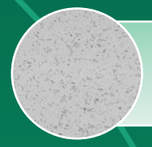
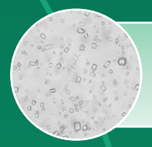
ParticleTech

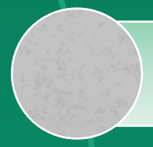
The smallest things make a big difference



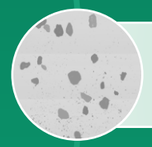
Crystallization
Looking to optimize your production?
Real-time measurements of crystal size, size distribution, shape, agglomeration, breakage etc.
Continuous monitoring for induction time, rate of nucleation, crystal growth rate etc.



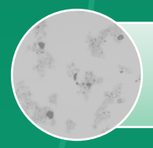
Sugar
Size distribution of seeds in slurrys, crystals in magmas and massecuites and dry sugar
MA and CV according to ICUMSA standard methods: Powers, Rens, RRSB and Butlers
60 times faster than conventional sieve analysis



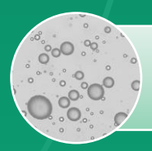
Fermentation
Continuous measurements of cell sizes, cell number, cell budding, etc.
Track how your cells are progressing over time
Strong visual tool for a qualitative assessment



Sand / dry powder
Use Roughness for a clear indication between round/smooth and crushed/edgy grains
Focus on both dust and big grains (0.5µm-3mm) using our unique size interval feature
Gives you the world's fastest sieve analysis



Flocculation
Looking to step up your flocculation?
Quantify flocculation effectiveness by counting free floating particles and measuring density of flocs
Receive fast and easy information as a reliable supplement to "eye-measurement"



Emulsions
How stable is your emulsion?
Quantify stability by measuring precise droplet size distribution and concentration
Monitor stability over time for indication of shelf life

Classification
Do you have different kinds of particles in your production?
Single particles, agglomerates, amorphous substances, biomass, crystalline particles etc.
Get customized algorithms to classify different particles by colours and data - in your production

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PARTICLE TECH

Optimize your production processes:

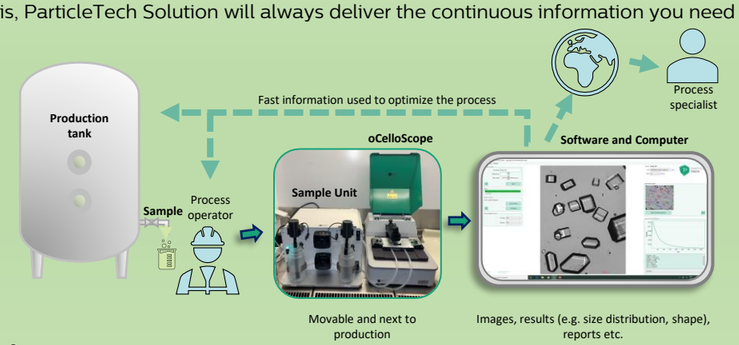
- Higher throughput
- Higher product quality
- Lower energy consumption

Real-time image analysis:

- See your product
- Particle Size Distribution (PSD)
- Particle Shape
- Fast alternative to sieve analysis

ParticleTech Solution

Sampling is the most crucial part of a measurement. We efficiently customize and optimize sampling to fit your product. We put great value into reliable, easy and safe sampling methods that everybody and anybody can do fast. Our images are state-of-the-art as they are based on the patented FluidScope tilted technology to achieve a powerful quality. Using our strong algorithms for customised image analysis, ParticleTech Solution will always deliver the continuous information you need to follow and react to your production.



Specifications

Applications	Most particles in (semi-)transparent substances/liquid or dry powder can be analysed, e.g.:	
	Agglomerates Alternative to sieve analysis Biomass Calcium Carbonate (Limestone) Cells Crystals	Dry powder Emulsions Flocculation Sand Sugar Yeast
Setup	At-line measurement	Flow
Measurements/statistics	**Particle Size Distribution:** D_{10}, D_{50}, and D_{90} Area **Particle Shape:** EQPC Sphericity Roughness **ICUMSA:** Butler method Powers method RENS method RRSB method	**Feret diameter:** Minimum Minimum$_{90}$ Maximum Maximum$_{90}$ Mean Ratio **Other:** Concentration (3D segmentation)
Classification	- Detects and discards air bobbles - Identifies specific shapes and/or contrasts (e.g. crystals, cells or others) - Distinguish between two or more types of objects (e.g. crystals and biomass)	
Object size	**Detectable size:** 0.5 µm – 2000 µm	**Minimum size for shape:** 5 µm
Measurement time	2-3 minuttes (typical)	
Sample container	128 x 86 x 12 mm (L x W x H): Standard 6-, 12-, 24-, 48-, and 96-wells titer plates ParticleTech Flow Cell ParticleTech Flow Cartridge ParticleTech Microscope Slide Holder	
Dilution pump for flow	Up to 1:2000 dilution (and even more with customized setup)	
Flow Cell dimensions	76 x 41 x 4.5 mm (L x W x H) **Chamber heights:** 100 µm 800 µm	**Tubes:** 3.2 mm (inner diameter) 1.6 mm (wall thickness)
Flow Cell/cartridge material	**Flow Cell (replaceable):** PMMA	**Flow cartridge (reusable):** Glass and aluminum

Use cases

1. Following a crystallization process and optimizing!

Findings:

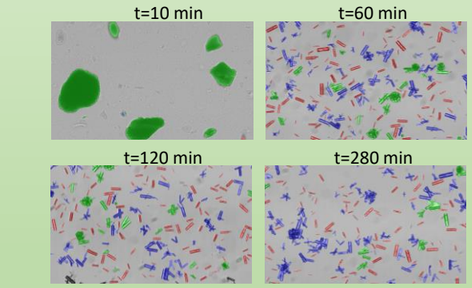
- Number of crystals vary among batches
- Crystallization peak after approx. 1 hour
- After peak, slight breakage of crystals due to shear force from stirrer

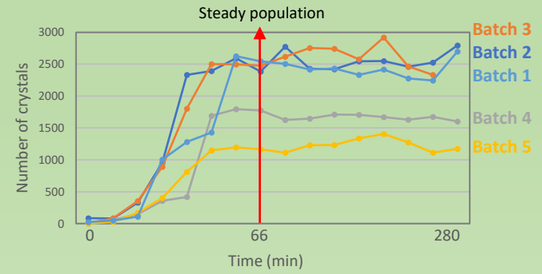
Actions:

- Reduce crystallization time by 76%
- Avoid variation among batches by optimizing parameters

Result:

- Energy reduction
- Time reduction
- Avoid broken crystals





2. A flexible moveable solution

Comparison between 5 high-temperature crystallizers:

- Flight case and table on wheels

Findings:

- 1 crystallizer less efficient
- Less pressure caused slower crystal growth

Actions:

- Reduce crystallization time by increasing pressure

Result:

- Energy savings
- Higher throughput (faster growth)
- Higher product quality (bigger crystals)

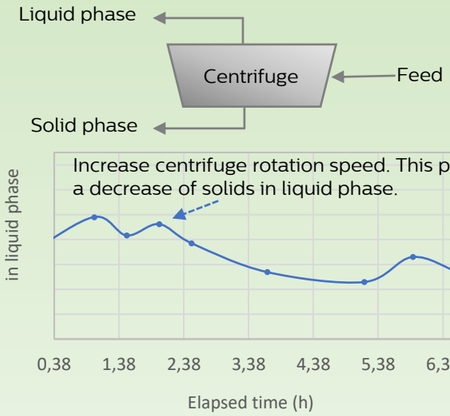
3. Collaboration with plant manufacturers

Centrifuge company:

- Problems with the centrifuge
- ParticleTech was part of their centrifuge calibration at a factory

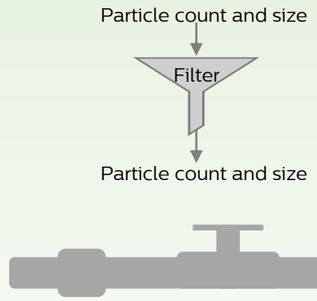
Separating particles from liquid:

- ParticleTech solution reveals how plant parameters affect the product



4. Filter efficiency

- Measure particle size before and after filtration to verify filter efficiency



5. Effects of product transportation in pipes

Findings:

- Up to 50% decrease in product particle size due to transportation in pipes

"Before I was blind, now I can see" – customer