









Welcome to
**“Critical Cleaning with CNp,
 Ultrasonics, or Both?”**
 We will begin soon...

7/8/2020
 POCWebinar with LPW

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Welcome to
**“Critical Cleaning with CNp,
 Ultrasonics, or Both?”**
 We will begin soon...

Ask your questions using
 the **Q&A** button

Q&A


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Why you should care...


Cleaning Blind Holes? Tubes? Porous Items?

“cleaning through a keyhole” - direct on the surface




WEBINAR
LPW
More than cleaning


The PQCW offers practical, hands-on and independent, training in cleaning.



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“Cleaning with Vacuum Cavitation”


Our Hosts - the PQCW Team



Barbara and Ed Kanegsberg - “The Cleaning Lady and the Rocket Scientist”

- BFK Solutions - Consultants in Critical Cleaning
- Authors and Editors of the two-volume CRC Handbook for Critical Cleaning
- Independent evaluations and recommendations
- Co-chairs of the Product Quality Cleaning Workshops
- barbara@bfksolutions.com and ed@bfksolutions.com





Darren Williams - “The Professor”

- Professor of Physical Chemistry at Sam Houston State University
- Leader of the Cleaning Research Group
- Co-chair of the Product Quality Cleaning Workshops
- Performs cleaning trials and formulates cleaning chemistries
- williams@shsu.edu

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Product Quality Cleaning Workshops

- ▶ Workshops
- ▶ Webinars
- ▶ Resources for more effective cleaning processes
- ▶ More information
 - ▶ shsu.edu/pqcw
 - ▶ bfksolutions.com/manufacturing-minds-pqcw/

Q: What was most valuable to you?
A: "The general overview of cleaning and the introduction to cleaning processes."
 – a 2018 attendee

"The vendor demos were great."
 – a 2018 attendee

"All the lab activities were interesting and made me think about things I need to consider in my own lab work."
 – a 2018 attendee

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“Cleaning with Vacuum Cavitation”

Our Guests from LPW

Gerhard Koblenzer

- Managing Owner of LPW Reinigungssysteme GmbH

Gerhard Koblenzer is the managing owner of LPW and has been active in the company for about 20 years. In the past 12 years, he developed the company from an automotive supplier to a specialist for the highest requirements in the field of critical cleaning. Before joining LPW, he was a professional officer at the German Light Mountain Infantry. Furthermore, Gerhard Koblenzer is chairman of the "Process and Fluid Technology" committee of the German cleaning technology association "FiT".

Hans Hauger

- Chief Technology Officer of LPW Reinigungssysteme GmbH

Hans Hauger has been the responsible development manager at LPW since 2015 and supports the expansion of the company's fine cleaning division with a variety of development projects. Based on many years of international experience in the engineering and process design of fluid and cleaning systems (e.g. semiconductor industry). Hans Hauger was involved in the implementation of a large number of patents.

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“Critical Cleaning with CNp, Ultrasonics, or Both?”



// Atomic residues



// Bacteria



// Toxic residues



// Particles



// Film type contamination


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About ...


LPW Reinigungssysteme GmbH

is a specialist for professional machines and process technology in the area of industrial component cleaning using aqueous media, located near Stuttgart/Germany.



2.400 m² assembling area
550 m² test and analytic area
83 employees


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Focus

Critical and Fine Cleaning

<p>Components</p> <p>New Methods</p> <p>Material</p> <p>Geometries</p> <p>Process</p> <p>Fluid</p>	<p>Medical Components, Devices, Implants Laser- and Vacuum Components Precision Components Optical and Sensor Components Components for e-Mobility and FuelCell-Systems</p> <p>Additive Manufacturing Critical Coatings and Adhesive Processes</p> <p>e.g. Stainless Steel, Aluminum, copper, brass, titanium, glass and ceramics, plastics</p> <p>All and complex</p> <p>Final Cleaning after pre-cleaning under the aspect of a Clean Process</p> <p>Water with Detergents</p>
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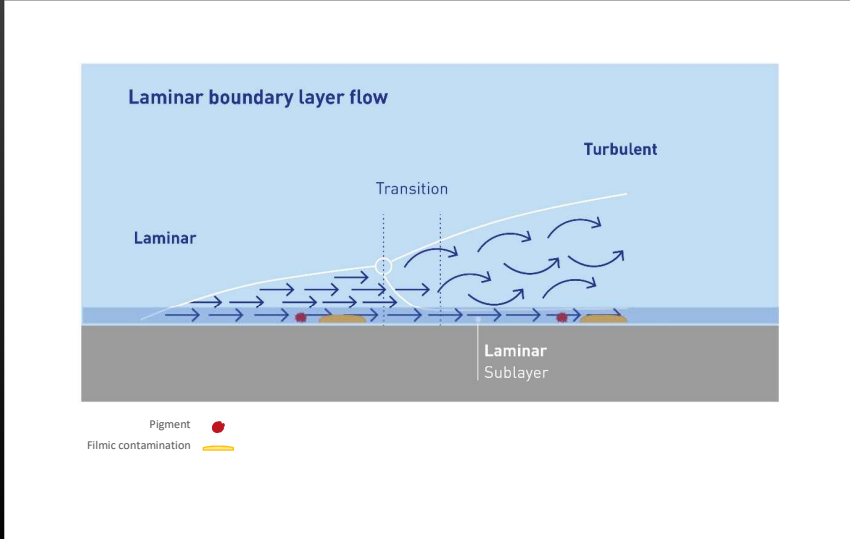

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Characteristics

of the Cleaning Processes

Cleaning directly in the Boundary Layer




Laminar boundary layer flow


Laminar Transition Turbulent

Laminar Sublayer


Pigment ●
Filmic contamination —





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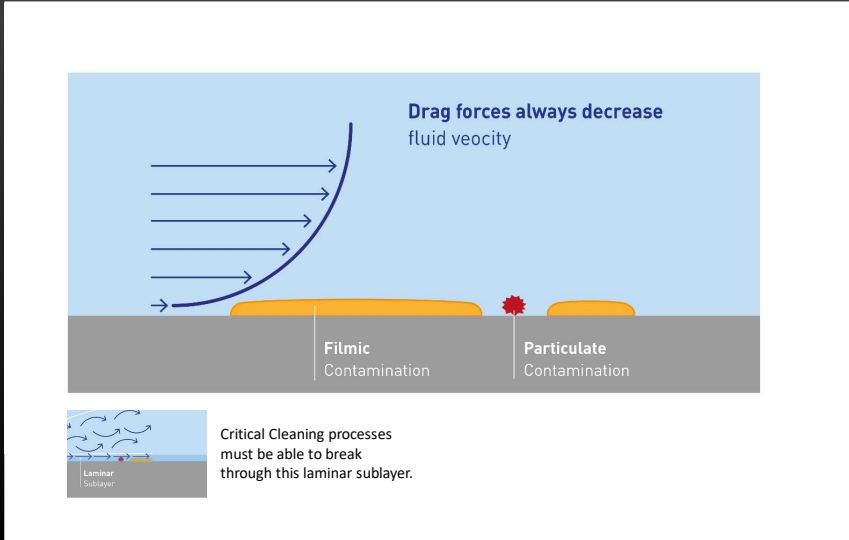
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Characteristics of the Cleaning Processes Cleaning directly in the Boundary Layer



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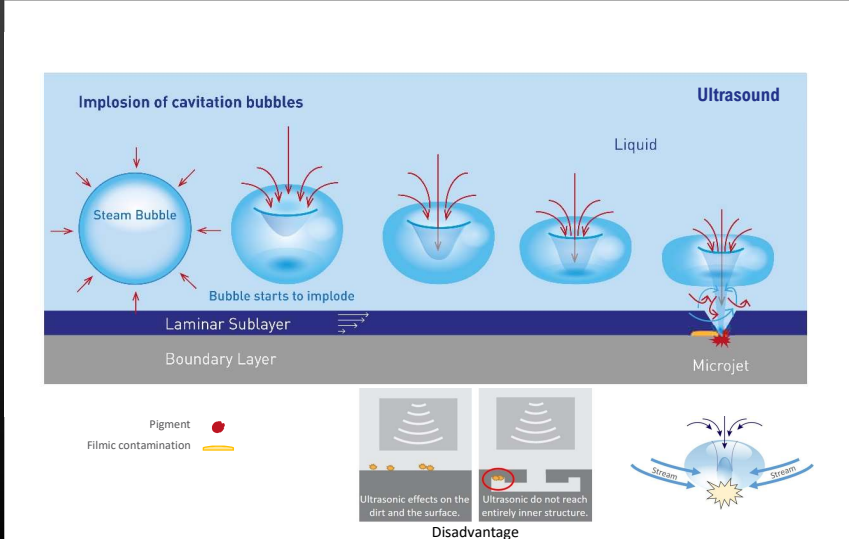
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Characteristics of the Cleaning Processes Cleaning directly in the Boundary Layer



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Characteristics of the Cleaning Processes

Cleaning directly in the Boundary Layer

Direct on the Surface ?

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Cyclic Nucleation process

Directly on the Surface: The New Quality of Cleanliness

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Basic Principle of the Cleaning Processes

Steam Curve

The graph plots pressure in psi and mbar against temperature in °C and °F. The y-axis ranges from 0 to 14,50 psi (0 to 1000 mbar). The x-axis ranges from 0 to 100 °C (32 to 212 °F). A blue curve represents the phase change from liquid water to steam. A red circle highlights a point on the curve at 311 mbar (4,51 psi) and 158 °C (314 °F).

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Basic Principle of the Cleaning Processes

Asymmetric Volume Flow and Cavitation

Asymmetric Volume Flow

The asymmetric change of volume creates a pumping effect ensuring the exchange of media in capillaries and blind holes helping to remove impurities.

Gas bubbles form on the reactive surface. The gas bubbles expand. The bubbles implode and generate cavitation.

Due to the isotropic distribution of pressure change in the cleaning fluid, Cyclic Nucleation (CNP) is highly effective in cleaning difficult geometries like undercuts and narrow channels.

Effects between dirt and reactive surface. Easily reaches shaded areas.

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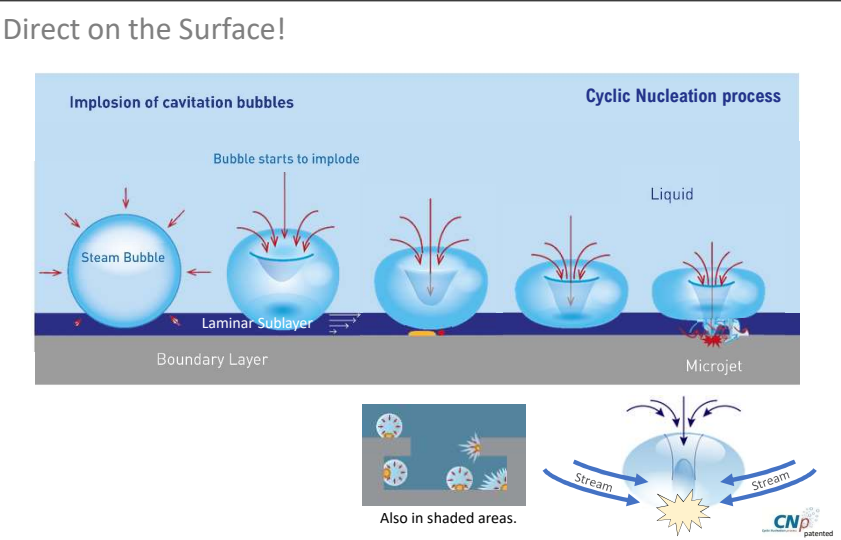
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Basic Principle of the Cleaning Processes

Advantage



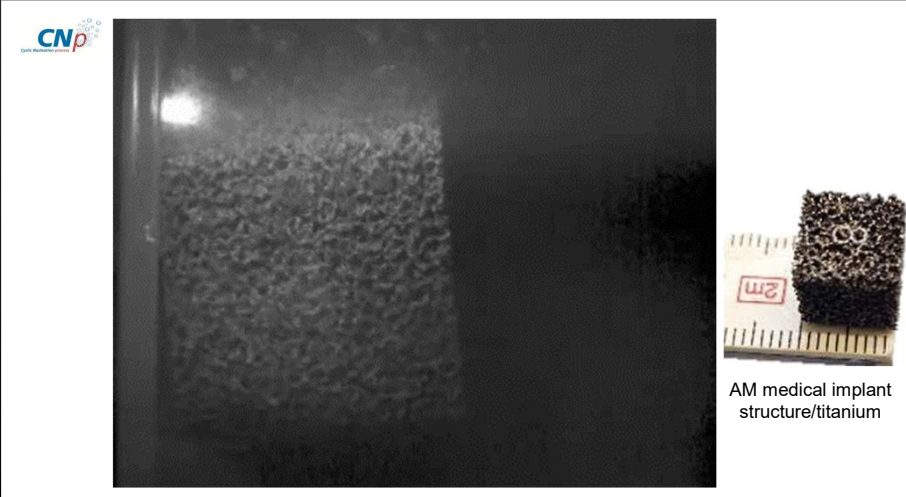
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R&D activities of LPW

Dynamic CNp for AM solutions



SlowMotion (Real 1,5s)

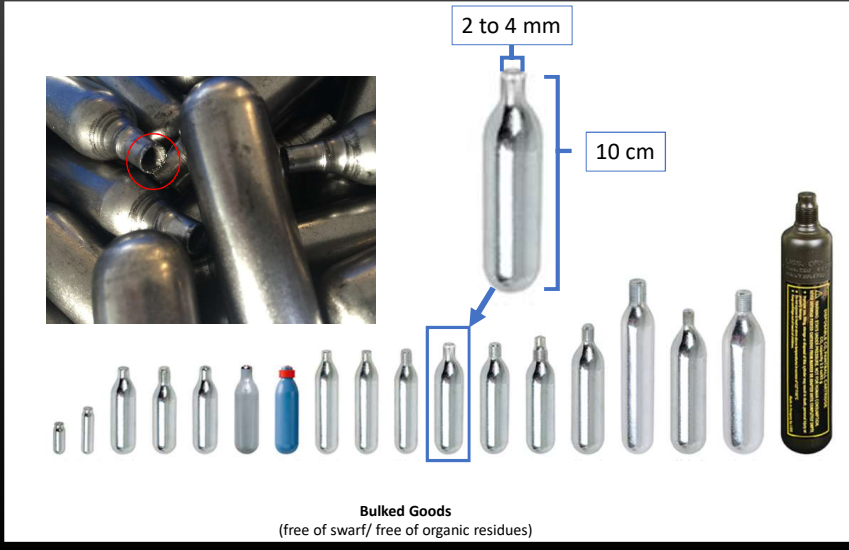
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Sample Applications

Carbon Dioxide Capsules



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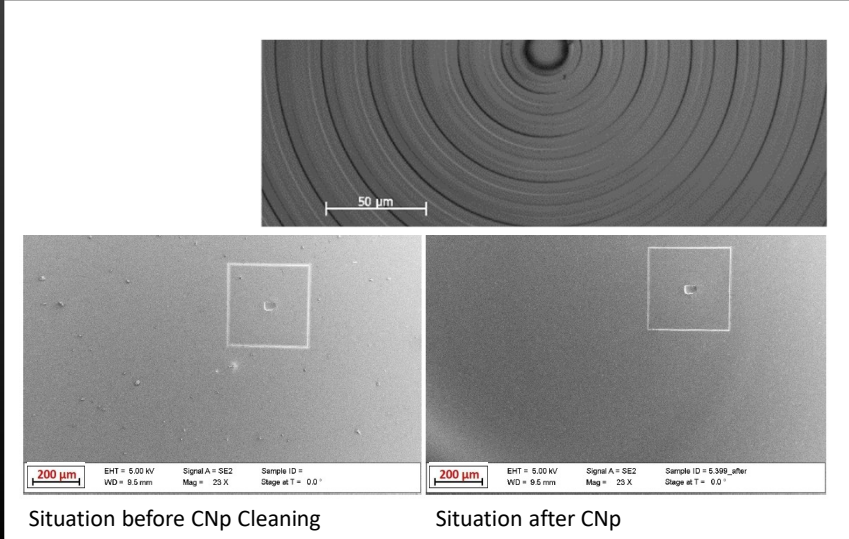
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Sample Applications

Coated Surfaces



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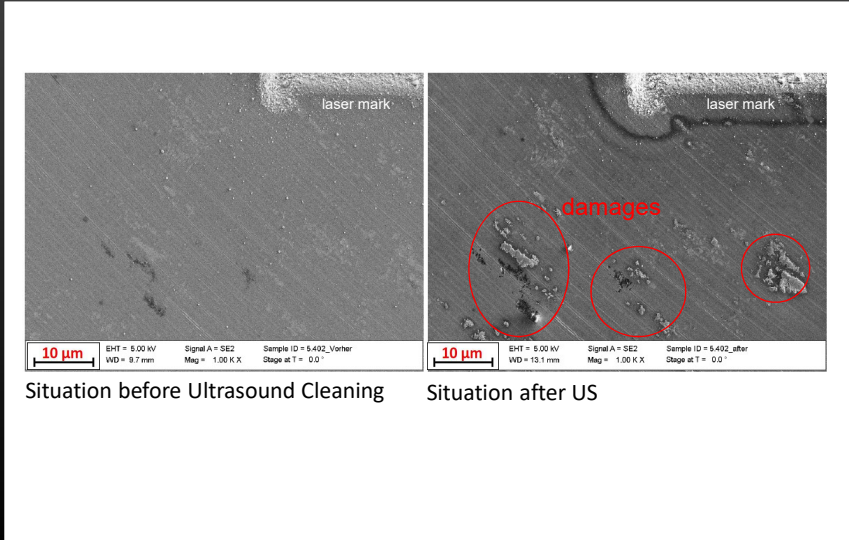
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Sample Applications

Coated Surfaces



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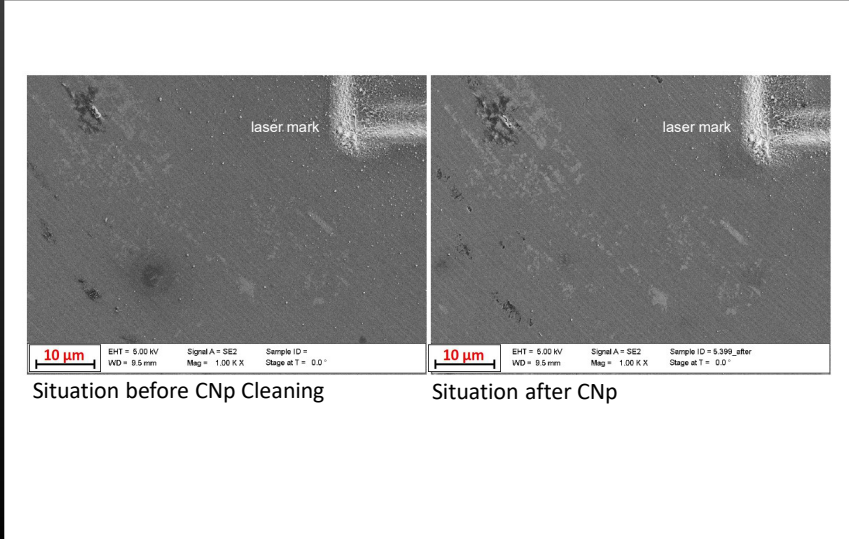


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Sample Applications

Coated Surfaces



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Sample Applications

Sintered Filters



left side: capping nut, bottom closed and filled with riboflavin
right side: open-pored filter (pore size 70-90 microns), screwed in the nut

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Sample Applications

Sintered Filters

Sintermetal Filters



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Sample Applications

Sintered Filters

Sintermetal Filters



After CNp: Filter and cap are free of riboflavin

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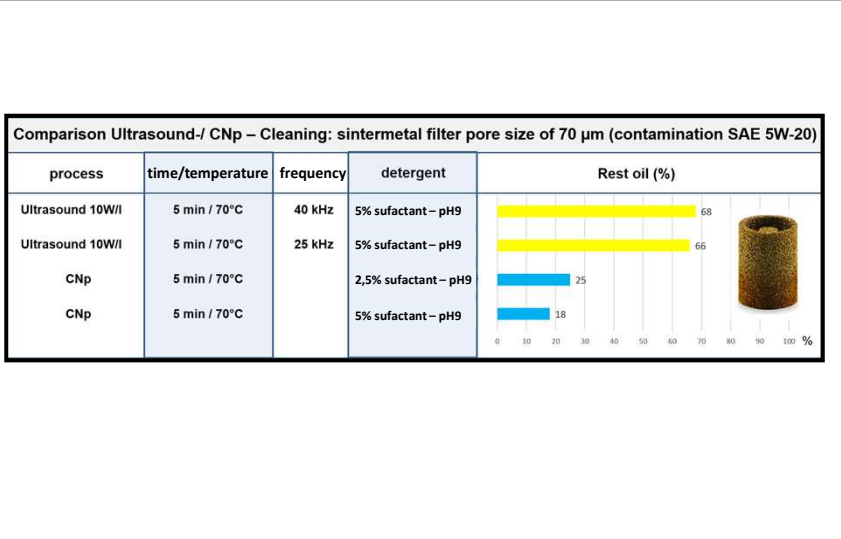


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Sample Applications

Sintered Filters



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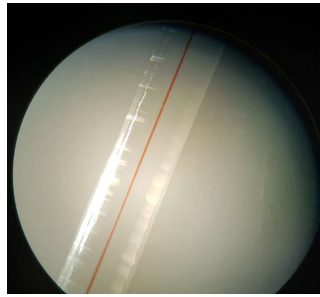


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Sample Applications

Glas Tubes



situation before cleaning



situation after CNp

Glas tubes
Length 300mm, inner diameter 70 microns

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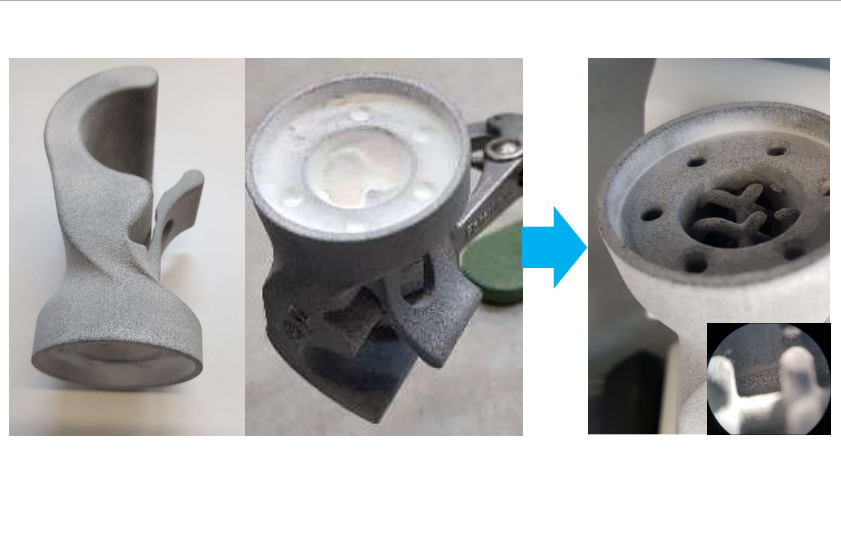


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Sample Applications

Cleaning of AM Components



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Sample Applications

Laser Components for SemiCon



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1st place at the CLEAN 2018

The Fraunhofer IPA Institute honours pioneering developments, new applications and innovative technologies with the annual CLEAN award for cleanliness technology. LPW won first prize with the CNp process in 2018.



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Thank you for attending!


Contact us with your questions...




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Product Quality Cleaning Workshops

COME TO THE PQCW

- ▶ **When?** To Be Announced
- ▶ **Where?** Sam Houston St. Univ., Huntsville TX
- ▶ **More Info?** Visit <http://shsu.edu/pqcw>

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Have a great rest of your day

product quality
cleaning workshops

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Discover the Cyclic Nucleation Process (CNp) with LPW

Contact us with your questions...

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