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Cleaning and Filtration Systems (CFS)

杜尔 **Ecoclean** 集团

Nanjing Seminar – China, April . 2012



DÜRR AG 德国杜尔集团

喷漆与装配系统



- 喷漆与总装系统
- 喷漆应用系统
- 航空技术系统

测量与装配系统



- 动平衡与装配产品
- 清洗和过滤系统

清洁技术系统



- 环境和能源系统
- 能源技术系统

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致力于加工支持



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清洗



对机加工和生产零件的清洗

过滤



对机床切削液和其它液体的过滤以及防锈

自动传送



在加工工位和其它的加工工艺之间传送产品

装配和测试



自动扭矩或者按压零件和液体测漏

系统整合



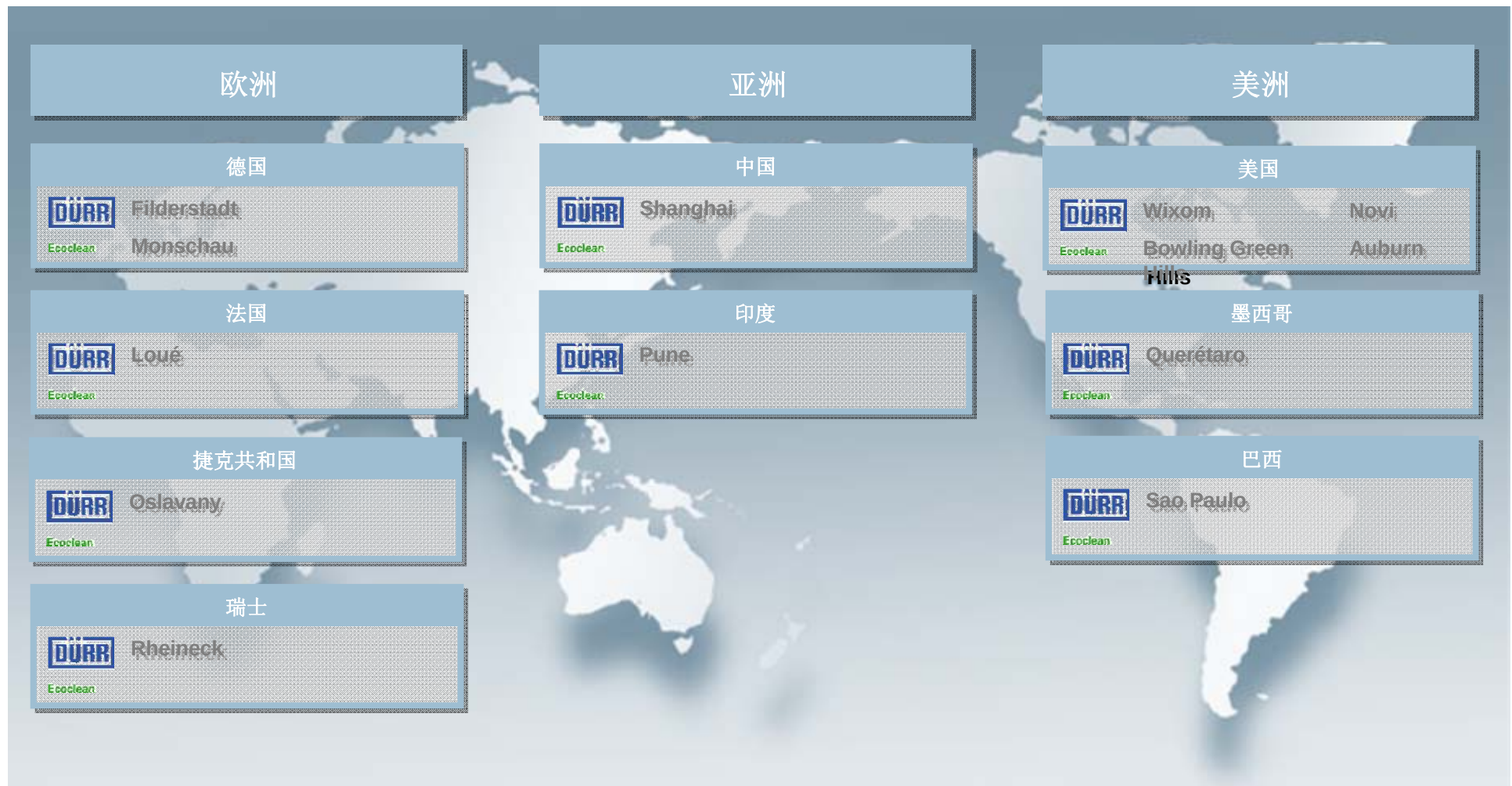
和机床供应商整合的所有应用线

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世界范围



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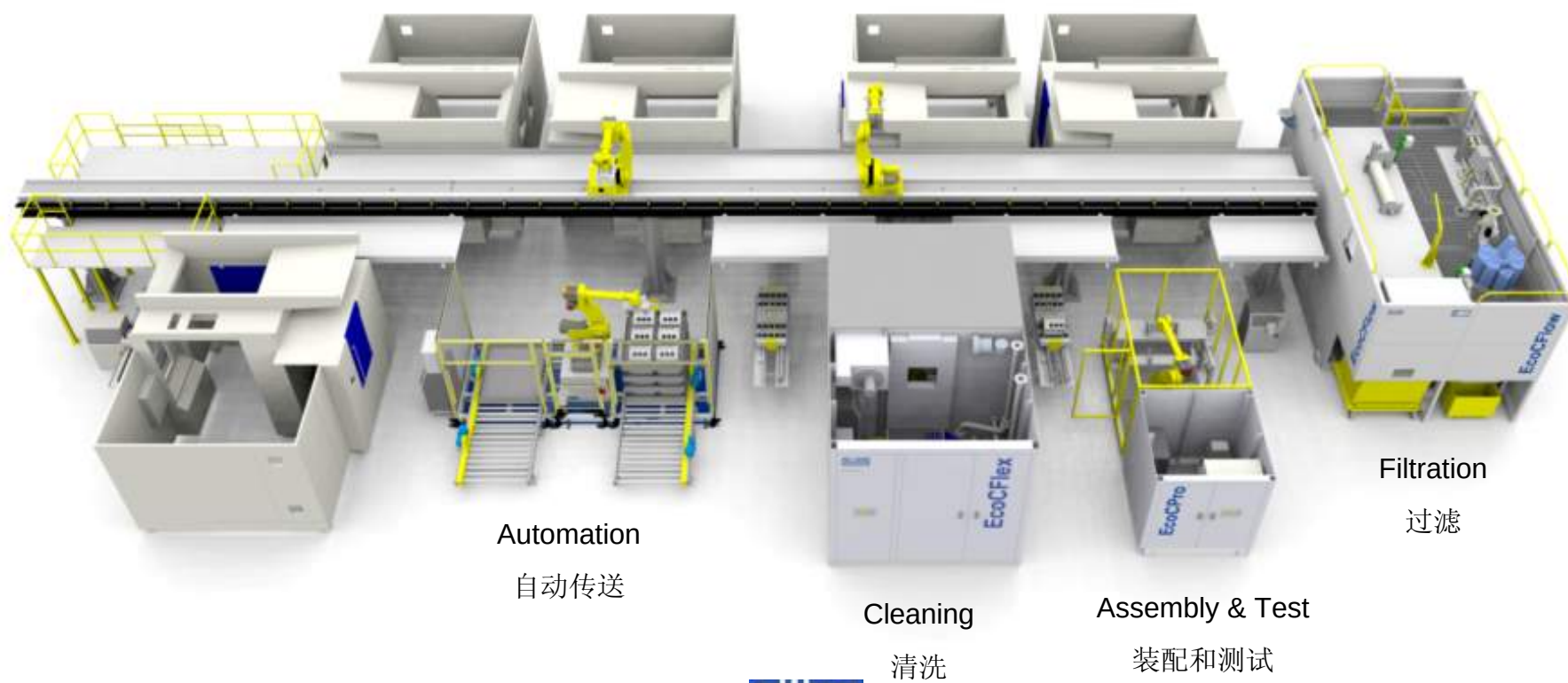


综合应用



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杜尔**Ecoclean** 是全球唯一一家提供所有非机加工类应用的供应商。



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产品范围

清洗

机加工和生产的零件清洗



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清洗技术

腔体式清洗系统（单腔及多腔）

浸没紊流清洗

全流量置换式过滤

超声波清洗

蒸汽脱脂

真空干燥

高压去毛刺

水基清洗设备

全真空溶剂清洗设备

封闭循环系统（更安全，更环保）



产品范围

过滤

对机床切削液和其它液体的过滤以及防锈



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过滤技术

单独的过滤系统和集中过滤系统

永久性和一次性的过滤介质

真空过滤

重力分离

磁性分离器

槽式过滤



产品范围



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自动传送

在加工工位和其它的加工工艺之间传送产品

自动传送技术

传送系统

机器人处理系统

龙门起重台和龙门式机器人

抓握器

归划平面布局

机床整合



产品范围

装配和测试

- 自动化拆卸气缸缸体缸盖上面的需要扭矩或者压入下一步零件装配的任何零件.
- 测试产品提供气缸缸体缸盖的密闭性检测

自动装配和测试技术

帽栓

管销

销子

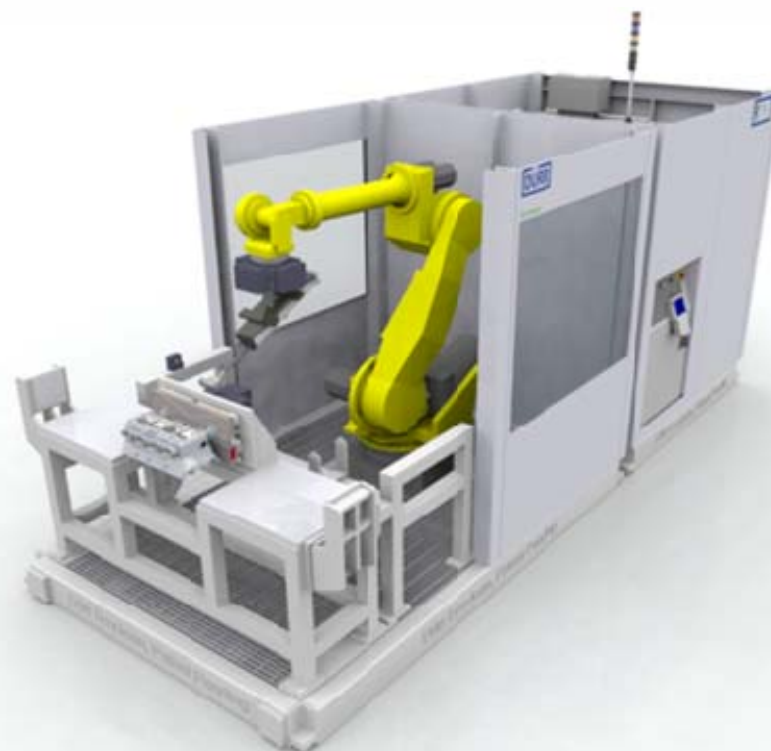
阀座

凸轮轴承

凸轮盖

主要轴承帽

缸体和缸盖梯



产品范围

系统整合

- 与机床供应商整合的所有应用
- 清洗，过滤， 自动传送， 装配和测试



系统整合

项目管理

工艺设计

整体平面布局设计

机床整合

交钥匙安装工程

售后市场服务

有关 R Factor®

聚焦长期盈利性

- 重新调配，重新装配
- 再循环，再利用，再翻新



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A light blue world map is visible in the background of the slide, showing the continents of North America, South America, Europe, Africa, and Australia.

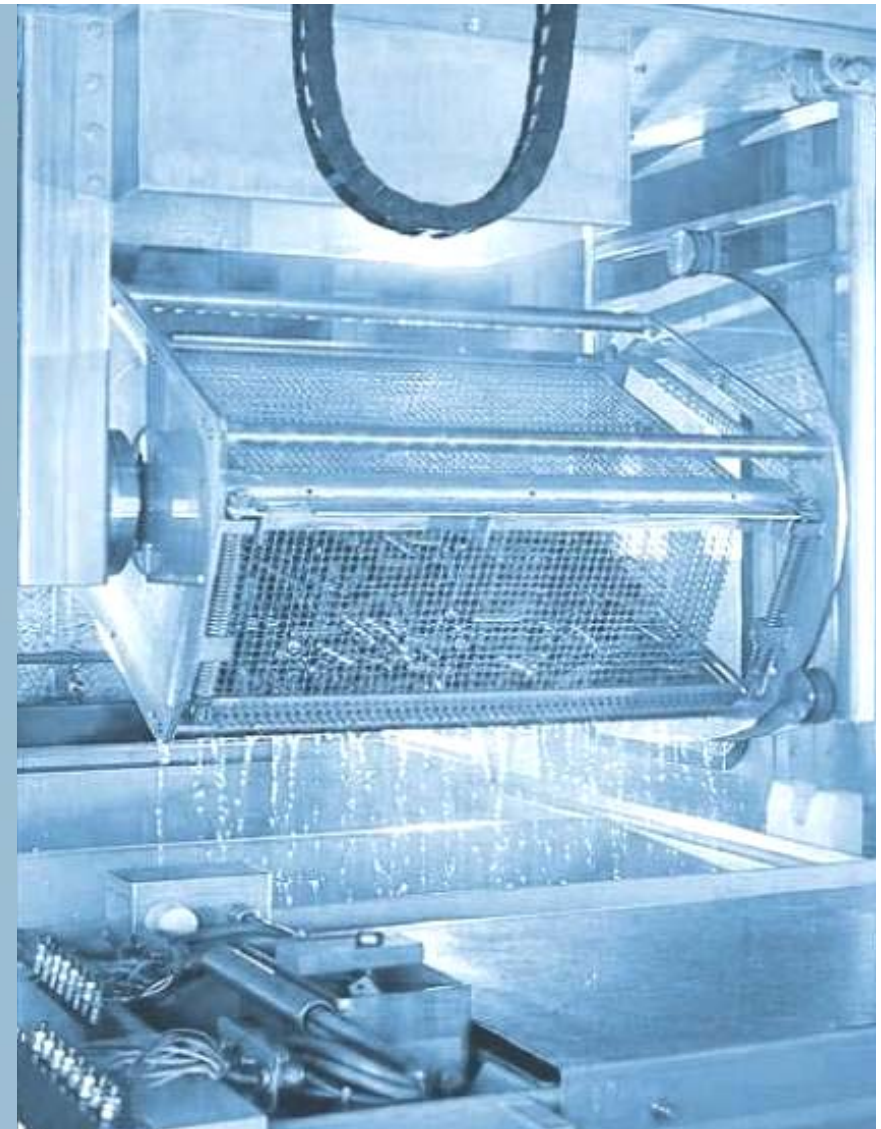
年份	收入	员工
2011	250€Million	949



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Cleaning and Filtration Systems

1. Introduction – why cleaning 介绍-为什么清洗





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Why cleaning? 为什么清洗?

The industrial parts cleaning lays important foundations for unobstructed production processes... 工业零件清洗是流畅的生产流程的重要基础

Ensurance of an optimal component surface for further manufacturing steps

确保零件表面达到最佳状态，为下一步的生产工序服务

- Cleaning of undesired material (oil, emulsion particles...) 清洗杂质（油脂，乳化剂微粒等等
- Removing of passive layers 除掉 钝化层
- Activation of surfaces 激活表面
- Protection against corrosion 防腐蚀保护

Ensurance of the component function concerning contamination (life cycle application)从污染物的角度而言，确保零件的功能 (生命周期)

- Conformance to preset cleanliness requirements 符合预先设定的清洗要求

...and for this reasons it is an adding value quality relevant manufacturing step in parts production. 因为上述原因，所以在零件生产当中，工业清洗是关系到质量，具有附加值的重要生产步骤。

When cleaning? 什么时候清洗?

Cleaning as manufacturing step 作为生产步骤的清洗

Drawing/pressing 拉伸

Metal-cutting processes

金属切割过程

Chemical processes 化学过程

Test processes 测试过程

Hardening 加硬

Casting 铸造

Grinding 磨削

Polishing 抛光

...



Assembly 组装

Packing 包装

Surface treatment
(hardening, coating,...)

表面处理, 加硬, 涂层

Further processing

进一步处理

Production process 生产过程

What is cleaning? 什么是（工业）清洗？

Possible contaminations 可能存在的污染物

Insignificant adhesive contaminations 没有用处的附着性污染物

Oil, emulsion particles, chips, dust 油脂，乳化剂微粒，碎屑，灰尘



Middle/strong adhesive contaminations 零件里面的附着性污染物

Fats, soaps, graphite, metal abrasion, polishing paste, lapping compounds

油脂，金属石墨，金属磨屑，表面涂层残留



Coatings 涂层

Reactive lubricants, phosphate/chromate/zinc coatings, corrosion layers

润滑剂，磷酸盐/镀铬，镀锌，腐蚀层



Spectrum of work pieces 工件范围

Handling 处理



Bulk ware 大批量零件

- Simple handling for mass and insensitive parts 大批量零件的简单处理
- Cleaning result depends on geometry and surface property 取决于零件几何结构和表面特性的清洗结果



Positioned parts 定位零件

- More elaborate handling, dependant on geometry of parts 更加细致的清洗，取决于零件的几何结构
- Better cleaning result due to positioning of parts 定位零件有更好的清洗效果



Single parts 单一零件

Belt- and chain transport systems 带式或链式输送系统

- Easy parts handling; limited cleaning efficiency 轻松零件处理，清洗效率有限

Specific handling (robotics) or transfer system 特定处理（机器人）或步进式系统

- High cleaning efficiency due to adjustment to parts geometry 适应零件的几何特征，清洗效率高

Examples for different cleaning requirements

不同清洗要求的举例说明



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Work piece type 工件类型	Large Parts 大型零件	Positioned parts 定位零件	Bulk ware 散装零件
Example 举例			
Cleaning task/ requirement 清洁度要求	Degreasing 脱脂 for further processing 为下一步加工 服务 (5 l oil/h)	Conservation 保护 for export shipment 用于出口运输	Particle removal 去除小颗粒 95% of particles < 250 µm
Throughput ^产 量/ Batch weight 批次重量	3 charges/h à 1500 kg	10 charges/h à 150 kg	4 charges/h à 50 kg

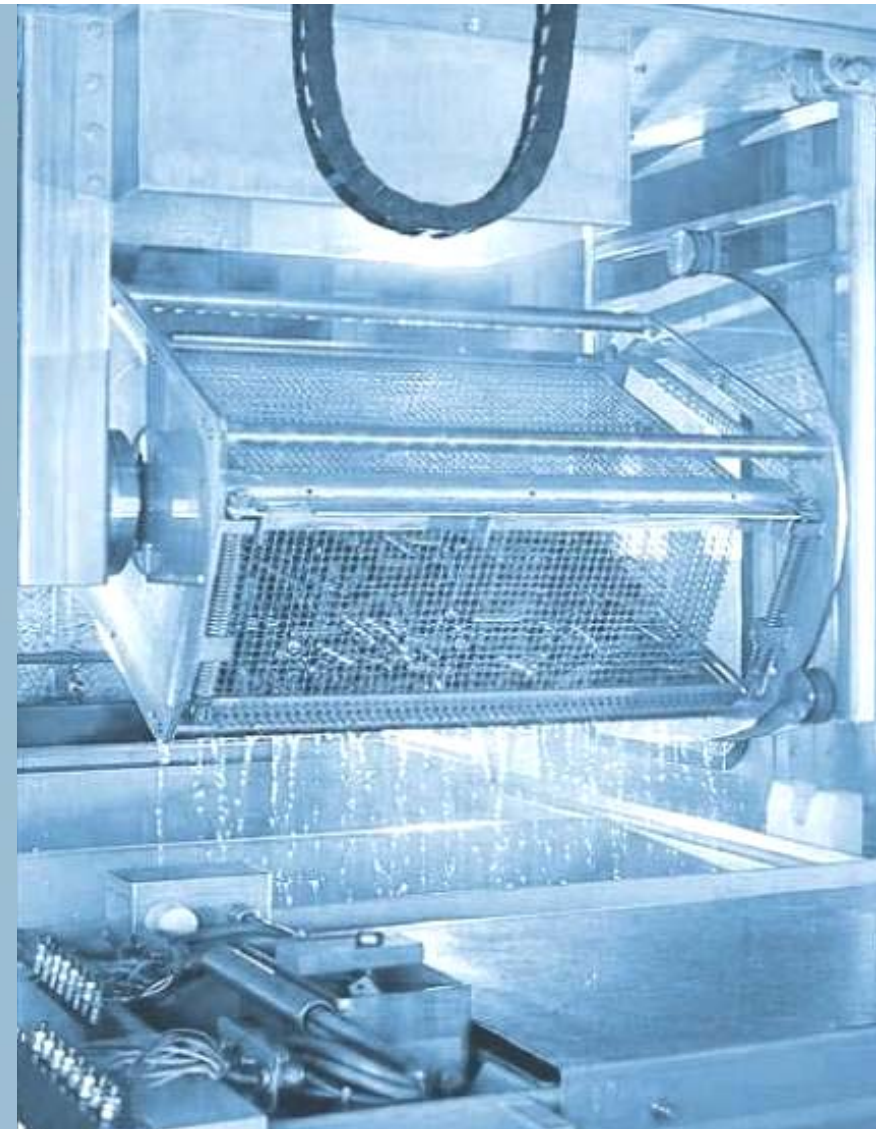


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Cleaning and Filtration Systems

1.1. Cleaning media comparison

清洗介质比较



Cleaning media 清洗介质



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- **Water based (alkaline) Cleaners** 水基清洗介质
- **Chlorinated Solvents (Trichloroethylene, perchlorethylene)** 氯化溶剂
三氯乙烯，四氯乙烯
- **Non – chlorinated Solvents (Hydrocarbons)**
非氯化溶剂（碳氢溶剂）
- **Polar Solvents** 极性溶剂



Comparing cleaning effectiveness of aqueous and Hydrocarbon systems 水基和碳氢系统清洗效果比较



4 pc. aluminium part with complex geometry
was manufactures / contaminated with:

4件铝制结构复杂零件，具有如下污染物

A.) Pure oil & Chips 纯油脂和切屑

B.) Water based coolant & Chips

水基冷却液和切屑

Cleaning of one part each in:

每个零件按如下清洗

1. Aqueous Cleaning system 水基清洗系统

2. hydrocarbon (Solvent) Cleaning system

碳氢清洗系统



Comparing cleaning effectiveness of **aqueous** and **Hydrocarbon** systems 水基和碳氢系统清洗效果比较

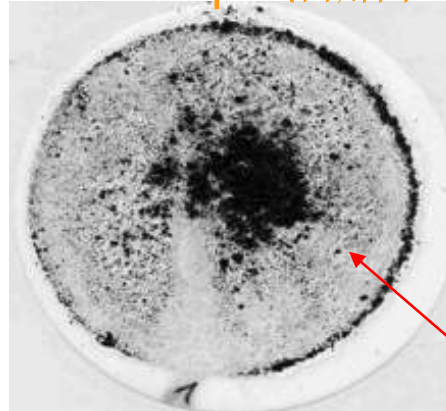


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A.) Contamination:

污染物

Oil & Chips 油脂和切屑



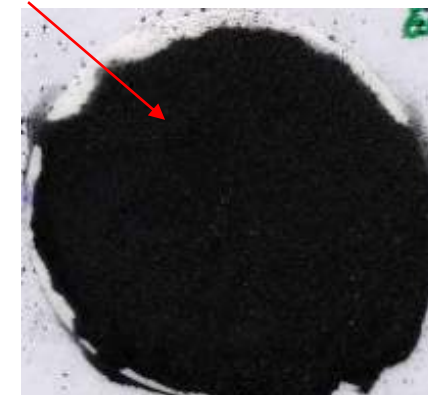
B.) Contamination:

污染物

Coolant & Chips 冷却液和切屑



Wrong solution 错误的方法



1. Millipore filter

after cleaning in a

Aqueous - Cleaning

machine 在水基清洗系统清洗后，经微孔过滤器过滤之后的效果

2. Millipore filter

after cleaning in a

Hydrocarbon -

Cleaning machine

在碳氢清洗系统清洗

之后，经微孔过滤器过

滤之后的效果

Comparing cleaning effectiveness of aqueous and Hydrocarbon systems

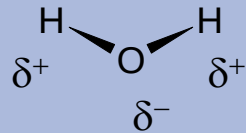


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水基和碳氢系统清洗效果比较

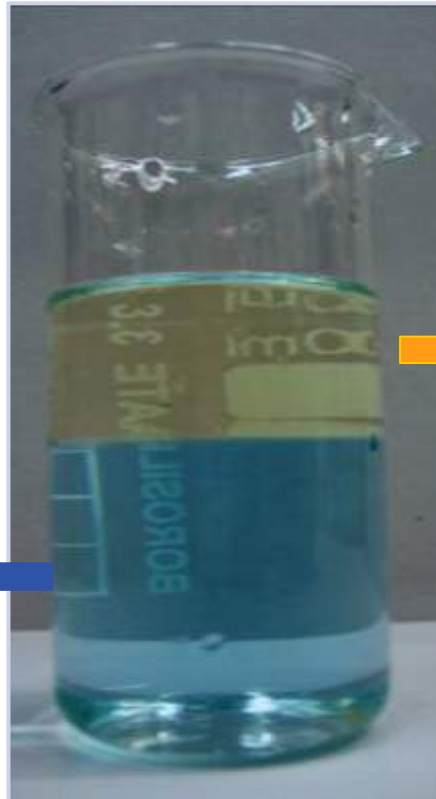
Water

水

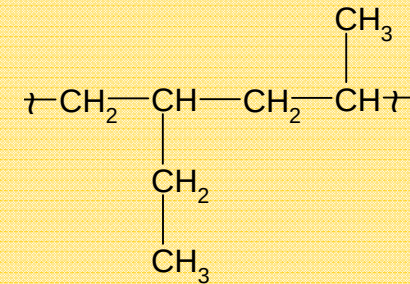


⇒ Polar 极性的

⇒ Oil is not soluble in water based cleaning media 油脂不能够在水基的清洗介质溶解



Hydrocarbon 碳氢



⇒ non-polar 非极性的

⇒ Oil is soluble in Solvent (Hydrocarbon) 油脂可以在碳氢溶剂中溶解

Which cleaning media for what kind of contamination ?



清洗介质和污染物之前的搭配如何？

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Medium 介质 Contamination 污染物	Aqueous – W 水基	Hydrocarbon- C 碳氢, Non-chlorinated Solvents 非氯化溶剂	Chlorinated Solvents 氯化溶剂 (TCE)-S
Oil, grease 油, 油脂 (有机的, 非极性的) (organic, non-polar)	Low 低	good - very good 好到非常好	very good 非常好
Kolophonium 松香, 松脂 (organic, polar) 有机的, 极性的	Moderate 中等	moderate - very good 中等到非常好	moderate – good 中等到非常好
Water based coolant / Emulsion, salts 水基冷却液, 乳化剂, 盐类 (mineral, polar) 矿物质, 极性	very good 非常好	(dependent on solvent formulation) 取决于溶剂	Low 低
Chips, swarf, dust 切屑, 残留, 灰尘 (mineral, non-polar) 矿物质, 非极性	Depending on machine configuration 取决于机器配置	moderate – low 中等到低	

Principle: “Like dissolves like” 相似者相容



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The selection of the right cleaning media is based on the principle: 选择正确的清洗介质请遵循以下原则:

“Like dissolves like” “相似相溶原理”

this has influence on your: 这会影响您的:

... **Surface quality** 表面质量

... **Cleanliness results** 清洗结果

... **Surface and corrosion protection** 表面腐蚀保护

... **Machine running time & waste management**
机器运转和废物处理

... **Energy and media cost** 能源和介质成本

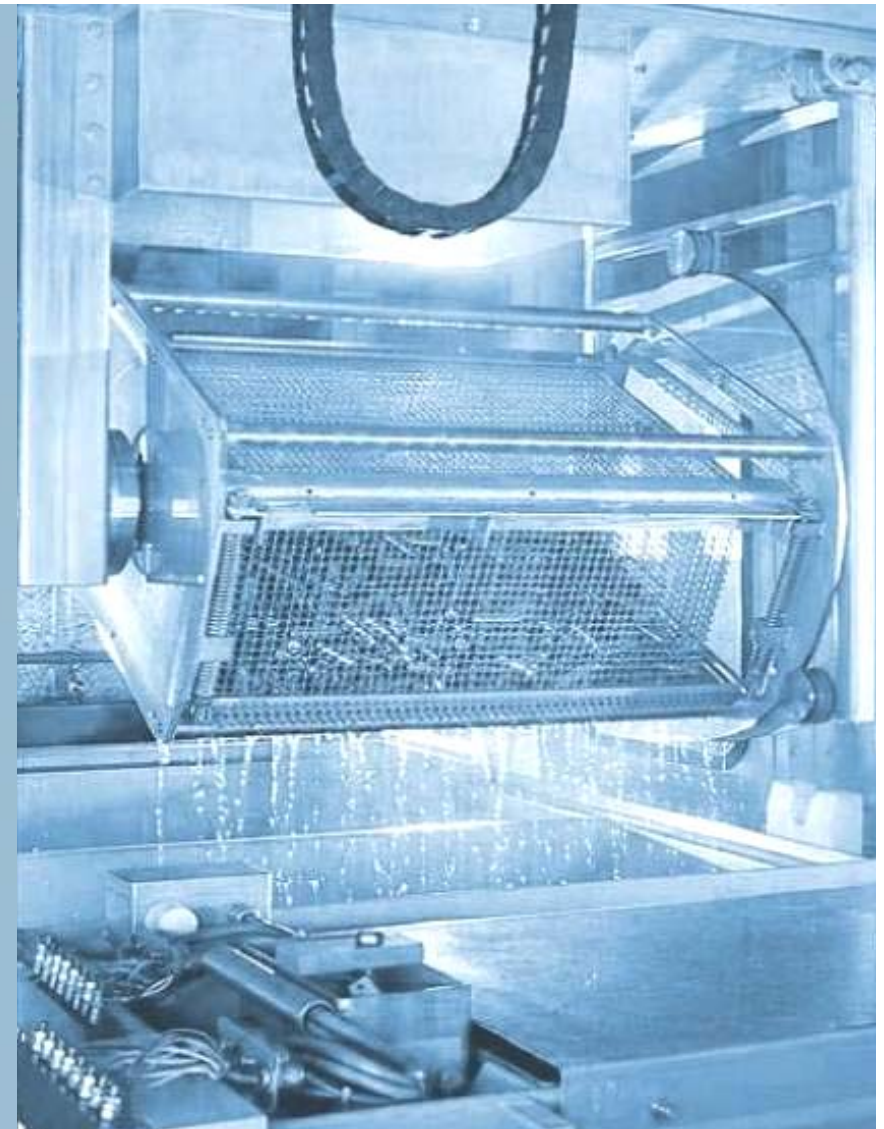


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Cleaning and Filtration Systems

2. State of art in industrial cleaning technique

工业技术的技术发展水平



State of art in industrial cleaning technique

工业清洗技术的技术发展水平

Past 过去



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State of art in industrial cleaning technique

工业清洗技术的技术发展水平

General and specific requirements 普遍要求和特殊要求

General requirements

普遍要求

- Cost effectiveness 成本效率
- Environmental compatibility 环境兼容性
- Health and safety 健康和安全
- Maintenance effort 维护
- Down time 故障



Special requirements 特殊要求

- Cleaning result 清洗结果 Flexibility 灵活性（柔性）
- Cycle time 节拍 Throughput 产量

State of art in industrial cleaning technique

工业清洗技术发展水平

Present 现在



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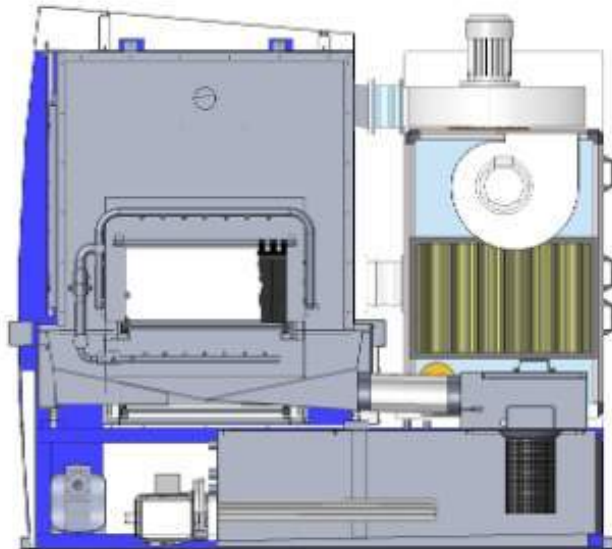
State of art in industrial cleaning technique

工业清洗技术的技术发展水平

Machine types 设备型号



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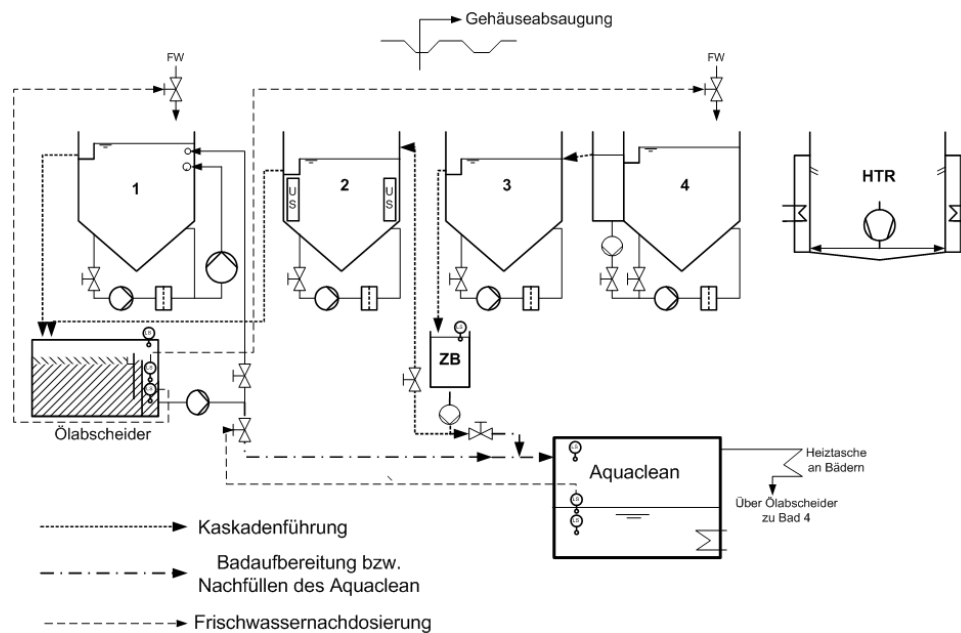
Inline Spray- cleaning (belt) systems (W-types)

在线喷淋清洗（带式）清洗系统（W型）

State of art in industrial cleaning technique

工业清洗技术的技术发展水平

Machine types 设备型号



Multi-tank cleaning systems (only W)

多槽式清洗系统 (仅限于W型)

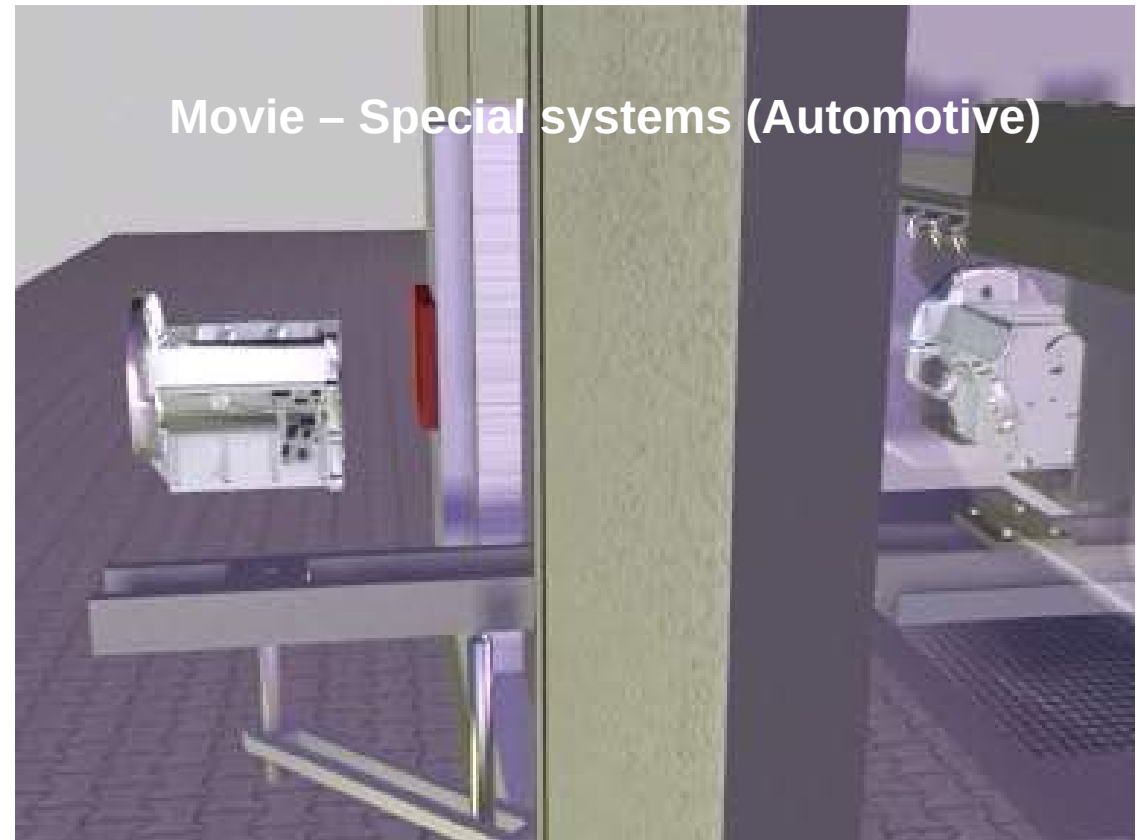
State of art in industrial cleaning technique

工业清洗技术的技术发展水平

Machine types 设备型号



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Transfer-, Robot- systems (only W-type)

Mainly for bigger automotive components

步进式，机器人系统（仅限于W型，主要用于较大的汽车零件）

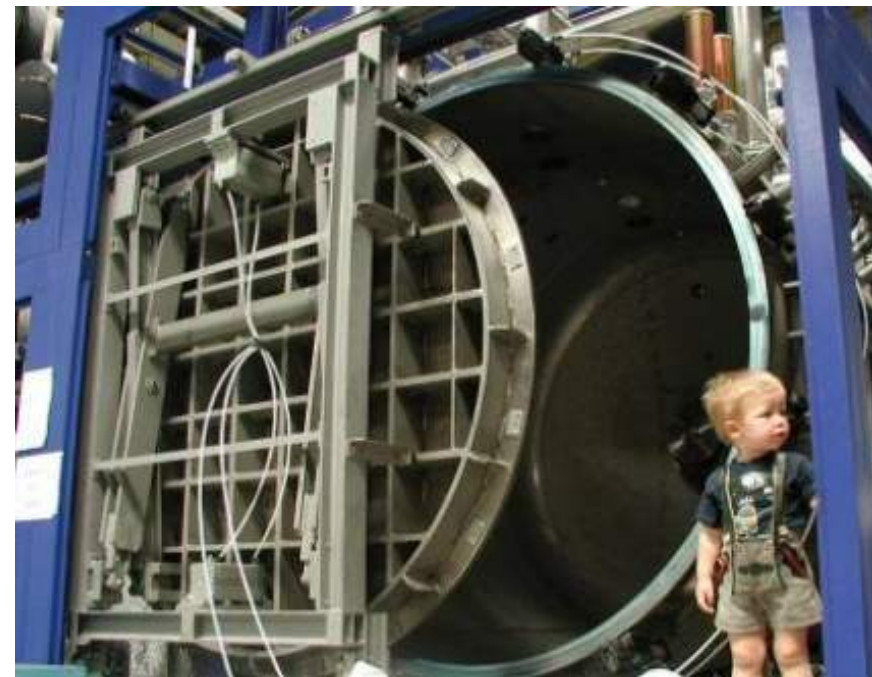
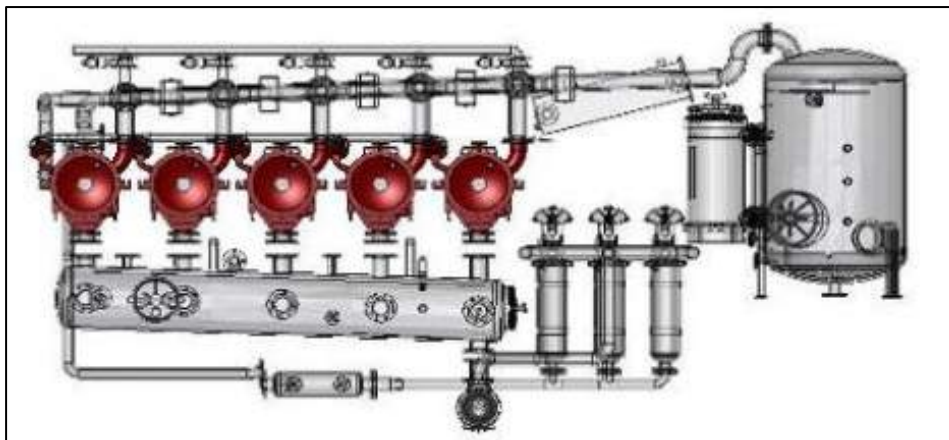
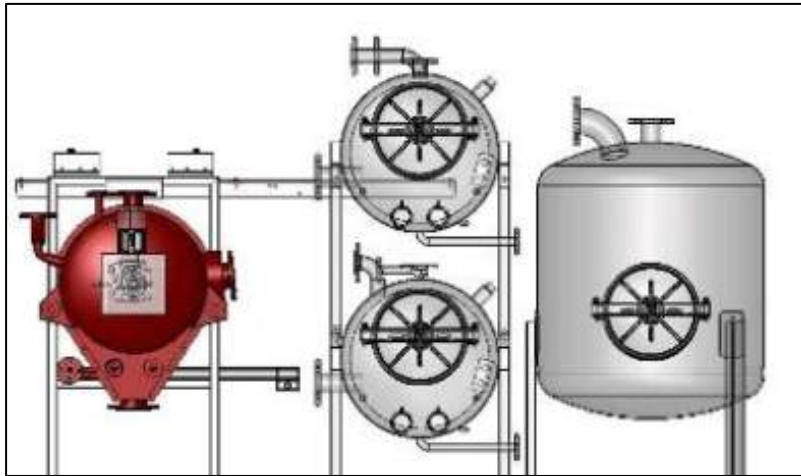
State of art in industrial cleaning technique

工业清洗技术的技术发展水平

Machine types 设备类型



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Single-, double-, multi Chamber cleaning systems
(W-, S-, C- types) 单腔, 双腔, 多腔 清洗系统
(W型, S型, C型)



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State of art in industrial cleaning technique

工业清洗技术的技术发展水平

Cleaning treatments

清洗工艺

- Parts movement 零件运动
- Closed systems (for Solvent)
and use of vacuum
封闭式系统（溶剂）和真空的应用
- Injection Flood wash (IFW)
and /or Spraying function
浸没紊流清洗 喷淋要求
- Ultrasonic 超声波
- Vapor degreasing (for Solvent)
蒸汽脱脂(溶剂)
- Hot air and /or vacuum drying
热风干燥和真空干燥

Movie –
Cleaning treatments ®



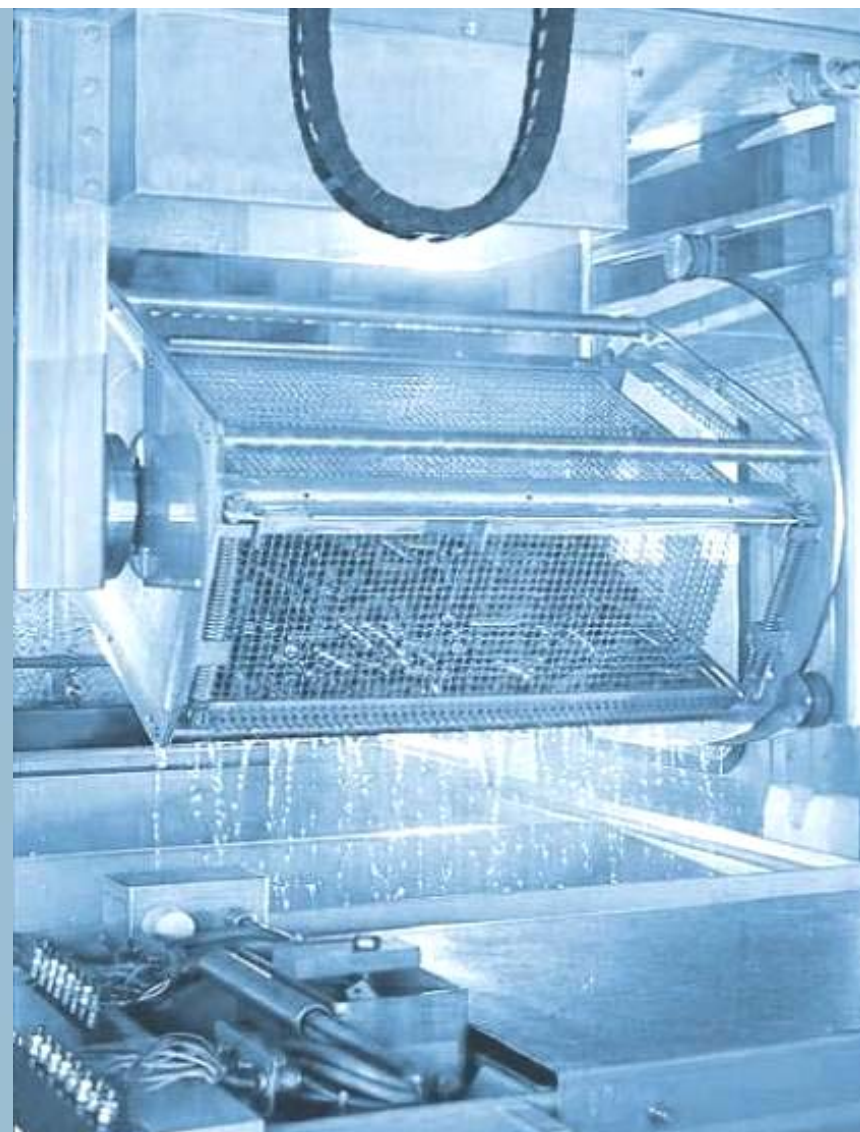
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Cleaning and Filtration Systems (CFS)

Cleaning of hydraulic parts

液压零件的清洗

PL Universal

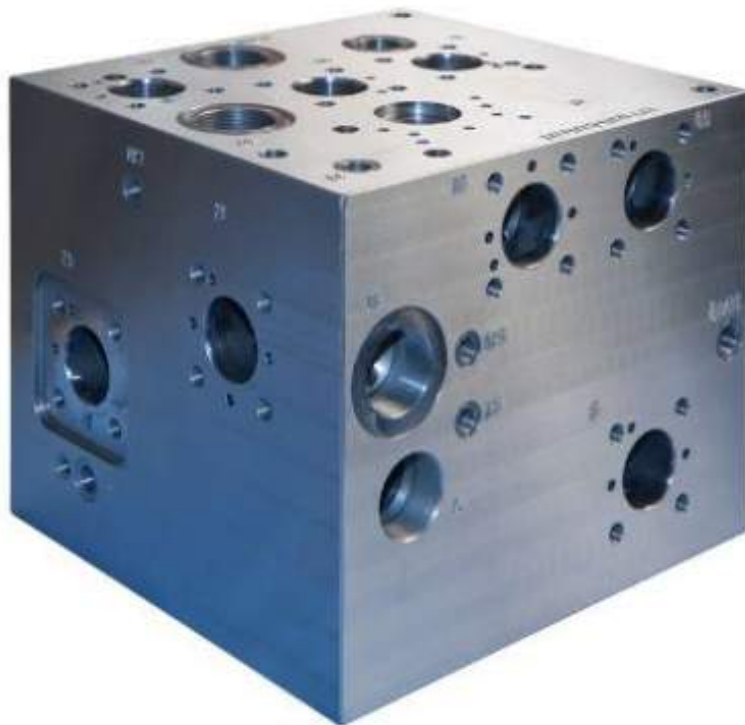


Product Line Universal 通用产品线

Cleaning of Hydraulic Parts 液压零件的清洗



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PL Universal – Market segment hydraulic parts

液压零件
Content内容



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Production process – hydraulic 生产工艺-液压

Hydraulic parts - typical contamination 液压零件-典型污染物

Why cleaning of hydraulic parts? 为什么清洗液压零件?

Difficulties while cleaning hydraulic parts 清洗液压零件的难点在哪里?

Reference customers 参考客户

Component and contamination define cleaning media and process

Case studies 案例分析

Reference list 参考清单

General information - hydraulic parts 综合信息-液压零件

Production process – Hydraulic 生产工艺-液 压



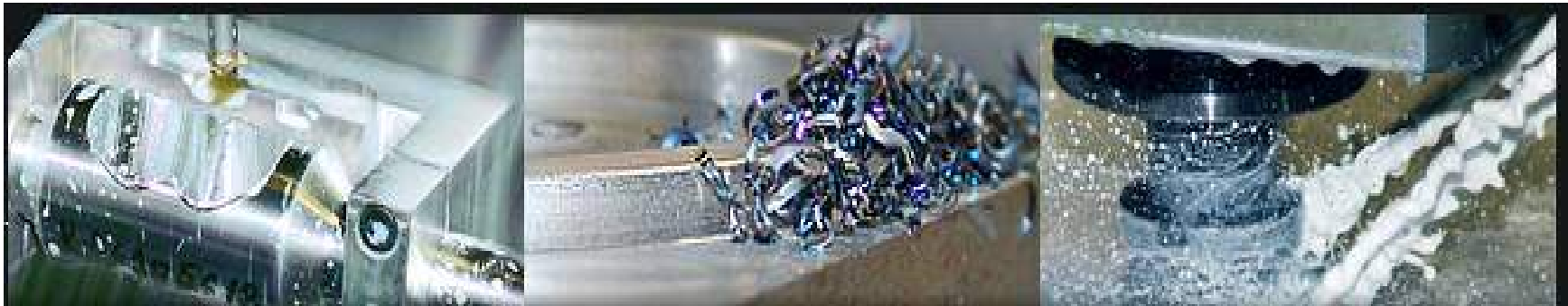
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Production process – Hydraulic 生产工艺-液压



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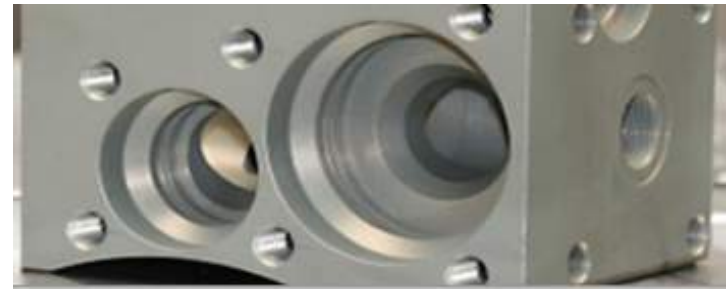


Production process – Hydraulic 生产工艺-液压



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Hydraulic parts 液压零件



液压工艺应用在当一个单点的刀具平行于表面的情况下。使用手动的方式或者CNC 或者自动车床，进行车削的时候，一款材料被旋转，刀具沿着2轴方向Z型前进来车出精确的直径和深度。车削也可以在汽缸的外侧和内侧来加工管状零件的结构。车削产生细碎的金属屑。加工的过程中需要冷却液。



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Why cleaning of hydraulic parts?

为什么要清洗液压零件？

The industrial parts cleaning as quality-relevant production step for surface and process improvement in the production of hydraulic parts

作为为提升表面质量和工艺提升而与质量关联的液压零件的清洗

- Intermediate cleaning for following production steps (clamping – handling processes)
- 为如下生产步骤服务的中间清洗（箝位-处理工艺）
- Cleaning of contaminations from processes (oils, emulsions, particles, chips)
- 清洗工艺流程中的污染物（油，乳化液，颗粒物，碎屑）
- Remove of passive layers 去除钝化层
- Activation of surfaces for chemical follow-up processes (e.g. coating)
- 激活表面为后续工序准备（比如说，涂层）
- Corrosion protection （防腐蚀保护）
- Fine cleaning while maintaining high cleanliness requirements
- 基于高清洁度要求的精细清洗

Difficulties while cleaning turned parts

清洗车削零件的难点

- Much oil: The difficulty is that for the further processing (e.g. galvanic processes, coating, sticking, mounting etc.) the parts must be absolutely free of fat (oil / emulsion). Particle sizes are also often a challenge.

大量油： 难度在于下一步的工艺（比如电镀工艺，涂层工艺，粘接，镶嵌等等）零件必须做到完全无油及乳化液, 零件的尺寸也是一个难点。

- Cleaning after TEM deburring: The difficulty is that the parts are brown; the cleaning contaminates the bathes strongly; for steel parts a passivation is compulsory.

热能（热爆）去毛刺之后的清洗： 难度在于零件是棕红色的，清洗会极大的污染清洗的水质； 钢质铁质零件的防锈也是必须要做的。

- Different materials (stainless steel, brass, steel, AL, etc.)

不同的材料（不锈钢， 黄铜， 铁， 铝等等）

- Bulk parts, density, throughput

大批量零件， 密度， 节拍

- Blind holes (small capillary tubes) 盲孔 （细小的孔）

- Bulk material as well as places parts (precision parts)

散装零件及定位零件（精密零件）



Reference customers 参考客户

Selection of hydraulic parts manufacturer 液压零件生产商选择



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Rexroth
Bosch Group



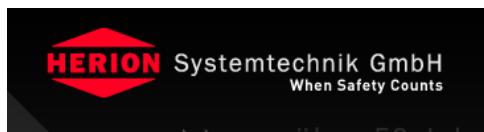
FLUIDTEAM
AUTOMATIONSTECHNIK
Ein Unternehmen der WESER-HYDRAULIK Gruppe



BRINKS

Dinacil, S.L.

IN-LHC



**SAUER
DANFOSS**

HYVA GEORG
HYDRAULIK

Component and contamination define cleaning media and process



Ecoclean

零件和污染物决定清洗介质和工艺

Parts零件	Contamination污染物	Cleaning with 用什么清洗
Hydraulic parts, e.g. hydraulic cylinders 液压零件，例如液压汽缸 	Emulsion, chips 乳化液，切屑 	... watery cleaning media: The Dürr Ecoclean W-series, e.g. Universal 81W, EcoCBase W3 水基设备：杜尔Ecoclean 的W 系列 

Component and contamination define cleaning media and process



Ecoclean

零件和污染物决定清洗介质和工艺

Parts 零件

Contamination 污染物

Cleaning with ... 用什么清洗

Hydraulic parts
e.g. pump parts

液压零件：泵类零件



Processing oils,
preserving agents,
polishing pastes,
particles 加工油，防
锈介质，打磨下来的
废料，碎屑



... hydrocarbons: 碳氢设备
The Dürr Ecoclean C-series,
e.g. Minio 85C, EcoCBase C2



Component and contamination define cleaning media and process

零件和污染物决定清洗介质和工艺



Ecoclean

Parts 零件	Contamination 污染物	Cleaning with ... 用什么清洗
Hydraulic parts 液压零件   	polar or non-polar contaminations (e.g. oils, salts, pastes, lacquers and adhesives) 极性或者非极性的污染物 (如, 油, 盐, 废料, 漆, 或者粘着物) 	... polar and part-polar solvents: 半极性溶剂 The Dürr Ecoclean P-series, e.g. Compact 80P, Universal 81P, <i>EcoCBase P2</i> 

Component and contamination define cleaning media and process



Ecoclean

零件和污染物决定清洗介质和工艺

Parts 零件

Contamination 污染物

Cleaning with ... 用什么清洗

**Hydraulic parts,
e.g. control blocks**

液压零件；如多路阀等

**Residuals of TEM
deburring**

热能去毛刺之后的污染物

... watery cleaning media: 水基介质
**The Dürr Ecoclean W-series,
e.g. Universal 71**





Ecoclean

Cleaning and Filtration Systems (CFS)

杜尔 **Ecoclean** 集团

Thanks for your attention!

感谢您的关注！

Nanjing Seminar – China, April . 2012

