippings are removed from the goods and carried away via a full power filtration which cleans the bath constantly. While draining the immersion bath, fractional dirt

particles may float on the surface and settle on the goods. In order to make them disappear as well an oil-free and fully filtered detergent purifies the rest. The result is a high level of cleanness. Afterwards the parts are dried by fresh, hot air or a vacuum. The PowerJet treatment achieves a far better result in many cases than a system which only floods with low pressure or solely splashes. Despite changing production programmes this system represents a sustainable, environmental-friendly and economic solution. Even though PowerJet is designed as a standard system, it stands out with its modular expandable system and can be delivered with a low wastewater rate and continuous rinsing water treatment. Special models or adaptations to customer specific needs are always possible.

POSSIBLE FIELDS OF APPLICATION



Premium aqueous fine cleaning

- » Components made of metal, plastic or ceramic
- » Bulk goods or positioned single components
- » Full or partly automated, i.e. diesel-injection components
- » Cleaning on residual-dirt of surface tension



Removal of coarse contaminants

- » Preparation for overhauling of a second-hand engine
- » Removal of contamination from usage before crack tests
- » Cleaning after lugging
- » Cleaning after grinding and polishing processes



Cleaning before/after thermal deburring

- » Removal of tinder residues before final assembly or processing
- » Removal of oil / emulsion residues as TEM-preparation i.e. hydraulic components



Fine cleaning of stainless steel/aluminium components

- » Process-reliable removal of chippings and processing residues after mechanical treatment
- » Preparation for meter-/leak-test-operations i.e. extension components, engine-/ transmission-production
- » Cleaning of residual-dirt or surface tension



Cleaning of engine- and transmission-components

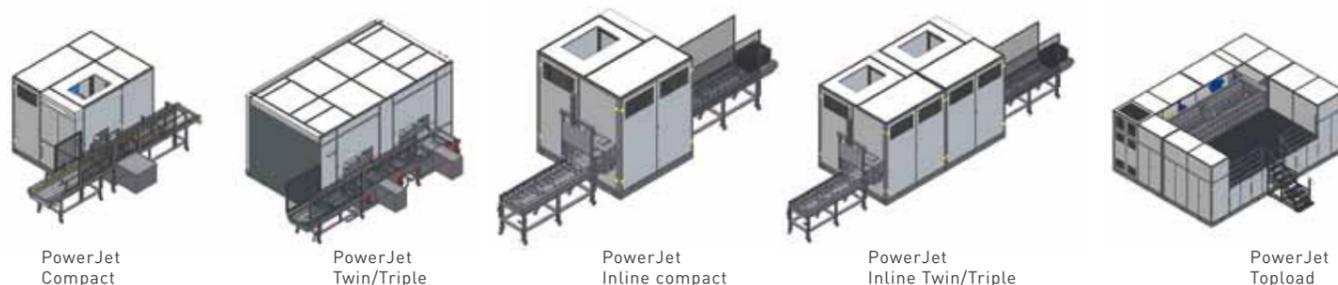
- » Aluminium, steel and grey cast iron components
- » Process-reliable removal of chippings and treatment residues after the mechanical treatment
- » Preparation of the components for meter-/leak-test-operations
- » Cleaning of residual-dirt or surface tension



Cleaning before/after heat treatment (hardening)

- » Removal of organic residues (normally emulsion)
- » Cleaning of processed components before further assembly

variants



PowerJet Compact

PowerJet Twin/Triple

PowerJet Inline compact

PowerJet Inline Twin/Triple

PowerJet Topload

SERIES POWERJET	Standard sizes		
	PowerJet 530	PowerJet 670	PowerJet 960
Outside dimensions of the plant			
Width (mm)	1700 - 2400	2100 - 3000	3000 - 4000
Depth (mm)	2100	2400	3000
Height (mm)	2200	2500	2500
Batch size	530 x 320 x 200	670 x 480 x 300	1020 x 650 x 560
Batch weight max.	100 kg	200 kg	400 kg
Batch throughput	6 - 12 /h	6 - 12 /h	6 - 12 /h
Container sizes			
Template cleaning	320 l	550 l	1300 - 2000 l
Template rinsing	320 l	550 l	1300 - 2000 l

- » High flow-rates
- » Designed for high residual dirt demands



- » Low cost cleaning system for simple component geometries
- » High availability at low operating costs



Multi bath immersion cleaning system

PowerStep - one with high capacity

Single-/ Multi chamber spray washing system

AquaJet - the flexible one

GENERAL FEATURES

The cleaning system PowerStep is designed for multistage aqueous immersion washing of workpieces in baskets or racks at high flow-rates. The baskets of goods are inserted in a transport rack automatically.

Then the transport rack is moved by a lifting device or cycle sliding-system to the respective treatment station. After the finished treatment the carrier rack is lifted from the station and transported onwards.

GENERAL FEATURES

The series AquaJet has all features and advantages of a premium immersion washing system with regard to design, quality and efficiency. With suitable component geometries one can achieve comparable cleaning and drying results despite shorter cycle times. The advantages of this system come especially into play

regarding intermediate cleaning or cleaning prior to quality relevant measuring operations. Whether as a budget-friendly isolated application or a fully integrated and automated module within a production process, it creates a good basis for high customer benefit.

POSSIBLE FIELDS OF APPLICATION



Premium aqueous fine cleaning

- » Components made of metal, plastic or ceramic
- » Bulk goods or positioned single components
- » Full or partly automated i.e. diesel-injection components
- » Cleaning of residual dirt or surface tension

Fine cleaning of stainless steel/ aluminium components

- » Process-reliable removal of chippings and processing residues after mechanical treatment
- » Preparation for measuring-/ leak-test-operations i.e. extension components, engine-/ transmission-production
- » Cleaning of residual-dirt or surface tension

POSSIBLE FIELDS OF APPLICATION



Surface final cleaning of individual components

- » Components made of metal, plastic or ceramic
- » Positioned individual components as a rule, cup-shaped geometry
- » Full or partly automated
- » Preparation of the components for measuring-/ leak-test-operations

Pre-cleaning

- » Removal of chippings and processing residues between and prior to final cleaning stage (aqueous or solvents)

Intermediate cleaning

- » Removal of chippings processing residues between mechanical treatments
- » Preparation of the components for measuring-/ leak-test-operations

- » Design for big flow-rate quantities at continuous loading
- » High availability
- » Low operating costs due to an energy-optimised system



Cycle washing system

PowerLine - the long-distance runner

GENERAL FEATURES

The Powerline cleaning system is designed for continuous cycle washing of workpieces with a high throughput rate. The type of the components, the contamination and the required degree of purity all lead to a version in line with the job requirements. A cycle cleaning system generally involves a job station, cleaning and rinsing zones, the drying zone and transfer station. The receiver tanks containers are located under the spray tunnel. The parts are put onto the transport system at the loading station. In order to minimise a delay between the cleaning and rinsing stations a neutral zone between them is essential.

A vapour suction in the inlet area and maybe in the neutral zones prevents fumes coming out of the plant. Furthermore, one can integrate blow devices in the neutral zones in order to free the workpieces largely from splashing water. After the cleaning process the drying follows – depending on the application with circulating air or a high pressure blow drying via blow devices. Depending on the design and chosen option, additional such as vaporisers, dirty water tanks and oil separators are placed as side units next to the plant.

EXAMPLE OF APPLICATION



Final/intermediate cleaning of individual components

- » Non or slightly scooping components
- » Positioned or free flow
- » High flow-rate quantities

“MADE IN GERMANY IS NOT AN IDEOLOGY BUT THE PREREQUISITE FOR HIGH QUALITY AND EFFICIENT PRODUCTION PROCESSES”



Custom-made special solutions



Tailor-made solutions

Fine cleaning module PowerJet 670 Ultra

CUSTOMER REQUIREMENTS

Following an individualized pre-cleaning with increased use of wash mechanical systems (single or multi stage) the components finally need to be cleaned on a higher level of cleanness and then dried.

OUR SOLUTION

Especially with precision machined components the classical procedures are often not sufficient, which is exactly why LPW implements an autonomous solution as part of an overall system or stand-alone plant. Besides the separate treatment chamber for a "one-medium solution" with suitable surfaces and an optimised residual-dirt draining system, the PowerJet Ultra offers a high volume flow rate together with suitable and efficient filtration systems in the forward and return flow. The receiver tank system has been optimised for dealing with residual dirt. One can integrate high-frequency ultrasound solutions in the treatment chambers. The drying follows with fully filtrated air supply. Spray and flooding processes in the chamber are both possible. The media processing is adapted to the contamination.

PowerLine 300 T3 Double belt

CUSTOMER REQUIREMENTS

After the mechanical treatment, sprockets are pre-cleaned and dried before the laser welding process. Besides integration in an automatic feed and drainage system, there is the possibility that the components can be loaded and discharged on a separate belt.

Cycle time: 10-15s per component

OUR SOLUTION

Three-stage cycle cleaning-systems with subsequent hot air drying. Double-belt system with its own power transmission stations (speed adjustable). The system is made of high-alloyed steel. All blow and spray systems are provided with quick release fasteners. Each zone is accessible separately. The whole maintenance area with filters, pumps, paper band filters, oil separators and water-cooled vapour condenser is equipped with an acoustic housing. The doors are made of safety glass and allow free access to all components and templates.

PowerJet 800T3 Twin

CUSTOMER REQUIREMENTS

A cleaning system for LARGE transmission boxes with integrated phosphating, hot air drying and external vacuum drying. The loading takes place on basic pallets, either automatically via robots or manually on a separate belt.

Cycle time: 8 min
Batch size: 800 x 800 x 800 mm
Batch weight: max. 400 kg
Requirement: absence of chippings (max. 800-1000 µm)

OUR SOLUTION

Three-stage double-chamber cleaning systems with integrated hot air drying in the second treatment chamber as well as vacuum drying on the discharge roller track.

Further equipment:

- Pressure flooding system (100m³/h at 18 bar)
- Sieving barrel with chip conveyor in the return flow to filter the chippings of the treatment
- Automation with 4 lift-/ lower stations and a chain conveyor for the re-transfer of the pallets

PowerJet 670T4 Twin TEM

CUSTOMER REQUIREMENTS

Cleaning system for cleaning bulk goods after the thermal deburring process with following solvent preservation.

Cycle time: 4 min
Batch size: 670 x 480 x 300 mm
Batch weight: max. 200 kg
Requirement: free of oxide residues, metal particles max. 500 µm

OUR SOLUTION

Four-stage double-chamber cleaning system with integrated hot air drying in the second treatment chamber as well as vacuum drying on the discharge roller track including a circuit robotic loading system with a transfer station for the cleaned and preserved goods.

Further facilities:

- Pressure flooding with 18 bar
- Ultrasound in chamber 1 and 2
- Separate VE-sink for premium steel components
- Full power filtration in all baths
- Media processing with vaporisers, coalescence cutters, centrifuge and circuit system for VE-sink
- Circuit automation with external vacuum dryer as well as a loading unit for the Hösel-solvent-preservation.



LPW – the company

Tradition, experience and innovation

The LPW cleaning systems GmbH is ranked amongst the leading suppliers for premium systems and process technologies in the industrial component cleaning business with aqueous media. The highly specialised systems are deployed not only in the areas of mechanical engineering, cars, aerospace but also for suppliers of the respective industries and in industry in general – for over 50 years.

The company's range of services includes standard as well as individual solutions to optimise production processes with regard to energy efficiency, availability and quality.

MADE IN GERMANY

All LPW-systems are developed and manufactured at the headquarters in Riederich. Also the single components of our suppliers are all "made in Germany". Together with our production halls an in-house technical centre with connected residual-dirt-analysis for testing purposes as well as training and meeting rooms are at our customers' disposal.

REPRESENTED WORLDWIDE

For many years LPW has already been delivering abroad and is in the meanwhile represented with over 250 systems on the international key markets. Also beyond Germany's borders our customers are provided with optimal support with regard to

development, purchase, distribution and service. Amongst other things this is guaranteed through the membership in the internationally operating Surface Alliance as well as through a wide network in several countries.

THE PARTNER FOR YOUR SUCCESS

Taking past experiences into account, using today's know-how and technology, thinking ahead about tomorrow's tasks – and therefore finding solutions for the future. According to these principles we develop customized systems with the best possible technical and economic benefit for our customers. For success, the cooperation of the various special departments as well as a strong innovative energy are crucial factors.
LPW – More than cleaning.

“TO REMAIN MEANS BEING
PREPARED FOR
TOMORROW'S CHALLENGES”





Questions and Answers / FAQs

about the industrial cleaning technology

QUESTION 1 WHY AQUEOUS CLEANING? WHERE ARE ITS LIMITS?

ANSWER

Above all, aqueous cleaning is ideal for the cleansing of inorganic contamination such as salts or stubborn particles on component surfaces. The removal of organic / filmy contaminations is possible even with high residual-dirt-requirements, however with great process and technical effort in the areas of bath maintenance and suitable chemical cleaning agents.

QUESTION 2 WHAT PART DOES THE CLEANING TECHNIQUE PLAY WITH REGARD TO THE COMPONENTS' CLEANLINESS?

ANSWER

In general the cleaning technique represents the end of a production process before the assembly or any further logistical process. Prerequisite for the quality is however the nature and excellence of the material, the quality and order of the mechanical machining processes, the skills of the appointed staff as well as the absence of burr. Failures in the pre-process make it hard or even impossible to achieve the necessary technical purity requirement.

FRAGE 3 HOW IMPORTANT ARE THE PROCESSING SYSTEMS?

ANSWER

Each industrial cleaning system has a cycle filtration as a standard processing unit which is used to remove particulate contamination within the media flow. If designed correctly it reduces the contaminants and therefore influences the amount of residual-dirt as well as the particle size. Generally, partial flow power processing units are deployed to remove finest particle contamination, organic dirt such as oil or emulsion parts. Along with the improved cleaning results these systems prolong the life time of the baths with regard to cleaning performance and process reliability.

QUESTION 4 WHAT PROBLEMS CAN AN INTEGRATED DISTILLATION PLANT SOLVE?

ANSWER

Like no other media processing unit, an integrated distillation plant is able to separate finest particulate, chemical and organic contaminations within the partial flow power from the carrier medium and therefore keep up the quality of the baths, especially the sink baths, over a long period of time. Moreover the baths remain at their processing temperature due to the energy-efficient heat coupling.

QUESTION 5 WHO SUPPORTS THE OPERATION OF A CLEANING SYSTEM?

ANSWER

The system supplier guarantees support after the delivery by means of his own capacities or service partners. Though in day-to-day business the chemical supplier with his service package plays an important role regarding bath care and the maintenance of the bath quality. In coordination with the manufacturer he is an important supporter for the operator running the system.

QUESTION 6 IS „COLD CLEANING“ AN ENERGY-EFFICIENT ALTERNATIVE?

ANSWER

The market offers a variety of efficient cleaners who are capable to achieve very good cleaning results at low temperatures. However, the saved energy for the preservation of the bath temperature is out of proportion to the high energetic effort which has to be made due to the low component temperature for the drying. In addition to that vacuum drying treatments aren't possible anymore due to low individual energy.

QUESTION 7 WHEN DO YOU USE INJECTION FLOODING, WHEN ULTRASOUND?

ANSWER

All the mentioned processes are complementary processes. Due to its pull-pressure-interplay the injection flooding ensures a low particle cleaning despite complicated geometries (i.e. deep-hole bores and intersections). Ultrasound is suitable for cleaning adherent ultrafine particle contaminations on the component surface.



Represented worldwide.



More than cleaning

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