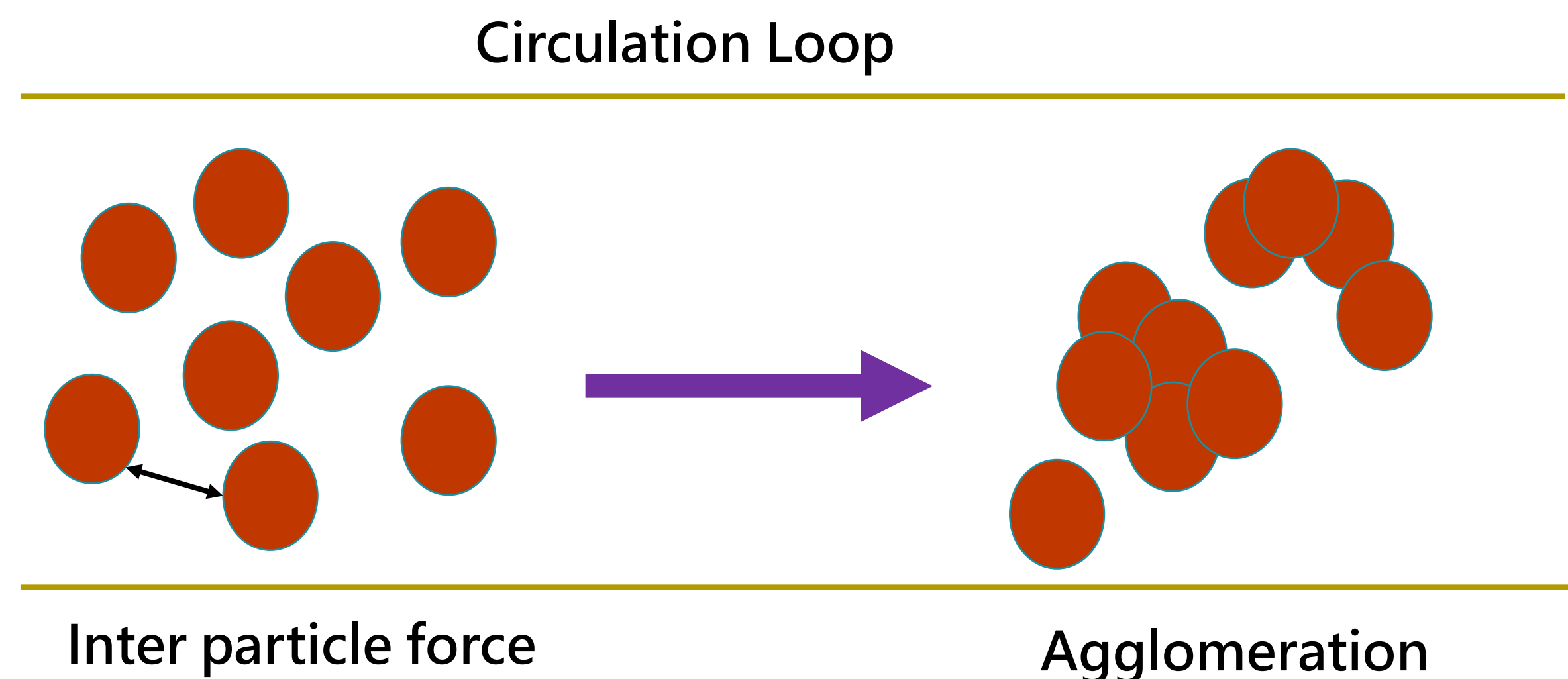


Why Shear Stress Matters: From Aggregation to Wafer Scratches

- Shear stress at CMP Slurry Dispense System(SDS)
 - Shear stress might happen at mixing, circulation loop, and filtration.
 - High shear causes slurry aggregation, creating Large Particles (LPC) that scratch wafers.

◆ Comparison of High and Low Shear Stress

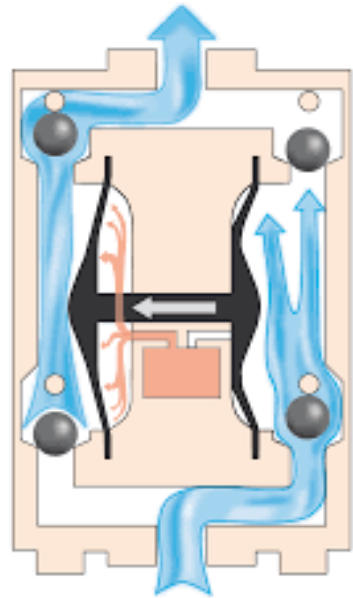
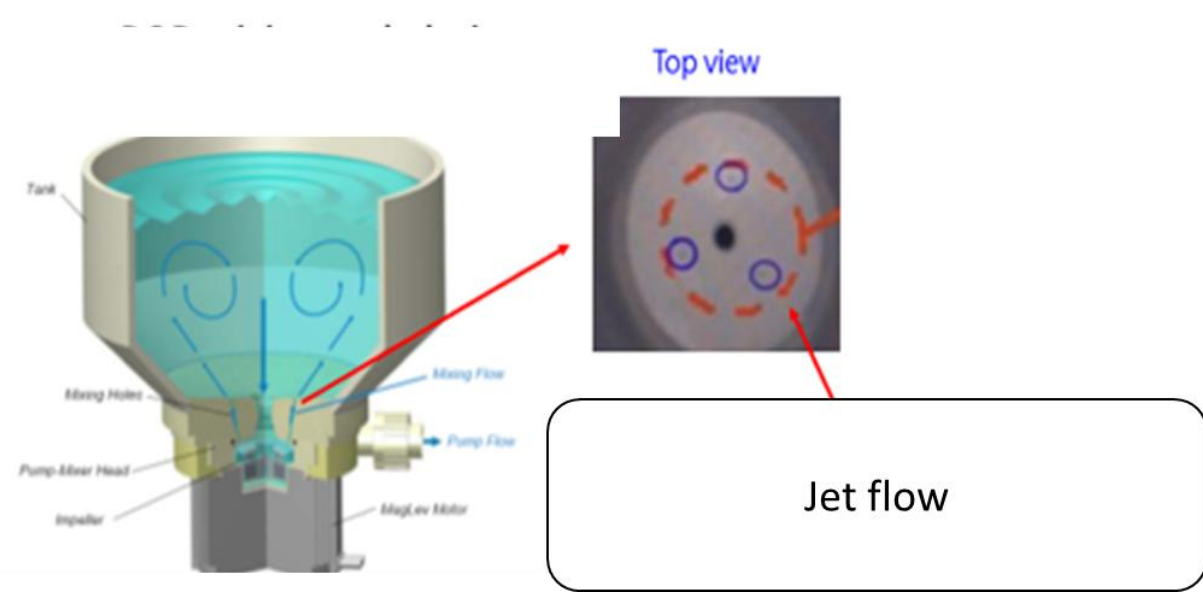
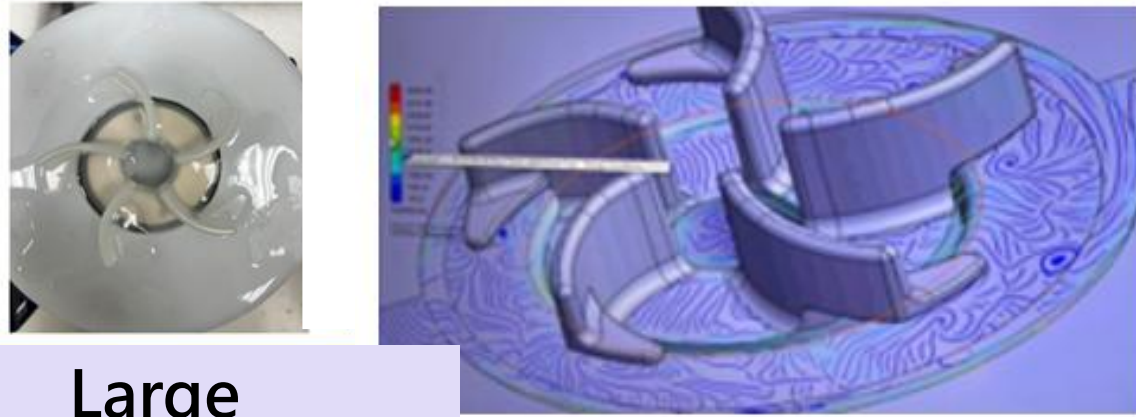
Stress effect



Comparison Item	High Shear Stress	Low Shear Stress
Particle Behavior	Aggregation	Dispersion
Slurry Impact	LPC Generation	Stable Properties
Wafer Yield	Severe Scratches	Stable Removal

Low-Shear-Stress Design at SDS

- Shear stress profile : Traditional v.s. CST Low-Shear-Stress Design

Comparison Item	Diaphragm Pump	Traditional Design (Maglev PTM)	CST_PMS (Maglev technology)
Agitation Mechanism	Flow circulation	High-speed jet agitation	low-speed agitation
Shear Stress Intensity on Mixing	high shear stress	low shear stress	Ultra-low shear stress
Impact on Slurry	Pulsation causes particle settling	Low impact, but slight dependance on nozzle jet speed	Virtually no slurry-component aggregation
Additional Comment	-	Advantage of combined pump and mixing feature in one device	-
Technical Diagram	 Reciprocating diaphragm	 Jet flow	 Large rotating region

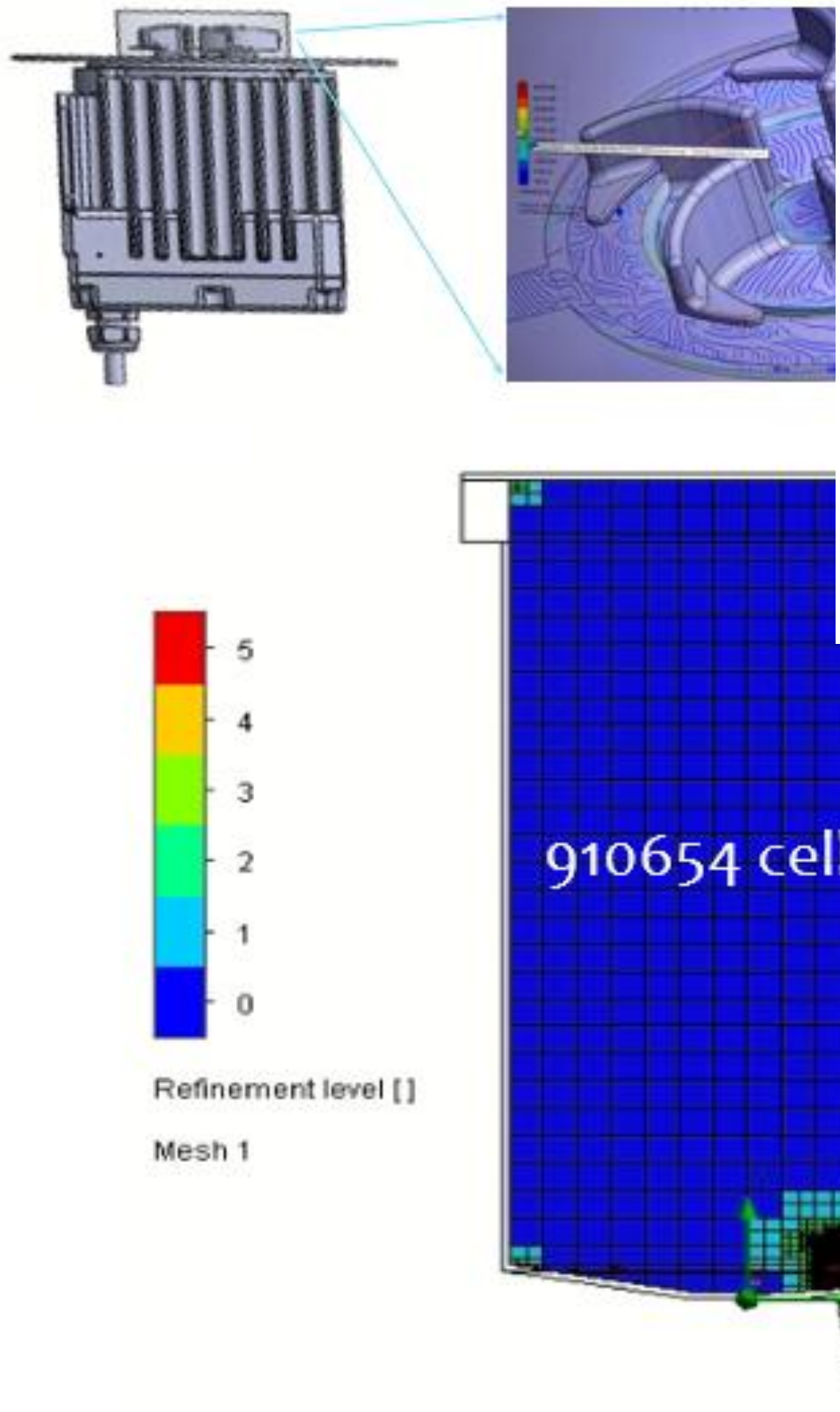
CFD Simulation- Tank Geometry & Agitation

- Use CFD simulation to study mixing effects based on following parameters.
 - Slurry tank bottom angle: 10°, 20°, 30°
 - Stirring speed: 100, 500 ,1000 rpm

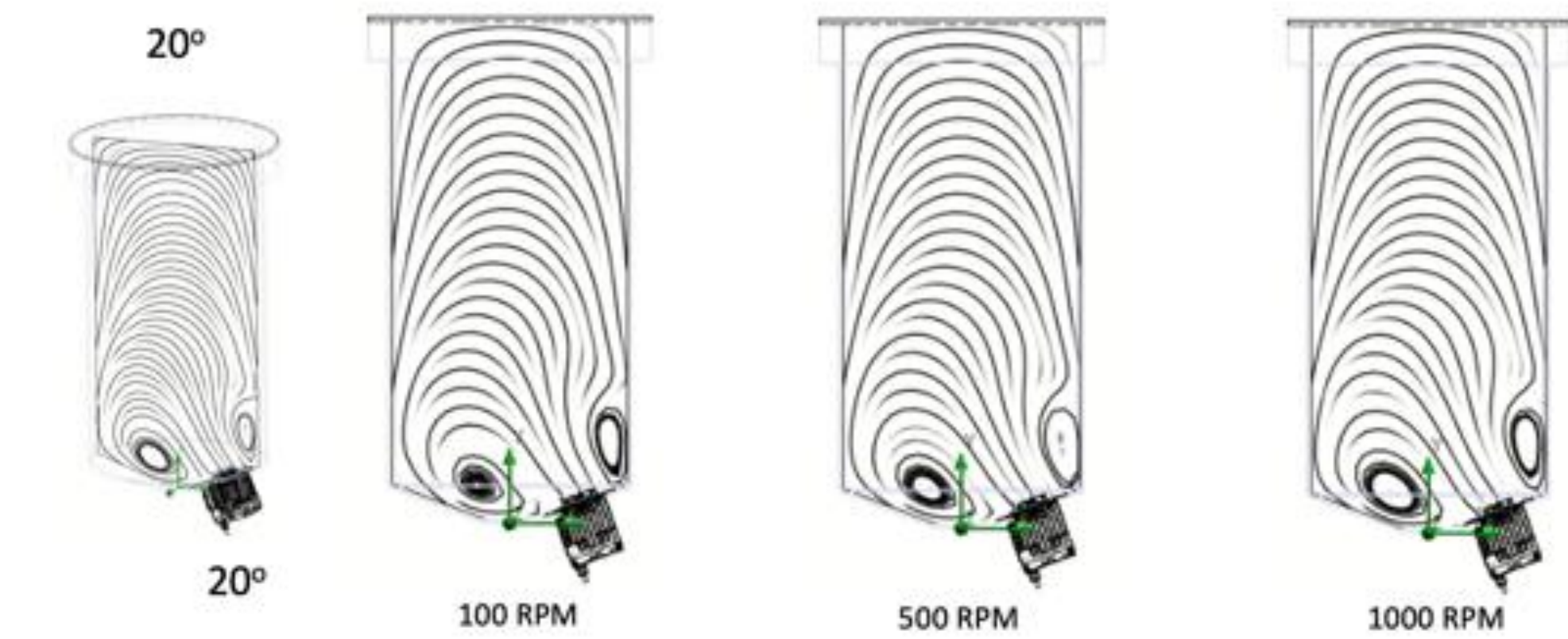


◆ PMS video

◆ CFD simulation



◆ Stirring speed



Simulation Results

●Optimal Parameters

Three findings from the vorticity map:

01 10° alone creates dead zones

Low angle + low rpm → poor uniformity.

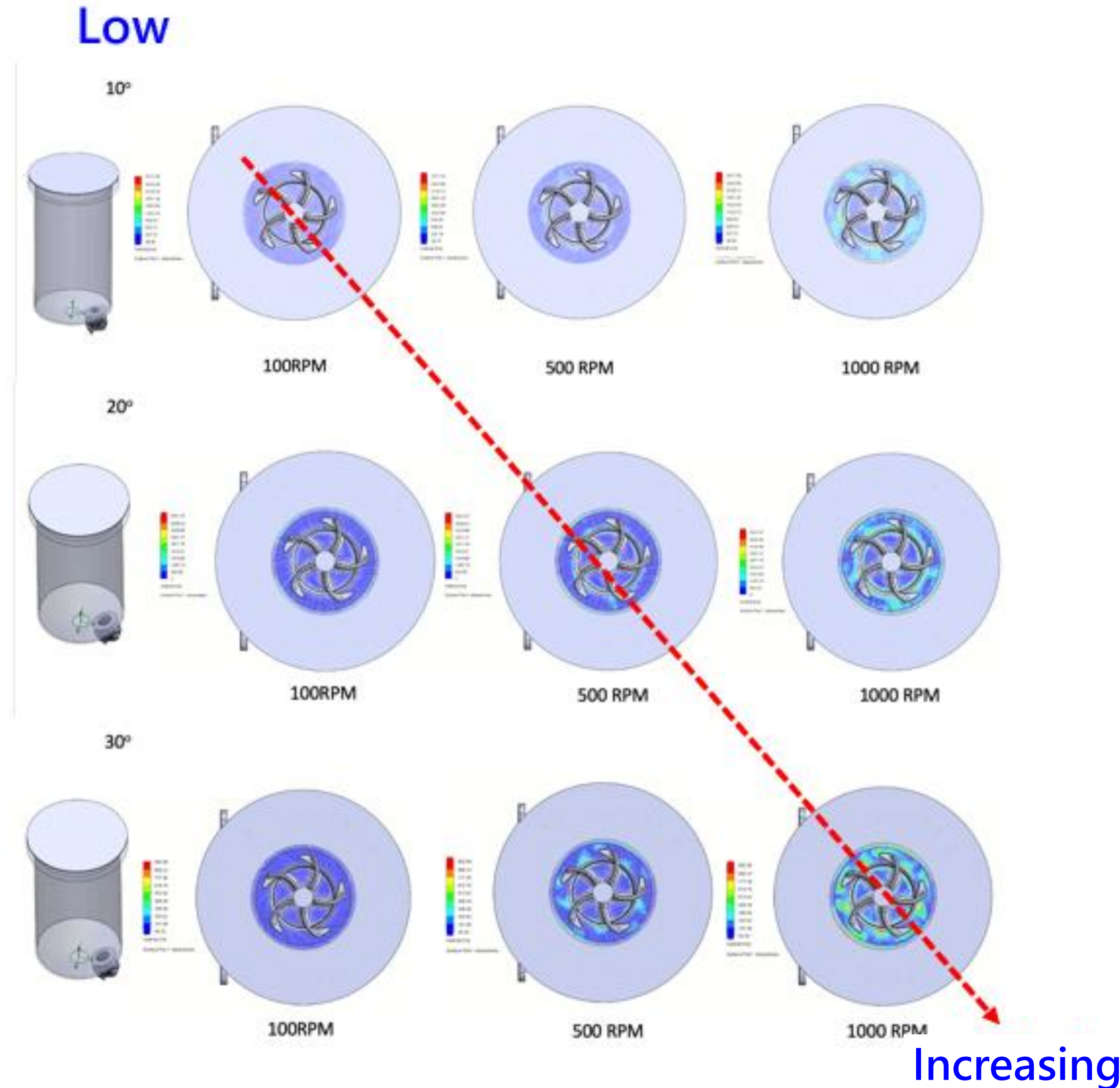
02 Large rotating region + low rpm = low shear

Confirms the design philosophy.

03 10°-20° + 200-400 rpm is optimum

Low shear and uniform mixing. · Patent granted.

●Shear stress

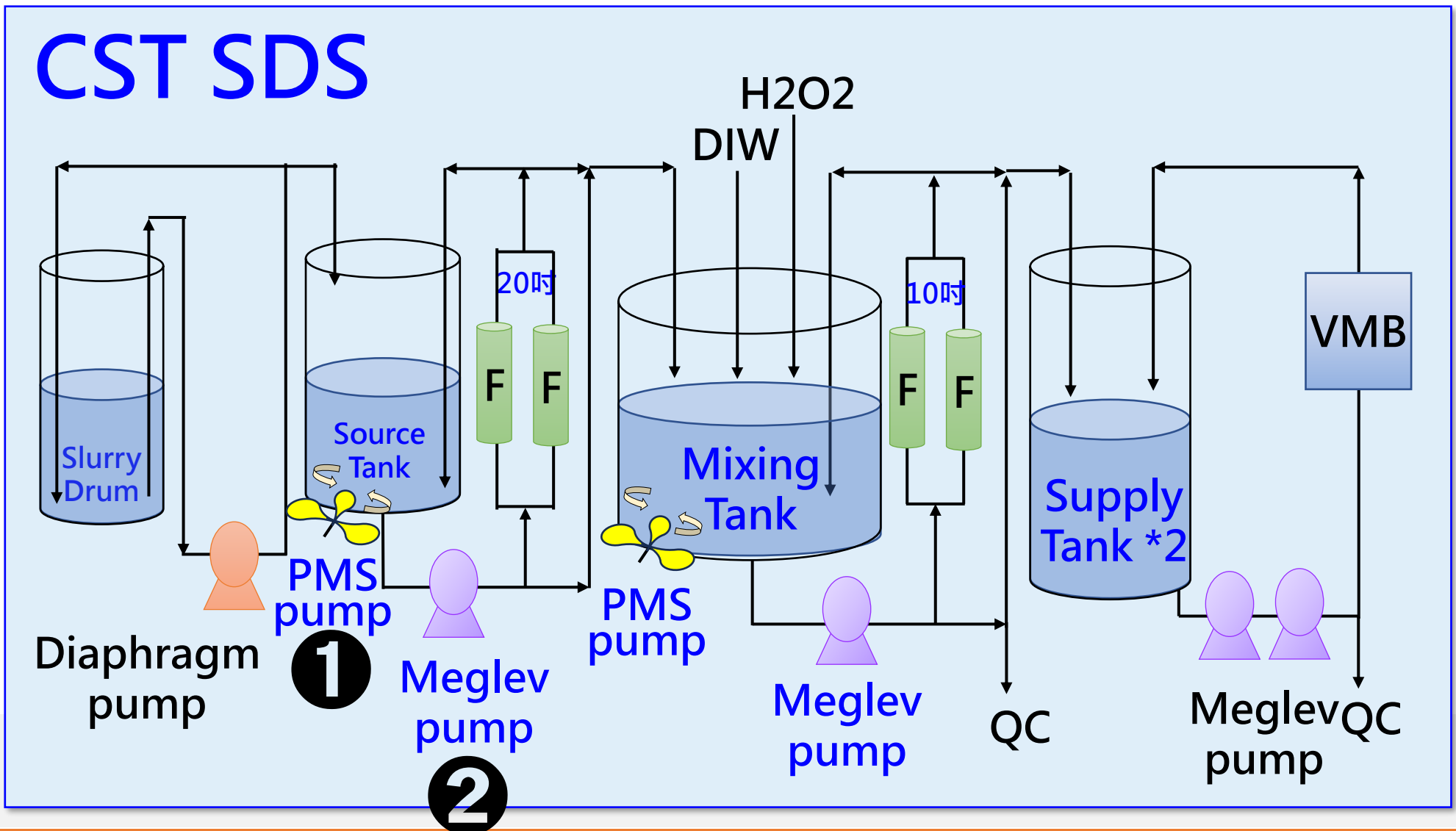


CST_SDS Main Equipment

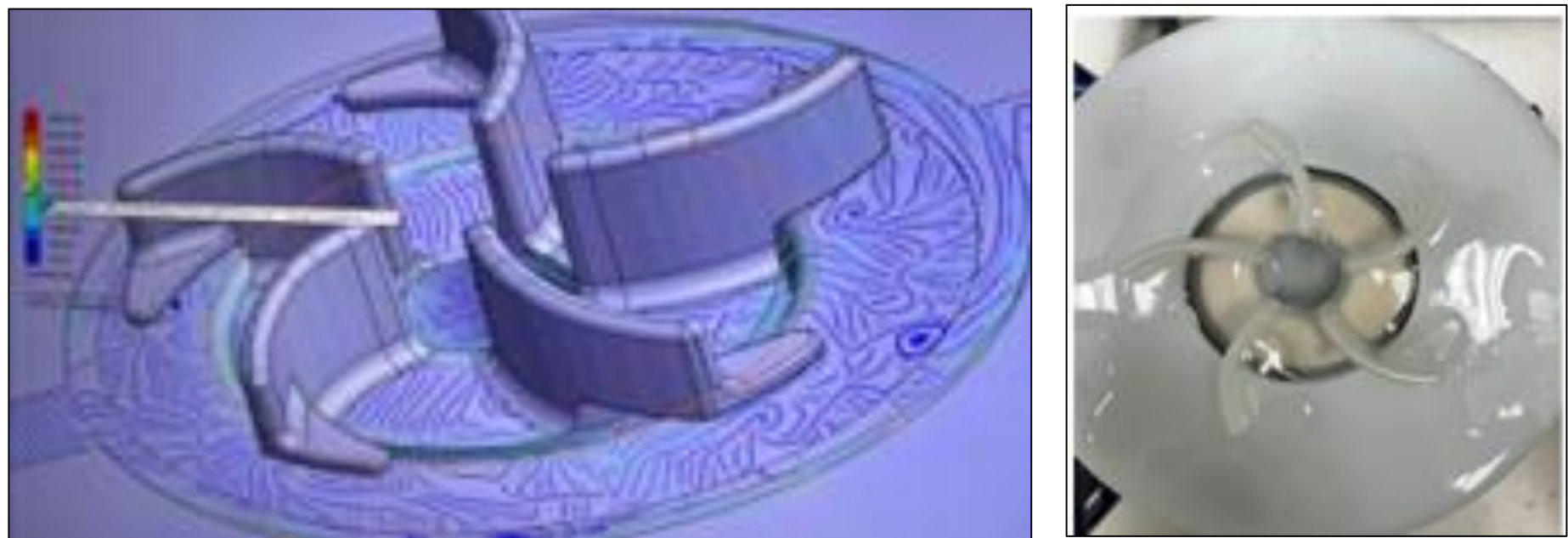
●CST_SDS PMS pump low-shear-stress mixing reduces aggregation.

Unit	CST SDS	Purpose	Benefit
Slurry Drum	Single Drum	-	-
Source Tank	Mixing & filtration pump are independently separated PMS Mixer ①	Separate mixing and filtration into independent loops	1. Filtration ↑ 2. Stable flow 3. Independent
Mixing Tank	+ Maglev pump(filtration) ②	Use PMS Mixer for slurry mixing	1. Uniformity ↑ 2. Shear stress ↓ 3. Slurry quality ↑
Supply Tank	Dual Supply Tank	-	-

Exterior view



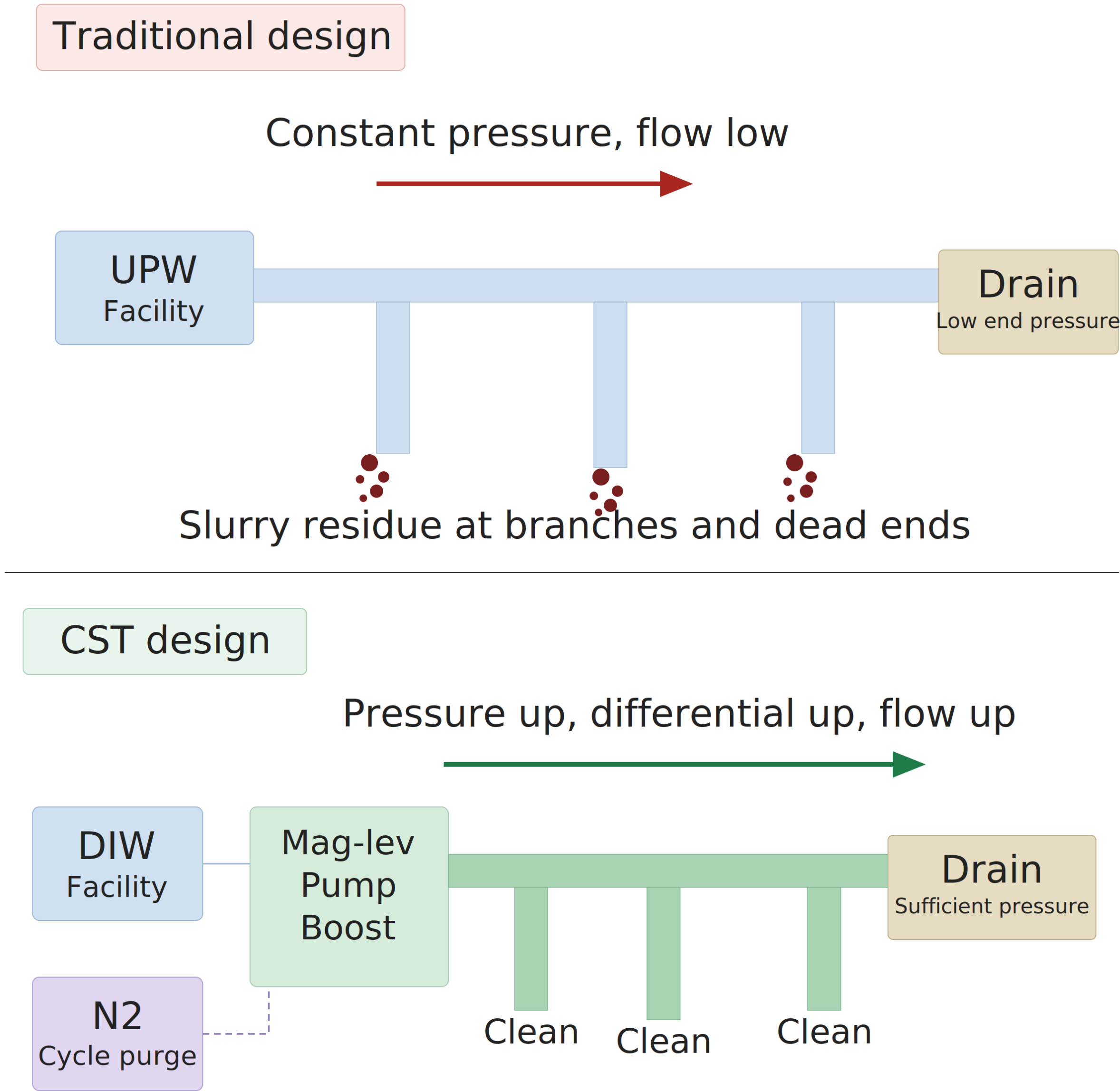
PMS Mixer



CST_SDS Zero-Residue Full-Loop Cleaning

- Supply Tank & Loop Clean
 - Custom **DIW pressure (mag-lev pump) + N₂ cycle purge** — replaces UPW-only flush and solves low pressure at branches and dead ends.

Feature	Description	Notes
Auto-Clean	Adds DI/KOH auto-clean.	Toggle on/off in settings.
Pressure Boost (Variable frequency control)	Uses custom DIW pressure (maglev pump)	Replaces facility UPW-only flush.
Problem Solved	Fixes low-pressure issues at branches and end-points.	
Cycle Control	Configurable cycle-purge count with auto-repeat.	



CST_SDS Slurry Stability & Quality Control

- Slurry Mixing Stability – Variability vs Threshold
 - CST low-shear control limits sit far below traditional threshold.

Quality Item	CST Stability Analysis with PMS	Enduser Specification (out of baseline)	Enduser Specification (out of control)	Enduser Specification (out of spec.)
Cond.	1.5%	2.5%	5%	8%
pH	0.5%	1.6%	5%	8%
SG	1.24%	2.6%	5%	8%
H ₂ O ₂	1%	2.5%	5%	8%

CST Ltd. _ Zhubei CTBC Technology Building

- Factory located at 10F-6, No. 85, Sec. 3, Huanbei Rd., Zhubei City, Hsinchu County
 - Area: 525 m²
 - Factory: Factory Registration Certificate obtained in Nov. 2024
- Innovation
 - Among 17 patent assets, including 2 U.S. inventions and 4 Taiwan inventions.

ITEM	CST
Period	2022 - 2026
Patent	Approved
U.S. Inventions	2
Taiwan Inventions	4
Taiwan Utility Models	11

