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Role of Air-Induction Nozzles in Aerial Application Conditions

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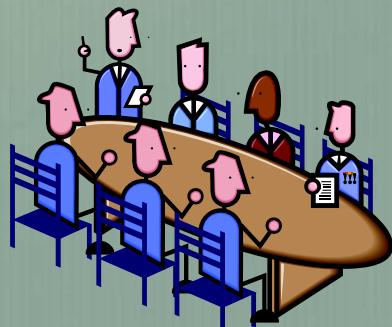
Why are we looking at AI nozzles?



Phone Calls



Emails



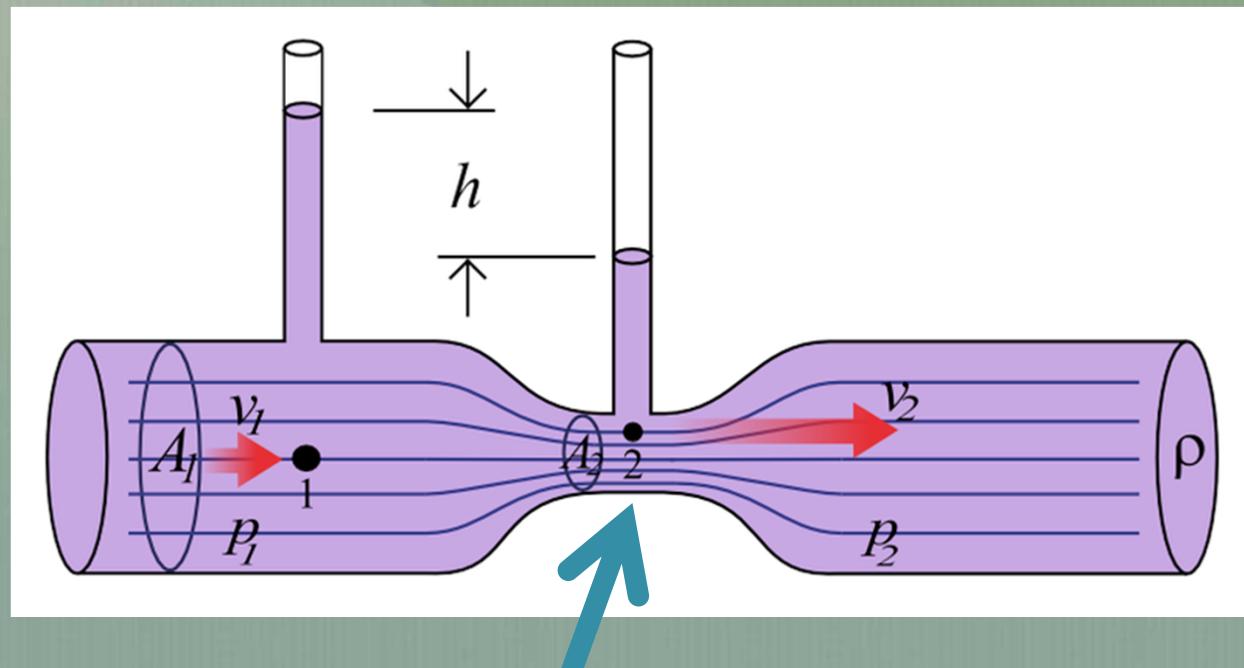
Meeting with individual applicators and at the R&T Committee

Basic Operating Principles

- Pressurized fluid (i.e. spray solution) goes through a venturi, which is a constriction in flow;
- Like on a wing, as the fluid speeds up, the pressure drops;

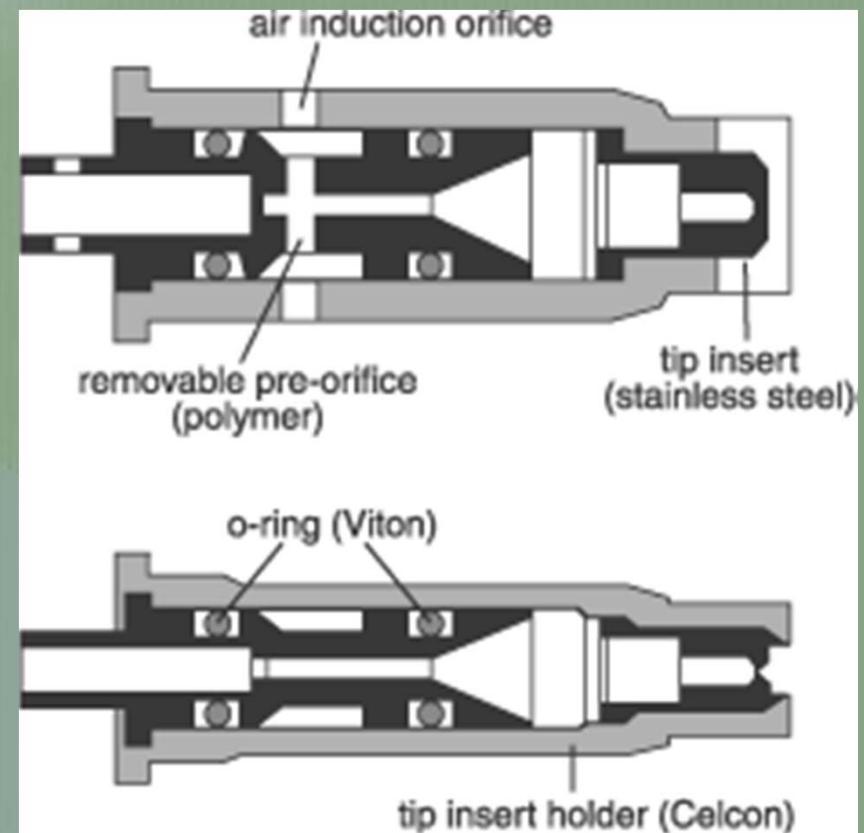
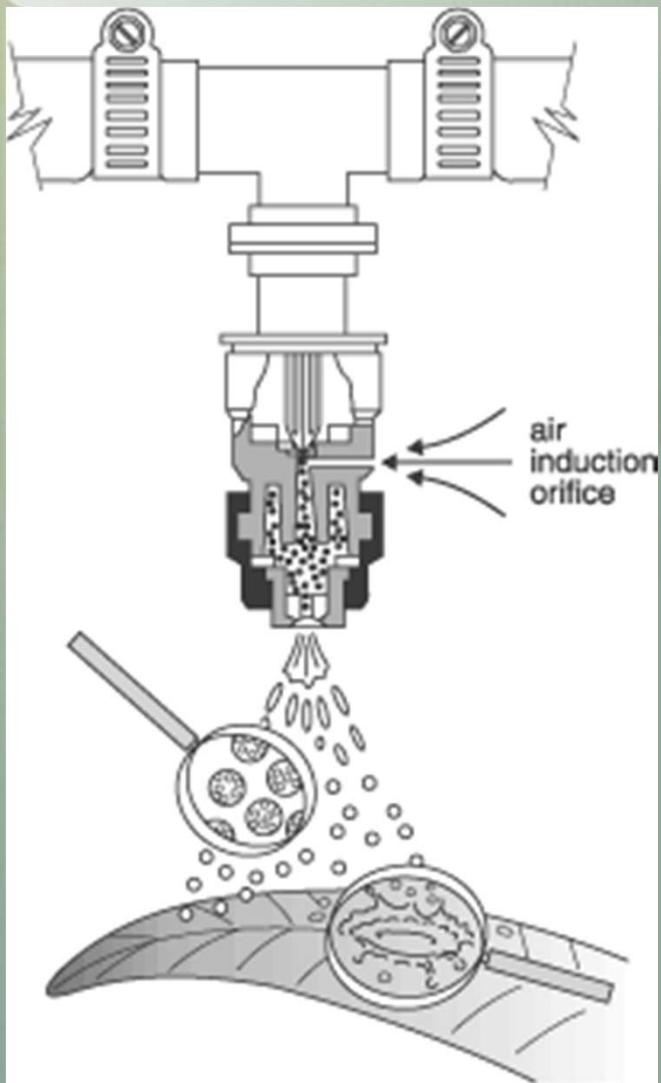
Operating Principles

- At the point of lowest pressure, holes are drilled into the venturi, which allows air to be pulled into the interior chamber of the nozzle.



By placing a hole here, you can draw in outside air.

Cross section of AI nozzles



Courtesy of GreenLeaf and TeeJet

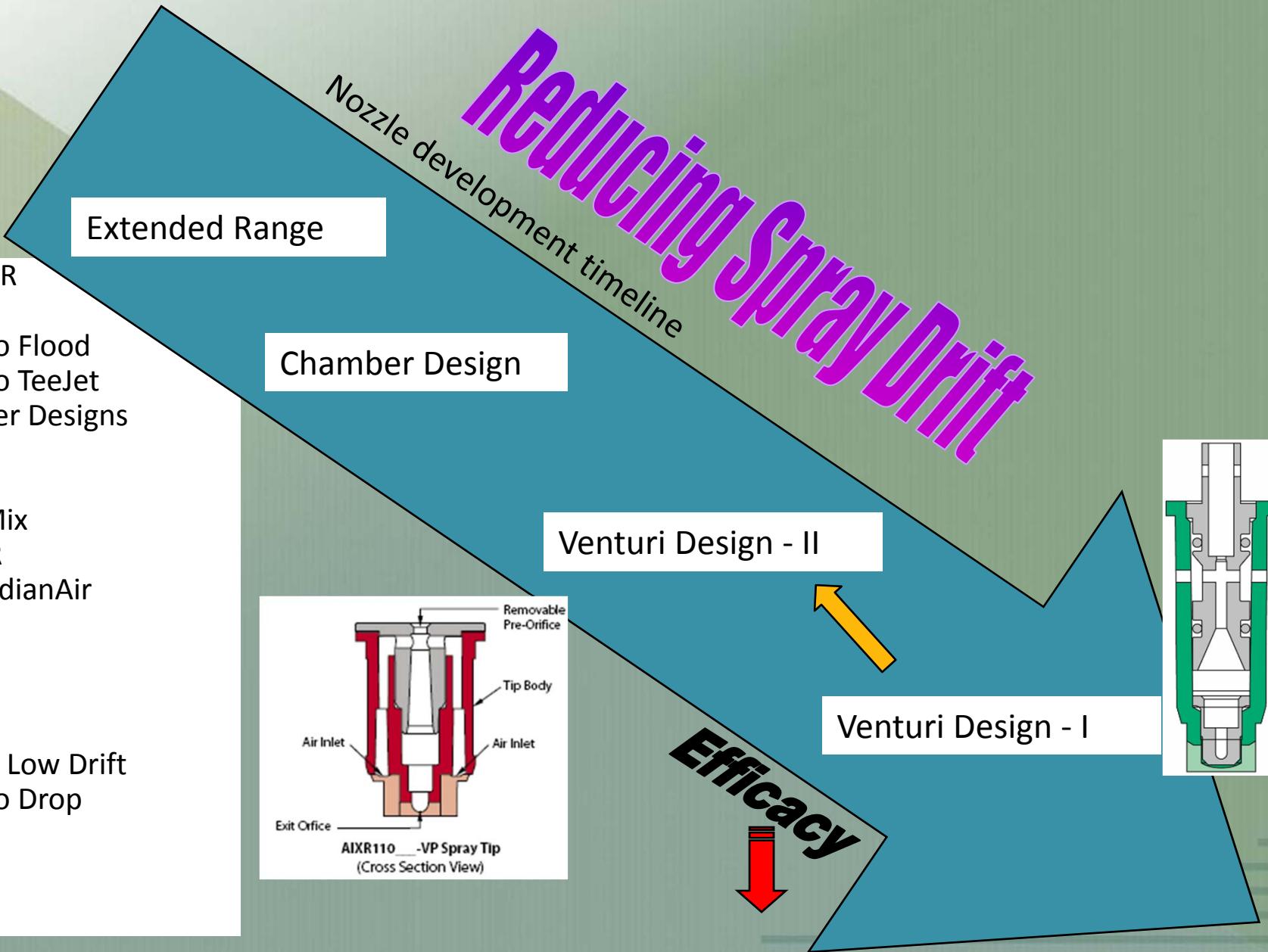
Nozzle Efficacy/Drift Slope

- XR, TR
- Turbo Flood
- Turbo TeeJet
- Wilger Designs

- Air Mix
- AI XR
- GuardianAir

- AI
- Ultra Low Drift
- Turbo Drop

- TTI



Droplet Spectra under Ground Application Conditions

	DV0.1 (μm)	DV0.5 (μm)	DV0.9 (μm)	Vol% < 100 μm	Vol% < 210 μm
XP11002 – N	124.4	307.1	569.6	5.7	28.9
	Efficacy is likely to suffer with these large drops			Great Drift Control	
AI11002 – Generation 1	369.7	734.5	1044.9	0.4	2.2
AIXR11002 – Generation 2	127.3	408.3	686.0	4.51	17.58

Advantages of AI Nozzles

- Larger droplets sizes and less fines at normal operating pressures;
 - Better efficacy with some products;
 - Some can operate over a larger range of pressures without significant changes in droplet size.
-
- However, this is only for ground applications at this point so let's look at them in high speed airstreams.

Objective

- To measure the spray droplet spectra from air-induction nozzles under aerial application spray scenarios.

Conclusion

- Under the high airspeeds (140+mph), the AI nozzles tested performed like flat fan nozzles.

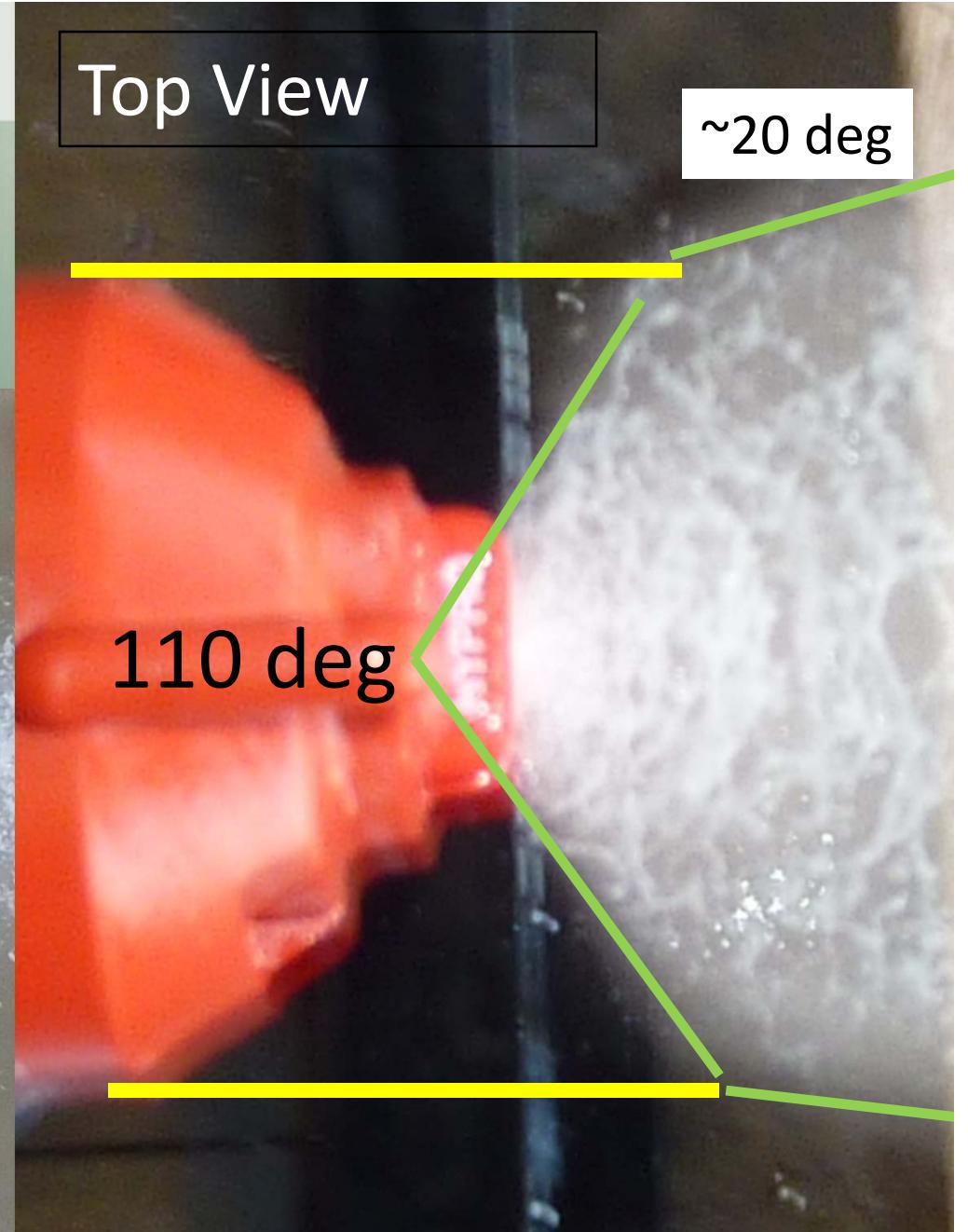
End View of Wind Tunnel Testing Facility

Laser System

Nozzle Spraying



Nozzles In Action

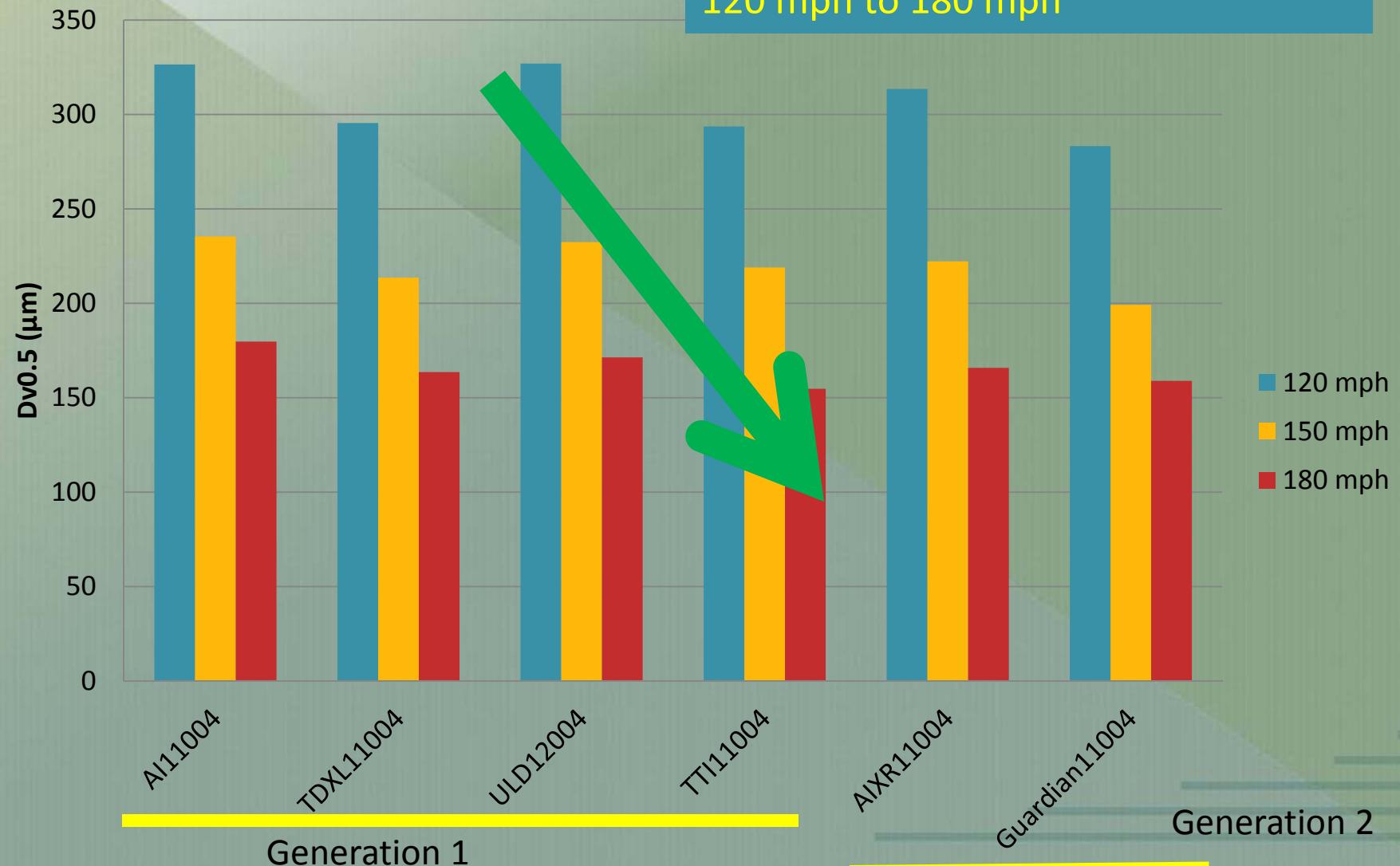


Remember that they are ground nozzles .

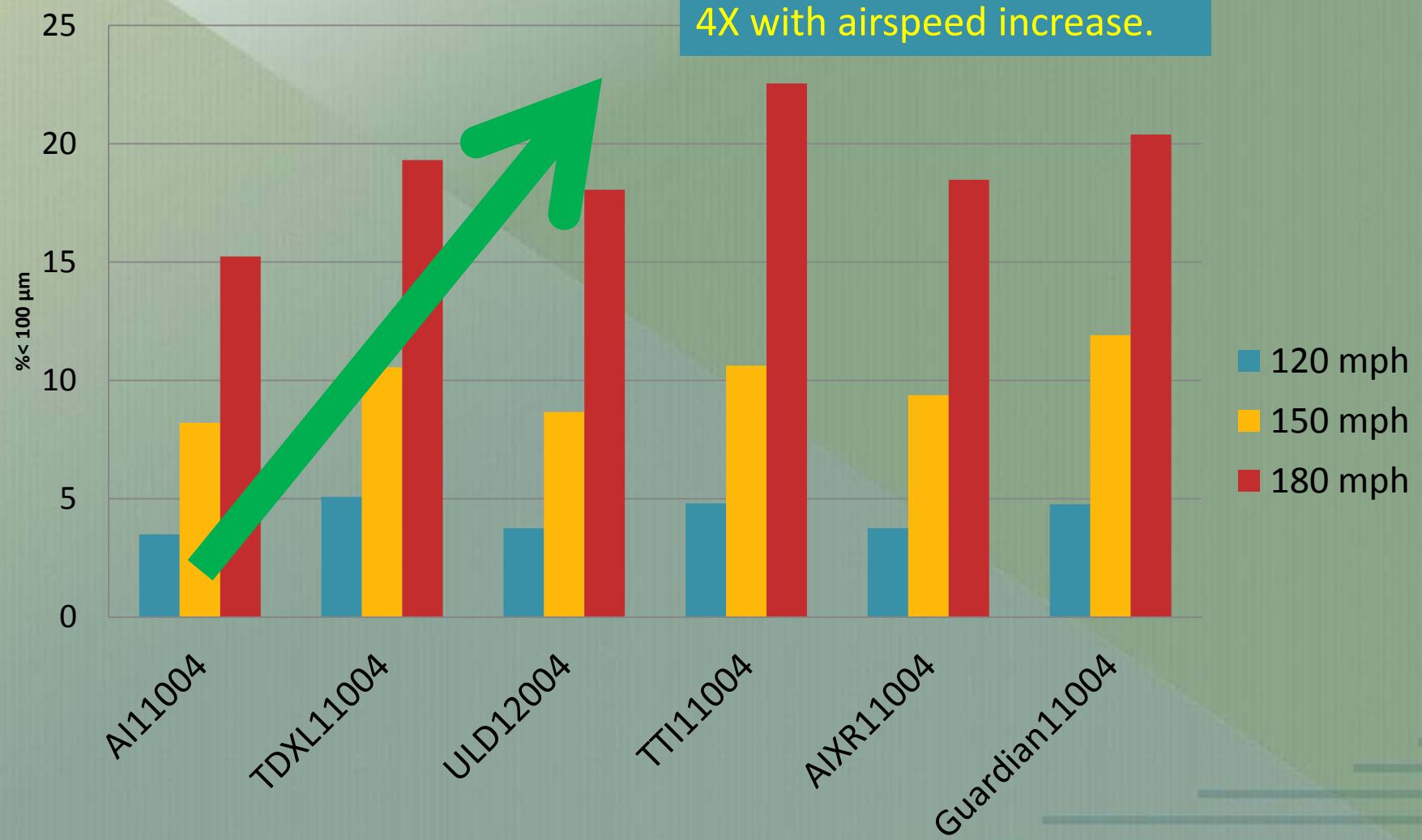


Decrease in VMD with Airspeed

VMD decreases by 50% by going from 120 mph to 180 mph



Increase in %<100 µm with Airspeed



CP FF and AI Nozzles: 60 psi and 0° Orientation

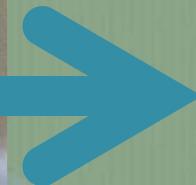
<u>150 mph</u>	Dv0.1 (μm)	Dv0.5 (μm)	Dv0.9 (μm)
AI11004	109	235	384
TDXL11004	97	214	354
CP4004	107	242	415
<hr/>			
<u>180 mph</u>			
AI11004	81	180	296
TDXL11004	71	164	277
CP4004	84	190	328

CP Data from Upcoming Presentation by Brad Fritz

Some Issues

- Spray coming back through air holes at shutoff;
- High speed air negates air induction due to vacuum

Air is blowing across or away from the hole



Don't turn them sideways



You will create a
new orifice

This nozzle was pointed down at 45° then rotated 90° so that the hole was pointed into the airstream

Conclusions

- Based on our data, the AI induction nozzles do not offer any benefit over a standard flat fan nozzle.
- These nozzles were designed for



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-- WORKING FOR APPLICATORS --