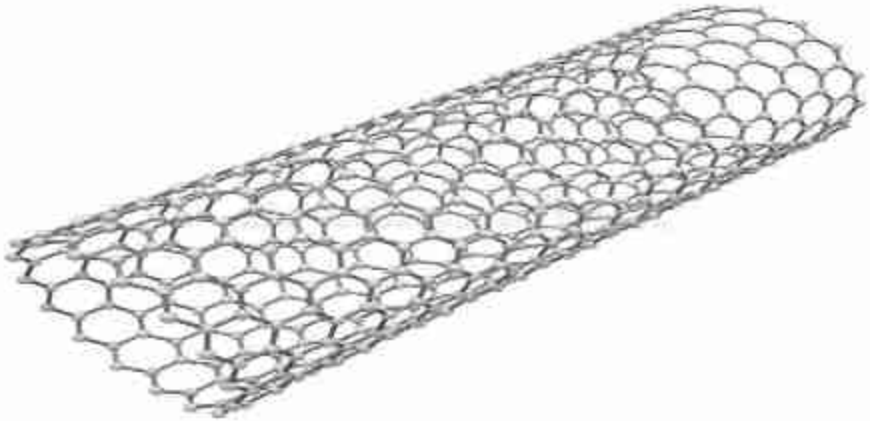

BERTOLI
A BRAND OF
INTERPUMP
GROUP
INTERPUMP GROUP

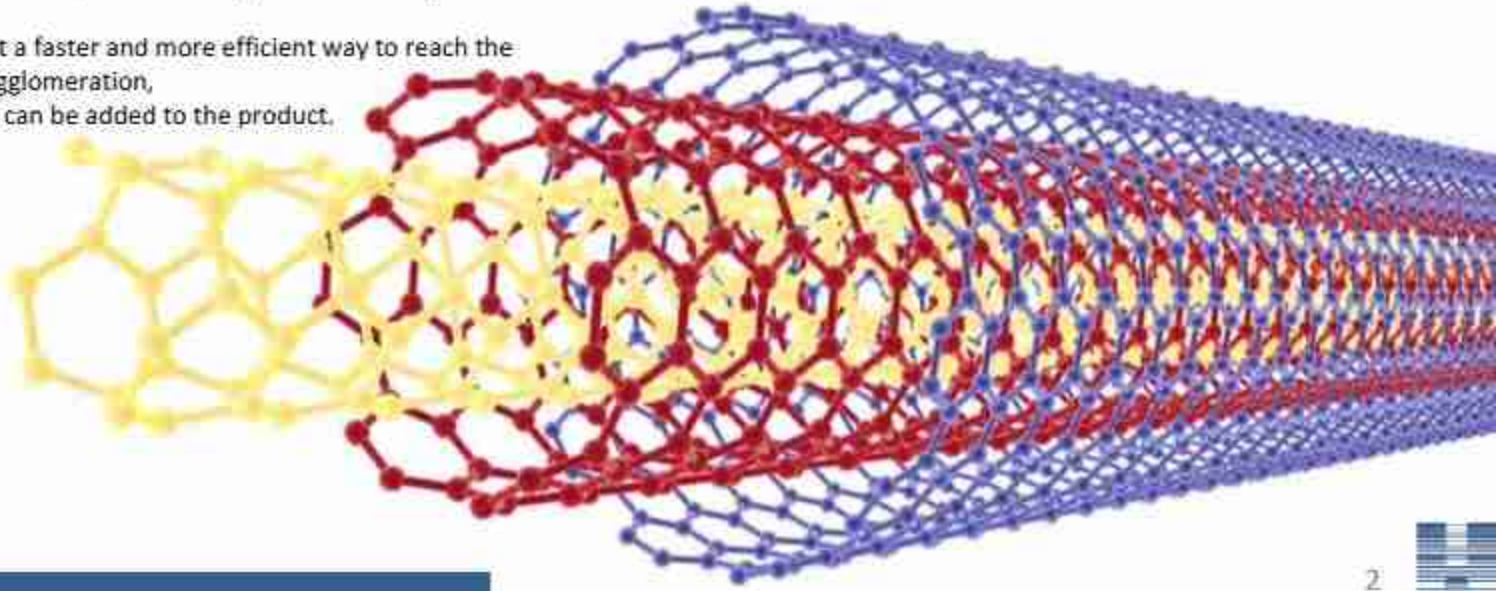
Homogenizer in CNT applications

The fastest, easier and with the highest quality result process for producing dispersions of single, SWNT, and multi-wall, MWNT, carbon nanotubes is to install a **homogenizer piston pump,** HPP.

The process can be used in a continuous mode for large volumes and is very suitable for large-scale industrial production.

The process starts with powder dispersion in a blend containing mainly water.
It than enters the homogenizer that breaks down the agglomerates,
separates them and places the nanotubes,
one after another, to create a linear structure.
Ø 5 – 100 ηm
L 1 – 105 µm
The result is an increased superficial area,it means an higher conducibility or insulation.
Through a Homogenizer we can get a faster and more efficient way to reach the dispersion and avoid the particel agglomeration,
Afterwards the resins and solvents can be added to the product.





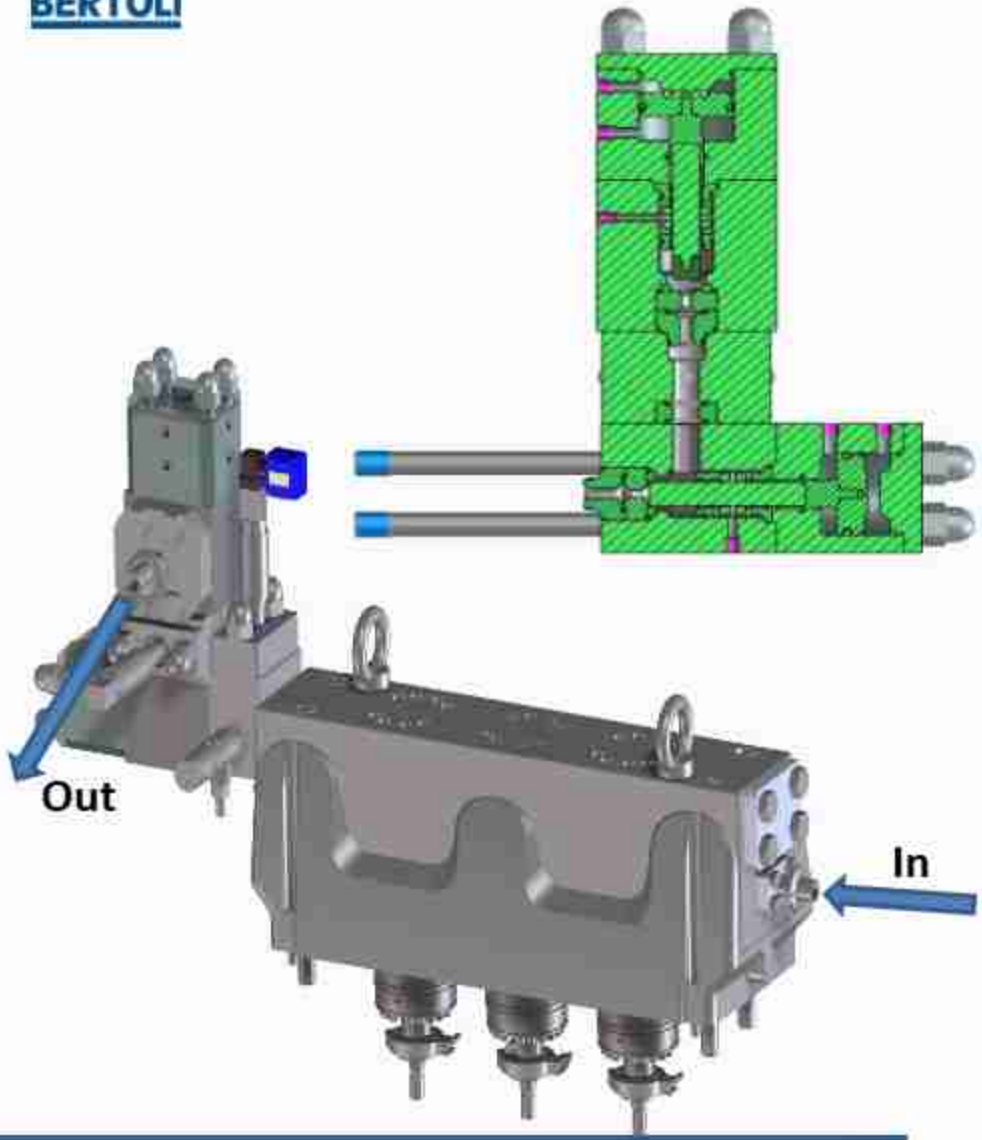
SRV Driving Factors

SRV Performances	
Flow Rate	Up to 1.800 lph
Power	Up to 110 kW
Stroke	90/130 mm
In/Out product connection	1 "- 2"
Air and Water Inlet	G ½ "
Water Consumption	250 lph
Air Pressure	At least 5 bar

Skid Version

Fully Automatic PLC solution, feeding pump, tubolar heat exchanger + temperatures probes, 2 modulating valves for product recirculation and temperature ,by PID control.

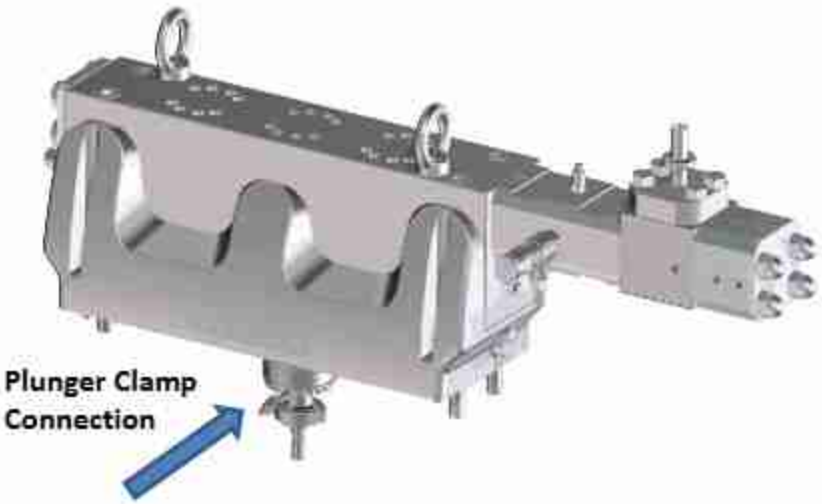
SRV Liquid End



Liquid End

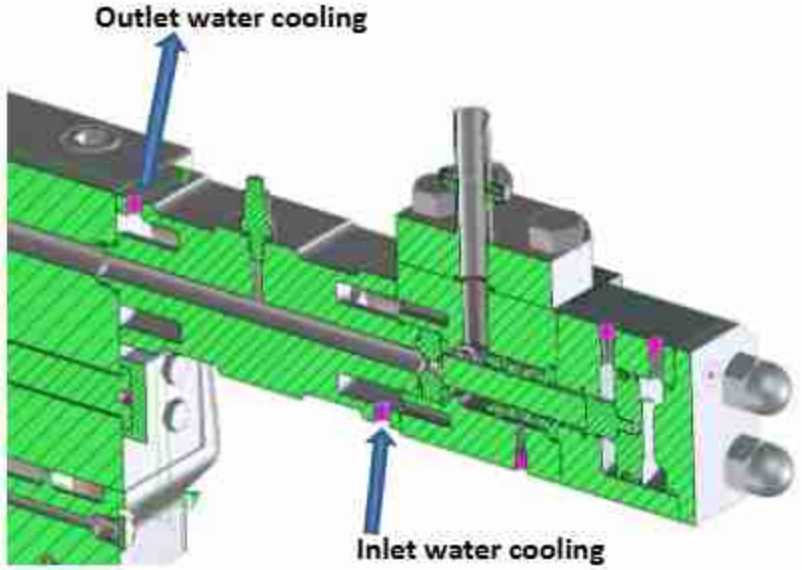
- Low internal volume to increase the volumetrical efficiency and reduce the pressure load on mechanical parts
- Homogenizing valve made of zirconia oxide or silicon nitride Double stage available
- Pneumatic/hydraulic system to guarantee high and gentile force with smooth application of force on the homogenizing valve
- No cross design increases parts lifetime and permits a better feeding with high viscous product
- Zero leakage at 1500 bar and zero cracks with less parts and less seals for reduced total cost of ownership
- Compression head mono-block made off Stainless Steel 17-4, shoot peened stainless steel compression head with high mechanical and corrosion resistance

SRV Liquid End features



Easy Maintenance

It's not anymore necessary to dismount the compression head,
Piston packing can be replaced easily by removing the clamp connection and few studs.



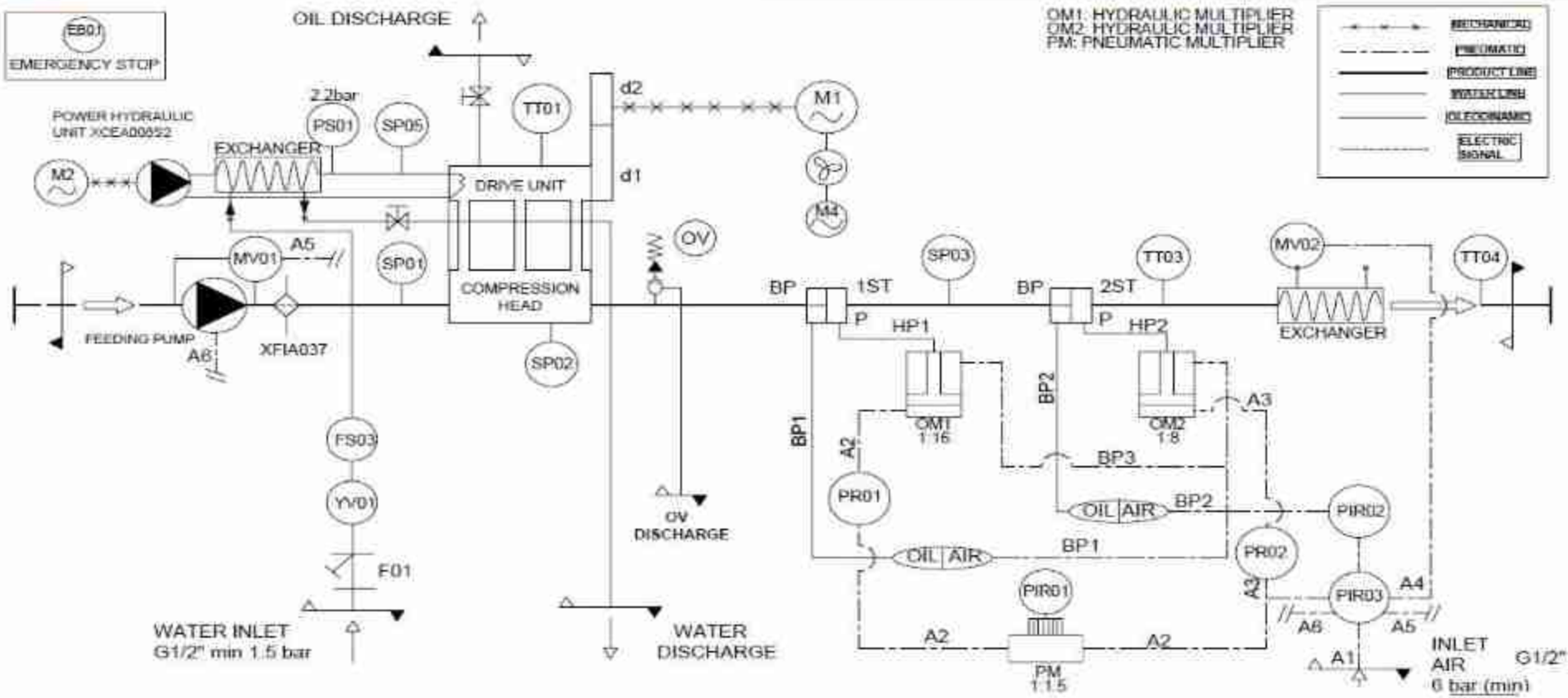
Heating/Cooling

The homogenizing group can be heated/cooled by flushing the cooling plunger water on it.
Temperature probes consent to check the product degrees.

SRV Features

Features
Integral Ceramic plungers AL2O3, plunger seals made of PE-UHMW
Longer lifetime of plunger and plunger seals by a vertical design
Sanitary or Aseptic execution
Single stage transmission system with trapezoidal belts and pulley Gear Reducer integrated on the drive unit
Ball type pumping valves, suction and delivery valve seats integrated in a single part
Overpressure valve, flow switch alarm on water circuit
Forced lubrication system with pressure switch
Drive unit made of cast iron crankcase with supporting roller bearings, Nitrurized crankshaft
Terminal box and control panel for local/remote control
Explosion proof design
Sound-proof design
Clean room design
Vibration and temperature monitoring and alarm
Compression Head also available in Super Duplex SAF 2507, for Pharma execution.

Bertoli P&ID Skid Solution



[1] MOUNTED ON THE FRONT SIDE OF THE MACHINE
[2] MOUNTED ON THE PANEL BOARD

PRODUCT INLET	PRODUCT OUTLET
TC ⅛ 1/2"	TC 1"

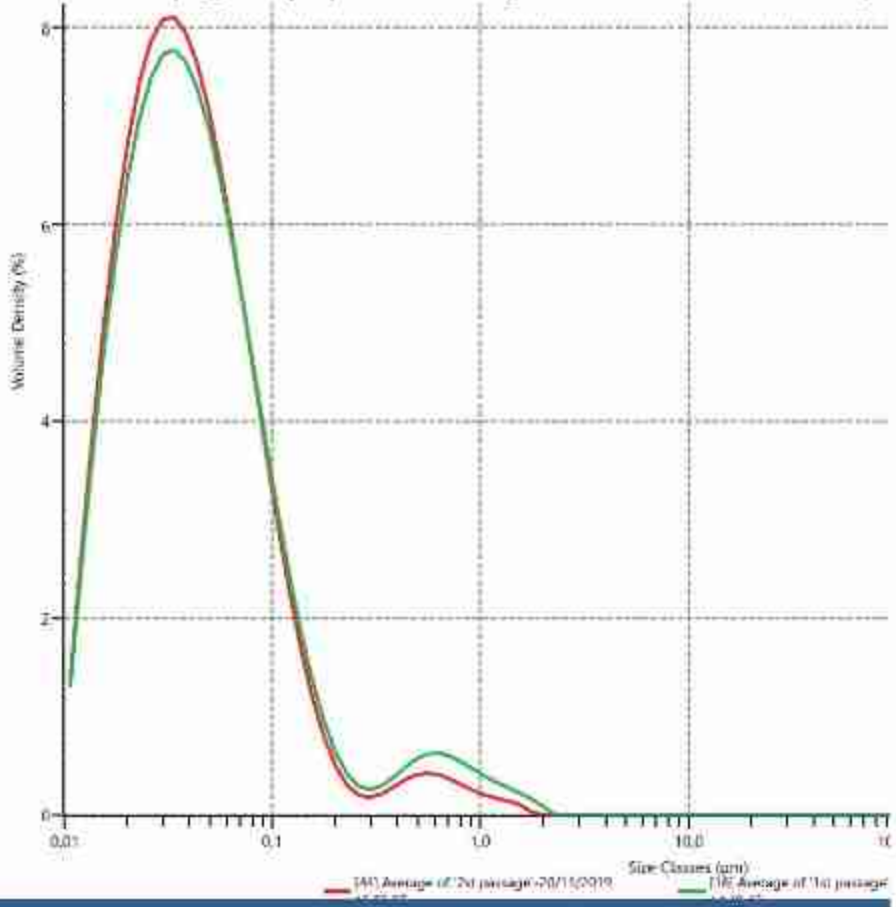
SAFETY VALVE
PRESSURE SETTING 1800 bar

I STAGE	2 STAGE
MULTIPLIER: YES	MULTIPLIER: YES
REGULATION: PNEUMATIC	REGULATION: PNEUMATIC
PR01 = 0-9.5 bar	PR02 = 0-9.5 bar
PIR01= 0-12 bar. Set=8 bar	PIR01= 0-12 bar. Set=8 bar
PIR02= 0-3 bar. Set=0.5 bar	PIR02= 0-3 bar. Set=0.5 bar
PIR03= 0-10 bar. Set= 6 bar	PIR03= 0-10 bar. Set= 6 bar

DIMENSION	FLOW CAPACITY	PRESSURE I ST	PRESSURE II ST	TEMPERATURE	VISCOSITY
MEASURE UNIT	l/h	bar	bar	°C	cP
PRODUCTION	min 300 MAX 1600	MAX 1500	MAX 300	MAX 80	MAX 500
CLEAN /STERIL.	MAX 1600	MAX -	MAX -	MAX 80	MAX

Bertoli Homogenization Results

The test conducted with our Laboratory 3 plungers machine ATOMO 3.0, shows a particle dimension lower than 0,1 µm, 100 nm, with just 1 passagge at 1.500 bar,
A SWNT,sigle layer, results lenght has to be < than 10 µm, and thickness < of 5 nm to avoid their agglomeration.



1 Passage at 1.500 bar	
Dv 10	0,0165 µm
Dv 50	0,0391 µm
Dv 90	0,127 µm

2 Passages at 1.500 bar	
Dv 10	0,0162 µm
Dv 50	0,0372 µm
Dv 90	0,107 µm

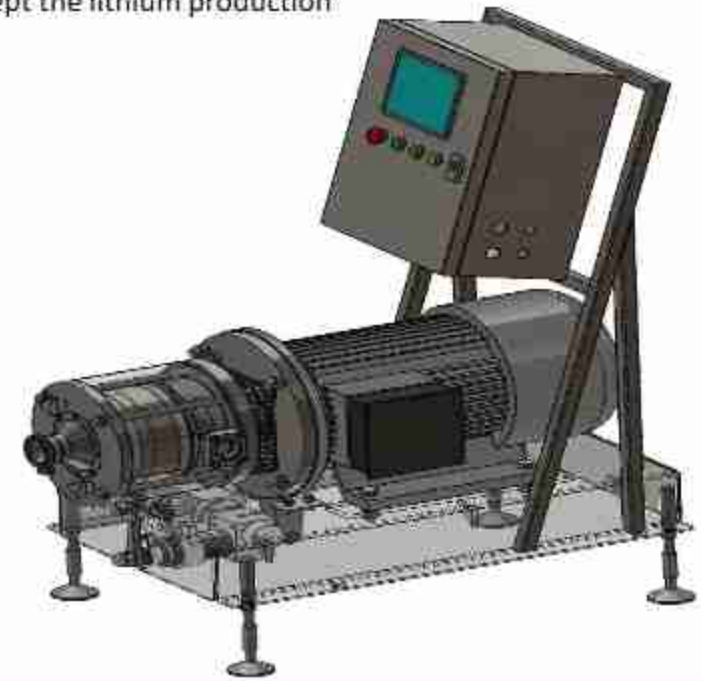
Colloidal Mill

Another solution, instaed of the Homogenization by high pressure,
is the **Colloidal Mill**.

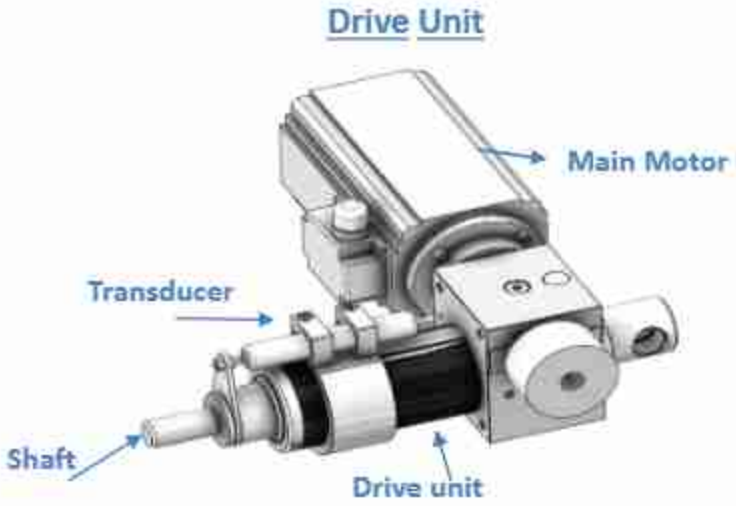
It can be reach the final CNT lenght up to 50 µm,
The **η** is > 98 % of the total Volume, with a final particle size lower 105 µm.

The Volume dispersion can be from 0,01 % to 20 %.

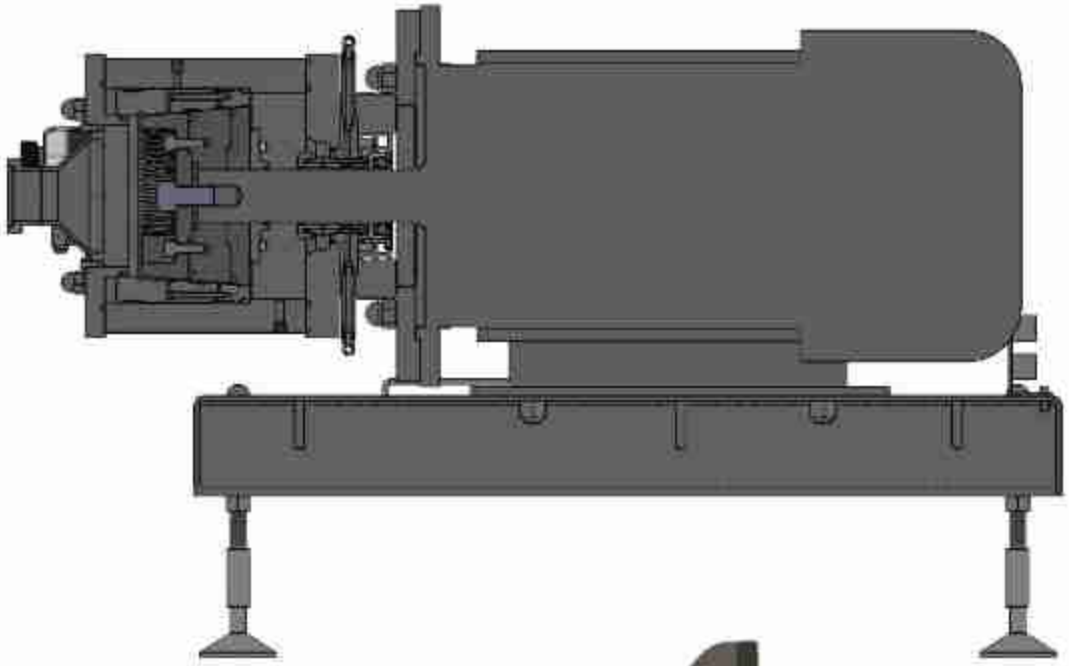
The product will not be homogeneous as by HPP and it takes more time,
But it is a suitable process solution for all the application,
except the lithium production



Performances	
Flow Rate	Up to 13.000 lph
Power	Up to 37 kW
Back Pressure	Up to 10 bar
Product In/Out connection	DN 40,50,65
Water Inlet and Outlet	G ½"
Max. Inlet Particle Size	Up to 5 mm



Colloidal Mill



Main Features
Frontal cover removable for inspection
Stainless steel with special coating rotor and stator for improved wear resistance
Special thermic treated stainless-steel transmission shaft
Tungsten carbide mechanical seal
Equipped with 2 distance ring regulators between rotor-stator
Product Outlet results from 100 µm to 50 µm
PLC automation to set stator position

Actuator - Stator Connection

Main Reference

KETI Korea Electronics Technology Institute

CM PARTNER

KUMHO PETROCHEMICAL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www.bertoli-homogenizers.com