

THE PANDA™ METAL 3D PRINTING SYSTEM

Metal additive manufacturing, made open.



ACCELERATING INNOVATION

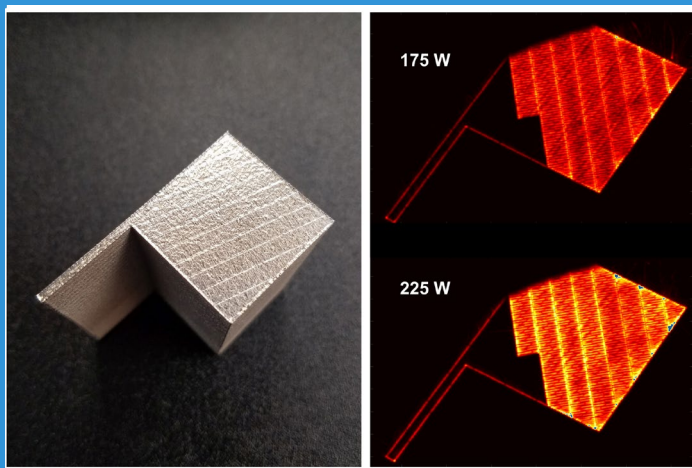
- PANDA™ offers **the best value** to empower researchers, technology developers, and part producers to create and innovate on an open, high-performance laser powder bed platform
- Ideal for:
 - Development and validation of laser AM technologies
 - Materials research and parameters development
 - Applications development and customization
 - Training and education
 - General manufacturing services



CUSTOMER SEGMENTS

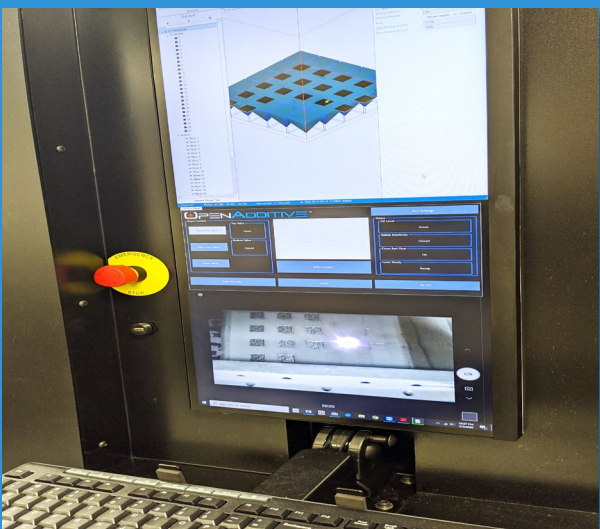
RESEARCH & DEVELOPMENT

- PANDA provides **unsurpassed value, system configurability, and user control** to accelerate fundamental and applied research and advanced development of laser powder bed processing, monitoring, and control technologies



EDUCATION & TRAINING

- PANDA provides **an affordable platform in a smart and safe industrial layout** that is ideal for introduction and mastery of metal AM processes across all learning levels – includes safety interlocks, laser-safe enclosure, and powder safety features



PROTOTYPING / PRODUCTION

- PANDA is **a high-performance 3D printing platform**, with 500W laser and high-quality scanner ideal for processing a wide range of reactive and non-reactive materials, with preset process recipes and full control of all process parameters



BUILD CHAMBER

Standard Volume:

6.0×6.0×9.5 in

Large Volume:

11.0×11.0×12.5 in

Add-ons:

Removable small-area sleeve
Heated build plate

ENVIRONMENTAL CONTROL

Inert gas chamber
Cross-bed flow
Optics gas flow
Integrated filtration
Sensors and control

CONVENIENT POWDER CATCH

No-mess powder collection
No scooping required

LASER & OPTICS

Standard Configuration:

500W IPG Yb-fiber laser
SCANLAB galvo with f-theta lens
Z-stage for focus adjustment

Advanced Options:

Dual laser
Dynamic focus control
1,000W laser upgrade
Pulsed laser

CONTROL SOFTWARE

User-friendly interface
Full parameters control
Advanced processing tools
Multiple hardware control
Plug-in capabilities
Perpetual license

SYSTEM DIMENSIONS

Standard configuration fits through
32"-wide single door

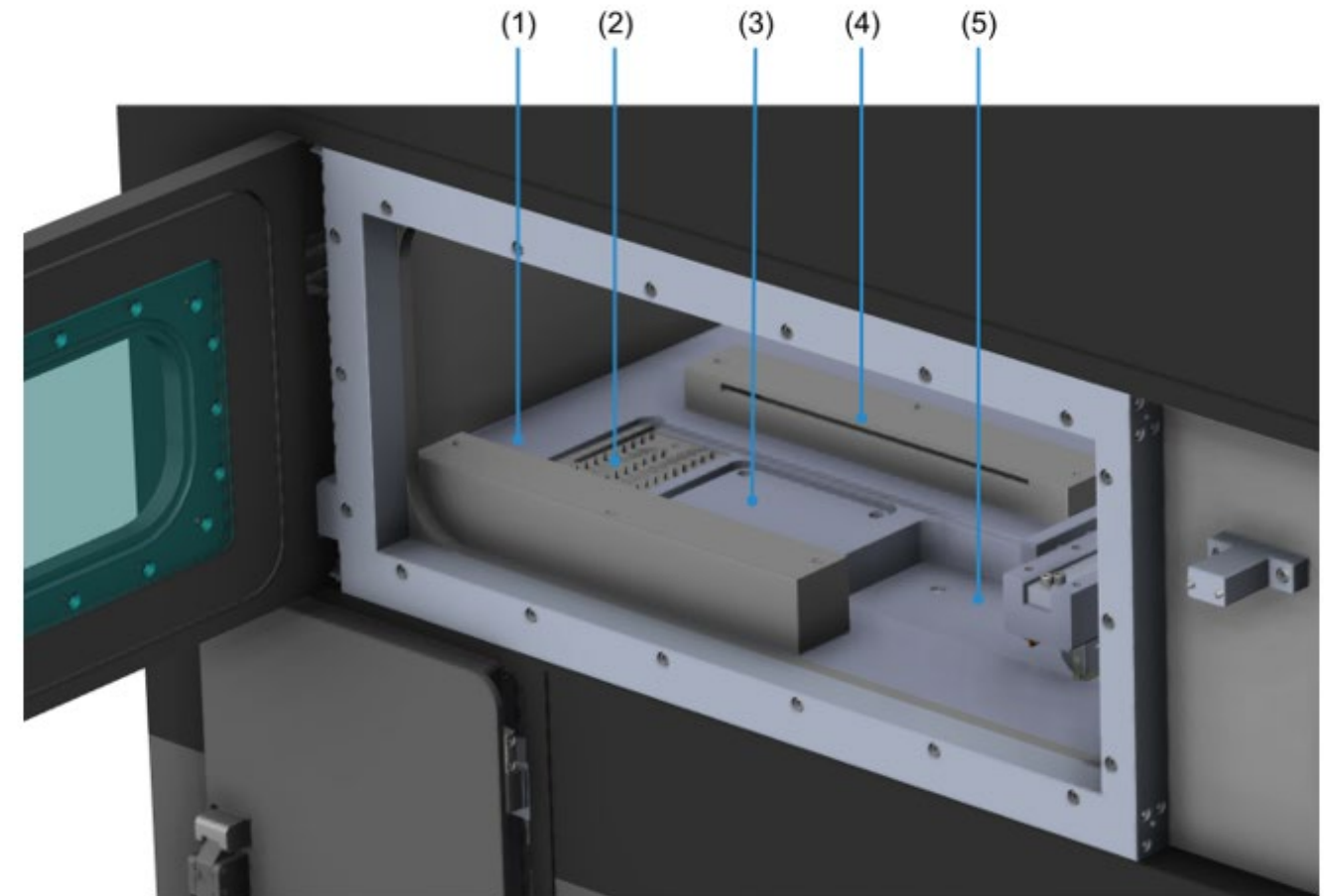
1" = 25.4 mm



BUILD CHAMBER

- Build volume
 - Base - **6.0" × 6.0" × 9.5"** (152 × 152 × 241 mm)
 - Large - **11.0" × 11.0" × 12.5"** (280 × 280 × 318 mm)
- Options*
 - Removable area-reduction sleeve
 - Removable heated sleeve (to 200C)
 - Heated build plate (to 500C)

* Not currently available with large build volume



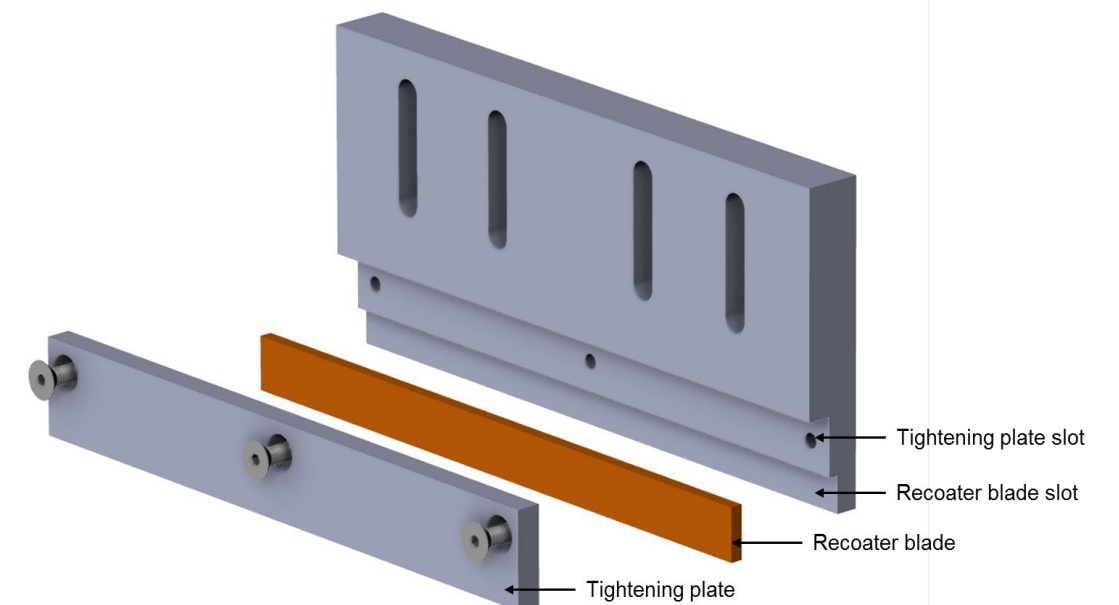
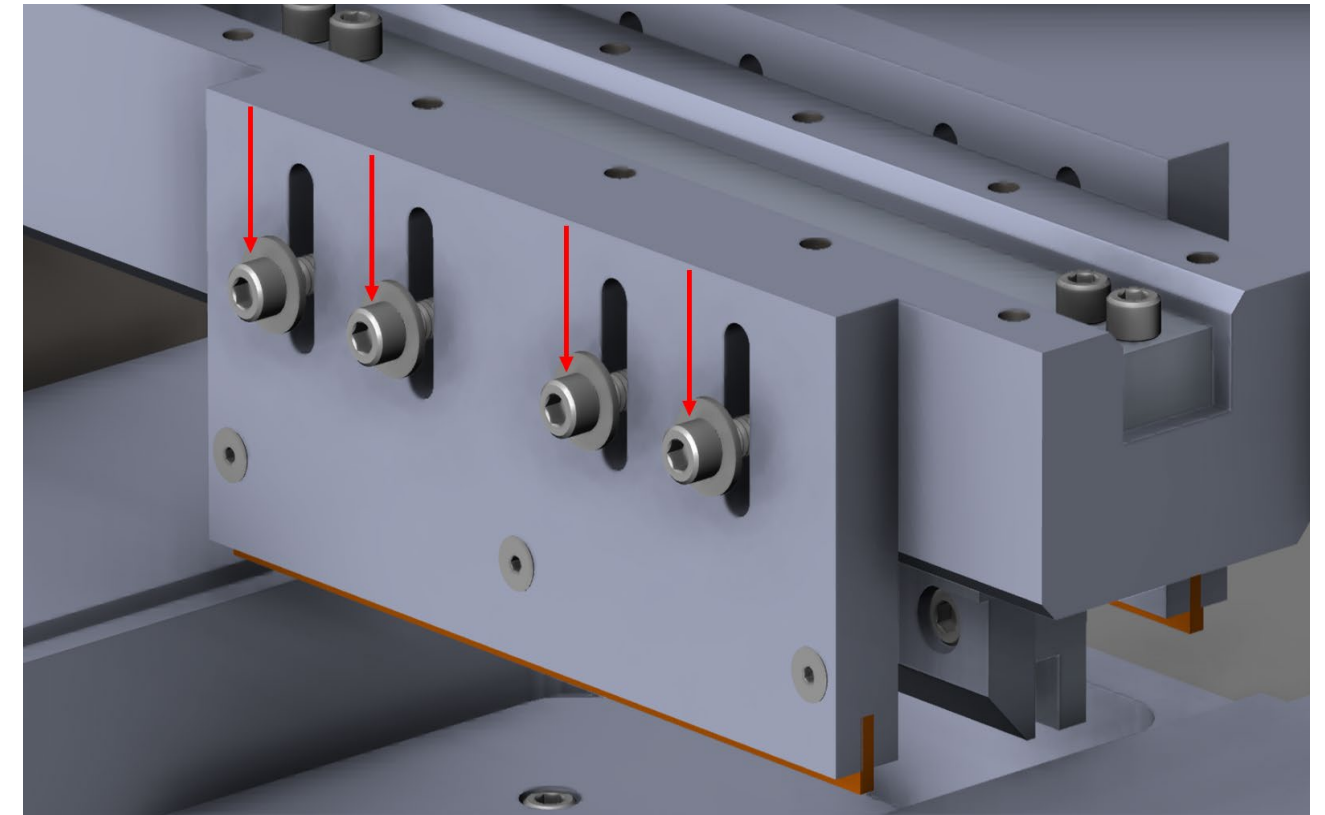
- | | |
|------------------------|--------------------------------|
| (1) Deck | (4) Cross bed flow output duct |
| (2) Powder catch grate | (5) Supply platform |
| (3) Build platform | |

The build chamber is designed for plenty of interior room for handling parts, mounting add-on sensors/mechanisms, and storing hand tools and partially used powder containers

- Base chamber interior: 40" W × 19" D × 12" H
- Large chamber interior: 48" W × 23" D × 17" H

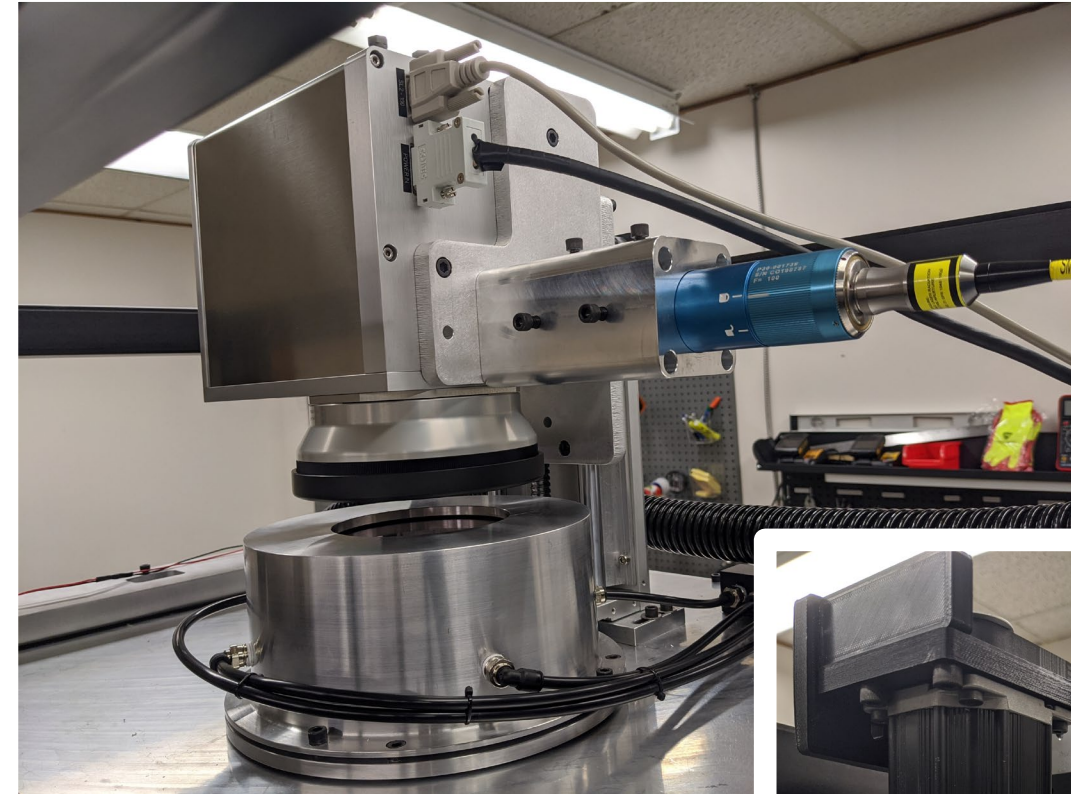
RECOATER ASSEMBLY

- Fully adjustable 3-blade system
 - Accommodates hard and soft blades
 - Use one or multiple blades at once
 - Simple to adjust and replace blades
 - Users may use alternate blades of their choice
 - Threaded holes included on recoater arm for mounting any add-on mechanisms



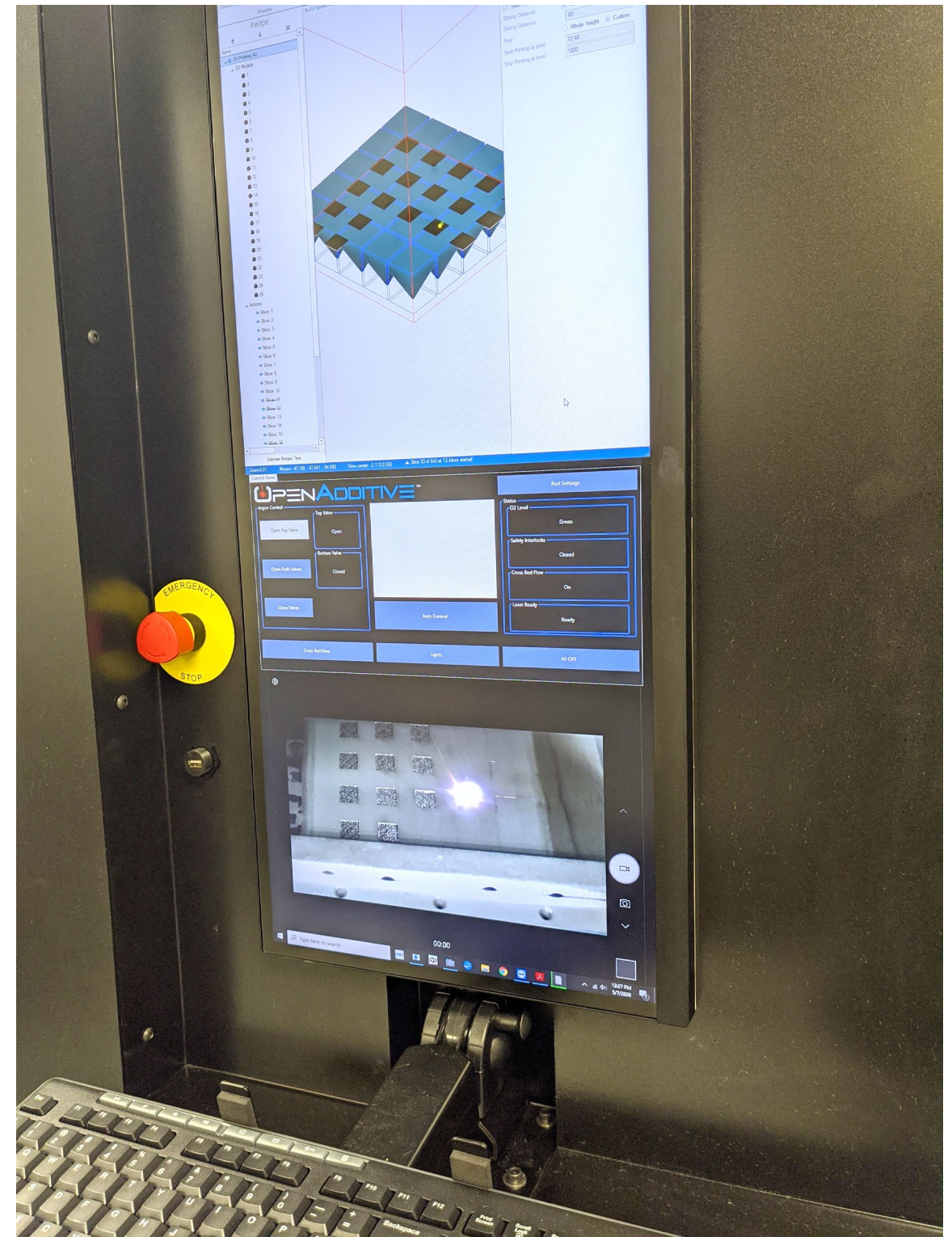
LASERS / OPTICS

- Standard setup provides performance and versatility for wide range of uses
 - 500W IPG air-cooled laser (1070 nm)
 - SCANLAB high-speed scan head
 - F-theta lens for flat field optics
 - Motorized Z-stage for spot size control
- Options:
 - Dynamic focus control (varioSCAN)
 - Upgrade to 1000W laser (includes chiller)
 - Dual laser configuration
 - Specialty lasers / custom configuration



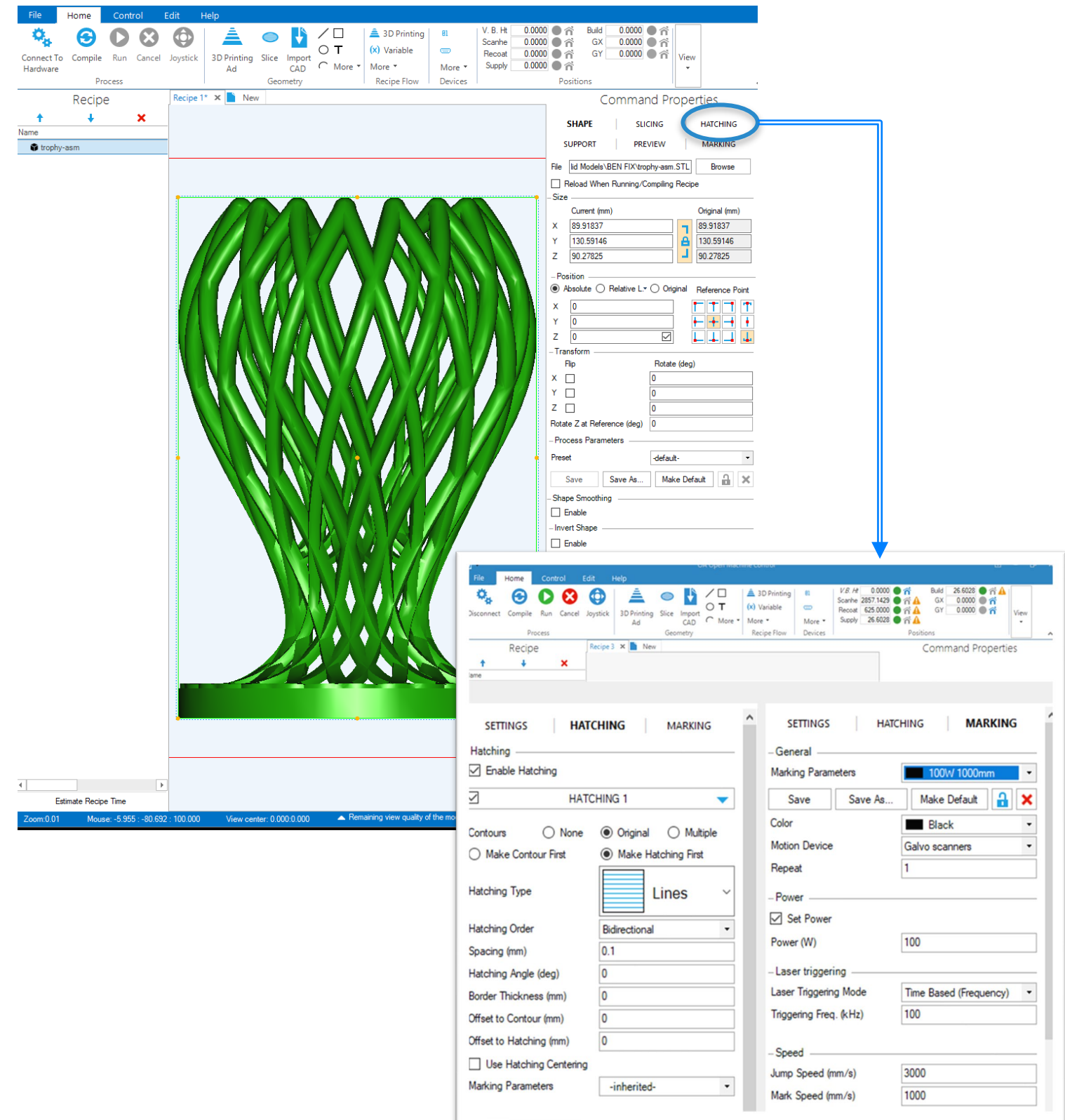
USER INTERFACE

- Complete workstation included
 - Windows 10 operating system with wireless keyboard, mouse, and USB port
 - Large 29" monitor – able to simultaneously display machine control software, environmental control dashboard, and live camera feed
 - Integrated camera for recording photo/video
 - Ability to run ancillary software, and use remote desktop to access system from other locations
 - Emergency stop button



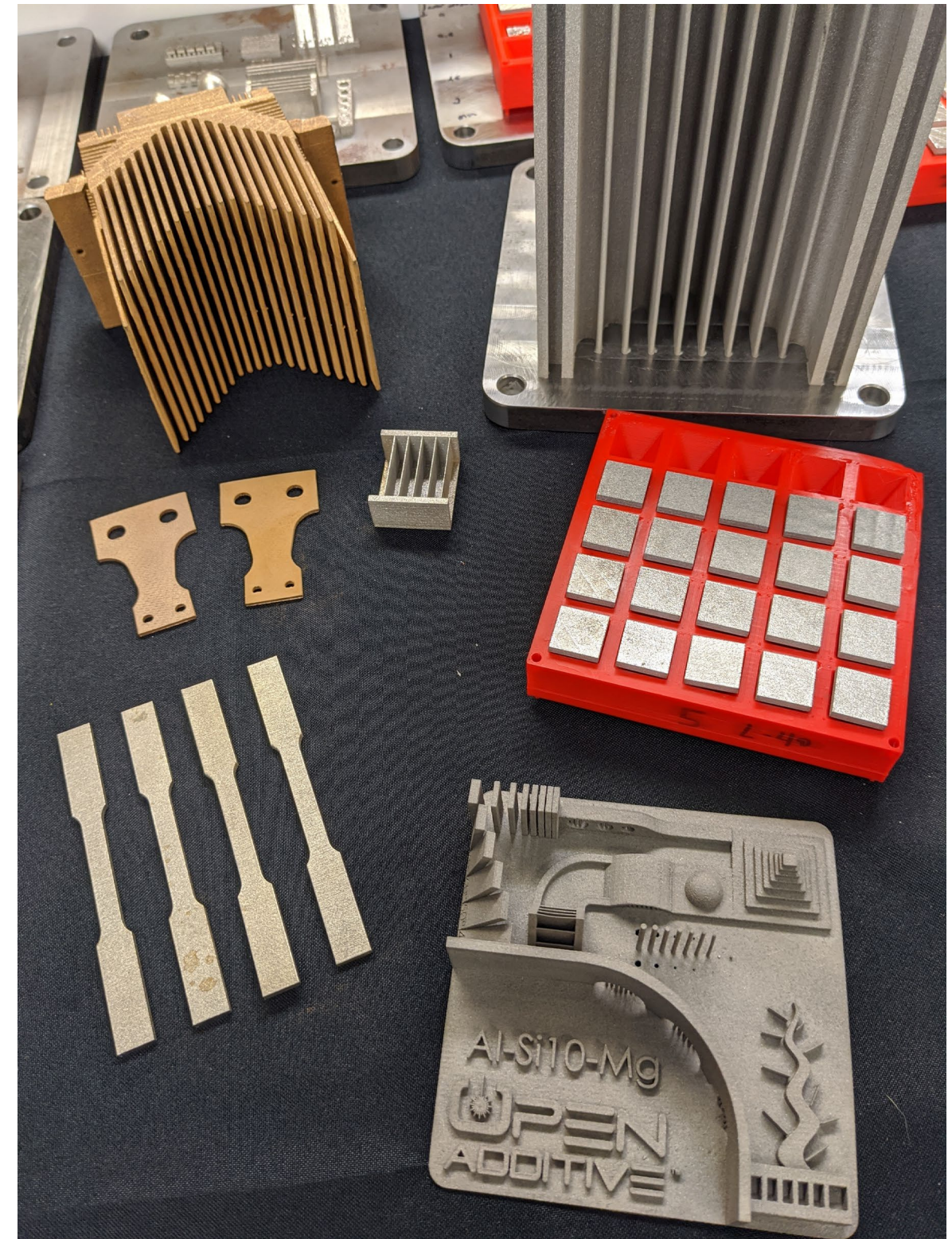
CONTROL SOFTWARE

- **Open Machine Control™**
 - Open Additive's OMC is a complete software solution – load models, arrange on plate, add supports, set scan parameters, perform slicing, and execute the build process
 - Multiple input file formats (STEP, STL, IGS) – CLI integration also in work
 - Full control of all process parameters, with ability to subdivide hatching/marking zones
 - Ability to save/recall processing recipes
 - Includes plug-in coding capabilities, allowing integration of custom scan strategies
 - Perpetual license included, with 3 years of upgrades as available



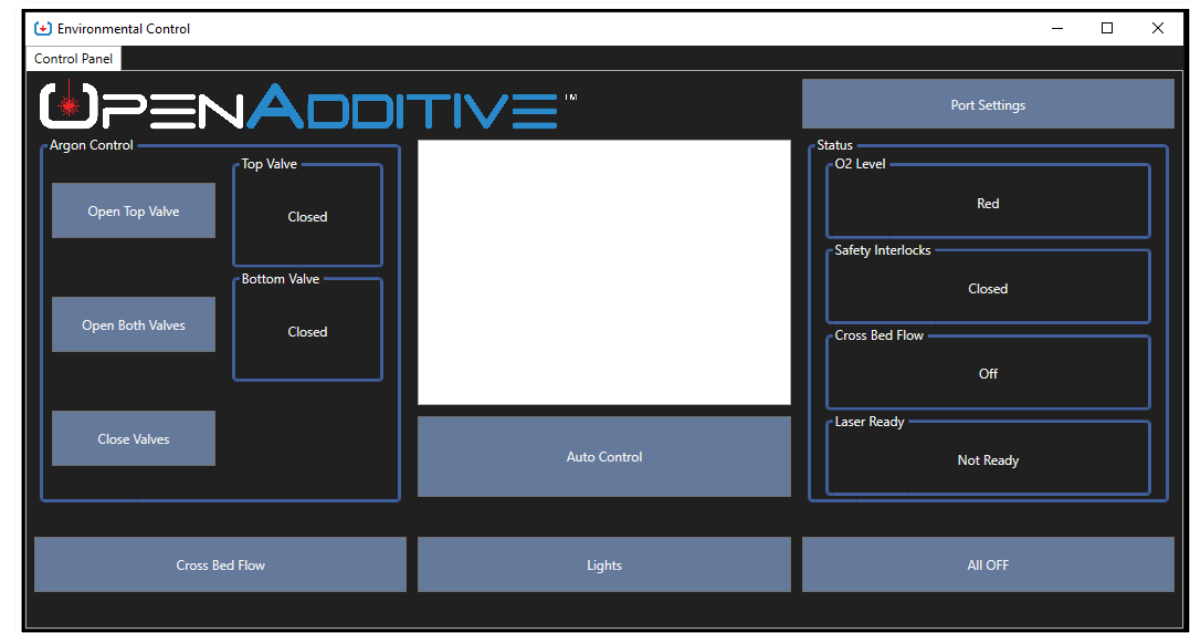
MATERIALS PARAMETERS


- **Open Materials Library™**
 - Open Additive's library of preset processing parameters for common materials is included, with one or more materials in each class:
 - Stainless steels
 - Tool steels
 - Aluminum alloys
 - High-temp alloys
 - Titanium alloys
 - Bronze alloys
 - Users have ability to see/modify these parameters and create and save their own
 - Open Additive's applications team works with prospective customers to develop application-specific parameters and part demonstrations



ENVIRONMENTAL CONTROL

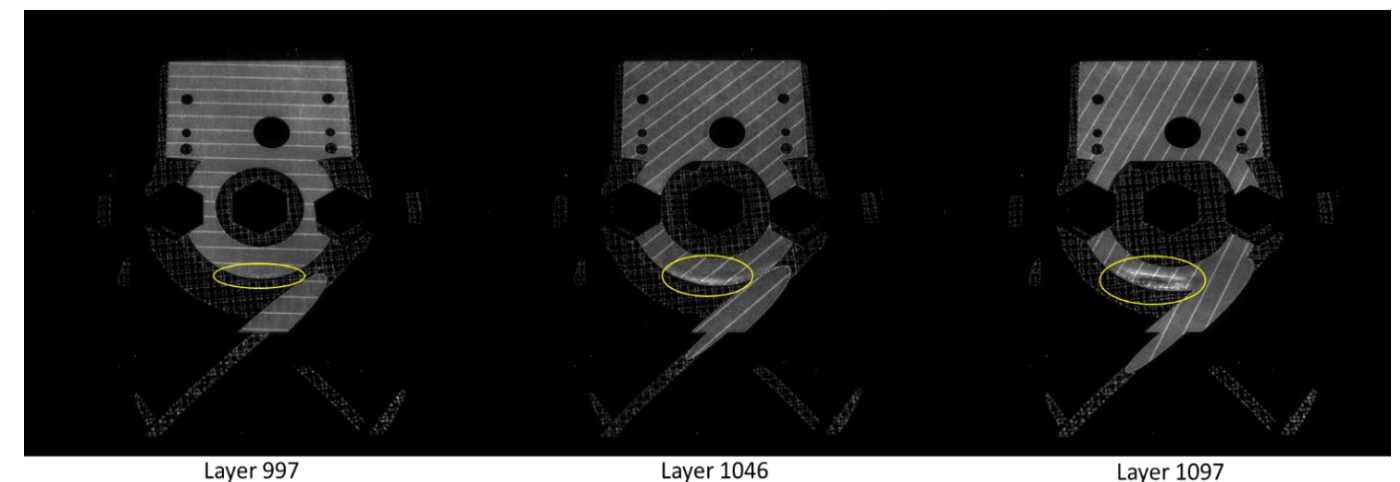
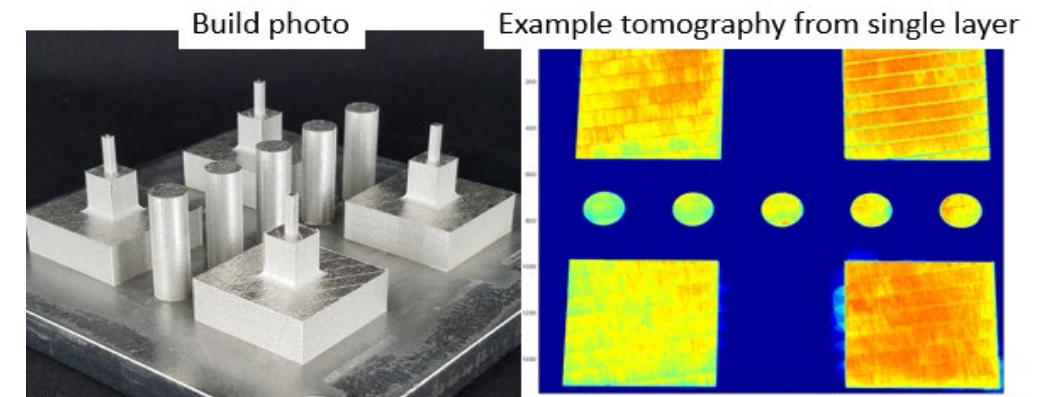
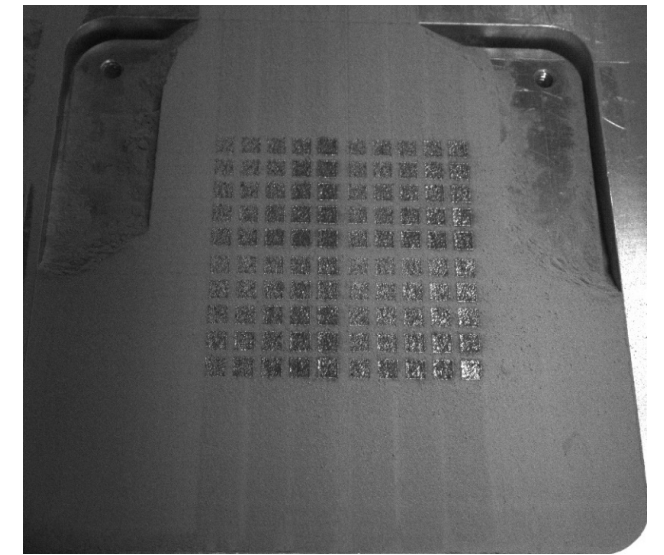
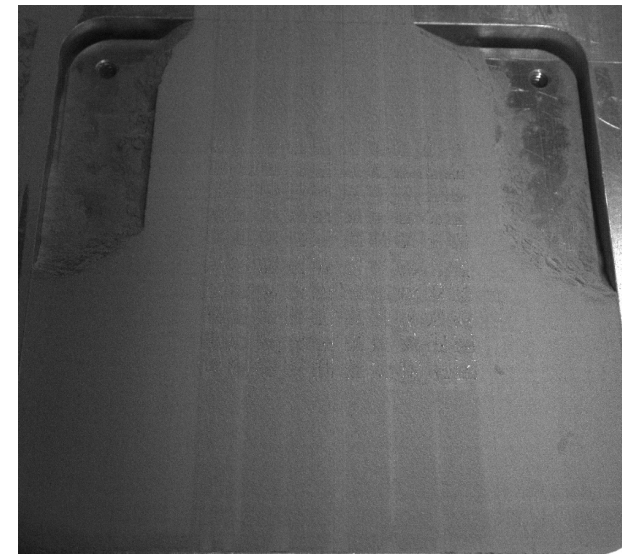
- Features:
 - Suited for both reactive/nonreactive materials, with standard hookups for shielding gas supply
 - Environmental control dashboard provides easy click-to-configure and real-time displays
 - Dual oxygen sensors with automated shutoff and alarm capabilities
 - Cross-bed flow removes soot/debris to minimize defects – users can modify outlet and intake as needed for R&D or application requirements
 - Gas flow across laser optics to prevent debris accumulation during the build
 - Two-stage filter collects debris particles, with low cost filters and little maintenance required



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- The photograph shows the physical hardware components of the environmental control system. At the top, there is a 'SYSTEM RESET' button. Below it is a 'PureAir' oxygen monitor displaying 'Oxygen 99.9%' and 'Air check ✓ O2'. To the right of the monitor is a 'SYSTEM PRESSURE' gauge. Further right is an 'AUTO PROCESS FLOW RATE' meter. Below these components is a 'TRIPP-LITE' power protection unit with various status lights (VERY HIGH, HIGH, NORMAL, LOW, VERY LOW, LINE, FAULT, OK) and a '120 VAC 1 AMP MAX' label. At the bottom, there is a control panel with a 'START' button, a 'STOP' button, and a 'Guide Beam' indicator.
- Oxygen monitor
 - Pressure meter
 - Flow rate meter

PROCESS MONITORING (OPTION)

- **AMSENSE®**
 - Integrated data collection and analysis platform
 - Provides access to raw and processed data each layer through proprietary S/W interface
 - Basic suite includes GUI and automation for data collection/processing, sensor viewports, recoat imaging system, and plug-in capabilities
- Add-on modules (sold separately)
 - **TOMOTHERM™** - thermal tomography sensor
 - **SPAT-TRAK™** - spatter tracking sensor



ROBUST DESIGN

- Features:
 - 2" steel frame with sheet metal exterior
 - Removable panels for interior accessibility
 - Plenty of room above build chamber for additional optics and optional sensors
 - Can be repositioned using locking wheels
 - Fits through narrow single doorway (32" x 80")
 - Total system weight ~1000-1300 lb (450-600 kg) depending on configuration



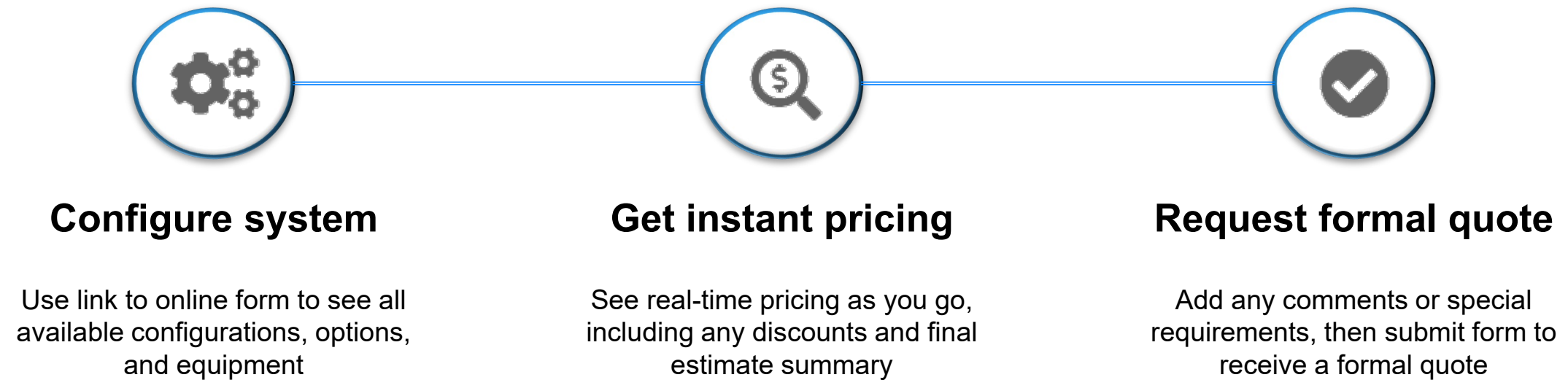
ANCILLARY EQUIPMENT

- **Optional**
 - **Bamboo Station™** - part cleanup and powder sieving and recycling station
 - **PANDACART™** - tailored for use with PANDA, hand cart to assist with loading/unloading builds
 - **PANDAVAC™** - commercial portable explosion-proof dry vacuum for powder cleanup
 - Personnel and facility safety packages
 - Other support equipment may be sourced as needed by customer

SERVICE & SUPPORT

- **Included** - 1-year warranty, service plan, and technical support on system, options, and ancillary equipment
- **Optional** - extended service plans available for 2 years or 3 years
- **Additional** - installation, training, S&H

FULLY OPEN PRICING



<https://tinyurl.com/buildmypanda>

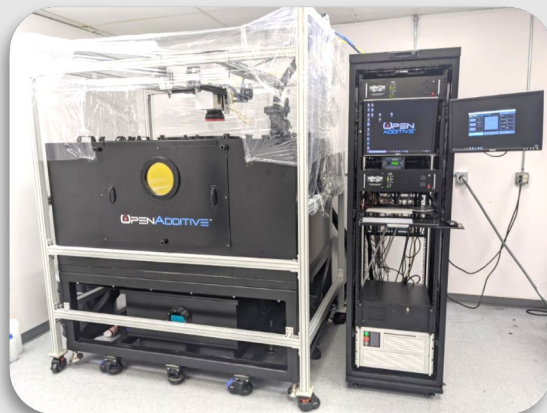
ADDITIONAL SERVICES



Technology development

We work with partners as lead or sub/supplier to develop and demonstrate AM processing, monitoring, and control technologies

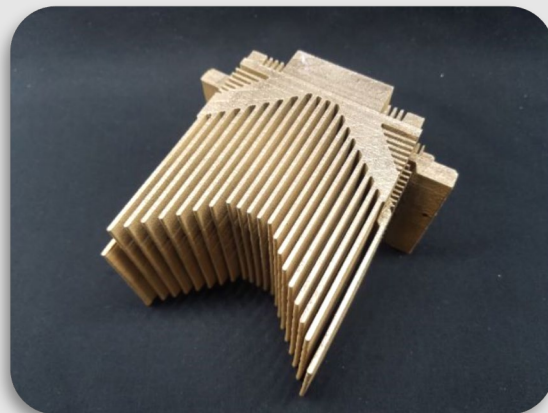
Contact us to see how we can help boost your proposal or project!



Applications development

We provide design for additive manufacturing (DfAM), materials parameters development, and engineering and prototyping services

Contact us to discuss how we help solve your AM application challenges!



Production services

We provide evaluation builds and limited production services to demonstrate the potential of our commercial AM systems

Contact us to discuss how we can help meet your manufacturing needs!



THANKS FOR YOUR INTEREST

- How can we help your organizational needs in Metal AM?
- Please contact us.



The PANDA nursery – adopt one soon!



Open Additive, LLC
2750 Indian Ripple Rd., Ste. A
Beavercreek, OH 45440
+1 (937) 306-6140

info@openadditive.com
www.openadditive.com