



iba-Tag 2023
IBA in Ceramic-Filter Water Treatment
May 2023 JRE



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The production of ceramic filters for industrial applications requires a high degree of discipline in addition to the highly complex production processes. Nanostone Water lives the "change management process" and "root cause analysis" with all the associated methods.

Due to the ever-increasing level of automation of our process equipment and the related understanding that changes in the user application have an impact on quality characteristics, we use IBA to identify changes in the manufacturing processes. Beside changes we are interested process-optimization under the aspect of yield, throughput and costs.

Besides manufacturing applications, we focus on piloting our products at customer sites. Processes with or without our solution is monitored by us with the help of IBA. We analyze and compare data and share this with our clients and partners.

1. Nanostone Water

Company History

Nanostone Water was formed in 2012 to develop and commercialize the core ceramic technology.

Nanostone Water is primarily owned by True North Venture Holdings, LLC, a U.S.-based company engaged in identifying, scaling and operating disruptive businesses in the water, energy, chemical, fuels and waste sectors.

Prior to releasing its first solution for commercial sale in 2017, Nanostone Water's technology, products and solutions were developed, tested and launched through rigorous, systematic processes over a six-year period.

In 2017, Nanostone Water qualified and ramped its automated, ISO 9001-certified ceramic module factory in Germany, culminating six years of process and equipment design and optimization. Nanostone Water's high yield/high throughput factory has been designed for low-cost production and efficient capacity expansion.

Today, Nanostone Water has ~ 150 associates with commercial offices in Asia, Europe, Middle East and U.S. in addition to the manufacturing facility in Germany. Our cultural commitment to operational excellence is backed by rigorous application of structured engineering practices and data-based quality and reliability programs derived from best-in-class methodologies.

1. Nanostone Water

Company History



2012

Nanostone Water is formed

Company incorporated and acquired IP.



2014

Alpha Product

R&D advances to prototype and alpha product field testing; pilot production line upgraded.



2015

Beta Product

Beta product launched and initial demonstration projects deployed.



2016

Manufacturing achieves a significant milestone

Commercial product development and qualification and commercial production line design and retrofit.



2017

Gen 1 Product Released

- Gen 1 product released;
- Nanostone began serving industrial customers in China and the greater Asia Pacific region.



2018

Commercialized Product launched

First drinking water installation.



2019

Market Expansion

Nanostone began working with leading municipal utilities in Europe, Asia, and North America to integrate its solutions into large greenfield treatment plants.



2021-Future

Continue a Systematic Expansion into New Markets.

Launched desalination pretreatment solution.



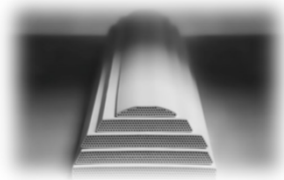
Nanostone Confidential

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1. Nanostone Water

Technology



Ceramic Membrane

- The rock solid, hydrophilic, and oxidant stable ceramic provides long life and resistance to fouling
- True ultrafiltration membrane with tightly designed 30 nm pore size for reliable removal of suspended solids and pathogens
- Inherent high permeability, high flux structure and pore channels
- The ceramic structure is fabricated using Nanostone's proprietary nanomaterials



Segmented Monolith Design

- Ceramic sheets are configured into a patented segmented monolith design
- The design allows unrestricted permeate flow out of the ceramic material along the entire length of the module, eliminating flow restrictions and unnecessary pressure drop
- The patented design maximizes surface area per module
- The segmented module format, along with proprietary materials and production processes, facilitate high throughput, low-cost manufacture



High Flowrate Module

- Each segmented monolith is integrated in a housing to provide an easy-to-use, corrosion-free module
- The module is designed for maximum flexibility and can retrofit all major UF racks as well as be deployed in a wide range of greenfield system designs
- Each 7 bar-rated module measures 1.9m height x 250mm diameter
- Due to the robust ceramic membrane and segmented monolith design, the module can operate at a high flux rate with high permeability over sustained period

1. Nanostone Water

Fields Of Application

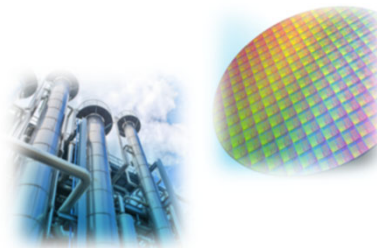
Desalination Market

- Availabilities Up To 97-98%
- Simplified Process
- Higher Quality Water - Lower Operating Expenses
- No Membrane Replacement For 20 Years



Municipal Drinking Water Market

- Nanostone Water provides a ceramic-based filtration system
- Integration of our solutions into plant upgrade and capacity expansion projects and retrofits

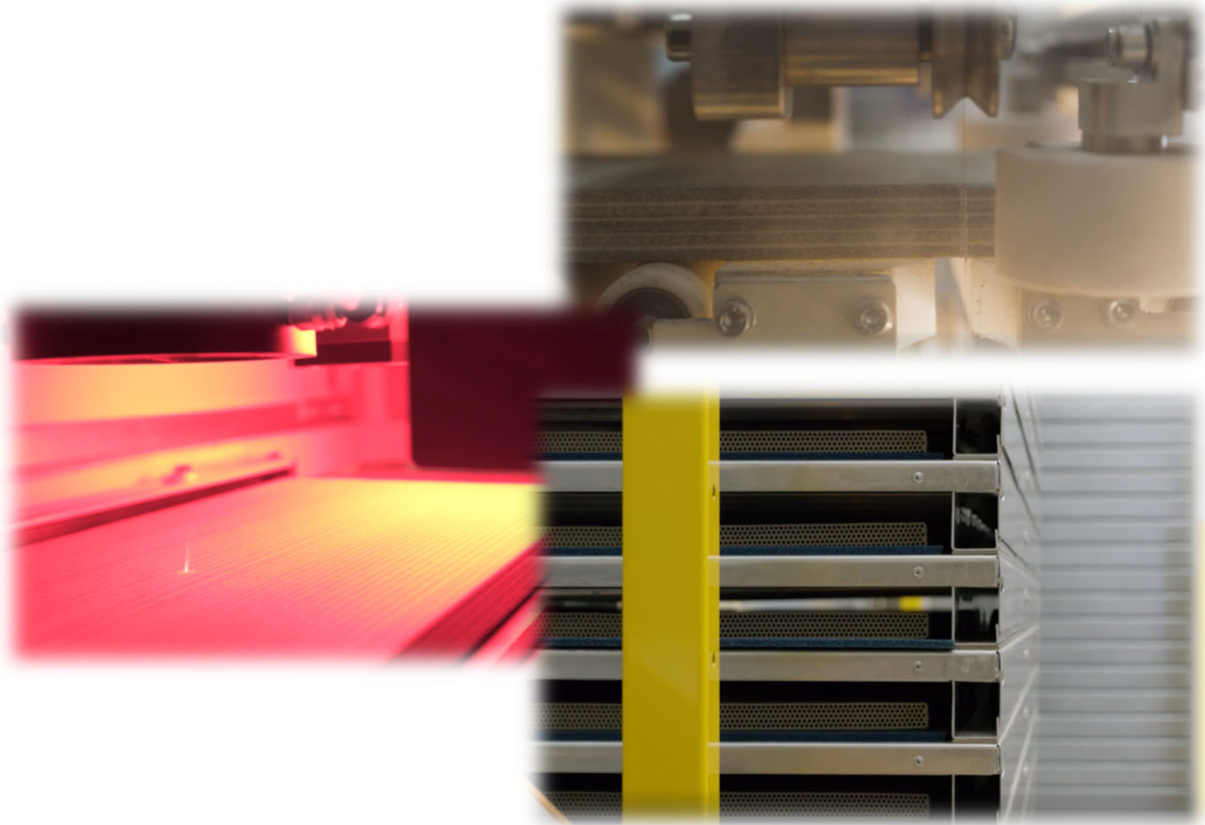
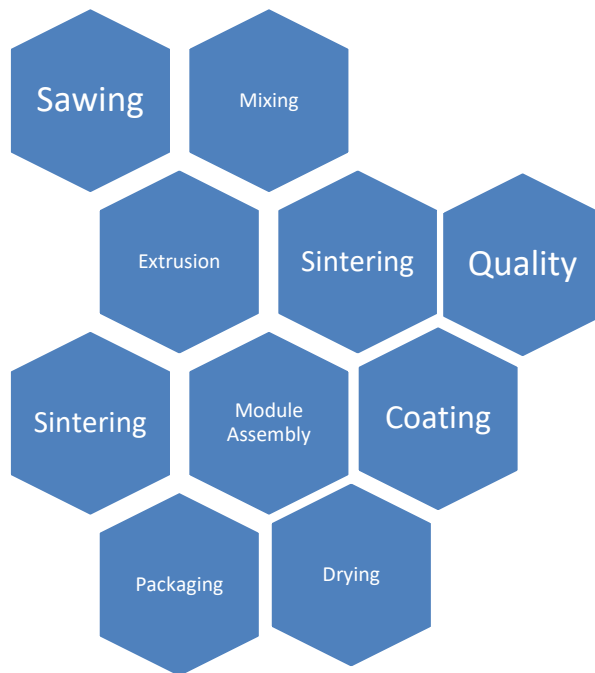


Industrial Market

- MINING
- POWER GENERATION
- MICROELECTRONICS
- CHEMICAL AND REFINING PLANTS

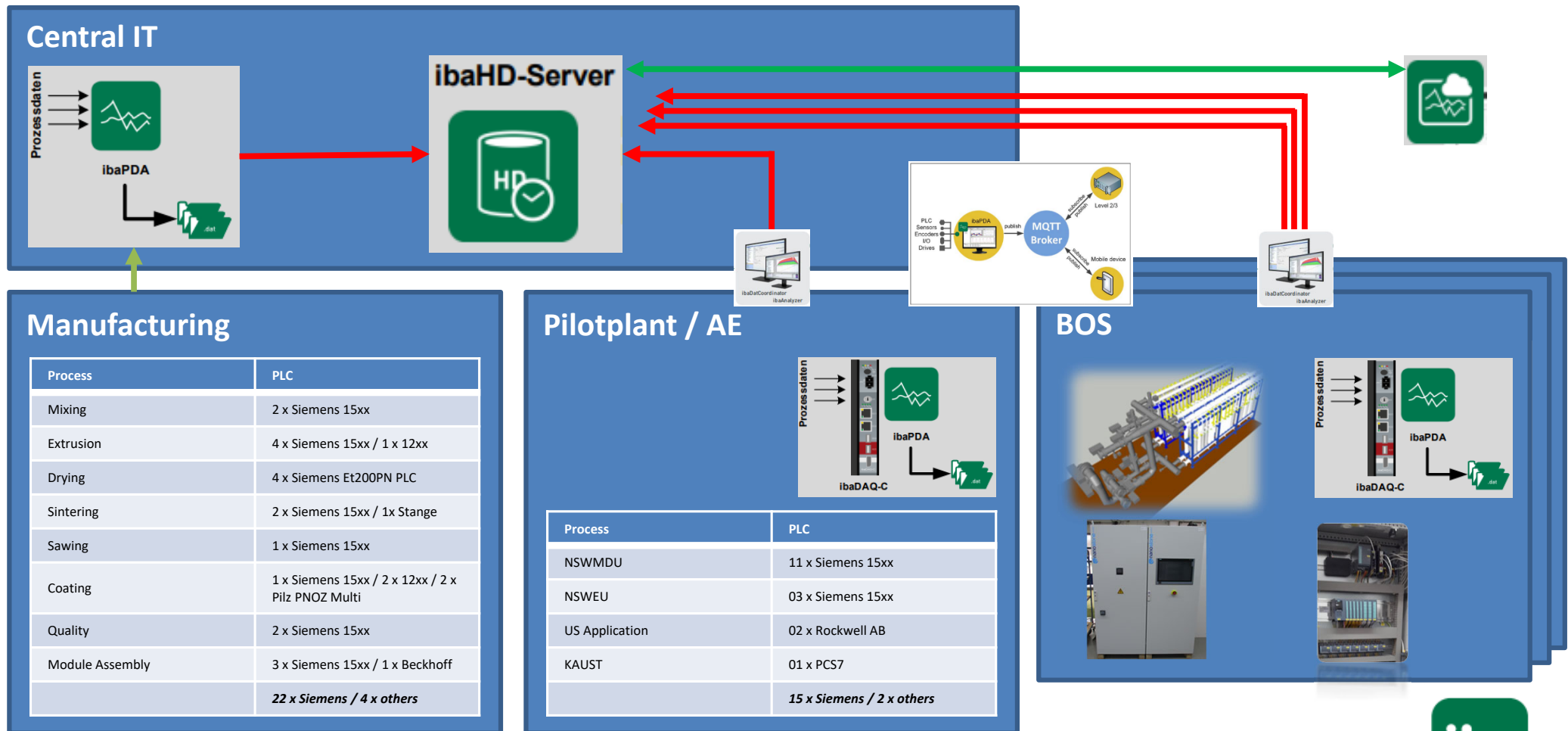
2. Manufacturing Of Ceramic Filter Modules

High Level Insight

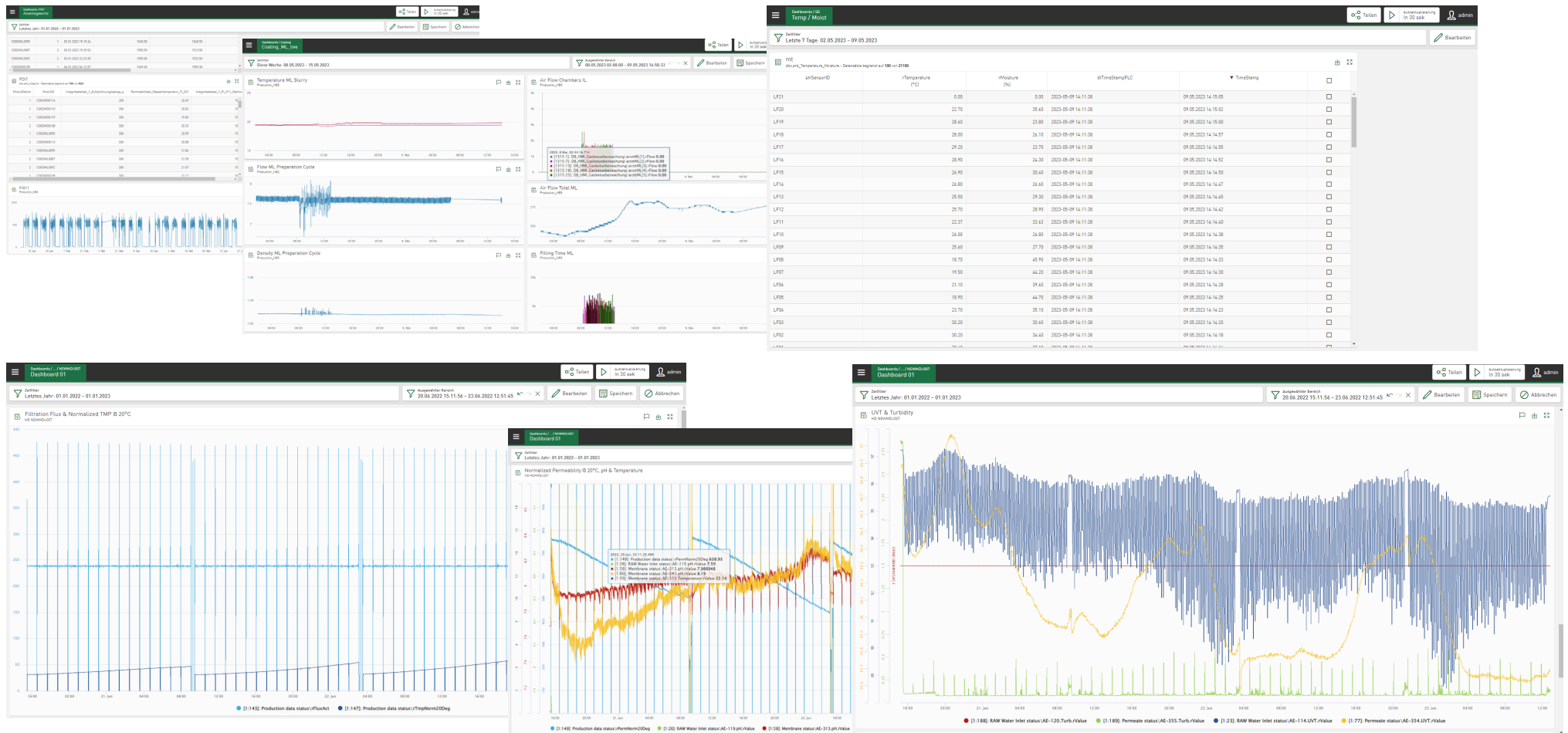




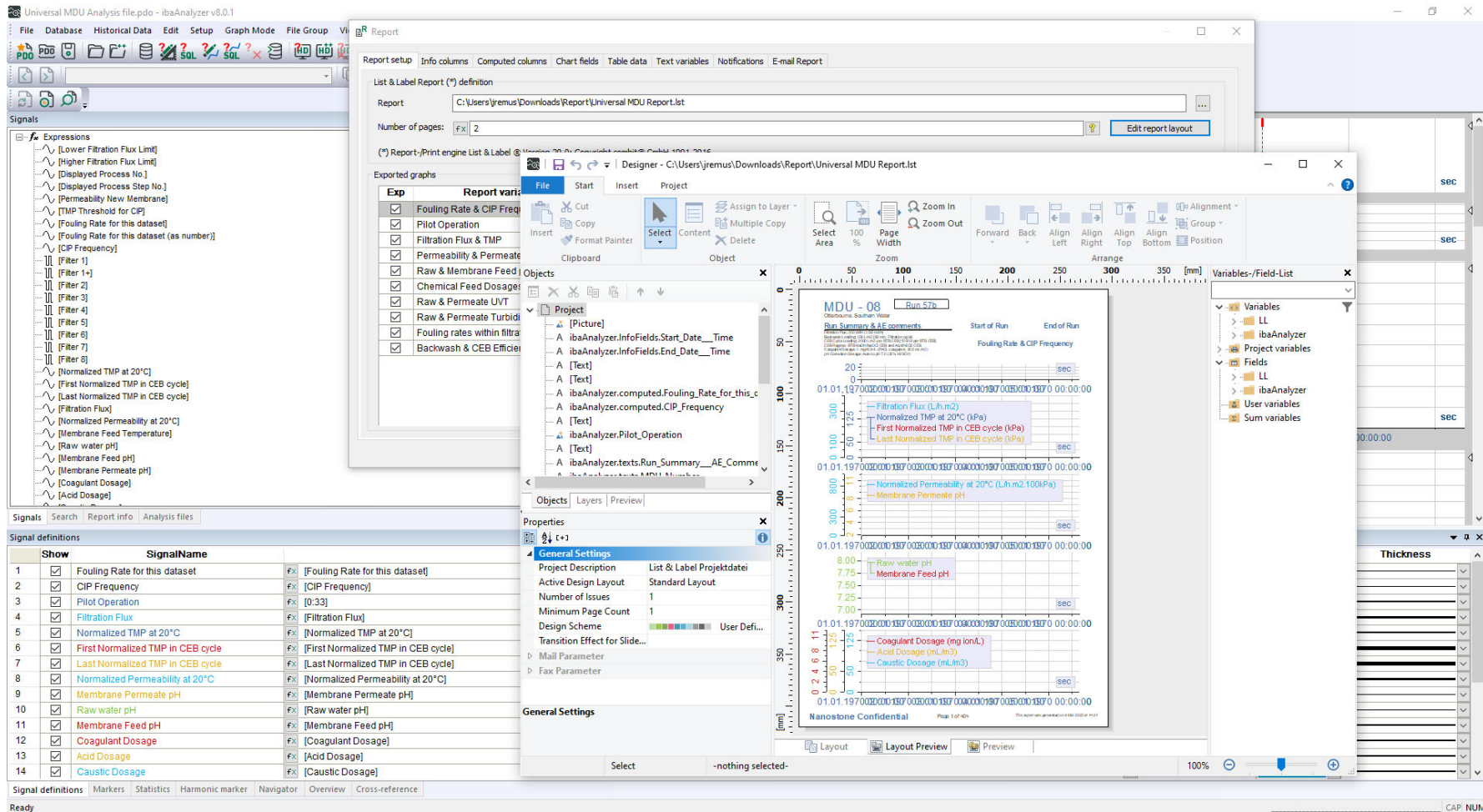
3. Nanostone Global IBA Architecture



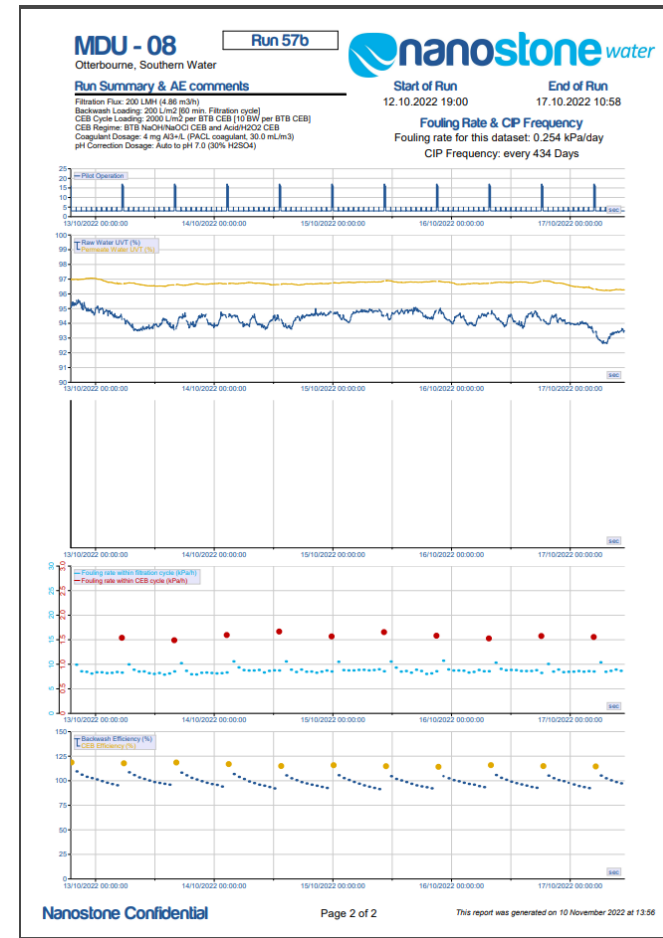
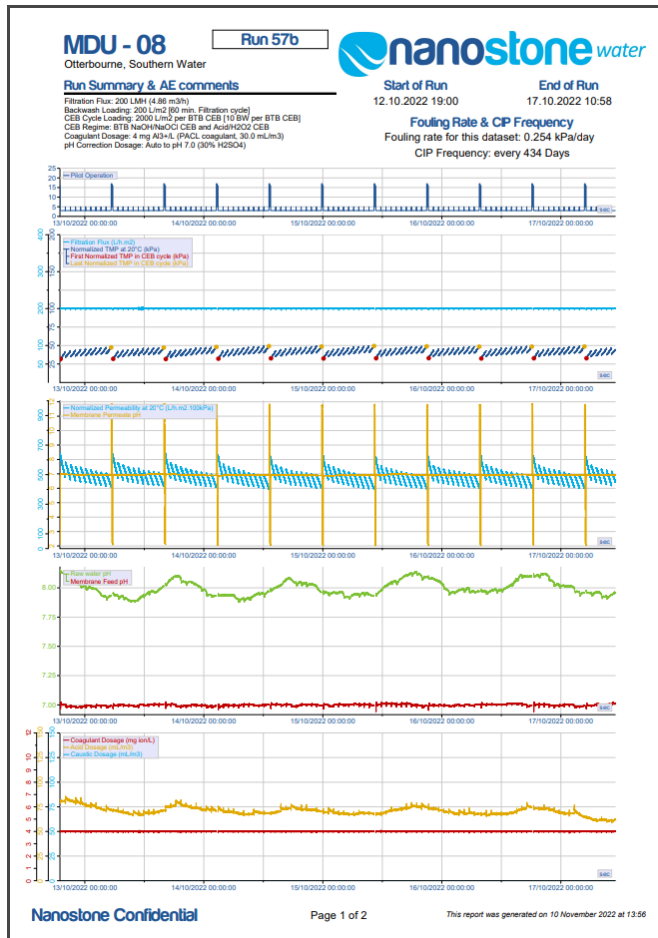
4. Nanostone Global IBA Architecture / DaVis



5. Nanostone Global IBA Architecture / Reports



6. Nanostone Global IBA Architecture / Reports



7. IBA As One Nanostone Standard

Data Acquisition

- Most Changes In Quality Can Be Led Back Into The Automated Process
- Very Open Transparent Source – Every Co-Worker Has Access And Can Analyze Data
- Open Interface To Statistic Tool Like JMP
- Interface To Almost All PLCs
- Interesting Connection Opportunities To IIoT Solutions

Reporting

- Standard Reporting For All Our Business Solutions (pilots and BOS)
- Uniform Report Design In Front Of Our Client
- Very Good Client-Solution – Different DaVis Dashboard Assignment

8. IBA As One Nanostone Standard

