

Engineered Materials with PPG's ARE Additive Manufacturing Technology



This document has been reviewed by the PPG Aerospace Export Control Department and has been determined to contain only EAR99 controlled data.

Advancing the State of Additive Manufacturing Polymeric Technology

Existing Thermoplastic Technology



<https://www.3dnatives.com/en/wp-content/uploads/sites/2/cover-121.jpg>

- ❌ Slow.
Energy intensive.



Thermal Stress

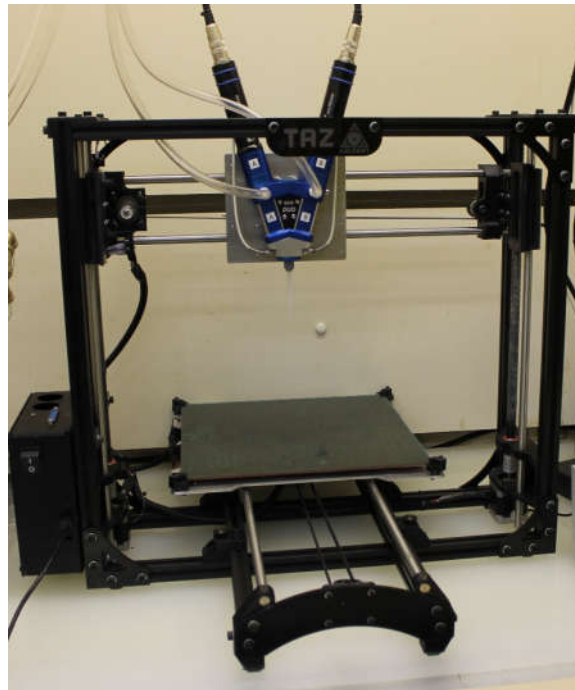
- ❌ Residual thermal stress.



Sabic - source

- ❌ Surface roughness

Ambient Reactive Extrusion (ARE)



The PPG Advantage

- Utilize decades of polymer expertise
- Unique materials for specific customer needs

Manufacturing Advantages

- 10x faster than thermoplastic 3D
- No external energy input

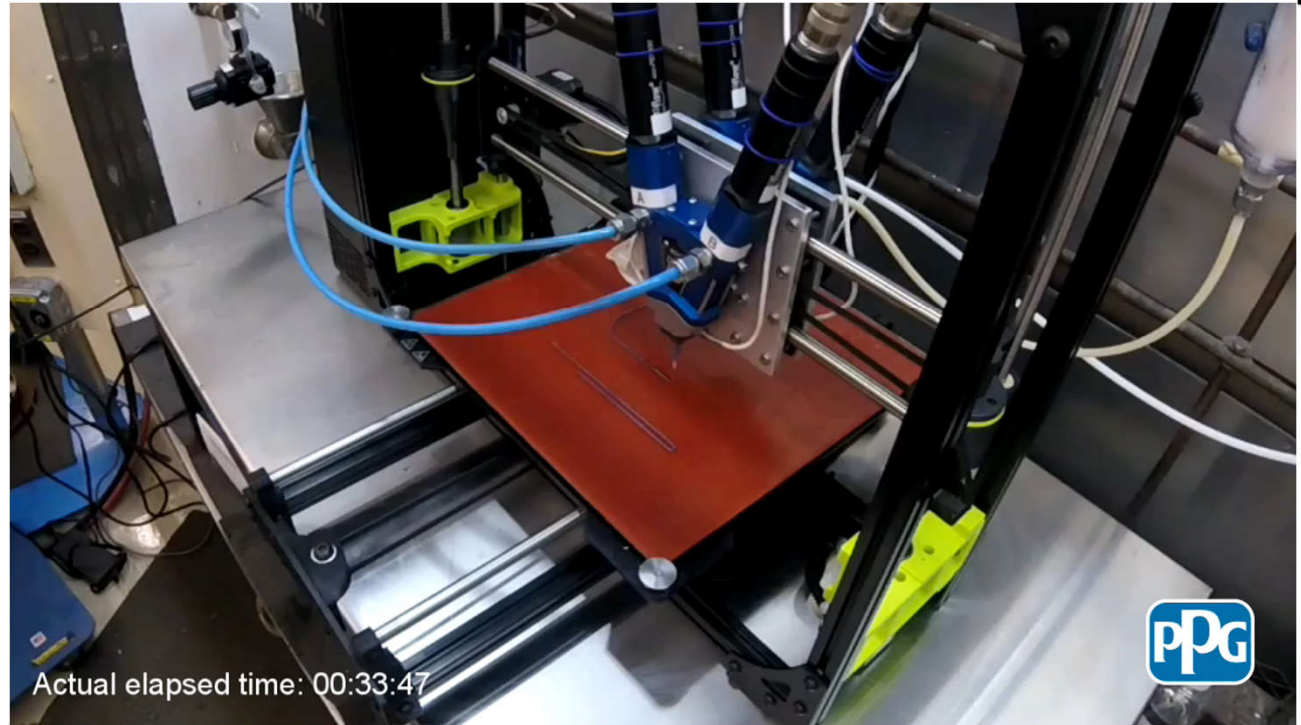
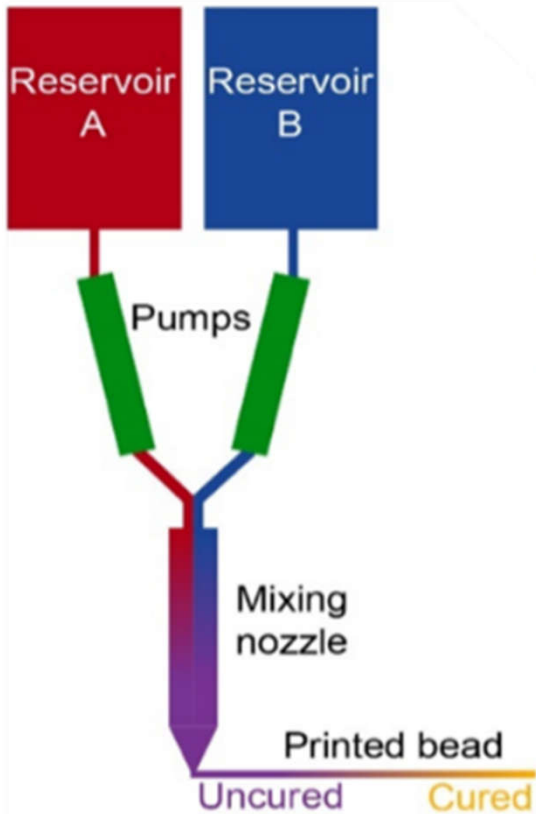
Material Advantages

- No thermal warping
- Multi-material manufacturing
- Improved surface finish

PPG ARE addresses multiple gaps within the current state of Additive Manufacturing



PPG's Ambient Reactive Extrusion (ARE) Technology



PPG's ARE technology is a two component, liquid feed stock AM process.



Elastomeric Parts Produced via PPG's Ambient Reactive Extrusion

Leverage one process to produce customized elastomeric parts

End-Use Elastomeric Parts

- PPG's ARE excels at additive manufacturing of elastomeric materials
- PPG's material portfolio to produce end-use elastomeric parts

PPG's Elastomeric Materials can be:

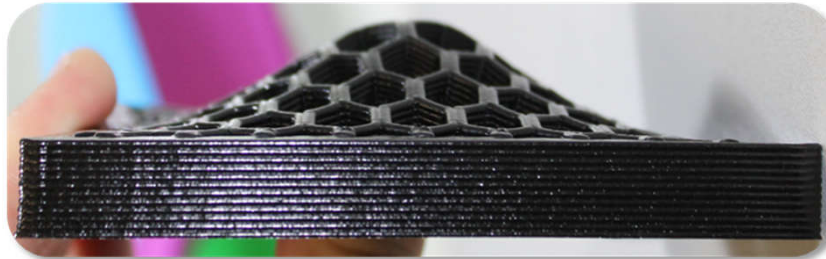
- Sound dampening
- Chemically resistant
- Abrasion resistant
- UV stable
- Lightweight
- Large-scale
- Colorful/texturized



PPG ARE printed large elastomeric lattice



PPG ARE printed, covalently bonded elastomers



PPG ARE printed flexible lattice with rigid frame



PPG ARE printed custom gasket

PPG's Ambient Reactive Extrusion produces tunable elastomeric parts



Production Scale Capabilities of PPG's Ambient Reactive Extrusion

Large-Format printer installed at PPG's Application Support Center



PPG's Production Ambient Reactive Extrusion Printer with 4'x5'x10' build volume

Equipment, Software and Machine Advantages:

- High speed gantry system
- Improved multi-material capabilities
- Advanced features and shapes
- Existing Aerospace qualified products for end use parts

PPG is committed to advancing the state of Polymer Additive Manufacturing production



PPG Ambient Reactive Extrusion Additive Manufacturing

- 1 Multi-Material
- 2 Color Expertise
- 3 Surface Finish
- 4 Lattice Structures
- 5 Scale and Speed
- 6 Air/Water Tight
- 7 Chemically Resistant
- 8 Award Winning



Interested in collaborating? Email us at ARE-Additive@ppg.com for more information.

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