

# VADER

LIQUID METAL 3D PRINTING



Tuesday, March 27, 2018  
Track E – Additive Manufacturing for  
AeroSpace Applications

Scott Vader  
President and Cofounder  
Vader Systems

# We are the inventors and sole supplier of the MagnetoJet™ liquid metal 3D printing technology

## Markets Served

Industrial Markets

Defense/Aerospace

Research and Development

## Solutions



Vader Liquid Metal 3D  
Printing System



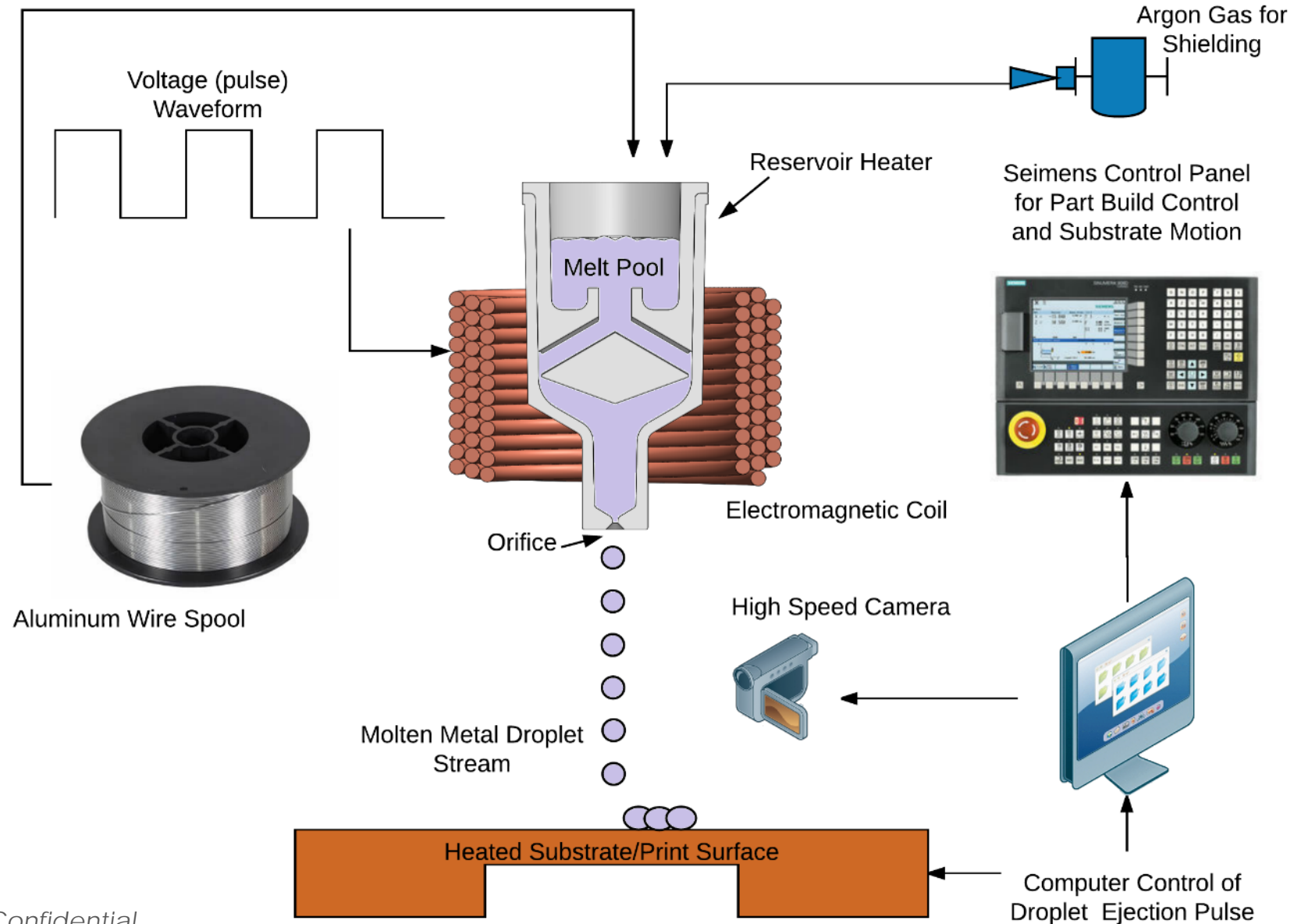
MagnetoJet™  
Pre-configured Subsystem  
for Hybrid Manufacturing



Vaderite™ "Powder"  
Production System



# Vader MagnetoJet™



# Vader MagnetoJet™



# Vader Liquid Metal 3D Printer

- On-demand manufacturing system
- Dramatically reduces *Total Processing Time* – from start to part



**Locally Sourced Materials**

Utilizes wire input materials that are easily sourced, less expensive and safe to handle.

**Low Waste**

Waste reduction: 98%+ material yield

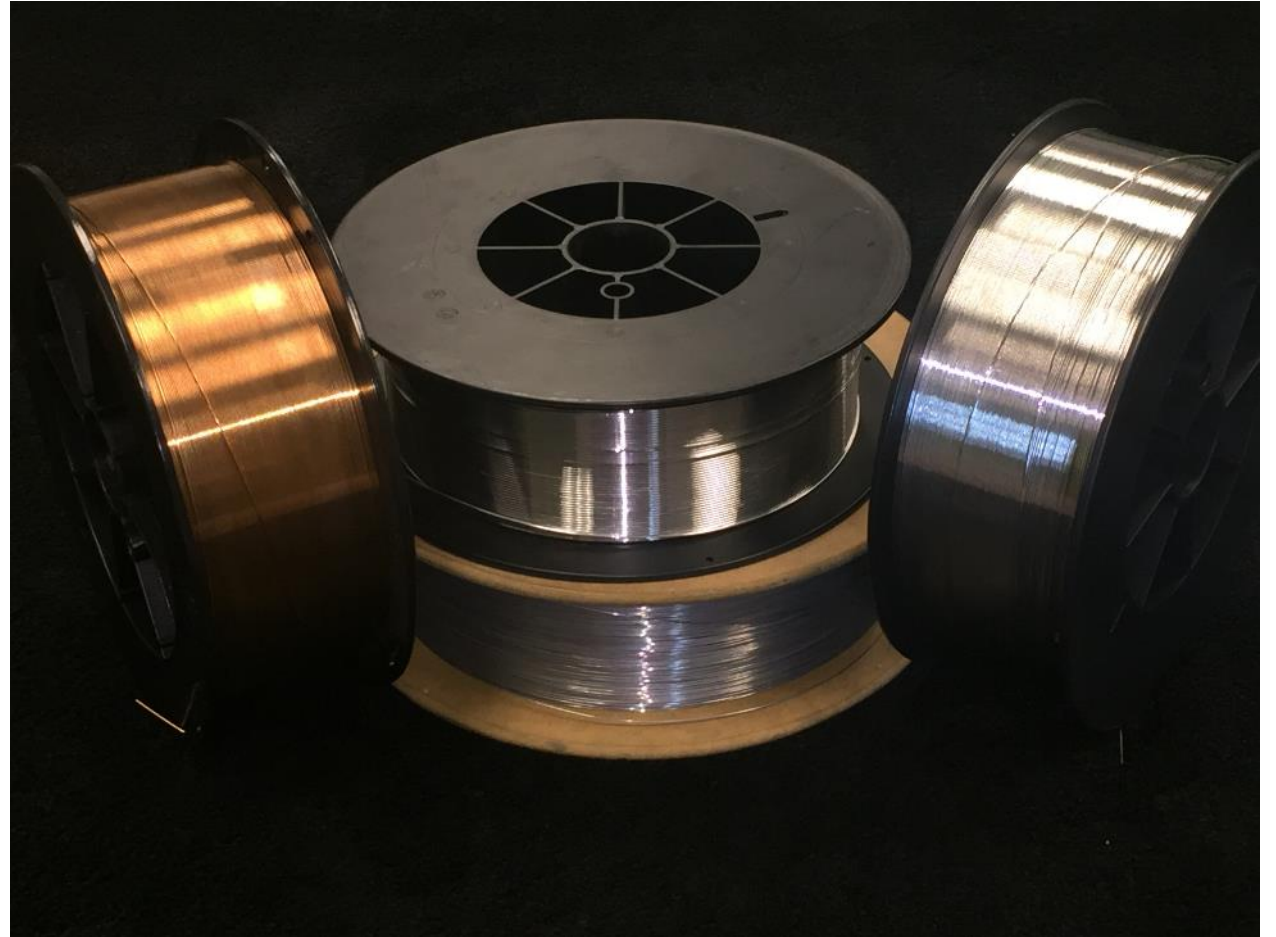
**High Throughput**

Builds at rates of up to 1lb/hr, yielding finished parts in record time

**Low Energy Costs**

ex. 50% faster at 50% power  
consumption = 25% of energy costs

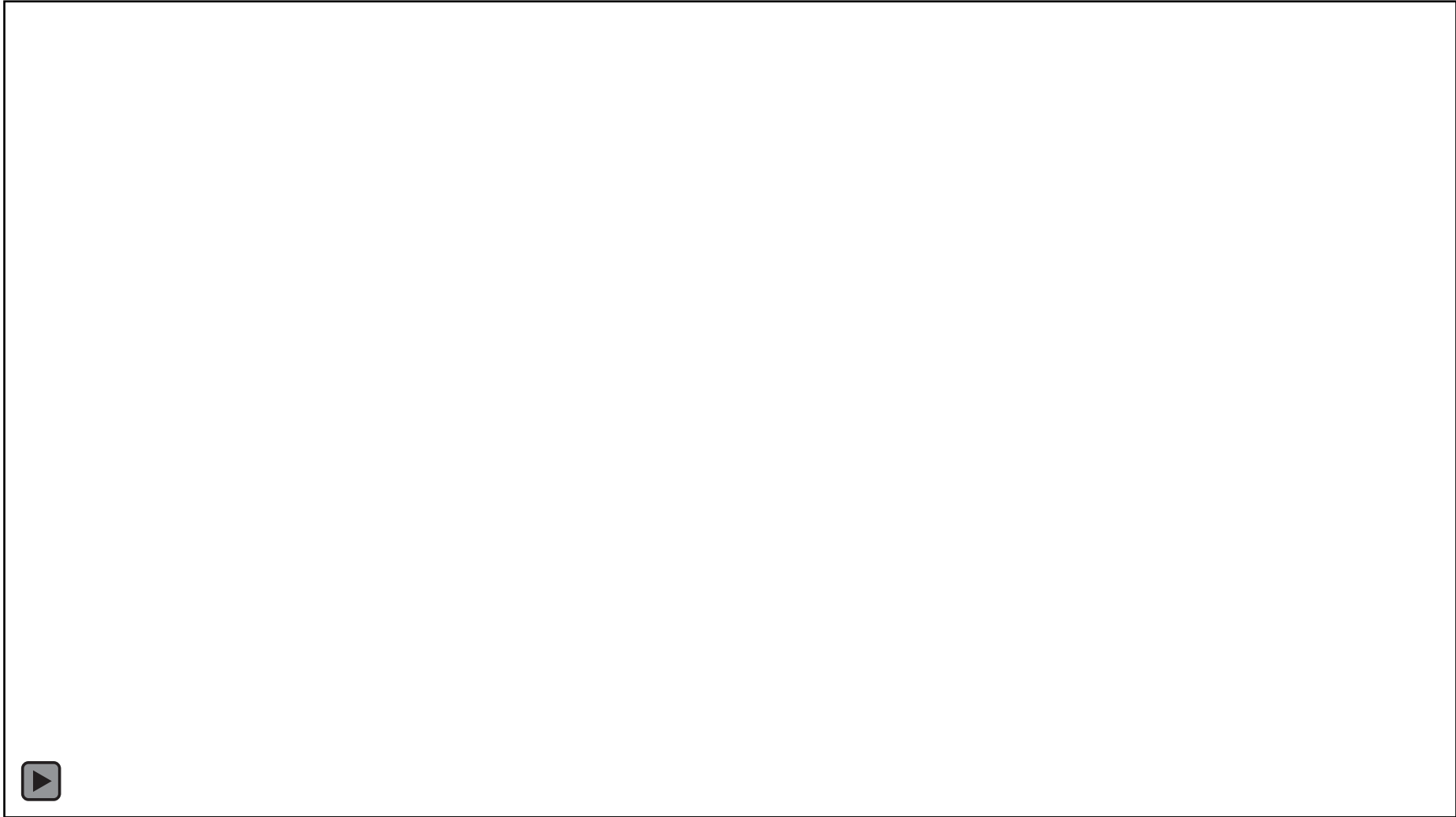
- Wire material
- Easily and locally sourced
- Safe handling
- Cost-effective
- High strength alloys ex 7075 are under development with strength to weight approaching Titanium





# Total Printed Part Cost per Pound\*

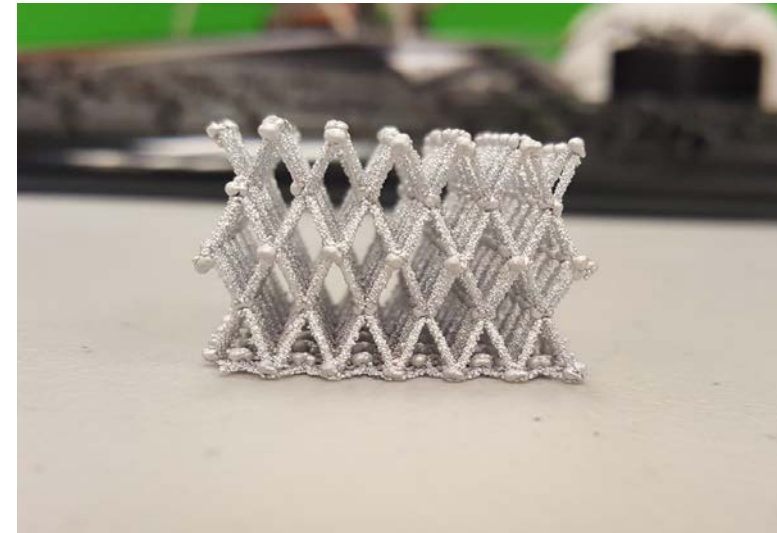
	Legacy Powder Based Technology	Vader Single Nozzle MagnetoJet
Material Cost (\$/lb)	60	3
Build Rate (lbs/hr)	0.5	1
Machine Cost (M\$) (estimated)	1	0.5
Life (hrs)	10,000	10,000
Total Printed (lbs)	5,000	10,000
Total Cost	1,300,000	430,000
Price Per Pound	<b>\$260</b>	<b>\$43</b>



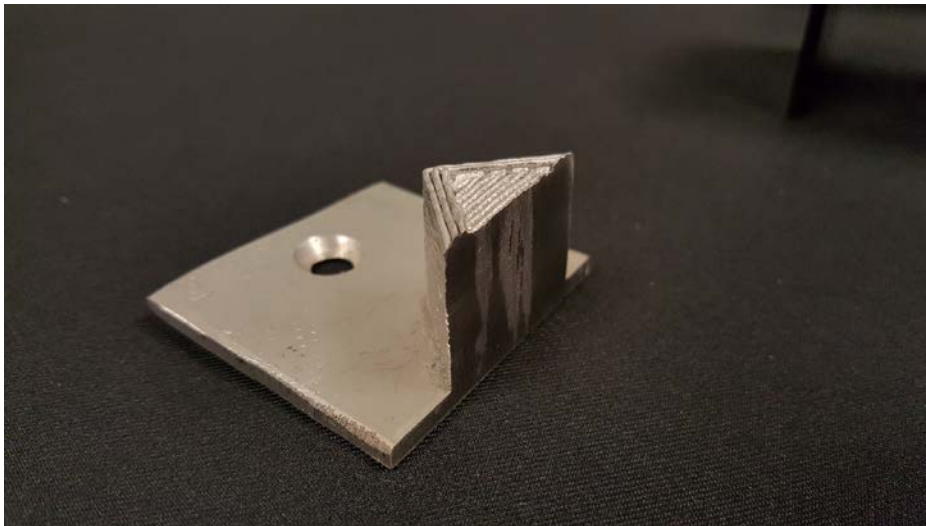
Vader Systems real time printing at 0.4 lbs/hour



3D Printed Structures



Lattice Structures by RIT



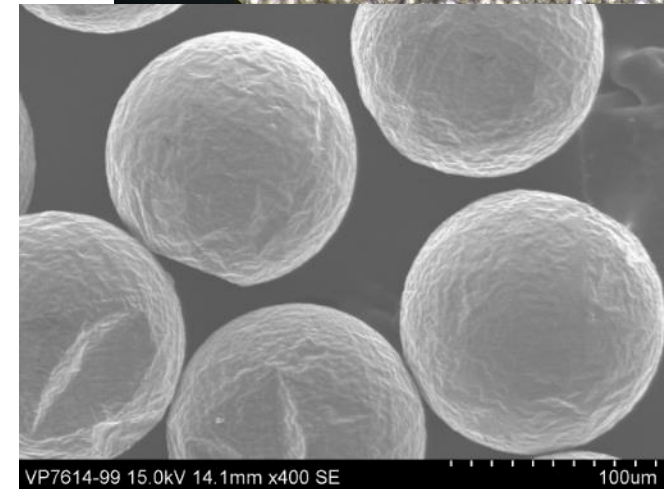
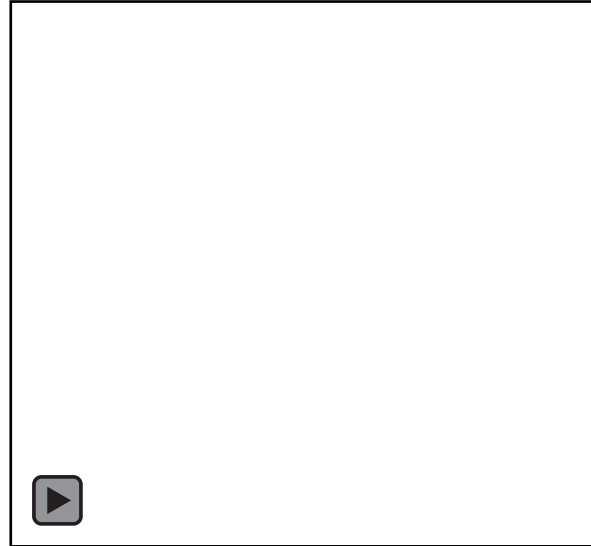
Repairs and 3D printing on existing structures



Fully conductive traces by RIT

# Vaderite™ Microbeads (Powder) Production System

- System for on-demand, small-batch “powder” production
- Produces precision, spherical, metal microbeads



**Very High Sphericity**

98.6% spherical beads

**High Flowability**

Spreads and pours easily

**No Sifting or Processing**

100% yield

**Inventory On-Demand**

Make what you need

**Quick Start-up & Change-Over**

Tailored or custom alloys possible in small batches

**Safer Manufacturing**

No fines, less hazardous

**Narrow Particle Size Distribution**

160µm with 10µm standard deviation

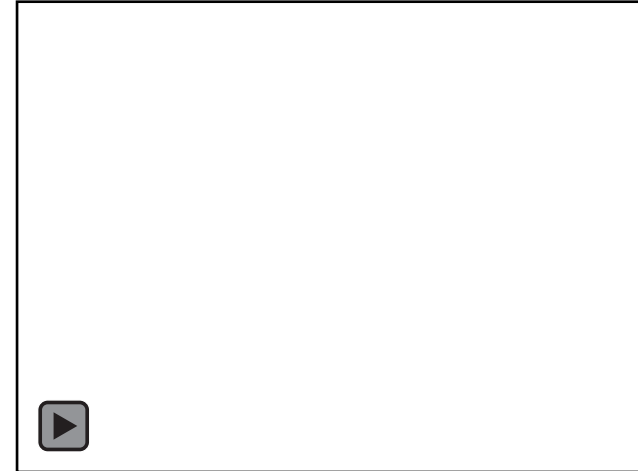
**Low Waster**

Due to near 100% yield and low operating costs



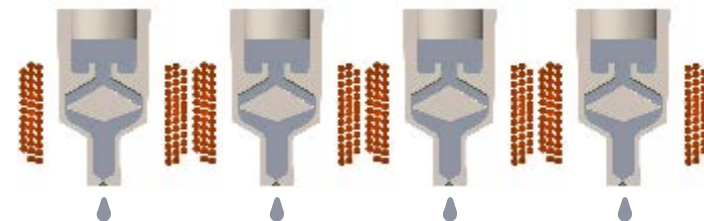
# Future Technical Developments

- **Multi-nozzle printing** for higher mass deposition rates
- **Miniaturization of nozzle** for quicker printing time
- **Software** - slicers, firmware, build process physics simulations

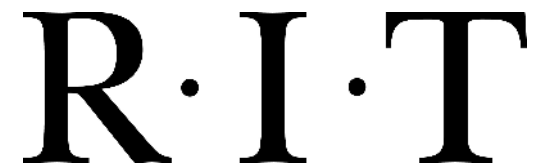


Multinozzle machine (30lbs/hr ++)

Future Multinozzle Expansion



# Collaborations





Scott Vader, Dr Denis Cormier and Zack Vader at the installation of Vader Systems Mk1 Serial #0001 at Rochester Institute of Technology June 6, 2017

*Thank You for your Time!*

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