

PINE



PRODUCT
INNOVATION
AND
ENGINEERING

Additive Manufacturing
It's What We Do!

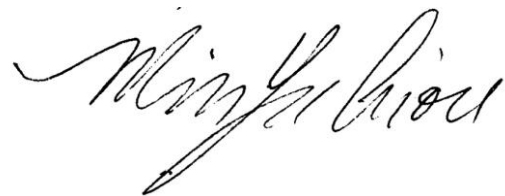
WELCOME TO PINE

Please take a few moments and browse our capability brochure and learn about our company, our capabilities and see why our corporate customers and government clients value and utilize our expertise in Additive Manufacturing.

We are young and we are hungry for your business. PINE was founded in 2002 as an advanced manufacturing system solution provider. Our main focus has been on software and consulting services in 3-D Rapid Prototyping/Manufacturing and 3-D Rapid Remanufacturing/Repair.

Our success comes from our ability to leverage the extraordinary engineering and scientific talents of our staff, who are constantly delivering world-class products to world-class organizations. We do this by providing solutions and value for our customers through creative engineering and utilizing cutting edge technologies. Our continued growth is a testament to the hard work, dedication, and constant learning of our employees.

When you need 3-D Rapid Prototyping/Manufacturing and 3-D Rapid Remanufacturing/Repair, please consider PINE as a partner or consultant for your Additive Manufacturing needs.

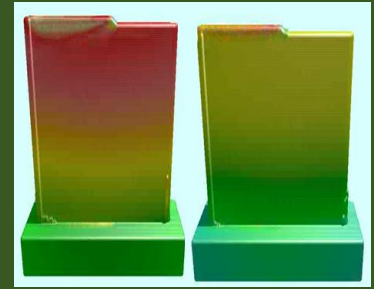
A handwritten signature in black ink, appearing to read 'Minyu Liou', written in a cursive, flowing style.

Minyu Lisa Liou, President

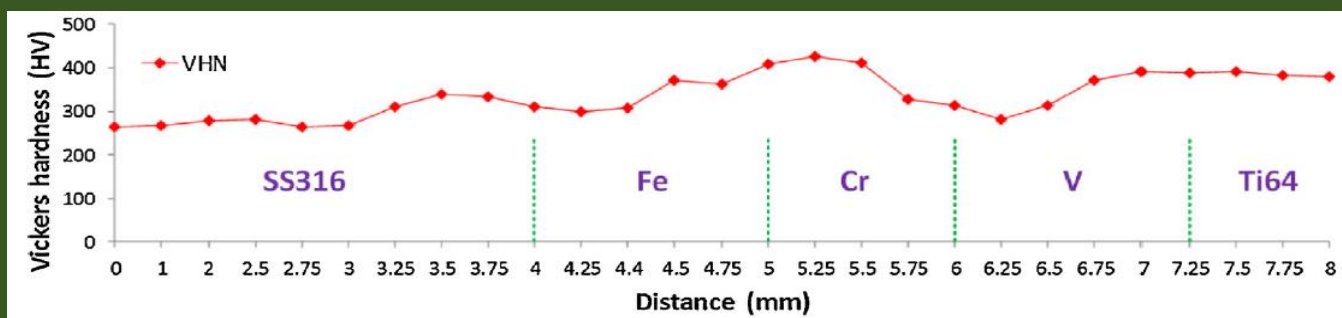
OUR SERVICES

System Integration

- Additive Manufacturing Simulator (AMS)
- Model-based process planning
- Novel AM process design & development



Using AMS to plan optimal AM parameters to reduce deposition temperature



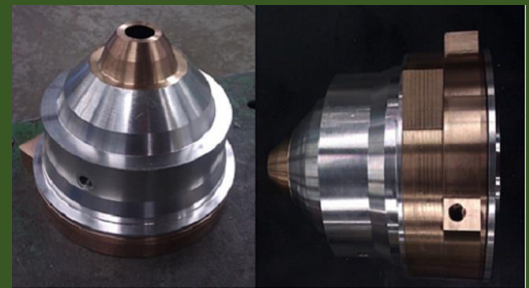
Using AM to smoothly integrate Ti64 with SS316

Advanced materials

- AM of functionally graded materials
- AM of high entropy alloys
- AM of multiple non-compatible materials

Rapid Prototyping

- AM prototyping of specialized machines and machine components
- Powder Delivery System for Additive Manufacturing



Custom designed Powder Feeders, Nozzles



Repair

- Repair and modify parts, molds, tools and dies
- Automated repair process planning
- In-situ sensing to prevent overheating

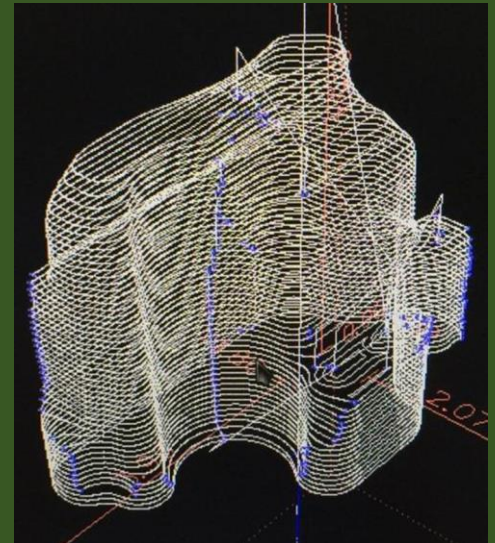
OUR PRODUCTS

Onsite Structural Restoration Methods for Aircraft Components

Sponsored by Navair
(N6833518C0603)



Automated repair; dual laser deposition

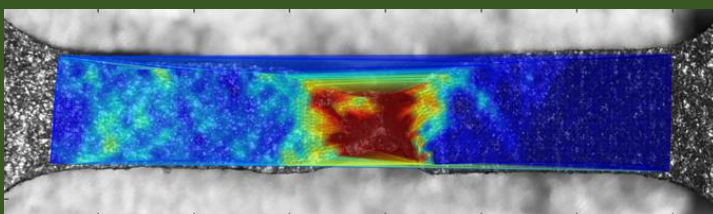


Advanced Mechanical Testing (AMT) System

Automated material characterization devices for AM applications



Sponsored by DOE
(DE-SC0018879)



AMT first device to be
delivered Spring 2021.

Automated mini-tensile testing device with digital Image correlation (DIC) technology

CURRENT CHALLENGES

Develop an innovative machining process that can effectively and precisely machine holes in composite structures while preventing induced damage.

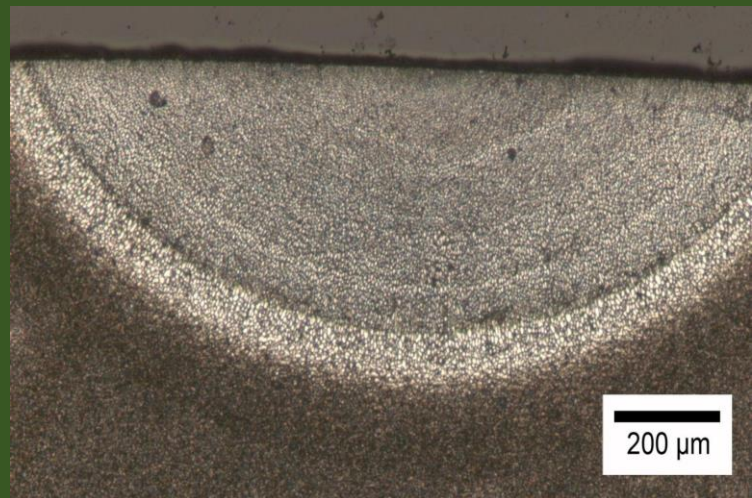
2 Benefits

Reduced cost for manufacturing consumables

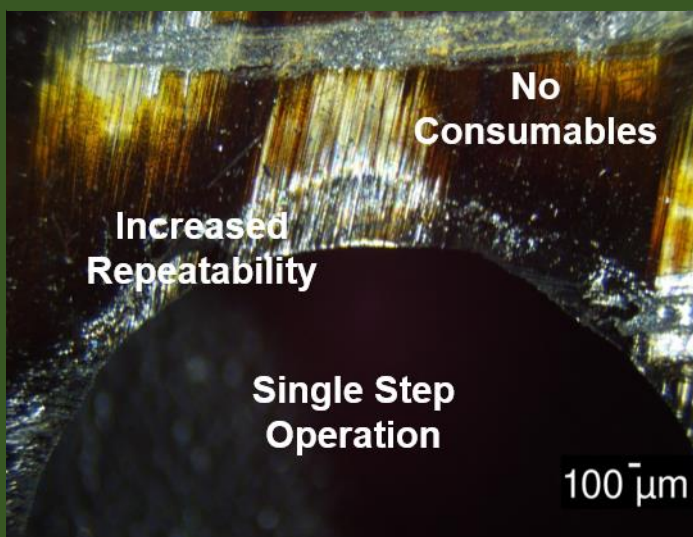
Advancing joinery abilities

Develop an innovative high performance (light-weight, high-strength) aluminum fabrication and repair technology.

High-performance aluminum deposition



**Drilling/Machining
Fiber Reinforced Polymers (FRP)**



CONTACT US

We appreciate your interest in Product Innovation and Engineering. Please contact us by email or use our corporate address below.

We look forward to hearing from you.

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