AEDA AGM, Barcelona, 26th May 2011

QUALITY OF SPRAY: THE KEY FACTORS

Nigel L Jackson
Director - Precision Global Research

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A PRECISION VALVE COMPANY

PRECISION VALVE CORPORATION

Founded (by Bob Abplanalp):	1949
Current President & CEO:	John Abplanalp
Subsidiaries:	16
Employees:	1950
Annual Turnover:	$350 million
Annual Valve Production	4 billion

Website: www.precisionglobal.com

QUALITY OF SPRAY: THE KEY FACTORS

Quality of Spray is "governed" by:-

Propellant	Type Pressure Quantity

"Black Magic"
& "years of experience"

Formula	Viscosity Surface Tension

Hardware (Valve)	Stem orifice Housing RTP & VTP
Hardware (Actuator)	Insert - Design - Orifice Size

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Propellant Type
Pressure
Quantity

Liquified Propellants

- LPG, DME or HFCs

Compressed Gases

Range of Pressure

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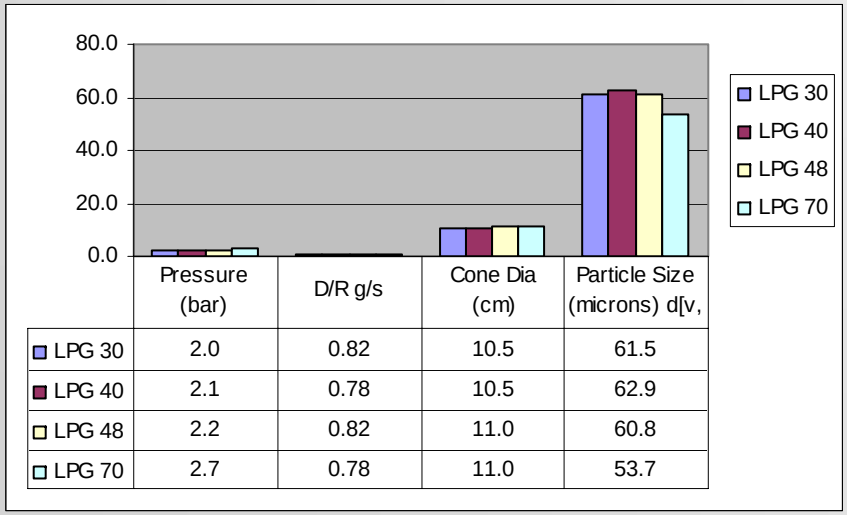
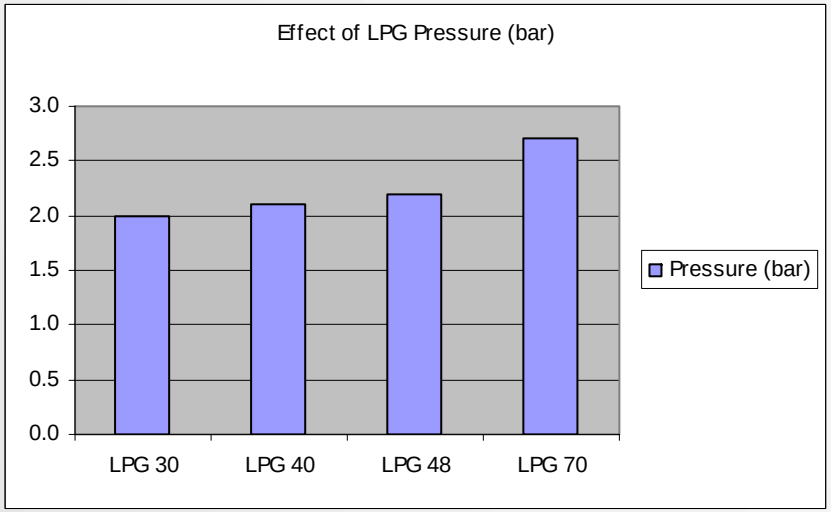
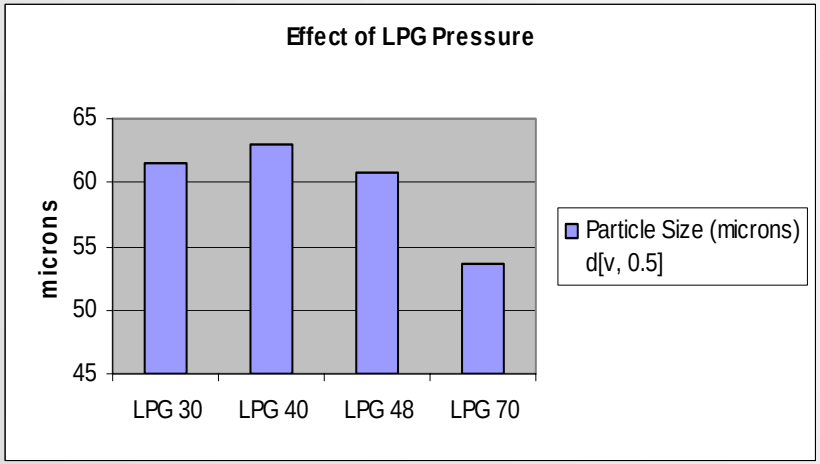
QUALITY OF SPRAY: THE KEY FACTORS

Propellant Type
Pressure
Quantity



	Pressure (bar)	D/R g/s	Cone Dia (cm)	Particle Size (microns) d[v,
LPG 30	2.0	0.82	10.5	61.5
LPG 40	2.1	0.78	10.5	62.9
LPG 48	2.2	0.82	11.0	60.8
LPG 70	2.7	0.78	11.0	53.7





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QUALITY OF SPRAY: THE KEY FACTORS

Propellant Type
Pressure
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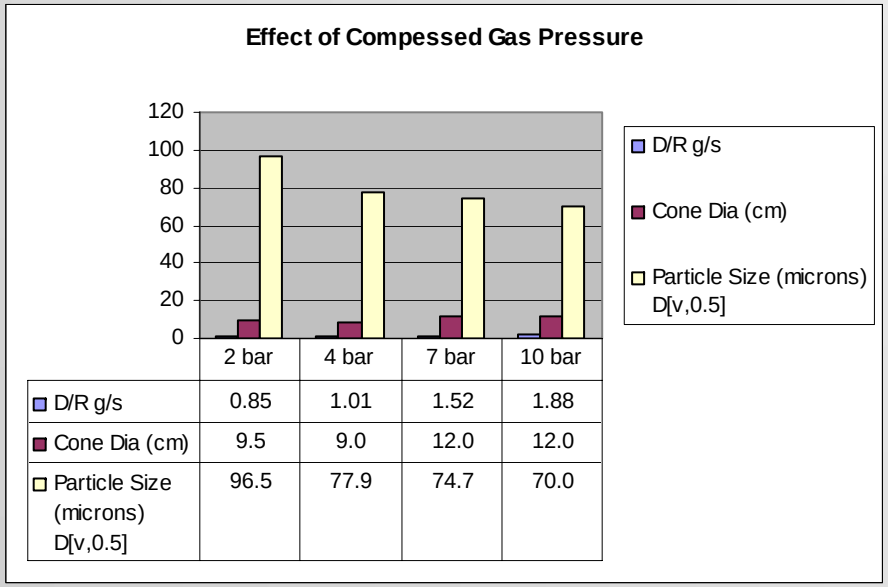
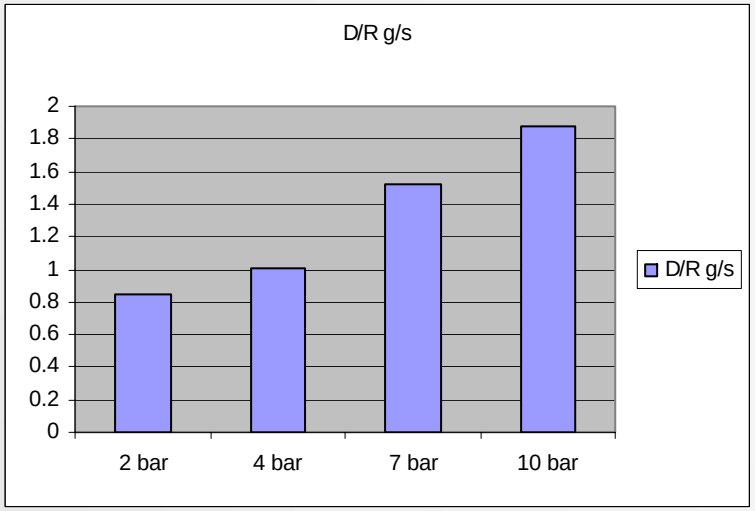
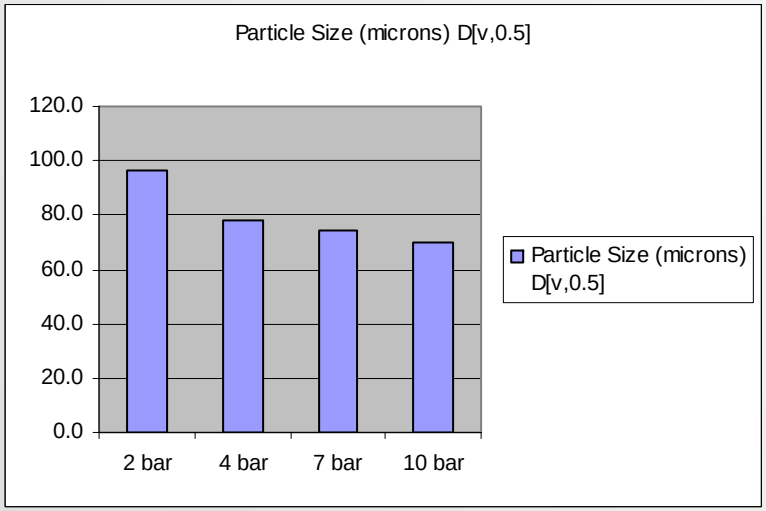


	2 bar	4 bar	7 bar	10 bar
D/R g/s	0.85	1.01	1.52	1.88
Cone Dia (cm)	9.5	9.0	12.0	12.0
Particle Size (microns) D[v,0.5]	96.5	77.9	74.7	70.0





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QUALITY OF SPRAY: THE KEY FACTORS

Quality of Spray is “governed” by:-

Formula	Viscosity Surface Tension

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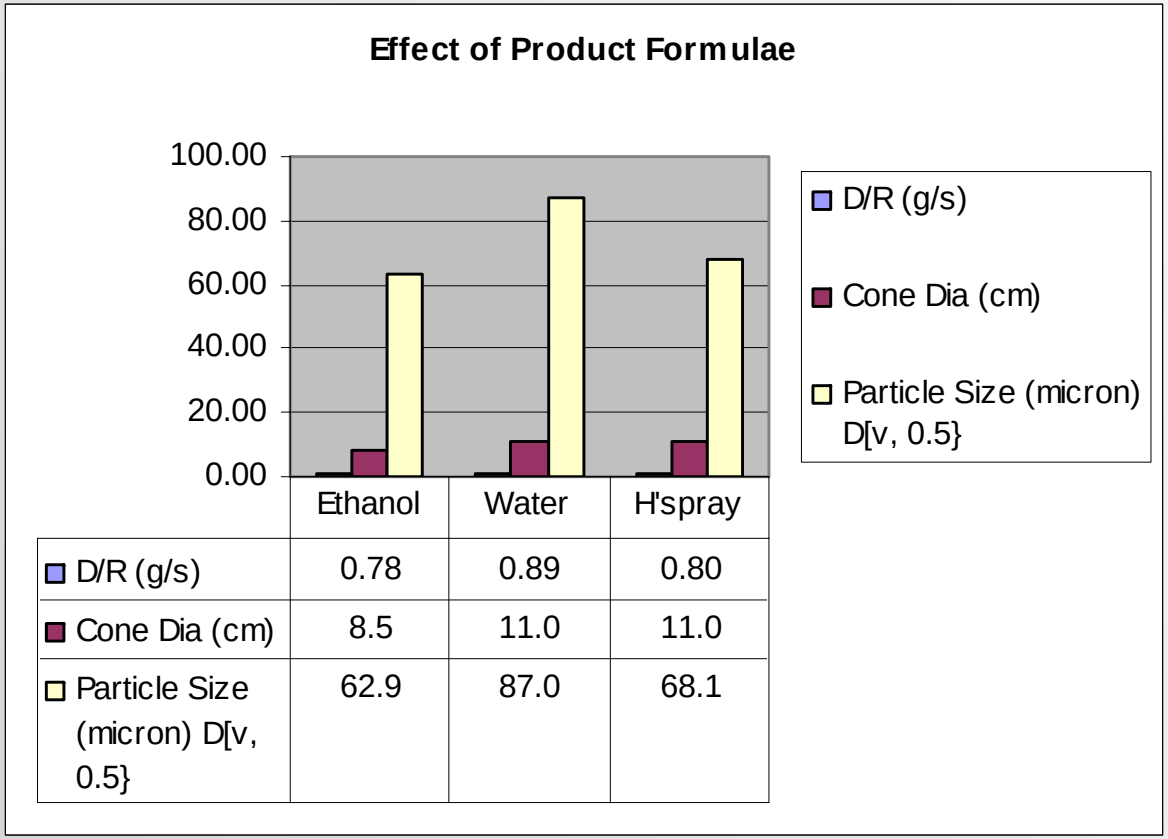
QUALITY OF SPRAY: THE KEY FACTORS

Formula Viscosity
Surface Tension



	Ethanol	Water	H'spray
D/R (g/s)	0.78	0.89	0.80
Cone Dia (cm)	8.5	11.0	11.0
Particle Size (micron) D[v, 0.5}	62.9	87.0	68.1

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QUALITY OF SPRAY: THE KEY FACTORS

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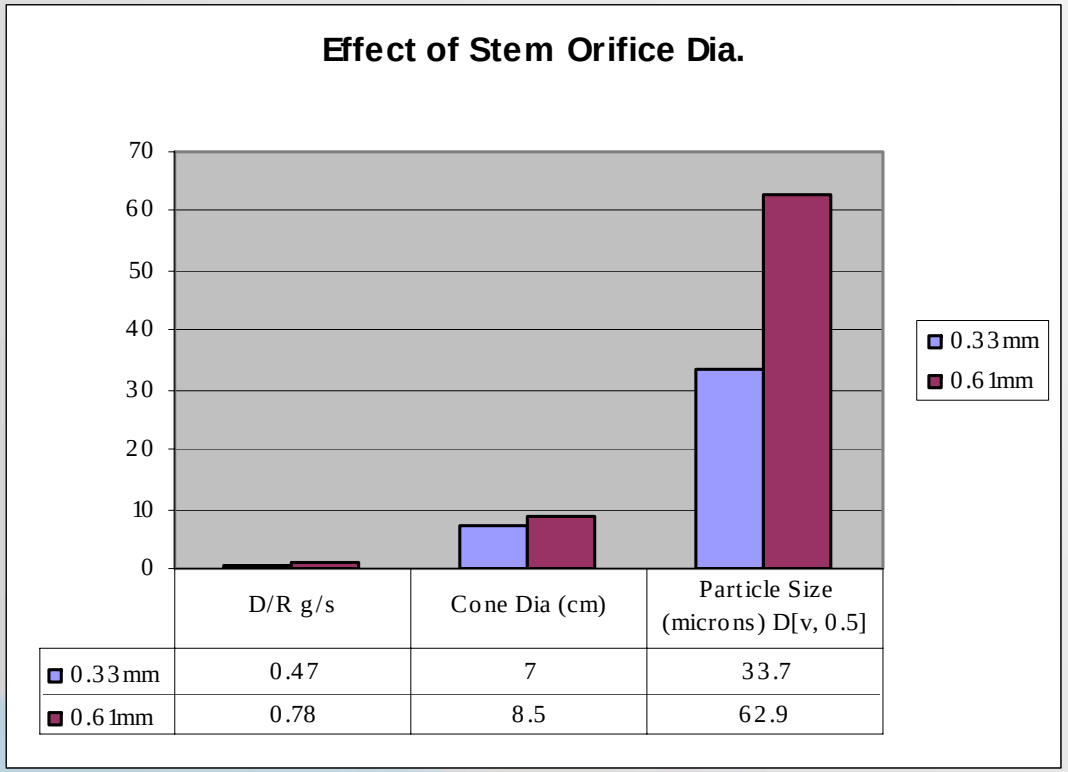

	D/R g/s	Cone Dia (cm)	Particle Size (microns) D[v, 0.5]
0.33mm	0.47	7	33.7
0.61mm	0.78	8.5	62.9

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	Housing RTP & VTP	
Hardware (Actuator)	Insert	- Design
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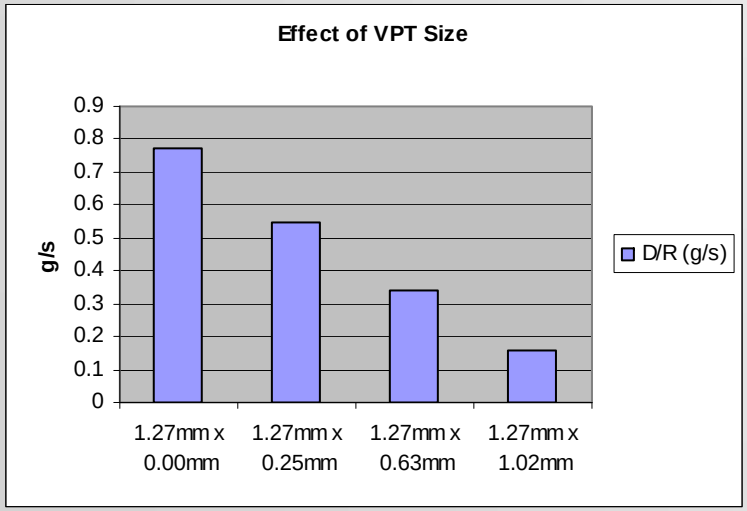

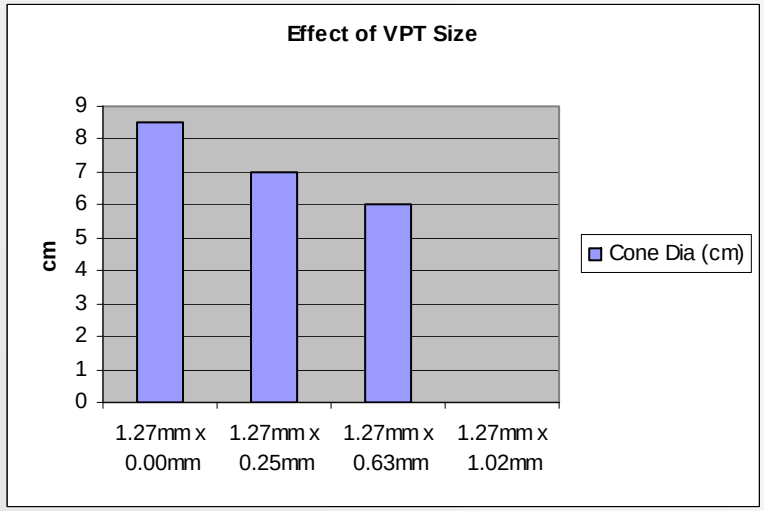

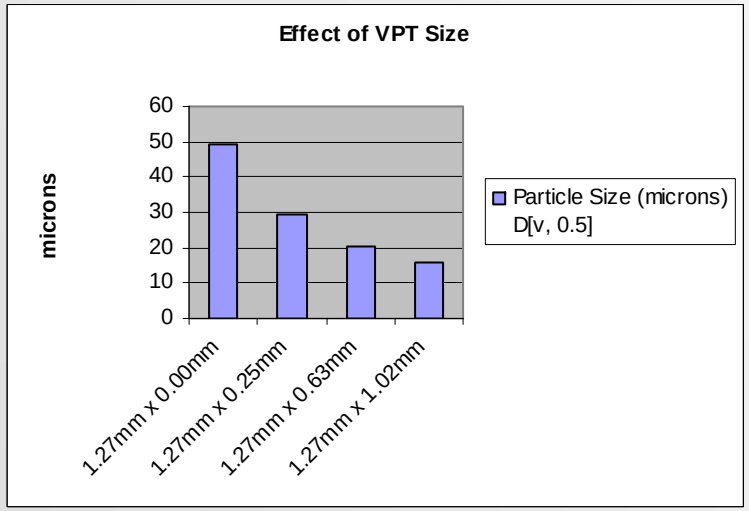

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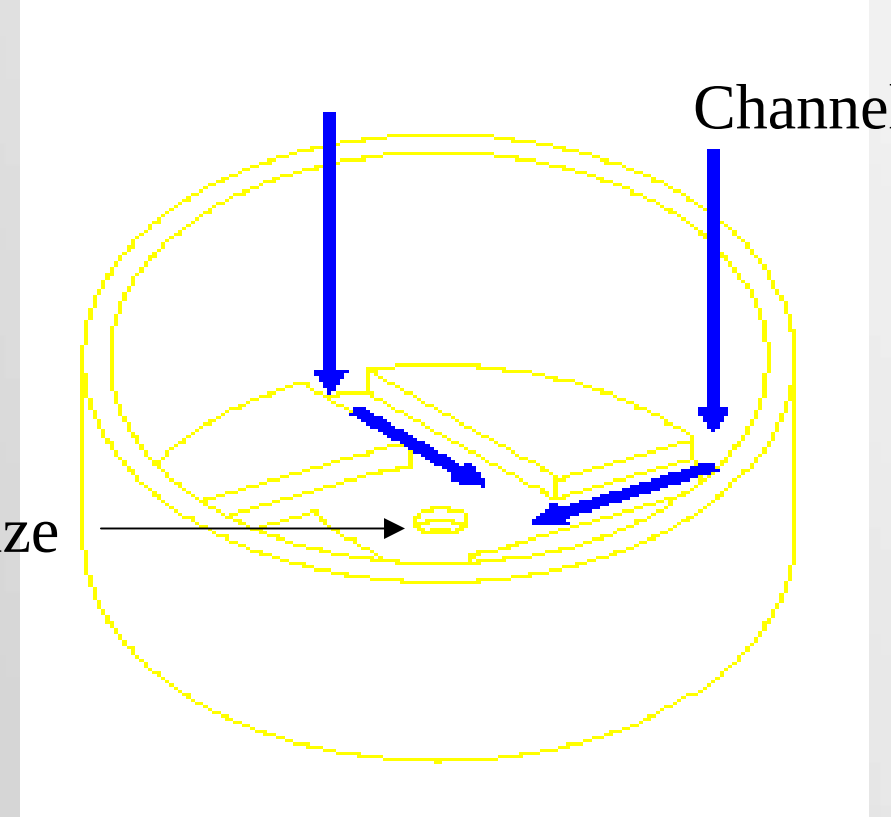
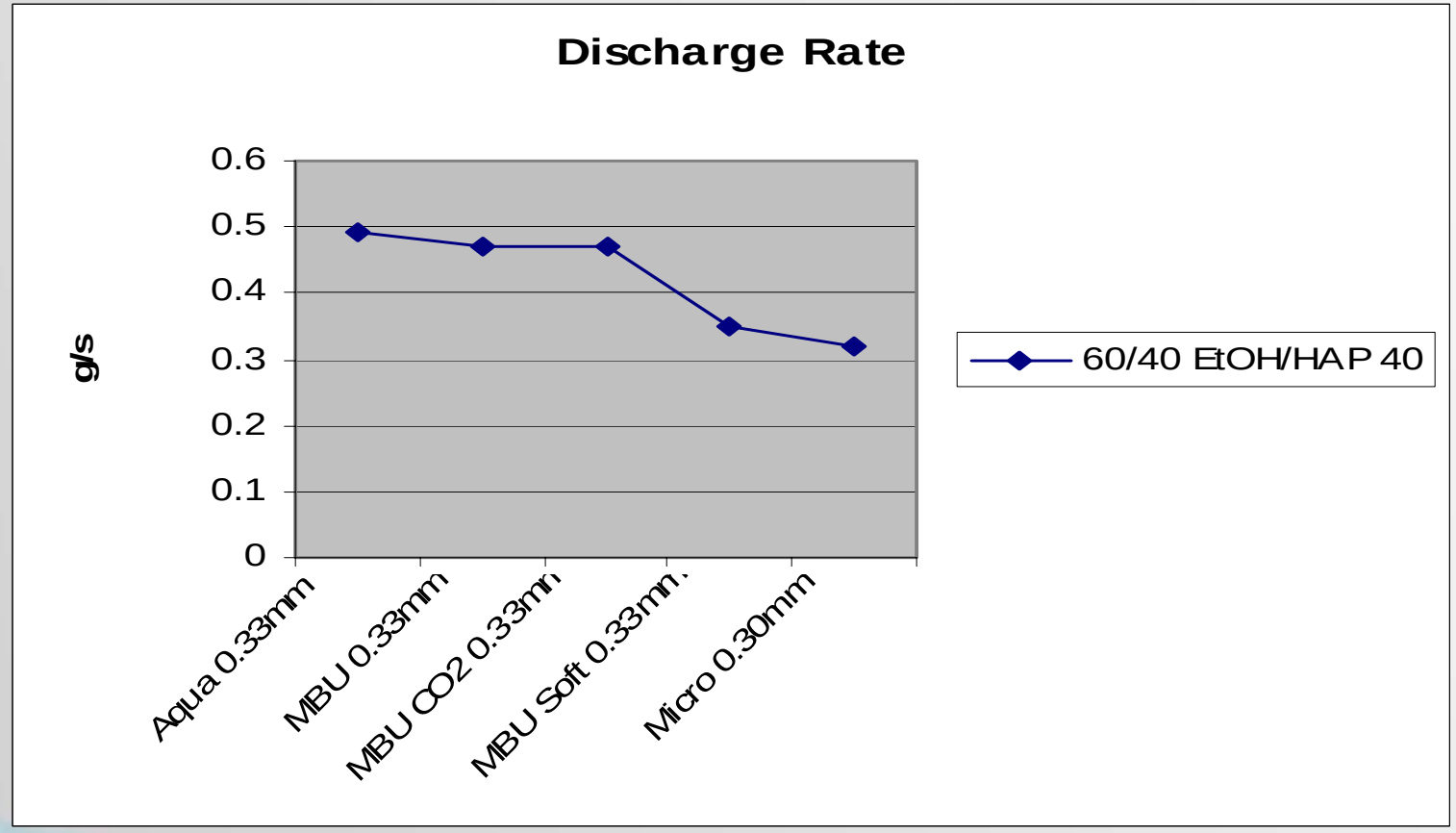
QUALITY OF SPRAY: THE KEY FACTORS

Effect of Insert (mbu) Design



QUALITY OF SPRAY: THE KEY FACTORS

Effect of Insert (mbu) Design on Discharge Rate



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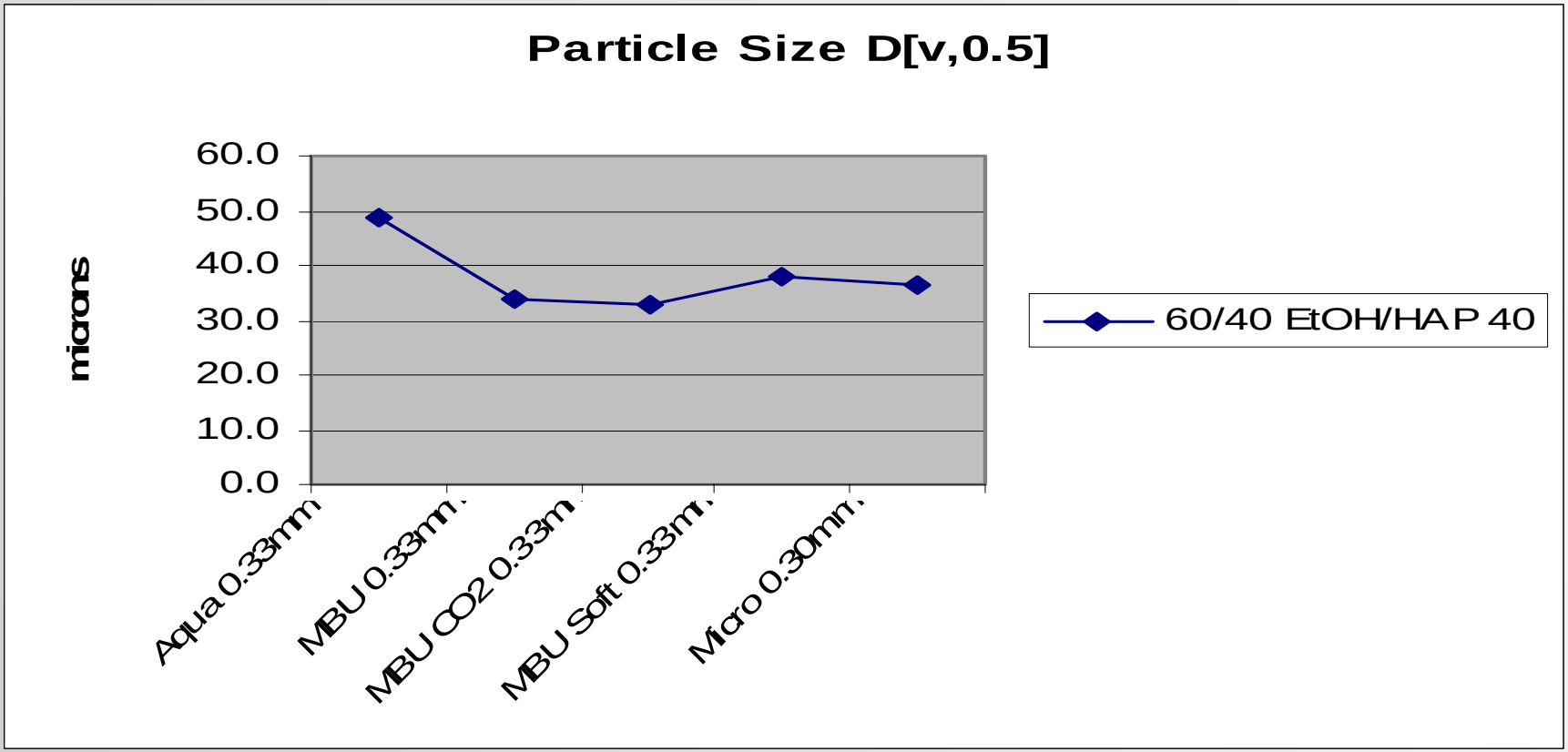
QUALITY OF SPRAY: THE KEY FACTORS

Effect of Insert (mbu) Design on Particle Size



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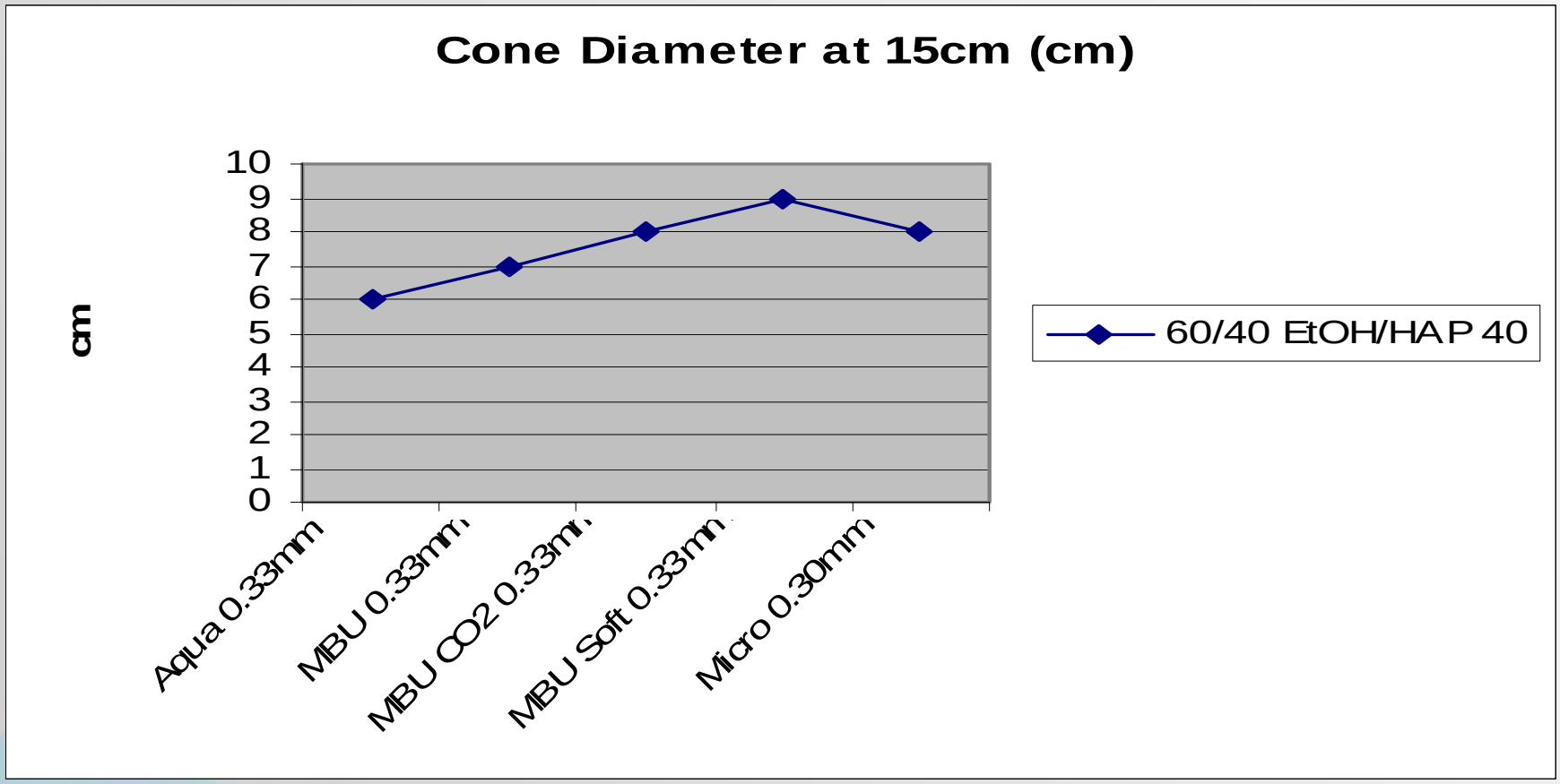
QUALITY OF SPRAY: THE KEY FACTORS

Effect of Insert (mbu) Design on Cone Diameter



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QUALITY OF SPRAY: THE KEY FACTORS

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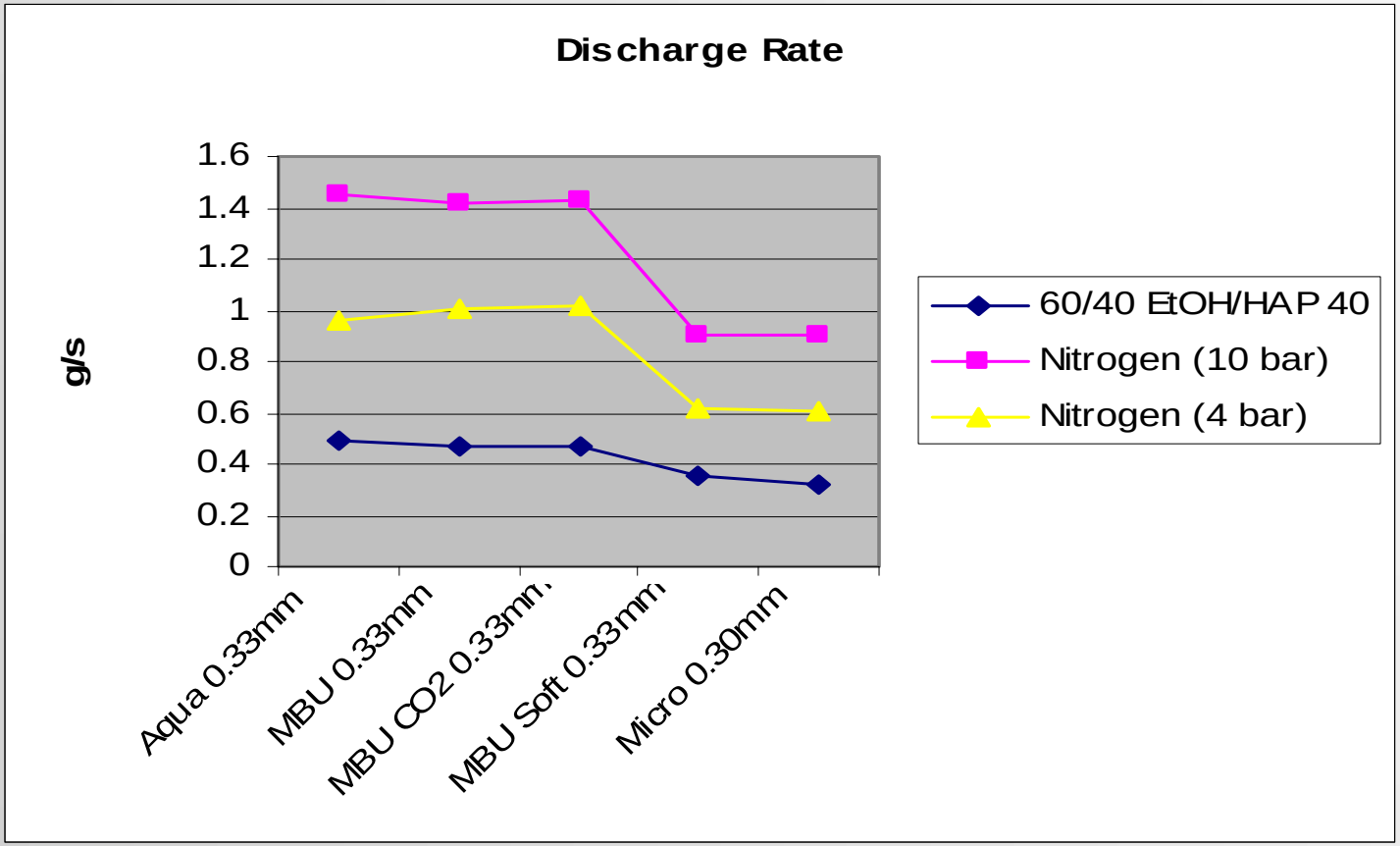

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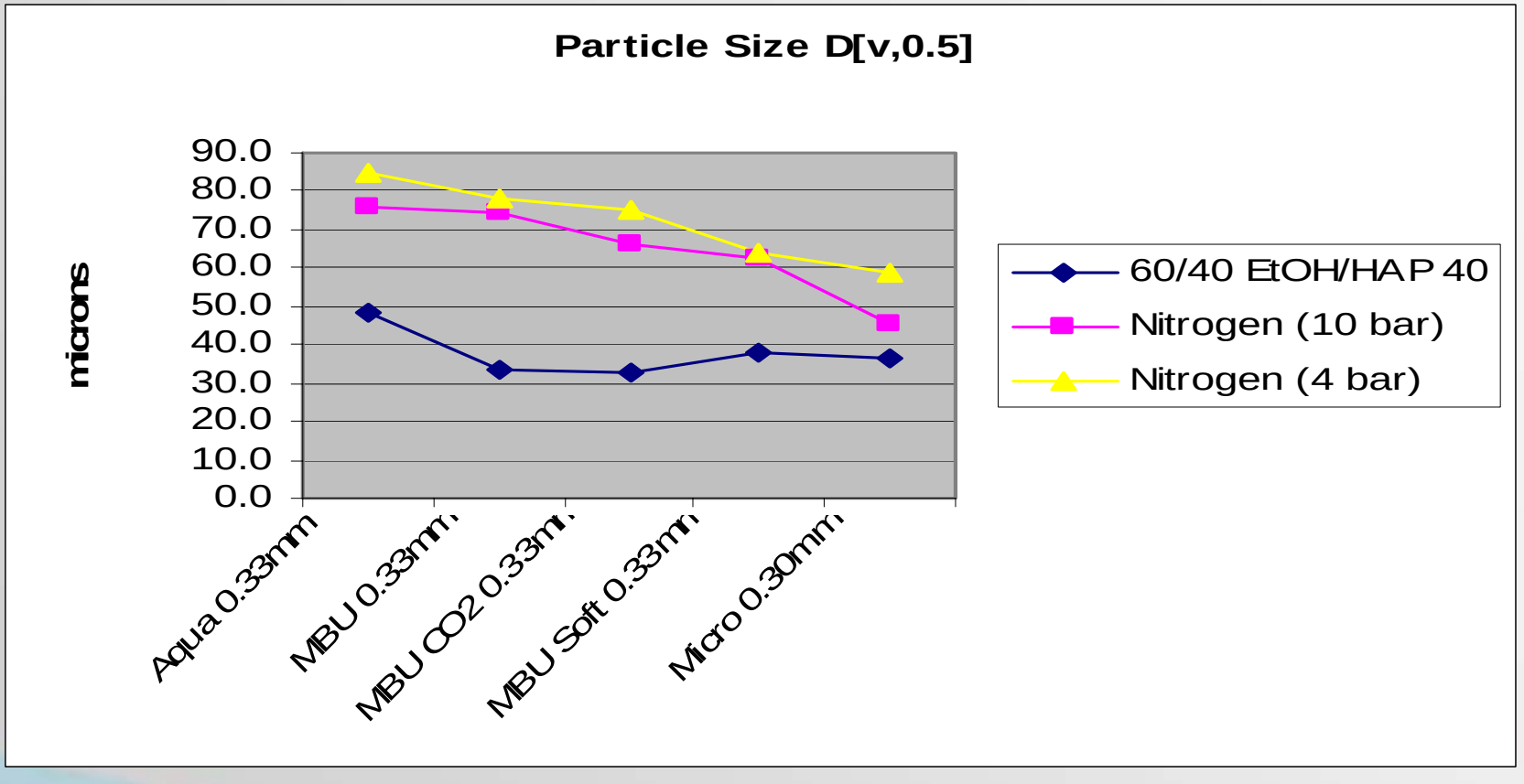
QUALITY OF SPRAY: THE KEY FACTORS

Effect of Insert (mbu) Design on Particle Size



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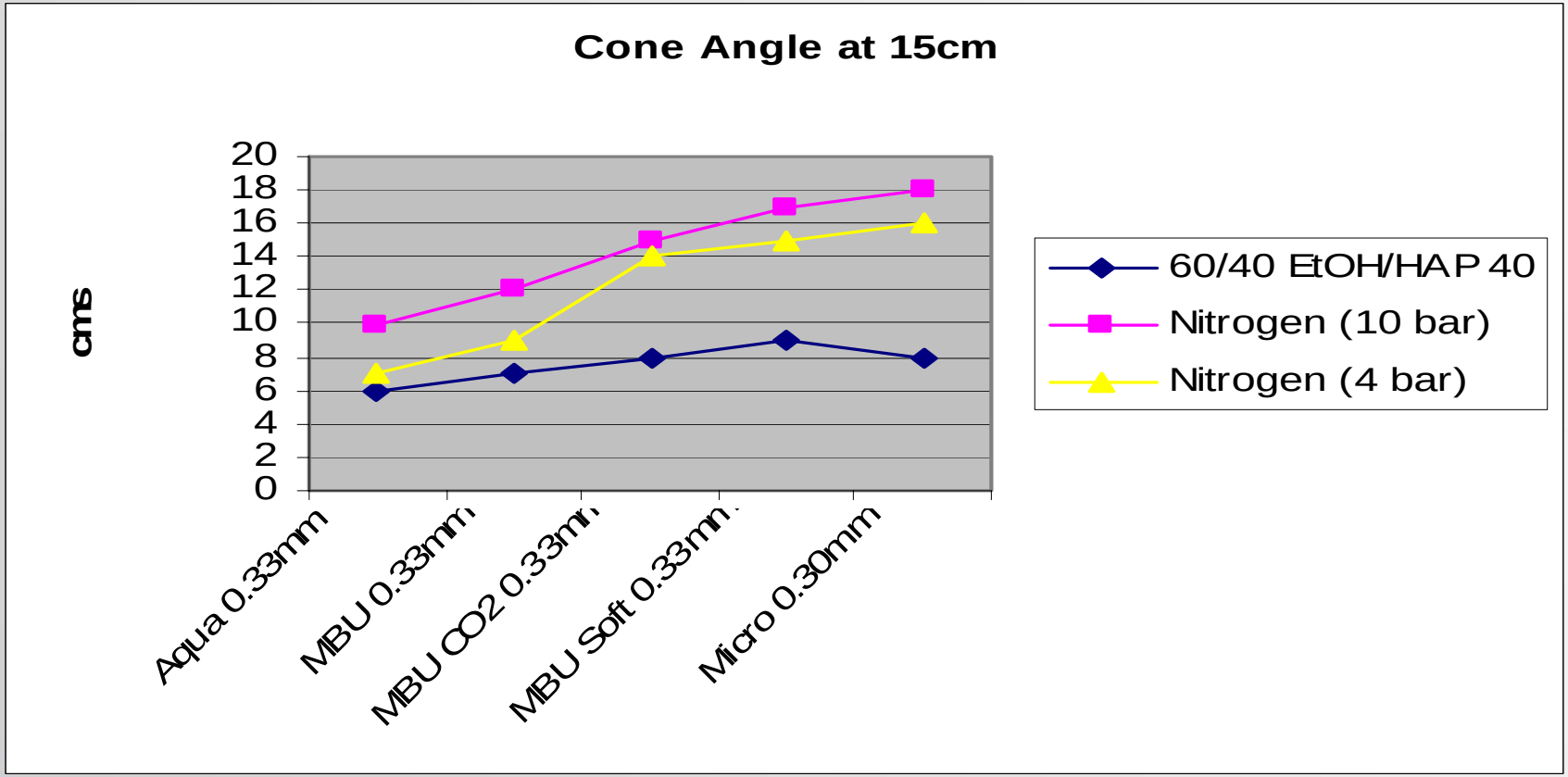

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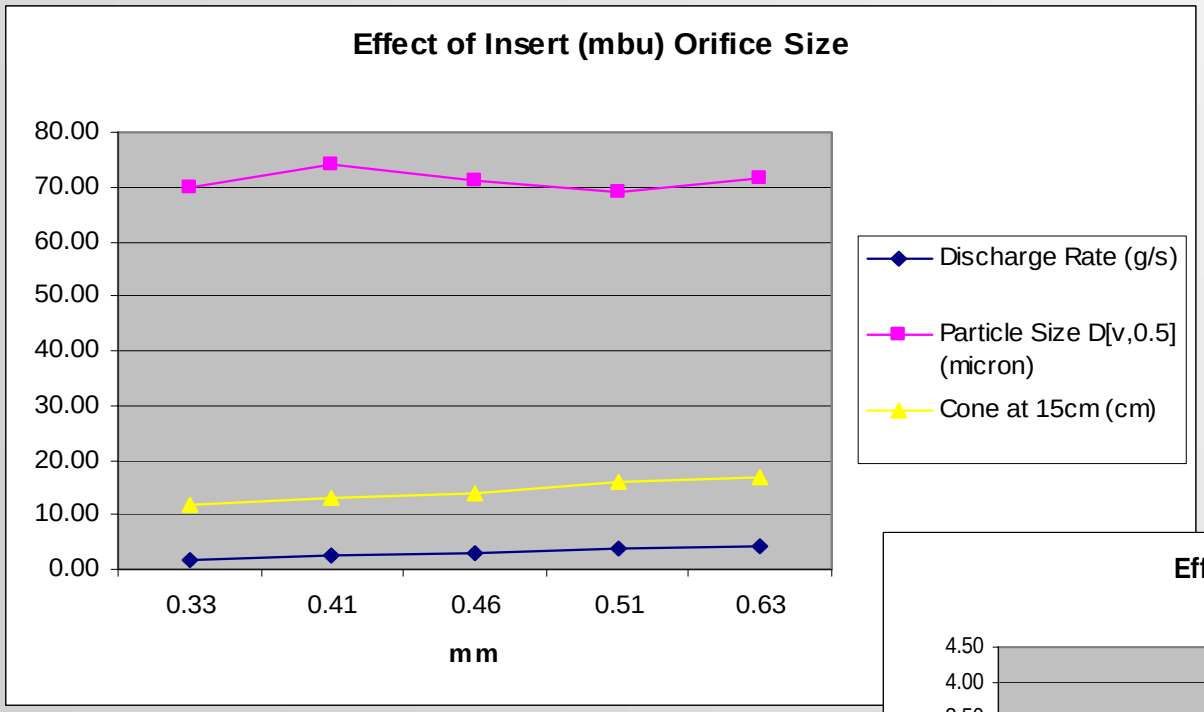
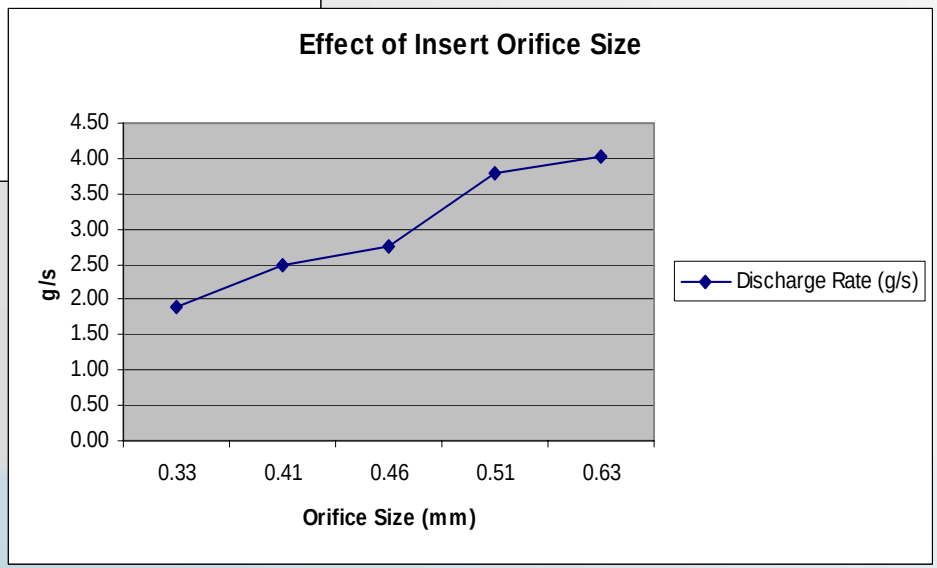
QUALITY OF SPRAY: THE KEY FACTORS

Effect of Insert (mbu) Orifice Size (10 bar nitrogen)





QUALITY OF SPRAY: THE KEY FACTORS

Replacing “magic” with “science”!

Computational Fluid Dynamics (CFD) software is a tool we can now use to investigate trends introduced by changes in geometry, pressure & fluids.

Geometric iterations can be studied prior to a design going to the stages of cutting steel & making physical parts.

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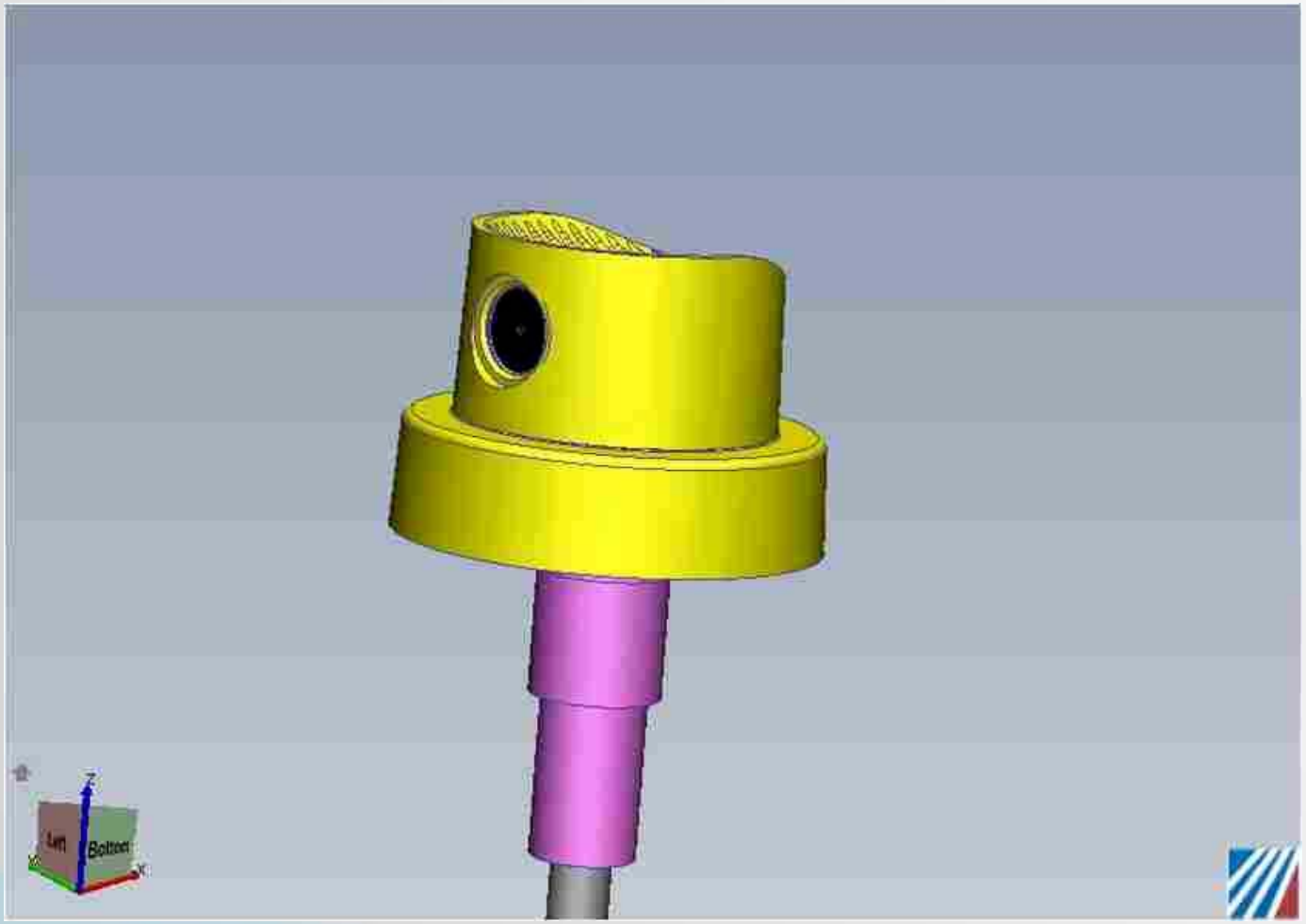

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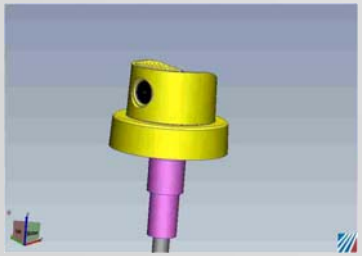

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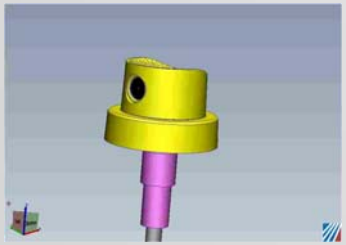

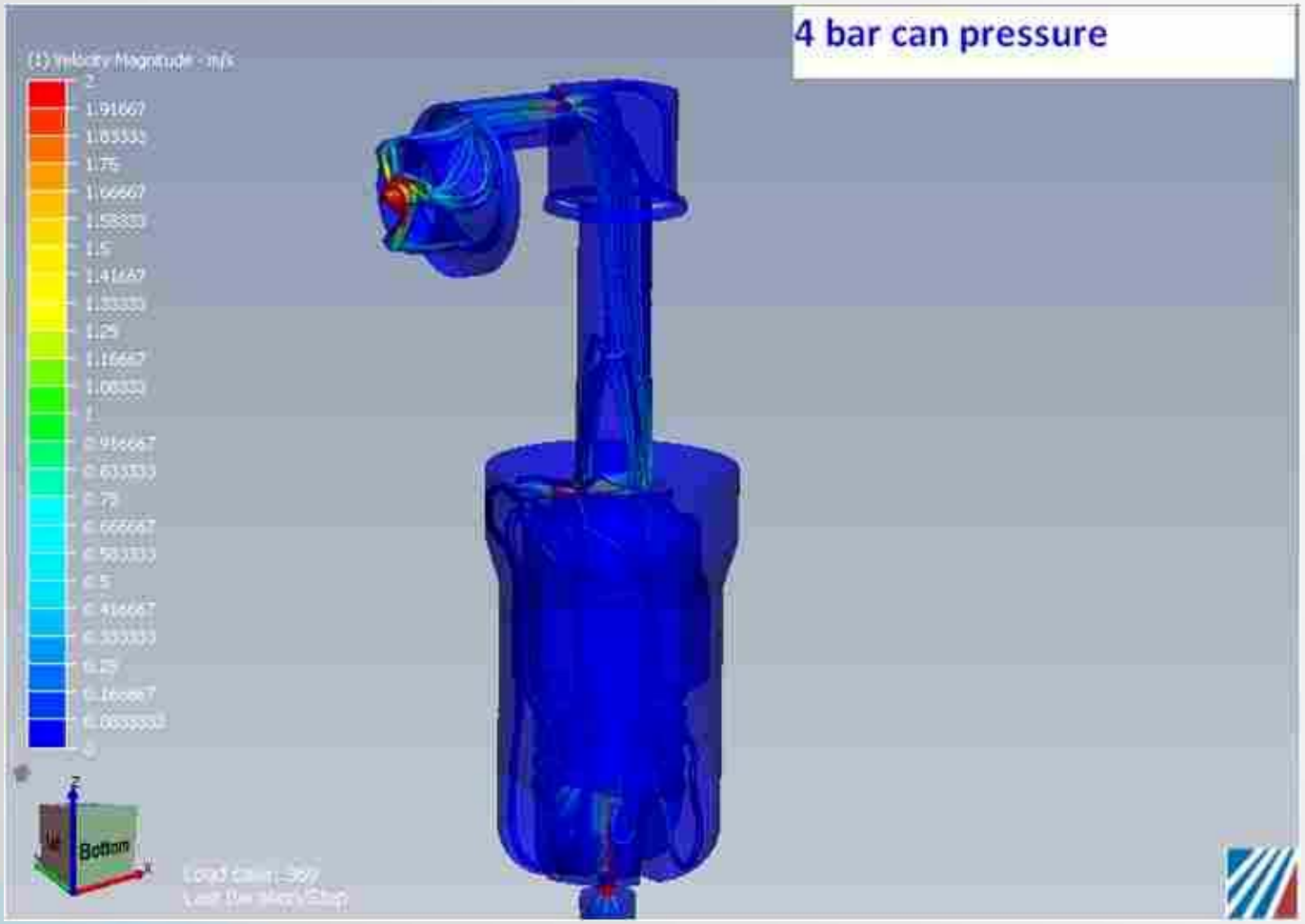

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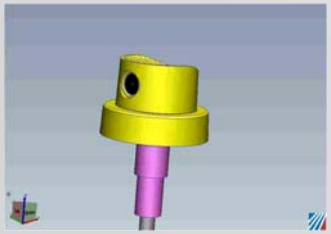

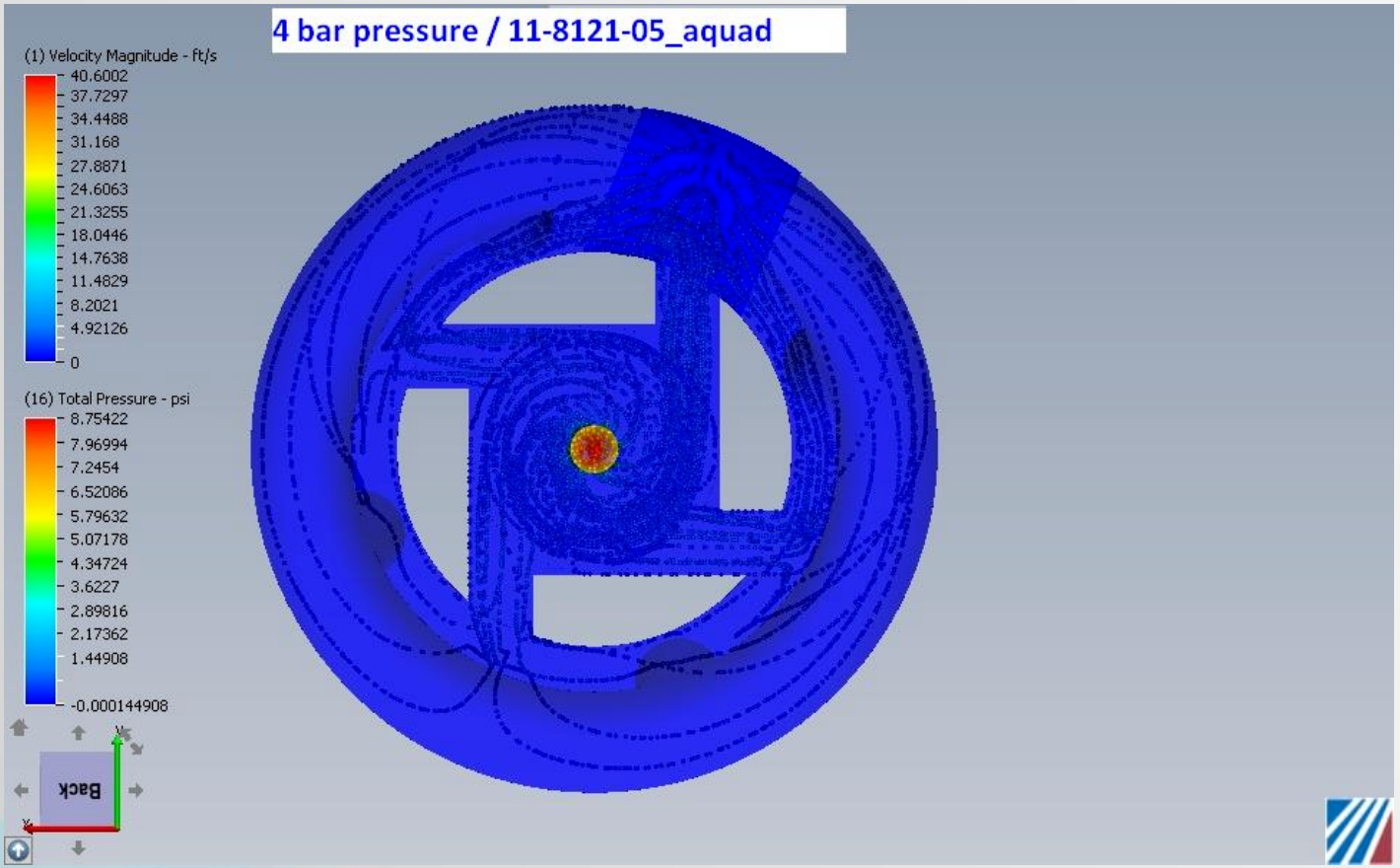

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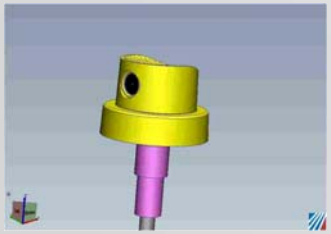

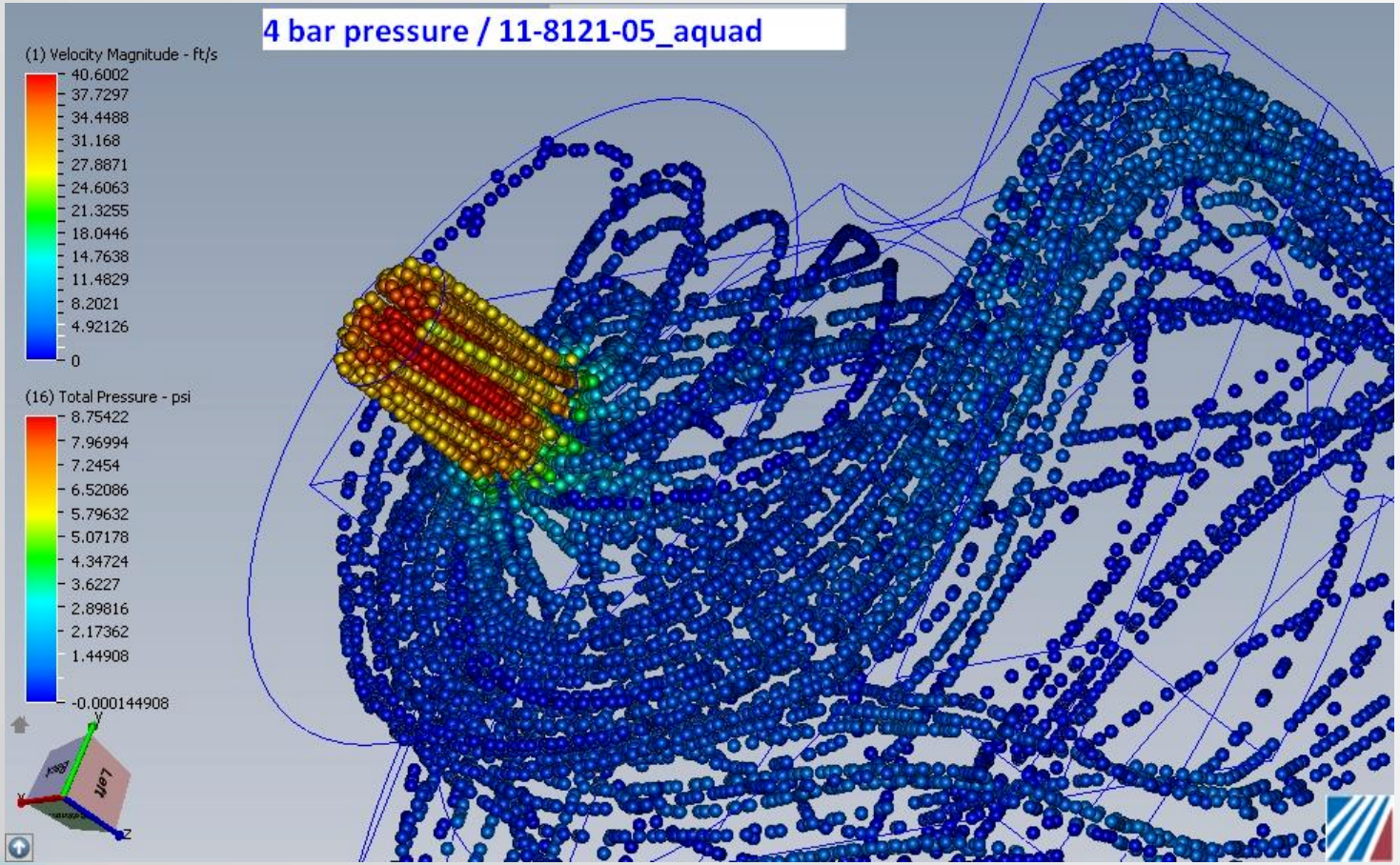

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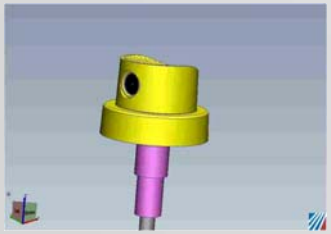

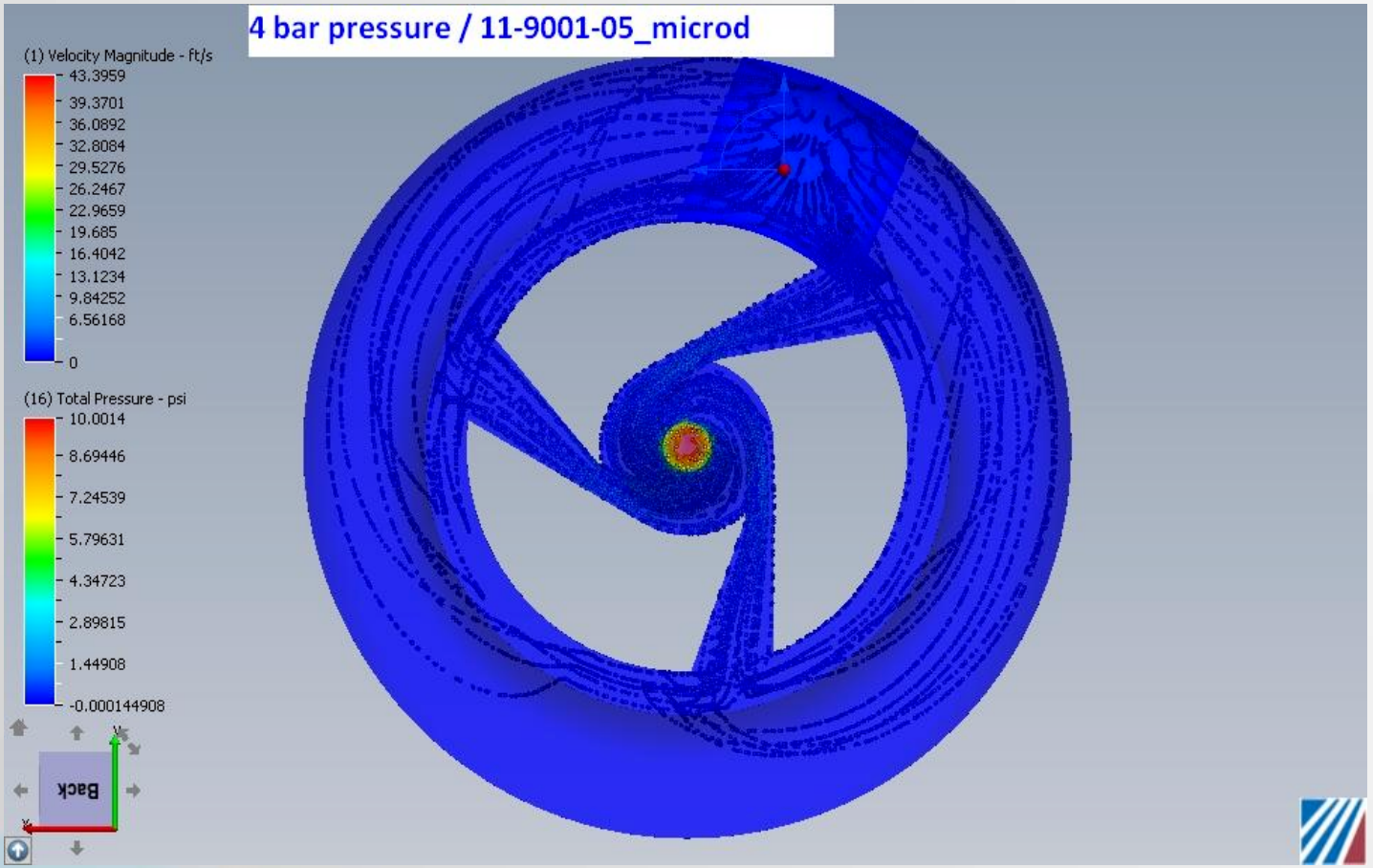

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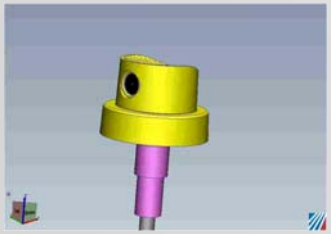

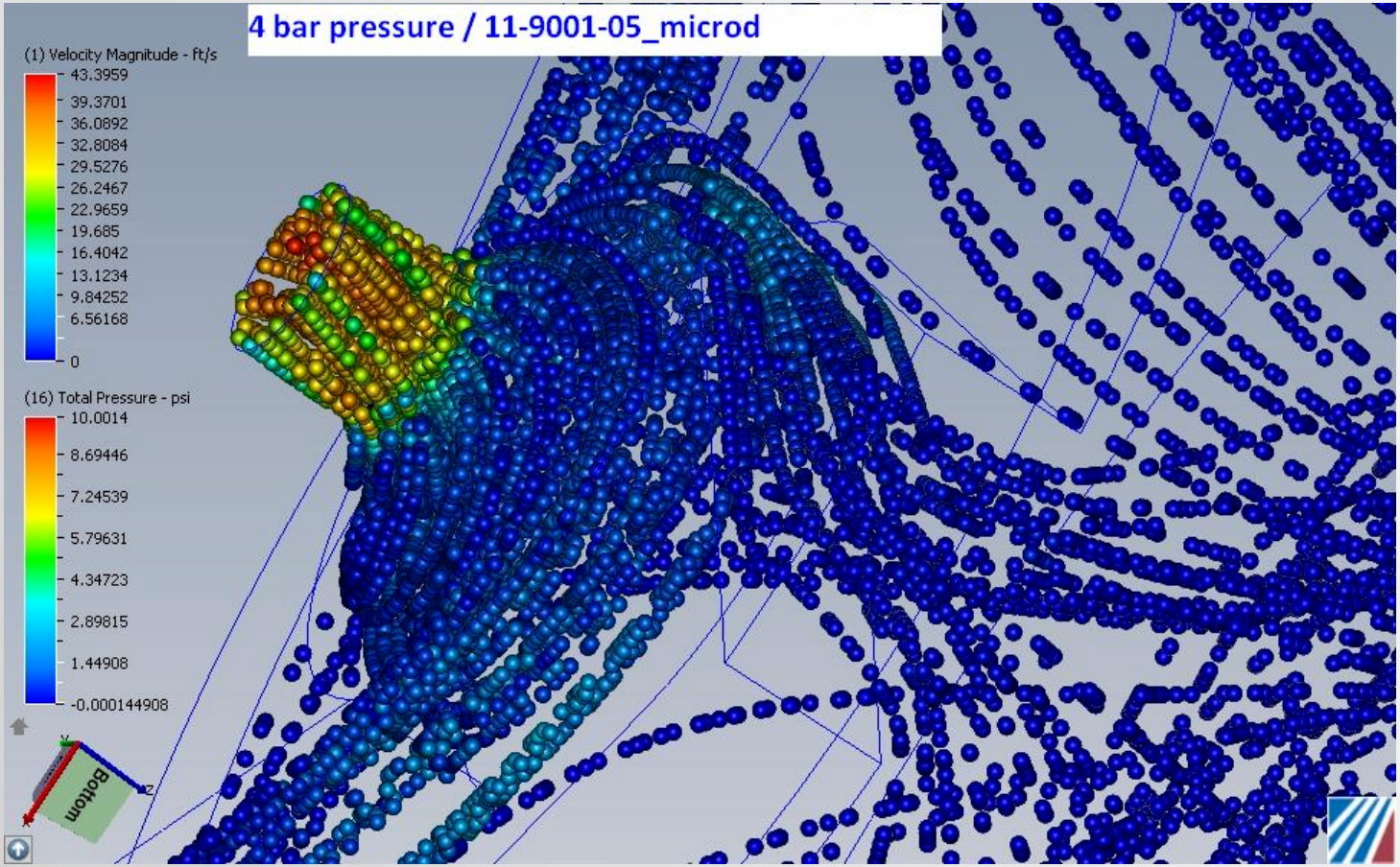

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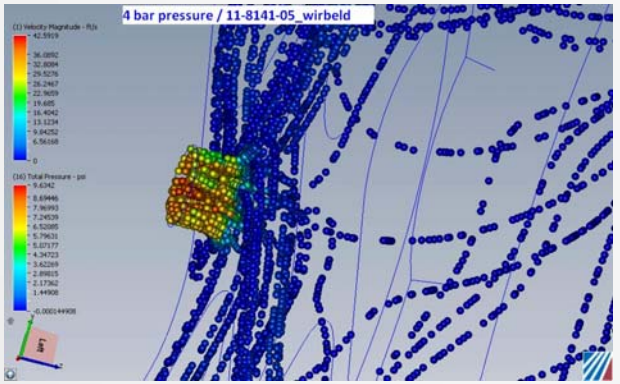

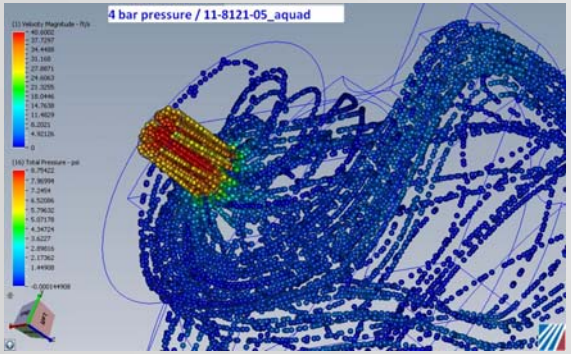

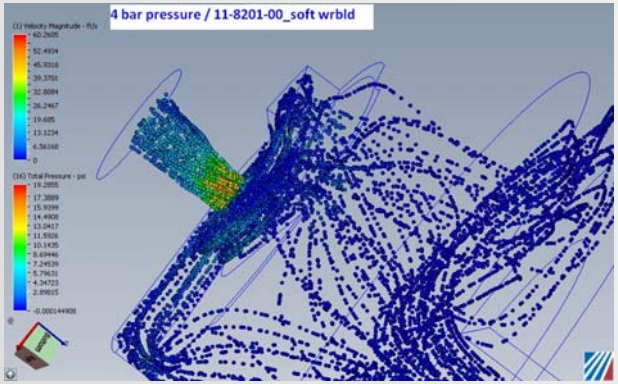

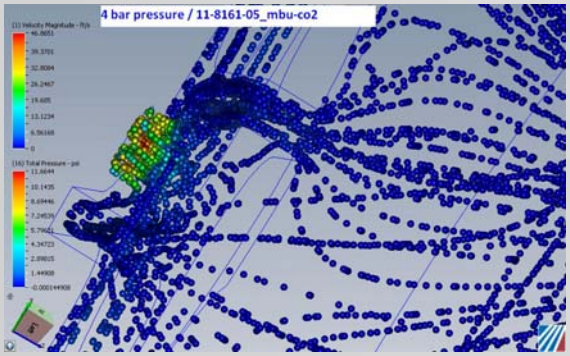

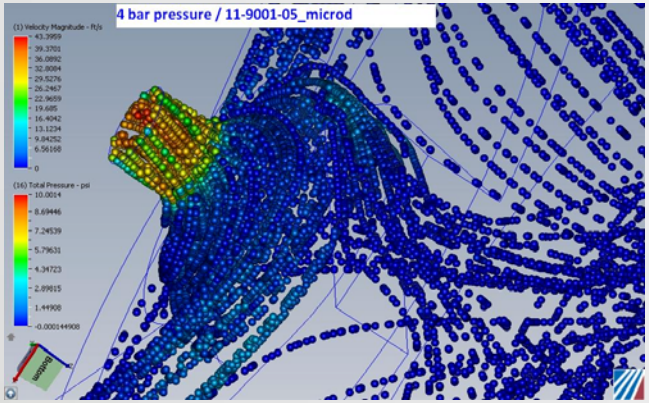

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MANY THANKS - ANY QUESTIONS?