



equadel



A new Generation of Multi-Dose Spray Devices

Hervé Pacaud, Director, Business development pumps,

Pharmapack 2009

VALOIS



VALOIS S.A.S.

Key figures 2007

Revenue (million €) : 345.6

Employees :

1,600 in France

2,200 all over the world

Manufacturing facilities in France,
Switzerland, USA and China

Main activities

- **Pharma**: drug delivery devices for pharma and healthcare
- **Beauty & Home**: standard and customized dispensing systems for fragrance and skincare
- **Indigo by Valois**: mini-packaging & sampling



equadel

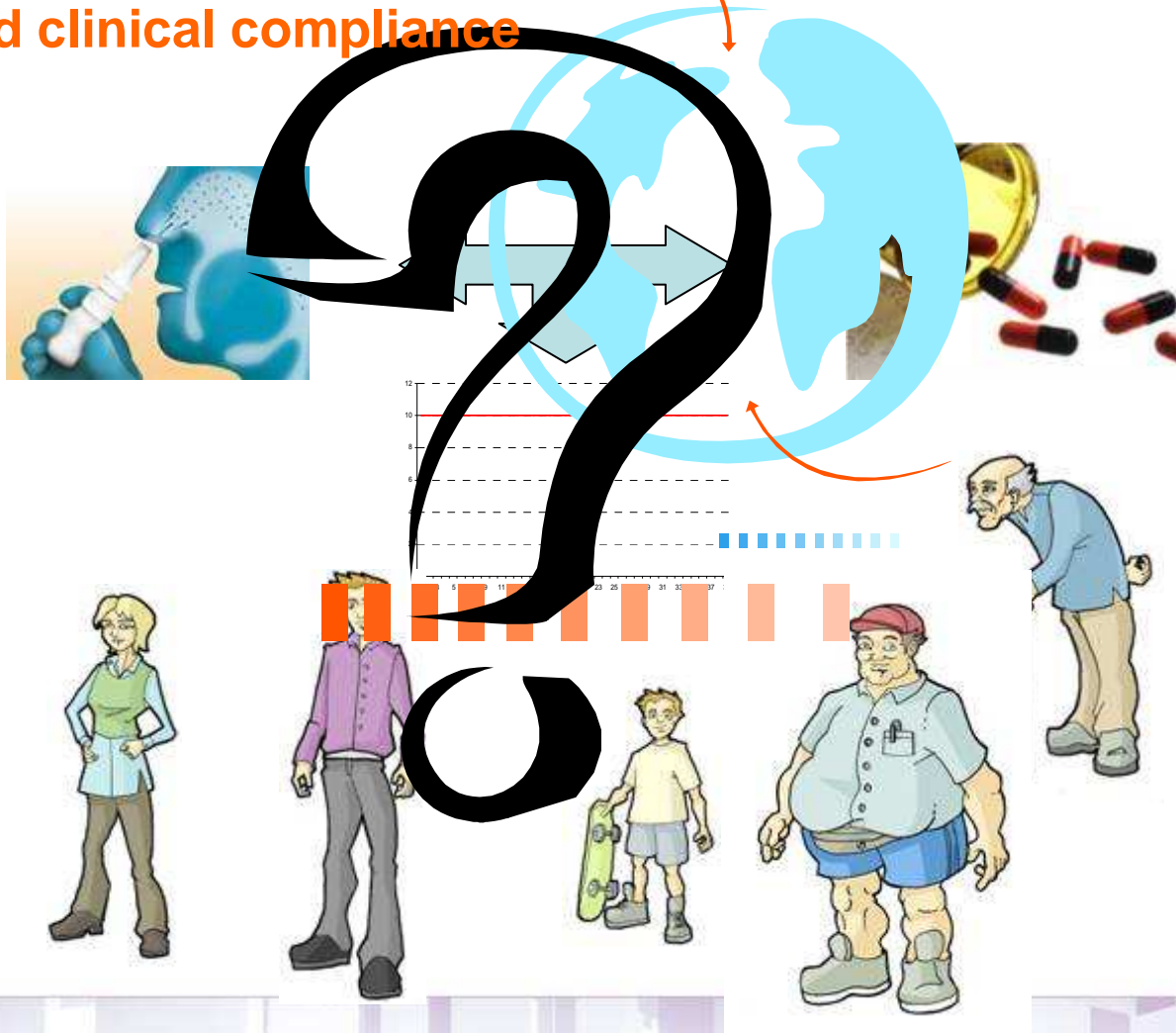


equa ... equal performances

del every delivery

Why a new Generation Spray Pump?

- Medical and clinical compliance



What makes Equadel different ?

- **Patient-Independent feature** – operates independently from the patient actuation force & speed profiles
 - **Full Dose compliance**
 - limits partial metering
 - reproducible doses
 - **Consistent spray performances**

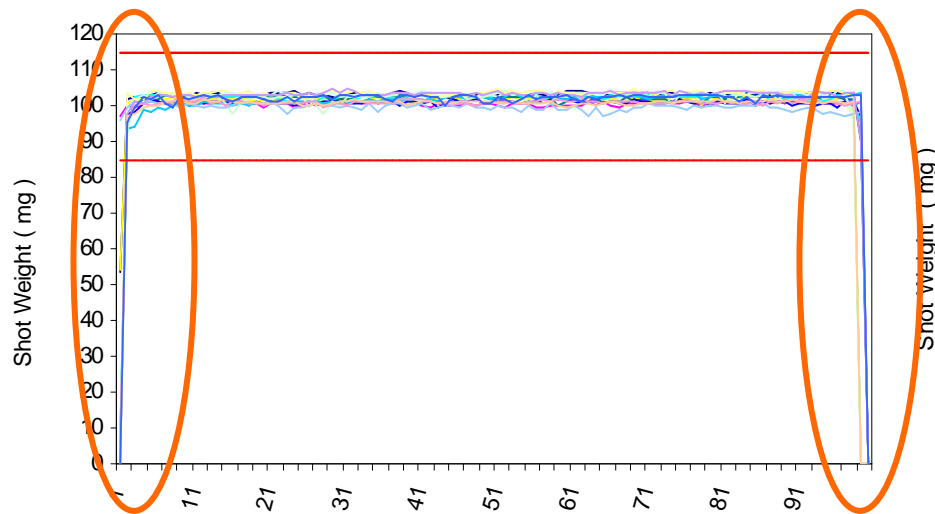


Performance/Dose Through Life - Water

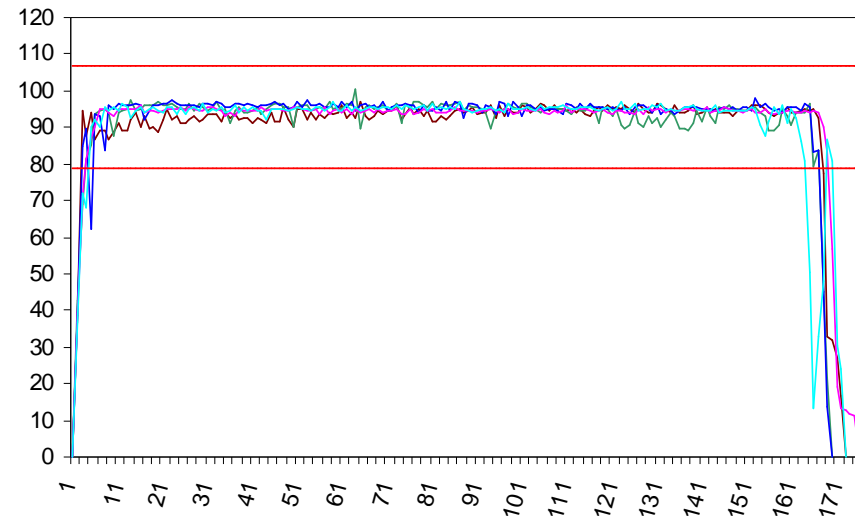
Equadel – Machine Actuation

2nd Gen. – Machine Actuation

EQUADEL dose 100 machine actuation



Second Generation Pumps Machine actuation



- Priming and Tail off are sharper with Equadel
- However on a test bench 2nd generation pump and Equadel provide similar performances

What makes Equadel different ?

ACTUATION PROFILES VS DOSE VOLUME DELIVERY

- Tests performed with a steroid from the trade
- Actuation profiles recorded with Innova Hand Actuation Monitor (HAM)

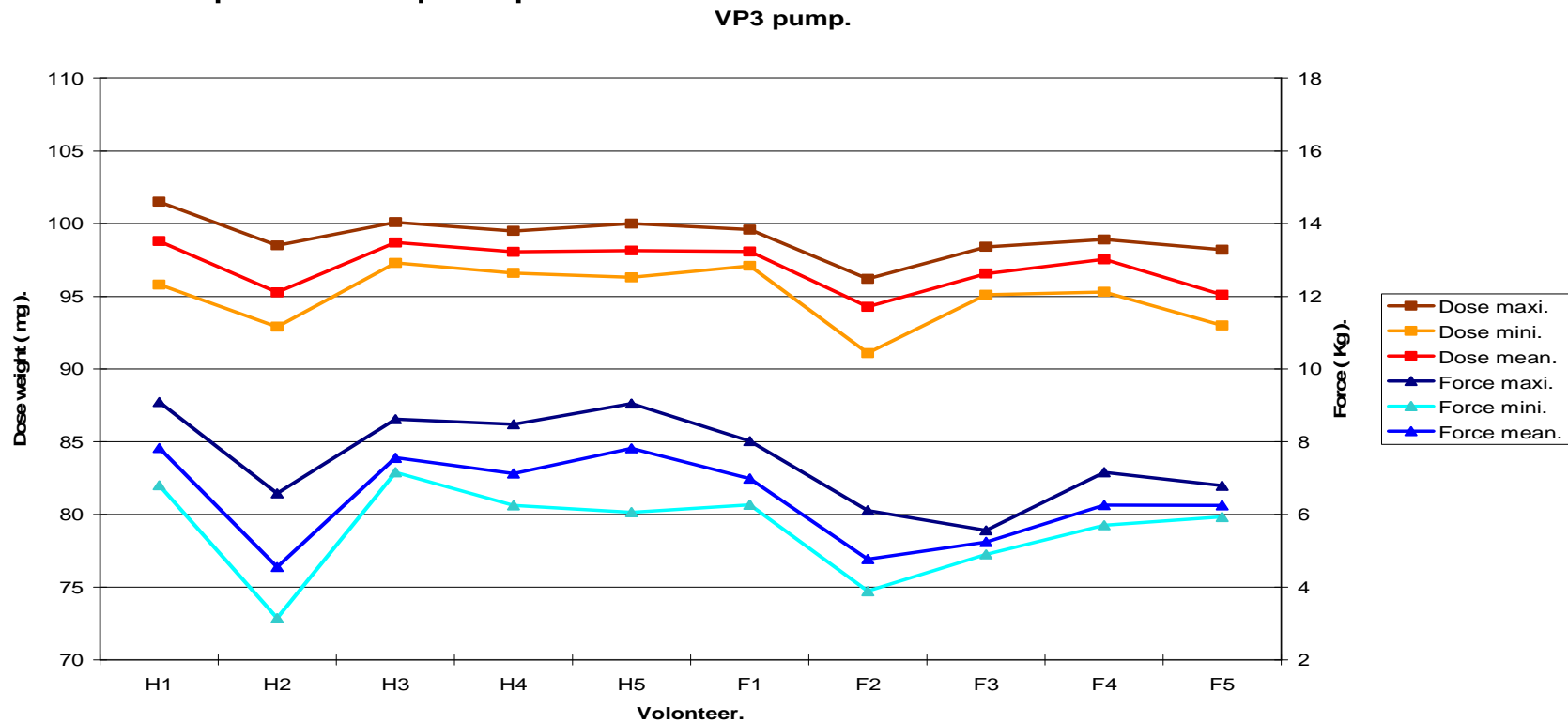
Force sensor : Interface , modèle : LW 1025-50 ,
Innova.Displacement sensor : Honeywell ,
modèle MLT - 38000203.Innova

- Pumps actuated by untrained volunteers (5 male, 5 female)
- Actuation profiles and dose volume delivery recorded



Actuation profiles vs dose volume delivery Test with untrained volunteers

- Precompression pump

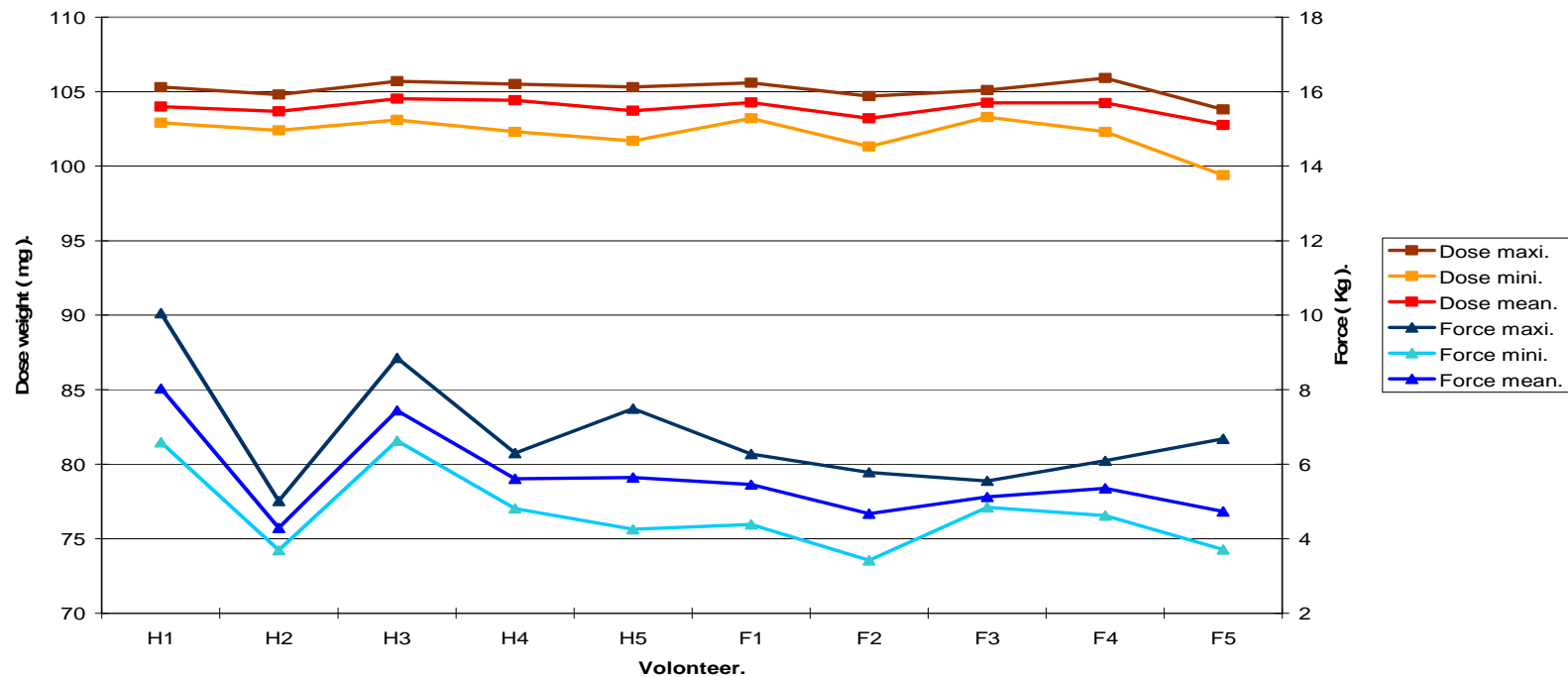


VP3, SD 2.1mg, min. 91.1mg, max. 101.5mg (range 10.4mg)

Actuation profiles vs dose volume delivery Test with untrained volunteers

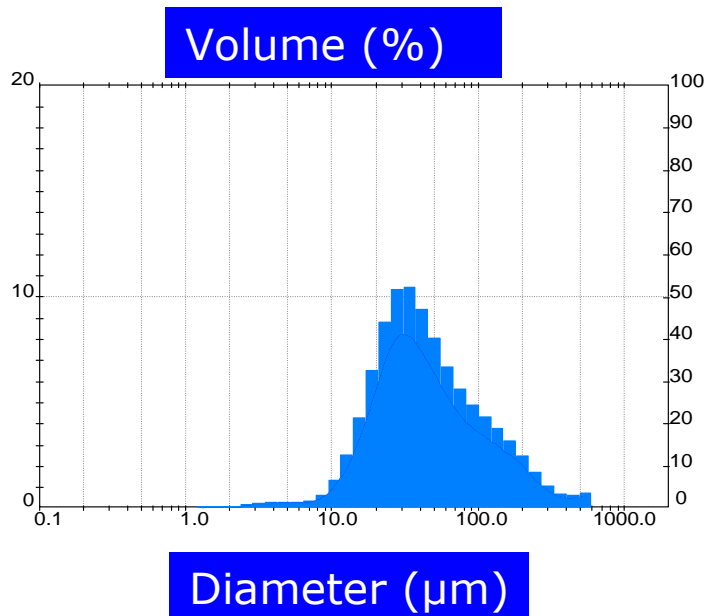


Equadel pump.



Equadel, SD 1.1mg, min. 99.4mg, max. 105.4mg (range 6.0mg)

Performance/Droplet Size Distribution measured at extreme actuation speeds (CS)

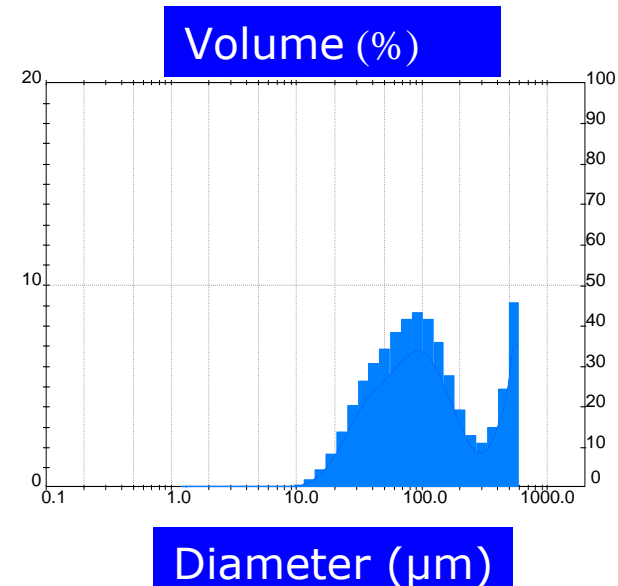


	%<10µm	D(v, 0.1)	D(v, 0.5)	D(v, 0.9)
Mean	2.7	16.8	40.7	154.7
SD	0.4	0.7	3.1	21.9

High Speed Actuation

Dose time: 10 msec

Force: 60 N



	%<10µm	D(v, 0.1)	D(v, 0.5)	D(v, 0.9)
Mean	0.4	31.9	119.3	373.3
SD	0.3	4.8	82.2	147.3

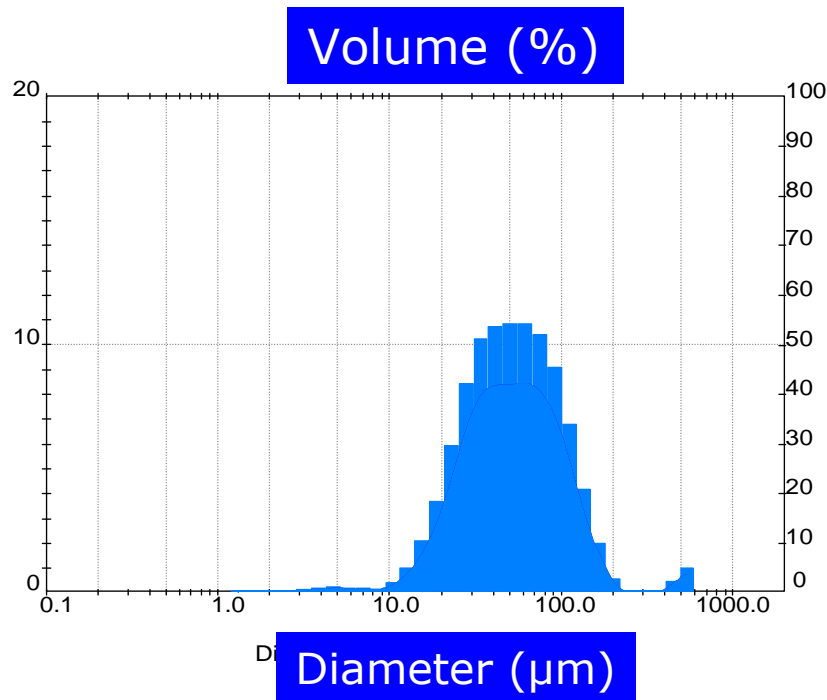
Low Speed Actuation

Dose time: 30 msec

Force: 30 N

Precompression Pump

Performance/Droplet Size Distribution measured at extreme actuation speeds (CS)

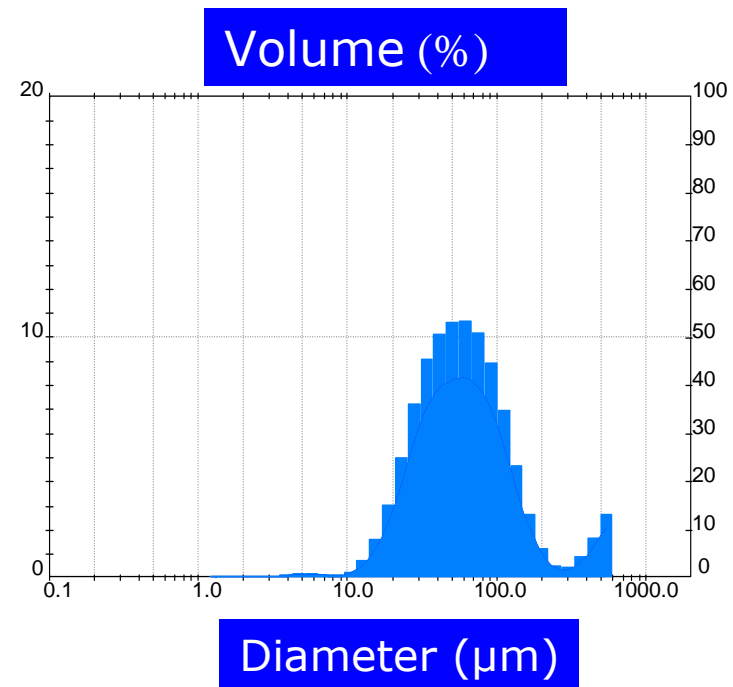


VP22	%<10µm	D(v, 0.1)	D(v, 0.5)	D(v, 0.9)
Mean	1.2	22.3	52.1	115.8
SD	0.2	1.3	5.0	8.8

High Speed Actuation

Dose time: 10 msec

Force: 60 N



VP22	%<10µm	D(v, 0.1)	D(v, 0.5)	D(v, 0.9)
Mean	0.9	24.3	58.2	164.4
SD	0.2	1.4	6.8	61.2

Low Speed Actuation

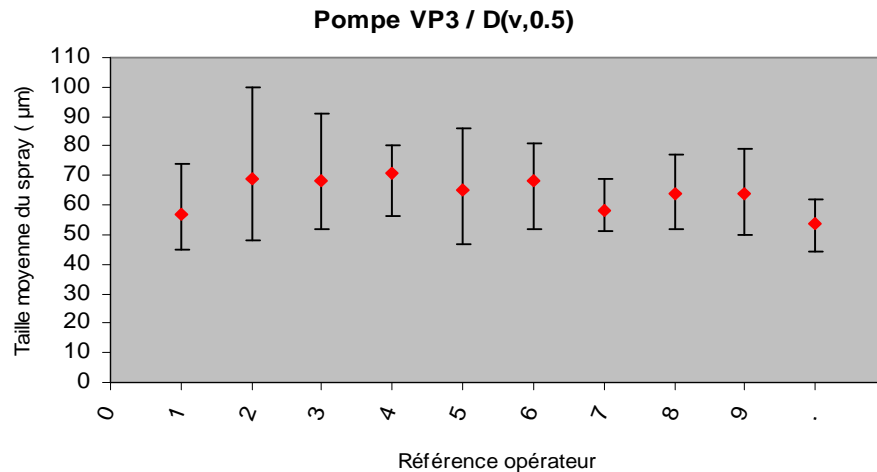
Dose time: 30 msec

Force: 30 N

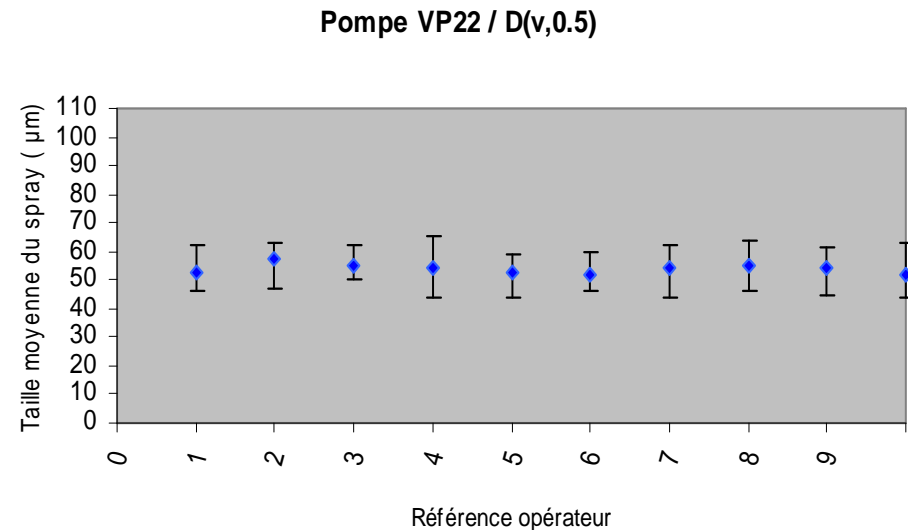
EQUADEL

Performance/Droplet Size Distribution Test with untrained volunteers

- Tests performed with water
- Analyzed by Malvern Laser particle sizing equipment
- Pumps actuated by untrained volunteers

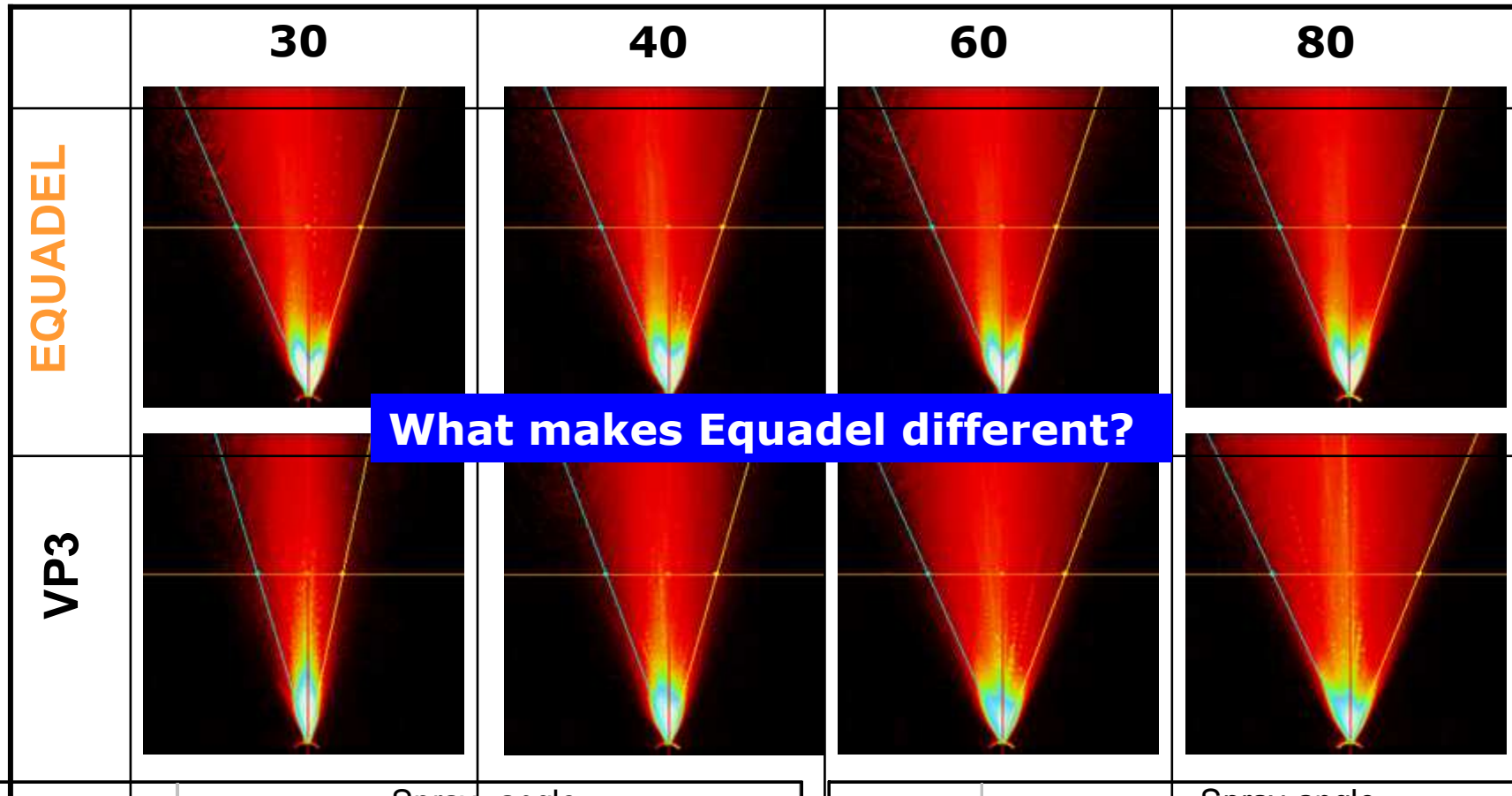


**Precompression
pump.SD 9.7µm**



equadel SD 5.0µm

Performance/Spray cone angle



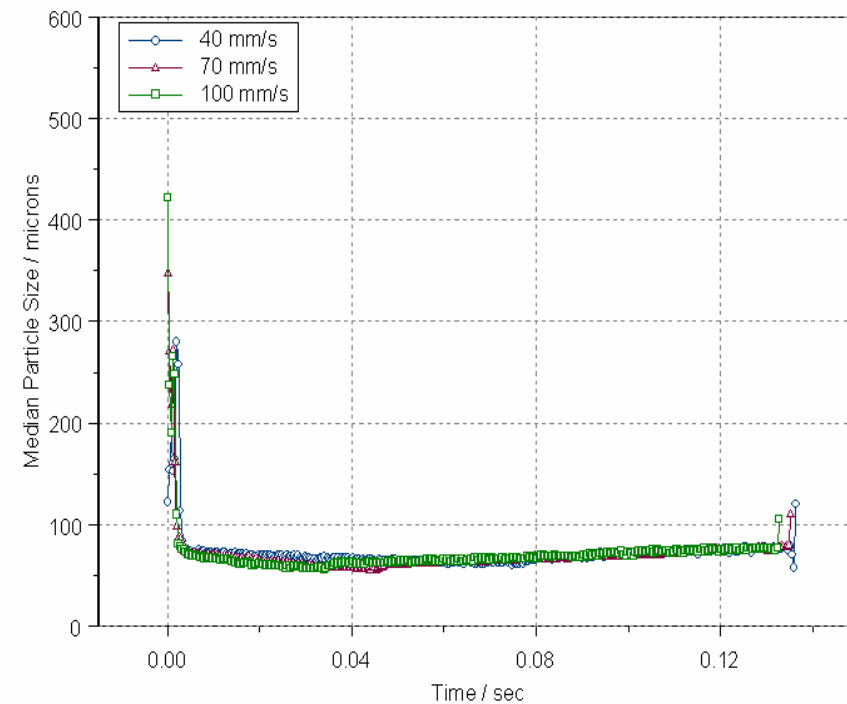
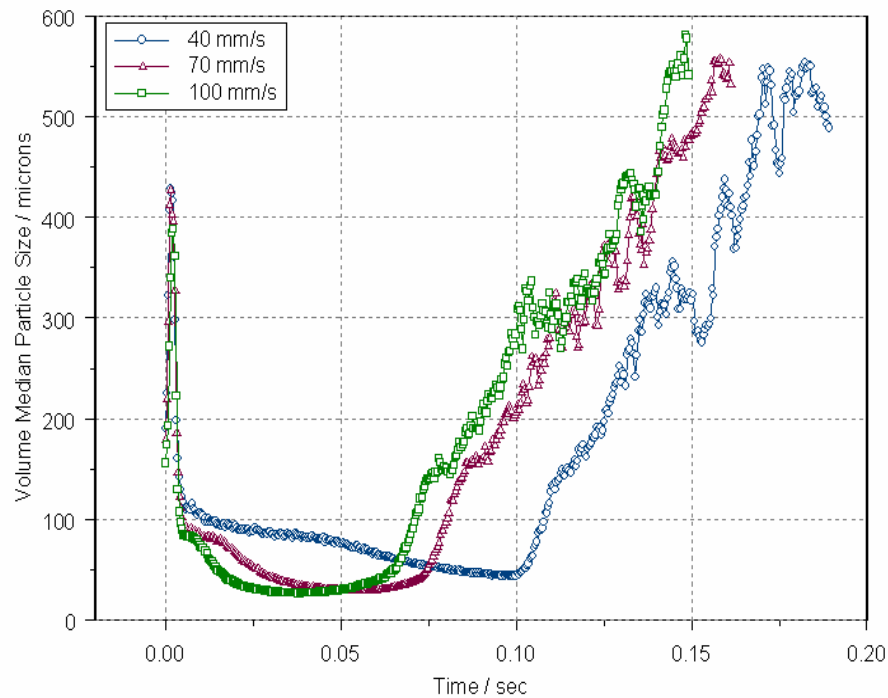
What makes Equadel different?

	Spray angle			
EQUADEL	30 mm/s	40 mm/s	60 mm/s	80 mm/s
Mean :	41,6	41,5	42,0	42,5
SD :	3,0	2,4	2,0	2,0

	Spray angle			
VP3	30 mm/s	40 mm/s	60 mm/s	80 mm/s
Mean :	32,9	39,7	45,8	47,7
SD :	2,9	2,4	2,0	1,8

Performance/DSD and stable phase of the spray

Precompression pump



Actuator Displacement & Spray

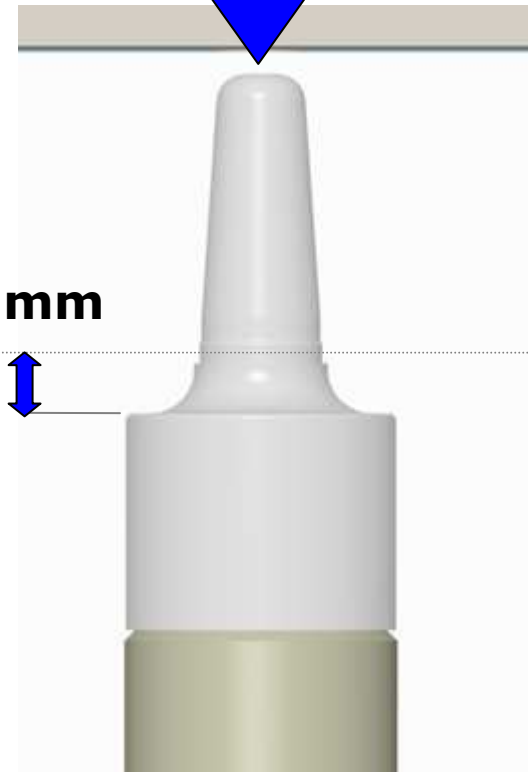
EQUADEL Dose 120 μ l



7.5 mm



8 mm



Pre-Compression and then Compression: 0 \rightarrow 30N

Spray generated by the end of the stroke \sim 30N

Summary

- ☑ **Patient-Independent Performance**
- ☑ **Full Dose Compliance**

- ☑ **Comfortable actuation**

- ☑ **Conventional Style/Ergonomics/
Handling/Filling Process**

- ☑ **Regulatory Compliant**

- ☑ **Novel and Patented Design**

