JETSCAN
Defoamer Tester

Automatically test defoaming agents
for efficiency and persistence

JETSCAN Brochure
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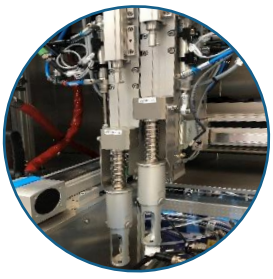
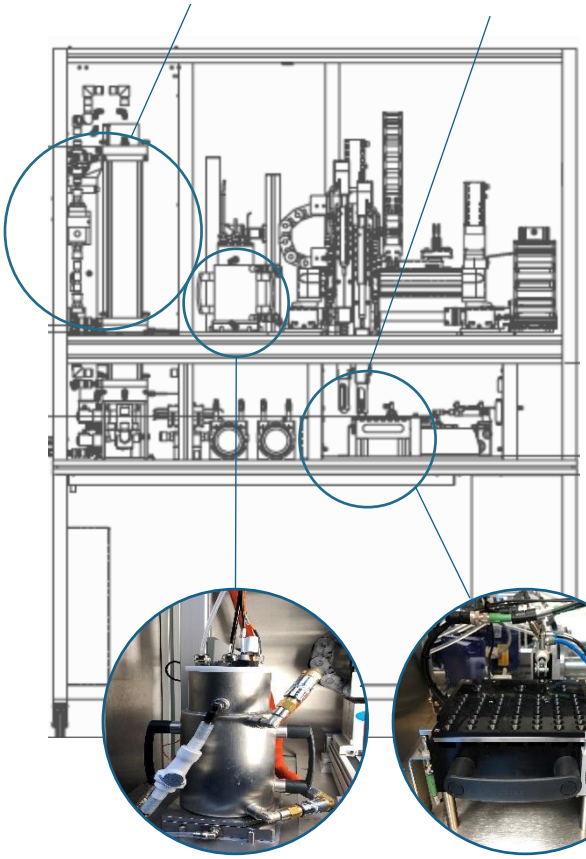
JETSCAN™ - AUTOMATED DEFOAMER TESTER

JETSCAN™ has been designed to measure defoaming agents' efficiency and persistence on foams produced by liquid jet circulation, using image analysis technics combined with TECLIS software.
Fully automated, JETSCAN™ controls experiment parameters, collects and injects up to 28 defoamer samples, measures foam volumes, clean the whole system after testing which gives the JETSCAN™ a high added-value in high-through-put defoamer testing.

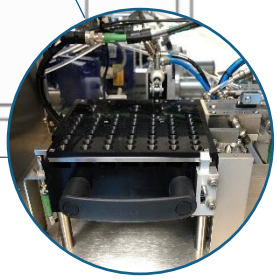
Measuring unit



Defoamer injection



Pre-heating system



Sampler

⇨ Automated Testing

- Test Protocol controlled by JETSCAN™ Software
- Automated circulation of foaming liquid
- Automated defoamer injection → up to 28 defoamers can be loaded
- Automatic cleaning

⇨ Testing reliability

- Control of foaming liquid volume injected controlled by image analysis and sensor, accuracy ±2 mL
- Defoamer volume accuracy ±1 µL
- Control flow rate, accuracy ±1% of reading
- temperature control, accuracy ±0,01°C

Antifoam and defoamer applications

- Food and beverage production, processing and packaging
- Laundry detergent manufacturing
- Paper industry and bio sourced material
- Industrial wastewater treatment

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Although foams are thermodynamically unstable, under practical conditions they can remain stable for a considerable time. Therefore, foaming causes problems throughout a range of industrial processes. Defoamers are chemical additives (Fig1&2) added to the surface of the foam to eliminate existing stable foams (produce low foam stability) by a shock effect.

- The effectiveness of the defoamer is evaluated from the ratio of the foam volumes after defoamer introduction (knock down effect).
- The persistence is measured by the time needed on reaching the maximum foam height with the presence of defoamer.

Fig1 Defoamer

Fig2 Silicone antifoam

JETSCAN™ has been designed to measure defoaming agents' efficiency and persistence on foams produced by liquid jet circulation.

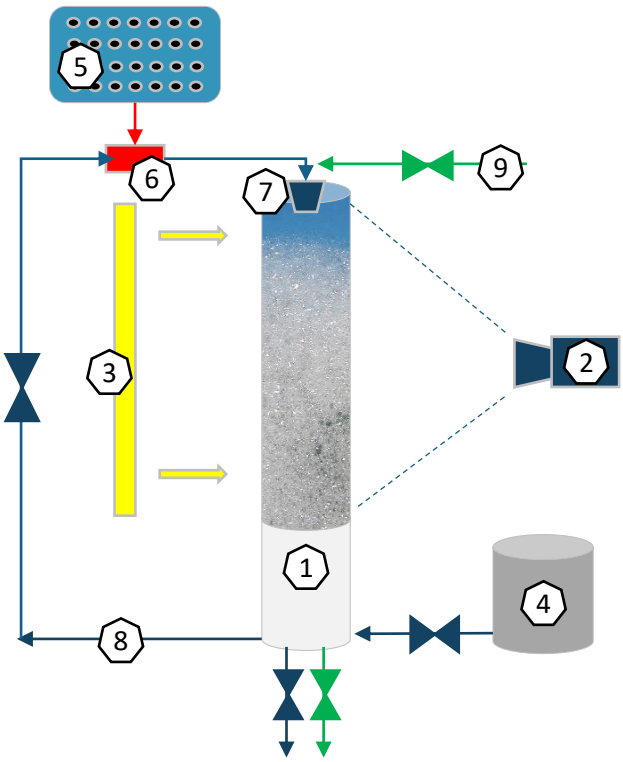
Experiments can be made at temperatures up to 90 °C. Experiment parameters such as T°, liquid volume, flow rate, defoaming agent quantity, and cleaning cycles are fully configurable and controlled by the software to ensure perfect reproducibility of the measurements.

A video camera views foam in the glass tube, providing data to image analysis software which determines foam volume before and after defoamer injection to measure their effectiveness and persistence.

JETSCAN™ is equipped with an automated sampler to test up to 28 defoaming agents.

JETSCAN™ is fully automated: controls experiment parameters, collects and injects defoamer samples, measures foam volumes, cleans the whole system between each defoamer testing which gives the JETSCAN™ a high added value in high-through-put defoamer testing.

JETSCAN™ schematic Diagram



1- Measuring double walled glass tube
2- CCD Camera
3- Light Source
4- Pre-heating beaker for the liquid
5- Automatic sampler
6- Defoamer injection chamber
7- Nozzle for the Liquid Jet
8- Main loop for the liquid
9- Cleaning system

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The measurement is based on an **Experiment Protocol** divided in 4 steps (Fig1) :

1. The foam is produced by liquid jet circulation for a chosen time → foam volume is measured
2. After stop liquid jet → foam stability is measured
3. Liquid jet is started again.
4. At chosen time or when the expected foam volume is reached, the Defoamer is injected → the change in foam volume determines the defoamer effectiveness and persistence

   → effectiveness is evaluated from the ratio of the foam volumes after defoamer introduction.

   → persistence is measured by the time needed on reaching the maximum foam eight with the presence of defoamer

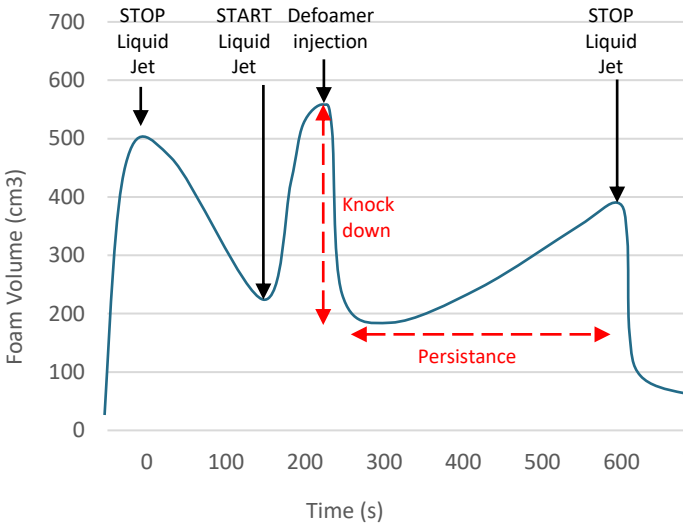

Fig1 Experiment profile Procedure

JETSCAN™ is equipped with a pre-heater beaker that heat the foaming liquid while the previous defoamer sample is tested. Defoamer testing can be run up to 90°C.

The foaming liquid volume injected in the main loop for testing is controlled by both image analysis and liquid volume probe. The flow rate is controlled by an oval-gear flowmeter (flow range 15-550 L/h Accuracy 1 % of reading), for maximum measurement reliability.

JETSCAN™ measuring optical system includes:

- The light source
- One CCD video camera (USB2, 744x480, 76fps) and 2.9/8.2 mm focal length Lens for foam height measurement

An **Automatic Cleaning** can be run after each defoamer testing which is out of the most importance to ensure perfect reliability of the measurements.

JETSCAN™ is equipped with an **Automated Sampler.** Up to 28 defoaming agents can be tested in a row. Each defoamer sample volume capacity is 4 mL.
A double syringes system allows to inject from 10 µL to 1000 µL of defoamer (accuracy +/- 1 µL):

- Automated switch from one to the other syringe is controlled by the software depending on the experiment parameters.
- Automated sampling capillary cleaning after defoamer picking (up to 3 cleaning positions)
- Automated syringe calibration (in option with interfaced 0.001 precision balance).

The speed of the sampler obviously depends on the experiment parameters, a usual rate is 3 to 6 defoamer samples tested per hour is realistic.

A digital control panel (Fig2) allows to easily control and monitor the experiment parameters, samples injection and cleaning cycles.

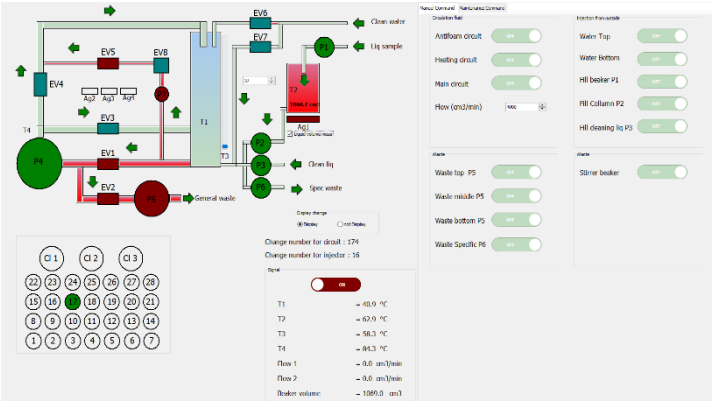

Fig2 Control Panel

The whole set, measurement unit and automated sampler, are integrated into a rolling stainless-steel chassis for easy access to the components.

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JETSCAN™ software controls experiments parameters, collects and injects defoamer samples, measures foam volumes, manages cleaning process.

Measurement

All experiment parameters such as T°, liquid volume, flow rate, defoaming agent quantity, and cleaning process are fully configurable and controlled by the software.

The CCD video camera views the foam in the measuring glass tube, providing data to image analysis software which determines foam volume in real time.

Each step of the experiment protocol is controlled by the software. Foam volume is continuously measured (Fig1) before and after defoamer injection to measure their effectiveness and persistence

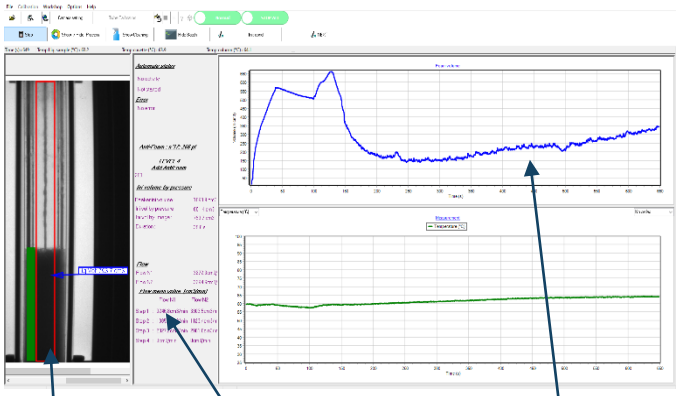


Fig1 Live Measurement

Live foam image analysis

Summary of experiment protocol and parameters

Foam volume measurement displayed in real time

Batch management

Batch function enables to write a scenario with an unlimited number of experiments (Fig2). All experiment parameters can be set or changed independently, even during measurement.

Any line in the set of experiments can be modified or deleted even though the series has started. Cleaning cycles can also be added or changed even though the series has started.

The set of experiments can be repeated in the same order or randomly.

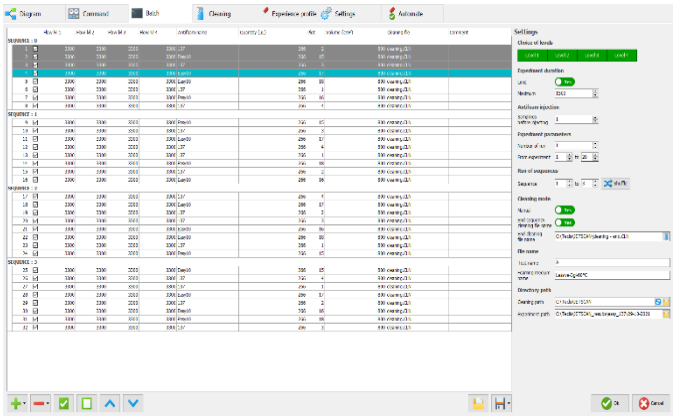
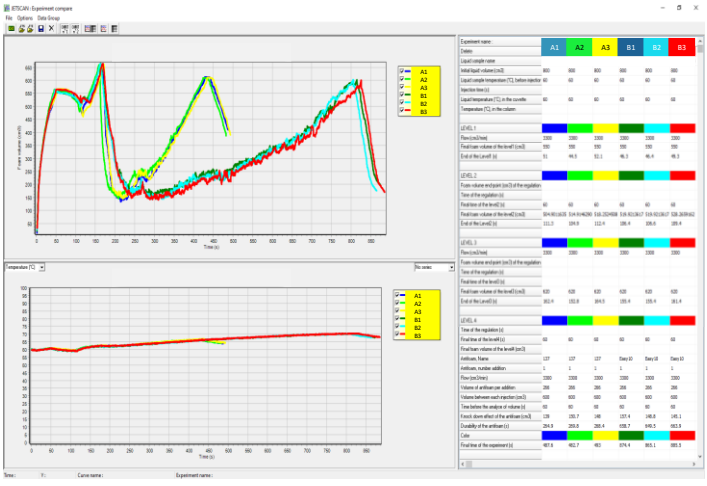


Fig2 Batch management

Data analysis

The results of each experiment are recorded, they can be exported or compared within the JETSCAN Software.

The results (Fig3) are displayed on graphs that enable a quick comparison of results. Each defoamer results' curve is displayed in one color that ease comparison and repeatability check.



The table displays the experiment parameters and results detailed for each defoamer at each step of the experiment protocol. When a series of experiments has been made for the same defoamer in the same conditions, the software calculates the mean and standard deviation of the effectiveness and persistence .

JETSCAN™ - Technical Features

Measurement system	
System	Aqueous foams
Foaming liquid Volume	750 mL – 900 mL → Optimum liquid volume for jet circulation is 800 mL
Foam volume	Max 800 mL – accuracy +/- 2 mL
pH range	2-13
Temperature	Up to 90°C
3 Fluids Input	Main water – foaming liquid - cleaning liquid
2 Fluids output	Main drainage – special drainage
Pre-heating system	Double walled stainless steel beaker 1,1L
Oval Gear Flow meter	Measuring Range 15-550 L/h - Accuracy: 1 % of reading - Viscosity range: 0 -1000 mPa·s
Nozzle size	2.5 to 5 mm diameter
Defoamer injection system	
Defoamer volume injection	10 µL to 1000 µL - accuracy +/- 1 µL with 2 sizes of capillary 50 µL and 350 µL
Defoamer volume capacity	4 mL
Defoamer Viscosity	100-2500 mPa·s
Automatic sampler	28 positions + 3 capillary cleaning positions
Material	
Measuring Tube	Double-walled Cylindrical Borosilicate glass – H450 mm / Int. Diam 50 mm – Volume 880 mL
Pump/Flaw meter/valves	Stainless steel
Tubing	FEP (fluorinated ethylene propylene), Norprene®
Tubes connectors	acetal
O-rings	FKM
Chemical compatibility	Not to use with organic / aromatic solvents such as benzene, toluene, Chlorophorm, ether
Optical system	
Light Source	LED 60x30 cm 32W 3200 lm
Video Camera	CCD video camera (USB2, 744x480, 76 fps) and 2.9/8.2 mm focal length Lens
Dimensions	
Size	H198 – L150 – l78
Weight	120 kg
Power supply	
Voltage	220V
Pneumatic system	compressed air 6bars
Hardware and software	
Software	TECLIS Jetscan software running on W10
Computer	Window 10 / Processor Intel I5 / RAM 8 Giga / Hard Drive 1 T